UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/024,027	05/05/2015	9027032	DAMA-31813	8381

25883 7590 04/15/2015

HOWISON & ARNOTT, L.L.P
P.O. BOX 741715
DALLAS, TX 75374-1715

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment is 99 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site http://pair.uspto.gov for additional applicants):

DAMAKA, INC., Richardson, TX, Assignee (with 37 CFR 1.172 Interest);
SIVAKUMAR CHATURVEDI, ALLEN, TX;
SATISH GUNDABATHULA, IRVING, TX;
RASHMI HIREMATH, ALLEN, TX;

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The USA offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to encourage and facilitate business investment. To learn more about why the USA is the best country in the world to develop technology, manufacture products, and grow your business, visit SelectUSA.gov.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

25883 7590 03/26/2015
HOWISON & ARNOTT, L.L.P
P.O. BOX 741715
DALLAS, TX 75374-1715

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission
I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/024,027	09/11/2013	SIVAKUMAR CHATURVEDI	DAMA-31813	8381

TITLE OF INVENTION: SYSTEM AND METHOD FOR PROVIDING ADDITIONAL FUNCTIONALITY TO EXISTING SOFTWARE IN AN INTEGRATED MANNER

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$480	$0	$0	$480	06/26/2015

EXAMINER	ART UNIT	CLASS-SUBCLASS
DORAIS, CRAIG C	2194	719-313000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
- ☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 Howison & Arnott LLP
2
3

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE: Damaka, Inc.

(B) RESIDENCE: (CITY and STATE OR COUNTRY): Richardson, Texas

Please check the appropriate assignee category or categories (will not be printed on the patent): ☐ Individual ☒ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:
- ☒ Issue Fee
- ☒ Publication Fee (No small entity discount permitted)
- ☐ Advance Order - # of Copies _____

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**
- ☐ A check is enclosed.
- ☐ Payment by credit card. Form PTO-2038 is attached.
- ☒ The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number 200780 (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)
- ☐ Applicant certifying micro entity status. See 37 CFR 1.29 — NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
- ☐ Applicant asserting small entity status. See 37 CFR 1.27 — NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
- ☐ Applicant changing to regular undiscounted fee status. — NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature /Timothy F. Bliss, Reg. #50,925/ Date March 31, 2015

Typed or printed name TIMOTHY F. BLISS Registration No. 50,925

PTOL-85 Part B (10-13) Approved for use through 10/31/2013. OMB 0651-0033 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Attorney Docket No. DAMA-31813

SUPPLEMENTAL DECLARATION

Title of Invention: SYSTEM AND METHOD FOR PROVIDING ADDITIONAL FUNCTIONALITY TO EXISTING SOFTWARE IN AN INTEGRATED MANNER

This declaration is directed to (check one):

- ☐ the attached application;
- ☐ the application identified by the attorney docket no. and title of invention given above;
- ☒ United States Application or PCT International Application No. 14/024,027, filed September 11, 2013.

As a below-named inventor, I hereby declare that:

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I have reviewed and understand the contents of the above-identified specification, including the claims as originally filed and as amended in the amendment(s) filed on March 16, 2015; and

I acknowledge my duty to disclose information of which I am aware which is material to the patentability of this application in accordance with 37 C.F.R. § 1.56.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. § 1001 by fine or imprisonment of not more than five (5) years, or both.

Signature: _____ 3/30/15

Inventor: Sivakumar Chaturvedi DATE

Attorney Docket No. DAMA-31813

SUPPLEMENTAL DECLARATION

Title of Invention: SYSTEM AND METHOD FOR PROVIDING ADDITIONAL FUNCTIONALITY TO EXISTING SOFTWARE IN AN INTEGRATED MANNER

This declaration is directed to (check one):

- ☐ the attached application;
- ☐ the application identified by the attorney docket no. and title of invention given above;
- ☒ United States Application or PCT International Application No. 14/024,027, filed September 11, 2013.

As a below-named inventor, I hereby declare that:

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I have reviewed and understand the contents of the above-identified specification, including the claims as originally filed and as amended in the amendment(s) filed on March 16, 2015; and

I acknowledge my duty to disclose information of which I am aware which is material to the patentability of this application in accordance with 37 C.F.R. § 1.56.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. § 1001 by fine or imprisonment of not more than five (5) years, or both.

Signature: _____ 3/30/15

Inventor: Satish Gundabathula DATE

Attorney Docket No. DAMA-31813

SUPPLEMENTAL DECLARATION

Title of Invention: SYSTEM AND METHOD FOR PROVIDING ADDITIONAL FUNCTIONALITY TO EXISTING SOFTWARE IN AN INTEGRATED MANNER

This declaration is directed to (check one):

- ☐ the attached application;
- ☐ the application identified by the attorney docket no. and title of invention given above;
- ☒ United States Application or PCT International Application No. 14/024,027, filed September 11, 2013.

As a below-named inventor, I hereby declare that:

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I have reviewed and understand the contents of the above-identified specification, including the claims as originally filed and as amended in the amendment(s) filed on March 16, 2015; and

I acknowledge my duty to disclose information of which I am aware which is material to the patentability of this application in accordance with 37 C.F.R. § 1.56.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. § 1001 by fine or imprisonment of not more than five (5) years, or both.

Signature: _____ 03/30/2015

Inventor: Rashmi Hiremath DATE

Electronic Patent Application Fee Transmittal

Application Number:	14024027
Filing Date:	11-Sep-2013
Title of Invention:	SYSTEM AND METHOD FOR PROVIDING ADDITIONAL FUNCTIONALITY TO EXISTING SOFTWARE IN AN INTEGRATED MANNER
First Named Inventor/Applicant Name:	SIVAKUMAR CHATURVEDI
Filer:	Timothy Frank Bliss/Heather Hamilton
Attorney Docket Number:	DAMA-31813

Filed as Small Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Utility Appl Issue Fee	2501	1	480	480
Publ. Fee- Early, Voluntary, or Normal	1504	1	0	0
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**480**

Electronic Acknowledgement Receipt	
EFS ID:	21926202
Application Number:	14024027
International Application Number:	
Confirmation Number:	8381
Title of Invention:	SYSTEM AND METHOD FOR PROVIDING ADDITIONAL FUNCTIONALITY TO EXISTING SOFTWARE IN AN INTEGRATED MANNER
First Named Inventor/Applicant Name:	SIVAKUMAR CHATURVEDI
Customer Number:	25883
Filer:	Timothy Frank Bliss
Filer Authorized By:	
Attorney Docket Number:	DAMA-31813
Receipt Date:	31-MAR-2015
Filing Date:	11-SEP-2013
Time Stamp:	18:52:31
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	$480
RAM confirmation Number	5667
Deposit Account	200780
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	DAM31813IssueFeeTransmittal.pdf	1600549 69fdaf5c12c0449311b0107f90b96b4021bd6fc2	no	1
Warnings:					
Information:					
2	Oath or Declaration filed	DAM31813SuppDecChaturvediEXE.pdf	820664 8f6a079058a67b3adc131d8c3aa7499bc6286cf4	no	1
Warnings:					
Information:					
3	Oath or Declaration filed	DAM31813SuppDecGundabathulaEXE.pdf	826830 bd0fc01dfba7aea431d94bc94c08244defed293d	no	1
Warnings:					
Information:					
4	Oath or Declaration filed	DAM31813SuppDecHiremathEXE.pdf	813477 598fb5454337629151 66f142a22f51994a7e2d65	no	1
Warnings:					
Information:					
5	Fee Worksheet (SB06)	fee-info.pdf	32342 f34b7ec65531a81a1bd63b81e48fdf234c8ffca7	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	4093862		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

25883 7590 03/26/2015

HOWISON & ARNOTT, L.L.P
P.O. BOX 741715
DALLAS, TX 75374-1715

EXAMINER	
DORAIS, CRAIG C	
ART UNIT	PAPER NUMBER
2194	

DATE MAILED: 03/26/2015

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/024,027	09/11/2013	SIVAKUMAR CHATURVEDI	DAMA-31813	8381

TITLE OF INVENTION: SYSTEM AND METHOD FOR PROVIDING ADDITIONAL FUNCTIONALITY TO EXISTING SOFTWARE IN AN INTEGRATED MANNER

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$480	$0	$0	$480	06/26/2015

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PTOL-85 (Rev. 02/11)

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

25883 7590 03/26/2015
HOWISON & ARNOTT, L.L.P
P.O. BOX 741715
DALLAS, TX 75374-1715

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission
I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/024,027	09/11/2013	SIVAKUMAR CHATURVEDI	DAMA-31813	8381

TITLE OF INVENTION: SYSTEM AND METHOD FOR PROVIDING ADDITIONAL FUNCTIONALITY TO EXISTING SOFTWARE IN AN INTEGRATED MANNER

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$480	$0	$0	$480	06/26/2015

EXAMINER	ART UNIT	CLASS-SUBCLASS
DORAIS, CRAIG C	2194	719-313000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

❑ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

❑ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list

(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,

(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 _____
2 _____
3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. The following fee(s) are submitted:

❑ Issue Fee

❑ Publication Fee (No small entity discount permitted)

❑ Advance Order - # of Copies _____

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**

❑ A check is enclosed.

❑ Payment by credit card. Form PTO-2038 is attached.

❑ The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)

❑ Applicant certifying micro entity status. See 37 CFR 1.29

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

❑ Applicant asserting small entity status. See 37 CFR 1.27

NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

❑ Applicant changing to regular undiscounted fee status.

NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

PTOL-85 Part B (10-13) Approved for use through 10/31/2013. OMB 0651-0033 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/024,027	09/11/2013	SIVAKUMAR CHATURVEDI	DAMA-31813	8381

25883 7590 03/26/2015

HOWISON & ARNOTT, L.L.P
P.O. BOX 741715
DALLAS, TX 75374-1715

EXAMINER	
DORAIS, CRAIG C	

ART UNIT	PAPER NUMBER
2194	

DATE MAILED: 03/26/2015

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Notice of Allowability	Application No. 14/024,027	Applicant(s) CHATURVEDI ET AL.	
	Examiner CRAIG DORAIS	Art Unit 2194	AIA (First Inventor to File) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *Application filed 09/11/2013*.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on_____.
2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.
3. ☒ The allowed claim(s) is/are *1 - 12 and 14 - 22*. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov .
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

   a) ☐ All b) ☐ Some *c) ☐ None of the:
   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☒ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date See Continuation Sheet
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
4. ☒ Interview Summary (PTO-413), Paper No./Mail Date *20150316* .
5. ☒ Examiner's Amendment/Comment
6. ☒ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/CRAIG DORAIS/
Primary Examiner, Art Unit 2194

Continuation of Attachment(s) 2. Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date: 12/13/2013, 12/13/2013, 12/13/2013.

DETAILED ACTION

1. The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

2. This Office Action is in response to an application entered on 09/11/2013.

3. Claims 1 - 12 and 14 - 22 are allowed. Claim 13 is canceled.

Examiner's Amendment

4. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a communication with Timothy F. Bliss on March 16, 2015.

Claims:

1. (Currently amended) A mobile device comprising:

a network interface;

a processor coupled to the network interface; and

a memory coupled to the processor and configured to store a plurality of instructions executable by the processor, the instructions including instructions for:

receiving, by a function block stored in the memory of the mobile device, a request for an audio/video (A/V) call from a superblock application stored in the memory of the mobile device;

determining, by the function block, that the superblock application is authorized to access A/V call functionality provided by the function block;

determining, by the function block, that the A/V ~~service~~ call requires access to a resource that is external to the mobile device;

establishing, by the function block, the A/V call between the superblock application and the resource via ~~the~~a network interface, wherein the establishing is not supported by the superblock application;

providing, by the function block, video output for the A/V call to a video window within a display window of the superblock application on the mobile device, wherein the video window is displayed simultaneously with the display window of the superblock application on a screen of the mobile device; and

providing, by the function block, audio for the A/V call via the mobile device.

2. (Currently amended) The device of claim 1 wherein the instructions further include determining, by the function block, whether the function block has ~~the~~ a capability to provide the A/V call.

3. (Currently amended) The device of claim 2 wherein the instructions further include determining, by the function block, whether the function block has ~~the~~ a capability to render the A/V call.

4. (Currently amended) The device of claim 3 wherein the instructions further include determining, by the function block, whether the superblock has ~~the~~ a capability to render the A/V call.

5. (Original) The device of claim 1 wherein the instructions further include determining, by the function block, that the resource is currently available prior to establishing the A/V call.

6. (Original) The device of claim 1 wherein the instructions further include initializing the function block, by the superblock application, when the superblock application is loaded into the memory and executed.

7. (Original) The device of claim 1 wherein the request is an application programming interface (API) call from the superblock application to the function block.

8. (Original) The device of claim 1 wherein the instructions further include enabling, by the function block, a user of the device to collaborate on at least one of a document, a file, or an application with a user on another device.

9. (Currently amended) A mobile device comprising:

a network interface;

a processor coupled to the network interface; and

a memory coupled to the processor and configured to store a plurality of instructions executable by the processor, the instructions including instructions for a superblock application having instructions for a function block included therein, wherein the function block is configured to provide a plurality of functions that are accessible to the superblock application via an application programming interface (API) of the function block, wherein the functions are provided within the superblock application itself and are accessible within the superblock application without switching context to another application on the mobile device, and wherein the superblock application cannot access at least one of the functions of the function block without providing the function block with an authorization code, and wherein the instructions further include providing, by the function block, video data to the superblock application for rendering by the superblock application, wherein the superblock application renders the video data in a video window that is superimposed on a display of the superblock application, and wherein both the video window and at least a portion of the display of the superblock application are simultaneously viewable.

10. (Original) The mobile device of claim 9 wherein the plurality of functions includes access to an external service not present on the mobile device.

11. (Original) The mobile device of claim 10 wherein the instructions further include providing an event notification by the function block to the superblock application when the function block receives a message from the external service.

12. (Original) The mobile device of claim 11 wherein the instructions further include receiving, by the function block, a response to the event notification from the superblock application.

13. (Canceled)

14. (Currently amended) The mobile device of claim ~~13~~ 10 wherein the video window is associated with an audio/video (A/V) call session, and wherein the function block communicates with ~~an~~ the external service to support the A/V call session.

15. (Original) The mobile device of claim 9 wherein the superblock application is not authorized to use at least one of the functions of the function block.

16. (Currently amended) A method comprising:

receiving, by a function block stored in a memory of a mobile device, a request for an audio/video (A/V) call from a superblock application stored in the memory of the mobile device;

determining, by the function block, that the superblock application is authorized to access A/V call functionality provided by the function block;

determining, by the function block, that the A/V ~~service~~ call requires access to a resource that is external to the mobile device;

establishing, by the function block, the A/V call between the superblock application and the resource via ~~the~~a network interface, wherein the establishing is not supported by the superblock application;

providing, by the function block, video output for the A/V call to a video window within a display window of the superblock application on the mobile device, wherein the video window is displayed simultaneously with the display window of the superblock application on a screen of the mobile device; and

providing, by the function block, audio for the A/V call via the mobile device.

17. (Original) The method of claim 16 further comprising determining, by the function block, whether the function block has the capability to provide the A/V call.

18. (Original) The method of claim 17 further comprising determining, by the function block, whether the function block has the capability to render the A/V call.

19. (Original) The method of claim 18 further comprising determining, by the function block, whether the superblock has the capability to render the A/V call.

20. (Original) The method of claim 16 further comprising initializing the function block, by the superblock application, when the superblock application is loaded into the memory and executed.

21. (Original) The method of claim 16 wherein the request is an application programming interface (API) call from the superblock application to the function block.

22. (Original) The method of claim 16 further comprising enabling, by the function block, a user of the device to collaborate on at least one of a document, a file, or an application with a user on another device.

Reasons for Allowance

5. Claims 1 - 12 and 14 - 22 are allowed. Claim 13 is canceled.

6. The following is an examiner's statement of reasons for allowance: Regarding independent claim 1 (and similarly, independent claims 9 and 16), when considered as a whole, is allowable over the prior art of record (three more relevant selections of said art being noted below). Specifically, the prior art of record fails to clearly teach or fairly suggest any anticipatory or obvious combination of the limitations found in claim 1.

7. Turski (US 2010/005853) discloses remotely inviable methods through a webpage application outside a web browser, where the browser extension first determines if the application it extends is able to invoke the remote functionality.

8. Liu et al. (US 2004/0193599) discloses dynamically adding extensions for system processes.

9. Balmori Labra et al. (US 2013/0125145) a cross-platform API for applications where the extension uses an API to determine if its application is authorizes information-sharing features.

Conclusion

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to CRAIG DORAIS whose telephone number is (571)270-3371. The examiner can normally be reached on Monday - Friday 8:30am - 5:00pm.

11. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hyung Sough can be reached on (571)272-6799. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

12. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/CRAIG DORAIS/
Primary Examiner, Art Unit 2194

Examiner-Initiated Interview Summary	Application No.	Applicant(s)	
	14/024,027	CHATURVEDI ET AL.	
	Examiner	Art Unit	
	CRAIG DORAIS	2194	

All participants (applicant, applicant's representative, PTO personnel):

(1) *CRAIG DORAIS*. (3)_____.

(2) *TIMOTHY F. BLISS*. (4)_____.

Date of Interview: *16 March 2015*.

Type: ☒ Telephonic ☐ Video Conference
☐ Personal [copy given to: ☐ applicant ☐ applicant's representative]

Exhibit shown or demonstration conducted: ☐ Yes ☒ No.
If Yes, brief description: _____.

Issues Discussed ☐101 ☒112 ☐102 ☒103 ☐Others
(For each of the checked box(es) above, please describe below the issue and detailed description of the discussion)

Claim(s) discussed: *1 - 4, 9, 10, 13, 14 and 16*.

Identification of prior art discussed: *none*.

Substance of Interview
(For each issue discussed, provide a detailed description and indicate if agreement was reached. Some topics may include: identification or clarification of a reference or a portion thereof, claim interpretation, proposed amendments, arguments of any applied references etc...)

Disscussed addressing formal matters in claims 1 - 4, 14 and 16 (involving various 112(b) indefinite issues) and to include the limitations of claim 13 into claim 9 to place the application in a condition for allowance (the material in claim 13 was already present in independent claims 1 and 16, but independent claim 19 did not have these limitations in itself without the inclusion of claim 13). It was later pointed out in a follow up communication that the material of claim 10 (from which claim 13 depended) was not necessary to include into the subject matter of claim 9 to place the application in a condition for allowance. All changes were agreed to in a communication from Applicant's representative received on 03/16/2015.

Applicant recordation instructions: It is not necessary for applicant to provide a separate record of the substance of interview.

Examiner recordation instructions: Examiners must summarize the substance of any interview of record. A complete and proper recordation of the substance of an interview should include the items listed in MPEP 713.04 for complete and proper recordation including the identification of the general thrust of each argument or issue discussed, a general indication of any other pertinent matters discussed regarding patentability and the general results or outcome of the interview, to include an indication as to whether or not agreement was reached on the issues raised.

☐ Attachment

/CRAIG DORAIS/ Primary Examiner, Art Unit 2194	

Notice of References Cited	Application/Control No. 14/024,027	Applicant(s)/Patent Under Reexamination CHATURVEDI ET AL.	
	Examiner CRAIG DORAIS	Art Unit 2194	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-2004/0193599 A1	09-2004	Liu et al.	707/007
*	B	US-2010/0058353 A1	03-2010	Turski, Andrzej	719/311
*	C	US-2013/0125145 A1	05-2013	Balmori Labra et al.	719/328
	D	US-			
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

PTO/SB/08a (01-10)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99**)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	~~2840~~ 2194
	Examiner Name	Craig Dorais
	Attorney Docket Number	DAMA-31813

U.S.PATENTS						Remove
Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	6031818	A	2000-02-29	LO ET AL.	
	2	6311150	B1	2001-10-30	RAMASWAMY ET AL.	
	3	6999932	B1	2006-02-14	ZHOU, GUOJUN	
	4	7272377	B2	2007-09-18	COX ET AL.	
	5	7412374	B1	2008-08-12	SEILER ET AL.	
	6	6766373	B1	2004-07-20	BEADLE, BRUCE A.	
	7	7304985	B2	2007-12-04	SOJKA ET AL.	
	8	7353255	B2	2008-04-01	ACHARYA ET AL.	

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.D./

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	~~2810~~ 2194
	Examiner Name	Craig Dorais
	Attorney Docket Number	DAMA-31813

	9	7477282	B2	2009-01-13	FIRESTONE ET AL.	
	10	5442637	A	1995-08-01	NGUYEN, MAI-HUONG	
	11	6343067	B1	2002-01-01	DROTTAR ET AL.	
	12	6473425	B1	2002-10-01	BELLATON ET AL.	
	13	6574668	B1	2003-06-01	GUBBI ET AL.	
	14	6850769	B2	2005-02-01	GROB ET AL.	
	15	7080158	B1	2006-07-01	SQUIRE, MATTHEW	
	16	5889762		1999-03-30	PAJUVIRTA ET AL	
	17	7184415	B2	2007-02-01	CHANEY ET AL.	
	18	5790637	A	1998-08-01	JOHNSON ET AL.	
	19	6836765	B1	2004-12-01	SUSSMAN, LESTER	

EFS Web 2.1.17

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.D./

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	~~2849~~ 2194
	Examiner Name	Craig Dorais
	Attorney Docket Number	DAMA-31813

	20	7613171	B2	2009-11-00	ZEHAVI ET AL.	
	21	6842460	B1	2005-01-00	OLKKONEN ET AL.	
	22	6987756		2006-01-00	RAVINDRANATH ET AL.	
	23	7512652		2009-03-00	APPELMAN ET AL.	

If you wish to add additional U.S. Patent citation information please click the Add button. Add

U.S.PATENT APPLICATION PUBLICATIONS Remove

Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20020184310	A1	2002-12-01	TRAVERSAT ET AL.	
	2	20030076815	A1	2003-04-23	MILLER ET AL.	
	3	20040034793	A1	2004-02-19	YUAN, WEI	
	4	20040139225	A1	2004-07-15	TAKAHASHI, MASAYUKI	
	5	20050033985	A1	2005-02-10	XU ET AL.	

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.D./

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	~~2840~~ 2194
	Examiner Name	Craig Dorais
	Attorney Docket Number	DAMA-31813

	6	20050091407	A1	2005-04-28	VAZIRI ET AL.	
	7	20050195802	A1	2005-09-08	KLEIN ET AL.	
	8	20050286519	A1	2005-12-29	RAVIKUMAR ET AL.	
	9	20070016921	A1	2007-01-01	LEVI ET AL.	
	10	20030046056	A1	2003-03-06	GODOY ET AL.	
	11	20040158471	A1	2004-08-12	DAVIS ET AL.	
	12	20050086309	A1	2005-04-21	GALLI ET AL.	
	13	20040162871	A1	2004-08-19	PABLA ET AL.	
	14	20030115251	A1	2003-06-19	FREDRICKSON ET AL.	
	15	20020178087	A1	2002-11-28	HENDERSON ET AL.	
	16	20060183476	A1	2006-08-17	MORITA, J. ET AL.	

EFS Web 2.1.17

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.D./

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	~~2810~~ 2194
	Examiner Name	Craig Dorais
	Attorney Docket Number	DAMA-31813

	17	20030220121	A1	2003-11-27	KONISHI, T. ET AL.	
	18	20080192756	A1	2008-08-14	DAMOLA ET AL.	
	19	20030072485	A1	2003-04-17	GUERIN ET AL.	
	20	20050008024	A1	2005-01-13	NEWPOL ET AL.	
	21	20020176404	A1	2002-11-28	GIRARD, GREGORY D.	
	22	20030137939	A1	2003-07-24	DUNNING ET AL.	
	23	20040100973	A1	2004-05-01	PRASAD, ANAND R.	
	24	20020080719	A1	2002-06-27	PARKVALL ET AL.	
	25	20040228279	A1	2004-11-18	MIDTUN ET AL.	
	26	20050050227	A1	2005-03-01	MICHELMAN, ERIC H.	
	27	20030217171	A1	2003-11-01	VON STUERMER ET AL.	

EFS Web 2.1.17 ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.D./

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	~~2849~~ 2194
	Examiner Name	Craig Dorais
	Attorney Docket Number	DAMA-31813

	28	20040267938	A1	2004-12-01	SHOROFF ET AL.	
	29	20020087887	A1	2002-07-01	BUSAM ET AL.	
	30	20020120757	A1	2002-08-01	SUTHERLAND ET AL.	
	31	20020166053	A1	2002-11-01	WILSON, RODGER P.	
	32	20030044020	A1	2003-03-01	ABOBA ET AL.	
	33	20030163697	A1	2003-08-01	PABLA ET AL.	
	34	20030177422	A1	2003-09-01	TARAROUKHINE ET AL.	
	35	20040260952	A1	2004-12-01	NEWMAN ET AL.	
	36	20050249196	A1	2005-11-01	ANSARI ET AL.	
	37	20060148516	A1	2006-07-01	REDDY ET AL.	
	38	20070110043	A1	2007-05-01	GIRARD, GREGORY D.	

EFS Web 2.1.17

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.D./

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	~~2840~~ 2194
	Examiner Name	Craig Dorais
	Attorney Docket Number	DAMA-31813

	39	20080069105	A1	2008-03-01	COSTA ET AL.	
	40	20080320096	A1	2008-12-01	SZETO, CHRISTOPHER	
	41	20090192976	A1	2009-07-01	SPIVACK ET AL.	
	42	20050119005	A1	2005-06-00	SEGAL ET AL.	
	43	20060246903	A1	2006-11-00	KONG ET AL.	
	44	20030031210	A1	2003-02-00	HARRIS, JOHN M.	
	45	20030035441	A1	2003-02-00	CHENG ET AL.	
	46	20030174707	A1	2003-09-00	GROB ET AL.	
	47	20050138119	A1	2005-06-00	SARIDAKIS, TITOS	

If you wish to add additional U.S. Published Application citation information please click the Add button. Add

FOREIGN PATENT DOCUMENTS Remove

Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] ¡	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]

EFS Web 2.1.17

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.D./

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	~~2840~~ 2194
	Examiner Name	Craig Dorais
	Attorney Docket Number	DAMA-31813

	1							☐

If you wish to add additional Foreign Patent Document citation information please click the Add button Add

NON-PATENT LITERATURE DOCUMENTS Remove

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T5
/C.D./	1	PCT: International Preliminary Report on Patentability of PCT/US2008/075141; 09 March 2010; 5 pgs.	☐
/C.D./	2	PCT: International Preliminary Report on Patentability of PCT/US2007/068820; 31December 2008; 8 pgs.	☐
/C.D./	3	PCT: International Preliminary Report on Patentability of PCT/US2007/068823; 27 November 2008; 8 pgs.	☐
/C.D./	4	PCT: International Preliminary Report on Patentability of PCT/US2006/047841; 06 November 2008; 7 pgs.	☐
/C.D./	5	PCT: International Preliminary Report on Patentability of PCT/US2007/002424; 07 August 2008; 6 pgs.	☐
/C.D./	6	PCT: International Preliminary Report on Patentability of PCT/US2006/040312; 02 May 2008; 5 pgs.	☐
/C.D./	7	PCT: International Preliminary Report on Patentability of PCT/IB2005/000821; 19 October 2006; 10 pgs.	☐

If you wish to add additional non-patent literature document citation information please click the Add button Add

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.D./

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	~~2810~~ 2194
	Examiner Name	Craig Dorais
	Attorney Docket Number	DAMA-31813

EXAMINER SIGNATURE			
Examiner Signature	/Craig Dorais/	Date Considered	03/13/2015

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.D./

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	~~2849~~ 2194
	Examiner Name	Craig Dorais
	Attorney Docket Number	DAMA-31813

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☐ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☐ See attached certification statement.

☐ Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ None

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Timothy F. Bliss Reg. #50925/	Date (YYYY-MM-DD)	2013-12-11
Name/Print	TIMOTHY F. BLISS	Registration Number	50925

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

EFS Web 2.1.17

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.D./

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these record s.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.D./

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

BIB DATA SHEET

CONFIRMATION NO. 8381

SERIAL NUMBER	FILING or 371(c) DATE RULE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
14/024,027	09/11/2013	719	2194	DAMA-31813

APPLICANTS

DAMAKA, INC., Richardson, TX, Assignee (with 37 CFR 1.172 Interest);

INVENTORS

SIVAKUMAR CHATURVEDI, ALLEN, TX;
SATISH GUNDABATHULA, IRVING, TX;
RASHMI HIREMATH, ALLEN, TX;

**** CONTINUING DATA **************************

This appln claims benefit of 61/846,958 07/16/2013

**** FOREIGN APPLICATIONS **************************

**** IF REQUIRED, FOREIGN FILING LICENSE GRANTED **** ** SMALL ENTITY **

09/25/2013

Foreign Priority claimed ☐ Yes ☑ No 35 USC 119(a-d) conditions met ☐ Yes ☐ No Verified and Acknowledged /CRAIG C DORAIS/ Examiner's Signature	☐ Met after Allowance Initials	STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
		TX	12	22	3

ADDRESS

HOWISON & ARNOTT, L.L.P
P.O. BOX 741715
DALLAS, TX 75374-1715
UNITED STATES

TITLE

SYSTEM AND METHOD FOR PROVIDING ADDITIONAL FUNCTIONALITY TO EXISTING SOFTWARE IN AN INTEGRATED MANNER

FILING FEE RECEIVED		
810	FEES: Authority has been given in Paper No._____ to charge/credit DEPOSIT ACCOUNT No._____ for following:	☐ All Fees ☐ 1.16 Fees (Filing) ☐ 1.17 Fees (Processing Ext. of time) ☐ 1.18 Fees (Issue) ☐ Other _____ ☐ Credit

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14024027	CHATURVEDI ET AL.
	Examiner	Art Unit
	CRAIG DORAIS	2194

CPC- SEARCHED		
Symbol	Date	Examiner

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner

SEARCH NOTES		
Search Notes	Date	Examiner
PALM and East inventor searches. East keyword and CPC and keyword searches. See attached. Some Google search.	03/14/2015	Craig Dorais

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner
719	313, 319, 329	03/16/2015	Craig Dorais
G06F9	54, 541, 542	03/16/2015	Craig Dorais

PTO/SB/08a (01-10)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	~~2819~~ 2194
	Examiner Name	Craig Dorais
	Attorney Docket Number	DAMA-31813

U.S.PATENTS						Remove
Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	5761309	A	1998-06-01	OHASHI ET AL.	
	2	6141687	A	2000-10-01	BLAIR, DANA L.	
	3	6202084	B1	2001-03-13	KUMAR ET AL.	
	4	6219638	B1	2001-04-01	PADMANABHAN ET AL.	
	5	6360196	B1	2002-03-01	POZNASKI ET AL.	
	6	6826613	B1	2004-11-01	WANG ET AL.	
	7	7013155	B1	2006-03-01	RUF ET AL.	
	8	7117526	B1	2006-10-01	SHORT, JOEL E.	

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.D./

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	~~2840~~ 2194
	Examiner Name	Craig Dorais
	Attorney Docket Number	DAMA-31813

	9	7353252	B1	2008-04-01	YANG ET AL.	
	10	6940826	B1	2005-09-06	SIMARD ET AL.	
	11	6741691	B1	2004-05-25	RITTER ET AL.	
	12	6912278	B1	2005-06-28	HAMILTON, THOMAS	
	13	6963555	B1	2005-11-08	BRENNER ET AL.	
	14	6975718	B1	2005-12-13	PEARCE ET AL.	
	15	6999575	B1	2006-02-14	SHEINBEIN, DANIEL	
	16	7079529	B1	2006-07-18	KHUC, MINH DUY	
	17	7457279	B1	2008-11-25	SCOTT ET AL.	

If you wish to add additional U.S. Patent citation information please click the Add button. Add

U.S.PATENT APPLICATION PUBLICATIONS Remove

Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear

EFS Web 2.1.17

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.D./

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	~~2849~~ 2194
	Examiner Name	Craig Dorais
	Attorney Docket Number	DAMA-31813

	1	20020038282	A1	2002-03-01	MONTGOMERY, ROB R.	
	2	20020042769	A1	2002-04-01	GUJRAL ET AL.	
	3	20020062285	A1	2002-05-01	AMANN ET AL.	
	4	20020097150	A1	2002-07-01	SANDELMAN ET AL.	
	5	20020143548	A1	2002-10-01	KORALL ET AL.	
	6	20020150110		2002-10-17	INBAR ET AL.	
	7	20030009565		2003-01-09	ARAO	
	8	20030061025	A1	2003-03-01	ABIR, ELI	
	9	20030061481	A1	2003-03-27	LEVINE ET AL.	
	10	20030078858	A1	2003-04-01	ANGELOPOULOS ET AL.	
	11	20030105812	A1	2003-06-05	FLOWERS, JR., ET AL.	

EFS Web 2.1.17

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.D./

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	2819
	Examiner Name	
	Attorney Docket Number	DAMA-31813

	12	20030110047	A1	2003-06-01	SANTOSUOSSO, JOHN MATTHEW	
	13	20030135569		2003-07-17	KHAKOO ET AL.	
	14	20030158722	A1	2003-08-01	LORD, JOHN RAYMOND	
	15	20030177186	A1	2003-09-01	GOODMAN ET AL.	
	16	20030187650	A1	2003-10-01	MOORE ET AL.	
	17	20040034776	A1	2004-02-01	FERNANDO ET AL.	
	18	20040039781	A1	2004-02-01	LAVALLEE ET AL.	
	19	20040044517	A1	2004-03-01	PALMQUIST, ROBERT	
	20	20040128554	A1	2004-07-01	MAHER, III, ET AL.	
	21	20040133689	A1	2004-07-08	VASISHT, SAMRAT	
	22	20040139228		2004-07-15	TAKEDA ET AL.	

EFS Web 2.1.17 ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.D./

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	~~2810~~ 2194
	Examiner Name	Craig Dorais
	Attorney Docket Number	DAMA-31813

	23	20040143678	A1	2004-07-01	CHARI ET AL.	
	24	20040153858	A1	2004-08-01	HWANG, SHAW HWA	
	25	20040267527	A1	2004-12-01	CREAMER ET AL.	
	26	20040268257	A1	2004-12-01	MUDUSURU, GIRI P.	
	27	20050004982	A1	2005-01-06	VERNON ET AL.	
	28	20050071481	A1	2005-03-01	DANIELI, DAMON V.	
	29	20050143105	A1	2005-06-01	OKAMOTO, YUKIFUMI	
	30	20050187957	A1	2005-08-01	KRAMER ET AL.	
	31	20050246193	A1	2005-11-03	ROEVER ET AL.	
	32	20050254440	A1	2005-11-17	SORRELL, JOHN D.	
	33	20060121986	A1	2006-06-01	PELKEY ET AL.	

EFS Web 2.1.17

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.D./

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	~~2840~~ 2194
	Examiner Name	Craig Dorais
	Attorney Docket Number	DAMA-31813

	34	20060168643	A1	2006-07-01	HOWARD ET AL.	
	35	20060218624	A1	2006-09-28	RAVIKUMAR ET AL.	
	36	20060230166	A1	2006-10-01	PHILYAW, JEFFRY JOVAN	
	37	20070078785	A1	2007-04-01	BUSH ET AL.	
	38	20070111794	A1	2007-05-01	HOGAN ET AL.	
	39	20070190987	A1	2007-08-01	VAANANEN, MIKKO KALERVO	
	40	20080005328		2008-01-01	SHIVELY ET AL.	
	41	20050105524	A1	2005-05-19	STEVENS ET AL.	
	42	20040103212	A1	2005-05-27	TAKEUCHI ET AL.	
	43	20090240821	A1	2009-09-24	JUNCKER ET AL.	

If you wish to add additional U.S. Published Application citation information please click the Add button. Add

FOREIGN PATENT DOCUMENTS Remove

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.D./

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	~~2849~~ 2194
	Examiner Name	Craig Dorais
	Attorney Docket Number	DAMA-31813

Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
/C.D./	1	1404082	EP	A2	2004-03-31	NORTEL NETWORKS LTD		☐
/C.D./	2	WO 2003/079635	WO		2003-09-25	IBM CORPORATION ET AL.		☐
/C.D./	3	WO 2004/063843	WO		2004-07-29	MATSUSHITA ELECTRIC IND CO LTD		☐
/C.D./	4	WO 2005/009019	WO		2005-01-27	SKYPER LTD. ET AL.		☐
/C.D./	5	2005-94600	JP		2005-04-07	NEC CORP.		☐
~~/C.D./~~	~~6~~	~~2007-043598~~	~~JP~~		~~2007-02-15~~	~~NEC CORP.~~		☐
~~/C.D./~~	~~7~~	~~10-2005-0030548~~	~~KR~~		~~2005-03-30~~	~~MICROSOFT CORP.~~		☐
/C.D./	8	WO 2006/075677	WO	A1	2006-07-20	SHARP KABUSHIKI KAISHA		☐

If you wish to add additional Foreign Patent Document citation information please click the Add button Add

NON-PATENT LITERATURE DOCUMENTS Remove

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]

EFS Web 2.1.17

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.D./

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	~~2040~~ 2194
	Examiner Name	Craig Dorais
	Attorney Docket Number	DAMA-31813

/C.D./	1	CHATHAPURAM, "Security in Peer-To-Peer Networks", August 8. 2001, XP002251813.	☐
/C.D./	2	International Search Report and Written Opinion of the International Searching Authority from PCT/IB2005/000821, dated August 5, 2005.	☐
/C.D./	3	International Search Report and Written Opinion of the International Searching Authority from PCT/US2006/032791, dated December 18, 2006.	☐
/C.D./	4	International Search Report and Written Opinion of the International Searching Authority from PCT/US2006/040312, dated March 2, 2007.	☐
/C.D./	5	International Search Report and Written Opinion of the International Searching Authority from PCT/US2006/047841, dated September 12, 2008.	☐
/C.D./	6	International Search Report and Written Opinion of the International Searching Authority from PCT/US2007/002424, dated August 14, 2007.	☐
/C.D./	7	International Search Report and Written Opinion of the International Searching Authority from PCT/US2007/068820, dated June 11, 2008.	☐
/C.D./	8	International Search Report and Written Opinion of the International Searching Authority from PCT/US2007/068821, dated June 14, 2008.	☐
/C.D./	9	International Search Report and Written Opinion of the International Searching Authority from PCT/US2007068823, dated June 1, 2008.	☐
/C.D./	10	JEFF TYSON, "How Instant Messaging Works", www.verizon.com/learningcenter, March 9, 2005.	☐
/C.D./	11	RORY BLAND, et al,"P2P Routing" 03/2002.	☐

EFS Web 2.1.17

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.D./

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	~~2840~~ 2194
	Examiner Name	Craig Dorais
	Attorney Docket Number	DAMA-31813

/C.D./	12	ROSENBERG, "STUN- Simple Traversal of UDP Through NAT", September 2002, XP015005058.	☐
/C.D./	13	SALMAN A. BASET, et al, "An Analysis Of The Skype Peer-To-Peer Internet Telephony Protocol", Department of Computer Science, Columbia University, New York, NY, USA, September 15, 2004.	☐
/C.D./	14	SINGH et al., "Peer-to Peer Internet Telephony Using SIP", Department of Computer Science, Columbia University, October 31, 2004, XP-002336408.	☐
/C.D./	15	SINHA, S. and OGLIESKI, A., A TCP Tutorial, November 1998 (Date posted on Internet: 19 April 2001) [Retrieved from the Internet <URL:http//www.ssfnet.org/Exchange/tcp/tcpTutorialNotes.html>]	☐
/C.D./	16	Pejman Khadivi, Terence D. Todd and Dongmei Zhao, "Handoff trigger nodes for hybrid IEEE 802.11 WLAN/cellular networks," Proc. Of IEEE International Conference on Quality of Service in Heterogeneous Wired/Wireless Networks, pp. 164-170, 18 October 2004.	☐
/C.D./	17	International Search Report and Written Opinion of the International Searching Authority from PCT/US2008/078142, dated March 27, 2009.	☐
/C.D./	18	International Search Report and Written Opinion of the International Searching Authority from PCT/US2008/084950, dated April 27, 2009.	☐
/C.D./	19	Hao Wang, Skype VoIP service-architecture and comparison, In: INFOTECH Seminar Advanced Communication Services (ASC), 2005, pp. 4, 7, 8.	☐
/C.D./	20	Seta, N.; Miyajima, H.; Zhang, L;; Fujii, T., "All-SIP Mobility: Session Continuity on Handover in Heterogeneous Access Environment," Vehicular Technology Conference, 2007. VTC 2007-Spring. IEEE 65th, 22-25 April 2007, pages: 1121-1126.	☐
/C.D./	21	International Search Report and Written Opinion of the International Searching Authority from PCT/US2008/075141, dated March 5, 2009.	☐
/C.D./	22	Qian Zhang; Chuanxiong Guo; Zihua Guo; Wenwu Zhu, "Efficient mobility management for vertical handoff between WWAN and WLAN," Communications Magazine, IEEE, vol. 41. issue 11, November 2003, pages: 102-108.	☐

EFS Web 2.1.17

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.D./

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	~~2040~~ 2194
	Examiner Name	Craig Dorais
	Attorney Docket Number	DAMA-31813

/C.D./	23	ISAACS, Ellen et al., "Hubbub: A sound-enhanced mobile instant messenger that supports awareness and opportunistic interactions," Proceedings of the SIGCHI Conference On Human Factors in Computing Systems; Vol. 4, Issue No. 1; Minneapolis, Minnesota; 20-25 April 2002; pgs. 179-186.	☐
/C.D./	24	PCT: International Preliminary Report on Patentability of PCT/US2008/084950; 01 June 2010; 5 pgs.	☐

If you wish to add additional non-patent literature document citation information please click the Add button **Add**

EXAMINER SIGNATURE

Examiner Signature	/Craig Dorais/	Date Considered	03/13/2015

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.D./

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	~~2840~~ 2194
	Examiner Name	Craig Dorais
	Attorney Docket Number	DAMA-31813

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☐ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☐ See attached certification statement.

☐ Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ None

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Timothy F. Bliss Reg. #50925/	Date (YYYY-MM-DD)	2013-12-11
Name/Print	TIMOTHY F. BLISS	Registration Number	50925

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

EFS Web 2.1.17

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.D./

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these record s.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.D./

PTO/SB/08a (01-10)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT
(Not for submission under 37 CFR 1.99)

Application Number	14024027
Filing Date	2013-09-11
First Named Inventor	Sivakumar CHATURVEDI
Art Unit	~~2819~~ 2194
Examiner Name	Craig Dorais
Attorney Docket Number	DAMA-31813

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	7778187	B2	2010-08-00	CHATURVEDI ET AL.	
	2	6438376	B1	2002-08-20	ELLIOTT ET AL.	
	3	6898413	B2	2005-05-24	YIP ET AL.	
	4	7664495	B1	2010-02-16	BONNER ET AL.	
	5	7623516	B2	2009-11-24	CHATURVEDI ET AL.	
	6	7623476	B2	2009-11-24	RAVIKUMAR ET AL.	
	7	7590758	B2	2009-09-15	TAKEDA ET AL.	
	8	6128283	A	2000-10-00	SABAA ET AL.	

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.D./

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	~~2849~~ 2194
	Examiner Name	Craig Dorais
	Attorney Docket Number	DAMA-31813

	9	6389016	B1	2002-05-00	SABAA ET AL.	
	10	7345999	B2	2008-03-00	SU ET AL.	
	11	7542472	B1	2009-06-00	GERENDAI ET AL.	
	12	8009586	B2	2011-08-00	CHATURVEDI ET AL.	
	13	7302496	B1	2007-11-27	METZGER	
	14	6161082		2000-12-12	GOLDBERG ET AL.	
	15	8065418		2011-11-00	ABUAN ET AL.	
	16	7656870	B2	2010-02-00	RAVIKUMAR ET AL.	
	17	7487248	B2	2009-02-00	MORAN ET AL.	
	18	7574523	B2	2009-08-00	TRAVERSAT ET AL.	
	19	7774495	B2	2010-08-00	PABLA ET AL.	

EFS Web 2.1.17

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.D./

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	~~2849~~ 2194
	Examiner Name	Craig Dorais
	Attorney Docket Number	DAMA-31813

	20	7782866	B1	2010-08-00	WALSH ET AL.	
	21	6298129		2001-10-00	CULVER ET AL.	
	22	6754181		2004-06-00	ELLIOTT ET AL.	
	23	7006508		2006-02-00	BONDY ET AL.	
	24	7010109		2006-03-00	GRITZER ET AL.	
	25	7123710		2006-10-00	RAVISHANKAR	
	26	7570743		2009-08-00	BARCLAY ET AL.	
	27	7769881		2010-08-00	MATSUBARA ET AL.	
	28	7346044	B1	2008-03-00	CHOU ET AL.	
	29	7092385		2006-08-00	GALLANT ET AL.	
	30	5818447		1998-10-00	WOLF ET AL.	

EFS Web 2.1.17 ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.D./

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	~~2840~~ 2194
	Examiner Name	Craig Dorais
	Attorney Docket Number	DAMA-31813

	31	7917584		2011-03-00	ARTHURSSON, DANIEL	
	32	7564843	B2	2009-07-21	MANJUNATHA ET AL.	
	33	7185114	B1	2007-02-27	HARIHARASUBRAHMANIAN	

If you wish to add additional U.S. Patent citation information please click the Add button. Add

U.S.PATENT APPLICATION PUBLICATIONS Remove

Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20030126213	A1	2003-07-03	BETZLER, BOAS	
	2	20030163525	A1	2003-08-28	HENDRIKS ET AL.	
	3	20040005877	A1	2004-01-00	VAANANEN, MIKKO KALERVO	
	4	20040249953	A1	2004-12-00	FERNANDEZ ET AL.	
	5	20080032695	A1	2008-02-07	ZHU ET AL.	
	6	20050136911	A1	2005-06-23	CSAPO ET AL.	

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.D./

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	~~2840~~ 2194
	Examiner Name	Craig Dorais
	Attorney Docket Number	DAMA-31813

	7	20040203834	A1	2004-10-14	MAHANY, RONALD L.	
	8	20020173303	A1	2002-11-21	SHIBUTANI, AKIRA	
	9	20060002355	A1	2006-01-05	BAEK ET AL.	
	10	20060182100	A1	2006-08-17	LI, JIN ET AL.	
	11	20080080392	A1	2008-04-03	WALSH, RICHARD J. ET AL.	
	12	20090300673	A1	2009-12-03	BACHET, FRANCK ET AL.	
	13	20020037000	A1	2002-03-00	PARK ET AL.	
	14	20030043764	A1	2003-03-00	KIM ET AL.	
	15	20030202480	A1	2003-10-00	SWAMI, YOGESH PREM	
	16	20040052234	A1	2004-03-00	AMEIGEIRAS ET AL.	
	17	20040213184	A1	2004-10-00	HU ET AL.	

EFS Web 2.1.17 ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.D./

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	~~2840~~ 2194
	Examiner Name	Craig Dorais
	Attorney Docket Number	DAMA-31813

	18	20090003322	A1	2009-01-01	ISUMI, SHINYA	
	19	20090327516	A1	2009-12-31	AMISHIMA, MAKI ET AL.	
	20	20060187926	A1	2006-08-24	IMAI, NAOKI	
	21	20070019545	A1	2007-01-25	ALT, WADE R. ET AL.	
	22	20050208947	A1	2005-09-22	BAHL, PRADEEP	
	23	20070297430	A1	2007-12-27	NYKANEN, PETRI ET AL.	
	24	20030214955	A1	2003-11-20	KIM, JUN-HYEONG	
	25	20050270992	A1	2005-12-08	SANZGIRI, AJIT ET AL.	
	26	20090052399	A1	2009-02-26	SILVER ET AL.	
	27	20070206563	A1	2007-09-06	SILVER ET AL.	
	28	20030217318	A1	2003-11-00	CHOI, SUNG-KYU	

EFS Web 2.1.17

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.D./

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	~~2849~~ 2194
	Examiner Name	Craig Dorais
	Attorney Docket Number	DAMA-31813

	29	20020064167	A1	2002-05-00	KHAN ET AL.	
	30	20060203750	A1	2006-09-14	RAVIKUMAR ET AL.	
	31	20060120375	A1	2006-06-08	RAVIKUMAR ET AL.	
	32	20070165629	A1	2007-07-19	CHATURVEDI ET AL.	
	33	20080235511	A1	2008-09-25	O'BRIEN, WILLIAM G. ET AL.	
	34	20100049980	A1	2010-02-25	BARRIGA, LUIS ET AL.	
	35	20080250408	A1	2008-10-09	TSUI ET AL.	
	36	20090136016	A1	2009-05-28	GORNOI ET AL.	
	37	20080235362	A1	2008-09-25	KJESBU ET AL.	
	38	20040148434	A1	2004-07-29	MATSUBARA ET AL.	
	39	20090182815	A1	2009-07-16	CZECHOWSKI ET AL.	

EFS Web 2.1.17 ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.D./

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	~~2840~~ 2194
	Examiner Name	Craig Dorais
	Attorney Docket Number	DAMA-31813

	40	20080273541	A1	2008-11-06	PHARN	
	41	20030046585	A1	2003-03-06	MINNICK	
	42	20040024879	A1	2004-02-05	DINGMAN ET AL.	
	43	20090006076	A1	2009-01-01	JINDAL, DINESH K.	
	44	20100223047	A1	2010-09-02	CHRIST, OLIVER	
	45	20100299150	A1	2010-11-25	FEIN ET AL.	
	46	20050198499	A1	2005-09-00	SALAPAKA ET AL.	
	47	20040139230	A1	2004-07-00	KIM, SEON KEON	
	48	20040240399	A1	2004-12-00	CORRAO ET AL.	
	49	20050201357	A1	2005-09-00	POYHONEN, PETTERI	
	50	20060121902	A1	2006-06-08	JAGADEESAN ET AL.	

EFS Web 2.1.17

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.D./

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	~~2840~~ 2194
	Examiner Name	Craig Dorais
	Attorney Docket Number	DAMA-31813

	51	20060205436	A1	2006-09-00	LIU ET AL.	
	52	20050130650	A1	2005-06-16	CREAMER ET AL.	
	53	20090088150	A1	2009-04-02	CHATURVEDI ET AL.	
	54	20100011111	A1	2010-01-14	MOHAMMAD, VIZAEI	
	55	20080130639	A1	2008-06-00	COSTA-REQUENA ET AL.	
	56	20060072506	A1	2006-04-00	SAYEEDI ET AL.	
	57	20060062180	A1	2006-03-00	SAYEEDI ET AL.	
	58	20080019285	A1	2008-01-00	JOHN ET AL.	
	59	20070253435	A1	2007-11-00	KELLER ET AL.	
	60	20050120073	A1	2005-06-00	CHO, JOON-HO	
	61	20050033843	A1	2005-02-00	SHAHI ET AL.	

EFS Web 2.1.17

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.D./

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	~~2840~~ 2194
	Examiner Name	Craig Dorais
	Attorney Docket Number	DAMA-31813

	62	20030088676	A1	2003-05-00	SMITH ET AL.	
	63	20070130253	A1	2007-06-00	NEWSON ET AL.	
	64	20100077023	A1	2010-03-00	ERIKSSON, ANDERS	
	65	20090055473	A1	2009-02-00	SYNNERGREN, PER	
	66	20080091813	A1	2008-04-00	BODLAENDER, MAARTEN	
	67	20070136459	A1	2007-06-00	ROCHE ET AL.	
	68	20050144288	A1	2005-06-00	LIAO, EN-YI	
	69	20040068567	A1	2004-04-00	MORAN ET AL.	
	70	20050220017	A1	2005-10-00	BRAND ET AL.	
	71	20030172145	A1	2003-09-00	NGUYEN	
	72	20110122864	A1	2011-05-26	CHERIFI ET AL.	

EFS Web 2.1.17

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.D./

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	~~2849~~ 2194
	Examiner Name	Craig Dorais
	Attorney Docket Number	DAMA-31813

	73	20090257433	A1	2009-10-15	MUTIKAINEN ET AL.	
	74	20060195402	A1	2006-08-00	MALINA ET AL.	
	75	20100299313	A1	2010-11-00	ORSINI ET AL.	
	76	20060171534	A1	2006-08-00	BAUGHMAN, WILLIAM P.	
	77	20070260359	A1	2007-11-00	BENSON ET AL.	
	78	20080168440	A1	2008-07-00	REGNIER ET AL.	
	79	20020031212	A1	2002-03-00	O'NEIL ET AL.	
	80	20050132009	A1	2005-06-00	SOLIE, KEVIN	
	81	20090234967	A1	2009-09-00	YU ET AL.	
	82	20100011108	A1	2010-01-00	CLARK ET AL.	
	83	20080123685	A1	2008-05-00	VARMA ET AL.	

EFS Web 2.1.17

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.D./

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	~~2849~~ 2194
	Examiner Name	Craig Dorais
	Attorney Docket Number	DAMA-31813

	84	20070082671	A1	2007-04-00	FENG ET AL.	
	85	20070025270	A1	2007-02-00	SYLVAIN, DANY	
	86	20060258289	A1	2006-11-00	DUA, ROBIN	
	87	20110099612	A1	2011-04-00	LEE ET AL.	
	88	20070274276	A1	2007-11-00	LAROIA ET AL.	
	89	20110040836	A1	2011-02-00	ALLEN ET AL.	
	90	20100312897	A1	2010-12-00	ALLEN ET AL.	
	91	20100312832	A1	2010-12-00	ALLEN ET AL.	
	92	20090156217	A1	2009-06-00	BAJPAI, RAJNEESH	
	93	20050138128	A1	2005-06-00	BANIEL ET AL.	
	94	20070116224	A1	2007-05-00	BURKE ET AL.	

EFS Web 2.1.17

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.D./

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	~~2810~~ 2194
	Examiner Name	Craig Dorais
	Attorney Docket Number	DAMA-31813

	95	20050187781	A1	2005-08-00	CHRISTENSEN, TORE L.	
	96	20110314134	A1	2011-12-00	FOTI, GEORGE	
	97	20100107205	A1	2010-04-00	FOTI, GEORGE	
	98	20100279670	A1	2010-11-00	GHAI ET AL.	
	99	20120263144	A1	2012-10-00	NIX, JOHN A.	
	100	20110145687	A1	2011-06-00	GRIGSBY ET AL.	
	101	20070239892	A1	2007-10-00	OTT ET AL.	
	102	20020152325	A1	2002-10-00	ELGEBALY ET AL.	
	103	20020156844	A1	2002-10-00	MAEHIRO, KAZUTOYO	
	104	20030212772	A1	2003-11-00	HARRIS, ADAM PIERCE	
	105	20020124096	A1	2002-09-05	LOGUINOV ET AL.	

EFS Web 2.1.17

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.D./

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	~~2040~~ 2194
	Examiner Name	Craig Dorais
	Attorney Docket Number	DAMA-31813

	106	20050201485	A1	2005-09-15	FAY	
	107	20060069775	A1	2006-03-30	ARTOBELLO ET AL.	
	108	20060165029	A1	2006-07-27	MELPIGNANO ET AL.	
	109	20050015502	A1	2005-01-20	KANG ET AL.	
	110	20030229715	A1	2003-12-11	BARATAKKE ET AL.	
	111	20010050923	A1	2001-12-13	PARK ET AL.	
	112	20040062267	A1	2004-04-01	MINAMI ET AL.	

If you wish to add additional U.S. Published Application citation information please click the Add button. Add

FOREIGN PATENT DOCUMENTS Remove

Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
/C.D./	1	1848163	EP	A1	2007-10-24	SHARP KABUSHIKI KAISHA		☐
/C.D./	2	1988698	EP	A1	2008-11-05	RESEARCH IN MOTION LIMITED		☐

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.D./

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	~~2849~~ 2194
	Examiner Name	Craig Dorais
	Attorney Docket Number	DAMA-31813

/C.D./	3	1988697	EP	A1	2008-11-05	RESEARCH IN MOTION LIMITED		☐
/C.D./	4	2006064047	WO	A1	2006-06-22	INTERNATIONAL BUSINESS MACHINES CORPORATION ET AL.		☐
/C.D./	5	1638275	EP	A2	2006-03-22	WECOMM LIMITED		☐
/C.D./	6	160339	EP	A1	2005-12-07	STMICROELECTRONICS S.R.I.		☐

If you wish to add additional Foreign Patent Document citation information please click the Add button Add

NON-PATENT LITERATURE DOCUMENTS Remove

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T5
/C.D./	1	PCT: International Search Report and Written Opinion for PCT/US2011/024870; 26 October 2011; 12 pages.	☐
/C.D./	2	J. ROSENBERG et al. " Session Traversal Utilities for NAT (STUN)", draft–ietf–behave–rfc3489bis–06, March 5, 2007.	☐
/C.D./	3	PCT: International Search Report and Written Opinion for PCT/US2011/028685; 9 November 2011; 10 pages.	☐
/C.D./	4	PCT: International Search Report and Written Opinion for PCT/US2011/029954; 24 November 2011; 8 pages.	☐
/C.D./	5	PCT: International Search Report and Written Opinion for PCT/US2011/024891; 25 November 2011; 9 pages.	☐

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.D./

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	~~2849~~ 2194
	Examiner Name	Craig Dorais
	Attorney Docket Number	DAMA-31813

/C.D./	6	PCT: International Search Report and Written Opinion for PCT/US2011/031245; 26 December 2011; 13 pages.	☐
/C.D./	7	Wireless Application Protocol - Wireless Transport Layer Security Specification, Version 18-Feb-2000, Wireless Application Forum, Ltd. 2000; 99 pages.	☐
/C.D./	8	PCT: International Search Report and Written Opinion for PCT/US2011/040864; 17 February 2012; 8 pages.	☐
/C.D./	9	PCT: International Search Report and Written Opinion for PCT/US2011/041565; 5 January 2012; 7 pages.	☐
/C.D./	10	PCT: International Search Report and Written Opinion for PCT/US2011/031246; 27 December 2011; 8 pages.	☐
/C.D./	11	PCT: International Search Report and Written Opinion for PCT/US2011/049000; 27 March 2012; 10 pages.	☐
/C.D./	12	PCT: International Search Report and Written Opinion for PCT/US2011/051877; 13 April 2012; 7 pages.	☐
/C.D./	13	PCT: International Search Report and Written Opinion for PCT/US2011/055101; 22 May 2012; 9 pages.	☐
/C.D./	14	Balamurugan Karpagavinayagam et al. (Monitoring Architecture for Lawful Interception in VoIP Networks, ICIMP 2007, 24 Aug 2008).	☐
/C.D./	15	NiceLog User's Manual 385A0114-08 Rev. A2, March 2004.	☐
/C.D./	16	WISPA: Wireless Internet Service Providers Association; WISPA-CS-IPNA-2.0; May 1, 2009.	☐

EFS Web 2.1.17

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.D./

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	~~2840~~ 2194
	Examiner Name	Craig Dorais
	Attorney Docket Number	DAMA-31813

/C.D./	17	PCT: International Preliminary Report on Patentability of PCT/US2011/024870; 30 August 2012; 7 pgs.	☐
/C.D./	18	RFC 5694 ("Peer-to-Peer (P2P) Architecture: Definition, Taxonomies, Examples, and Applicability", November 2009).	☐
/C.D./	19	Mahy et al., The Session Initiation Protocol (SIP) "Replaces" Header, September 2004, RFC 3891, pages 1-16.	☐
/C.D./	20	PCT: International Preliminary Report on Patentability of PCT/US2011/024891; 30 August 2012; 6 pgs.	☐
/C.D./	21	T. Dierks & E. Rescorla, The Transport Layer Security (TLS) Protocol (Ver. 1.2, 8/2008) retrieved at http://tools.ietf.org/html/rfc5246. Relevant pages provided.	☐
/C.D./	22	J. Rosenberg et al., SIP: Session Initiation Protocol (6/2008) retrieved at http://tools.ietf.org/html/rfc3261. Relevant pages provided.	☐
/C.D./	23	Philippe Bazot et al., Developing SIP and IP Multimedia Subsystem (IMS) Applications (2/5/2007) retrieved at redbooks IBM form number: SG24-7255-00. Relevant pages provided.	☐
/C.D./	24	PCT: International Preliminary Report on Patentability of PCT/US2011/028685; 4 October 2012; 6 pgs.	☐
/C.D./	25	PCT: International Preliminary Report on Patentability of PCT/US2011/031245; 26 October 2012; 9 pgs.	☐
/C.D./	26	PCT: International Preliminary Report on Patentability of PCT/US2011/029954; 11 October 2012; 5 pgs.	☐
/C.D./	27	PCT: International Preliminary Report on Patentability of PCT/US2011/031246; 08 November 2012; 5 pgs.	☐

EFS Web 2.1.17

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.D./

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	~~2840~~ 2194
	Examiner Name	Craig Dorais
	Attorney Docket Number	DAMA-31813

/C.D./	28	Rosenberg, J; "Interactive Connectivity Establishment (ICE): A Protocol for Network Address Translator (NAT) Traversal for Offer/Answer Protocols"; 29 October 2007; I ETF; I ETF draft of RFC 5245, draft-ietf-mmusic-ice-19; pp 1-120.	☐
/C.D./	29	Blanchet et al; "IPv6 Tunnel Broker with the Tunnel Setup Protocol (TSP)"; 6 May 2008; IETF; IETF draft of RFC 5572, draftblanchet-v6ops-tunnelbroker-tsp-04; pp 1-33	☐
/C.D./	30	Cooper et al; "NAT Traversal for dSIP"; 25 February 2007; IETF; IETF draft draft-matthews-p2psip-dsip-nat-traversal-00; pp 1-23	☐
/C.D./	31	Cooper et al; "The Effect of NATs on P2PSIP Overlay Architecture"; IETF; IETF draft draft-matthews-p2psip-nats-and-overlays-01.txt; pp 1-20	☐
/C.D./	32	Srisuresh et al; "State of Peer-to-Peer(P2P) Communication Across Network Address Translators(NATs)"; 19 November 2007; I ETF; I ETF draft for RFC 5128, draft-ietf-behave-p2p-state-06.txt; pp 1-33	☐
/C.D./	33	PCT: International Search Report and Written Opinion for PCT/US2012/046026; 18 October 2012; 6 pages.	☐
/C.D./	34	DUNIGAN, Tom, "Almost TCP over UDP (atou)," last modified Jan. 12, 2004; retrieved on Jan. 18, 2011 from <http://www.csm.ornl.gov/~dunigan/net100/atou.html> 18 pgs.	☐
/C.D./	35	PCT: International Preliminary Report on Patentability of PCT/US2011/040864; 3 January 2013; 6 pgs.	☐
/C.D./	36	PCT: International Preliminary Report on Patentability of PCT/US2011/041565; 10 January 2013; 6 pgs.	☐
/C.D./	37	PCT: International Preliminary Report on Patentability of PCT/US2011/049000; 26 February 2013; 6 pgs.	☐
/C.D./	38	PCT: International Preliminary Report on Patentability of PCT/US2011/051877; 26 March 2013; 5 pgs.	☐

EFS Web 2.1.17

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.D./

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	~~2810~~ 2194
	Examiner Name	Craig Dorais
	Attorney Docket Number	DAMA-31813

/C.D./	39	PCT: International Preliminary Report on Patentability of PCT/US2011/055101; 16 April 2013; 7 pgs.	☐

If you wish to add additional non-patent literature document citation information please click the Add button **Add**

EXAMINER SIGNATURE

Examiner Signature	/Craig Dorais/	Date Considered	03/13/2015

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.D./

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	~~2840~~ 2194
	Examiner Name	Craig Dorais
	Attorney Docket Number	DAMA-31813

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☐ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☐ See attached certification statement.

☐ Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ None

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Timothy F. Bliss Reg. #50925/	Date (YYYY-MM-DD)	2013-12-11
Name/Print	TIMOTHY F. BLISS	Registration Number	50925

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.D./

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these record s.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.D./

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14024027	CHATURVEDI ET AL.
	Examiner	**Art Unit**
	CRAIG DORAIS	2194

CPC						
Symbol					**Type**	**Version**
G06F		9	/	54	F	2013-01-01
G06F		9	/	542	I	2013-01-01
G06F		9	/	541	I	2013-01-01
			/			
			/			
			/			
			/			
			/			
			/			
			/			
			/			
			/			
			/			
			/			
			/			

CPC Combination Sets								
Symbol					**Type**	**Set**	**Ranking**	**Version**
			/					
			/					

NONE (Assistant Examiner) (Date)	**Total Claims Allowed:** 21	
/CRAIG DORAIS/ Primary Examiner.Art Unit 2194 (Primary Examiner) (Date)	O.G. Print Claim(s) 16	O.G. Print Figure 6A

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14024027	CHATURVEDI ET AL.
	Examiner	**Art Unit**
	CRAIG DORAIS	2194

US ORIGINAL CLASSIFICATION		INTERNATIONAL CLASSIFICATION	
CLASS	SUBCLASS	CLAIMED	NON-CLAIMED
719	313	G 06 F 3 / 00 (2006.01.01)	
		G 06 F 9 / 44 (2006.01.01)	
CROSS REFERENCE(S)		G 06 F 9 / 46 (2006.01.01)	
		G 06 F 13 / 00 (2006.01.01)	

CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)				
719	319	329			

NONE (Assistant Examiner) (Date)	**Total Claims Allowed:** 21
/CRAIG DORAIS/ Primary Examiner.Art Unit 2194 (Primary Examiner) (Date)	O.G. Print Claim(s): 16 O.G. Print Figure: 6A

U.S. Patent and Trademark Office

Part of Paper No. 20150316

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14024027	CHATURVEDI ET AL.
	Examiner	**Art Unit**
	CRAIG DORAIS	2194

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
1	1	16	17												
2	2	17	18												
3	3	18	19												
4	4	19	20												
5	5	20	21												
6	6	21	22												
7	7														
8	8														
9	9														
10	10														
11	11														
12	12														
-	13														
13	14														
14	15														
15	16														

NONE (Assistant Examiner) (Date)	**Total Claims Allowed:** 21	
/CRAIG DORAIS/ Primary Examiner.Art Unit 2194 (Primary Examiner) (Date)	O.G. Print Claim(s) 16	O.G. Print Figure 6A

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S1	37	("20010050923" | "20020143548" | "20020156844" | "20030202480" | "20040034776" | "20040103212" | "20050130650" | "20050132009" | "20050198499" | "20050201485" | "20060168643" | "20060258289" | "20070136459" | "20070165629" | "20070206563" | "20070297430" | "20080273541" | "20090052399" | "20090240821" | "20090327516" | "20110122864" | "20110314134" | "6128283" | "7079529" | "7092385" | "7487248" | "7623476" | "20030177422" | "20050033985" | "20050091407" | "6850769" | "7304985" | "20020037000" | "20020064167" | "20030110047" | "20030172145" | "20030214955" | "20040139230" | "20040153858" | "20040268257" | "20050136911" | "20050138128" | "20060072506" | "20060120375" | "20070082671" | "20070130253" | "20110145687" | "6219638" | "6754181" | "6999575" | "7185114" | "7590758" | "7623516" | "7774495" | "20030035441" | "20030076815" | "20030217171" | "20040260952" | "20050050227" | "5442637" | "5889762" | "6343067" | "7080158" | "20020031212" | "20020062285" | "20030046585" | "20040052234" | "20040139228" | "20040267527" | "20050187781" | "20060121902" | "20060171534" | "20060187926" | "20070253435" | "20080032695" | "20080168440" | "20090055473" | "20100049980" | "20100107205" | "20100312897" | "20110099612" | "20120263144" | "6141687" | "6898413" | "7010109" | "7345999" | "7457279" | "7542472" | "7570743" | "8065418" | "20020080719" | "20020176404" | "20030031210" | "20030115251" | "20070016921" | "6836765" | "20020042769" | "20020124096" | "20030009565" | "20030043764" | "20030105812" | "20040128554" | "20050004982" | "20050120073" | "20050220017" | "20060062180" | "20060182100" | "20060205436" | "20070019545" | "20080091813" | "20080130639" | "20090003322" | "20090156217" | "20090234967" | "20090257433" |	USPAT; USOCR	OR	OFF	2015/03/13 10:50

		"20100011108" | "20100011111" | "20100279670" | "20100299150" | "20100299313" | "7346044" | "7353252" | "7574523" | "7656870" | "20020087887" | "20020120757" | "20020184310" | "20030046056" | "20030163697" | "20040034793" | "20050195802" | "20070110043" | "20080320096" | "6987756" | "7184415" | "7272377" | "7412374" | "7477282" | "7512652" | "20020097150" | "20020152325" | "20030088676" | "20030126213" | "20030158722" | "20030163525").PN.				
S2	36	("20030187650" | "20040024879" | "20040068567" | "20040203834" | "20040240399" | "20050071481" | "20050143105" | "20050246193" | "20060002355" | "20060069775" | "20060203750" | "20070025270" | "20070190987" | "20070260359" | "20080123685" | "20080250408" | "20100077023" | "6963555" | "6975718" | "7006508" | "7013155" | "7564843" | "7782866" | "20040100973" | "20040158471" | "20040162871" | "20040228279" | "20040267938" | "20050008024" | "20050286519" | "20080192756" | "6766373" | "7613171" | "20020173303" | "20030078858" | "20030212772" | "20040005877" | "20040249953" | "20050033843" | "20050105524" | "20050270992" | "20070078785" | "20070111794" | "20070239892" | "20080019285" | "20080080392" | "20090136016" | "6298129" | "6360196" | "6826613" | "7117526" | "7302496" | "7664495" | "7778187" | "8009586" | "20020166053" | "20030044020" | "20030072485" | "20030174707" | "20050119005" | "20050249196" | "20090192976" | "6999932" | "7353255" | "20020150110" | "20040039781" | "20040044517" | "20040062267" | "20040148434" | "20040213184" | "20050015502" | "20050144288" | "20050201357" | "20060195402" | "20060218624" | "20060230166" | "20070116224" | "20070274276" | "20080005328" | "20090182815" | "20100312832" | "20110040836" | "5761309" | "6202084" | "6389016" | "6438376" | "6741691" | "6940826" | "7769881" | "20030137939" | "20040139225" | "20060183476" | "20060246903" | "20080069105" | "6031818" | "6311150" | "6574668" | "6842460" | "20020038282" | "20030061025" | "20030061481" | "20030135569" | "20030177186" | "20030217318" | "20030229715" | "20040133689" | "20040143678" | "20050187957" | "20050208947" | "20050254440" | "20060121986" | "20060165029" | "20080235362"	USPAT; USOCR	OR	OFF	2015/03/13 10:50

		"20080235511" | "20090006076" | "20090088150" | "20090300673" | "20100223047" | "5818447" | "6161082" | "6912278" | "7123710" | "7917584" | "20020178087" | "20030220121" | "20050086309" | "20050138119" | "20060148516" | "5790637" | "6473425").PN.				
S3	304	("20010050923" | "20020143548" | "20020156844" | "20030202480" | "20040034776" | "20040103212" | "20050130650" | "20050132009" | "20050198499" | "20050201485" | "20060168643" | "20060258289" | "20070136459" | "20070165629" | "20070206563" | "20070297430" | "20080273541" | "20090052399" | "20090240821" | "20090327516" | "20110122864" | "20110314134" | "6128283" | "7079529" | "7092385" | "7487248" | "7623476" | "20030177422" | "20050033985" | "20050091407" | "6850769" | "7304985" | "20020037000" | "20020064167" | "20030110047" | "20030172145" | "20030214955" | "20040139230" | "20040153858" | "20040268257" | "20050136911" | "20050138128" | "20060072506" | "20060120375" | "20070082671" | "20070130253" | "20110145687" | "6219638" | "6754181" | "6999575" | "7185114" | "7590758" | "7623516" | "7774495" | "20030035441" | "20030076815" | "20030217171" | "20040260952" | "20050050227" | "5442637" | "5889762" | "6343067" | "7080158" | "20020031212" | "20020062285" | "20030046585" | "20040052234" | "20040139228" | "20040267527" | "20050187781" | "20060121902" | "20060171534" | "20060187926" | "20070253435" | "20080032695" | "20080168440" | "20090055473" | "20100049980" | "20100107205" | "20100312897" | "20110099612" | "20120263144" | "6141687" | "6898413" | "7010109" | "7345999" | "7457279" | "7542472" | "7570743" | "8065418" | "20020080719" | "20020176404" | "20030031210" | "20030115251" | "20070016921" | "6836765" | "20020042769" | "20020124096" | "20030009565" | "20030043764" | "20030105812" | "20040128554" | "20050004982" | "20050120073" | "20050220017" | "20060062180" | "20060182100" | "20060205436" | "20070019545" | "20080091813" | "20080130639" | "20090003322" | "20090156217" | "20090234967" | "20090257433" | "20100011108" | "20100011111" | "20100279670" | "20100299150" | "20100299313" | "7346044" | "7353252" |	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/03/13 11:25

		"7574523" | "7656870" | "20020087887" | "20020120757" | "20020184310" | "20030046056" | "20030163697" | "20040034793" | "20050195802" | "20070110043" | "20080320096" | "6987756" | "7184415" | "7272377" | "7412374" | "7477282" | "7512652" | "20020097150" | "20020152325" | "20030088676" | "20030126213" | "20030158722" | "20030163525").PN.				
S4	36	("20030187650" | "20040024879" | "20040068567" | "20040203834" | "20040240399" | "20050071481" | "20050143105" | "20050246193" | "20060002355" | "20060069775" | "20060203750" | "20070025270" | "20070190987" | "20070260359" | "20080123685" | "20080250408" | "20100077023" | "6963555" | "6975718" | "7006508" | "7013155" | "7564843" | "7782866" | "20040100973" | "20040158471" | "20040162871" | "20040228279" | "20040267938" | "20050008024" | "20050286519" | "20080192756" | "6766373" | "7613171" | "20020173303" | "20030078858" | "20030212772" | "20040005877" | "20040249953" | "20050033843" | "20050105524" | "20050270992" | "20070078785" | "20070111794" | "20070239892" | "20080019285" | "20080080392" | "20090136016" | "6298129" | "6360196" | "6826613" | "7117526" | "7302496" | "7664495" | "7778187" | "8009586" | "20020166053" | "20030044020" | "20030072485" | "20030174707" | "20050119005" | "20050249196" | "20090192976" | "6999932" | "7353255" | "20020150110" | "20040039781" | "20040044517" | "20040062267" | "20040148434" | "20040213184" | "20050015502" | "20050144288" | "20050201357" | "20060195402" | "20060218624" | "20060230166" | "20070116224" | "20070274276" | "20080005328" | "20090182815" | "20100312832" | "20110040836" | "5761309" | "6202084" | "6389016" | "6438376" | "6741691" | "6940826" | "7769881" | "20030137939" | "20040139225" | "20060183476" | "20060246903" | "20080069105" | "6031818" | "6311150" | "6574668" | "6842460" | "20020038282" | "20030061025" | "20030061481" | "20030135569" | "20030177186" | "20030217318" | "20030229715" | "20040133689" | "20040143678" | "20050187957" | "20050208947" | "20050254440" | "20060121986" | "20060165029" | "20080235362" | "20080235511" | "20090006076" | "20090088150" | "20090300673" | "20100223047" | "5818447" | "6161082"	USPAT; USOCR	OR	OFF	2015/03/13 11:26

		"6912278" | "7123710" | "7917584" | "20020178087" | "20030220121" | "20050086309" | "20050138119" | "20060148516" | "5790637" | "6473425").PN.				
S5	268	("20030187650" | "20040024879" | "20040068567" | "20040203834" | "20040240399" | "20050071481" | "20050143105" | "20050246193" | "20060002355" | "20060069775" | "20060203750" | "20070025270" | "20070190987" | "20070260359" | "20080123685" | "20080250408" | "20100077023" | "6963555" | "6975718" | "7006508" | "7013155" | "7564843" | "7782866" | "20040100973" | "20040158471" | "20040162871" | "20040228279" | "20040267938" | "20050008024" | "20050286519" | "20080192756" | "6766373" | "7613171" | "20020173303" | "20030078858" | "20030212772" | "20040005877" | "20040249953" | "20050033843" | "20050105524" | "20050270992" | "20070078785" | "20070111794" | "20070239892" | "20080019285" | "20080080392" | "20090136016" | "6298129" | "6360196" | "6826613" | "7117526" | "7302496" | "7664495" | "7778187" | "8009586" | "20020166053" | "20030044020" | "20030072485" | "20030174707" | "20050119005" | "20050249196" | "20090192976" | "6999932" | "7353255" | "20020150110" | "20040039781" | "20040044517" | "20040062267" | "20040148434" | "20040213184" | "20050015502" | "20050144288" | "20050201357" | "20060195402" | "20060218624" | "20060230166" | "20070116224" | "20070274276" | "20080005328" | "20090182815" | "20100312832" | "20110040836" | "5761309" | "6202084" | "6389016" | "6438376" | "6741691" | "6940826" | "7769881" | "20030137939" | "20040139225" | "20060183476" | "20060246903" | "20080069105" | "6031818" | "6311150" | "6574668" | "6842460" | "20020038282" | "20030061025" | "20030061481" | "20030135569" | "20030177186" | "20030217318" | "20030229715" | "20040133689" | "20040143678" | "20050187957" | "20050208947" | "20050254440" | "20060121986" | "20060165029" | "20080235362" | "20080235511" | "20090006076" | "20090088150" | "20090300673" | "20100223047" | "5818447" | "6161082" | "6912278" | "7123710" | "7917584" | "20020178087" | "20030220121" | "20050086309" | "20050138119" | "20060148516" | "5790637" | "6473425").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/03/13 11:26

S6	98	CHATURVEDI-SIVAKUMAR-$.in. CHATURVEDI-SIVAKUMAR.in. GUNDABATHULA-SATISH.in. GUNDABATHULA-SATISH-$.in. HIREMATH-RASHMI.in. HIREMATH-RASHMI-$.in.	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2015/03/13 12:02
S7	8533	(G06F9/54.cpc. G06F9/541.cpc. G06F9/542.cpc.) AND @ad<"20130911"	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/03/13 15:56
S8	9338	(G06F9/54.cpc. G06F9/541.cpc. G06F9/542.cpc. G06F9/44526.cpc.) AND @ad<"20130911"	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/03/13 15:59
S9	1053	plug-in AND (G06F9/54.cpc. G06F9/541.cpc. G06F9/542.cpc. G06F9/44526.cpc.) AND @ad<"20130911"	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/03/13 16:14
S10	60	S8 AND ((plug-in plugin plug ADJ in addon add-on add ADJ on addin add-in add ADJ in extension) WITH (verify verifies verifying verified verification check checks checking checked determine determines determining determined) WITH (authority authorize authorizes authorizing authorized approve approves approving approved approval allow allows allowing allowed allowance ok okeys oking oked okes ok-ed ok-ing)) AND @ad<"20130911"	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/03/13 16:21
S11	9338	(G06F9/54.cpc. G06F9/541.cpc. G06F9/542.cpc. G06F9/44526.cpc.) AND @ad<"20130911"	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/03/13 16:50
S12	60	S11 AND ((plug-in plugin plug ADJ in addon add-on add ADJ on addin add-in add ADJ in extension) WITH (verify verifies verifying verified verification check checks checking checked determine determines determining determined) WITH (authority authorize authorizes authorizing authorized approve approves approving approved approval allow allows allowing allowed allowance ok okeys oking oked okes ok-ed ok-ing)) AND @ad<"20130911"	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/03/13 16:50
S13	6	S11 AND ((plug-in plugin plug ADJ in addon add-on add ADJ on addin add-in add ADJ in extension) WITH (verify verifies verifying verified verification check checks checking checked determine determines determining determined) WITH (authority authorize authorizes authorizing authorized approve approves approving approved approval allow allows allowing allowed allowance ok okeys oking oked okes ok-ed ok-ing)) AND @ad<"20130911" NOT S12	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/03/13 16:50
S14	34	S11 AND ((plug-in plugin plug ADJ in addon add-on add ADJ on addin add-in add ADJ in extension) WITH (verify verifies	US-PGPUB; USPAT; EPO; JPO;	OR	ON	2015/03/13 16:58

		verifying verified verification check checks checking checked determine determines determining determined) WITH (authority authorize authorizes authorizing authorized approve approves approving approved approval allow allows allowing allowed allowance ok okeys oking oked okes ok-ed ok-ing able capable permission clearence)) AND @ad<"20130911" NOT S12	DERWENT; IBM_TDB			
S15	9352	(G06F9/54.cpc. G06F9/541.cpc. G06F9/542.cpc. G06F9/44526.cpc.) AND @ad<"20130911"	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/03/14 10:41
S16	60	S15 AND ((plug-in plugin plug ADJ in addon add-on add ADJ on addin add-in add ADJ in extension) WITH (verify verifies verifying verified verification check checks checking checked determine determines determining determined) WITH (authority authorize authorizes authorizing authorized approve approves approving approved approval allow allows allowing allowed allowance ok okeys oking oked okes ok-ed ok-ing)) AND @ad<"20130911"	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/03/14 10:41
S17	5569	((plug-in plugin plug ADJ in addon add-on add ADJ on addin add-in add ADJ in extension) WITH (verify verifies verifying verified verification check checks checking checked determine determines determining determined) WITH (authority authorize authorizes authorizing authorized approve approves approving approved approval allow allows allowing allowed allowance ok okeys oking oked okes ok-ed ok-ing able capable permission clearence)) AND @ad<"20130911" NOT S16	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/03/14 10:41
S18	1248	((window screen pane image display) WITH (plug-in plugin plug ADJ in addon add-on add ADJ on addin add-in add ADJ in extension)) AND((plug-in plugin plug ADJ in addon add-on add ADJ on addin add-in add ADJ in extension) WITH (verify verifies verifying verified verification check checks checking checked determine determines determining determined) WITH (authority authorize authorizes authorizing authorized approve approves approving approved approval allow allows allowing allowed allowance ok okeys oking oked okes ok-ed ok-ing able capable permission clearence)) AND @ad<"20130911" NOT S16	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/03/14 10:44
S19	6	S15 AND ((plug-in plugin plug ADJ in addon add-on add ADJ on addin add-in add ADJ in extension) WITH (verify verifies verifying verified verification check checks checking checked determine determines determining determined) WITH (authority authorize authorizes authorizing authorized approve approves approving approved approval allow allows allowing allowed	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/03/14 10:47

		allowance ok okeys oking oked okes ok-ed ok-ing)) AND @ad<"20130911" NOT S16				
S20	34	S15 AND ((plug-in plugin plug ADJ in addon add-on add ADJ on addin add-in add ADJ in extension) WITH (verify verifies verifying verified verification check checks checking checked determine determines determining determined) WITH (authority authorize authorizes authorizing authorized approve approves approving approved approval allow allows allowing allowed allowance ok okeys oking oked okes ok-ed ok-ing able capable permission clearence)) AND @ad<"20130911" NOT S16	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/03/14 10:47
S22	125	((window screen pane image display) WITH (plug-in plugin plug ADJ in addon add-on add ADJ on addin add-in add ADJ in extension) WITH (both together simultaneously "same time" concurrent concurrently simultaneous)) AND((plug-in plugin plug ADJ in addon add-on add ADJ on addin add-in add ADJ in extension) WITH (verify verifies verifying verified verification check checks checking checked determine determines determining determined) WITH (authority authorize authorizes authorizing authorized approve approves approving approved approval allow allows allowing allowed allowance ok okeys oking oked okes ok-ed ok-ing able capable permission clearence)) AND @ad<"20130911" NOT S16	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/03/14 10:57
S24	1	((window screen pane image display) WITH (function ADJ block plug-in plugin plug ADJ in addon add-on add ADJ on addin add-in add ADJ in extension) WITH (both together simultaneously "same time" concurrent concurrently simultaneous)) AND((function ADJ block plug-in plugin plug ADJ in addon add-on add ADJ on addin add-in add ADJ in extension) WITH (verify verifies verifying verified verification check checks checking checked determine determines determining determined) WITH (authority authorize authorizes authorizing authorized approve approves approving approved approval allow allows allowing allowed allowance ok okeys oking oked okes ok-ed ok-ing able capable permission clearence)) AND @ad<"20130911" NOT (S16 S19 S20 S22)	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/03/14 11:21
S25	2	((window screen pane image display) WITH (((function program application app sub) NEAR2 (block section segment)) plug-in plugin plug ADJ in addon add-on add ADJ on addin add-in add ADJ in extension) WITH (both together simultaneously "same time" concurrent concurrently simultaneous)) AND((function ADJ block plug-in plugin plug ADJ in addon add-on add ADJ on addin add-in add ADJ in extension) WITH (verify verifies verifying verified verification check	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/03/14 11:24

		checks checking checked determine determines determining determined) WITH (authority authorize authorizes authorizing authorized approve approves approving approved approval allow allows allowing allowed allowance ok okeys oking oked okes ok-ed ok-ing able capable permission clearence)) AND @ad<"20130911" NOT (S16 S19 S20 S22 S23)				
S26	876	G06F9/44526.cpc. AND @ad<"20130911"	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/03/14 11:27
S27	37	("20010050923" | "20020143548" | "20020156844" | "20030202480" | "20040034776" | "20040103212" | "20050130650" | "20050132009" | "20050198499" | "20050201485" | "20060168643" | "20060258289" | "20070136459" | "20070165629" | "20070206563" | "20070297430" | "20080273541" | "20090052399" | "20090240821" | "20090327516" | "20110122864" | "20110314134" | "6128283" | "7079529" | "7092385" | "7487248" | "7623476" | "20030177422" | "20050033985" | "20050091407" | "6850769" | "7304985" | "20020037000" | "20020064167" | "20030110047" | "20030172145" | "20030214955" | "20040139230" | "20040153858" | "20040268257" | "20050136911" | "20050138128" | "20060072506" | "20060120375" | "20070082671" | "20070130253" | "20110145687" | "6219638" | "6754181" | "6999575" | "7185114" | "7590758" | "7623516" | "7774495" | "20030035441" | "20030076815" | "20030217171" | "20040260952" | "20050050227" | "5442637" | "5889762" | "6343067" | "7080158" | "20020031212" | "20020062285" | "20030046585" | "20040052234" | "20040139228" | "20040267527" | "20050187781" | "20060121902" | "20060171534" | "20060187926" | "20070253435" | "20080032695" | "20080168440" | "20090055473" | "20100049980" | "20100107205" | "20100312897" | "20110099612" | "20120263144" | "6141687" | "6898413" | "7010109" | "7345999" | "7457279" | "7542472" | "7570743" | "8065418" | "20020080719" | "20020176404" | "20030031210" | "20030115251" | "20070016921" | "6836765" | "20020042769" | "20020124096" | "20030009565" | "20030043764" | "20030105812" | "20040128554" | "20050004982" | "20050120073" | "20050220017" | "20060062180" | "20060182100" | "20060205436" | "20070019545" |	USPAT; USOCR	OR	OFF	2015/03/14 11:29

		"20080091813" | "20080130639" | "20090003322" | "20090156217" | "20090234967" | "20090257433" | "20100011108" | "20100011111" | "20100279670" | "20100299150" | "20100299313" | "7346044" | "7353252" | "7574523" | "7656870" | "20020087887" | "20020120757" | "20020184310" | "20030046056" | "20030163697" | "20040034793" | "20050195802" | "20070110043" | "20080320096" | "6987756" | "7184415" | "7272377" | "7412374" | "7477282" | "7512652" | "20020097150" | "20020152325" | "20030088676" | "20030126213" | "20030158722" | "20030163525").PN.				
S28	36	("20030187650" | "20040024879" | "20040068567" | "20040203834" | "20040240399" | "20050071481" | "20050143105" | "20050246193" | "20060002355" | "20060069775" | "20060203750" | "20070025270" | "20070190987" | "20070260359" | "20080123685" | "20080250408" | "20100077023" | "6963555" | "6975718" | "7006508" | "7013155" | "7564843" | "7782866" | "20040100973" | "20040158471" | "20040162871" | "20040228279" | "20040267938" | "20050008024" | "20050286519" | "20080192756" | "6766373" | "7613171" | "20020173303" | "20030078858" | "20030212772" | "20040005877" | "20040249953" | "20050033843" | "20050105524" | "20050270992" | "20070078785" | "20070111794" | "20070239892" | "20080019285" | "20080080392" | "20090136016" | "6298129" | "6360196" | "6826613" | "7117526" | "7302496" | "7664495" | "7778187" | "8009586" | "20020166053" | "20030044020" | "20030072485" | "20030174707" | "20050119005" | "20050249196" | "20090192976" | "6999932" | "7353255" | "20020150110" | "20040039781" | "20040044517" | "20040062267" | "20040148434" | "20040213184" | "20050015502" | "20050144288" | "20050201357" | "20060195402" | "20060218624" | "20060230166" | "20070116224" | "20070274276" | "20080005328" | "20090182815" | "20100312832" | "20110040836" | "5761309" | "6202084" | "6389016" | "6438376" | "6741691" | "6940826" | "7769881" | "20030137939" | "20040139225" | "20060183476" | "20060246903" | "20080069105" | "6031818" | "6311150" | "6574668" | "6842460" | "20020038282" | "20030061025" | "20030061481" | "20030135569" | "20030177186" | "20030217318" | "20030229715" | "20040133689" | "20040143678"	USPAT; USOCR	OR	OFF	2015/03/14 11:29

		"20050187957" | "20050208947" | "20050254440" | "20060121986" | "20060165029" | "20080235362" | "20080235511" | "20090006076" | "20090088150" | "20090300673" | "20100223047" | "5818447" | "6161082" | "6912278" | "7123710" | "7917584" | "20020178087" | "20030220121" | "20050086309" | "20050138119" | "20060148516" | "5790637" | "6473425").PN.				
S29	304	("20010050923" | "20020143548" | "20020156844" | "20030202480" | "20040034776" | "20040103212" | "20050130650" | "20050132009" | "20050198499" | "20050201485" | "20060168643" | "20060258289" | "20070136459" | "20070165629" | "20070206563" | "20070297430" | "20080273541" | "20090052399" | "20090240821" | "20090327516" | "20110122864" | "20110314134" | "6128283" | "7079529" | "7092385" | "7487248" | "7623476" | "20030177422" | "20050033985" | "20050091407" | "6850769" | "7304985" | "20020037000" | "20020064167" | "20030110047" | "20030172145" | "20030214955" | "20040139230" | "20040153858" | "20040268257" | "20050136911" | "20050138128" | "20060072506" | "20060120375" | "20070082671" | "20070130253" | "20110145687" | "6219638" | "6754181" | "6999575" | "7185114" | "7590758" | "7623516" | "7774495" | "20030035441" | "20030076815" | "20030217171" | "20040260952" | "20050050227" | "5442637" | "5889762" | "6343067" | "7080158" | "20020031212" | "20020062285" | "20030046585" | "20040052234" | "20040139228" | "20040267527" | "20050187781" | "20060121902" | "20060171534" | "20060187926" | "20070253435" | "20080032695" | "20080168440" | "20090055473" | "20100049980" | "20100107205" | "20100312897" | "20110099612" | "20120263144" | "6141687" | "6898413" | "7010109" | "7345999" | "7457279" | "7542472" | "7570743" | "8065418" | "20020080719" | "20020176404" | "20030031210" | "20030115251" | "20070016921" | "6836765" | "20020042769" | "20020124096" | "20030009565" | "20030043764" | "20030105812" | "20040128554" | "20050004982" | "20050120073" | "20050220017" | "20060062180" | "20060182100" | "20060205436" | "20070019545" | "20080091813" | "20080130639" | "20090003322" | "20090156217" | "20090234967" | "20090257433" |	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/03/14 11:29

		"20100011108" | "20100011111" | "20100279670" | "20100299150" | "20100299313" | "7346044" | "7353252" | "7574523" | "7656870" | "20020087887" | "20020120757" | "20020184310" | "20030046056" | "20030163697" | "20040034793" | "20050195802" | "20070110043" | "20080320096" | "6987756" | "7184415" | "7272377" | "7412374" | "7477282" | "7512652" | "20020097150" | "20020152325" | "20030088676" | "20030126213" | "20030158722" | "20030163525").PN.				
S30	36	("20030187650" | "20040024879" | "20040068567" | "20040203834" | "20040240399" | "20050071481" | "20050143105" | "20050246193" | "20060002355" | "20060069775" | "20060203750" | "20070025270" | "20070190987" | "20070260359" | "20080123685" | "20080250408" | "20100077023" | "6963555" | "6975718" | "7006508" | "7013155" | "7564843" | "7782866" | "20040100973" | "20040158471" | "20040162871" | "20040228279" | "20040267938" | "20050008024" | "20050286519" | "20080192756" | "6766373" | "7613171" | "20020173303" | "20030078858" | "20030212772" | "20040005877" | "20040249953" | "20050033843" | "20050105524" | "20050270992" | "20070078785" | "20070111794" | "20070239892" | "20080019285" | "20080080392" | "20090136016" | "6298129" | "6360196" | "6826613" | "7117526" | "7302496" | "7664495" | "7778187" | "8009586" | "20020166053" | "20030044020" | "20030072485" | "20030174707" | "20050119005" | "20050249196" | "20090192976" | "6999932" | "7353255" | "20020150110" | "20040039781" | "20040044517" | "20040062267" | "20040148434" | "20040213184" | "20050015502" | "20050144288" | "20050201357" | "20060195402" | "20060218624" | "20060230166" | "20070116224" | "20070274276" | "20080005328" | "20090182815" | "20100312832" | "20110040836" | "5761309" | "6202084" | "6389016" | "6438376" | "6741691" | "6940826" | "7769881" | "20030137939" | "20040139225" | "20060183476" | "20060246903" | "20080069105" | "6031818" | "6311150" | "6574668" | "6842460" | "20020038282" | "20030061025" | "20030061481" | "20030135569" | "20030177186" | "20030217318" | "20030229715" | "20040133689" | "20040143678" | "20050187957" | "20050208947" | "20050254440" | "20060121986" | "20060165029" | "20080235362"	USPAT; USOCR	OR	OFF	2015/03/14 11:29

		"20080235511" | "20090006076" | "20090088150" | "20090300673" | "20100223047" | "5818447" | "6161082" | "6912278" | "7123710" | "7917584" | "20020178087" | "20030220121" | "20050086309" | "20050138119" | "20060148516" | "5790637" | "6473425").PN.				
S31	268	("20030187650" | "20040024879" | "20040068567" | "20040203834" | "20040240399" | "20050071481" | "20050143105" | "20050246193" | "20060002355" | "20060069775" | "20060203750" | "20070025270" | "20070190987" | "20070260359" | "20080123685" | "20080250408" | "20100077023" | "6963555" | "6975718" | "7006508" | "7013155" | "7564843" | "7782866" | "20040100973" | "20040158471" | "20040162871" | "20040228279" | "20040267938" | "20050008024" | "20050286519" | "20080192756" | "6766373" | "7613171" | "20020173303" | "20030078858" | "20030212772" | "20040005877" | "20040249953" | "20050033843" | "20050105524" | "20050270992" | "20070078785" | "20070111794" | "20070239892" | "20080019285" | "20080080392" | "20090136016" | "6298129" | "6360196" | "6826613" | "7117526" | "7302496" | "7664495" | "7778187" | "8009586" | "20020166053" | "20030044020" | "20030072485" | "20030174707" | "20050119005" | "20050249196" | "20090192976" | "6999932" | "7353255" | "20020150110" | "20040039781" | "20040044517" | "20040062267" | "20040148434" | "20040213184" | "20050015502" | "20050144288" | "20050201357" | "20060195402" | "20060218624" | "20060230166" | "20070116224" | "20070274276" | "20080005328" | "20090182815" | "20100312832" | "20110040836" | "5761309" | "6202084" | "6389016" | "6438376" | "6741691" | "6940826" | "7769881" | "20030137939" | "20040139225" | "20060183476" | "20060246903" | "20080069105" | "6031818" | "6311150" | "6574668" | "6842460" | "20020038282" | "20030061025" | "20030061481" | "20030135569" | "20030177186" | "20030217318" | "20030229715" | "20040133689" | "20040143678" | "20050187957" | "20050208947" | "20050254440" | "20060121986" | "20060165029" | "20080235362" | "20080235511" | "20090006076" | "20090088150" | "20090300673" | "20100223047" | "5818447" | "6161082" | "6912278" | "7123710" | "7917584" | "20020178087" | "20030220121" |	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/03/14 11:29

		"20050086309" | "20050138119" | "20060148516" | "5790637" | "6473425").PN.				
S32	375	S26 AND (mobile cell cellular phone iphone) NOT (S16 S19 S20 S22 S24 S25 S27 S28 S29 S30 S31)	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/03/14 11:29

3/16/2015 11:10:16 AM
C:\Users\cdorais\Documents\EAST\Workspaces\14024027AdditionalFuncntltyForSftwr-InIntgrtdManner.wsp

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
14/024,027	09/11/2013	SIVAKUMAR CHATURVEDI	DAMA-31813

CONFIRMATION NO. 8381

25883
HOWISON & ARNOTT, L.L.P
P.O. BOX 741715
DALLAS, TX 75374-1715

PUBLICATION NOTICE



Title:SYSTEM AND METHOD FOR PROVIDING ADDITIONAL FUNCTIONALITY TO EXISTING SOFTWARE IN AN INTEGRATED MANNER

Publication No.US-2015-0026700-A1
Publication Date:01/22/2015

NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently http://www.uspto.gov/patft/.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Office of Public Records. The Office of Public Records can be reached by telephone at (703) 308-9726 or (800) 972-6382, by facsimile at (703) 305-8759, by mail addressed to the United States Patent and Trademark Office, Office of Public Records, Alexandria, VA 22313-1450 or via the Internet.

In addition, information on the status of the application, including the mailing date of Office actions and the dates of receipt of correspondence filed in the Office, may also be accessed via the Internet through the Patent Electronic Business Center at www.uspto.gov using the public side of the Patent Application Information and Retrieval (PAIR) system. The direct link to access this status information is currently http://pair.uspto.gov/. Prior to publication, such status information is confidential and may only be obtained by applicant using the private side of PAIR.

Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 1-866-217-9197.

Office of Data Managment, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 14/024,027

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	70		N/A	
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	300		N/A	
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	360		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	22 minus 20 =	* 2	x 40 =	80	OR		
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3 minus 3 =	*	x 210 =	0.00			
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			0.00			
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				0.00			
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	810		TOTAL	

APPLICATION AS AMENDED - PART II

AMENDMENT A

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
Application Size Fee (37 CFR 1.16(s))									
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
					TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

AMENDMENT B

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE($)	ADDITIONAL FEE($)	OR	RATE($)	ADDITIONAL FEE($)
Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
Application Size Fee (37 CFR 1.16(s))									
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
					TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
14/024,027	09/11/2013	2819	810	DAMA-31813	22	3

CONFIRMATION NO. 8381

UPDATED FILING RECEIPT

25883
HOWISON & ARNOTT, L.L.P
P.O. BOX 741715
DALLAS, TX 75374-1715

OC000000068830566

Date Mailed: 06/06/2014

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

SIVAKUMAR CHATURVEDI, ALLEN, TX;
SATISH GUNDABATHULA, IRVING, TX;
RASHMI HIREMATH, ALLEN, TX;

Applicant(s)

DAMAKA, INC., Richardson, TX

Assignment For Published Patent Application

DAMAKA, INC., Richardson, TX

Power of Attorney: The patent practitioners associated with Customer Number 25883

Domestic Priority data as claimed by applicant

This appln claims benefit of 61/846,958 07/16/2013

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

If Required, Foreign Filing License Granted: 09/25/2013
The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 14/024,027**
Projected Publication Date: 01/22/2015
Non-Publication Request: No
Early Publication Request: No
**** SMALL ENTITY ****

Title

SYSTEM AND METHOD FOR PROVIDING ADDITIONAL FUNCTIONALITY TO EXISTING SOFTWARE IN AN INTEGRATED MANNER

Preliminary Class

326

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

SelectUSA

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop technology, manufacture products, deliver services, and grow your business, visit http://www.SelectUSA.gov or call +1-202-482-6800.

PTO/SB/08a (01-10)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	2819
	Examiner Name	
	Attorney Docket Number	DAMA-31813

U.S.PATENTS						Remove
Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	5761309	A	1998-06-01	OHASHI ET AL.	
	2	6141687	A	2000-10-01	BLAIR, DANA L.	
	3	6202084	B1	2001-03-13	KUMAR ET AL.	
	4	6219638	B1	2001-04-01	PADMANABHAN ET AL.	
	5	6360196	B1	2002-03-01	POZNASKI ET AL.	
	6	6826613	B1	2004-11-01	WANG ET AL.	
	7	7013155	B1	2006-03-01	RUF ET AL.	
	8	7117526	B1	2006-10-01	SHORT, JOEL E.	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	2819
	Examiner Name	
	Attorney Docket Number	DAMA-31813

	9	7353252	B1	2008-04-01	YANG ET AL.	
	10	6940826	B1	2005-09-06	SIMARD ET AL.	
	11	6741691	B1	2004-05-25	RITTER ET AL.	
	12	6912278	B1	2005-06-28	HAMILTON, THOMAS	
	13	6963555	B1	2005-11-08	BRENNER ET AL.	
	14	6975718	B1	2005-12-13	PEARCE ET AL.	
	15	6999575	B1	2006-02-14	SHEINBEIN, DANIEL	
	16	7079529	B1	2006-07-18	KHUC, MINH DUY	
	17	7457279	B1	2008-11-25	SCOTT ET AL.	

If you wish to add additional U.S. Patent citation information please click the Add button. Add

U.S.PATENT APPLICATION PUBLICATIONS Remove

Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	2819
	Examiner Name	
	Attorney Docket Number	DAMA-31813

	1	20020038282	A1	2002-03-01	MONTGOMERY, ROB R.	
	2	20020042769	A1	2002-04-01	GUJRAL ET AL.	
	3	20020062285	A1	2002-05-01	AMANN ET AL.	
	4	20020097150	A1	2002-07-01	SANDELMAN ET AL.	
	5	20020143548	A1	2002-10-01	KORALL ET AL.	
	6	20020150110		2002-10-17	INBAR ET AL.	
	7	20030009565		2003-01-09	ARAO	
	8	20030061025	A1	2003-03-01	ABIR, ELI	
	9	20030061481	A1	2003-03-27	LEVINE ET AL.	
	10	20030078858	A1	2003-04-01	ANGELOPOULOS ET AL.	
	11	20030105812	A1	2003-06-05	FLOWERS, JR., ET AL.	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	2819
	Examiner Name	
	Attorney Docket Number	DAMA-31813

	12	20030110047	A1	2003-06-01	SANTOSUOSSO, JOHN MATTHEW	
	13	20030135569		2003-07-17	KHAKOO ET AL.	
	14	20030158722	A1	2003-08-01	LORD, JOHN RAYMOND	
	15	20030177186	A1	2003-09-01	GOODMAN ET AL.	
	16	20030187650	A1	2003-10-01	MOORE ET AL.	
	17	20040034776	A1	2004-02-01	FERNANDO ET AL.	
	18	20040039781	A1	2004-02-01	LAVALLEE ET AL.	
	19	20040044517	A1	2004-03-01	PALMQUIST, ROBERT	
	20	20040128554	A1	2004-07-01	MAHER, III, ET AL.	
	21	20040133689	A1	2004-07-08	VASISHT, SAMRAT	
	22	20040139228		2004-07-15	TAKEDA ET AL.	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	2819
	Examiner Name	
	Attorney Docket Number	DAMA-31813

	23	20040143678	A1	2004-07-01	CHARI ET AL.	
	24	20040153858	A1	2004-08-01	HWANG, SHAW HWA	
	25	20040267527	A1	2004-12-01	CREAMER ET AL.	
	26	20040268257	A1	2004-12-01	MUDUSURU, GIRI P.	
	27	20050004982	A1	2005-01-06	VERNON ET AL.	
	28	20050071481	A1	2005-03-01	DANIELI, DAMON V.	
	29	20050143105	A1	2005-06-01	OKAMOTO, YUKIFUMI	
	30	20050187957	A1	2005-08-01	KRAMER ET AL.	
	31	20050246193	A1	2005-11-03	ROEVER ET AL.	
	32	20050254440	A1	2005-11-17	SORRELL, JOHN D.	
	33	20060121986	A1	2006-06-01	PELKEY ET AL.	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	2819
	Examiner Name	
	Attorney Docket Number	DAMA-31813

	34	20060168643	A1	2006-07-01	HOWARD ET AL.	
	35	20060218624	A1	2006-09-28	RAVIKUMAR ET AL.	
	36	20060230166	A1	2006-10-01	PHILYAW, JEFFRY JOVAN	
	37	20070078785	A1	2007-04-01	BUSH ET AL.	
	38	20070111794	A1	2007-05-01	HOGAN ET AL.	
	39	20070190987	A1	2007-08-01	VAANANEN, MIKKO KALERVO	
	40	20080005328		2008-01-01	SHIVELY ET AL.	
	41	20050105524	A1	2005-05-19	STEVENS ET AL.	
	42	20040103212	A1	2005-05-27	TAKEUCHI ET AL.	
	43	20090240821	A1	2009-09-24	JUNCKER ET AL.	

If you wish to add additional U.S. Published Application citation information please click the Add button. Add

FOREIGN PATENT DOCUMENTS Remove

EFS Web 2.1.17

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	2819
	Examiner Name	
	Attorney Docket Number	DAMA-31813

Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1	1404082	EP	A2	2004-03-31	NORTEL NETWORKS LTD		☐
	2	WO 2003/079635	WO		2003-09-25	IBM CORPORATION ET AL.		☐
	3	WO 2004/063843	WO		2004-07-29	MATSUSHITA ELECTRIC IND CO LTD		☐
	4	WO 2005/009019	WO		2005-01-27	SKYPER LTD. ET AL.		☐
	5	2005-94600	JP		2005-04-07	NEC CORP.		☐
	6	2007-043598	JP		2007-02-15	NEC CORP.		☐
	7	10-2005-0030548	KR		2005-03-30	MICROSOFT CORP.		☐
	8	WO 2006/075677	WO	A1	2006-07-20	SHARP KABUSHIKI KAISHA		☐

If you wish to add additional Foreign Patent Document citation information please click the Add button Add

NON-PATENT LITERATURE DOCUMENTS Remove

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	2819
	Examiner Name	
	Attorney Docket Number	DAMA-31813

	1	CHATHAPURAM, "Security in Peer-To-Peer Networks", August 8. 2001, XP002251813.	☐
	2	International Search Report and Written Opinion of the International Searching Authority from PCT/IB2005/000821, dated August 5, 2005.	☐
	3	International Search Report and Written Opinion of the International Searching Authority from PCT/US2006/032791, dated December 18, 2006.	☐
	4	International Search Report and Written Opinion of the International Searching Authority from PCT/US2006/040312, dated March 2, 2007.	☐
	5	International Search Report and Written Opinion of the International Searching Authority from PCT/US2006/047841, dated September 12, 2008.	☐
	6	International Search Report and Written Opinion of the International Searching Authority from PCT/US2007/002424, dated August 14, 2007.	☐
	7	International Search Report and Written Opinion of the International Searching Authority from PCT/US2007/068820, dated June 11, 2008.	☐
	8	International Search Report and Written Opinion of the International Searching Authority from PCT/US2007/068821, dated June 14, 2008.	☐
	9	International Search Report and Written Opinion of the International Searching Authority from PCT/US2007068823, dated June 1, 2008.	☐
	10	JEFF TYSON, "How Instant Messaging Works", www.verizon.com/learningcenter, March 9, 2005.	☐
	11	RORY BLAND, et al,"P2P Routing" 03/2002.	☐

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	2819
	Examiner Name	
	Attorney Docket Number	DAMA-31813

	12	ROSENBERG, "STUN- Simple Traversal of UDP Through NAT", September 2002, XP015005058.	☐
	13	SALMAN A. BASET, et al, "An Analysis Of The Skype Peer-To-Peer Internet Telephony Protocol", Department of Computer Science, Columbia University, New York, NY, USA, September 15, 2004.	☐
	14	SINGH et al., "Peer-to Peer Internet Telephony Using SIP", Department of Computer Science, Columbia University, October 31, 2004, XP-002336408.	☐
	15	SINHA, S. and OGLIESKI, A., A TCP Tutorial, November 1998 (Date posted on Internet: 19 April 2001) [Retrieved from the Internet <URL:http//www.ssfnet.org/Exchange/tcp/tcpTutorialNotes.html>]	☐
	16	Pejman Khadivi, Terence D. Todd and Dongmei Zhao, "Handoff trigger nodes for hybrid IEEE 802.11 WLAN/cellular networks," Proc. Of IEEE International Conference on Quality of Service in Heterogeneous Wired/Wireless Networks, pp. 164-170, 18 October 2004.	☐
	17	International Search Report and Written Opinion of the International Searching Authority from PCT/US2008/078142, dated March 27, 2009.	☐
	18	International Search Report and Written Opinion of the International Searching Authority from PCT/US2008/084950, dated April 27, 2009.	☐
	19	Hao Wang, Skype VoIP service-architecture and comparison, In: INFOTECH Seminar Advanced Communication Services (ASC), 2005, pp. 4, 7, 8.	☐
	20	Seta, N.; Miyajima, H.; Zhang, L;; Fujii, T., "All-SIP Mobility: Session Continuity on Handover in Heterogeneous Access Environment," Vehicular Technology Conference, 2007. VTC 2007-Spring. IEEE 65th, 22-25 April 2007, pages: 1121-1126.	☐
	21	International Search Report and Written Opinion of the International Searching Authority from PCT/US2008/075141, dated March 5, 2009.	☐
	22	Qian Zhang; Chuanxiong Guo; Zihua Guo; Wenwu Zhu, "Efficient mobility management for vertical handoff between WWAN and WLAN," Communications Magazine, IEEE, vol. 41. issue 11, November 2003, pages: 102-108.	☐

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	2819
	Examiner Name	
	Attorney Docket Number	DAMA-31813

	23	ISAACS, Ellen et al., "Hubbub: A sound-enhanced mobile instant messenger that supports awareness and opportunistic interactions," Proceedings of the SIGCHI Conference On Human Factors in Computing Systems; Vol. 4, Issue No. 1; Minneapolis, Minnesota; 20-25 April 2002; pgs. 179-186.	☐
	24	PCT: International Preliminary Report on Patentability of PCT/US2008/084950; 01 June 2010; 5 pgs.	☐

If you wish to add additional non-patent literature document citation information please click the Add button Add

EXAMINER SIGNATURE

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	2819
	Examiner Name	
	Attorney Docket Number	DAMA-31813

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☐ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☐ See attached certification statement.

☐ Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ None

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Timothy F. Bliss Reg. #50925/	Date (YYYY-MM-DD)	2013-12-11
Name/Print	TIMOTHY F. BLISS	Registration Number	50925

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these record s.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 404 082 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
31.03.2004 Bulletin 2004/14

(51) Int Cl.[7]: **H04L 29/06**

(21) Application number: **03016018.8**

(22) Date of filing: **15.07.2003**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IT LI LU MC NL PT RO SE SI SK TR
Designated Extension States:
AL LT LV MK

(30) Priority: **24.09.2002 US 253097**

(71) Applicant: **Nortel Networks Limited**
St. Laurent, Quebec H4S 2A9 (CA)

(72) Inventor: **Roshko, Michael E.**
Brentford, Middlesex TW8 9QJ (GB)

(74) Representative: **Anderson, Angela et al**
Nortel Networks
IP Law Group,
Harlow Laboratories,
London Road
Harlow, Essex CM17 9NA (GB)

(54) Methods for discovering network address and port translators

(57) Network Address and Port Translators (NATs) have the potential to interrupt the end-to-end nature of Internet applications, thereby threatening end-to-end security and other end-to-end functions. Thus it is important to be able to discover the existence of NATs and their type. Accordingly there is provided a method of discovering the existence and type of NAT that involves instigating a test call between media endpoints on a Media Gateway (MG) and a Media Gateway Controller (MGC). The MGC is able to deduce the existence of a NAT by examining the media packets sent to its endpoint. If a NAT is determined to be present the MGC instructs the endpoint on the MG to send media packets to another endpoint on the MGC. By comparing the IP addresses and ports of the media packets received at the endpoints of the MGC, the MGC is able to deduce whether the type of NAT is Cone or Symmetric.

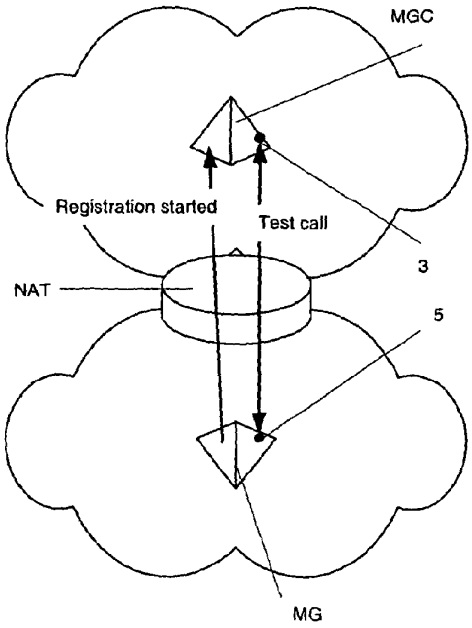


Fig. 1

EP 1 404 082 A2

Printed by Jouve, 75001 PARIS (FR)

Description

Field of the Invention

[0001] The present invention relates to a method of discovering Network Address and Port Translators, and, more particularly, to method of discovering Network Address and Port Translators sitting between Telephony Service Provider Networks and Networks containing Media Gateways.

Background of the invention

[0002] Network Address Translators (NATs) are used to interconnect a private network consisting of unregistered Internet Protocol (IP) addresses with a global IP network using a limited number of registered IP addresses. NATs are also used to avoid address renumbering in a private network when topology outside the private network changes for variety of reasons, such as customers changing providers, company backbones being reorganized, or providers merging or splitting. In addition, there are many other applications of NAT operation.

[0003] Basic Network Address Translation or Basic NAT is a method by which IP addresses are mapped from one group to another, transparent to end users. Network Address Port Translation, or NAPT is a method by which many network addresses and their Transmission Control Protocol/User Datagram Protocol (TCP/UDP) ports are translated into a single network address and TCP/UDP ports. Together, both these operations are referred to as traditional NAT.

[0004] NAT operation is asymmetrical with respect to the two Networks with which the NAT interfaces. In general, packets originating in the private network ("inside") are allowed to be sent to any address in the other network ("outside"). When the first packet of such a packet flow traverses the NAT, a NAT bind will be created, and the source IP address and port of the packet will be changed to reflect the NAT bind. Thus, when the packet arrives at its destination, it will appear to have come from a different source (i.e. from the NAT device). All subsequent packets of the flow will be modified in the same way. In contrast, packets originating from the outside network can not be routed to a host in the inside network, unless a NAT bind has previously been created in the NAT device. In such a case, the packets will have to be addressed to the IP address and port of the NAT bind on the NAT device. Upon receipt of the packets, the NAT device will translate the destination address and port into the proper inside address and port, and forward the packets on to their inside destination. Because of this asymmetry, hosts in the "inside" network are said to be "behind the NAT'.

[0005] NATs are further classified based on the rules used to create NAT binds. NATs which create a unique bind for unique source and destination IP addresses and ports are known as Symmetric. NATs which create a unique bind for a unique source addess and port only (i. e. for any destination) are known as Cone.

[0006] Unless mentioned otherwise, the term NAT, as used in this specification, will pertain to traditional NAT, namely basic NAT as well as NAPT, and to the devices performing these functions: Network Address Translators, and Network Address and Port Translators.

[0007] A number of NAT deployments are currently in use and, naturally, a large number of internet applications work transparently with NATs. However, there are applications that fail if their packets traverse a NAT, such as applications that set-up voice over Internet Protocol (VoIP) calls. VoIP works by the two media endpoints involved in the call exchanging their Session Description Protocol (SDP). The SDP describes the IP address and port where the endpoint expects to receive media for the call, among other things. This exchange of SDP is made possible by the use of a protocol such as SIP, MGCP, H.248 (MEGACO), H.323, NCS or ASPEN, and often involves the help of a Media Gateway Contoller (MGC), typically a softswitch, to broker the exchange. NATs break this model, since the IP address and port embedded in SDP will not reflect the IP address and port modifications made by the NAT. In cases where NATs break the end-to-end functionality of applications, Application Level Gateways (ALGs) are required within the NAT to make application-specific changes to the packet contents so that it reflects the NAT bind, in order to ensure that the application can work through the NAT.

[0008] NATs have the potential to interrupt the end-to-end nature of Internet applications, thereby threatening end-to-end security and other end-to-end functions. In addition, NATs have topology restrictions and other constraints on the protocols and applications that run across the NATs. Thus it is important to be able to discover the existence of NATs and their type.

[0009] Known techniques for VoIP applications in which an MGC in a public TSP network is controlling a Media Gateway (MG) in a private network, involve determining a NAT's existence and type either through 'ad hoc' methods (for example, telephoning the owner of the MG and asking if they are using a NAT and then provisioning this information (by hand) into the MGC prior to bringing the MG into service), or by using a protocol such as Simple Traversal of UDP through NATs (STUN) to discover the presence and type of NATs between the MG and the TSP network. STUN is an Internet Engineering Task Force (IETF) Protocol, defined in the IETF draft "http://www.ietf.org/internet-drafts/draft-ietf-midcom-stun-02.txt", that allows applications to discover the presence and types of NATs in a network, as well as discovering the actual NAPT bind used for a particular media flow. It requires a STUN server in the outside network, and a STUN client in the inside network. By using the STUN protocol between the STUN client and server, the STUN client in the inside network is able to determine NAT existence, type and the actual NAT bind used

Ex.1002 / Page 107 of 1008
Cisco Systems, Inc.

for a media flow.

[0010] The disadvantage of the first technique is that it requires manual human intervention, and is unfeasible as a real solution. The disadvantage of the second technique is that STUN requires the introduction of new network components (STUN clients and servers) in both the TSP and MG networks. In addition, the STUN client must be integrated into the MGs themselves, which means that existing, deployed MGs must be upgraded to contain STUN clients before this technique can be used. Another disadvantage of the second technique is that NAT information is determined by the STUN client behind the NAT (i.e. by an agent in the inside), rather than by the MGC outside of the NAT, although the MGC may need to have knowledge of this information.

[0011] Thus there is a need for devising a method of discovering the existence of NATs and their type without requiring any new network elements, without requiring any new protocols or protocol extensions, without requiring any work on the MGs or NATS, without imposing any requirements on the networks outside the TSP network, that will work with existing deployments, using existing protocols.

[0012] The present invention aims to address the needs or at least mitigate the problems identified above.

[0013] This may be met by combinations of features of the main claims, the sub-claims disclose further advantageous embodiments of the invention.

Summary of the Invention

[0014] Accordingly, there is provided a method of determining the presence of a Network Address and Port Translator between a Telephony Service Provider Network and a network comprising a Media Gateway, said Telephony Service Provider Network comprising a Media Gateway Controller, said method comprising: instigating a test call between a first endpoint on the Media Gateway Controller acting as a calling party, and an endpoint on the Media Gateway acting as a called party; receiving a reply comprising the local Session Description Protocol of the endpoint of the Media Gateway at the Media Gateway Controller; receiving an empty/noise media packet from the Media Gateway at the first endpoint of the Media Gateway Controller; and comparing the source IP address and port of the empty/noise media packet received at the first endpoint of the Media Gateway Controller with the IP address and port contained in the received local Session Description Protocol of the endpoint of the Media Gateway, wherein if the IP addresses are different or the ports are different then a Network Address and Port Translator is determined to be present, otherwise, if the IP addresses are the same and the ports are the same then a Network Address and Port Translator is determined not to be present.

[0015] In a preferred embodiment, if a Network Address and Port Translator is found to present, said method further comprises determining the type of Network Address and Port Translator that is present. Preferably, determining the type of Network Address and Port Translator comprises: changing the remote Session Description Protocol for the call to one with a different IP address, but still on the same Media Gateway Controller, corresponding to a second virtual media endpoint; sending a message to modify the Session Description Protocol to the Media Gateway from the Media Gateway Controller; prompting the Media Gateway to send empty/noise media packets to the changed IP address and port corresponding to the second virtual media endpoint on the Media Gateway Controller; receiving the empty/noise media packets at the second virtual media endpoint on the Media Gateway Controller; comparing the source IP address and port of the empty/noise media packets received at the second virtual media endpoint of the Media Gateway Controller with the source IP address and port of the media packets received at the first virtual media endpoint of the Media Gateway Controller, wherein if the same source IP address and port is used for the media packets sent to the first and the second virtual media endpoints on the Media Gateway Controller, the Network Address and Port Translator is determined to be a Cone Network Address and Port Translator, but if a different source IP address or port is used for the media packets sent to the first and the second virtual media endpoints on the Media Gateway Controller, the Network Address and Port Translator is determined to be a Symmetric Network Address and Port Translator.

[0016] According to a second aspect of the invention there is provided a computer program for use in a computer for determining the presence of a Network Address and Port Translator between a Telephony Service Provider Network and a network comprising a Media Gateway, according to the first aspect.

[0017] According to a third aspect there is provided a computer program stored on a data carrier for use in a computer for determining the presence of a Network Address and Port Translator between a Telephony Service Provider Network and a network comprising a Media Gateway, according to the first aspect.

[0018] According to a fourth aspect there is provided a Media Gateway Controller comprising a first virtual media endpoint, and capable of determining the presence of a Network Address and Port Translator between a Telephony Service Provider Network in which said Media Gateway Controller is located, and a network comprising a Media Gateway, said Media Gateway Controller operable to: instigate a test call between its first virtual media endpoint acting as a calling party, and an endpoint on the Media Gateway acting as a called party; receive a reply comprising the local Session Description Protocol of the endpoint of the Media Gateway; receive empty/noise media packets from the Media Gateway at its first virtual media endpoint; and compare the source IP address and port of the empty/noise media packets received at its first virtual media endpoint with the IP ad-

Ex.1002 / Page 108 of 1008
Cisco Systems, Inc.

dress and port contained in the received local Session Description Protocol of the endpoint of the Media Gateway, wherein if the IP addresses are different or the ports are different then a Network Address and Port Translator is determined to be present, otherwise, if the IP addresses are the same and the ports are the same then a Network Address and Port Translator is determined not to be present.

[0019] In a preferred embodiment if a Network Address and Port Translator is found to be present, said Media Gateway Controller is operable to determine the type of Network Address and Port Translator that is present. Preferably, further comprising a second virtual media endpoint, wherein if a Network Address and Port Translator is found to be present, said Media Gateway Controller is operable to: change the remote Session Description Protocol for the call to one with a different IP address and port, but still on said Media Gateway Controller, corresponding to said second virtual media endpoint; send a message to modify the Session Description Protocol to the Media Gateway; receive empty/noise media data packets at the changed IP address and port, corresponding to its second virtual media endpoint, from the Media Gateway; and compare the source IP address and port of the empty/noise media packets received at its second virtual media endpoint with the IP address and port of the media packets received at its first virtual media endpoint, wherein if the same source IP address and port is used for the media packets sent to said first and said second virtual media endpoints, the Network Address and Port Translator is determined to be a Cone Network Address and Port Translator, but if a different source IP address or port is used for the media packets sent to said first and said second virtual media endpoints, the Network Address and Port Translator is determined to be a Symmetric Network Address and Port Translator.

[0020] According to a fifth aspect there is provided a packet-switched network comprising a Media Gateway Controller according to the forth aspect of the invention.

[0021] Other aspects and features of the present invention will become apparent to those ordinarily skilled in the art upon review of the following description of specific embodiments of the invention in conjunction with the accompanying figures.

Brief Description of the Drawings

[0022]

Figure 1 is a schematic diagram showing messaging for instigating a test call between a media endpoint of a Media Gateway and a virtual media endpoint on a Media Gateway Controller, during registration, in accordance with an embodiment of the present invention;

Figure 2 is a schematic diagram showing the IP address changes that take place during the messaging shown in Figure 1, when a Cone NAT has been detected in accordance with a preferred embodiment of the present invention;

Figure 3 is a message sequence chart following a specific format known in the art, and shows the flow of messaging that occurs between the Media Gateway Controller and the Media Gateway when a Cone NAT is detected in accordance with the preferred embodiment;

Figure 4 is a schematic diagram showing the IP address changes that take place during the messaging for a test call between the endpoints of a Media Gateway Controller and a Media Gateway when a Symmetric NAT has been detected in accordance with a further embodiment of the present invention;

Figure 5 is a message sequence chart following a specific format known in the art, and shows the flow of messaging that occurs between the Media Gateway Controller and the Media Gateway when a Symmetric NAT is detected in accordance with the embodiment of the invention shown in Figure 4;

Figure 6 is a message sequence chart following a specific format known in the art, and shows the flow of messaging that occurs in accordance with another embodiment of the present invention where a MGC virtual media endpoint and a Media Proxy are used to deduce the presence of Symmetric NAT; and

Figure 7 is a schematic diagram showing an example of a NAT aggregate.

Detailed description of the Preferred Embodiments

[0023] The following description is of a preferred embodiment by way of example only and without limitation to the combination of features necessary for carrying the invention into effect.

[0024] The present invention proposes a technique that involves instigating a "test call" during Media Gateway registration, as illustrated in Figure 1, to determine the existence and type of a NAT. In this test call a virtual media endpoint 3 on the Media Gateway Controller (MGC) acts as the calling party and a real media endpoint 5 on the Media Gateway (MG) acts as the called party. A media endpoint is a source or a sink of media flow, normally Real-time Transport Protocol (RTP) packets. The media endpoints on the MGC are "virtual" since a MGC would not normally have media endpoints and, therefore, they are not "real" endpoints, as such, as in the case of a MG. The MGC is able to deduce the existence of a Network Address Translator (NAT), by examining the media packets (usually RTP packets) sent

Ex.1002 / Page 109 of 1008
Cisco Systems, Inc.

to the virtual media endpoint 3. If a NAT is determined to be present, the MGC instructs the endpoint 5 to now send media packets to virtual media endpoint 4 on the MGC that has a different IP address than endpoint 3. By comparing the media packets received by endpoint 4 with the packets received previously by endpoint 3, the MGC is able to deduce whether the type of NAT is Cone or Symmetric.

[0025] An example of how a Cone NAT between a Telephony Service Provider (TSP) network and a network containing a MG can be detected is described with reference to Figure 2. This technique requires that the MGC has two virtual media endpoints with different IP addresses on which it may receive media packets. The MG is located behind a Cone NAT, and the MGC is located in the TSP network. When the MG is first being brought into service, it attempts to register with its MGC by sending a registration message to the MGC (for example, a ReStart In Progress (RSIP) message in Multimedia Gateway Control Protocol (MGCP)). Receipt of the registration message triggers the MGC to instigate a Test Call between its virtual media endpoints and a media endpoint on the MG to deduce that the MG is behind a Cone NAT. The first part of the test call establishes if there is a NAT between the MG and the TSP network, by comparing the address and port pair from the local Session Description Protocol (SDP) with that of the media packet (usually RTP) received on the first MGC virtual media endpoint. If a NAT is found, then the second part of the test call deduces the type of NAT by instructing the MG to send media to the second MGC virtual media endpoint, and comparing the source address and port pair from the packets received on the first MGC virtual media endpoint, with those received on the second MGC virtual media endpoint.

[0026] There are two message paths established between the MG and the MGC: one for the control messages exchange between the MG and the MGC (for example, MGCP messages such as CRCX, MDCX, DLCX); and one for the media path (for example RTP flow between the media endpoints). If the MG is behind a NAT, then when the MG registers with its MGC, the registration message (i.e. control message, for example RSIP), will go through the NAT, and as it does, a bind will be created. The MGC notes the source of the registration message and uses that address port for all future communication with that MG. Hence there are no problems with control messages traversing the NAT.

[0027] Figure 3 shows the flow of messages taking place between the MG and the MGC using pseudo-MGCP device control protocol. Firstly, the MG sends ReStart In Progress (RSIP) messages to register its media endpoints. The MGC chooses one of these for its test call and sends an Audit Endpoints message (AUEP) to it to make sure the media endpoint 5 is available, and to query its capabilities. The MG responds indicating that the media endpoint 5 is okay and what its capabilities are. At this time, the media endpoints have not been fully initialised in the MGC and the MG has not been supervised to scan for off-hook conditions etc. Therefore there is no need to worry about the media endpoints being used for real calls yet (as there will be no dial tone, and the MG will not report off-hook, digits, etc. to the MGC). The advantage of using this technique during registration is that it does not impact on the real-time usage of the device, i.e. the MG endpoints.

[0028] Next, the MGC sends a Create Connection (CRCX) message to the media endpoint on the MG to initiate a test call on the endpoint. The remote Session Description Protocol (SDP) sent in the CRCX message contains the IP address and port of a virtual media endpoint 3 on the MGC. The CRCX message also contains a prompt to place the media endpoint 5 of the MG into a mode requiring it to send media packets (i.e. sendonly or sendrecv mode.) The MG replies with the local SDP of the media endpoint 5, which the MGC takes note of. The MG then sends empty/silence/noise packets to the IP address and port that it was given in the remote SDP (i.e. to the virtual media endpoint 3 on the MGC). Note that the MG sends empty/silence/noise packets as it has no available voice data to send since the test call is being instigated during registration. The type of packet sent is dependent upon the configuration of the MG. As the packet goes through the NAT, a bind is created and its source address and port are changed. When the packet arrives at the virtual media endpoint 3 on the MGC, the MGC compares the source address and port of the packet with the IP address and port contained in the local SDP it had received previously from the media endpoint 5 on the MG. Since the source address and port of the packet differ from the address and port from the local SDP, the MGC concludes there is a NAT between the TSP network and the network containing the MG.

[0029] The MGC then sends a Modify connection (MDCX) message to the MG, changing the remote SDP for this call so that it contains the IP address and port of a second virtual media endpoint 4 on the MGC. The second virtual media endpoint 4 has a different IP address than that of the virtual media endpoint 3, but is still on the same MGC. The MG sends the empty/silence/noise packets to the new address and port. Since the NAT in this example is a Cone NAT, the same bind is used for these packets, and thus the source address and port is modified in the same way as before. When the packets arrive at the second virtual media endpoint 4 on the MGC, the MGC compares the source address and port of these packets with those that it had received on the virtual media endpoint 3. Since they are the same, the MGC concludes that the NAT is a Cone NAT. The MGC stores this information in its database for later use, and sends a DLCX message to take down the test call. MG registration then continues as usual.

[0030] Alternatively, this technique could be used during the setting up of a cali, rather than during registration. Advantageously, this allows real-time discovery of

Ex.1002 / Page 110 of 1008
Cisco Systems, Inc.

NATs, however, it will slow down the call set-up time. A further advantage of using this technique during the setting up of a call, is that by performing the test call on the MG endpoint actually involved in the call, it is possible to determine the actual NAT bind that will be used for the media flow of the call, if the NAT is a Cone NAT.

[0031] The information that the MGC has stored in its database allows it to know which MGs are behind NATs. It can then make use of a NAT traversal strategy (such as the use of a Media Proxy) for calls involving these MGs. MGCs are conventionally used for controlling the devices that source and sink media flows (usually RTP), but the described technique uses the MGC itself as a sink of a media flow.

[0032] With reference to Figures 4 and 5, the differences in logic for determining the existence of a Symmetric NAT are given below. As shown in Figure 4, instead of a Cone NAT there is now a Symmetric NAT between the TSP network and the MG's network.

[0033] The first part of the test call (that determines NAT existence) for Symmetric NATs is identical to the first part of the test call in the Cone NAT example. Likewise, the set-up for the second part of the test call is the same as the example of the Cone NAT, and the media endpoint 5 on the MG is instructed to send media to the second virtual media endpoint 4 on the MGC. As in the Cone NAT example, the MG sends the empty/silence/noise packets to the new address and port (the second virtual media endpoint 4), but since the NAT is Symmetric, a new bind is created for these packets. Thus the source address and port of these packets are modified differently than the packets that were sent to the media endpoint 3 on the MGC in the first part of the test call. When the packets arrive at the second virtual media endpoint 4 on the MGC, the MGC compares their source address and port with the source address and port of those packets that had arrived on the virtual media endpoint 3 in the first part of the test call. Since they are different, the MGC concludes that the NAT is a Symmetric NAT. Then as described previously for the example of the Cone NAT, the MGC stores this information in its database and sends a DLCX message to take down the test call, and MG registration continues as usual.

[0034] Advantageously, the described technique allows the existence and type of NAT to be determined without the necessity of changing anything outside the TSP network.

[0035] Although Multimedia Gateway Control Protocol (MGCP) is used in the examples described above, any Device Control Protocol (DCP), such as H.248 (MEGACO), NCS or ASPEN, could be used instead. In addition, Session Initiation Protocol (SIP), H.323, or other similar SDP exchange protocols that are not DCPs and that do not always fit into the MG/MGC architecture, could be used instead.

[0036] In the examples described above, a number of assumptions have been made. Firstly, it has been assumed that the MG will send empty/silence/noise media packets if it has been put into send mode but does not have any real media to send. The specifications of most DCPs require this behaviour, but if a MG cannot send such packets, then the method can be modified so that the endpoint is instructed to send a signal, for example a ring tone, instead of silence or noise. Secondly, it has been assumed that if the same NAT bind is used for a different destination, then the NAT must be some type of Cone NAT (whether it be full, restricted, or port restricted). This assumption is true by definition if one follows the definition of Cone and Symmetric NAT found in the Internet Engineering Task Force (IETF) STUN specification, "http://www.ietf.org/internet-drafts/draft-ietf-midcom-stun-02.txt". Further examples of how the present technique can used to determine the existence and type of NAT are described below.

[0037] In one variation of the present technique, one or both of the virtual media endpoints may be housed on a device external to the MGC, but under the MGC's control. Such a device would have to be capable of sinking a media flow, and have an interface in the TSP. This would allow the media flows for one or both parts of the test call to be sinked on the device external to the MGC, but reported to the MGC. Examples of such devices could be a MG located in the TSP dedicated for use in such test calls, or a Media Proxy. Such a variation using a Media Proxy is described below.

[0038] With reference to Figure 6, an example of how a virtual media endpoint on an MGC and a Media Proxy can be used to deduce the existence and type of a NAT (in this example, a Symmetric NAT) is shown in the message sequence chart. Note that the protocol shown for messaging between the MG and the MGC is psuedo-MGCP, whereas the protocol shown for messaging between the MGC and the Media Proxy is pseudo-H.248. Although, the skilled person will appreciate that any other suitable DCP or Media Proxy control protocol could be used instead. The procedure for deducing the existence of the NAT is the same as already discussed above for the example of the Cone NAT between the TSP Network and the network containing the MG, as illustrated in Figure 3. The steps common to both procedures are indicated in Figure 6 with an asterix next to them.

[0039] After the MGC has compared the source address and port of the empty/silence/noise packet with the address and port from the local SDP it had received previously, and concluded that there is a NAT because they are different, the MGC sends a message to the Media Proxy requesting the reservation of a public IP address and port for media flow. The Media Proxy sends a reply to the MGC containing the reserved IP address and port. The MGC sends another message to the Media Proxy telling it to inform the MGC of the source IP address and port of the first media packet it receives on its reserved IP address and port. The Media Proxy responds by indicating it will. Next the MGC sends a Modify Connection request (MDCX) to the media endpoint

Ex.1002 / Page 111 of 1008
Cisco Systems, Inc.

on the MG instructing it to send its media to the reserved IP address and port on the Media Proxy. The MG acknowledges the instruction, and then begins to send the empty/silence/noise RTP packets to the reserved IP address and port on the Media Proxy. As the RTP packets traverse the NAT, their source IP address and port are modified differently than the source IP address and port of those packets that were destined for the virtual media endpoint on the MGC, i.e. a new bind is created for these packets, because the NAT being traversed is a Symmetric NAT. When the first RTP packet arrives at the Media Proxy, the Media Proxy notifies the MGC of the packet's source IP address and port.. Then, as in the two previously described examples, the MGC compares the source address and port of this packet with that of the packets that had been sent to its virtual media endpoint. Since they are different, the MGC concludes that the NAT is a Symmetric NAT, and the MGC stores this information in its database and sends a DLCX message to take down the test call, and a message to the Media Proxy to free the IP address and port that it had reserved. MG registration then continues as usual.

[0040] The technique described in this document can be used even when there is more than one NAT between the MGC and MG, but only if arranged in series, i.e. non-parallel, as illustrated in Figure 7. The technique enables the detection of a NAT aggregate 7, and the type of the strongest NAT in the NAT aggregate 7. For example, if there are four NATs in series and one of them is a Symmetric NAT, then because a change in the source IP address and port is detected by the MGC due to the presence of the symmetric NAT, the MGC determines that there is at least one symmetric NAT in the NAT aggregate 7. It is not, however, possible for the MGC to determine whether there are any Cone NATs present in the NAT aggregate 7 in addition to the Symmetric one (s) detected, as the Cone NATs do not change the source IP address and port of packets based on destination. Only if all four NATs in the aggregate are Cone NATs, can the MGC determine that the NAT aggregate is composed of Cone NATs, because there is no change detected in the IP address and port using the technique described above.

[0041] Advantageously, the methods described herein may be implemented in software, hardware, or a mixture of both.

[0042] It will be appreciated that the techniques described herein may be used with trivial modifications as would be contemplated by the skilled person to deduce the existence and type of NATs in network systems having MGs and MGCs and/or Media Proxies, and that such modifications would fall within the scope of the invention as claimed.

[0043] Although the embodiments of the invention described with reference to the drawings comprise computer apparatus and processes performed in computer apparatus, the invention also extends to computer programs, particularly computer programs on or in a carrier, adapted for putting the invention into practice. The program may be in the form of source code, object code, a code intermediate source and object code such as in partially compiled form, or in any other form suitable for use in the implementation of the processes according to the invention. The carrier may be any entity or device capable of carrying the program.

[0044] For example, the carrier may comprise a storage medium, such as ROM, for example a CD ROM or a semiconductor ROM, or a magnetic recording medium, for example a floppy disc or hard disk. Further, the carrier may be a transmissible carrier such as an electrical or optical signal which may be conveyed via electrical or optical cable or by radio or other means.

[0045] When the program is embodied in a signal which may be conveyed directly by a cable or other device or means, the carrier may be constituted by such cable or other device or means.

[0046] Alternatively, the carrier may be an integrated circuit in which the program is embedded, the integrated circuit being adapted for performing, or for use in the performance of, the relevant processes.

[0047] Although the invention has been shown and described with respect to a best mode embodiment thereof, it should be understood by those skilled in the art that the foregoing and various other changes, omissions and additions in the form and detail thereof may be made therein without departing from the scope of the invention as claimed.

[0048] In summary, Network Address and Port Translators (NATs) have the potential to interrupt the end-to-end nature of Internet applications, thereby threatening end-to-end security and other end-to-end functions. Thus it is important to be able to discover the existence of NATs and their type. Accordingly there is provided a method of discovering the existence and type of NAT that involves instigating a test call between media endpoints on a Media Gateway (MG) and a Media Gateway Controller (MGC). The MGC is able to deduce the existence of a NAT by examining the media packets sent to its endpoint. If a NAT is determined to be present the MGC instructs the endpoint on the MG to send media packets to another endpoint on the MGC. By comparing the IP addresses and ports of the media packets received at the endpoints of the MGC, the MGC is able to deduce whether the type of NAT is Cone or Symmetric.

Claims

1. A method of determining the presence of a Network Address and Port Translator between a Telephony Service Provider Network and a network comprising a Media Gateway (MG), said Telephony Service Provider Network comprising a Media Gateway Controller (MGC), said method comprising:

   instigating a test call between a first endpoint

Ex.1002 / Page 112 of 1008
Cisco Systems, Inc.

(3) on the Media Gateway Controller acting as a calling party, and an endpoint (5) on the Media Gateway acting as a called party;
receiving a reply comprising the local Session Description Protocol of the endpoint of the Media Gateway at the Media Gateway Controller;
receiving an empty/noise media packet from the Media Gateway at the first endpoint of the Media Gateway Controller; and
comparing the source IP address and port of the empty/noise media packet received at the first endpoint of the Media Gateway Controller with the IP address and port contained in the received local Session Description Protocol of the endpoint of the Media Gateway,

wherein if the IP addresses are different or the ports are different then a Network Address and Port Translator is determined to be present, otherwise, if the IP addresses are the same and the ports are the same then a Network Address and Port Translator is determined not to be present.

2. A method according to claim 1, wherein instigating the test call comprises sending a message to create a connection to the endpoint on the Media Gateway from the Media Gateway Controller, wherein a remote Session Description Protocol is sent in the message to create the connection and corresponds to a first virtual media endpoint on the Media Gateway Controller.

3. A method according to claim 2, wherein the empty/noise media packets from the Media Gateway are received at the first virtual media endpoint on the Media Gateway Controller.

4. A method according to claim 2, wherein if a Network Address and Port Translator is found to present, said method further comprises:

determining the type of Network Address and Port Translator that is present.

5. A method according to claim 4, wherein determining the type of Network Address and Port Translator comprises:

changing the remote Session Description Protocol for the call to one with a different IP address, but still on the same Media Gateway Controller, corresponding to a second virtual media endpoint;
sending a message to modify the Session Description Protocol to the Media Gateway from the Media Gateway Controller;
prompting the Media Gateway to send empty/noise media packets to the changed IP address and port corresponding to the second virtual media endpoint on the Media Gateway Controller;
receiving the empty/noise media packets at the second virtual media endpoint on the Media Gateway Controller;
comparing the source IP address and port of the empty/noise media packets received at the second virtual media endpoint of the Media Gateway Controller with the source IP address and port of the media packets received at the first virtual media endpoint of the Media Gateway Controller,

wherein if the same source IP address and port is used for the media packets sent to the first and the second virtual media endpoints on the Media Gateway Controller, the Network Address and Port Translator is determined to be a Cone Network Address and Port Translator, but if a different source IP address or port is used for the media packets sent to the first and the second virtual media endpoints on the Media Gateway Controller, the Network Address and Port Translator is determined to be a Symmetric Network Address and Port Translator.

6. A method according to claim 5, wherein the message to create a connection instructs the endpoint on the Media Gateway to be in a mode for sending media packets.

7. A method according to any of the preceding claims, wherein the test call is instigated during registration of the Media Gateway with the Media Gateway Controller.

8. A method according to any of the preceding claims, wherein the test call between the Media Gateway and the Media Gateway Controller is instigated during set-up of an actual call.

9. A method according to any of the preceding claims, wherein the test call is instigated between the virtual media endpoint on the Media Gateway Controller and a real media endpoint on the Media Gateway.

10. A method according to any of the preceding claims, wherein the Media Gateway Controller stores information relating to the type of Network Address and Port Translator determined.

11. A method according to any of the preceding claims, wherein said Telephony Service Provider and said network comprising the Media Gateway are packet-switched networks.

12. A method according to any of the preceding claims

Ex.1002 / Page 113 of 1008
Cisco Systems, Inc.

for use with voice over IP applications

13. A method according to claim 5, wherein receipt of a registration message from the Media Gateway triggers the instigating of the test call.

14. A computer program for use in a computer for determining the presence of a Network Address and Port Translator between a Telephony Service Provider Network and a network comprising a Media Gateway, according to the method of any of the preceding claims.

15. A computer program stored on a data carrier for use in a computer for determining the presence of a Network Address and Port Translator between a Telephony Service Provider Network and a network comprising a Media Gateway, according to the method of any of claims 1 to 13.

16. A Media Gateway Controller comprising a first virtual media endpoint, and capable of determining the presence of a Network Address and Port Translator between a Telephony Service Provider Network in which said Media Gateway Controller is located, and a network comprising a Media Gateway, said Media Gateway Controller operable to:

instigate a test call between its first virtual media endpoint acting as a calling party, and an endpoint on the Media Gateway acting as a called party;
receive a reply comprising the local Session Description Protocol of the endpoint of the Media Gateway;
receive empty/noise media packets from the Media Gateway at its first virtual media endpoint; and
compare the source IP address and port of the empty/noise media packets received at its first virtual media endpoint with the IP address and port contained in the received local Session Description Protocol of the endpoint of the Media Gateway,

wherein if the IP addresses are different or the ports are different then a Network Address and Port Translator is determined to be present, otherwise, if the IP addresses are the same and the ports are the same then a Network Address and Port Translator is determined not to be present.

17. A Media Gateway Controller according to claim 16, wherein if a Network Address and Port Translator is found to be present, said Media Gateway Controller is operable to:

determine the type of Network Address and Port Translator that is present.

18. A Media Gateway Controller according to claim 15, further comprising a second virtual media endpoint, wherein if a Network Address and Port Translator is found to be present, said Media Gateway Controller is operable to:

change the remote Session Description Protocol for the call to one with a different IP address and port, but still on said Media Gateway Controller, corresponding to said second virtual media endpoint;
send a message to modify the Session Description Protocol to the Media Gateway;
receive empty/noise media data packets at the changed IP address and port, corresponding to its second virtual media endpoint, from the Media Gateway; and
compare the source IP address and port of the empty/noise media packets received at its second virtual media endpoint with the IP address and port of the media packets received at its first virtual media endpoint,

wherein if the same source IP address and port is used for the media packets sent to said first and said second virtual media endpoints, the Network Address and Port Translator is determined to be a Cone Network Address and Port Translator, but if a different source IP address or port is used for the media packets sent to said first and said second virtual media endpoints, the Network Address and Port Translator is determined to be a Symmetric Network Address and Port Translator.

19. A Media Gateway Controller according to claim 25, comprising a data store capable of holding information relating to the type of Network Address and Port Translator determined.

20. A packet-switched network comprising a Media Gateway Controller according to any of claims 16 to 19.

Ex.1002 / Page 114 of 1008
Cisco Systems, Inc.

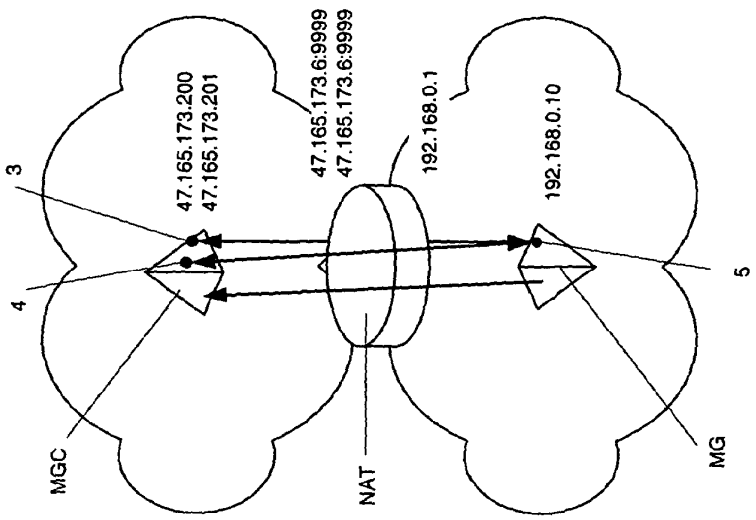

3
4
47.165.173.200
47.165.173.201
47.165.173.6:9999
47.165.173.6:9999
192.168.0.1
192.168.0.10
5
MGC
NAT
MG

Fig. 2

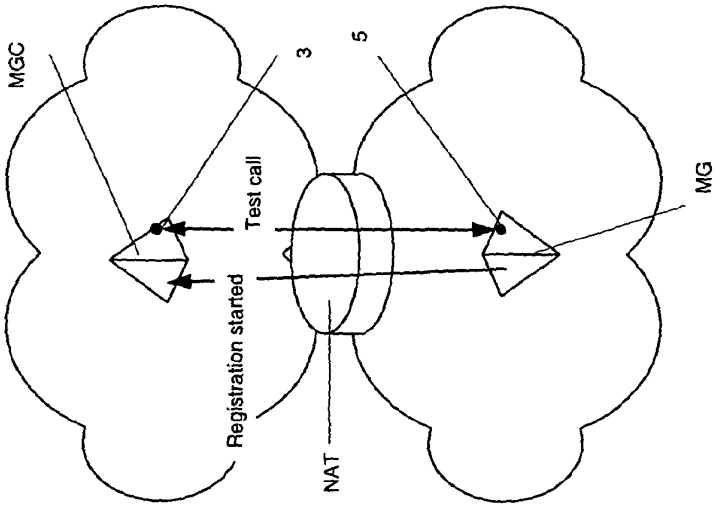

MGC
3
5
Test call
Registration started
NAT
MG

Fig. 1

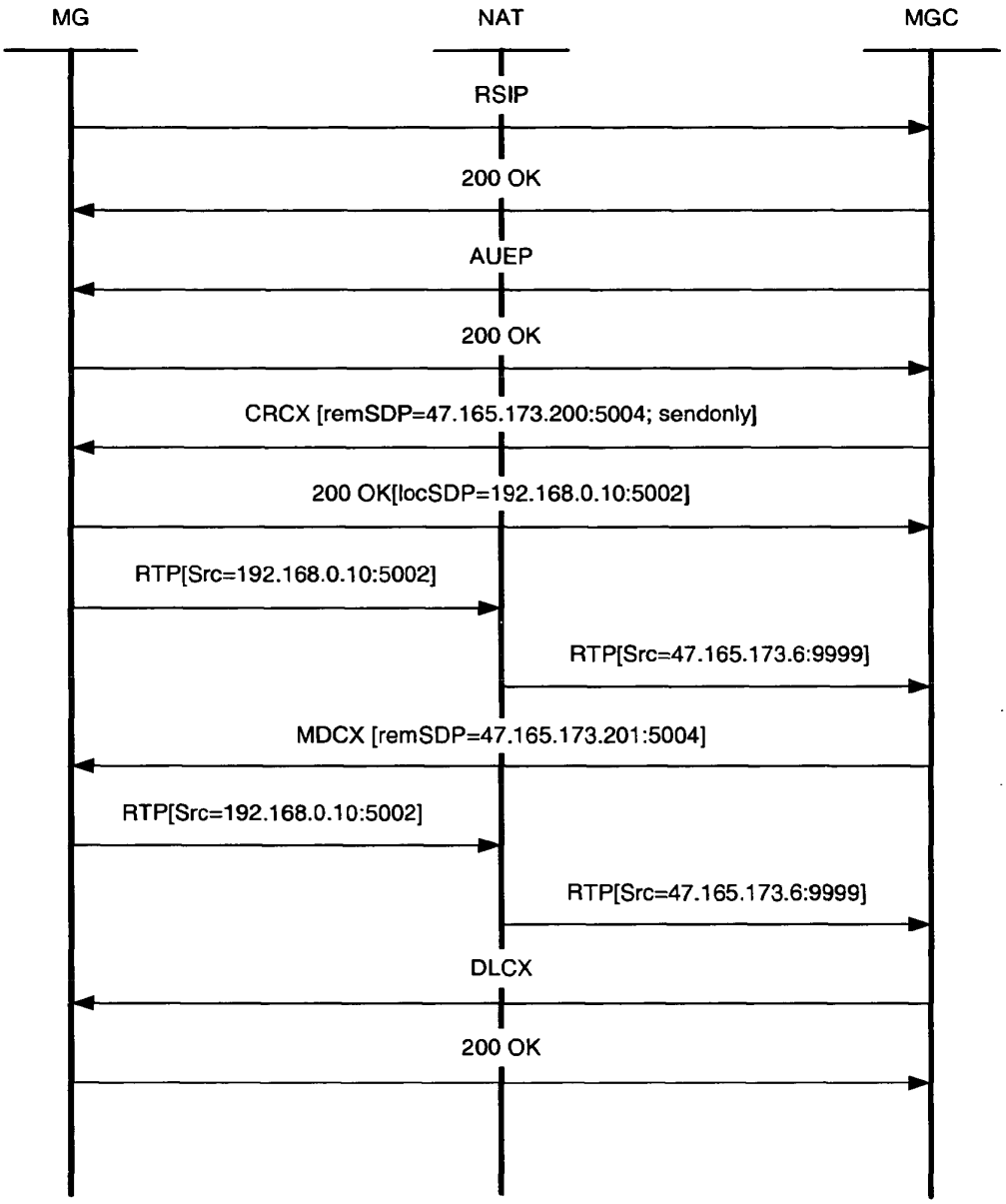


Fig. 3

Ex.1002 / Page 116 of 1008
Cisco Systems, Inc.

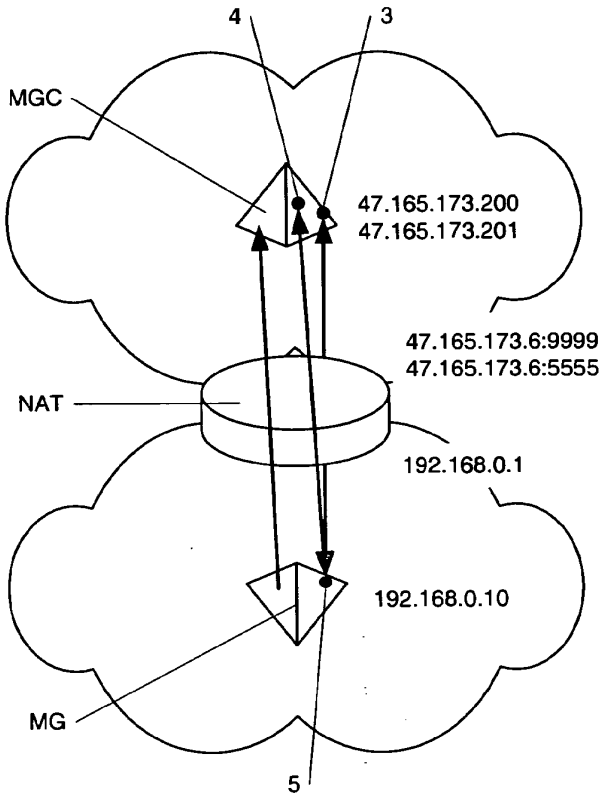

4
3
MGC
47.165.173.200
47.165.173.201
47.165.173.6:9999
47.165.173.6:5555
NAT
192.168.0.1
192.168.0.10
MG
5

Fig. 4

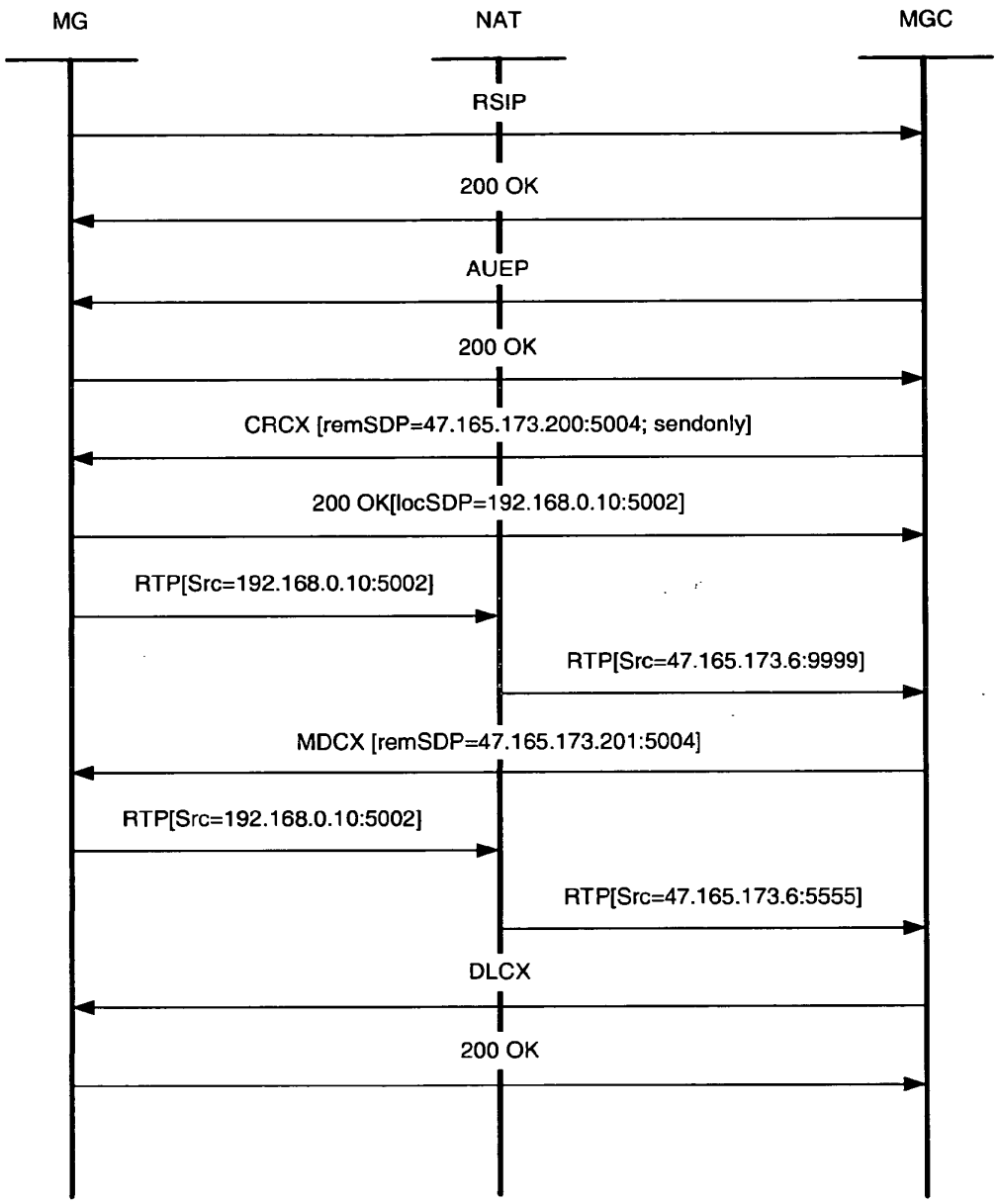

MG
NAT
MGC
RSIP
200 OK
AUEP
200 OK
CRCX [remSDP=47.165.173.200:5004; sendonly]
200 OK[locSDP=192.168.0.10:5002]
RTP[Src=192.168.0.10:5002]
RTP[Src=47.165.173.6:9999]
MDCX [remSDP=47.165.173.201:5004]
RTP[Src=192.168.0.10:5002]
RTP[Src=47.165.173.6:5555]
DLCX
200 OK

Fig. 5

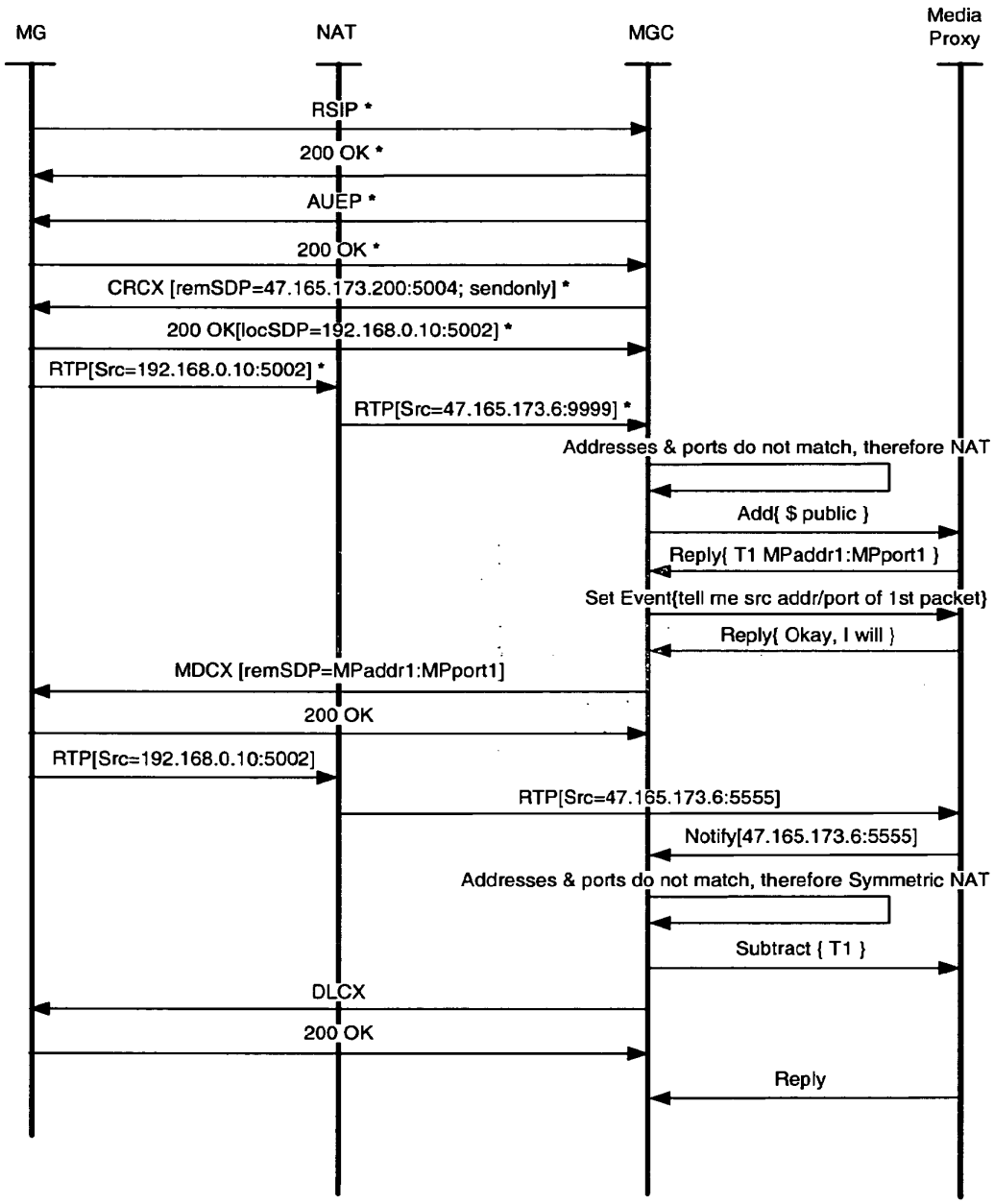

MG
NAT
MGC
Media Proxy
RSIP *
200 OK *
AUEP *
200 OK *
CRCX [remSDP=47.165.173.200:5004; sendonly] *
200 OK[locSDP=192.168.0.10:5002] *
RTP[Src=192.168.0.10:5002] *
RTP[Src=47.165.173.6:9999] *
Addresses & ports do not match, therefore NAT
Add{ $ public }
Reply{ T1 MPaddr1:MPport1 }
Set Event{tell me src addr/port of 1st packet}
Reply{ Okay, I will }
MDCX [remSDP=MPaddr1:MPport1]
200 OK
RTP[Src=192.168.0.10:5002]
RTP[Src=47.165.173.6:5555]
Notify[47.165.173.6:5555]
Addresses & ports do not match, therefore Symmetric NAT
Subtract { T1 }
DLCX
200 OK
Reply

Fig. 6

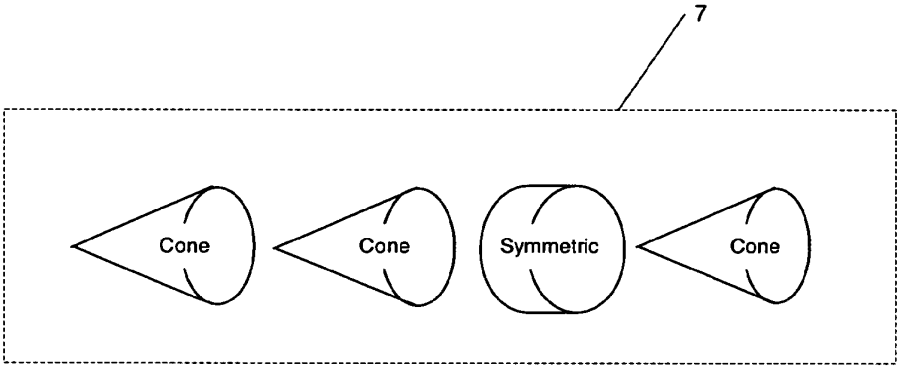


Fig. 7

Ex.1002 / Page 120 of 1008
Cisco Systems, Inc.

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
25 September 2003 (25.09.2003)

PCT

(10) International Publication Number
WO 03/079635 A1

(51) International Patent Classification[7]: H04L 29/06, 29/08

(21) International Application Number: PCT/GB03/00776

(22) International Filing Date: 24 February 2003 (24.02.2003)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
10/098,976 15 March 2002 (15.03.2002) US

(71) Applicant: **INTERNATIONAL BUSINESS MACHINES CORPORATION** [US/US]; New Orchard Road, Armonk, NY 10504 (US).

(71) Applicant *(for MG only)*: **IBM UNITED KINGDOM LIMITED** [GB/GB]; PO Box 41, North Harbour, Portsmouth, Hampshire PO6 3AU (GB).

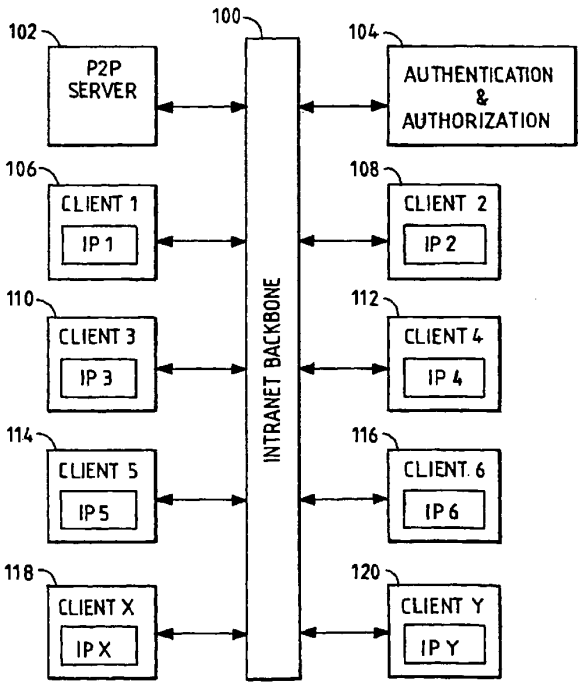
(72) Inventors: **GOODMAN, Brian**; 296 Painter Hill Road, Roxbury, CT 06783 (US). **ROONEY, John, Warren**; 1 Titicus Mountain Road, New Fairfield, CT 06812 (US). **SUBRAMANIAN, Ramesh**; 119 Old Town Farm Road, Woodbury, CT 06798 (US). **SWEENEY, William**; 208 East Rocks Road, Norwalk, CT 06851 (US).

(74) Agent: **BURT, Roger, James**; IBM United Kingdom Limited, Intellectual Property Law, Hursley Park, Winchester, Hampshire SO21 2JN (GB).

(81) Designated States *(national)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW.

[Continued on next page]

(54) Title: SECURED AND ACCESS CONTROLLED PEER-TO-PEER RESOURCE SHARING METHOD AND APPARATUS



(57) Abstract: A peer-to-peer network propagates searches from client to client. Resources within each client are selectively searched in response to authentication and authorization processes. Authentication information may be included in a search request or may be performed by an authentication process external to the client. Authorization is performed by a process external to the client. Only after authentication or authorization may resources of any particular client be accessed. The system allows for secure propagated searches and resource access in a peer-to-peer network environment. The network may further include a server for maintaining a list of clients connected to the peer-to-peer network in order to more efficiently facilitate peer-to-peer communications.

WO 03/079635 A1

(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— *with international search report*

— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

SECURED AND ACCESS CONTROLLED PEER-TO-PEER RESOURCE SHARING METHOD AND APPARATUS

Field of the Invention

This invention is related to the field of peer-to-peer networks.

Background of the Invention

Until recently, corporate data and content within global or other large organizations were distributed by replicating and distributing such data and content using centralized content repositories. That is, the data was globally distributed, but made available within a location of geographical area by using a central server that was responsible for serving the content to clients located within the specified area.

The advent of peer-to-peer (P2P) computing has changed this approach. The accent has shifted from storing content in, and serving from, centralized servers to storing and serving at least some of the content from the client-side. In this P2P model, the content provider manages the content in a local client, and shares the content with anyone who accesses the content. In this model, content creation, storage and security dwells on the client side.

There are several advantages to this P2P approach. By shifting the responsibility for content to the client side, server-side management of diverse resources can be vastly reduced. Server managers need not be responsible for the integrity of the content. Problems arising from centralized distribution of content could be averted.

There are at least three architectural approaches to peer-to-peer resource sharing systems. P2P with centralized control, pure P2P with no centralized control and a hybrid approach that incorporates some of the aspects of the other two.

One example of P2P with a centralized controller is a system referred to as Napster. The Napster system uses a central server to maintain a list of connected clients. Every client connects to the central server, which scans the clients' disks for shared resources and maintains directories and indexes of the shared resources. A client searching for a resource performs the search on the maintained directories and indexes of the central server. Once a client knows where to find the resources that

Ex.1002 / Page 123 of 1008
Cisco Systems, Inc.

is it seeking (i.e. which client has the files it is searching for), it makes a direct connection to the appropriate client and transfers the resources.

Napster is not web-based, and does not run in a browser. It is a stand-alone application that runs on each individual client, and uses TCP/IP for its data-communication and data transfers. Since Napster depends on a central server that acts as a collector and regulator of information, the clients are not guaranteed anonymity. The Napster system is also vulnerable if the central server fails.

A good example of pure P2P with no centralized control is a system referred to as Gnutella. Gnutella is a generic term used to identify those P2P systems that use the Gnutella protocol. There is no single interpretation of what the protocol is, actually. However, there are certain common elements that manifest in Gnutella-based systems. Chief among those is that Gnutella does away with the central server. In this system, each client continuously keeps track of other clients by pinging known clients in the system. Distributed searches are propagated from one client to its immediate neighbors in ever-increasing circles until answers are found, or the search times out. Search responses are propagated back to the searcher in the same manner.

Like Napster, Gnutella-based systems are also not web-based, and run as applications in client environments. Gnutella is a truly anonymous resource sharing system. No server is used to facilitate searches, clients must establish ad-hock peer information. The searcher does not know the identity of the responder, and vice-versa. Thus there are no authentication or authorization checks, trust is implicitly assumed.

A serious problem in Gnutella-based systems is their reputation for being unreliable. Lacking a central server that keeps track of which client is connected, and which is not, there is no way for a client to know if all its neighbors are alive and connected. This leads to less than reliable performance.

The third approach to P2P systems is referred to as Web Mk. This is more of an approach than an actual product, and is described in a Gartner Report on the emergence of P2P computing entitled The Emergence of Distributed Content Management and Peer-to-Peer Content Networks, January 2001. Said report is hereby incorporated by reference. This is a web-based approach that uses web servers and web browsers. The web browsers would be

configurable by users and would integrate resource-sharing features. The servers will maintain multiple indexes and allow access to different forms of data. This type of system would use software agents or Bots to provide services such as extraction and consolidation of multiple resources, chat facilities, and notifications of changes. Search requests could be stored in the server and set to run in real-time or as a batch process, and alert the appropriate clients of the results.

What is needed is a system that adapts the advantages of the P2P network while resolving disadvantages of current P2P systems. What is needed is a P2P network that takes advantage of the reduced central server requirements of a pure P2P network without sacrificing the efficiencies of the central server. What is further needed is a P2P network that provides secure access and control to client resources without the requirement of a central server.

Brief Summary of the Invention

In a first aspect, the present invention provides a method of securely conducting a resource search initiated by a first client in a peer-to-peer network, the resource search included with a search request having a credentials signal indicative of the first client, the method comprising the steps of: communicating the search request from the first client to a second client, the second client having a multiplicity of second resources, each of the multiplicity of second resources having at least one corresponding access attribute; at the second client, selectively searching the multiplicity of second resources in response to comparison of the credentials signal and the at least one access attribute of each of the multiplicity of second resources; communicating the search request from the second client to a third client, the third client having a multiplicity of third resources, each of the multiplicity of third resources having at least one corresponding access attribute; and at the third client, selectively searching the multiplicity of third resources in response to comparison of the credentials signal and the at least one access attribute of each of the multiplicity of third resources.

The method preferably further comprises the steps of: at the third client, determining a matching resource in response to said step of selectively searching the multiplicity of third resources; and communicating a matching signal indicative of the matching resource from the third client to the first client.

Preferably, the credentials signal includes an identification signal indicative of the first client and the access attributes of the second and third resources includes an authorization signal indicative of at least one of a plurality of clients, the plurality of clients including the first client, and further said step of selectively searching the second multiplicity of resources searches one of the second multiplicity of resources if the identification signal substantially matches the authorization signal included with the corresponding access attributes, and said step of selectively searching the third multiplicity of resources searches one of the third multiplicity of resources if the identification signal substantially matches the authorization signal included with the corresponding access attributes.

Preferably, the credentials signal includes an identification signal indicative of the first client and the access attributes of the second and third resources includes an authorization signal indicative of at least one of a plurality of clients, the plurality of clients including the first client, and said step of selectively searching the second multiplicity of resources further includes the steps of: communicating from the second client to an authentication process external to the first, second and third clients the identification signal; receiving from the authentication process an authenticated signal indicative of the first client in response thereto; and searching one of the second multiplicity of resources if the authenticated signal substantially matches the authorization signal included with the corresponding access attributes, and said step of selectively searching the third multiplicity of resources further includes the steps of: communicating from the third client to the authorization process the identification signal; receiving from the authorization process the authenticated signal indicative of the first client in response thereto; and searching one of the third multiplicity of resources if the authenticated signal substantially matches the authorization signal included with the corresponding access attributes.

The method prefeerably further comprises the steps: at the second client, storing the identification signal and the received authenticated signal in a cache memory at the second client; and at the second client searching the cache memory for the identification signal and the received authentication signal prior to said step communicating from the second client to the authentication process, wherein said step communicating from the second client to the authentication process is not performed if said step of searching the cache memory finds the identification signal and the received authentication signal stored therein, and said step of searching

one of the second multiplicity of resources uses the authenticated signal stored in the cache memory, thereby reducing communication between the second client and the authentication process.

The method preferably further comprises the steps: at the third client, storing the identification signal and the received authenticated signal in a cache memory at the third client; and at the third client searching the cache memory for the identification signal and the received authentication signal prior to said step communicating from the third client to the authentication process, wherein said step communicating from the third client to the authentication process is not performed if said step of searching the cache memory finds the identification signal and the received authentication signal stored therein, and said step of searching one of the third multiplicity of resources uses the authenticated signal stored in the cache memory, thereby reducing communication between the third client and the authentication process.

Preferably, said step of communicating the search request from the second client to the third client and said step of selectively searching the multiplicity of third resources are not performed if the authentication signal is not received from the authentication process by the second client.

Preferably, the credentials signal includes an identification signal indicative of the first client and the access attributes of the second and third resources includes an authorization signal indicative of at least one of a plurality of client classes, wherein said step of selectively searching the second multiplicity of resources further includes the steps of: communicating from the second client to an authorization process external to the second client the identification signal; receiving from the authorization process a client class signal indicative which of the plurality of client classes are associated with the identification signal; and searching one of the second multiplicity of resources if the client class signal substantially matches the authorization signal included with the corresponding access attributes, and said step of selectively searching the third multiplicity of resources further includes the steps of: communicating from the third client to the authorization process external to the third client the identification signal; receiving from the authorization process the client class signal indicative which of the plurality of client classes are associated with the identification signal; and searching one of the third multiplicity of

Ex.1002 / Page 127 of 1008
Cisco Systems, Inc.

resources if client class signal substantially matches the authorization signal included with the corresponding access attributes.

The method preferably further comprises the steps: at the second client, storing the identification signal and the received client class signal in a cache memory at the second client; and at the second client searching the cache memory for the identification signal and the received client cache signal prior to said step communicating from the second client to the authorization process, wherein said step communicating from the second client to the authorization process is not performed if said step of searching the cache memory finds the identification signal and the received client cache signal stored therein, and said step of searching one of the second multiplicity of resources uses the client cache signal stored in the cache memory, thereby reducing communication between the second client and the autorization process.

The method preferably further comprises the steps: at the third client, storing the identification signal and the received client class signal in a cache memory at the third client; and at the third client searching the cache memory for the identification signal and the received client cache signal prior to said step communicating from the third client to the authorization process, wherein said step communicating from the third client to the authorization process is not performed if said step of searching the cache memory finds the identification signal and the received client class signal stored therein, and said step of searching one of the third multiplicity of resources uses the client class signal stored in the cache memory, thereby reducing communication between the third client and the authentication process.

Preferably, the peer-to-peer network further including a multiplicity of clients including the first, second and third clients, each of the multiplicity of clients having a unique client address, and a server having a list of client addresses, said method further comprising the steps of: communicating from the server to the first client a first seed list comprising a first portion of the list of client addresses; and communicating from the server to the second client a second seed list comprising a second portion of the list of client addresses, the first seed list including a second client address corresponding to the second client and the second seed list including a third client address corresponding to the third client, wherein said step of communicating the search request from the first client to the second client communicates to the second client in response to the second client address included in the

first seed list, and said step of communicating the search request from the second client to the third client communicates to the third client in response to the third client address included in the second seed list.

Preferably, each of the multiplicity of clients may be either connect to or disconnect from the peer-to-peer network at any time, and the method further comprising the steps of: at the server, determining which of the multiplicity of clients is connected to the peer-to-peer network; at the server, generating a list of connected client addresses in response said step of determining; and at the server, generating the first and second seed lists from the list of connected client addresses.

The method preferably further comprises the steps: communicating a connection signal from one of the multiplicity of clients to the server in response to the one of the multiplicity of clients connecting to the peer-to-peer network; and at the server, adding a newly connected client address corresponding to the one of the multiplicity of clients to the list of connected client addresses in response thereto.

In a second aspect, the present invention provides a client included in a peer-to-peer network having a multiplicity of clients, the client comprising: a peer-to-peer network dispatcher for receiving a resource search request from a second client of the multiplicity of clients, the search request initiating from an initiating client of the multiplicity of clients, the search request including a credentials signal having an identification signal indicative of the initiating client; a memory for storing a plurality of resources, each of the plurality of resources having at least one corresponding access attribute; and a search engine for selectively searching at least one of the plurality of resources in response to a comparison of the credentials signal and the at least one access attribute of each of the plurality of resources.

Preferably, said peer-to-peer network dispatcher communicates the identification signal to an authentication process external to the client and receives an authenticated signal if the identification signal is authenticated by the authentication process, and said search engine does not search any of the plurality of resources if the authenticated signal is not received from the authentication process.

Preferably, said peer-to-peer network dispatcher communicates the resource search request to a third client of the multiplicity of clients if the authenticated signal is received from the authentication process,

Ex.1002 / Page 129 of 1008
Cisco Systems, Inc.

or does not communicate the resource search request to the third client if the authenticated signal is not received from the authentication process.

Preferably, the access attribute is indicative of a class of clients permitted to access to the corresponding resource, said peer-to-peer network dispatcher communicates the identification signal to an authorization process external to the client and receives a client class signal in response thereto, and said search engine selectively searches the at least one of the plurality of resources in response to a comparison of the client class signal and the at least one access attribute of each of the plurality of resources.

Preferably, the peer-to-peer network further includes a server and each of the multiplicity of clients has a unique client address, the client further comprises a seed list receiver for receiving and storing a seed list of client address from the server, and said peer-to-peer network search dispatcher forwards the resource search request to client addresses of the seed list.

It is suitable to have a method of securely conducting a resource search initiated by a first client in a peer-to-peer network, the resource search included with a search request having a credentials signal indicative of the first client, the method comprising the steps of: communicating the search request from the first client to a second client; communicating the search request from the second client to a third client, the third client having a multiplicity of third resources, each of the multiplicity of third resources having at least one corresponding access attribute; and at the third client, selectively searching the multiplicity of third resources in response to comparison of the credentials signal and the at least one access attribute of each of the multiplicity of third resources.

Preferably, the peer-to-peer network further including a multiplicity of clients including the first, second and third clients, each of the multiplicity of clients having a unique client address, and a server having a list of client addresses, said method further comprising the steps of: communicating from the server to the first client a first seed list comprising a first portion of the list of client addresses; and communicating from the server to the second client a second seed list comprising a second portion of the list of client addresses, the first seed list including a second client address corresponding to the second client and the second seed list including a third client address

corresponding to the third client, wherein said step of communicating the search request from the first client to the second client communicates to the second client in response to the second client address included in the first seed list, and said step of communicating the search request from the second client to the third client communicates to the third client in response to the third client address included in the second seed list.

One preferred embodiment of the invention provides a method in a peer-to-peer network for securely conducting a resource search initiated by a first client, the resource search included with a search request having a credentials signal indicative of the first client. The method comprising the steps of communicating the search request from the first client to a second client, communicating the search request from the second client to a third client, the third client having a multiplicity of third resources, each of the multiplicity of third resources having at least one corresponding access attribute; and at the third client, selectively searching the multiplicity of third resources in response to comparison of the credentials signal and the at least one access attribute of each of the multiplicity of third resources.

Another embodiment of the invention provides a client included in a peer-to-peer network having a multiplicity of clients. The client comprises a peer-to-peer network dispatcher for receiving a resource search request from a second client of the multiplicity of clients, the search request initiating from an initiating client of the multiplicity of clients, the search request including a credentials signal having an identification signal indicative of the initiating client. The client also comprises a memory for storing a plurality of resources, each of the plurality of resources having at least one corresponding access attribute and a search engine for selectively searching at least one of the plurality of resources in response to a comparison of the credentials signal and the at least one access attribute of each of the plurality of resources.

Another embodiment of the invention provides a method in a peer-to-peer network a for securely conducting a resource search initiated by a first client, the resource search included with a search request having a credentials signal indicative of the first client. The method comprises the step of communicating the search request from the first client to a second client, the second client having a multiplicity of second resources, each of the multiplicity of second resources having at least one corresponding access attribute. The method further comprises the

Ex.1002 / Page 131 of 1008
Cisco Systems, Inc.

step of at the second client, selectively searching the multiplicity of second resources in response to comparison of the credentials signal and the at least one access attribute of each of the multiplicity of second resources. The method further comprises the step of communicating the search request from the second client to a third client, the third client having a multiplicity of third resources, each of the multiplicity of third resources having at least one corresponding access attribute. The method further comprises the step of at the third client, selectively searching the multiplicity of third resources in response to comparison of the credentials signal and the at least one access attribute of each of the multiplicity of third resources.

Brief Description of the Drawings

FIG. 1 shows a block diagram of a P2P network and system operating in accordance with a preferred embodiment of the present invention

FIG. 2 shows a block diagram a server of the P2P network and system operating in accordance with a preferred embodiment of the present invention.

FIG. 3 shows a block diagram of an authentication and authorization process of the P2P network and system operating in accordance with a preferred embodiment of the present invention.

FIG. 4 shows a block diagram of a client of the P2P network and system operating in accordance with a preferred embodiment of the present invention..

FIG. 5 shows a process flow diagram including interactions between a client and server for generating and maintaining seed lists in accordance with the a preferred embodiment of the present invention.

FIG. 6 shows a process flow diagram of PING, SEARCH and GET request processing by a client in accordance with a preferred embodiment of the present invention.

FIG. 7 shows a process flow diagram of an authentication process that does not require communication with an authentication process external to the client.

FIG. 8 shows a process flow diagram of communication between a client and an authentication process external to the client in accordance with a preferred embodiment of the present invention.

FIG. 9 shows a process flow diagram of a communication between a client and an authorization process external to the client in accordance with a preferred embodiment of the present invention.

Detailed Description of the Invention

It is important to note, that these embodiments are only examples of the many advantageous uses of the innovative teachings herein. In general, statements made in the specification of the present application do not necessarily limit any of the equivalent and various claimed inventions. Moreover, some statements may apply to some inventive features but not to others. In general, unless otherwise indicated, singular elements may be in the plural and visa versa with no loss of generality.

The preferred embodiment is directed towards peer-to-peer (P2P) resource sharing within a corporate intranet environment. The preferred embodiment is a hybrid system for P2P resource sharing. It consists of both a server and a client component. It supports the features of the three aforementioned P2P architectures, as well as some additional characteristics.

The client is an application running in the client computer, and acts as a modified pure P2P client. The system includes reliable IP repository, security integration through enterprise systems, an enhanced client side database for better search results and some basic network activity reduction. Together these qualities provide P2P services for the corporate environment.

Characteristics of the preferred embodiment include:

Reliable IP Repository – Each client first "announces itself' to the server, and requests a list of IP addresses of connected clients. The server sends a seed list of the connected clients. (The term seed list is used because each client needs to know only a limited number of other connected clients). The server maintains a current list of connected clients by maintaining a list of clients, and pinging each client periodically.

Ex.1002 / Page 133 of 1008
Cisco Systems, Inc.

Authentication and authorization – Metadata associated with each resource includes file descriptions as well as security and access control information. The security checks can be local account based or enterprise level security based.

Enhanced client database – Each client maintains a database of resources that it shares. The database will preferably not only contain names and characteristics of the files, but also user-defined metadata describing the files.

Reduced Network Activity – Unlike a pure P2P network, clients need not ping the other clients continuously. Instead, a client maintains awareness of other connected clients by downloading the list of IP addresses from the server periodically. Each client sends a handshake to each of the clients in the list received. If an acknowledgement is received from another client, that client is added to the original client's list.

Pure P2P Protocol Based – Like most of the packet communications, search and search response is accomplished among clients using a protocol similar to a pure P2P protocol.

This approach enables use of the central server concept within a P2P environment that results in a highly enhanced P2P resource sharing system. This system thus builds upon existing P2P approaches and provides additional functionality.

FIG. 1 shows a block diagram of a P2P network and system operating in accordance with a preferred embodiment of the present invention. An intranet backbone 100 couples a P2P server 102 and an authentication and authorization process 104 to a multiplicity of clients 1 - Y 106 - 120. Each client has a corresponding address indicative of the client as shown by IP 1 through IP Y. The intranet 100 also facilitates communication between the clients thereby enabling the P2P communications.

FIG. 2 shows a block diagram a server of the P2P network and system operating in accordance with a preferred embodiment of the present invention. Server 102 is coupled to intranet backbone 100 through a network interface 202 that facilitates communication with the intranet and the clients. When a client connects to the intranet, a client connect signal is received by the network interface 202 and process by the client connect function 204 which adds the address of the connected client to the

connected client list 206. In response to the connect signal, seed list generator 208 generates a seed list for the connected client. The seed list being a member of a multiplicity of seed lists 210 that the server has provided to the clients. The seed list is shown being stored in a memory having all seed lists, in the preferred embodiment. The memory storage is optional. Seed lists may be randomly generated or generated in response to a number of criteria. Example criterion include geographic and client characterization. For example, seed lists may be limited to connected clients in a specific country or regions such as the United States or Europe. Alternatively seed lists may be limited to connected clients classes sharing a common attribute such as engineering or sales. Seed lists may also be generated in response to distance from client, distance including network response time, where clients that are close are included in the seed list. In another embodiment seed lists may be generated in response to prior seed lists in order to generate an optimal network interconnection in an effort to maximize searched clients within a search time. Such a method could be further used to create search islands within a P2P network. Server 102 also maintains the connected client IP addresses 206 by testing for an expected acknowledgement signal from the connected clients. If an acknowledgement signal is not received, then the client address is removed from the list. Preferably the server periodically send a PING signal to connected clients and if an acknowledgement PONG signal is not received within a predetermined time the server determines the client is disconnected and removes the address of the client from list 206.

FIG. 3 shows a block diagram of an authentication and authorization process of the P2P network and system operating in accordance with a preferred embodiment of the present invention. Authentication and authorization process 104 preferably resides in a separate network security server but may alternatively reside in server 102. The authentication and authorization process is coupled to intranet backbone 100 through a network interface 302 that facilitates communication with the intranet and the clients. Before a client performs a resource search, the client may request that the authentication and authorization process provide authentication and/or authorization of the resource search.

If authentication is required, the client sends an authentication request signal to process 104. Network interface 302 receives the authentication request and communicates it to authentication credential check 304. The credentials are indicative of a client initiating a SEARCH request and included in the SEARCH request signal. When a client receives

Ex.1002 / Page 135 of 1008
Cisco Systems, Inc.

the SEARCH request and desires authentication of the requesting client, the credentials are communicated to process 104. The credentials preferably include a client ID of the client initiating the search and a corresponding password. Process 104 has a table of predetermined client identifications and passwords. If the client ID 306 and password 308 match those included in the authentication request signal, then the requesting client is verified and the process 104 sends an authentication signal back to the requesting client. Those familiar with the art appreciate that numerous other authentication processes are known and may be substituted for the authentication process described above.

If authorization is required, the client sends an authorization request signal to process 104. Network interface 302 receives the authorization request and communicates it to authorization process 310. The credentials are indicative of the client initiating the SEARCH request and included in the SEARCH request signal. When a client receives the SEARCH request and desires to determine which resources the requesting client is authorized to access, the credentials are communicated to process 104. The credentials preferably include a client ID of the client initiating the SEARCH. Process 104 has a table of predetermined client identifications 312 and access controls 314. In response to the authorization request, process 104 sends an authorization signal having the corresponding access control signals back to the requesting client. Access control signals 314 are indicative of the type of resources or client classes a client is permitted to search on its peers. Examples of various access controls or client classes include engineering resources, marketing resources and managerial resources. Each access control may have a number of subcategories, for example engineering may include network, integrated circuit and operating system subcategories. Each client may have authorization to access unique to each subcategory. For example, a client in an engineering department may not be authorized to search for managerial resources related to personnel issues or engineering integrated circuit resources while authorized to search engineering network and operating system resources.

In the preferred embodiment, both authentication and authorization processes are performed by a single request signal from the client, and may be performed for both SEARCH and GET requests. In alternative embodiments, only authorization or only authentication may be used. Furthermore, the authentications and/or authorizations may be held in the cache of a client in order to eliminate duplicate authentication and/or

Ex.1002 / Page 136 of 1008
Cisco Systems, Inc.

authorization communications of subsequent SEARCH and GET requests, thereby reducing network traffic.

FIG. 4 shows a block diagram of a client of the P2P network and system operating in accordance with a preferred embodiment of the present invention. The client is preferably a process operating in a personal computer coupled to intranet backbone 100. In alternate embodiments the process is operable in other computing devices such as laptop PCs, PDAs, and interactive consumer devices such as set top boxes, televisions, stereos, cell phones or other types of resource storing devices. Dispatcher and network interface 402 facilitates communication with the server, authentication and authorization process and other clients via the intranet backbone 100. The dispatcher responds to at least three signals received on the intranet backbone. The three signals are PING, SEARCH and GET. The client is also able to initiate PING, SEARCH and GET commands as well as communicate with the server 102 and authentication and authorization process 104. In responding to commands, the dispatcher 402 routs PING commands to ping/pong process 404 which responds to reception of a PING command with an acknowledging PONG command. SEARCH and GET commands are routed by dispatcher 402 to search and get processors 405 and 406. However, before a SEARCH or GET command is processed, the command is evaluated by the authentication and authorization process 408. Process 408 has at least three components, all of which are optional. The first component of authorization is predetermined and based upon the identification of the requesting client. This embodiment does not require the external authentication process 104. The second and third components are authentication and authorization performed by the external authentication and authorization 104. Numerous embodiments may be realized by various combinations of these three components. Authentication and authorization also includes an optional cache for storing authorized client identifications and or access controls associated with a client ID 412. Storage of this information in cache 410 reduces repeated authentication and/or authorization request to the process of FIG. 3.

If a SEARCH request is not authenticated, it need not be propagated to a subsequent peer in the P2P system, thereby reducing network traffic. Furthermore, the failure of the authentication need not be communicated to the requesting client, thereby deterring intranet hacking because the search requester will not know why the search yielded no results - either the resource was not found or the searcher not authenticated. If the SEARCH request is authenticated, then memory 320 of the client is searched for resource 422 matching the SEARCH request. Resources are preferably

Ex.1002 / Page 137 of 1008
Cisco Systems, Inc.

searched by searching metadata 424 which includes access controls and resource attributes. Search process 404 determines which resources may be searched by comparing the authorized access controls with the access controls associated with each resource. If there is a match, then the resource may be searched. Searching is preferably performed by searching attributes of the resource, the attributes including file type, file size, date or author. The attributes may also include comments or abstracts, for example manually generated by the author, providing additional information about the resource, thereby facilitating keyword searches. Alternatively, a more exhaustive search of the resource itself may be conducted. If a match is found, then a positive signal is propagated back to the client initiating the search.

A GET request is typically initiated by a client having initiated a SEARCH request and further having received a positive search result from the client receiving the GET request. The GET request may be both authorized and/or authenticated prior to execution by get process 406. Thereafter, the particular resource identified by the GET request is communicated to the requesting client.

Note that dispatcher 402 directly routs PING commands, however SEARCH and GET requests are in effect hidden behind a custom firewall 408. All requests, PING, SEARCH and GET appear to any other client as available. However, no response from the client may also mean there were security measures protecting GET or SEARCH. For example, a failed search does not send back a "no items found" signal. So if a client does not receive a response from a search, it does not know if the items were protected or if the items simply do not exist.

The client of FIG. 4 may also initiate SEARCH and GET requests. When a SEARCH request is initiated, the terms of the search are received typically from an operator of the client. The SEARCH and GET request processor 430 packages the terms of the search along with the credentials of the client 432 including a client ID and password as well as its IP address. The search request is then communicated to clients having an IP address included in its seed list 434, seed list 434 having IP addresses received from server 102. Credentials 432 are used in the aforementioned authentication and authorization processes. If a particular resource in a particular client is desired as a result of the search, then the SEARCH and GET request processor 430 packages the resource identification along with credential information into a GET request and sends the GET request to the corresponding client.

As a further part of the P2P search propagation process, a SEARCH request processed by search process 405 is also communicated to other addresses included in the seed list 434. This provides a peer-to-peer network search dispatcher for forwarding a resource search to client address of the seed list. However, the SEARCH request may not be propagated if there is a timeout or if there is a failure of the authentication process.

FIG. 5 shows a process flow diagram including interactions between a client and server for generating and maintaining seed lists in accordance with the a preferred embodiment of the present invention. For clarity, processes performed within the client are on the left and processes performed within the server are on the right. Beginning at step 500, the client stays at step 500 until it connects to the network. Connection preferably involves executing a program facilitating coupling to the P2P network. Such a program may be executed in a desktop personal computer client after it is powered ON. Similarly, such a program may be executed in a portable laptop personal computer client after it is physically coupled to the backbone.

Thereafter, the client sends a connect signal including the address of the client to the server at step 502. The server receives the connect signal at step 504 and adds the client address to the connected client address list, step 506. Step 508 generates a seed list for the client using any method including the aforementioned seed list generation methods. The seed list is sent from the server at step 510 and received by the client at step 512. Step 512 further sends a PING signal to the clients on the seed list to verify their connection to the P2P network. Non-acknowledging clients will be removed from the seed list at step 522. If the client has been disconnected at step 514, the process returns to step 500 awaiting reconnection. Disconnection can result at any time and be the result of a number of different events such as the client being powered OFF or the operator terminating the client's P2P program. It is not necessary for the client to actively signal the server that it is disconnected from the network. If still connected the client acknowledges any PING signal received as step 516. PING signals may be received from the server or other clients and are typically acknowledged with a PONG signal. Step 520 communicates with other clients performing PING, SEARCH and GET requests. If a client on the seed list does not respond to a PING, SEARCH or GET request, or may not otherwise be coupled or bound to, the client is determined to have been disconnected from the network and is removed from the seed list at step 522. Step 524 determines if the seed

Ex.1002 / Page 139 of 1008
Cisco Systems, Inc.

list should be refreshed, and if so sends the server a request to refresh the seed list at step 526. The seed list may be refreshed for any of several reasons including removal of one or more clients at step 522. Alternatively the seed list can be refreshed in response to a specific input from the operator, initiation of a new search, or after a certain period of time or inactivity. In other embodiments the server may initiate a refresh in order to reconfigure network behaviors. Seed list refresh may be a total or partial refresh. For example, if a seed list initially contained ten clients and it was determined that four of the clients had disconnected then the seed list refresh could request four new client addresses. Alternatively, if a first initiated search was based in engineering resources and a second initiated search was based in sales resources, an entire seed list could be replaced accordingly to optimize searching for a different type of resource. At the server, step 528 maintains the connected client address list. This is done by periodically sending a PING signal from the server to the clients on the connected list. If an expected acknowledgement signal, such as a PONG signal, is not received, then the client is removed from the connected client list. Then step 530 determines if the server has received a seed list refresh request and if not returns to step 504. Otherwise the server generates a seed list refresh from the connected client IP address list at step 532 and sends the seed list to the requesting client at step 534. The client receives the refreshed seed list at step 536 and sends a PING signal to new clients. Any non-acknowledging new clients are removed from the seed list at step 522. By the process of FIG. 5, seed lists are established and maintained at the client and the connected client IP address list is maintained at the server. It should be appreciated that in alternate embodiments the server may remove a client from the connected lists in response to any non-acknowledgement including non-response to a PING signal. For example clients could periodically send an acknowledgement signal without requiring PING from the server and if the acknowledgement signal is not received within a predetermined time, then step 528 removes the client from the connected list. Alternatively the client could actively send a disconnect signal, conditions permitting, and the server remove the client from the connected list in response thereto. Note in the preferred embodiment clients on the seed list are not regularly sent PING requests because the PING requests of steps 512 and 536 are sufficient. This has the advantage of significantly reducing network traffic in a distributed search P2P network.

FIG. 6 shows a process flow diagram of PING, SEARCH and GET request processing by a client in accordance with a preferred embodiment of the

Ex.1002 / Page 140 of 1008
Cisco Systems, Inc.

present invention. If a PING is received by a client at step 600 then a PONG is sent by the client at step 602. If a SEARCH request is received at step 604 then authentication is performed at step 606 and a search time out is checked at step 608. Authentication will be described in more detail below. If authentication passes and the search has not timed out, then step 610 forwards the search request to other clients in the seed list. Step 612 determines which resources may be searched by the client requesting or initiating the search. Of the selected or authorized resources, step 614 searches resource metadata for a match with the search request. If there is a resource match at step 616 then the client replies with a signal indicative of the matching resource at step 608 for propagation back to the requesting computer. From either of steps 604, 606, 608, 616 or 618 the process proceeds to step 620 to determine if a GET request is received. A GET request is typically initiated by a client after initiating a SEARCH request and receiving a match signal generated at step 618. If a GET request is received then step 622 determines if the requesting client is authorized to receive the resource. If authorized, step 624 sends the resource to the client initiating the GET request. It should be appreciated that the search is not propagated in response to a time out at step 608 or in response to an authentication failure at step 606. It should further be appreciated by one familiar with the art that the authentication process of step 606 may be combined with the determination process of step 612 while inhibiting search propagation in response to failure of authentication.

FIG. 7 shows a process flow diagram of an authentication process that does not require communication with an authentication process external to the client. The process of FIG. 7 occurs at the client at steps 612 and 622 of FIG. 6. At step 700 the identification credentials of the client initiating the search request are checked. The credential check could be a simple comparison of the client ID with a predetermined list, determination of the IP address of the requesting client, verification of a check sum, an encryption technique, security certificate or other method that does not require authentication through a process external to the client in response to a SEARCH or GET request. At step 702, resource access limitations are compared with the credentials of the initiating client. For example, it may be predetermined that client 1 has access to resources 2 and 3 while client 2 has access to resources 5 and 6. Alternatively it may be predetermined that clients from a certain IP gateway have limited access while other clients have unlimited access to resources. In response step 704 determines which specific resources may be searched or sent to the requesting client. The process shown in FIG. 7 has

Ex.1002 / Page 141 of 1008
Cisco Systems, Inc.

the advantage of providing for selective resource sharing in a distributed P2P network without the requirement of an external authorization and/or authentication process, the selection being in response to credentials indicative of the requesting client.

FIG. 8 shows a process flow diagram of communication between a client and an authentication process external to the client in accordance with a preferred embodiment of the present invention. For clarity, the client processes occur on the left side of FIG. 8 and the external authentication processes occur on right side of FIG. 8. The processes of FIG. 8 provide more detail to the processes shown in steps 612 or 622 of FIG. 6. Step 800 examines the client cache for a prior authentication of identification credentials performed in a prior SEARCH or GET request. If no prior authentication, then step 802 sends the identification credentials to an external authentication process, such as process 104 of FIG. 1. The external authentication process receives the credentials at step 804 and determines if the name and password included in the credentials matches a name and password stored at the authentication process. If there is a match, the authentication signal is returned to the client at step 806. Otherwise authentication is denied. The authentication signal is received by the client at step 808 and stored in the client cache along with the credentials received in the SEARCH or GET request at step 810. Thereafter, resource access controls are compared with identification credentials at step 812. For example it may be predetermined that client 1 has access to resources 2 and 3 while client 2 has access to resources 5, and 6. Alternatively it may be predetermined that clients from a certain IP gateway have limited access while other clients have unlimited access to resources. Step 814 determines which resources may be searched or sent to the requesting client. The process shown in FIG. 8 has the advantage of providing for selective resource sharing in a distributed P2P network using a centrally controlled authentication process. In a large organization where employees routinely are hired or terminated, central control of authentication allows for secure control of who may conduct a search in a distributed search P2P network system. Furthermore, caching of prior authentications significantly reduces authentication network traffic.

FIG. 9 shows a process flow diagram of a communication between a client and an authorization process external to the client in accordance with a preferred embodiment of the present invention. For clarity, the client processes occur on the left side of FIG. 9 and the external authorization processes occur on right side of FIG. 9. The processes of

Ex.1002 / Page 142 of 1008
Cisco Systems, Inc.

FIG. 9 provide more detail to the processes shown in steps 612 or 622 of FIG. 6. Step 900 examines the client cache for prior authorization access limitations of identification credentials performed in a prior SEARCH or GET request. If no prior authorization, then step 902 sends the identification credentials to an external authorization process, such as process 104 of FIG. 1. The external authorization process receives the credentials at step 904 and determines which access controls are associated with the identification credentials. In response an authorization access control signal is returned to the client at step 906. The authorization access control signal is received by the client at step 908 and stored in the client cache along with the credentials received in the SEARCH or GET request at step 910. Thereafter, authorization access controls associated with the requesting client are compared with resource access controls at step 912. Step 914 determines which resources may be searched or sent to the requesting client. The process shown in FIG. 9 has the advantage of providing for selective resource sharing in a distributed P2P network using a centrally controlled authorization process. In a large organization where employees regularly change job functions, thereby requiring access to differing types of information, central control of authorization allows for secure control of the type of resource one may search in a distributed search P2P network system. Furthermore, caching of prior authorizations significantly reduces authorization network traffic.

Thus, what is provided is a system that adapts the advantages of the P2P network while resolving disadvantages of current P2P systems. The P2P network takes advantage of the reduced central server requirements of a pure P2P network without sacrificing the efficiencies of the central server. Furthermore, the P2P network provides secure access and control to client resources without the requirement of a central server. The server function and security functions can operate independently. For example, the P2P network of FIG. 1 may be operated without the authentication and authorization functions 104 to provide server enhanced P2P search propagation. Alternately, the P2P network of FIG. 1 may be operated without the P2P server 102 providing a P2P search propagation with authentication and/or authorization functionality. The server 102 and authentication and authorization 104, when combined produce an efficient and secure P2P search propagation network. Such a combined system finds advantageous application in intranet application for global or other large organizations.

The present invention, as would be known to one familiar with the art, could be produced in hardware or software, or in a combination of

Ex.1002 / Page 143 of 1008
Cisco Systems, Inc.

hardware and software. The system, or method, according to the inventive principles as disclosed in connection with the preferred embodiment, may be produced in a single computer system having separate elements for performing the individual functions or steps described or claimed or one or more elements combining the performance of any of the functions or steps disclosed or claimed, or may be arranged in a distributed computer system, interconnected by any suitable means as would be known by one familiar with the art.

According to the inventive principles as disclosed in connection with the preferred embodiment, the invention and the inventive principles are not limited to any particular kind of computer system but may be used with any general purpose computer, as would be known to one familiar with the art, arranged to perform the functions described and the method steps described. The operations of such a computer, as described above, may be according to a computer program contained on a medium for use in the operation or control of the computer, as would be known to one familiar with the art. The computer medium that may be used to hold or contain the computer program product, may be a fixture of the computer such as an embedded memory or may be on a transportable medium such as a disk, as would be known to one familiar with the art.

The invention is not limited to any particular computer program or logic or language, or instruction but may be practiced with any such suitable program, logic or language, or instructions as would be known to one familiar with the art. Without limiting the principles of the disclosed invention any such computing system can include, inter alia, at least a computer readable medium allowing a computer to read data, instructions, messages or message packets, and other computer readable information from the computer readable medium. The computer readable medium may include nonvolatile memory, such as ROM, Flash memory, floppy disk, Disk drive memory, CDROM, and other permanent storage. Additionally, a computer readable medium may include, for example, volatile storage such as RAM, buffers, cache memory, and network circuits.

Furthermore, the computer readable medium may include computer readable information in a transitory state medium such as a network link and/or a network interface, including a wired network or a wireless network, that allow a computer to read such computer readable information.

Although a specific embodiment of the invention has been disclosed. It will be understood by those familiar with the art that changes can be made

to this specific embodiment without departing from the spirit and scope of the invention. The scope of the invention is not to be restricted, therefore, to the specific embodiment, and it is intended that the appended claims cover any and all such applications, modifications, and embodiments within the scope of the present invention.

Ex.1002 / Page 145 of 1008
Cisco Systems, Inc.

CLAIMS

1. In a peer-to-peer network a method of securely conducting a resource search initiated by a first client, the resource search included with a search request having a credentials signal indicative of the first client, the method comprising the steps of:

communicating the search request from the first client to a second client, the second client having a multiplicity of second resources, each of the multiplicity of second resources having at least one corresponding access attribute;

at the second client, selectively searching the multiplicity of second resources in response to comparison of the credentials signal and the at least one access attribute of each of the multiplicity of second resources;

communicating the search request from the second client to a third client, the third client having a multiplicity of third resources, each of the multiplicity of third resources having at least one corresponding access attribute; and

at the third client, selectively searching the multiplicity of third resources in response to comparison of the credentials signal and the at least one access attribute of each of the multiplicity of third resources.

2. The method according to claim 1 further comprising the steps of:

at the third client, determining a matching resource in response to said step of selectively searching the multiplicity of third resources; and

communicating a matching signal indicative of the matching resource from the third client to the first client.

3. The method according to claim 1 or claim 2 wherein

the credentials signal includes an identification signal indicative of the first client and

the access attributes of the second and third resources includes an authorization signal indicative of at least one of a plurality of clients, the plurality of clients including the first client, and further wherein

said step of selectively searching the second multiplicity of resources searches one of the second multiplicity of resources if the identification signal substantially matches the authorization signal included with the corresponding access attributes, and

said step of selectively searching the third multiplicity of resources searches one of the third multiplicity of resources if the identification signal substantially matches the authorization signal included with the corresponding access attributes.

4. The method according to any preceding claim wherein the credentials signal includes an identification signal indicative of the first client and

the access attributes of the second and third resources includes an authorization signal indicative of at least one of a plurality of clients, the plurality of clients including the first client, wherein

said step of selectively searching the second multiplicity of resources further includes the steps of:

communicating from the second client to an authentication process external to the first, second and third clients the identification signal;

receiving from the authentication process an authenticated signal indicative of the first client in response thereto; and

searching one of the second multiplicity of resources if the authenticated signal substantially matches the authorization signal included with the corresponding access attributes, and

said step of selectively searching the third multiplicity of resources further includes the steps of:

communicating from the third client to the authorization process the identification signal;

receiving from the authorization process the authenticated signal indicative of the first client in response thereto; and

searching one of the third multiplicity of resources if the authenticated signal substantially matches the authorization signal included with the corresponding access attributes.

5. The method according to claim 4 further comprising the steps:

at the second client, storing the identification signal and the received authenticated signal in a cache memory at the second client; and

at the second client searching the cache memory for the identification signal and the received authentication signal prior to said step communicating from the second client to the authentication process, wherein

said step communicating from the second client to the authentication process is not performed if said step of searching the cache memory finds the identification signal and the received authentication signal stored therein, and

said step of searching one of the second multiplicity of resources uses the authenticated signal stored in the cache memory, thereby reducing communication between the second client and the authentication process.

6. The method according to claim 4 further comprising the steps:

at the third client, storing the identification signal and the received authenticated signal in a cache memory at the third client; and

at the third client searching the cache memory for the identification signal and the received authentication signal prior to said step communicating from the third client to the authentication process, wherein

said step communicating from the third client to the authentication process is not performed if said step of searching the cache memory finds the identification signal and the received authentication signal stored therein, and

said step of searching one of the third multiplicity of resources uses the authenticated signal stored in the cache memory, thereby reducing communication between the third client and the authentication process.

7. The method according to claim 4 wherein said step of communicating the search request from the second client to the third client and said step of selectively searching the multiplicity of third resources are not performed if the authentication signal is not received from the authentication process by the second client.

8. The method according to any preceding claim wherein

the credentials signal includes an identification signal indicative of the first client and

the access attributes of the second and third resources includes an authorization signal indicative of at least one of a plurality of client classes, wherein

said step of selectively searching the second multiplicity of resources further includes the steps of:

communicating from the second client to an authorization process external to the second client the identification signal;

receiving from the authorization process a client class signal indicative which of the plurality of client classes are associated with the identification signal; and

searching one of the second multiplicity of resources if the client class signal substantially matches the authorization signal included with the corresponding access attributes, and

said step of selectively searching the third multiplicity of resources further includes the steps of:

communicating from the third client to the authorization process external to the third client the identification signal;

receiving from the authorization process the client class signal indicative which of the plurality of client classes are associated with the identification signal; and

searching one of the third multiplicity of resources if client class signal substantially matches the authorization signal included with the corresponding access attributes.

9. The method according to claim 8 further comprising the steps:

at the second client, storing the identification signal and the received client class signal in a cache memory at the second client; and

at the second client searching the cache memory for the identification signal and the received client cache signal prior to said step communicating from the second client to the authorization process, wherein

said step communicating from the second client to the authorization process is not performed if said step of searching the cache memory finds the identification signal and the received client cache signal stored therein;

said step of searching one of the second multiplicity of resources uses the client cache signal stored in the cache memory, thereby reducing communication between the second client and the autorization process;

at the third client, storing the identification signal and the received client class signal in a cache memory at the third client; and

at the third client searching the cache memory for the identification signal and the received client cache signal prior to said step communicating from the third client to the authorization process, wherein

said step communicating from the third client to the authorization process is not performed if said step of searching the cache memory finds the identification signal and the received client class signal stored therein, and

said step of searching one of the third multiplicity of resources uses the client class signal stored in the cache memory, thereby reducing communication between the third client and the authentication process.

10. A client included in a peer-to-peer network having a multiplicity of clients, the client comprising:

a peer-to-peer network dispatcher for receiving a resource search request from a second client of the multiplicity of clients, the search request initiating from an initiating client of the multiplicity of clients, the search request including a credentials signal having an identification signal indicative of the initiating client;

a memory for storing a plurality of resources, each of the plurality of resources having at least one corresponding access attribute; and

a search engine for selectively searching at least one of the plurality of resources in response to a comparison of the credentials signal and the at least one access attribute of each of the plurality of resources.

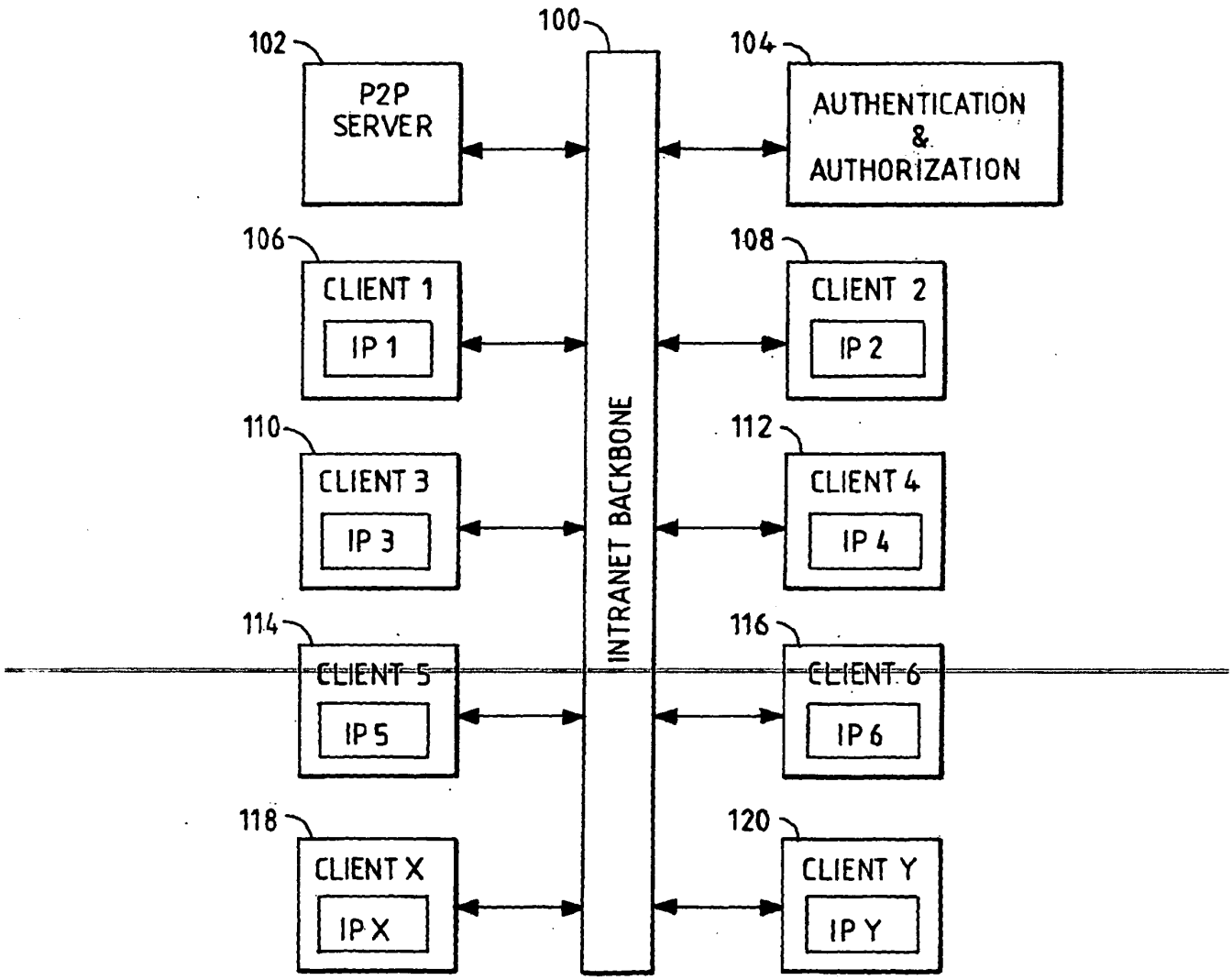

100
102
P2P SERVER
104
AUTHENTICATION & AUTHORIZATION
106
CLIENT 1
IP 1
108
CLIENT 2
IP 2
110
CLIENT 3
IP 3
112
CLIENT 4
IP 4
114
CLIENT 5
IP 5
116
CLIENT 6
IP 6
118
CLIENT X
IP X
120
CLIENT Y
IP Y
INTRANET BACKBONE

FIG. 1

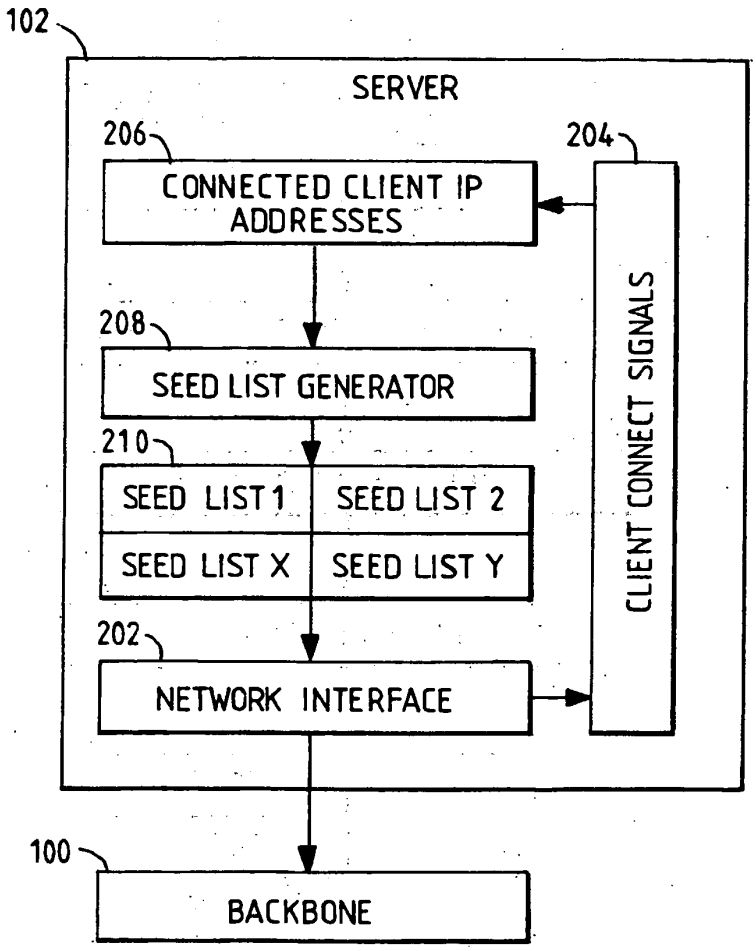


FIG. 2

Ex.1002 / Page 153 of 1008
Cisco Systems, Inc.

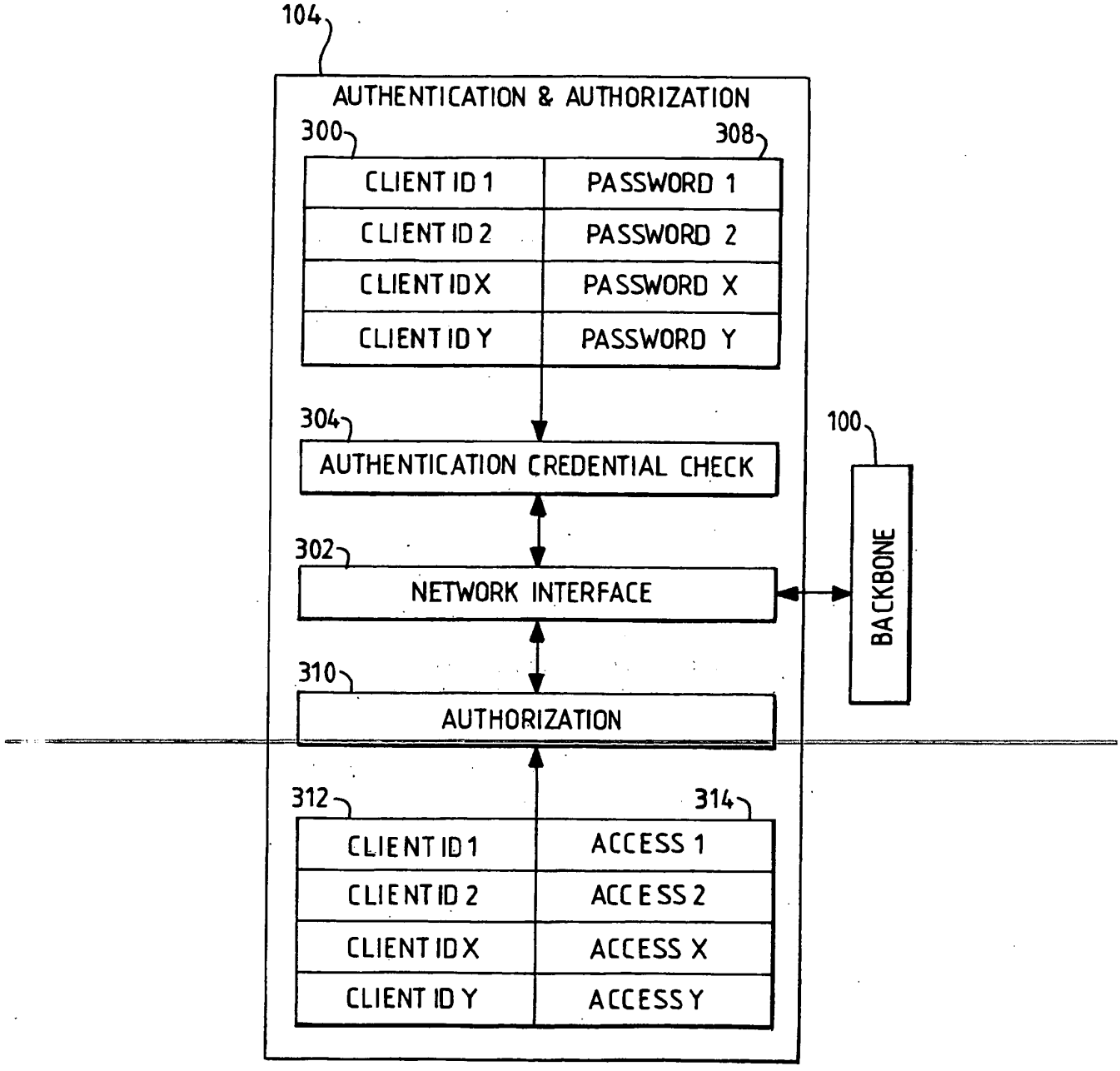

104
AUTHENTICATION & AUTHORIZATION
300
308
CLIENT ID 1
PASSWORD 1
CLIENT ID 2
PASSWORD 2
CLIENT ID X
PASSWORD X
CLIENT ID Y
PASSWORD Y
304
AUTHENTICATION CREDENTIAL CHECK
100
302
NETWORK INTERFACE
BACKBONE
310
AUTHORIZATION
312
314
CLIENT ID 1
ACCESS 1
CLIENT ID 2
ACCESS 2
CLIENT ID X
ACCESS X
CLIENT ID Y
ACCESS Y

FIG. 3

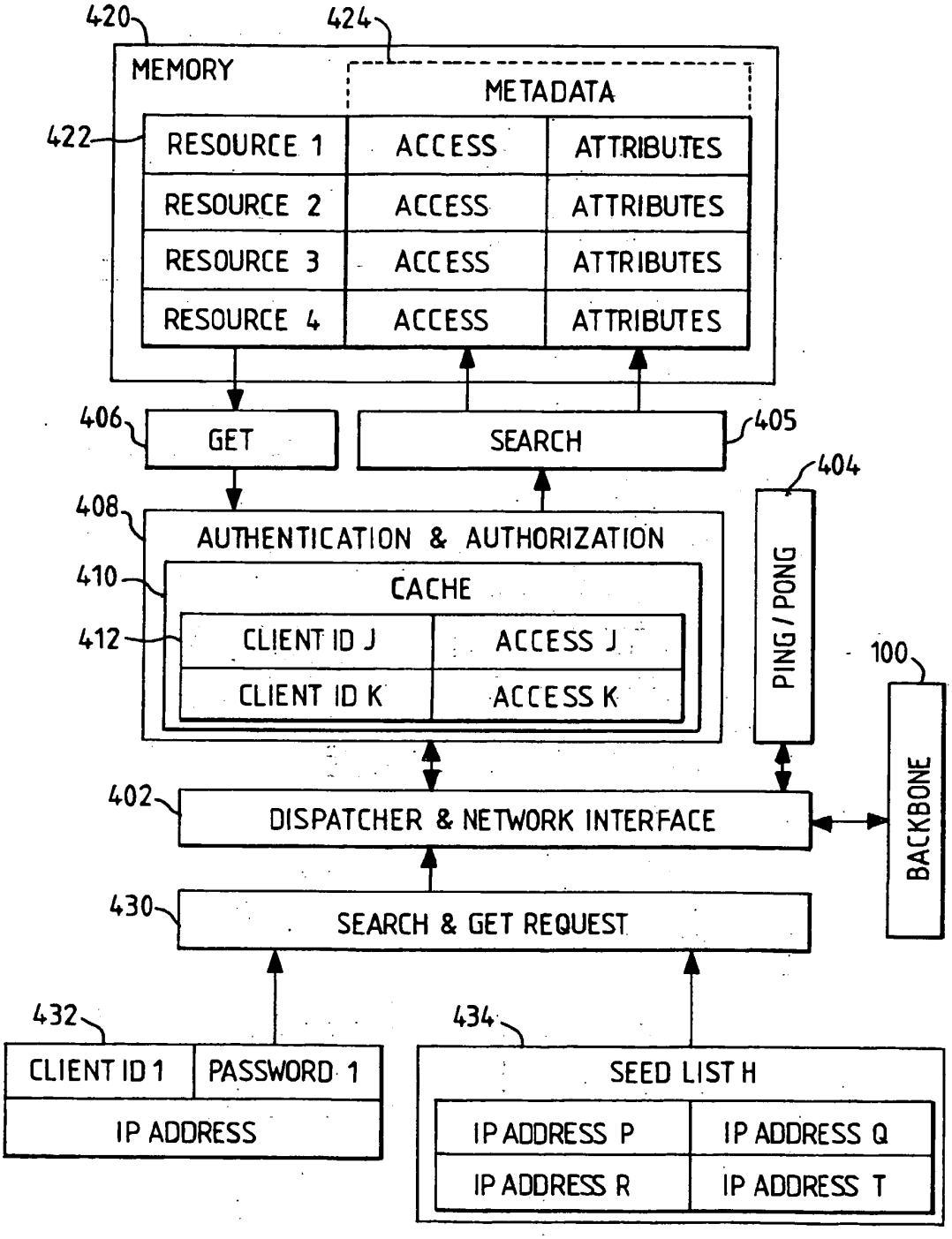

420
424
MEMORY
METADATA
422
RESOURCE 1
ACCESS
ATTRIBUTES
RESOURCE 2
ACCESS
ATTRIBUTES
RESOURCE 3
ACCESS
ATTRIBUTES
RESOURCE 4
ACCESS
ATTRIBUTES
406
GET
SEARCH
405
404
408
AUTHENTICATION & AUTHORIZATION
410
CACHE
412
CLIENT ID J
ACCESS J
CLIENT ID K
ACCESS K
PING / PONG
100
BACKBONE
402
DISPATCHER & NETWORK INTERFACE
430
SEARCH & GET REQUEST
432
CLIENT ID 1
PASSWORD 1
IP ADDRESS
434
SEED LIST H
IP ADDRESS P
IP ADDRESS Q
IP ADDRESS R
IP ADDRESS T

FIG. 4

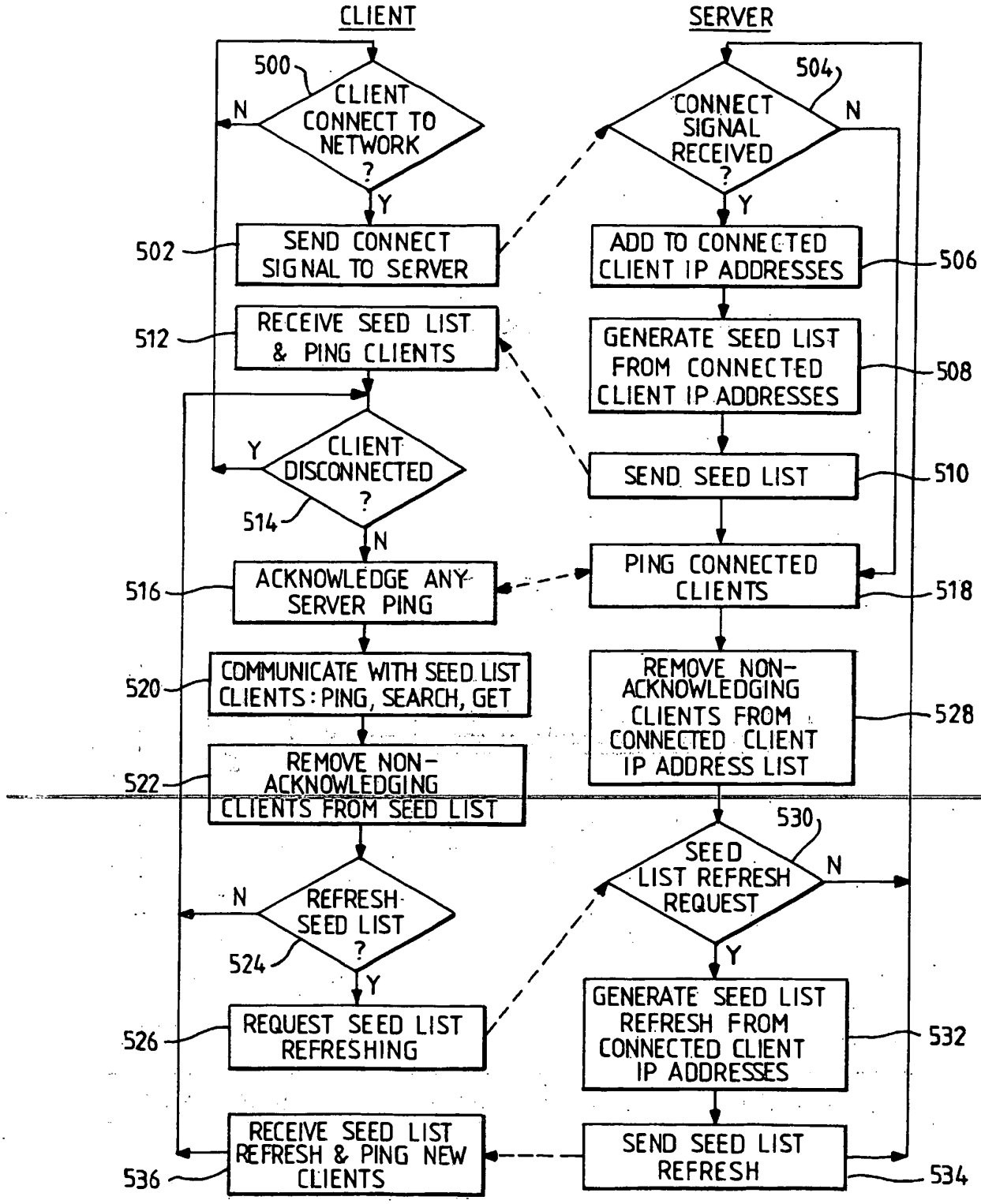


FIG. 5

BNSDOCID: <WO_____03079635A1_I_>

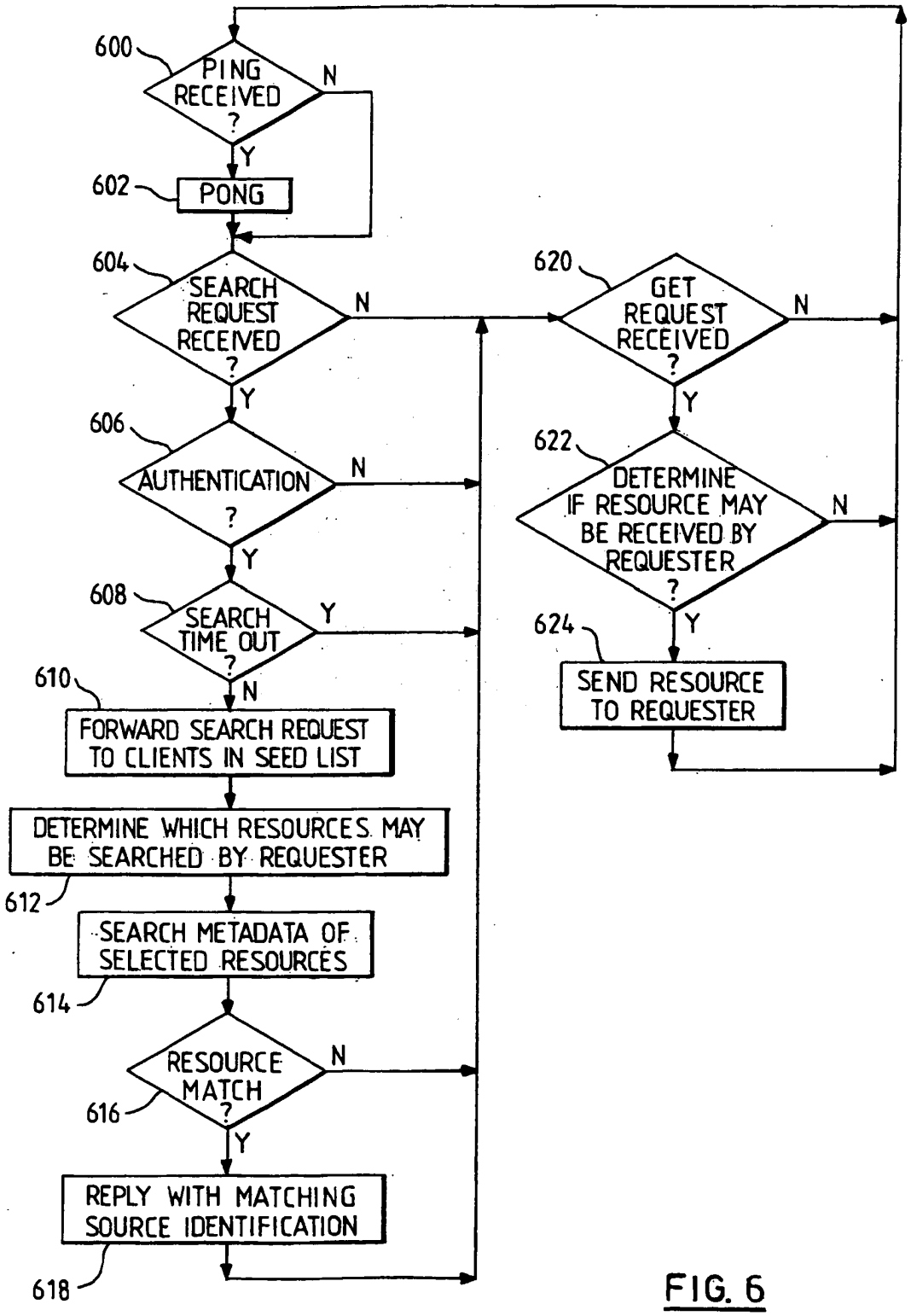

600
PING RECEIVED ?
N
Y
602
PONG
604
SEARCH REQUEST RECEIVED ?
N
Y
606
AUTHENTICATION ?
N
Y
608
SEARCH TIME OUT ?
Y
N
610
FORWARD SEARCH REQUEST TO CLIENTS IN SEED LIST
DETERMINE WHICH RESOURCES MAY BE SEARCHED BY REQUESTER
612
SEARCH METADATA OF SELECTED RESOURCES
614
RESOURCE MATCH ?
N
616
Y
REPLY WITH MATCHING SOURCE IDENTIFICATION
618
620
GET REQUEST RECEIVED ?
N
Y
622
DETERMINE IF RESOURCE MAY BE RECEIVED BY REQUESTER ?
N
Y
624
SEND RESOURCE TO REQUESTER

FIG. 6

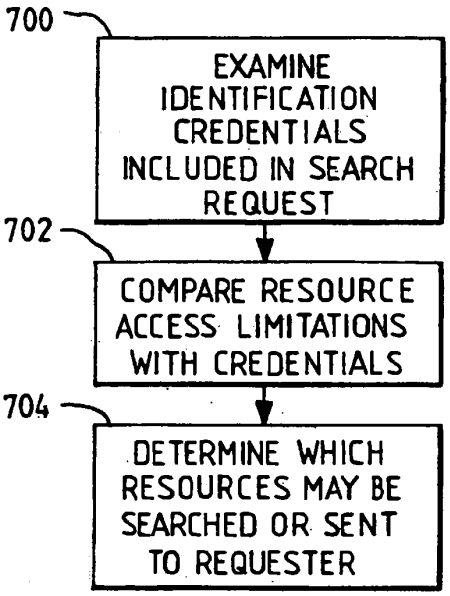

700
EXAMINE IDENTIFICATION CREDENTIALS INCLUDED IN SEARCH REQUEST
702
COMPARE RESOURCE ACCESS LIMITATIONS WITH CREDENTIALS
704
DETERMINE WHICH RESOURCES MAY BE SEARCHED OR SENT TO REQUESTER

FIG. 7

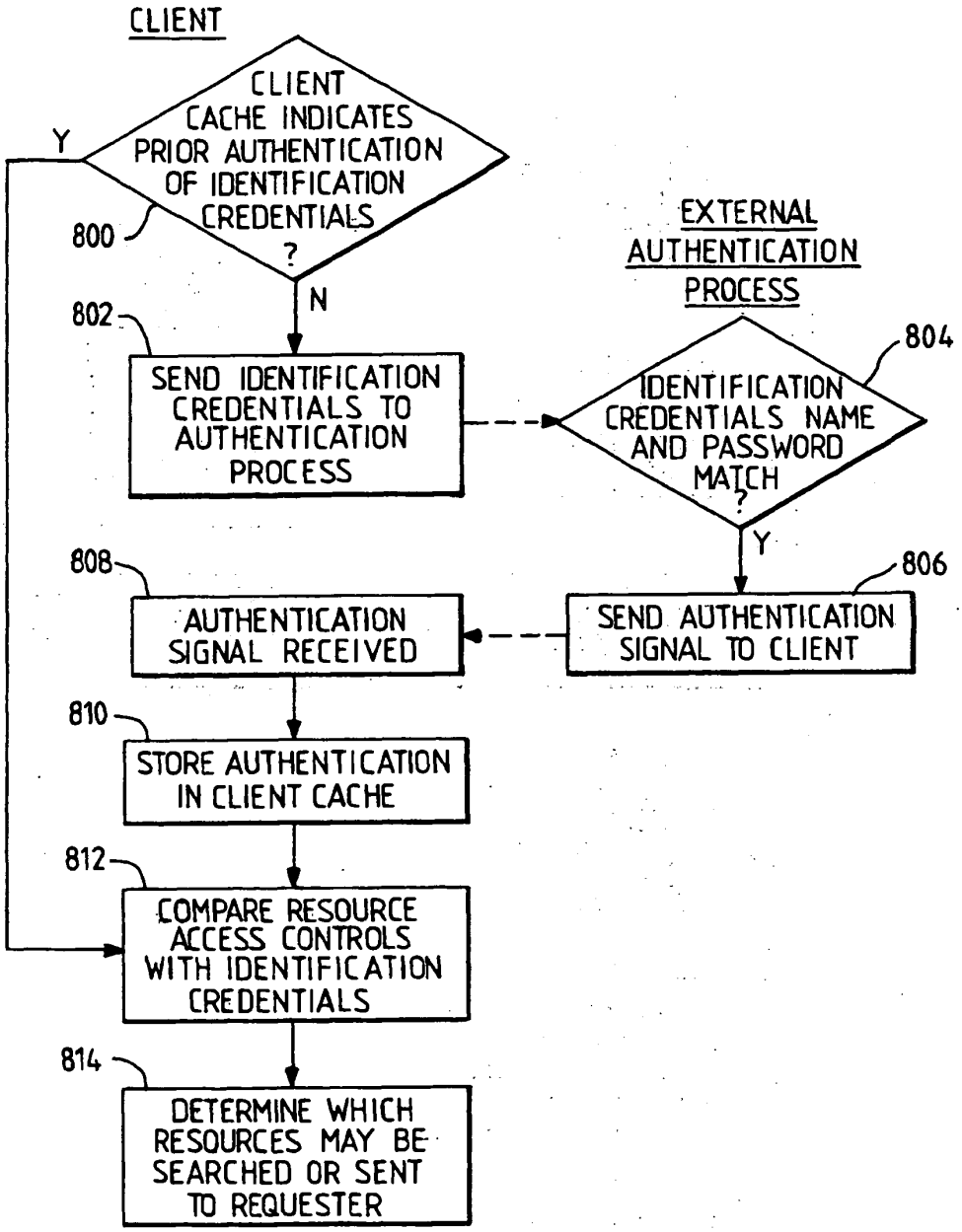

CLIENT
CLIENT CACHE INDICATES PRIOR AUTHENTICATION OF IDENTIFICATION CREDENTIALS ?
800
Y
N
802
SEND IDENTIFICATION CREDENTIALS TO AUTHENTICATION PROCESS
EXTERNAL AUTHENTICATION PROCESS
804
IDENTIFICATION CREDENTIALS NAME AND PASSWORD MATCH ?
Y
806
SEND AUTHENTICATION SIGNAL TO CLIENT
808
AUTHENTICATION SIGNAL RECEIVED
810
STORE AUTHENTICATION IN CLIENT CACHE
812
COMPARE RESOURCE ACCESS CONTROLS WITH IDENTIFICATION CREDENTIALS
814
DETERMINE WHICH RESOURCES MAY BE SEARCHED OR SENT TO REQUESTER

FIG. 8

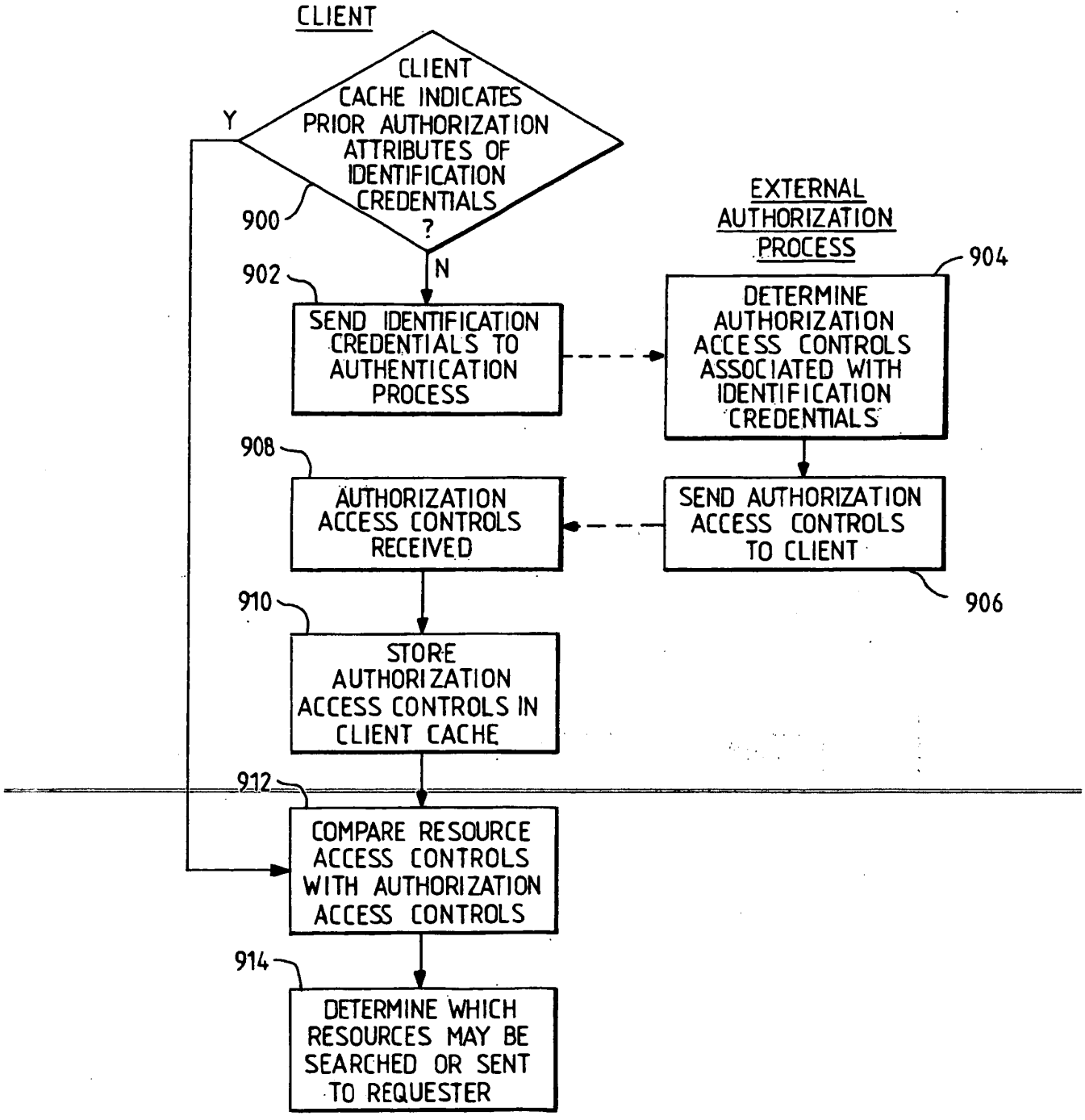

CLIENT
CLIENT CACHE INDICATES PRIOR AUTHORIZATION ATTRIBUTES OF IDENTIFICATION CREDENTIALS ?
900
Y
N
902
SEND IDENTIFICATION CREDENTIALS TO AUTHENTICATION PROCESS
EXTERNAL AUTHORIZATION PROCESS
904
DETERMINE AUTHORIZATION ACCESS CONTROLS ASSOCIATED WITH IDENTIFICATION CREDENTIALS
908
AUTHORIZATION ACCESS CONTROLS RECEIVED
SEND AUTHORIZATION ACCESS CONTROLS TO CLIENT
906
910
STORE AUTHORIZATION ACCESS CONTROLS IN CLIENT CACHE
912
COMPARE RESOURCE ACCESS CONTROLS WITH AUTHORIZATION ACCESS CONTROLS
914
DETERMINE WHICH RESOURCES MAY BE SEARCHED OR SENT TO REQUESTER

FIG. 9

INTERNATIONAL SEARCH REPORT

Internatl Application No
PCT/GB 03/00776

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04L29/06 H04L29/08

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 H04L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, PAJ, WPI Data, INSPEC, IBM-TDB

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WOOYOUNG KIM ET AL: "A secure platform for peer-to-peer computing in the Internet" PROCEEDINGS OF THE 35TH ANNUAL HAWAII INTERNATIONAL CONFERENCE ON SYSTEM SCIENCES, PROCEEDINGS OF THE 35TH ANNUAL HAWAII INTERNATIONAL CONFERENCE ON SYSTEM SCIENCES, BIG ISLAND, HI, USA, 7-10 JAN. 2002, 'Online! pages 3948-3957, XP002251810 2002, Los Alamitos, CA, USA, IEEE Comput. Soc, USA ISBN: 0-7695-1435-9 Retrieved from the Internet: <URL:7198204> 'retrieved on 2003-08-14! Abstract 2.3 Queries 2.4 Communication 3.3 Capability-based Access Control -/--	1-10

[X] Further documents are listed in the continuation of box C. [X] Patent family members are listed in annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier document but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
21 August 2003	01/09/2003

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Bertolissi, E

Form PCT/ISA/210 (second sheet) (July 1992)

ISDOCID: <WO_____03079635A1_I_>

Ex.1002 / Page 161 of 1008
Cisco Systems, Inc.

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
	5. Advertising Service and Ad Hoc Discovery --- ADVANCED REALITY: "Advanced Reality Introduces Peer-to-Peer Collaboration Platform that Makes Any Application Collaborative " ADVANCED REALITY PRESS RELEASE, 'Online! 10 December 2001 (2001-12-10), XP002251811 Retrieved from the Internet: <URL:http://www.advancedreality.com/news_and_events/Press_Releases/2001/Presence-AR%20Press%20Release%20121001.pdf> 'retrieved on 2003-08-14! Page 2, Enterprise Level Security	
X		1-10
	--- ADVANCED REALITY : "Presence-AR Technology Overview " ADVANCED REALITY INTERNET PUBLICATION, 'Online! 20 March 2002 (2002-03-20), XP002251812 Retrieved from the Internet: <URL:http://www.advancedreality.com/Resource_Library/Presence-AR_Technology_Overview.pdf> 'retrieved on 2003-08-14! pages 9-10, Security	
P,X		1-10
	--- UMA S CHATHAPURAM: "Security in Peer-to-Peer Networks" INTERNET PUBLICATION, 'Online! 8 August 2001 (2001-08-08), XP002251813 Retrieved from the Internet: <URL:http://netserver.cerc.wvu.edu/classes/cs491h_summer2_2001/sankaran_securityoverview/security-uma.doc> 'retrieved on 2003-08-14! Page 3, Introduction Page 7, Availability	
X		1,10
	--- WO 01 13201 A (SARNOFF CORP) 22 February 2001 (2001-02-22) abstract	
A		1,10
	--- EP 1 229 442 A (SUN MICROSYSTEMS INC) 7 August 2002 (2002-08-07) abstract paragraph '0285! - paragraph '0303!	
P,X		1,10
	--- WO 02 091239 A (SUN MICROSYSTEMS INC) 14 November 2002 (2002-11-14) abstract page 35, line 22 - line 28 page 41, line 25 - line 31	
P,X		1,10
	--- -/--	

Form PCT/ISA/210 (continuation of second sheet) (July 1992)

BNSDOCID: <WO_____03079635A1_I_>

INTERNATIONAL SEARCH REPORT

Internati Application No
PCT/GB 03/00776

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 2000 112860 A (MITSUBISHI ELECTRIC CORP) 21 April 2000 (2000-04-21) abstract paragraph '0001! - paragraph '0017!	1-10

Form PCT/ISA/210 (continuation of second sheet) (July 1992)

ISDOCID: <WO_____03079635A1_I_>

INTERNATIONAL SEARCH REPORT

Internati Application No
PCT/GB 03/00776

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
WO 0113201	A	22-02-2001	AU	6522200 A	05-03-2001
			AU	6537400 A	13-03-2001
			EP	1203479 A2	08-05-2002
			WO	0111817 A2	15-02-2001
			WO	0113201 A2	22-02-2001
EP 1229442	A	07-08-2002	EP	1229442 A2	07-08-2002
			EP	1229443 A2	07-08-2002
			WO	02057917 A2	25-07-2002
			US	2002143944 A1	03-10-2002
			US	2002143855 A1	03-10-2002
			US	2002184310 A1	05-12-2002
			US	2002184357 A1	05-12-2002
			US	2002184311 A1	05-12-2002
			US	2003002521 A1	02-01-2003
			US	2002152299 A1	17-10-2002
			US	2002184358 A1	05-12-2002
			US	2002188657 A1	12-12-2002
			US	2002147810 A1	10-10-2002
			US	2002147771 A1	10-10-2002
			US	2002156893 A1	24-10-2002
			US	2003041141 A1	27-02-2003
			EP	1282289 A2	05-02-2003
			US	2003028585 A1	06-02-2003
			US	2003070070 A1	10-04-2003
			US	2003055894 A1	20-03-2003
			US	2003055898 A1	20-03-2003
WO 02091239	A	14-11-2002	US	2003088544 A1	08-05-2003
			US	2003126120 A1	03-07-2003
			WO	02091238 A2	14-11-2002
			WO	02091239 A2	14-11-2002
			WO	02091107 A2	14-11-2002
			WO	02091241 A2	14-11-2002
			WO	02091242 A2	14-11-2002
			WO	02091243 A2	14-11-2002
			US	2003050959 A1	13-03-2003
			US	2003050924 A1	13-03-2003
			US	2003055818 A1	20-03-2003
JP 2000112860	A	21-04-2000	NONE		

Form PCT/ISA/210 (patent family annex) (July 1992)

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
29 July 2004 (29.07.2004)

PCT

(10) International Publication Number
WO 2004/063843 A2

(51) International Patent Classification[7]: G06F

(21) International Application Number:
PCT/JP2004/000261

(22) International Filing Date: 15 January 2004 (15.01.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
10/342,304 15 January 2003 (15.01.2003) US
10/372,218 25 February 2003 (25.02.2003) US

(71) Applicant *(for all designated States except US)*: **MATSUSHITA ELECTRIC INDUSTRIAL CO.,LTD.** [JP/JP]; 1006, Oaza Kadoma, Kadoma-shi, Osaka 5718501 (JP).

(72) Inventors; and
(75) Inventors/Applicants *(for US only)*: **TAKEDA, Yutaka** [/]. **BOIRI, Youssef, Kamal** [/].

(74) Agents: **MAEDA, Hiroshi** et al.; Honmachi-nakajima Bldg., 4-8,, Utsubohonmachi 1-chome, Nishi-ku, Osaka-shi, Osaka 5500004 (JP).

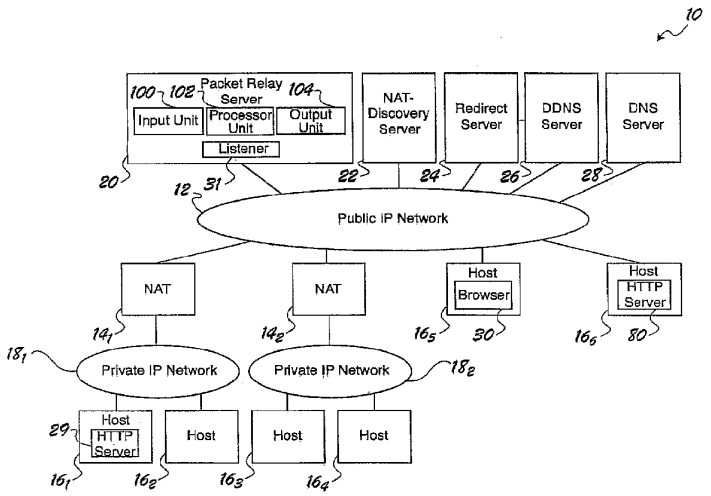
(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— *without international search report and to be republished upon receipt of that report*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: PEER-TO-PEER (P2P) CONNECTION DESPITE NETWORK ADDRESS TRANSLATOR (NATs) AT BOTH ENDS



(57) Abstract: Methods of operating a first endpoint device (ED) facilitate the making of a peer-to-peer (P2P) connection between the first ED and a second ED despite intervening network address translators (NATs) at both ends. The P2P connection extends across a system compliant with the internet protocol (IP) whose architecture that includes a first network (having at least the first ED and a first NAT), a second network (having at least the second ED and a second NAT) and a third network. The first ED connects to the third network via the first NAT while the second ED connects to the third network via the second NAT. A first such method includes: providing the second ED with the first IP-address/port pair; and providing the second ED with first type-information regarding the type of the first NAT.

WO 2004/063843 A2

DESCRIPTION

PEER-TO-PEER (P2P) CONNECTION DESPITE NETWORK ADDRESS TRANSLATOR (NATs) AT BOTH ENDS

BACKGROUND ART

In the last decade, the number of computers connected to the Internet has increased by an enormous order of magnitude. High growth in the number of Internet connections has put severe pressure on the available address-space of routable internet protocol (IP) addresses. To overcome the problem of limited and diminishing IP address-space, it became imperative to have a solution that would allow multiple users to share a single routable internet address. The commonly used solution for sharing a single IP address is known as a Network Address Translator (NAT). Operation of a typical NAT is described next.

The basic concept underlying a NAT is to have a device or software module that allows sharing of one or more routable Internet Protocol (IP) addresses by multiple computers. A typical NAT is connected to the public internet on one side and has at least one global or public IP address for receiving and sending data packets from and to the public internet. On the other side of the typical NAT is a private network, in which each network node (computer) is assigned a local arbitrary address. Typically, the NAT assigns arbitrary addresses to the nodes of the private network using a Dynamic host Control Protocol (DHCP) or alternatively the NAT assigns static translation addresses.

According to Simple Traversal of UDP through NAT ("STUN", where UDP is the acronym for User Datagram Protocol), there are five basic types of NAT in the Background Art. It is helpful to discuss the differences between the types of NAT, which will be done in terms of the simplistic system block diagrams of Background Art Figs. 4A - 4E.

Fig. 4A depicts a system 400 according to the Background Art that includes: an endpoint device 404; an endpoint device 406 having an IP address X and ports p and q; an endpoint device 408 having an IP address Y and ports p and q; and a full cone type of NAT 404. Devices 404, 406 and 408 are described as "endpoint" devices because they can be the endpoints of a communication session, e.g., between device 404 and device 406 or between device 404 and device 408. While there will be at least one intermediary device, namely the NAT 402, between the endpoint devices, the endpoints themselves are not intermediary devices for the purposes of this explanation.

The endpoint devices 404, 406 and 408, respectively, can be, e.g., a host of server such as an HTTP server, a host of browser such as an HTTP browser, an IP video camera, etc. Typically, the endpoint device 404 is part of a first network 418, and the endpoint devices 406 and 408 are part of a second network 419. The full-cone NAT 402 can be considered as part of each of the first network 418 and the second network 419. The endpoint devices 406 and 408 communicate with the endpoint device 404 via the full-cone NAT 402, and vice-versa, respectively.

In general, any type of the four types of NAT will allocate or map an address and port-number pair to the endpoint device 404. As a practical matter, this address/port pair makes it seem to devices on the second network 419 as if the endpoint device 404 is directly connected to the second network 419. In particular, the full-cone NAT 402 will accept a packet from any device on the second network 419, e.g., endpoint devices 406 or 408.

In Fig. 4A, a packet (not depicted) can be sent from the endpoint device 404 to the endpoint device 406 through the full-cone NAT 402 using the destination address/port pair X,p, as indicated by path 410. Not surprisingly, a packet (not depicted) sent by the endpoint device 406 to the endpoint device 404 using the source address/port pair X,p will

be accepted by the full-cone NAT 402 (and passed along to the endpoint device 404), as indicated by the path 412.

The nature of the full-cone NAT 402 is to accept a packet whose destination address/port pair is the address/port pair mapped to the endpoint device 404, regardless of the packet's source address, i.e., regardless of whether the source address and/or source port of the received packet matches a destination address of a packet previously sent from the endpoint device 404 via the full-cone NAT 402 to the second network 419. As such, packets (not shown) having the following source address/port pairs will also be accepted by the full-cone NAT 402: X,q as indicated by path 413; Y,p as indicated by path 414; and Y,q as indicated by path 416.

In contrast, other types of NAT depicted in Figs. 4B, 4C, 4D and 4E each exhibit greater restrictions upon what types of packets coming from the second network 419 will be accepted.

Fig. 4B depicts a system 420 that is similar to the system 400 except that an address-restricted cone type of NAT 422 is present instead of the full-cone NAT 402.

In Fig. 4B, a packet (not depicted) can be sent from the endpoint device 404 to the endpoint device 406 through the address-restricted NAT 422 using the destination address/port pair X,p, as indicated by path 424. Not surprisingly, a packet (not depicted) sent by the endpoint device 406 to the endpoint device 404 using the source address/port pair X,p will be accepted by the address-restricted NAT 422 (and passed along to the endpoint device 404), as indicated by the path 424.

The more-restricted nature of the address-restricted NAT 422 is to accept a packet whose destination address/port pair is the address/port pair mapped to the endpoint device 404 so long as the source address in the received packet matches a destination address of a packet previously sent from the endpoint device 404 via the address-restricted NAT 422 to

the second network 419, regardless of whether the source port matches the destination port of the packet previously sent from the endpoint device 404 via the full-cone NAT 422 to the second network 419. As such, a packet (not shown) having the address/port pair X,q will be also be accepted by the full-cone NAT 422, as indicated by path 426.

But packets having the following source address/port pairs will not be accepted (i.e., will be blocked) by the full-cone NAT 402: Y,p as indicated by path 430; and Y,q as indicated by path 432. Again, this is because the source addresses of the packets of path 430 and 432 do not match a destination address of a packet previously sent by the address-restricted NAT 422, e.g., such as the destination address of the packet of path 424.

Fig. 4C depicts a system 440 that is similar to the system 420 except that an address&port-restricted ("port-restricted") cone type of NAT 442 is present instead of the address-restricted NAT 422.

In Fig. 4C, a packet (not depicted) can be sent from the endpoint device 404 to the endpoint device 406 through the port-restricted NAT 442 using the destination address/port pair X,p, as indicated by path 444. Not surprisingly, a packet (not depicted) sent by the endpoint device 406 to the endpoint device 404 using the source address/port pair X,p will be accepted by the port-restricted NAT 442 (and passed along to the endpoint device 404), as indicated by the path 446.

The further-restricted nature of the port-restricted NAT 442 is to accept a packet whose destination address/port pair is the address/port pair mapped to the endpoint device 404 so long as the source port as well as the source address in the received packet matches a destination address/port pair of a packet previously sent from the endpoint device 404 via the port-restricted NAT 442 to the second network 419. Consequently, packets having the following source address/port pairs will not be accepted (i.e., will be blocked) by the port-

restricted NAT 442: X,q as indicated by path 448; Y,p as indicated by path 450; and Y,q as indicated by path 452.

Again, though the packet of path 448 has a source address that matches the destination address for the packet of path 444, the source port does not match a destination port of a packet previously sent via the port-restricted NAT 442. And both of the source addresses and source ports of the packets of paths 450 and 452, and hence their respective address/port pairs, fail to match the address/port of a packet previously sent via the port-restricted NAT 442.

Fig. 4D depicts a system 460 that is similar to the system 440 except that a symmetric and port-sensitive ("SYM_S") type of NAT 462 is present instead of the port-restricted NAT 442. For the purposes of this explanation, it is assumed that the SYM_S 462 has mapped two address/port pairs to the endpoint device 404; namely: a first address/port pair having the address of the SYM_S 462 and port:v; and a second pair having the same address but using port:w.

In Fig. 4D, a packet (not depicted) can be sent from the endpoint device 404 to the endpoint device 406 through port-v of the SYM_S 462 using the destination address/port pair X,p, as indicated by path 464. Not surprisingly, a packet (not depicted) sent by the endpoint device 406 to the endpoint device 404 using the source address/port pair X,p and the destination port-v will be accepted by the SYM_S 462 (and revised and then passed along to the endpoint device 404), as indicated by the path 466.

The yet further-restricted nature of the SYM_S 462 is similar to the port-restricted NAT 442, albeit with a significant difference. For each different destination address/port pair that the endpoint device 404 sends a packet, the SYM_S 462 allocates/maps a separate address/port pair. For a packet to be accepted from the second network 419 by the SYM_S 442, the packet's combination of destination port and source address/port pair should

match the combination of source port and destination address/port pair, respectively, of a packet sent to the second network 419 via the SYM_S NAT 462.

It is assumed for the purposes of explanation that a packet will be sent from the endpoint device 404 to each of the endpoint devices 406 (specifically at port:p) and 408 (specifically at port:q) via the SYM_S 462.

For use with respect to port:p of the endpoint device 406 (address/port pair X,p), the SYM_S 462 maps its port:v to the endpoint device 404. Similarly, for use with respect to port:q of the endpoint device 408 (address/port pair Y,q), the SYM_S 462 maps its port:w to the endpoint device 404. The packet (not depicted) sent to port:p of the endpoint device 406 through port:v of the SYM_S 462 is indicated by path 464, while the packet (not depicted) sent to port:q of the endpoint device 408 through port:w of the SYM_S 462 is indicated by path 470. Not surprisingly, a packet (not depicted) sent by the endpoint device 406 to the endpoint device 404 using the source address/port pair X,p will be accepted by the SYM_S 462 (and revised and then passed along to the endpoint device 404), as indicated by the path 466. Similarly, a packet (not depicted) sent by the endpoint device 408 using the source address/port pair Y,q will be accepted by the SYM_S 462, as indicated by the path 472.

But packets having the following source address/port pairs will not be accepted (i.e., will be blocked) by the SYM_S 462: X,q as indicated by path 468; and Y,q as indicated by path 474. Again, though the address portion of the source address/port pair of the packet of path 468 matches an address portion of a packet previously sent via the SYM_S 462, the port portion (namely port:q) of the source address/port pair does not match.

Fig. 4E depicts a system 480 that is similar to the system 460 except that a symmetric and port-insensitive ("SYM_I") type of NAT 482 is present instead of the port-restricted NAT 462. For the purposes of this explanation, it is assumed that the SYM_I 482

has mapped two address/port pairs to the endpoint device 404; namely: a first address/port pair having the address of the SYM_I 462 and port:v; and a second pair having the same address but using port:w.

In Fig. 4E, a packet (not depicted) can be sent from the endpoint device 404 to the endpoint device 406 through port-v of the SYM_I 462 using the destination address/port pair X,p, as indicated by path 484. Not surprisingly, a packet (not depicted) sent by the endpoint device 406 to the endpoint device 404 using the source address/port pair X,p and the destination port-v will be accepted by the SYM_I 462 (and revised and then passed along to the endpoint device 404), as indicated by the path 486.

The further-restricted nature of the SYM_I 482 is similar to the port-restricted NAT 462, albeit with a significant difference that makes the SYM_I 482 somewhat similar also to the address-restricted NAT 422. For each different destination address (not address/port pair as with the SYM_S NAT 462) that the endpoint device 404 sends a packet, the SYM_I 462 allocates/maps a separate address/port pair. The SYM_I type of NAT 462 can have two implementations: loose (not separately depicted); and tight (not separately depicted). Depending upon the particular implementation, one of two initialization scenarios, namely tightly initialized or loosely initialized, will describe what sort of initialization should take place before a packet from the second network 419 will be accepted by the SYM_I NAT 482.

First, the loosely initialized scenario for a loose SYM_I NAT 482 will be described. For a packet to be accepted from the second network 419 by the loose SYM_I NAT 482, the packet's combination of destination port and source address (but not also source port) should match the combination of source port and destination address, respectively, of a packet sent to the second network 419 via the loose SYM_I NAT 482. In terms of an example, despite the loose SYM_I NAT 482 having not sent a packet to port:q of the endpoint device 406 (again, address X) via port:v (of the NAT 482), a packet having

source address/port pair X,q (i.e., coming from port:q of the endpoint device 406) nevertheless will be accepted by the loose SYM_I NAT 482 (e.g., at its port:v) if the SYM_I NAT 482 has been loosely initialized. Being loosely initialized should be understood as meaning that a packet previously has been sent (in the context of this example) to the endpoint device 406 at another port, e.g., port:p (destination address/port pair X,p) via the SYM_I NAT 482.

The tightly initialized scenario for a tight SYM_I NAT 482 will now be described. For a packet to be accepted from the second network 419 by the tight SYM_I NAT 482, the packet's combination of destination port and source address/port pair (i.e.. the combination of source port and source address) should match the combination of source port and destination address/port pair, respectively, of a packet sent to the second network 419 via the tight SYM_I NAT 482. In terms of an example, a packet having source address/port pair X,q (i.e., coming from port:q of the endpoint device 406) will be accepted by the tight SYM_I NAT 482 (e.g., at its port:v) if the SYM_I NAT 482 has been tightly initialized. Being tightly initialized should be understood as meaning that a packet previously has been sent (in the context of this example) to the endpoint device 406 at the same port, e.g., port:q (destination address/port pair X,q) via the SYM_I NAT 482.

After initialization, the loose and tight implementations of the SYMI NAT 482 behave the same. For a packet to be accepted from the second network 419 by the SYMI NAT 482 after initialization, the packet's combination of destination port and source address (but not also source port as with the SIM_S NAT 462) should match the combination of source port and destination address, respectively, of a packet sent to the second network 419 via the SYMI NAT 482. In other words, similar to the address-sensitive NAT 422, for each port on the SYM_I NAT 482, the SYM_I NAT 482 (again, after initialization) will accept packets from different source ports so long as their source

address is the same as a packet previously sent to the second network 419 via the SYM_I NAT 482.

It is assumed for the purposes of explanation that a packet will be sent from the endpoint device 404 to each of the endpoint devices 406 (specifically at port:p) and 408 (specifically at port:q) via the SYM_I NAT 482.

For use with respect to the endpoint device 406 (address X), the SYM_I NAT 482 maps its port:v to the endpoint device 404. Similarly, for use with respect to the endpoint device 408 (address Y), the SYM_I NAT 482 maps its port:w to the endpoint device 404. The packet (not depicted) sent to port:p of the endpoint device 406 through port:v of the SYM_I NAT 482 is indicated by path 484, while the packet (not depicted) sent to port:q of the endpoint device 408 through port:w of the SYM_I NAT 482 is indicated by path 490.

Not surprisingly, a packet (not depicted) sent by the endpoint device 406 to the endpoint device 404 using the source address/port pair X,p will be accepted by the SYM_I NAT 482 (and revised and then passed along to the endpoint device 404), as indicated by the path 486. Similarly, a packet (not depicted) sent by the endpoint device 408 using the source address/port pair Y,q will be accepted by the SYM_I NAT 482 (again, after initialization), as indicated by the path 492. Moreover, packets having the following source address/port pairs will also be accepted (i.e., will not be blocked) by the SYM_I NAT 482 (again, after initialization): X,q as indicated by path 488; and Y,q as indicated by path 494.

The full cone NAT 402, the address-restricted NAT 422 and the port-restricted NAT 442 each permits a ratio of 1:N (where N can be any positive integer) between one of its own ports and source addresses or source address/port pairs, respectively, on the second network 419. The 1:N ratio is what gives rise to each of the NATs 402, 422 and 442 being described with the term "cone."

In contrast, each of the SYM_I NAT 482 and the SIM_S NAT 462 permits only a ratio of 1:1 between one of its own ports and a source address or a source address/port pair, respectively, on the second network 419. The 1:1 ratio is what gives rise to each of the NATs 482 and 462 being described with the term "symmetric."

An analogy will be provided to aid the explanation of how the various NATs operate.

The analogy is couched in terms of a doorman to a building (corresponding to the first network 418) in which endpoint device 404 is located. Each of the NATs 402, 422, 442 and 462 can act as a wall of the building. Until the NAT allocates/maps an address/port pair to the endpoint device 404, there are no doors in any of the walls of the building by which a packet from the second network 419 could gain entry or a packet from the endpoint device 404 could leave.

When the NAT allocates/maps an address/port pair to the endpoint device 404, the effect is as if the NAT creates a door in the wall that it represents. From the perspective of the second network 419, the NAT will act as a doorman relative to the doors that it has created.

The NAT (as doorman) keeps the door it created (for the endpoint device 404) closed until the endpoint device 404 sends a packet to the second network 419 via the NAT. In other words, the NAT (as doorman) will not let through packets (from the second network 419) appearing at the door (i.e., where the packet has a destination address the address/port pair allocated/mapped to the endpoint device 404) until the NAT opens the door.

When the endpoint device 404 finally does send a packet to the second network 419 via the NAT, initially the packet's indicated source address is the address on the first network 418 of the endpoint device 404. The NAT revises it so that the packet's indicated

source address information becomes the address/port pair which the NAT has allocated to the endpoint device 404, and then passes along the revised packet to the second network 419. In revising and passing along the packet, the effect is as if the NAT (as doorman) opens the door that it has created so that certain packets (depending upon the type of NAT) coming from the second network can pass through the doorway.

The full-cone NAT 402, in its role as doorman, will let through the door any packet appearing at the door (i.e., received by the NAT 402) that is intended for the endpoint device 404 (i.e., whose destination address is the address/port pair that the NAT 402 has mapped to the endpoint device 404). The NAT 402 (as doorman) is the least discriminating type of NAT about what packets it lets through its opened doors. The other NATs 422, 442 and 462 are increasingly more discriminating in their roles as doorman, respectively, checking more than just the packet's destination address/port pair.

The other NATs 422, 442, 462 and 482 treat the packets sent out from the endpoint device 404 as invitations corresponding to a guest list. In their roles as doormen, NATs 422, 442, 462 and 482 act as though they check whether packets appearing at their doors are on a guest list. As should be expected, the guest lists of the NATs 422, 442, 462 and 482 are more selective, respectively, than the full-cone NAT 402.

To be on the guest list for a door opened by the address-restricted NAT 422, a packet from the second network 419 should also have a source address (but not necessarily a source port) that matches a destination address of an invitation (packet) previously sent by the endpoint device via the NAT 422. To be on the guest list for a door opened by the port-restricted NAT 442, a packet from the second network 419 should also have a source address/source port pair that matches a destination address/port pair of a previously sent invitation packet.

Like the port-restricted NAT 442, being on a guest list maintained by the SYM_S 462 in its role as doorman requires that a packet from the second network 419 should also have a source address/source port pair that matches a destination address/port pair of an invitation (packet) previously sent by the endpoint device via the NAT 422. The port-restricted NAT 442 opens only one door for the endpoint device 404 (through which packets of varying destination address can be sent). As such, the port-restricted NAT 442 maintains only one guest list for the endpoint device 404.

In contrast, the SYM_S 462 creates/opens a door for each destination address to which the endpoint device 404 sends a packet. Accordingly, the SYM_S 462 (as doorman) maintains a separate guest list for each door it creates/opens for the endpoint device 404. So in Fig. 4D, a packet having destination port:v and source address/port pair Y,q would not be on either the guest list corresponding to door:v (port:v) or door:w (port:w). This is because the endpoint device 404 never sent a packet to source address/port pair Y,q via port:v. Rather, the packet sent to source address/port pair Y,q was sent via port:w (again, see path 470).

Like the SYM_S NAT 462, the SYM_I NAT 462 (as doorman) maintains a separate guest list for each door it creates/opens for the endpoint device 404. But unlike the SYM_S NAT 462, the SYM_I NAT 462 (as doorman) creates/opens only one door for each address on the second network 419, i.e., different ports of the same address use the same door created/opened by the SYM_I NAT 462 albeit after initialization.

So in Fig. 4E, after initialization, the packet (not depicted) of path 488 having destination port:v and source address/port pair Y,q is on the guest list corresponding to door:v (port:v). Similarly after initialization, the packet (not depicted) of path 494 having destination port:w and source address/port pair Y,p is on the guest list corresponding to door:w (port:w).

This concludes explanation of the analogy.

The NAT provides a convenient way of providing shared and transparent communication between the public internet and the computers (attached to a private network) having a non-globally-unique IP address, i.e., an IP address that is not globally-unique. However, not all forms of communications are operable over a NAT. This is a problem. Many types of applications require a globally-unique IP address as a termination point or require IP address consistency over the whole communication cycle. For example, an IP enabled phone will typically require a globally-unique IP address to receive and send voice-transmission using the IP. The presence of a NAT at the receiving end of the IP phone call may block the receiver (the endpoint device) from receiving the phone IP packets.

The presence of NATs in a network poses another type of problem as described next. There is no simple and convenient way to access a server type of device located behind a NAT from the public internet side of the NAT. For example, if a Hypertext Transfer Protocol (HTTP) webserver is located behind a NAT, then it has a private address which is invisible to the outside world through the public internet. On the contrary, a typical webserver, e.g., an HTTP server, which is not behind a NAT, is readily accessible from the public internet if it has an IP address that can be resolved using common methods like the Domain Name System (DNS).

TCP/IP allows multiple applications to run on a single computer using a variety of port numbers. When a NAT is used by a private network to share an IP address, then the port addresses are shielded behind the NAT from the outside network. This situation can be further complicated by presence of a firewall with a security policy that does not allow access to specific ports of the computers on the private network as described next.

A port-forwarding solution creates a "tunnel" through the firewall so that external users from the public internet can access a specific computer in the private network using the designated port for the tunnel. Typically, a port forwarding solution has a maximum number of about five forwarded port entries. But many applications like network-gaming, instant messaging and collaboration software may require access to previously "unopened" specific TCP/UDP ports from the external public internet. Creating all the required tunnels for such applications can be an impractical task for a typical user, since the tunnel configuration process can be complicated and confusing. Port forwarding is typically a kind of functionality provided by a router, hence it typically raises a need for a specific router that has an inbuilt port forwarding capability.

The presence of a NAT may not affect the network much if the transport connections are initiated from the clients that are behind the NAT. But if a server is located behind a NAT, then IP requests originating from the public network may not be able to access the server due to the presence of the NAT. An approach to solve this problem and its drawbacks are discussed next. In a Dynamic Domain Name System (DDNS) the users attempting to access a server located behind a NAT using a Fully Qualified Domain Name (FQDN) may face problems. Such problems result from the situation when a server or device behind a NAT is assigned a private IP address by a NAT which is invisible. A DDNS trying to route packets to an IP address due to a FQDN access request will fail since the NAT-assigned private address is invisible to the public internet side of the NAT.

Attempts have been made to define protocols for solving the NAT traversal problem described above. For example, protocols such as TURN (Traversal Using Relay NAT), STUN (Simple Traversal of UDP through NAT), SPAN-A (Simple Protocol for Augmenting NATs), etc., provide an approach that does not require routers to have the

specific functionality of supporting NAT traversal. However, these protocols do not provide a complete NAT traversal mechanism. These protocols are to be handled by an application known as SIP (Session Initiation Protocol).

Gnutella is a Peer-To-Peer (P2P) file-sharing system. The Gnutella protocol ("The Gnutella Protocol Specification v0.4 Document Revision 1.2") is widely used by Gnutella clone systems such as Kazaa, BearShare, etc. Unlike a centralized server network, the Gnutella protocol does not rely on a central server to keep track of all shared files. The Gnutella protocol uses multiple nodes known as "servents" each of which can become both a server and a client. The Gnutella protocol uses TCP protocol for a communication between the servents.

Once a servent finds an IP address of another servent which has a file the servent wants to download, it starts downloading the file through the TCP connection between the two. The Gnutella protocol can accommodate the presence of one NAT between two servents. If a servent is behind a NAT, other servents cannot initiate a TCP connection. In this case, the other servents send a "Push" descriptor to tell the server behind the NAT to initiate the TCP connection back to the other servents.

DISCLOSURE OF INVENTION

Embodiments of the invention provide methods of operating a first endpoint device (ED) facilitate the making of a peer-to-peer (P2P) connection between the first ED and a second ED despite intervening network address translators (NATs) at both ends. The P2P connection extends across a system compliant with the internet protocol (IP) whose architecture that includes a first network (having at least the first ED and a first NAT), a second network (having at least the second ED and a second NAT) and a third network. The first ED connects to the third network via the first NAT while the second ED connects to the third network via the second NAT.

One such embodiment according to the invention provides a facilitation method that includes: providing the second ED with the first IP-address/port pair; and providing the second ED with first type-information regarding the type of the first NAT.

Another such embodiment provides a facilitation method that includes: generating a session description protocol (SDP) message including an SDP attribute that describes the type of the NAT; and sending the SDP message to the second network from the first network.

Another such embodiment provides a facilitation method, for determining a port increment size (Δp) for a symmetric network address translator (NAT), that includes: requesting the symmetric NAT to map a plurality of port identification numbers (IDs); receiving information regarding the plurality of port IDs; and comparing the information to determine an increment size (Δp) of the NAT.

Another such embodiment provides a facilitation method that includes: receiving an indication of increment size (Δp) used by the second NAT to allocate/map new port numbers; and predicting, based upon the indication of increment size (Δp), at least one predicted destination port identification number ("ID") that would be used by the second NAT for the P2P connection between the first ED and a second ED.

Other embodiments provide the corresponding software and the corresponding devices that perform the methods, respectively.

Further areas of applicability of the invention will become apparent from the detailed description provided hereinafter. It should be understood that the detailed description and specific examples, while indicating the preferred embodiment of the invention, are intended for purposes of illustration only and are not intended to limit the scope of the invention.

BRIEF DESCRIPTION OF DRAWINGS

Figure 1 shows a network configuration according to an embodiment of the invention;

Figure 2 is a sequence diagram of operations according to an embodiment of the invention; and

Figure 3 is a sequence diagram of operations by which a P2P connection can be facilitated according to embodiments of the invention.

Figures 4A-4E are block diagram depictions of various types of NATs according to the Background Art.

Fig. 5A is a table showing how possible combinations of NAT-types can be organized into classes according to an embodiment of the invention.

Fig. 5B is a more detailed version of Fig. 5A that shows how Class V can be further organized into subclasses according to another embodiment of the invention.

Figs. 6A-6B, 7A-7C, 8A-8C, 9A-9C, 10A-10C, 11, 12, 13A-13B, 14A-14C, 15A-15D, 16A-16D, 17A-17C, 18A-18D and 19A-19C are hybrid block-sequence diagram that further the discussion of how to handle the classes of Fig. 5B, according to embodiments of the invention, respectively.

Figure 20 depicts a table that organizes actions, according to an embodiment of the invention, which can be taken toward establishing a P2P connection, depending upon the classes and subclasses described in Fig. 5B.

Fig. 21 is a flowchart, related to the table of Fig. 20, depicting actions relative to the classes and subclasses described in Fig. 5B that can be taken by an endpoint device, e.g., an endpoint server, according to embodiments of the invention.

Fig. 22 is a flowchart, related to the table of Fig. 20, depicting actions relative to the classes and subclasses described in Fig. 5B that can be taken by an endpoint device, e.g., a browser, according to embodiments of the invention.

BEST MODE FOR CARRYING OUT THE INVENTION

The following description of the example embodiment(s) is merely exemplary in nature and is in no way intended to limit the invention, its application, or uses.

The following acronyms are used below: UDP = User Datagram Protocol; NAT = Network Address Translation (Translator); IETF = Internet Engineering Task Force; STUN = Simple Traversal of UDP through NAT; TURN = Traversal Using Relay NAT; P2P = Peer-To-Peer (as opposed to 'server and client'); DNS = Domain Name Server; DDNS = Dynamic DNS; FQDN = Fully Qualified Domain Name; HTTP = Hyper Text Transfer Protocol; HTML = Hyper Text Markup Language; URI = Uniform Resource Indicator; URL = Uniform Resource Locator (a subset of all URIs, couched in terms of primary access technique); IP = Internet Protocol; TCP = Transmission Control Protocol; RTP = Real-time Transfer Protocol; and SDP = Session Description Protocol.

Until noted below, the following section briefly discusses some aspects of a prior patent application (U.S. Patent Application, Serial No. 10/342,304, filed January 15, 2003 and having the same inventor).

Figure 1 shows a network configuration 10 according to an embodiment of the invention of the prior patent application. Network configuration 10 includes a public IP network 12 that can be, e.g., the Internet.

Included as being attached to the public network 12 are: a packet relay server 20, a NAT-discovery server 22, e.g., a STUN (Simple Traversal UDP (User Datagram Protocol) through NATs) server, a redirect server 24, a dynamic DNS (DDNS) server 26, a DNS

(domain name system) server 28, a host computing device 16_5, a host computing device 16_6, a network address translator (NAT) 14_1 and a NAT 14_2.

The network configuration 10 further includes a private network 18_1 and a private network 18_2. Host computing devices 16_1 and 16_2 connect to the network 18_1 while host computing devices 16_3 and 16_4 connect to the network 18_2.

For the purposes of subsequent discussion, it can be helpful to think in terms of examples in which there is: an application, e.g., a web browser 30, that runs on the host 16_5; an application, e.g., an HTTP server 29, that runs on the host 16_1; an input unit 100, a processing unit 102 and an output unit 104 in the relay server 20; an application, e.g., a listener 31, that runs on the packet relay server 20; and an application, e.g., an HTTP server 80, that runs on the host 16_6.

Host 16_1 is indirectly connected to the public network 12 via the NAT 14_1 and the private IP network 18_1. In contrast, host 16_5 is directly connected to the public IP network 12.

Network configuration 10 described above including the hosts, NATs and private IP networks is a non-limiting example of how the network configuration 10 can be implemented in an embodiment of the invention of the prior patent application. As a practical matter, the presence of NAT 14_1 will not allow a typical client, e.g., the browser 30, to directly access the HTTP server 29 on host 16_1, since the browser 30 is most unlikely to have the port number of host 16_1 that was assigned by the NAT 14_1. This problem is known as the NAT traversal problem. To perform a NAT traversal, network configuration 10 according to an embodiment of the invention of the prior patent application includes additional elements as described next.

After booting up, the HTTP server 29 running on the host 16_1 performs a NAT-discovery process, e.g., a STUN test, resulting in an indication that the NAT 14_1 is present in the connection between the host 16_1 and the STUN server 22.

After positively determining the presence of a NAT, the host 16_1 connects to the packet relay server 20, which is operable to receive and forward IP packets. Host 16_1 initiates a TCP (Transmission Control Protocol) session and sends a packet relay initiation request to the input unit 100 of the relay server 20. In response, the processing unit 102 of the relay server 20 can run a TCP application known as a listener 31.

The output unit 104 of the relay server 20 returns to the host 16_1 a global IP address (namely, the IP address of the packet relay server 20) and a port on which it (namely, the packet relay server 20 running the listener 31) will receive and send packets on behalf of the host 16_1.

Hosts connected to the public IP network 12 such as the Internet can send packets to the IP address and port number designated by the relay server 20 as the listener 31. The listener 31 in turn forwards such packets to the host 16_1. Similarly, the host 16_1 can send packets to the relay server 20, and the relay server 20 can rewrap the payloads and transmit them to the specific forwarding IP address given in the packets.

After obtaining the set of global IP address and port number from the relay server 20, the host 16_1 via the NAT 14_1 provides the redirect server 24 with the IP address and port number of the listener 31. Then the redirect server 24 can redirect HTTP requests from the public IP network 12 seeking the HTTP server 29 to the global IP address and port number of the listener 31 on the relay server 20.

The HTTP server 29 on host 16_1 is assigned a FQDN, which is statically associated with a global IP address on the redirect server 24. The redirect server 24 adaptively maps the FQDN to the dynamic IP address and port number of the listener 31. Hence, when a

user (not depicted) makes a request via the browser 30 to access the FQDN, the request from the browser 30 will first be received by the redirect server 24. The redirect server 24 can use multiple methods to redirect the HTTP request to the listener 31 on the relay server 20, e.g., by providing a "splash page" (not depicted) to the browser 30 that can include a hyperlink to the listener 34 or by automatically redirecting the HTTP request to the listener 34 using the "307 Temporary Redirect" feature of the HTTP 1.1 protocol or by using a combination of a splash page with an automatic JAVA-script-based redirect method.

Figure 2 is a sequence diagram of operations according to an embodiment of the invention of the prior patent application. Figure 2 does not strictly conform to the conventions of UML-type sequence diagrams. After booting-up, the HTTP server 29 running on the host 16_1 sends a message 70 initiating a NAT-discovery process, e.g., a STUN test. The message 70 is sent to the NAT-discovery server, e.g., STUN server 22, via the NAT 14_1. The intervening role of the NAT 14_1 is indicated by the dot 72 at the intersection of the message 70 and the lifeline 74 of the NAT 14_1. Such a dot convention will be used for other messages passing via the NAT 14_1. The NAT-discovery server 22 sends a return message 76 to indicate the presence of the NAT 14_1 to the host 16_1.

Host 16_1 sends a message 32 to the packet relay server 20 requesting it to open a listener 31. The packet relay server 20 sends back a message 34 to the host 16_1 indicating the global IP address (of the packet relay server 20) and the port number (on the packet relay server 20) assigned to the listener 31. The host 16_1 then updates the redirect server 24 by a message 36 to register the global IP address and port number of the listener 31 on the relay server 20. The redirect server 24 will authenticate the message 36 and update its database to associate the IP address and port number of the listener 31 with the FQDN of the HTTP server 29. After the above initiation process is over, the user can access the, e.g., of the browser 30 on the host 16_5, HTTP server 29 running on the host 16_1.

Harkening back to the example, it is to be noted that the browser 30 on the host 16_5 is representative of any computer or IP-enabled device connected to the public IP network 12 (shown in Fig. 1). When the user of the browser 30 types in the URL (Universal Resource Locator), e.g., FQDN, of the HTTP server 29, the browser 31 on the host 16_5 sends a message 38 to the DNS server 28 with the FQDN in order to obtain the DNS entry of the entered URL. The DNS server 28 sends back a message 40 to the host 16_5 with the IP address of the redirect server 24. It may be necessary for the DNS server 28 to communicate (not shown as a message in Fig. 2) with the DDNS server 26 in order to collectively provide the IP address of the redirect server 24 to the browser 30.

The typical browser 30 on the host 16_5 can then initiate an HTTP request to the IP address of the redirect server 24 on the default port 80 (for HTTP protocol communications) via a message 42. The redirect server 24 in turn checks its database to find a set of IP address and port number of the listener 31 on the relay server 20 that correspond to the requested URL or URI (Universal Resource Indicator).

Host 16_5 (as part of hosting the browser 30) then sends an HTTP request to the relay server 20 as indicated by the message 46 based on the redirection IP address and port number received from the redirect server 24. The relay server 20 in turn sends a message 48 to the host 16_1 with which it has maintained a live TCP session.

On the return side, the host 16_1 (as part of hosting the HTTP server 29) will send a response to the packet relay server 20 as message 50. Further, the relay server 20 transmits the response to the browser 30 on the host 16_5. Thus, an HTTP session is established where the browser 30 on the host 16_5 can access the HTTP server 29 on the host 16_1 even though the host 16_1 is located behind the NAT 14_1, i.e., even though the NAT 14_1 is located between the browser 30 and the HTTP server 29.

Such NAT traversal is achieved above without the browser 30 on the host 16_5 having knowledge of the private IP address of the HTTP server 29 shielded by the NAT 14_1. No manual step or configuration is required at the host 16_5, i.e., on the user side of the HTTP access operation.

The preceding section, as noted above, briefly discusses some aspects of the prior patent application.

An embodiment of the invention, in part, represents the recognition of the following: SIP (again, Session Initiation Protocol) does not provide a way to establish a P2P connection through NATs at both ends where one of the following NAT combinations is present: A symmetric NAT and an address-restricted NAT; a symmetric NAT and port-restricted NAT; and a symmetric NAT and a symmetric NAT. Also, the "Push" scheme of the Gnutella protocol does not work in the circumstance that each of the endpoints has one or more NATs.

An embodiment of the invention is, in part, the recognition of the following. Based upon the NAT traversal mechanism described above, a client (e.g., an HTTP browser) can reach an endpoint device (e.g., an HTTP server) regardless of whether or not both the server and client are behind NATs. However, all the traffic would have to go through the packet relay server. In the circumstance of the packet content being data, e.g., multimedia data, that consumes large bandwidth, e.g., where the server is an IP video camera, the traffic load on packet relay server can be significant.

An embodiment of the invention provides multiple relay servers as a solution to the recognized problem, namely large bandwidth data overly loading a packet relay server being used for NAT traversal. A concern can be, from a business point of view, that providing multiple relay servers could potentially be prohibitively expensive.

Another embodiment of the invention solves the recognized problem mentioned above (again, large bandwidth data overly loading a packet relay server being used for NAT traversal) by changing the way that the data is exchanged after the packet-relay-server-based connection has been established, e.g., by providing a method that facilitates the making of a peer-to-peer (P2P) connection (e.g., using the STUN protocol) between two endpoint devices (e.g., an HTTP server and would-be client of the server) through one or more NATs interposed between the two.

Different types of NATs exhibit different circumstances under which incoming UDP packets (from a first, e.g., public, network that are to be forwarded via the NAT into a second, e.g., private, network) will be accepted by the NAT. By accounting for such differences, embodiments of the invention can establish P2P connections through NATs even though NATs are at both ends of the connection. A NAT-discovery process, e.g., such as provided by the STUN protocol, can be used not only to detect the presence of a NAT, but also to analyze the type of NAT. Knowledge of the NATs at one or both ends will determine what the two endpoint devices, e.g., the server and the client, should do to establish the P2P connection.

Fig. 5A is a table showing possible combinations of NAT-types (including the absence, or no, NAT) interposed as part of a connection between two endpoint devices. Fig. 5A also shows how such combinations can be organized into classes according to an embodiment of the invention. In particular, the rows represent possible types of NAT adjacent to a first endpoint device, e.g., an HTTP server, while the columns represent possible types of NAT adjacent to a second endpoint device, e.g., an HTTP client such as a browser.

Fig. 5B is a more detailed version of Fig. 5A that shows how Class V can be further organized into subclasses V1, V2 and V3 according to another embodiment of the invention.

Each of the classes of Fig. 5B will now be discussed in view of Figs. 6A- 19C. To further the explanation, each of Figs. 6A-17C assumes the following. The first endpoint device 629 is an HTTP server (hereafter "endpoint server"), e.g., an IP video camera, and that the second endpoint device 630 is a host/PC running an HTTP client such as a browser. In this regard, the HTTP server corresponds to the server 29 of Fig. 2 and the HTTP browser corresponds to the browser 630 of Fig.2. Further, it is assumed that a packet-relay-server-based connection exists between the first endpoint device 629 and the second endpoint device 630 via a relay server (not depicted) (hereafter "implied relay server"), e.g., taking the form of a TURN server. The relay sever can correspond to the relay sever 20 of Fig. 2. Also, a NAT-discovery server 622, e.g., taking the form of a STUN server, is assumed to be present. The NAT-discovery server 622 can correspond to the NAT-discover server 22 of Fig. 2. It is noted that the first endpoint device, the second endpoint device, the relay server and the NAT-discovery server 622 can take other forms.

Class I will now be discussed in terms of Figs. 6A-6B.

Conditions Of Class 1:

endpoint server side	Any Type Of NAT.
browser side	No NAT. (Open to the Internet)

To further the context of the explanation, Figs. 6A-6B assume that the endpoint server 629 connects via a NAT 602 (of any of the types discussed above) to an IP network

606 including the NAT-discovery server 622, the implied relay server and the browser 630. The browser is not associated with a NAT. In Fig. 6A, the endpoint server 629 receives (via the implied relay server and the NAT 602) information from the browser 630 as to the local address/port pair of the browser 630, as indicated by path 604. In Fig. 6B, the endpoint server 629 sends a stream of packets (e.g., a video stream where the endpoint server 629 is an IP video camera) over a UDP type of P2P connection to the browser 630, as indicated by path 605.

Class II will now be discussed in terms of Figs. 7A-7C.

Conditions of Class II:

endpoint server side	Any Type Of NAT (except a symmetric NAT in the case where the browser side has a port-restricted NAT).
browser side	Full / Address-Restricted / Port-restricted cone NAT

To further the context of the explanation, Figs. 7A-7C assume that: the endpoint server 629 connects to an IP network 706 (that includes the implied relay server and the NAT-discovery server 622) via a NAT 702; and the browser 630 connects to the network 706 via a NAT 704. The NAT 704 can be any of the following types: full cone; address-restricted; or port-restricted. The NAT 702 can be any type of NAT except a symmetric NAT in the case where the NAT 704 is a port-restricted NAT.

In Fig. 7A, the endpoint server 629 communicates with the NAT-discovery server 622 (via the NAT 702) to determine the address/port pair mapped by the NAT 702 to the endpoint server 629 and what type the NAT 702 is, as indicated by path 707A. Similarly,

the browser 630 communicates with the NAT-discovery server 622 (via the NAT 704) to determine the address/port pair mapped by the NAT 704 to the browser 630 and what type the NAT 704 is, as indicated by path 707B. Information as to the type of NAT and how an endpoint device determines that information will be discussed below.

An endpoint device, such as the endpoint server 629 or the browser 630, can determine the type of the NAT through which it communicates using a NAT type-discovery process, for example the STUN discovery process disclosed in the document entitled "STUN - Simple Traversal of UDP Through Network Address Translators," J. Rosenberg et al., Internet Engineering Task Force, draft-ietf-midcom-stun-02.txt, dated August 22, 2002 (expires February 2003) (the entirety of which is hereby incorporated by reference), see, e.g., section 10.1 and Fig. 2.

The endpoint server 629 receives from the browser 630 (via the NAT 704, the implied relay server and the NAT 702) information regarding the address/port pair mapped by the NAT 704 to the browser 630 and what type the NAT 704 is, as indicated by path 708. Similarly, the browser 630 receives from the endpoint server 629 (via the NAT 702, the implied relay server and the NAT 704) information regarding the address/port pair mapped by the NAT 702 to the endpoint server 629 and what type the NAT 702 is, as indicated by path 710.

Fig. 7B assumes the circumstance that the NAT 704 is either a full-cone NAT, an address-restricted NAT or a port-restricted NAT. So in Fig. 7B, the browser 630 sends a break-out packet ("BOP") to the endpoint server 629, as indicated by path 712. The BOP might or might not be blocked by the NAT 702 depending upon what type of NAT it is. The purpose of the BOP of path 712 is not thwarted if it is blocked by the NAT 702. Rather, a purpose of sending the BOP of path 712 is to open the door in the NAT 704 to packets from the endpoint server 629 sent via the NAT 702.

In Fig. 7C, the endpoint server 629 sends a stream of packets (e.g., a video stream where the endpoint server 629 is an IP video camera) over a UDP type of P2P connection to the browser 630, as indicated by path 714. Because the door at the NAT 704 was previously opened via the BOP of path 712, the NAT 704 accepts the stream of packets of path 714.

Class III will now be discussed in terms of Figs. 8A-8C.

Condition of Class III:

endpoint server side	No NAT. (Open to the Internet)
browser side	Symmetric NAT

To further the context of the explanation, Figs. 8A-8C assume that: the endpoint server 629 is part of a network 806 (that includes the implied relay server) and is not associated with a NAT; and the browser 630 connects to the network 806 via a symmetric NAT 804.

In Fig. 8A, the browser 630 communicates with the NAT-discovery server 622 (via the NAT 804) to determine the address/port pair mapped by the NAT 804 to the browser 630 and what type the NAT 804 is, as indicated by path 807. The endpoint server 629 receives from the browser 630 (via the NAT 804) information regarding the address/port pair mapped by the NAT 804 to the browser 630 and what type the NAT 804 is, as indicated by path 808.

In Fig. 8B, the browser 630 sends a break-out packet ("BOP") to the endpoint server 629, as indicated by path 812. A purpose of the BOP of path 812 is to open the door in the NAT 804 to packets from the endpoint server 629. Here, another purpose is that the

endpoint server 629 records (as indicated by item 813) the address/source pair mapped by the NAT 804 to the browser 630.

In Fig. 8C, the endpoint server 629 sends a stream of packets (e.g., a video stream where the endpoint server 629 is an IP video camera) over a UDP type of P2P connection to the browser 630, as indicated by path 814. Because the door at the NAT 804 was previously opened via the BOP of path 812, the NAT 804 accepts the stream of packets of path 814.

Class IV will now be discussed in terms of Figs. 9A-9C.

Conditions of Class IV:

endpoint server side	Full / Address-restricted cone NAT
browser side	Symmetric NAT

To further the context of the explanation, Figs. 9A-9C assume that: the endpoint server 629 connects to an IP network 906 (that includes the implied relay server and the NAT-discovery server 622) via a NAT 902; and the browser 630 connects to the network 906 via a symmetric NAT 904. The NAT 902 can be a full cone type or address-restricted cone type of NAT.

In Fig. 9A, the endpoint server 629 communicates with the NAT-discovery server 622 (via the NAT 902) to determine the address/port pair mapped by the NAT 902 to the endpoint server 629 and what type the NAT 902 is, as indicated by path 907A. Similarly, the browser 630 communicates with the NAT-discovery server 622 (via the NAT 904) to determine the address/port pair mapped by the NAT 904 to the browser 630 and what type the NAT 904 is, as indicated by path 907B.

A path 910 indicates that: the endpoint server 629 receives from the browser 630 (via the NAT 904, the implied relay server and the NAT 902) information regarding the address/port pair mapped by the NAT 904 to the browser 630 and what type the NAT 904 is; and the browser 630 receives from the endpoint server 629 (via the NAT 902, the implied relay server and the NAT 904) information regarding the address/port pair mapped by the NAT 902 to the endpoint server 629 and what type the NAT 902 is.

In the circumstance that the NAT 902 is an address-restricted NAT, the endpoint server 629 sends a BOP via the NAT 902 to the browser 630, as indicated by path 908. A purpose of the BOP of path 908 is to open a door in the NAT 902 to packets from the browser 630 that will come directly to the NAT 902 from the NAT 904 rather via the implied relay server.

In Fig. 9B, the browser 630 sends a BOP to the endpoint server 629, as indicated by path 912. A purpose of the BOP of path 912 is to open a door in the NAT 904 to packets from the endpoint server 629 that will come directly to the NAT 904 from the NAT 902 rather via the implied relay server. Here, because it is symmetric, the NAT 904 will allocate/map a separate port (door) for use with the address/pair mapped to the endpoint server 629 by the NAT 902. As such, another purpose of the BOP of path 912 is that the endpoint server 629 records (as indicated by item 913) the address/source pair mapped by the NAT 904 to the browser 630.

In Fig. 9C, the endpoint server 629 sends a stream of packets (e.g., a video stream where the endpoint server 629 is an IP video camera) over a UDP type of P2P connection to the browser 630, as indicated by path 914. Because the door at the NAT 904 was previously opened via the BOP of path 912, the NAT 904 accepts the stream of packets of path 914.

Class V has three subsets of conditions to which Figs. 10A-12 correspond.

The second subset (of the three) will be discussed first in terms of Figs. 10A-10C. The second (of three) subsets of conditions of Class V, referred to as subclass V_2, is:

endpoint server side	Port restricted-cone NAT
browser side	Symmetric NAT

To further the context of the explanation, Figs. 10A-10C assume that: the endpoint server 629 connects to an IP network 1006 (that includes the implied relay server and the NAT-discovery server 622) via a NAT 1002 that is of the port-restricted cone type; and the browser 630 connects to the network 1006 via a symmetric NAT 1004.

In Fig. 10A, the endpoint server 629 communicates with the NAT-discovery server 622 (via the NAT 1002) to determine the address/port pair mapped by the NAT 1002 to the endpoint server 629 and what type the NAT 1002 is, as indicated by path 1007A. Similarly, the browser 630 communicates with the NAT-discovery server 622 (via the NAT 1004) to determine the address/port pair mapped by the NAT 1004 to the browser 630 and what type the NAT 1004 is, as indicated by path 1007B.

A path 1010 indicates that: the endpoint server 629 receives from the browser 630 (via the NAT 1004, the implied relay server and the NAT 1002) information regarding the address/port pair mapped by the NAT 1004 to the browser 630 and what type the NAT 1004 is; and the browser 630 receives from the endpoint server 629 (via the NAT 1002, the implied relay server and the NAT 1004) information regarding the address/port pair mapped by the NAT 1002 to the endpoint server 629 and what type the NAT 1002 is. For simplicity, it is assumed that port:a was mapped by the NAT 1004 to the browser 630. The symmetric nature of the NAT 1004 should be kept in mind, i.e., only packets having as a

source address the address/port pair of the NAT-discovery server 622 will be accepted at port:a by the symmetric NAT 1004.

In Fig. 10B, the browser 630 sends a break-out packet ("BOP") to the endpoint server 629 that goes from the NAT 1004 to the NAT 1002 without going via the implied relay server, as indicated by path 1012. A purpose of the BOP of path 1012 is to open a door in the symmetric NAT 1004 to packets from the endpoint server 629 that will come directly to the symmetric NAT 1004 from the NAT 1002 rather than by way of the implied relay server. Here, because it is symmetric, the NAT 1004 will allocate/map a separate port (door), e.g., port:b, for use with the address/pair mapped to the endpoint server 629 by the NAT 1002.

The port-restricted NAT 1002 blocks the packet of path 1012 because a packet has not yet been sent via the NAT 1002 from the endpoint server 629 to port:b of the symmetric NAT 1004 (which is the port allocated to the browser 630 by the NAT 1004 for use with the endpoint server 629). Because the NAT 1002 is of the port-restricted type, the packet previously sent via the NAT 1002 from the endpoint server 629 to port:a of the NAT 1004 (which is a port allocated to the browser 630 by the symmetric NAT 1004, albeit for use with the address/port pair of the implied relay server) will not open the door to a packet from the browser 630 sent via port:b of the symmetric NAT 1004.

Because the packet of path 1012 was blocked by the NAT 1002, the endpoint server 629 was not able to examine the packet and so is not able to determine what port has been assigned by the symmetric NAT 1004 to the browser 630 for packets from the endpoint server 629 that will come directly to the symmetric NAT 1004 from the NAT 1002 rather than by way of the implied relay server. In Fig. 10C, the attempt by the endpoint server 629 to send a BOP to the browser 630 fails, as indicated by path 1016 not

reaching the symmetric NAT 104, because the endpoint server 629 does not know that it is port:b which the endpoint server 629 should be using.

Until the endpoint server 629 can successfully send BOP corresponding to path 1016, endpoint server 629 will not be able to send a stream of packets (e.g., a video stream where the endpoint server 629 is an IP video camera) over a UDP type of P2P connection to the browser 630. A technique to overcome this problem is discussed below.

Again, class V has three subsets of conditions. The first subset (of the three) will now be discussed in terms of Fig. 11.

The first (of three) subsets of conditions of Class V, referred to as subclass V_1, is:

endpoint server side	Symmetric NAT
browser side	Port restricted-cone NAT

To further the context of the explanation, Fig. 11 assumes that: the endpoint server 629 connects to an IP network 1106 (that includes the implied relay server and the NAT-discovery server 622) via a symmetric NAT 1102; and the browser 630 connects to the network 1106 via a NAT 1104 that is of the port-restricted cone type.

In Fig. 11, the endpoint server 629 communicates with the NAT-discovery server 622 (via the NAT 1102) to determine the address/port pair mapped by the NAT 1102 to the endpoint server 629 and what type the NAT 1102 is, as indicated by path 1107A. Similarly, the browser 630 communicates with the NAT-discovery server 622 (via the NAT 1104) to determine the address/port pair mapped by the NAT 1104 to the browser 630 and what type the NAT 1104 is, as indicated by path 1107B.

Similar to path 1010 of Fig. 10A (though a corresponding path is not depicted in Fig. 11 for brevity), the following occurs: the endpoint server 629 receives from the browser 630 (via the NAT 1104, the implied relay server and the NAT 1102) information regarding the address/port pair mapped by the NAT 1104 to the browser 630 and what type the NAT 1104 is; and the browser 630 receives from the endpoint server 629 (via the NAT 1102, the implied relay server and the NAT 1104) information regarding the address/port pair mapped by the NAT 1102 to the endpoint server 629 and what type the NAT 1102 is.

For simplicity, it is assumed that port:a was mapped by the NAT 1102 to the endpoint server 629 for use with the NAT-discovery server 622. The symmetric nature of the NAT 1104 should be kept in mind, i.e., only packets having as a source address the address/port pair of the NAT-discovery server 622 will be accepted at port:a by the symmetric NAT 1102.

In Fig. 11, the browser 630 would like to send a BOP to the endpoint server 629, as indicated by path 1112. A purpose of the BOP of path 1112 would be to open the door in the port-restricted NAT 1104 to packets from the endpoint server 629 that will come directly to the port-restricted NAT 1104 from the NAT 1102 rather than by way of the implied relay server. But the browser 630 knows that the NAT 1102 is a symmetric NAT which will assign a port other than port:a for use with packets from it (the browser 630) that will come directly to the symmetric NAT 1102 from the NAT 1104 rather than by way of the implied relay server. Unfortunately, the browser 630 only knows of port:a, at which only packets from the address/port pair of the NAT-discovery server 622 are accepted by the symmetric NAT 1102. Thus, the browser 630 is prevented from actually sending the BOP of path 1112.

In Fig. 11, the attempt by the browser 630 to send a BOP to the endpoint server 629 fails, as indicated by path 1112 not reaching the symmetric NAT 104, because the endpoint

server 629 does not know that it is port:b to which it (the endpoint server 629) should be sending.

Until the browser 630 can successfully send BOP corresponding to path 1112, the endpoint server 629 will not be able to send a stream of packets (e.g., a video stream where the endpoint server 629 is an IP video camera) over a UDP type of P2P connection to the browser 630 because the door/port on the NAT 1104 will not be open to packets coming from the endpoint sever 629 by way of port:b of the NAT 102. A technique to overcome this problem is discussed below.

Yet again, class V has three subsets of conditions. The third subset (of the three) will now be discussed in terms of Figs. 12.

The third (of three) subset of conditions of Class V, referred to as subclass V_3, is:

endpoint server side	Symmetric NAT
browser side	Symmetric NAT

To further the context of the explanation, Fig. 12 assumes that: the endpoint server 629 connects to an IP network 1206 (that includes the implied relay server and the NAT-discovery server 622) via a symmetric NAT 1202; and the browser 630 connects to the network 1206 via a symmetric NAT 1204.

In Fig. 12, the endpoint server 629 communicates with the NAT-discovery server 622 (via the NAT 1202) to determine the address/port pair mapped by the NAT 1202 to the endpoint server 629 and what type the NAT 1202 is, as indicated by path 1207A. Similarly, the browser 630 communicates with the NAT-discovery server 622 (via the

NAT 1204) to determine the address/port pair mapped by the NAT 1204 to the browser 630 and what type the NAT 1204 is, as indicated by path 1207B.

Similar to path 1010 of Fig. 10A (though a corresponding path is not depicted in Fig. 12 for brevity), the following occurs: the endpoint server 629 receives from the browser 630 (via the NAT 1204, the implied relay server and the NAT 1202) information regarding the address/port pair mapped by the NAT 1204 to the browser 630 and what type the NAT 1204 is; and the browser 630 receives from the endpoint server 629 (via the NAT 1202, the implied relay server and the NAT 1204) information regarding the address/port pair mapped by the NAT 1202 to the endpoint server 629 and what type the NAT 1202 is.

For simplicity, it is assumed that port:a was mapped by the NAT 1202 to the endpoint server 629 for use with the implied relay server and, similarly, port:a was mapped by the NAT 1204 to the browser 630 for use with the implied relay server. The symmetric nature of the NATs 1202 and 1204 should be kept in mind, i.e., only packets having as a source address the address/port pair of the NAT-discovery server 622 will be accepted at port:a by each of the symmetric NATs 1202 and 1204.

Similar to what is described above relative to path 1112 of Fig. 11, the attempt by the browser 630 to send a BOP to the endpoint server 629 fails, as indicated by path 1212. The circumstance of path 1212 is sufficient to prevent the endpoint server 629 from sending a stream of packets (e.g., a video stream where the endpoint server 629 is an IP video camera) over a UDP type of P2P connection to the browser 630. There is a further problem of subclass V_3 to be overcome.

In Fig. 12, the endpoint server 629 would also like to send a send a stream of packets (e.g., again, a video stream where the endpoint server 629 is an IP video camera) over a UDP type of P2P connection to the browser 630. But the endpoint server 629 knows that the NAT 11204 is a symmetric NAT which will assign a port other than port:a

for use with packets from it (the endpoint server 629) that will come directly to the symmetric NAT 1202 from the NAT 1204 (such as with the P2P connection) rather than by way of the implied relay server. Unfortunately, the endpoint server 629 only knows of port:a, at which only packets from the address/port pair of the NAT-discovery server 622 are accepted by the symmetric NAT 1204.

In Fig. 12, the attempt by the endpoint server 629 to make the P2P connection to the browser 630 fails, as indicated by path 1216 not reaching the symmetric NAT 104, because the endpoint server 629 does not know that it is port:b to which it (the endpoint server 629) should be sending.

Until the endpoint server 629 can determine the port on the NAT 1204 that it (the endpoint server 629) should use to make a P2P connection, the endpoint server 629 will be prevented from making the P2P connection. A technique to overcome this problem is discussed below.

In the context of a first endpoint device, its associated NAT (the "first NAT"), a counterpart endpoint device and its counterpart NAT (that happens to be a symmetric NAT), an embodiment of the invention, in part, is a recognition of the following: the otherwise unknown particular identification number ("ID") of a port which will be assigned/mapped/bound to the counterpart endpoint device by the counterpart symmetric NAT (see the problems of subclasses V_1, V_2 and V_3 discussed above) can be predicted; and, accordingly, BOPs can be sent to predicted port IDs of the counterpart symmetric NAT by the first endpoint device via the first NAT in order to open doors in the first NAT in anticipation of receiving packets sourced through the predicted port IDs of the counterpart NAT.

An embodiment of the invention, in part, is the recognition that symmetric NATs assign/map ports, i.e., bind a particular port ID to an IP address or address/port pair, using a substantially constant increment size (Δp).

An embodiment of the invention provides a method to determine the substantially constant increment size (Δp) of a port-sensitive symmetric NAT, e.g., SIM_S NAT 462 of Background Art Fig. 4D. Such a method will be explained in terms of Fig. 13A. It is noted that such a method can be applied to a negative increment size, i.e., a decrement size.

In Fig. 13A, an endpoint device 1302, e.g., such as the endpoint device 629 or the browser 630, connects to a network 1304 via a SIM_S NAT 1306. The endpoint device 1302 will determine the increment size (Δp) by discovering the port IDs which the SIM_S NAT 1306 allocates/maps (or binds) to various destination address/port pairs to which the endpoint device 1302 attempts to send test packets; and then calculating the differences between successive ones of the port IDs. If a consistent value among the differences emerges, then this number can be treated as the increment size (Δp). The endpoint device 1302 can discover the port IDs by performing a NAT-discovery process, as e.g., a STUN test, in conjunction with a NAT discover server such as the NAT-discovery server 622.

The endpoint device 1302 sends packets via the SIM_S NAT 1306 to destinations in the network 1304 having the address/port pairs X,p (as indicated by arrow 1308), X,q (as indicated by arrow 1310), Y,p (as indicated by arrow 1312) and Y,q (as indicated by arrow 1314). To simplify the explanation, example port IDs will be assumed for the ports of the SIM_S NAT 1306 allocated/mapped/bound to the destinations of 1308 -1314, namely: port 49152 for destination X,p (path 1308); port 49153 for destination X,q (path 1310); port 49154 for destination Y,p (path 1312); and port 49155 for destination Y,q (path 1314). Here, the differences between successive ones of the port IDs are always one, hence $\Delta p=1$. In actuality, Δp can be 1, or 2 or a greater integer.

Also, it is noted that the destination X,p of path 1308 and the destination X,q of path 1310 differ only in port number, which is also true of destinations Y,p (path 1312) and Y,q (path 1314). Because associated port IDs (namely 49152 & 49153 and 49154 & 49155, respectively) are different, the endpoint device will recognize the symmetric NAT 1302 as a SIM_S type of NAT. This knowledge is useful because, where a counterpart NAT is the SIM_S-type, there is little benefit (in effect) to the endpoint device 1302 sending more than one prediction-based BOP, as will be discussed in more detail below.

Another embodiment of the invention provides a method to determine the substantially constant increment size (Δp) of a port-insensitive symmetric NAT, e.g., SYM_I NAT 482 of Background Art Fig. 4E. Such a method will be explained in terms of Fig. 13B.

Fig. 13B is similar to Fig. 13A except that the SIM_S NAT 1326 has been replaced with a SYM_I NAT 1326. The endpoint device 1302 will determine the increment size (Δp) as before by discovering and analyzing the port IDs which the SYM_I NAT 1326 allocates/maps (or binds) to various destination address/port pairs to which the endpoint device attempts to send test packets.

The endpoint device 1302 again sends packets via the SIM_S NAT 1326 to destinations in the network 1304 having the address/port pairs X,p (as indicated by arrow 1328), X,q (as indicated by arrow 1330), Y,p (as indicated by arrow 1332) and Y,q (as indicated by arrow 1334). To simplify the explanation, again example port IDs will be assumed for the ports of the SYM_I NAT 1326 allocated/mapped/bound to the destinations of 1328 -1334, namely: port 49152 for destinations X,p (path 1328) and X,q (path 1330); and port 49153 for destinations Y,p (path 1332) and Y,q (path 1334).

For the SIM_S NAT 1326, there is no difference in port ID for different ports at the same destination address, namely X,p (path 1328) and X,q (path 1330) have port 49152,;

and Y,p (path 1332) and Y,q (path 1334) have the same port 49153. But port 49152 for destinations having address X (paths 1328 and 1330) differs by one from port 49153 for destinations having address Y (paths 1332 and 1334). As such, the endpoint device 1302 will determine that $\Delta p=1$. In actuality, Δp can be 1, or 2 or a greater integer. Also, the endpoint device 1302 will recognize the symmetric NAT 1326 as a SYM_I type of NAT. This knowledge is useful because, where a counterpart NAT is the SYM_I-type, there can be significant benefit to the endpoint device 1302 sending more than one prediction-based break-out packet ("BOP"), as will be discussed in more detail below.

When the endpoint device 1302 receives information indicating that a NAT (not depicted) associated with another endpoint device (not depicted) (hereafter the "counterpart NAT" associated with the "counterpart endpoint device") is a SIM_S or SYM_I type of NAT, the endpoint device 1302 will also be provided with the estimate of the counterpart NAT's Δp. The endpoint device 1302 predicts port numbers at the counterpart symmetric NAT, in succession, by adding Δp to the port ID mapped by the counterpart symmetric NAT to the counterpart endpoint device.

There will be a time lag between when the counterpart NAT allocates/maps/binds a port number (the "previous" port number) to the counterpart endpoint device for use with the NAT-discovery server 622 and when the counterpart NAT allocates/maps/binds a port number to the counterpart endpoint device for use with the endpoint device 1302. During the time lag, the counterpart NAT might allocate/map/bind one or more successive port IDs to one or more applications other than the counterpart endpoint device might create another binding on the same Symmetric NAT.

This creates a problem that the next port number to be assigned by the counterpart NAT for use relative to the endpoint device 1302 might not be +1 to the previous port number, but instead +2 or greater. To minimize the effect of this problem, the counterpart

endpoint device can be configured to minimize a delay between when it receives information about the NAT (the "home NAT") associated with the endpoint device 1302 and when a port ID on the counterpart NAT is allocated/mapped/bound for use with the endpoint device 1302 exclusive of a relay server.

The port ID assigned by a NAT typically lies within a predetermined port range, e.g., 0xC000 to 0xCFFF (hexadecimal notation). Occasionally, as a symmetric NAT assigns subsequent port IDs, the symmetric NAT will reach the upper boundary 0xCFFF. Because port IDs can be recycled, then the symmetric NAT will recycle to the beginning of the address range (0xC000) in order to obtain available port IDs. But the difference between a port ID at the end of the range and a port ID at the beginning of the range is enormous. In this situation, the NAT will treat the difference as an anomaly and will repeat the Δp determination process.

If the port ID at the counterpart NAT that is mapped/bound to the counterpart endpoint device is not what the endpoint device 1302 predicted, the result is that the endpoint device 1302 will send a prediction-based packet either (i) to an unbound port ID of the counterpart NAT, or (ii) to a port ID mapped/bound to an application other than the counterpart endpoint device or (iii) to a port mapped/bound to the counterpart endpoint device albeit for use relative to a different port ID of the home NAT. In case (i), the sent packet will be discarded by the counterpart NAT because there is no such port ID has been mapped/bound. In case (ii) and (iii), where the counterpart NAT is of the symmetric type (which does not receive an incoming packet from an unknown IP address and/or port number), the prediction-based packet will be discarded by the counterpart NAT and should have no affect on the counterpart endpoint device or the other applications.

Next, prediction-based P2P connection facilitation will be discussed for subclass V_1 in terms of Figs. 14A-14C.

To further the context of the explanation, Fig. 14A assumes that: the endpoint server 629 connects to an IP network 1406 (that includes the implied relay server and the NAT-discovery server 622) via a symmetric NAT 1402; and the browser 630 connects to the network 1406 via a NAT 1404 that is of the port-restricted cone type. It should be observed that Fig. 14A is similar to Fig. 11. Here, also to further the explanation, example port IDs and a value for Δp are assumed which should not be viewed as limiting the scope of this disclosure.

In Fig. 14A, the endpoint server 629 communicates with the NAT-discovery server 622 (via the NAT 1402) to determine the address/port pair (for example, the port ID is 49152) mapped by the NAT 1402 to the endpoint server 629, what type the NAT 1402 is and the increment size, Δp (here, Δp=+1), as indicated by path 1407A. Similarly, the browser 630 communicates with the NAT-discovery server 622 (via the NAT 1404) to determine the address/port pair (here, the port ID is 60004) mapped by the NAT 1404 to the browser 630 and what type the NAT 1404 is, as indicated by path 1407B.

The endpoint server 629 receives from the browser 630 (via the NAT 1404, the implied relay server and the NAT 1402) information regarding the address/port pair mapped by the NAT 1404 to the browser 630 and what type the NAT 1404 is, as indicated by path 1408. The browser 630 receives from the endpoint server 629 (via the NAT 1402, the implied relay server and the NAT 1404) information regarding the address/port pair mapped by the NAT 1402 to the endpoint server 629 and what type the NAT 1402 is (including Δp), as depicted by path 1410.

In Fig. 14B, the browser 630 would like to send one or more break-out packets ("BOPs") to the endpoint server 629. A purpose of the BOP of path 1412 would be to

open the door in the port-restricted NAT 1404 to packets from the endpoint server 629 that will come directly to the port-restricted NAT 1404 from the NAT 1402 rather than by way of the implied relay server. But the endpoint server 629 knows that the NAT 1404 is a symmetric NAT which will assign a new port ID other than port ID=49152 for use with packets from it (the endpoint server 629) that will come directly to the symmetric NAT 1404 from the NAT 1402 rather than by way of the implied relay server. Using the knowledge that $\Delta p=+1$ for the NAT 1504, the endpoint server 629 can predict a possible value of the new port ID. To improve the chances of successfully predicting the new port ID, the browser 630 can make more than one prediction. Then, the browser 630 can generate one or more corresponding multiple prediction-based BOPs ("p-BOPs").

The browser 630 predicts port IDs and sends corresponding p-BOPs as follows: port ID 49153 over path 1410; port ID 49154 over path 1412; port ID 49155 over path 1414; and port ID 49156 over path 1416. The p-BOPs of paths 1410-1416 are blocked because the symmetric NAT 1402 has not yet sent a packet directly to port 6004 of the NAT 1404. But that does not thwart the purpose of the p-BOPs because a purpose of their being sent is to open the port 60004 in the NAT 1404 to packets from the endpoint server 629 sent via the predicted ports of the NAT 1402.

Continuing in terms of the example port IDs, it is assumed that the NAT 1402 assigns port ID 49154 for use with packets coming/going directly between the port-restricted NAT 1404 and the NAT 1402 rather than by way of the implied relay server. Port ID 49154 corresponds to the packet of path 1412, hence door (port ID 60004) at the NAT 1404 is already open to packets originating through port ID 49154 that do not arrive by way of the implied relay server. As such, in Fig. 14C, the endpoint server 629 sends a stream of packets (e.g., a video stream where the endpoint server 629 is an IP video camera) over a UDP type of P2P connection to the browser 630, as indicated by path 1420.

Next, prediction-based P2P connection facilitation will be discussed for subclass V_2 in terms of Figs. 15A-15C.

To further the context of the explanation, Fig. 15A assumes that: the endpoint server 629 connects to an IP network 1506 (that includes the implied relay server and the NAT-discovery server 622) via a port-restricted cone type NAT 1502; and the browser 630 connects to the network 1506 via a symmetric NAT 1504. It should be observed that Fig. 15A is similar to Fig. 10A. Here, also to further the explanation, example port IDs and a value for Δp are assumed which should not be viewed as limiting the scope of this disclosure.

In Fig. 15A, the endpoint server 629 communicates with the NAT-discovery server 622 (via the NAT 1502) to determine the address/port pair (for example, the port ID is 60004) mapped by the NAT 1502 to the endpoint server 629, what type the NAT 1502 is, as indicated by path 1507A. Similarly, the browser 630 communicates with the NAT-discovery server 622 (via the NAT 1504) to determine the address/port pair (here, the port ID is 49152) mapped by the NAT 1504 to the browser 630 and what type the NAT 1504 is and the increment size, Δp (here, Δp=+1), as indicated by path 1507B.

The endpoint server 629 receives from the browser 630 (via the NAT 1504, the implied relay server and the NAT 1502) information regarding the address/port pair mapped by the NAT 1504 to the browser 630 and what type the NAT 1504 is (including Δp), as indicated by path 1508. The browser 630 receives from the endpoint server 629 (via the NAT 1502, the implied relay server and the NAT 1504) information regarding the address/port pair mapped by the NAT 1502 to the endpoint server 629 and what type the NAT 1502 is, as depicted by path 1510.

In Fig. 15B, the endpoint server 629 would like to send a break-out packet ("BOP") to the endpoint server 629, as indicated by path 1512. A purpose of the BOP of path 1512 would be to open the door in the port-restricted NAT 1502 to packets from the browser 630 that will come directly to the port-restricted NAT 1502 from the NAT 1504 rather than by way of the implied relay server. But the endpoint server 629 knows that the NAT 1504 is a symmetric NAT which will assign a new port ID other than port ID=49152 for use with packets from it (the endpoint server 629) that will come directly to the symmetric NAT 1504 from the NAT 1502 rather than by way of the implied relay server. Using the knowledge that $\Delta p=+1$ for the NAT 1504, the browser 630 can predict a possible value of the new port ID. To improve the chances of successfully predicting the new port ID, the browser 630 can make more than one prediction. Then, the browser can generate one or more corresponding multiple prediction-based BOPs ("p-BOPs").

The endpoint server 629 predicts port IDs and sends corresponding p-BOPs as follows: port ID 49153 over path 1510; port ID 49154 over path 1512; port ID 49155 over path 1514; and port ID 49156 over path 1516. The p-BOPs of paths 1510-1516 are blocked because the symmetric NAT 1504 has not yet sent a packet directly to port 6004 of the NAT 1504. But that does not thwart the purpose of the p-BOPs because a purpose of their being sent is to open the existing port 60004 in the NAT 1502 to packets from the browser 630 sent via the predicted ports of the NAT 1504.

Continuing in terms of the example port IDs, it is assumed that the NAT 1504 assigns port ID 49154 for use with packets coming/going directly between the port-restricted NAT 1502 and the NAT 1504 rather than by way of the implied relay server. Port ID 49154 corresponds to the packet of path 1512, hence door (port ID 60004) at the NAT 1502 is already open to packets originating through port ID 49154 that do not arrive by way of the implied relay server. But the endpoint server 629 does not yet know which

of its predictions was successful, i.e., which of the predicted ports 49153-49156 corresponds to the new port. In Fig. 15C, the browser 630 sends a break-out packet ("BOP") to the endpoint server 629, as indicated by path 1518. A purpose of the BOP of path 1518 would be to open the door (port ID 49154) in the symmetric NAT 1504 to packets from the endpoint server 629 that will come directly to the symmetric NAT 1504 from the NAT 1502 rather than by way of the implied relay server.

Upon receiving the p-BOP of path 1518, the endpoint server 629 records its port ID 49154 (and the IP address) for use in making a P2P connection with the browser 630, as indicated by item 1519. Then, in Fig. 15D, the endpoint server 629 sends a stream of packets (e.g., a video stream where the endpoint server 629 is an IP video camera) over a UDP type of P2P connection to the browser 630, as indicated by path 1520.

Next, prediction-based P2P connection facilitation will be discussed for subclass V_3. As there are two types of symmetric NAT as discussed above, namely SYM_S and SYM_I, there are four sub-classes of sub-class V_3, i.e., four sub-sub-classes: V_{3A}; V_{3B}; V_{3C}; and V_{3D}. The following table, as an example, assumes that a first endpoint device is an endpoint server, e.g., 629, and that the second endpoint device is a browser, e.g., 630.

		Browser Side	
		SYM_I NAT	SYM_S NAT
Endpoint Server Side	SYM_I NAT	**$V3_A$**	**$V3_C$**
	SYM_S NAT	**$V3_B$**	**$V3_D$**

Sub-sub-class V_{3A} will now be discussed in terms of Figs. 16A-16D.

To further the context of the explanation, Fig. 16A assumes that: the endpoint server 629 connects to an IP network 1606 (that includes the implied relay server and the NAT-discovery server 622) via a port-insensitive symmetric ("SYM_I") NAT 1602; and the

browser 630 connects to the network 1606 also via a SYM_I NAT 1604. Here, also to further the explanation, example port IDs and a value for Δp are assumed which should not be viewed as limiting the scope of this disclosure.

In Fig. 16A, the endpoint server 629 communicates with the NAT-discovery server 622 (via the NAT 1602) to determine the address/port pair (for example, the port ID is 50012) mapped by the NAT 1602 to the endpoint server 629, what type the NAT 1602 is and the increment size, Δp (here, $\Delta p=+2$), as indicated by path 1607A. Similarly, the browser 630 communicates with the NAT-discovery server 622 (via the NAT 1604) to determine the address/port pair (here, the port ID is 49152) mapped by the NAT 1604 to the browser 630 and what type the NAT 1604 is and the increment size, Δp (here, $\Delta p=+1$), as indicated by path 1607B.

The endpoint server 629 receives from the browser 630 (via the NAT 1604, the implied relay server and the NAT 1602) information regarding the address/port pair mapped by the NAT 1604 to the browser 630 and what type the NAT 1604 is (including Δp), as indicated by path 1608. The browser 630 receives from the endpoint server 629 (via the NAT 1602, the implied relay server and the NAT 1604) information regarding the address/port pair mapped by the NAT 1602 to the endpoint server 629 and what type the NAT 1602 is, as depicted by path 1610.

In Fig. 16B, the endpoint server 629 would like to send a break-out packet ("BOP") to the browser 630. A purpose of such a BOP would be to open the door in the SYM_I NAT 1602 to packets from the browser 630 that will come directly to the SYM_I NAT 1602 from the NAT 1604 rather than by way of the implied relay server. But the endpoint server 629 knows that the NAT 1604 is a symmetric NAT which will assign a new port ID other than port ID=49152 for use with packets from it (the endpoint server 629) that will come directly to the symmetric NAT 1604 from the NAT 1602 rather than by way of the implied

relay server. Using the knowledge that $\Delta p=+1$ for the NAT 1604, the browser 630 can predict a possible value of the new port ID.

Because the NAT 1602 is a SYM_I NAT rather than a SYM_S NAT, once it has sent a packet to an address/port pair, the SYM_I NAT 1602 will not assign a new port ID for any other port at the same IP address to which it sends a packet. Hence, the NAT 1602 can send multiple prediction-based BOPs ("p-BOPs") to multiple ports from just one of its own ports, thereby improving the chances of successfully predicting the new port ID. In the example of Fig. 16B, it is assumed that the endpoint server 629 will generate multiple prediction-based BOPs ("p-BOPs").

The endpoint server 629 predicts port IDs and sends corresponding p-BOPs as follows: port ID 49153 over path 1610; port ID 49154 over path 1612; port ID 49155 over path 1614; and port ID 49156 over path 1616. The p-BOPs of paths 1610-1616 are blocked because the symmetric NAT 1604 has not yet sent a packet directly to port 6004 of the NAT 1604. But that does not thwart the purpose of the p-BOPs because a purpose of their being sent is to open the existing port 50012 in the NAT 1602 to packets from the browser 630 sent via the predicted ports of the NAT 1604.

Continuing in terms of the example port IDs, it is assumed that the NAT 1604 assigns port ID 49154 for use with packets coming/going directly between the port-restricted NAT 1602 and the NAT 1604 rather than by way of the implied relay server. Port ID 49154 corresponds to the packet of path 1612, hence door (port ID 60004) at the NAT 1602 is already open to packets originating through port ID 49154 that do not arrive by way of the implied relay server. But the endpoint server 629 does not yet know which of its predictions was successful, i.e., which of the predicted ports 49153-49156 corresponds to the new port.

The browser 630 also would like to send one or more break-out packets ("BOPs") to the endpoint server 629. A purpose of the BOP of path 1612 would be to open the door (port ID=49154) in the symmetric NAT 1604 to packets from the endpoint server 629 that will come directly to the symmetric NAT 1604 from the NAT 1602 rather than by way of the implied relay server. But the browser 630 knows that the NAT 1602 is a symmetric NAT which will assign a new port ID other than port ID=50012 for use with packets from it (the browser 630) that will come directly to the symmetric NAT 1602 from the NAT 1604 rather than by way of the implied relay server. Using the knowledge that $\Delta p=+2$ for the NAT 1604, the browser 630 can predict a possible value of the new port ID.

Because the NAT 1604 is a SYM_I NAT rather than a SYM_S NAT, once it has sent a packet to an address/port pair, the SYM_I NAT 1602 will not assign a new port ID for any other port at the same IP address to which it sends a packet. Hence, the NAT 1604 can send multiple prediction-based BOPs ("p-BOPs") to multiple ports from just one of its own ports, thereby improving the chances of successfully predicting the new port ID. In the example of Fig. 16C, it is assumed that the browser 630 will generate multiple prediction-based BOPs ("p-BOPs").

The browser 630 predicts port IDs and sends corresponding p-BOPs as follows: port ID 50014 over path 1630; port ID 50016 over path 1632; port ID 50018 over path 1634; and port ID 50020 over path 1636. The p-BOPs of paths 1630-1636 are blocked because the symmetric NAT 1602 has not yet sent a packet directly to port 49154 of the NAT 1604. But that does not thwart the purpose of the p-BOPs because a purpose of their being sent is to open the port 49154 in the NAT 1604 to packets from the endpoint server 629 sent via the predicted ports of the NAT 1602.

Continuing in terms of the example port IDs, it is assumed that the NAT 1602 assigns port ID 50014 for use with packets coming/going directly between the symmetric

NAT 1602 and the symmetric NAT 1604 rather than by way of the implied relay server. Port ID 50014 corresponds to the packet of path 1630, hence door (port ID 49154) at the NAT 1604 is already open to packets originating through port ID 50014 that do not arrive by way of the implied relay server.

Upon receiving the p-BOP of path 1630, the endpoint server 629 records its port ID 49154 (and the IP address) for use in making a P2P connection with the browser 630, as indicated by item 1639. Then, in Fig. 16D, the endpoint server 629 sends a stream of packets (e.g., a video stream where the endpoint server 629 is an IP video camera) over a UDP type of P2P connection to the browser 630, as indicated by path 1640.

Sub-sub-class V_{3B} will now be discussed in terms of Figs. 17A-17C.

To further the context of the explanation, Fig. 17A assumes that: the endpoint server 629 connects to an IP network 1706 (that includes the implied relay server and the NAT-discovery server 622) via a port-sensitive symmetric ("SYM_S") NAT 1702; and the browser 630 connects to the network 1706 via a port-insensitive symmetric (SYM_I) NAT 1704. Here, also to further the explanation, example port IDs and a value for Δp are assumed which should not be viewed as limiting the scope of this disclosure.

In Fig. 17A, the endpoint server 629 communicates with the NAT-discovery server 622 (via the NAT 1702) to determine the address/port pair (for example, the port ID is 50012) mapped by the NAT 1702 to the endpoint server 629, what type the NAT 1702 is and the increment size, Δp (here, Δp=+2), as indicated by path 1707A. Similarly, the browser 630 communicates with the NAT-discovery server 622 (via the NAT 1704) to determine the address/port pair (here, the port ID is 49152) mapped by the NAT 1704 to the browser 630 and what type the NAT 1704 is and the increment size, Δp (here, Δp=+1), as indicated by path 1707B.

The endpoint server 629 receives from the browser 630 (via the NAT 1704, the implied relay server and the NAT 1702) information regarding the address/port pair mapped by the NAT 1704 to the browser 630 and what type the NAT 1704 is (including Δp), as indicated by path 1708. The browser 630 receives from the endpoint server 629 (via the NAT 1702, the implied relay server and the NAT 1704) information regarding the address/port pair mapped by the NAT 1702 to the endpoint server 629 and what type the NAT 1702 is, as depicted by path 1710.

Continuing in terms of the example port IDs, it is assumed that the NAT 1704 assigns port ID 49153 for use with packets coming/going directly between the port-restricted NAT 1702 and the NAT 1704 rather than by way of the implied relay server. The browser 630 would like to send one or more break-out packets ("BOPs") to the endpoint server 629. A purpose of the BOP of path 1712 would be to open the door (port ID=49153) in the symmetric NAT 1704 to packets from the endpoint server 629 that will come directly to the symmetric NAT 1704 from the NAT 1702 rather than by way of the implied relay server. But the browser 630 knows that the NAT 1702 is a symmetric NAT which will assign a new port ID other than port ID=50012 for use with packets from it (the browser 630) that will come directly to the symmetric NAT 1702 from the NAT 1704 rather than by way of the implied relay server. Using the knowledge that Δp=+2 for the NAT 1704, the browser 630 can predict a possible value of the new port ID.

Because the NAT 1704 is a SYM_I NAT rather than a SYM_S NAT, once it has sent a packet to an address/port pair, the SYM_I NAT 1702 will not assign a new port ID for any other port at the same IP address to which it sends a packet. Hence, the NAT 1704 can send multiple prediction-based BOPs ("p-BOPs") to multiple ports from just one of its own ports, thereby improving the chances of successfully predicting the new port ID. In the

example of Fig. 17C, it is assumed that the browser 630 will generate multiple prediction-based BOPs ("p-BOPs").

The browser 630 predicts port IDs and sends corresponding p-BOPs as follows: port ID 50014 over path 1730; port ID 50016 over path 1732; port ID 50018 over path 1734; and port ID 50020 over path 1736. The p-BOPs of paths 1730-1736 are blocked because the symmetric NAT 1702 has not yet sent a packet directly to port 49154 of the NAT 1704. But that does not thwart the purpose of the p-BOPs because a purpose of their being sent is to open the port 49154 in the NAT 1704 to packets from the endpoint server 629 sent via the predicted ports of the NAT 1702.

Continuing in terms of the example port IDs, it is assumed that the SYM_S NAT 1702 assigns port ID 50014 (=50012+2) for use with packets coming/going directly between the SYM_S NAT 1702 and the SYM_I NAT 1704 rather than by way of the implied relay server. The endpoint server 629 predicts that the port ID on the SYM_I NAT 1704 will be ID=49153 (=49153+1). In Fig. 17D, the endpoint server 629 sends a stream of packets (e.g., a video stream where the endpoint server 629 is an IP video camera) over a UDP type of P2P connection to the browser 630 using predicted port ID=49153, as indicated by path 1740. If the prediction is wrong, then the endpoint server 629 can predict another port ID and resend the stream iteratively until the prediction is successful and the P2P connection is established.

Sub-sub-class V_{3C} will now be discussed in terms of Figs. 18A-18D.

To further the context of the explanation, Fig. 18A assumes that: the endpoint server 629 connects to an IP network 1806 (that includes the implied relay server and the NAT-discovery server 622) via a port-insensitive symmetric (SYM_I) NAT 1802; and the browser 630 connects to the network 1806 via a port-sensitive symmetric ("SYM_S") NAT

1804. Here, also to further the explanation, example port IDs and a value for Δp are assumed which should not be viewed as limiting the scope of this disclosure.

In Fig. 18A, the endpoint server 629 communicates with the NAT-discovery server 622 (via the NAT 1802) to determine the address/port pair (for example, the port ID is 50012) mapped by the NAT 1802 to the endpoint server 629, what type the NAT 1802 is and the increment size, Δp (here, Δp=+2), as indicated by path 1807A. Similarly, the browser 630 communicates with the NAT-discovery server 622 (via the NAT 1804) to determine the address/port pair (here, the port ID is 49152) mapped by the NAT 1804 to the browser 630 and what type the NAT 1804 is and the increment size, Δp (here, Δp=+1), as indicated by path 1807B.

In Fig. 18B, the endpoint server 629 would like to send a break-out packet ("BOP") to the browser 630. A purpose of such a BOP would be to open the door in the SYM_I NAT 1802 to packets from the browser 630 that will come directly to the SYM_I NAT 1802 from the NAT 1804 rather than by way of the implied relay server. But the endpoint server 629 knows that the NAT 1804 is a symmetric NAT which will assign a new port ID other than port ID=49152 for use with packets from it (the endpoint server 629) that will come directly to the symmetric NAT 1804 from the NAT 1802 rather than by way of the implied relay server. Using the knowledge that Δp=+1 for the NAT 1804, the browser 630 can predict a possible value of the new port ID.

Because the NAT 1802 is a SYM_I NAT rather than a SYM_S NAT, once it has sent a packet to an address/port pair, the SYM_I NAT 1802 will not assign a new port ID for any other port at the same IP address to which it sends a packet. Hence, the NAT 1802 can send multiple prediction-based BOPs ("p-BOPs") to multiple ports from just one of its own ports, thereby improving the chances of successfully predicting the new port ID. In the

example of Fig. 18B, it is assumed that the endpoint server 629 will generate multiple prediction-based BOPs ("p-BOPs").

The endpoint server 629 predicts port IDs and sends corresponding p-BOPs as follows: port ID 49153 over path 1810; port ID 49154 over path 1812; port ID 49155 over path 1814; and port ID 49156 over path 1816. The p-BOPs of paths 1810-1816 are blocked because the symmetric NAT 1804 has not yet sent a packet directly to port 50014 of the NAT 1804. But that does not thwart the purpose of the p-BOPs because a purpose of their being sent is to open the existing port 50014 in the NAT 1802 to packets from the browser 630 sent via the predicted ports of the NAT 1804.

Continuing in terms of the example port IDs, it is assumed that the NAT 1804 assigns port ID 49154 for use with packets coming/going directly between the port-restricted NAT 1802 and the NAT 1804 rather than by way of the implied relay server. Port ID 49154 corresponds to the packet of path 1812, hence door (port ID 50014) at the NAT 1802 is already open to packets originating through port ID 49154 that do not arrive by way of the implied relay server. But the endpoint server 629 does not yet know which of its predictions was successful, i.e., which of the predicted ports 49153-49156 corresponds to the new port.

In Fig. 18C, the browser 630 sends a predicted break-out packet ("p-BOP") to the endpoint server 629, as indicated by path 1818. A purpose of the BOP of path 1818 would be to open the door (port ID 49154) in the SYM_S NAT 1804 to packets from the endpoint server 629 that will come directly to the SYM_S NAT 1804 from the SYM_I NAT 1802 rather than by way of the implied relay server.

Upon receiving the p-BOP of path 1818, the endpoint server 629 records its port ID 49154 (and the IP address) for use in making a P2P connection with the browser 630, as indicated by item 1819. Then, in Fig. 18D, the endpoint server 629 sends a stream of

packets (e.g., a video stream where the endpoint server 629 is an IP video camera) over a UDP type of P2P connection to the browser 630, as indicated by path 1820.

Sub-sub-class V_{3D} will now be discussed in terms of Figs. 19A-19C.

To further the context of the explanation, Fig. 19A assumes that: the endpoint server 629 connects to an IP network 1906 (that includes the implied relay server and the NAT-discovery server 622) via a port-sensitive symmetric ("SYM_S") NAT 1902; and the browser 630 connects to the network 1906 also via a SYM_S NAT 1904. Here, also to further the explanation, example port IDs and a value for Δp are assumed which should not be viewed as limiting the scope of this disclosure.

In Fig. 19A, the endpoint server 629 communicates with the NAT-discovery server 622 (via the NAT 1902) to determine the address/port pair (for example, the port ID is 50012) mapped by the NAT 1902 to the endpoint server 629, what type the NAT 1902 is and the increment size, Δp (here, Δp=+2), as indicated by path 1907A. Similarly, the browser 630 communicates with the NAT-discovery server 622 (via the NAT 1904) to determine the address/port pair (here, the port ID is 49152) mapped by the NAT 1904 to the browser 630 and what type the NAT 1904 is and the increment size, Δp (here, Δp=+1), as indicated by path 1907B.

In Fig. 19B, the browser 630 sends a predicted break-out packet ("p-BOP") to the endpoint server 629, as indicated by path 1918. A purpose of the BOP of path 1918 would be to open the door (port ID 49153) in the SYM_S NAT 1904 to packets from the endpoint server 629 that will come directly to the SYM_S NAT 1904 from the SYM_S NAT 1902 rather than by way of the implied relay server.

Using the knowledge that Δp=+2 for the NAT 1904, the browser 630 can predict a possible value of the new port ID.

The browser 630 predicts the port ID to be ID=50014 sends corresponding p-BOP over path 1918. The p-BOP of paths 1918 is blocked because the symmetric NAT 1902 has not yet sent a packet directly to port 49154 of the SYM_S NAT 1904. But that does not thwart the purpose of the p-BOP because a purpose of it being sent is to open the port 49153 in the SYM_S NAT 1904 to packets from the endpoint server 629 sent via the predicted port of the SYM_S NAT 1902.

Continuing in terms of the example port IDs, it is assumed that the SYM_S NAT 1902 actually does assign port ID 50014 (=50012+2) for use with packets coming/going directly between the SYM_S NAT 1902 and the SYM_I NAT 1904 rather than by way of the implied relay server. The endpoint server 629 predicts that the port ID on the SYM_I NAT 1904 will be ID=49153 (=49153+1). In Fig. 19C, the endpoint server 629 sends a stream of packets (e.g., a video stream where the endpoint server 629 is an IP video camera) over a UDP type of P2P connection to the browser 630 using predicted port ID=49153, as indicated by path 1920. If the prediction is wrong, then the endpoint server 629 can repeat the process, starting with the paths 1907A, 1907B, etc., albeit including the following differences: the endpoint server 629 and the browser 630 can cause the respective NATs to make new bindings by communicating to the NAT-discovery server 622 using different source port IDs, respectively.

According to another embodiment of the invention, an extension to the Session Description Protocol ("SDP"), namely a new attribute, is provided by which information as to the type of a NAT can be exchanged. Alternatively, techniques other than an SDP-message can be used to exchange NAT-type information.

SDP is suitable for use with HTTP because, e.g., SDP is text-based and/or because it is commonly used as a voice-over-IP protocol. Over HTTP, an SDP message having

NAT-type information can be sent as some or all of the content/body of a request (e.g., using HTTP's POST method) and a response (e.g., using HTTP's message 200 OK) message.

Such an SDP NAT-type attribute can be as follows.

- Content-Type: application/sdp
- Use a= field: (ex. a=<attribute>:<value>)
- Attribute name: nat
- Attribute value (see following table):

Open	OPEN (default)
Full-cone NAT	F
Address-restricted cone NAT	R
Port-restricted-cone NAT	PR
Port-sensitive Symmetric NAT	SYM
Port-INsensitive Symmetric NAT	SYMI
UDP_BLOCKED	UB

The following is an example SDP-message that can be used to exchange NAT-type information. This example will treat the characters, //, and every subsequent character encountered until the end of a line as a comment, i.e., as not being part of the SDP message.

POST /P2PRequest HTTP/1.1	//HTTP header, request line
Content-Type: application/sdp	//HTTP header, attribute line
Content-Length: 89	///HTTP header, attribute line
	//Intentional SDP Blank line
v=0	//Version number of SDP
s=P2P Viewer	//Name of browser
c=IN IP4 67.105.5.125	//IPV4 scheme, browser's //address
a=recvonly	//browser receive only not also //send
m=video 61003 RTP/AVP 26	//forthcoming P2P content //(media)
a=nat:F	//Specific example of extension // to SDP according to an //embodiment of the invention, // here NAT type is full cone (F)

In the case that the NAT is a symmetric NAT, the attribute value will have a second field in addition to the type field (e.g., for a symmetric NAT, the type field will be "SYM" or "SYMI"). The second field represents the value of the increment size (Δp). As an example, a SYM_I NAT having $\Delta p=+2$ can be represented as: a=nat:SYMI 2. As another example, a SYM_S NAT having $\Delta p=+1$ can be represented as: a=nat:SYM 1.

Figure 20 depicts a table that organizes actions, according to an embodiment of the invention, which can be taken toward establishing a P2P connection between a first endpoint device and a second endpoint device after these devices have exchanged NAT-mapped address and NAT-type information via a relay-server-based connection, depending upon the class (I, II, III, IV and V_1, V_2, V_{3A}, V_{3B}, V_{3C} and V_{3D}) of NAT-combination. As in the explanations above, the first endpoint device can be, e.g., an endpoint server such as 629, and the second endpoint device can be, e.g., a browser such as 630. In Fig. 20, the legend "SR" indicates source port recording. There, the endpoint server can record the

source port number of an incoming packet to be used as a destination port to send UDP packets.

Fig. 21 is a flowchart, related to the table of Fig. 20, depicting actions that can be taken by the first endpoint device, e.g., (again), an endpoint server such as 629, according to embodiments of the invention. The various classes (I, II, III, IV and V_1, V_2, V_{3A}, V_{3B}, V_{3C} and V_{3D}) of NAT-combination, indicated generally at item 2102, enter the flowchart of Fig. 21 at different locations. Classes IV, V_2, V_{3A}, and V_{3C} enter box 2104, where the first endpoint device sends one or more BOPs and/or p-BOPs. For classes V_2, V_{3A}, V_{3B}, V_{3C} and V_{3D}, the first endpoint device might send multiple p-BOPs to destinations predicted using the increment size (Δp) of the second endpoint device's NAT.

Flow moves in Fig. 21 from box 2104 to decision box 2106, where the first endpoint device waits to receive a packet from the second endpoint device. It is noted that class III enters the flowchart by entering decision box 2106. If a packet is received by the first endpoint device, then flow moves from box 2106 to box 2108, where the first endpoint device records the packet's source port (and IP address).

Flow moves further in Fig. 21 from box 2108 to box 2110, where the first endpoint device sends a stream of packets over a UDP type of P2P connection. It is noted that classes I, II, V_1, V_{3B}, and V_{3D} enter the flowchart by entering decision box 2104. After the P2P connection is finished, flow moves from box 2110 to box 2112, where flow ends. If a packet is not received by the first endpoint device after waiting a predetermined time, T1 (e.g., T1 = 10 seconds), a failure/exception is considered to have occurred and flow moves from box 2106 to box 2114, where the first endpoint device carries out appropriate exception/failure procedures. Flow moves from box 2114 to box 2112.

Fig. 22 is a flowchart, related to the table of Fig. 20 (and the flowchart of Fig. 21), depicting actions that can be taken by the second endpoint device, e.g., (again), a browser

such as 630, according to another embodiment of the invention. The various classes (I, II, III, IV and V1, V2, V3A, V3B, V3C and V3D) of NAT-combination, indicated generally item at 2202, enter the flowchart of Fig. 22 at different locations. Classes I, II, III, IV and V1, V2, V3A, V3B, V3C and V3D (i.e., all except class I) enter box 2204, where the second endpoint device sends one or more BOPs and/or p-BOPs. For classes V_2, V_{3A} or V_{3B}, the second endpoint device might send multiple p-BOPs to destinations predicted using the increment size (Δp) of the first endpoint device's NAT.

Flow moves from box 2204 to decision box 2206, where the second endpoint device waits to receive a packet from the first endpoint device. If a packet is received by the second endpoint device, then flow in Fig. 22 moves from box 2206 to box 2210, where the second endpoint device attempts receives a stream of packets over a UDP type of P2P connection. It is noted that class I enters the flowchart by entering decision box 2210. After the P2P connection is finished, flow moves from box 2210 to box 2212, where flow ends.

In Fig. 22, if a packet is not received by the second endpoint device after waiting a predetermined time, T2 (e.g., T2 = 10 milliseconds), flow moves or loops from box 2206 back to box 2204. If a packet is not received by the second endpoint device after waiting a concurrently-elapsing predetermined time, T1 (e.g., T1 = 10 seconds), a failure/exception is considered to have occurred and flow moves from box 2206 to box 2214, where the second endpoint device carries out appropriate exception/failure procedures. Flow moves from box 2214 to box 2212.

Figure 3 is a sequence diagram of operations by which a P2P connection can be facilitated according to embodiments of the invention. Figure 23 does not strictly conform to the conventions of UML-type sequence diagrams. Figure 3 is similar to Fig. 2 in that it includes: an endpoint server 629; a first NAT 2314_1 corresponding to 14_1; a NAT-

discovery server 2322 corresponding to 22; a packet relay server 2320 corresponding to 20; a redirect server 2324 corresponding to 24; a second NAT 2314_2 corresponding to 14_2; and a browser 630. The endpoint server 629 and the browser 630, again, are examples of endpoint devices; other types of endpoint devices can be used.

Further, Figure 3 is similar to Fig. 2 in its sequence of messages up through a point at which the packet-relay-based connection is established, as indicated by item 2362. As such, messages 2330, 2332, 2334, 2336, 2342, 2344, 2346, 2348, 2350 and 2352 of Figure 3 correspond to messages 30, 32, 34, 36, 42, 44, 46, 48, 50 and 52 of Fig. 2, respectively, and will be described further, if at all, merely with brief comments, for the sake of brevity. Comments, as indicated by items 2391 and 2393, have been listed in Figure 3 for messages 2332 and 2336, respectively. Messages corresponding to 38 and 40 can take place in Figure 3, but are not depicted for brevity. The intervening roles of the NATs 2314_1 and 2314_2 are indicated by the dots 72 at the intersections of messages and the lifelines 2373 and 2375.

Messages 2330, 2332, 2334 and 2336 can be described as occurring during a boot-up phase (as indicated by item 2359) of the endpoint server 629. An additional message 2360 is sent by the endpoint server 629 during the boot-up phase 2359, namely message 2360 sent after message 2330 but before message 2332. Message 2360 is a NAT-discovery-over-UDP test initiated by the endpoint server 629 to determine information about what type the NAT 2314_1 is and to gather data by which the endpoint server 629 can determine the value of the increment size (Δp) of the NAT 2314_1.

Messages 2342, 2344, 2346, 2348, 2350 and 2352 can be described as occurring during a redirect phase (as indicated by item 2361). Message 2342, as an example, assumes 'URL:http://www.cam1.mweb.com' as an address mapped by the NAT 2314_1 to the endpoint server 629. Messages 2344, 2350 and 2352 each, as an example, assumes a

response that includes the HTTP message "200 OK". The HTTP session between the endpoint server 629 and the browser 630 via the relay server 2320 as intermediary becomes established after message 2352.

Figure 3 further includes the following phases: a browser-status-check phase (as indicated by item 2363) which the browser 630 undergoes, corresponding to messages 2364, 2366 and 2368; an SDP-message-exchange phase (as indicated by item 2365) including messages 2370, 2371, 2374, 2376, 2378 and 2389; and a priming phase (as indicated by item 2367) including messages 2382 and 2384. After the priming phase 2367, the endpoint server 629 and the browser 630 are ready to make a P2P connection, as indicated by item 2388.

The browser-status-check phase 2363 will now be described in more detail. After receiving the message 2352, the browser 630 sends a message 2364, which is a NAT-discovery-over-UDP test to determine information about what type the NAT 2314_2 is and to gather data by which the endpoint server 629 can determine the value of the increment size (Δp) of the NAT 2314_2. Message 2364 corresponds to message 2360. A typical browser 630 does not have the capability to perform a NAT-discovery-over-UDP test. Such capability can be added to the browser 630 via a plug-in module, an active-X control, an applet, etc. provided to the browser 630, e.g., as an additional part of the messages 2350 and 2352.

Then, the browser 630 sends message 2366, e.g., a STUN allocate request, by which the browser 630 requests the port allocated/mapped to it (the browser 630) by the NAT 2314_2 for a forthcoming P2P connection with the endpoint server 629. The NAT-discovery server 2322 responds in the form of message 2368, e.g., a STUN Mapped-Address indicating at least a port ID if not an address/port pair.

The SDP-message-exchange phase 2365 will now be described in more detail. After message 2368, the browser 630 sends message 2370, e.g., an SDP on HTTP message, to the endpoint server 629 via the relay server 2320, which relays message 2370 as message 2371 to the endpoint server 629. Aspects of the messages 2370 and 2371 can include: an indication that browser 630 wants to set-up a P2P connection; an indication of what type the NAT 2314_2 is; and an indication of what is the value of the increment size (Δp), e.g., using the NAT-type attribute extension to SDP discussed above. For example, the sample SDP-type message discussed above, namely "POST/P2PRequest HTTP/1.1 ...", uses the "POST" method available in SDP to convey information. Among other things, the text string "P2PRequest" (in the field known as the "requested URI" field) indicates that the browser 630 (as the sender of the message) wants to set-up a P2P connection with the recipient of the message, namely the endpoint server 629. Other SDP methods could be used to convey such information.

The endpoint server 629 responds by sending message 2374, e.g., a STUN allocate request, by which the endpoint server 629 requests the port allocated/mapped to it (the browser 630) by the NAT 2314_2 for a forthcoming P2P connection with the browser 630. The NAT-discovery server 2322 responds in the form of message 2376, e.g., a STUN Mapped-Address indicating at least a port ID if not an address/port pair. The endpoint server 629 sends message 2378, e.g., an SDP on HTTP message, to the browser 630 via the relay server 2320, which relays message 2378 as message 2380 to the endpoint server 629. The messages 2378 and 2380, similar to messages 2370 and 2371, indicate what type the NAT 2314_1 is as well as what is the value of the increment size (Δp), e.g., using the NAT-type attribute extension to SDP discussed above.

It is noted that the SDP exchange phase can be carried out in ways other than the messages 2370 - 2389. Alternatively, the NAT-type information, etc., can be exchanged

between the browser 630 and the endpoint server 629 via the existing relay-server-based HTTP session, a separate MODEM-supported communication channel,; a wireless connection, a ping-pong Gnutella-type-protocol session, etc.

The priming phase 2367 will now be described in more detail. If the characteristics of the two NATs 2314_1 and 2314_2 correspond to one of classes III, IV or V, then the endpoint server 629 sends one or more BOPs or p-BOPs to the browser 630. Then, if the characteristics of the two NATs 2314_1 and 2314_2 correspond to one of classes II, III, IV or V, the browser 630 sends one or more BOPs or p-BOPs to endpoint server 629. And if the characteristics of the two NATs 2314_1 and 2314_2 correspond to one of classes III, IV or V, then the endpoint server 629 also records the port ID allocated/mapped by the NAT 2314_2 to the browser 630 for the forthcoming P2P connection, as indicated by note 2386. It is noted that a trigger for causing the endpoint server 629 to send one or more BOPs can be the P2P request included in message 2371/2370. Similarly, a trigger for the browser 630 to send one or more BOPs can be the message 2378/2380 that responds to the P2P request.

After message 2384 and (in some cases) the source port recording 2386, the endpoint server 629 and the browser 630 are ready to establish a P2P connection. As indicated by message 2390, the endpoint server 629 then sends a stream of packets (e.g., a video stream where the endpoint server 629 is an IP video camera) over a UDP type of P2P connection to the browser 630.

The description of the invention is merely exemplary in nature and, thus, variations that do not depart from the gist of the invention are intended to be within the scope of the invention. Such variations are not to be regarded as a departure from the spirit and scope of the invention.

CLAIMS

1. A method of operating a first endpoint device (ED) to facilitate a peer-to-peer (P2P) connection between the first ED and a second ED despite intervening network address translators (NATs) at both ends of the connection, for use with a system compliant with the internet protocol (IP),

the system having an architecture that includes a first network, a second network and a third network,

the first network having at least the first ED and a first NAT, the first ED being connected to the third network via the first NAT, the first NAT allocating a first pair of an IP address and port number for communication from the third-network-side of the first NAT with the first ED via the first NAT,

the second network having at least the second ED and a second NAT, the second ED being connected to the third network via the second NAT, the second NAT allocating a second IP-address/port pair for communication from the third-network-side of the second NAT with the second ED via the second NAT,

the method comprising:

providing the second ED with the first IP-address/port pair; and

providing the second ED with first type-information regarding the type of the first NAT.

2. The method of claim 1, further comprising:

determining the first type-information.

3. The method of claim 2, wherein the first type-information is determined by performing a NAT-discovery test.

4. The method of claim 3, wherein the NAT-discovery test is a STUN test over the UDP.

5. The method of claim 1, further comprising:

receiving the second IP-address/port pair from the second ED; and

receiving second type-information regarding the type of the second NAT from the second ED.

6. The method of claim 1, wherein at least one of the first IP-address/port pair and the first type-information is provided to the second ED via one of: an HTTP session with the second ED; a separate MODEM-supported communication channel with the second ED; a wireless connection to the second ED; and ping-pong type-protocol session with the second ED.

7. The method of claim 6, wherein the first type-information is provided via an SDP-on-HTTP message.

8. The method of claim 7, wherein the SDP-on-HTTP message includes an SDP attribute representing the type of a NAT.

9. The method of claim 8, wherein content of the attribute can indicate that the NAT is one of the following types: full-cone; restricted cone; port-restricted cone; genus symmetric; species port-sensitive symmetric; species port-insensitive symmetric; and UDP-blocked.

10. The method of claim 1, wherein one of the first and second EDs is a server and the other ED is a would-be client of the server.

11. The method of claim 1, wherein the server is an HTTP server and the would-be client is a browser.

12. The method of claim 1, wherein the first network and the second network are each private networks and the third network is a public network.

13. The method of claim 12, wherein the public network is the internet.

14. A method of communicating information about a network address translator (NAT), where the NAT connects a first network to a second network, the method comprising:

generating a session description protocol (SDP) message;

including an SDP attribute in the message that describes the type of the NAT; and

sending the SDP message to the second network from the first network via the NAT.

15. The method of claim 14, wherein the SDP is an SDP on HTTP message.

16. The method of claim 14, wherein content of the attribute can indicate that the NAT is one of the following types: full-cone; restricted cone; port-restricted cone; genus symmetric; species port-sensitive symmetric; species port-insensitive symmetric;; and UDP-blocked.

17. A first endpoint device (ED) for use with a system compliant with the internet protocol (IP),

the system having an architecture that includes a first network, a second network and a third network,

the first network having at least the first ED and a first NAT, the first ED being connected to the third network via the first NAT, the first NAT allocating a first pair of an IP address and port number for communication from the third-network-side of the first NAT with the first ED via the first NAT,

the second network having at least a second ED and a second NAT, the second ED being connected to the third network via the second NAT, the second NAT allocating a second IP-address/port pair for communication from the third-network-side of the second NAT with the second ED via the second NAT,

the first ED being operable to facilitate a peer-to-peer (P2P) connection between the first ED and the second ED, despite the intervening first and second NATs at both ends of the connection, by performing the method of any one of claims 1, 14, 20 and 27.

18. The first endpoint device of claim 17, wherein the first ED is one of a server and a would-be client of a server.

19. The first endpoint device of claim 18, wherein the server is an HTTP server and the would-be client is a browser.

20. A method of determining a port increment size (Δp) for a symmetric network address translator (NAT), the method comprising:

requesting the symmetric NAT to map a plurality of port identification numbers (IDs);

receiving information regarding the plurality of port IDs; and

comparing the information to determine an increment size (Δp) of the NAT.

21. The method of claim 20, wherein the information is compared by

calculating the difference between port IDs allocated, respectively, by the NAT in response to successive requests for mappings; and

analyzing the resulting distribution of differences to estimate increment size (Δp).

22. The method of claim 20, further comprising:

determining whether the symmetric NAT is port-sensitive or port-insensitive.

23. The method of claim 22, wherein, if two mapping requests to the NAT for different destination port IDs on the same destination IP address are mapped to the same port on the NAT, then the NAT is port-insensitive.

24. The method of claim 20, wherein

the NAT is a first NAT; and

the receiving and comparing of the information is done by a first endpoint device (ED) being used with a system compliant with the internet protocol (IP),

the system having an architecture that includes a first network, a second network and a third network,

the first network having at least the first ED and the first NAT, the first ED being connected to the third network via the first NAT, the first NAT allocating a first pair of an IP address and port number for communication from the third-network-side of the first NAT with the first ED via the first NAT,

the second network having at least the second ED and a second NAT, the second ED being connected to the third network via the second NAT, the second NAT allocating a second IP-address/port pair for communication from the third-network-side of the second NAT with the second ED via the second NAT,

the method further comprising:

sending an indication of the increment size (Δp) from the first ED to the second ED.

25. The method of claim 24, wherein the indication of increment size (Δp) is sent via a packet-relay-server-based connection between the first ED and the second ED.

26. The method of claim 24, wherein the indication of increment size (Δp) is represented via an SDP message having a NAT-type attribute.

27. A method of operating a first endpoint device (ED) to facilitate a peer-to-peer (P2P) connection between the first ED and a second ED despite intervening network address translators (NATs) at both ends of the connection, for use with a system compliant with the internet protocol (IP),

the system having an architecture that includes a first network, a second network and a third network,

the first network having at least the first ED and a first NAT, the first ED being connected to the third network via the first NAT, the first NAT allocating a first pair of an IP address and port number for communication from the third-network-side of the first NAT with the first ED via the first NAT,

the second network having at least the second ED and a second NAT, the second ED being connected to the third network via the second NAT, the second NAT allocating a second IP-address/port pair for communication from the third-network-side of the second NAT with the second ED via the second NAT,

the method comprising:

receiving an indication of increment size (Δp) used by the second NAT to allocate/map new port numbers; and

predicting, based upon the indication of increment size (Δp), at least one predicted destination port identification number ("ID") that would be used by the second NAT for the P2P connection between the first ED and a second ED.

28. The method of claim 27, further comprising:

generating at least one predicted break-out packet ("p-BOP") corresponding to the one predicted destination port, respectively.

29. The method of claim 28, further comprising:

sending the at least one p-BOP to the second ED via the first NAT.

30. The method of claim 27, wherein the increment size (Δp) is received from the second ED.

31. The method of claim 30, wherein the increment size (Δp) is received via a packet-relay-server-based connection between the first ED and the second ED.

32. The method of claim 30, wherein the indication of increment size (Δp) is represented via an SDP message having a NAT-type attribute.

33. A computer-readable medium having code portions embodied thereon that are readable by a first endpoint device (ED), the first ED being usable with a system compliant with the internet protocol (IP),

the system having an architecture that includes a first network, a second network and a third network,

the first network having at least the first ED and a first NAT, the first ED being connected to the third network via the first NAT, the first NAT allocating a first pair of an IP address and port number for communication from the third-network-side of the first NAT with the first ED via the first NAT,

the second network having at least a second ED and a second NAT, the second ED being connected to the third network via the second NAT, the second NAT allocating a second IP-address/port pair for communication from the third-network-side of the second NAT with the second ED via the second NAT,

the code portions embodied on the computer-readable medium, when read by the first ED, causing the first ED to perform any one of the methods of claims 1, 14, 20 and 27, thereby making the first ED operable to facilitate a peer-to-peer (P2P) connection between the first ED and the second ED, despite the intervening first and second NATs at both ends of the connection.

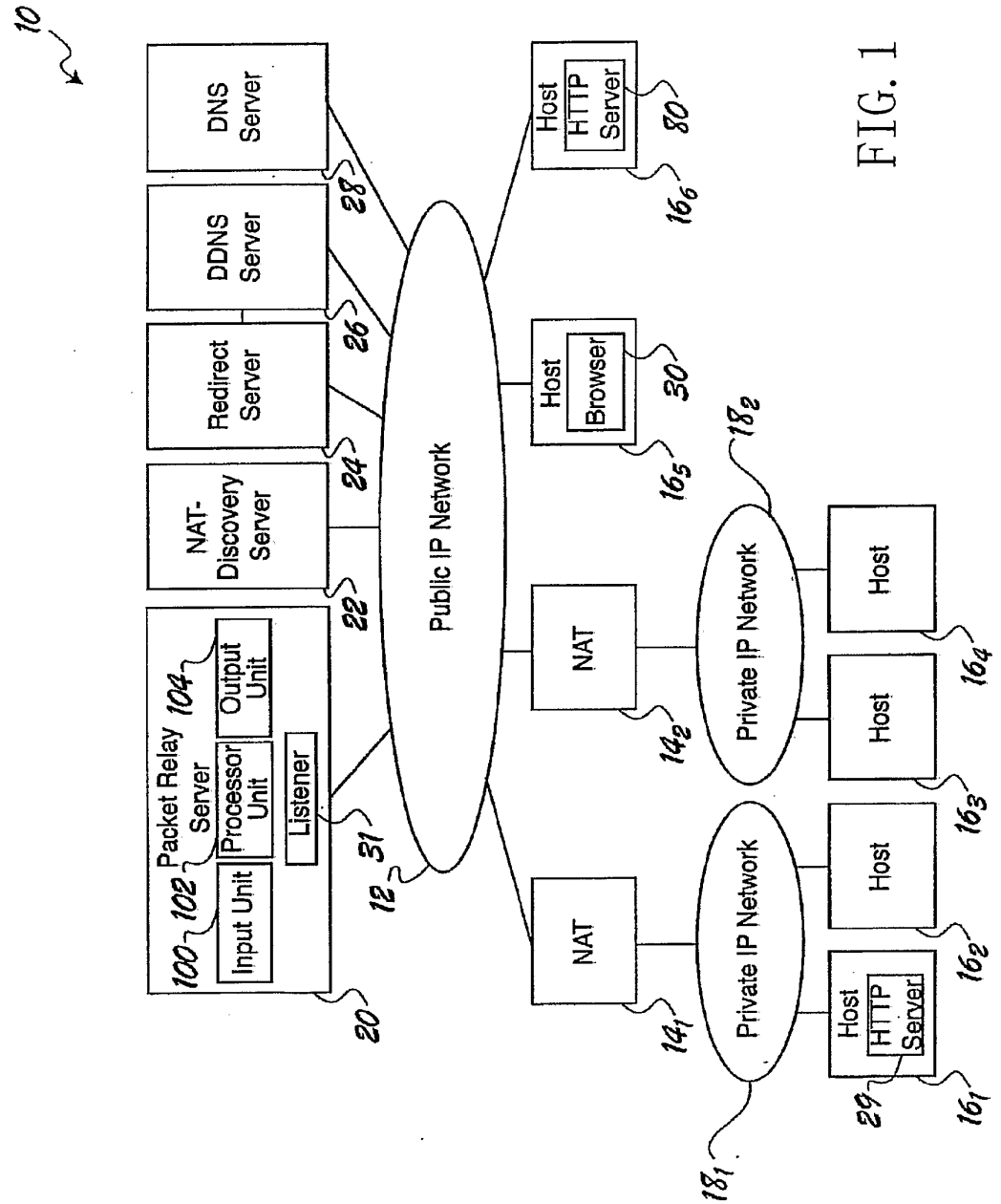

10
DNS Server
DDNS Server
Redirect Server
NAT-Discovery Server
Packet Relay Server
Input Unit
Processor Unit
Output Unit
Listener
Public IP Network
Host HTTP Server
Host Browser
NAT
NAT
NAT
Private IP Network
Private IP Network
Host
Host
Host
Host
Host HTTP Server
12
20
22
24
26
28
30
31
80
100
102
104
141
142
161
162
163
164
165
166
181
182
29

FIG. 1

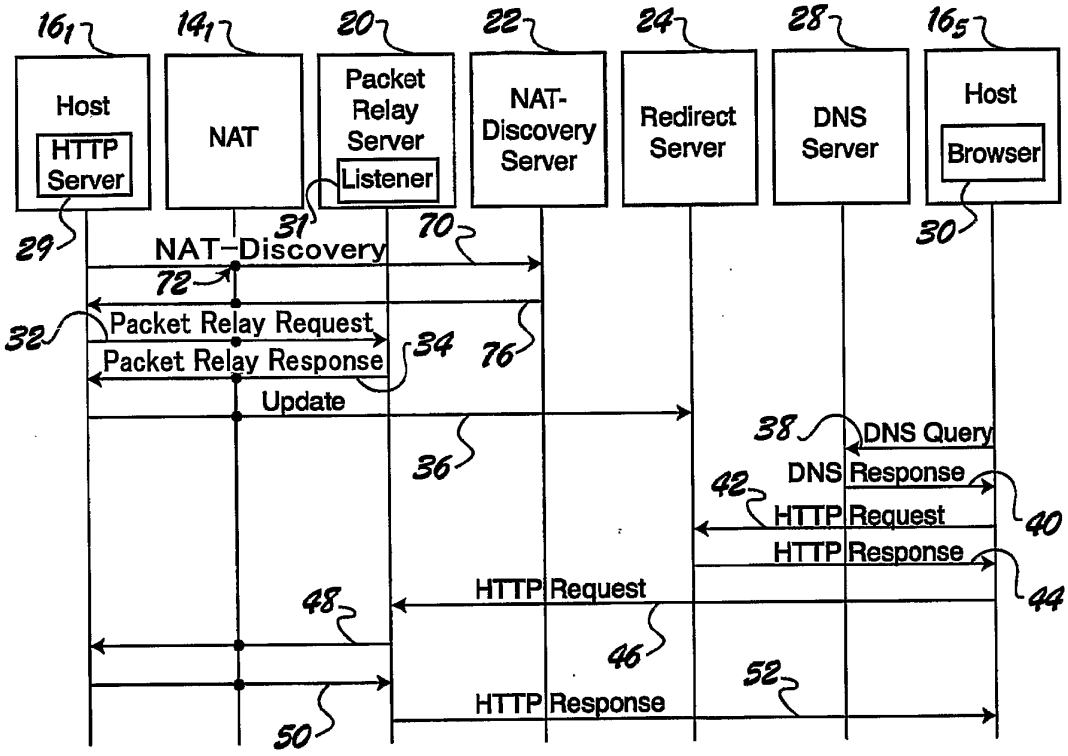

16₁
14₁
20
22
24
28
16₅
Host
HTTP Server
NAT
Packet Relay Server
Listener
NAT-Discovery Server
Redirect Server
DNS Server
Host
Browser
29
31
70
30
NAT-Discovery
72
32
Packet Relay Request
Packet Relay Response
34
76
Update
36
38
DNS Query
DNS Response
42
HTTP Request
40
HTTP Response
44
48
HTTP Request
46
52
50
HTTP Response

FIG. 2

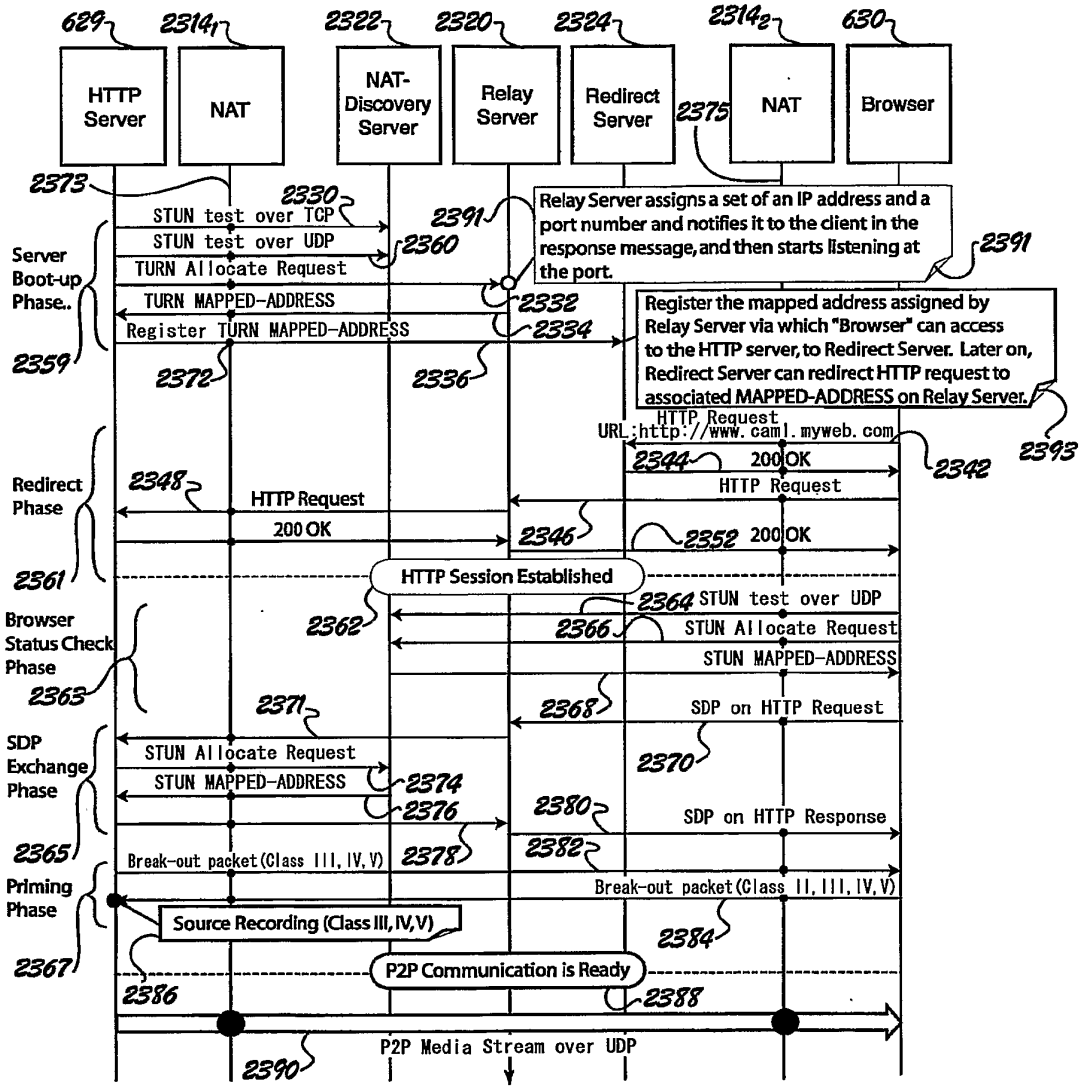

629
2314₁
2322
2320
2324
2314₂
630
HTTP Server
NAT
NAT-Discovery Server
Relay Server
Redirect Server
2375
NAT
Browser
2373
2330
STUN test over TCP
STUN test over UDP
2360
TURN Allocate Request
TURN MAPPED-ADDRESS
Register TURN MAPPED-ADDRESS
Server Boot-up Phase..
2359
2372
2336
2391
Relay Server assigns a set of an IP address and a port number and notifies it to the client in the response message, and then starts listening at the port.
2391
2332
2334
Register the mapped address assigned by Relay Server via which "Browser" can access to the HTTP server, to Redirect Server. Later on, Redirect Server can redirect HTTP request to associated MAPPED-ADDRESS on Relay Server.
2393
HTTP Request
URL:http://www.caml.myweb.com
2344
200 OK
2342
HTTP Request
Redirect Phase
2348
HTTP Request
200 OK
2346
2352
200 OK
2361
HTTP Session Established
2364
STUN test over UDP
2362
2366
STUN Allocate Request
STUN MAPPED-ADDRESS
Browser Status Check Phase
2363
2371
2368
SDP on HTTP Request
2370
STUN Allocate Request
STUN MAPPED-ADDRESS
SDP Exchange Phase
2374
2376
2380
SDP on HTTP Response
2365
Break-out packet(Class III, IV, V)
2378
2382
Break-out packet(Class II, III, IV, V)
Priming Phase
Source Recording (Class III, IV, V)
2384
2367
P2P Communication is Ready
2386
2388
P2P Media Stream over UDP
2390

FIG. 3

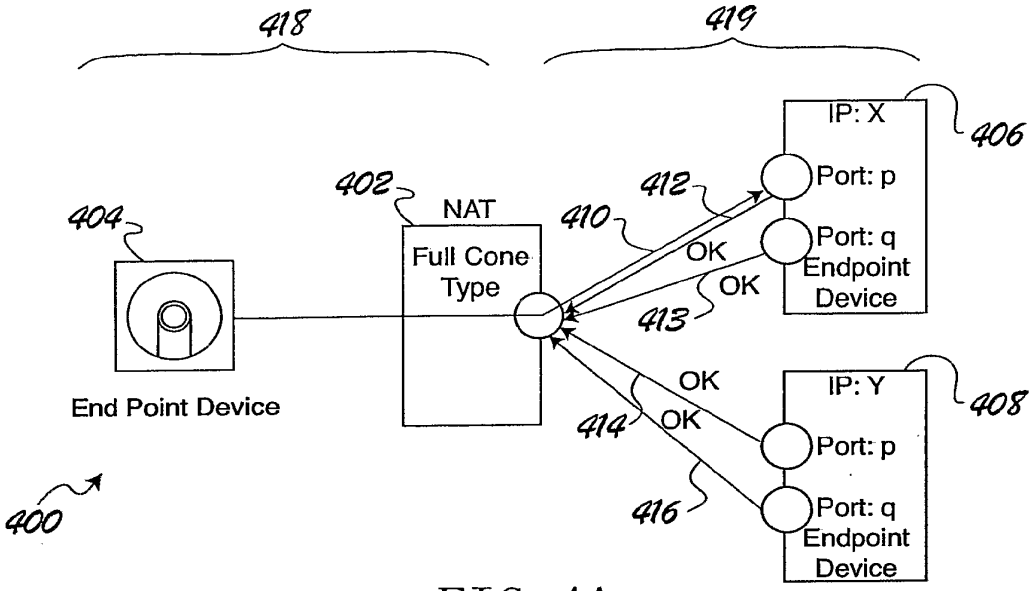


FIG. 4A
(Background Art)

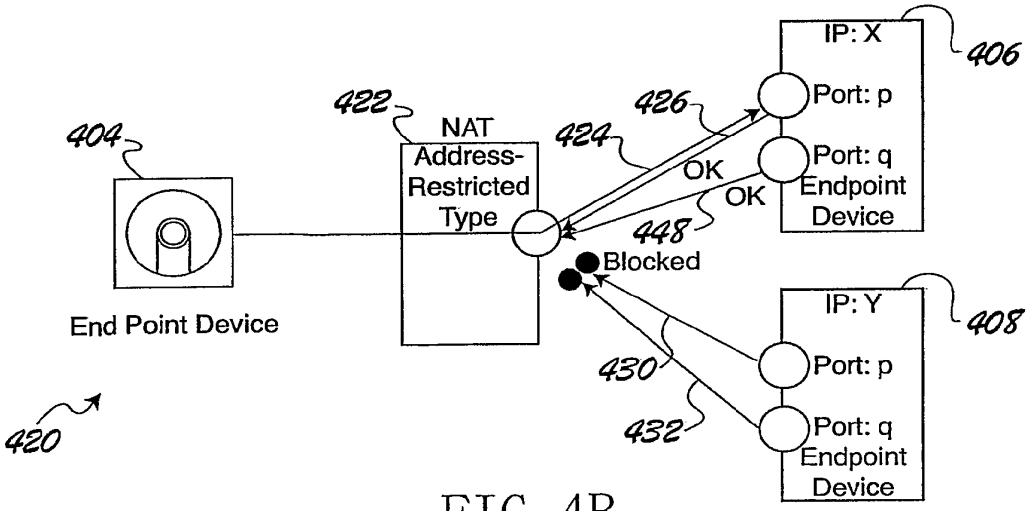


FIG. 4B
(Background Art)

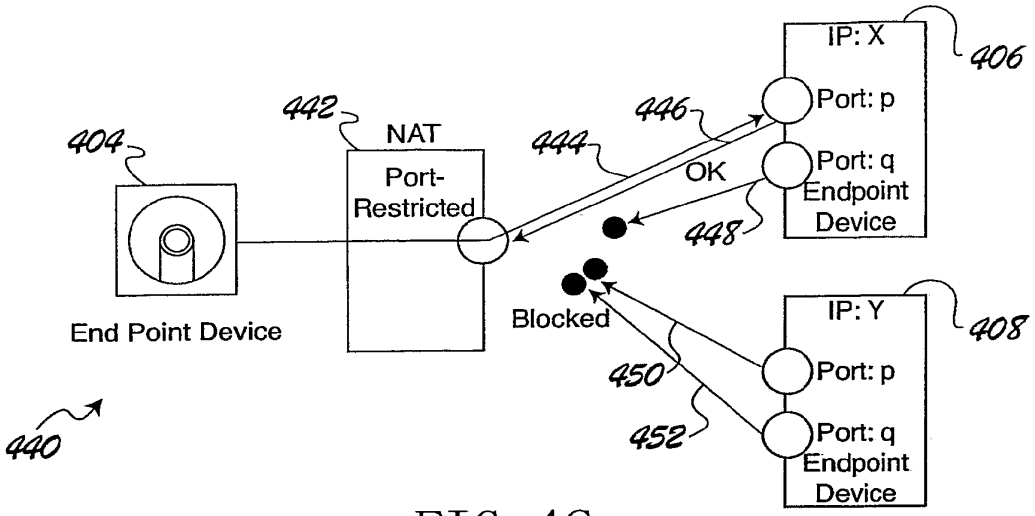


FIG. 4C
(Background Art)

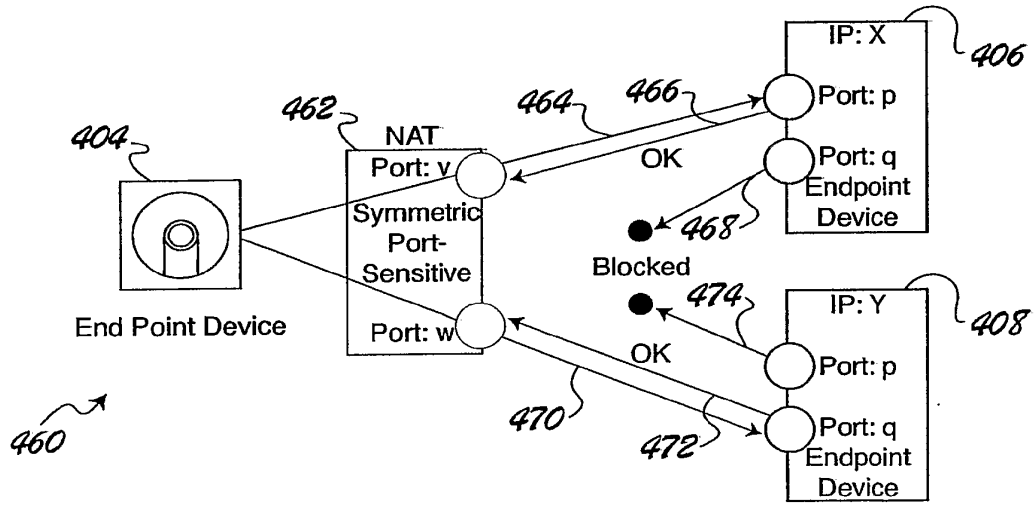


FIG. 4D
(Background Art)

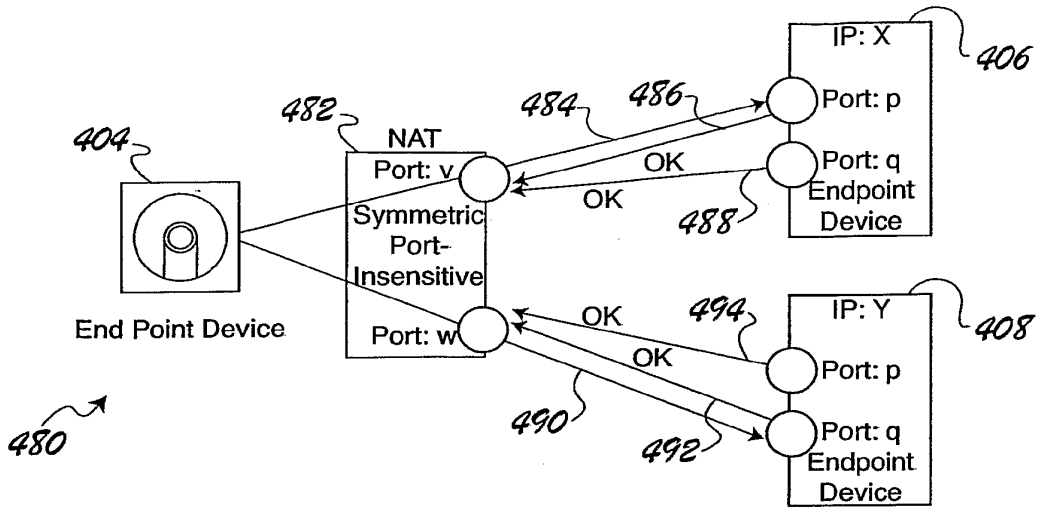


FIG. 4E
(Background Art)

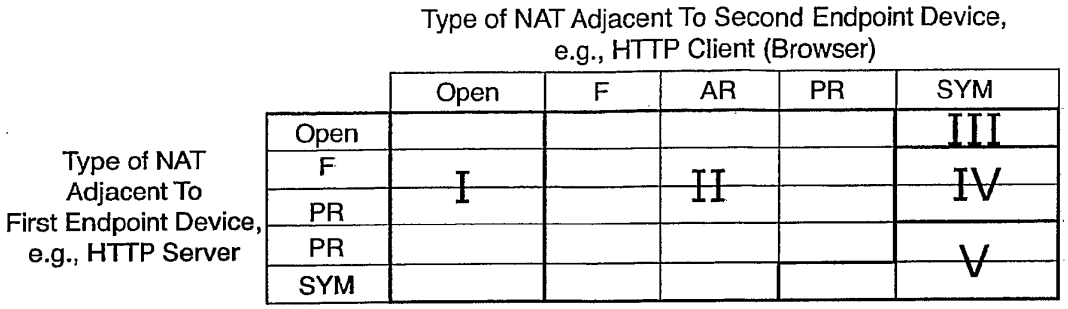

Type of NAT Adjacent To Second Endpoint Device, e.g., HTTP Client (Browser)
Open
F
AR
PR
SYM
Type of NAT Adjacent To First Endpoint Device, e.g., HTTP Server
Open
F
PR
PR
SYM
I
II
III
IV
V

FIG. 5A

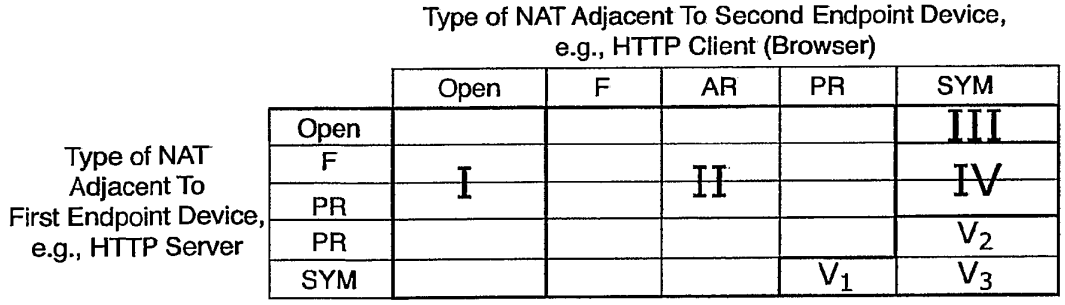

Type of NAT Adjacent To Second Endpoint Device, e.g., HTTP Client (Browser)
Open
F
AR
PR
SYM
Type of NAT Adjacent To First Endpoint Device, e.g., HTTP Server
Open
F
PR
PR
SYM
I
II
III
IV
V2
V1
V3

FIG. 5B

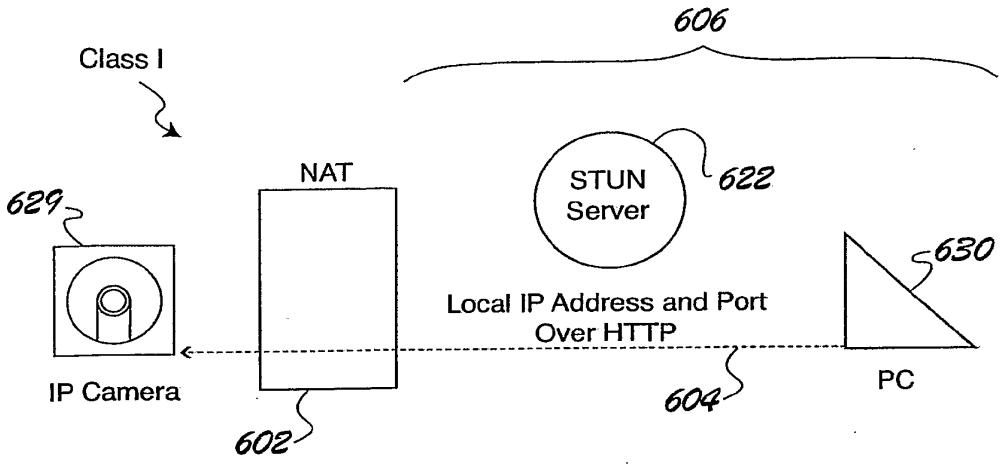

606
Class I
NAT
STUN
Server
622
629
630
Local IP Address and Port
Over HTTP
IP Camera
604
PC
602

FIG. 6A

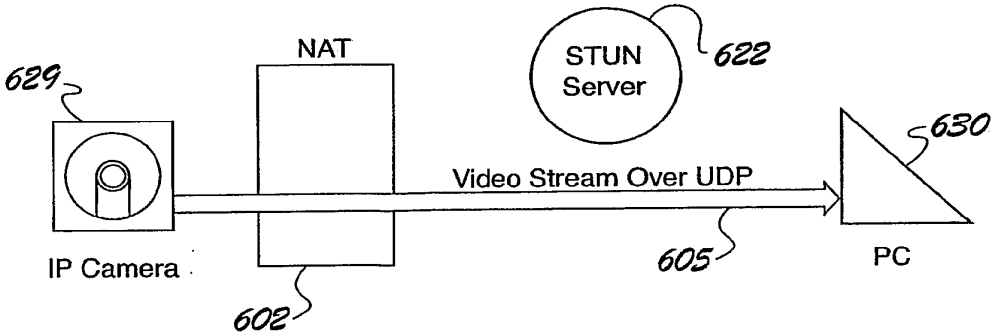

NAT
STUN
Server
622
629
630
Video Stream Over UDP
IP Camera
605
PC
602

FIG. 6B

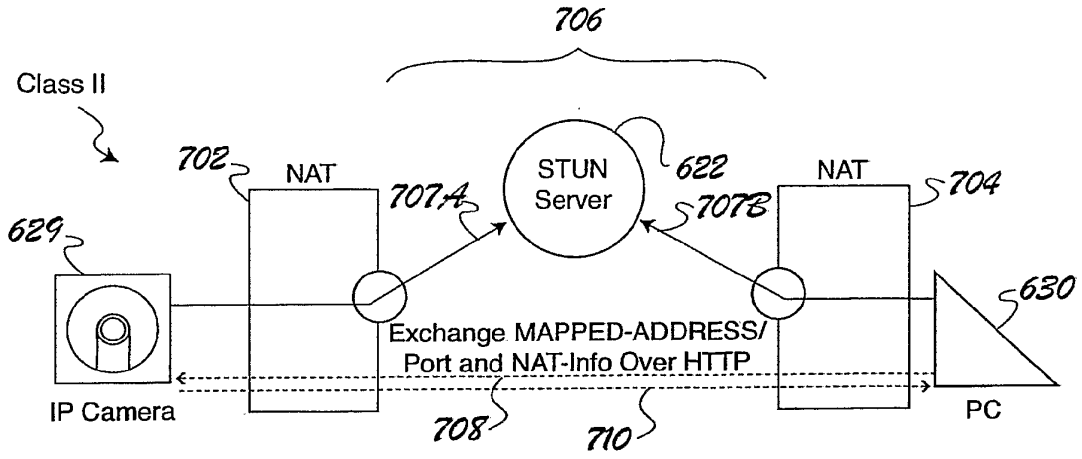


FIG. 7A

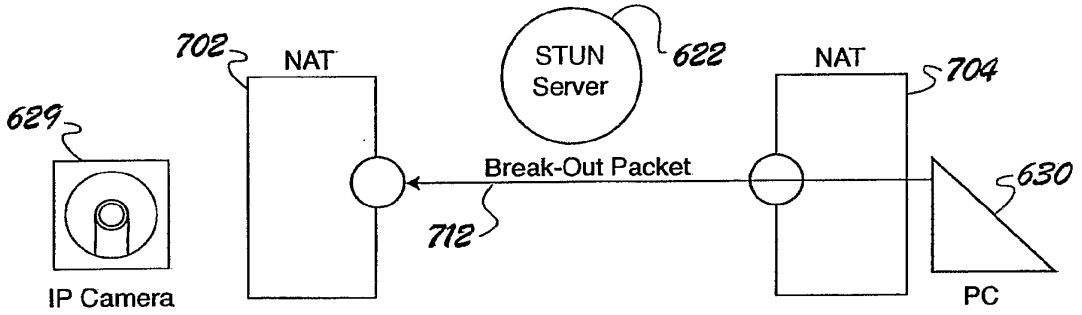


FIG. 7B

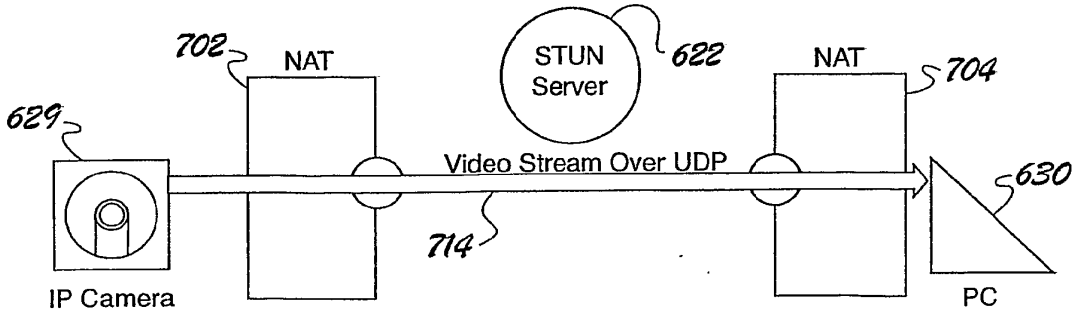


FIG. 7C

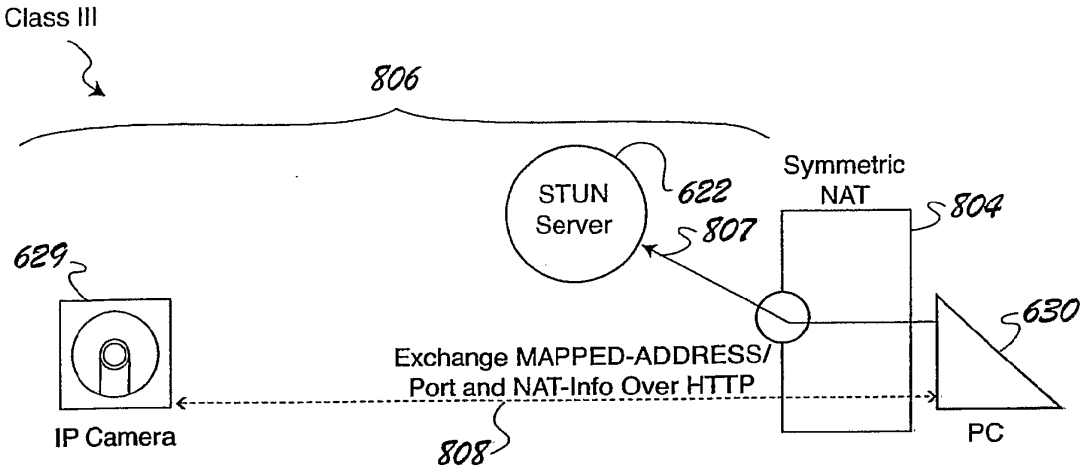


FIG. 8A

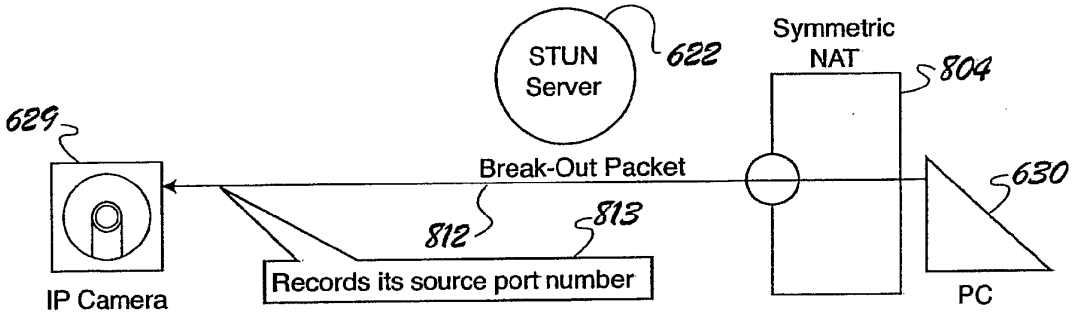


FIG. 8B

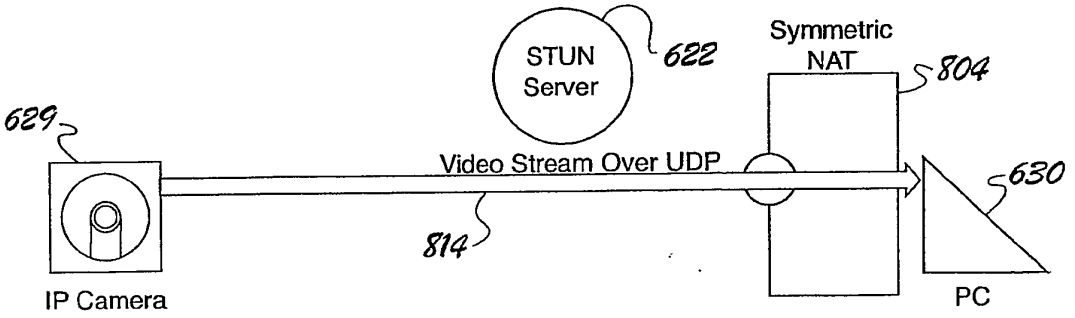


FIG. 8C

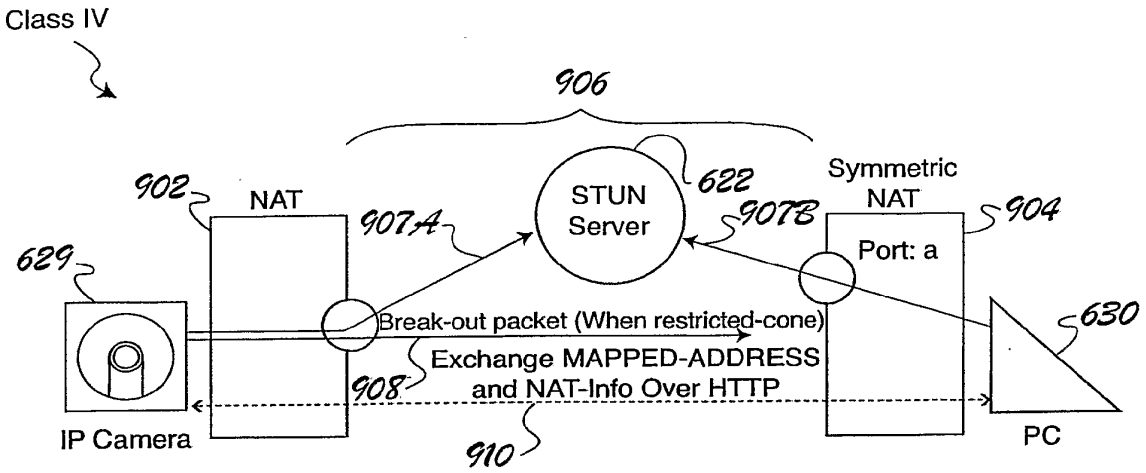


FIG. 9A

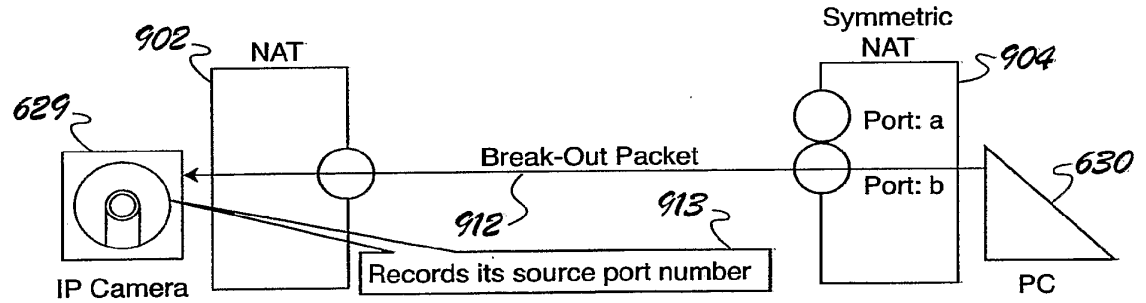


FIG. 9B

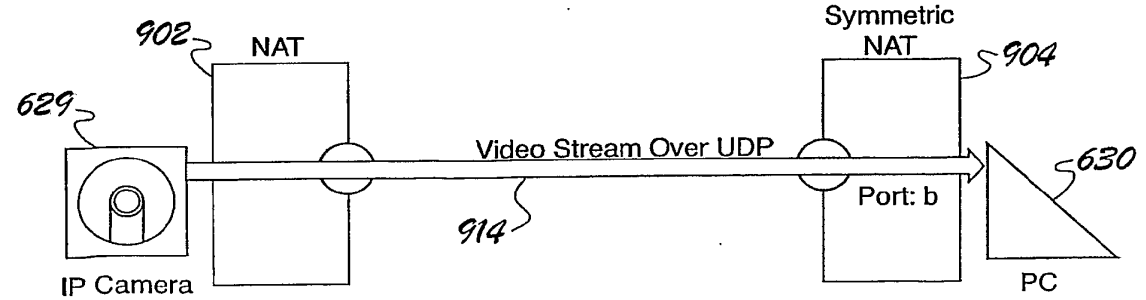


FIG. 9C

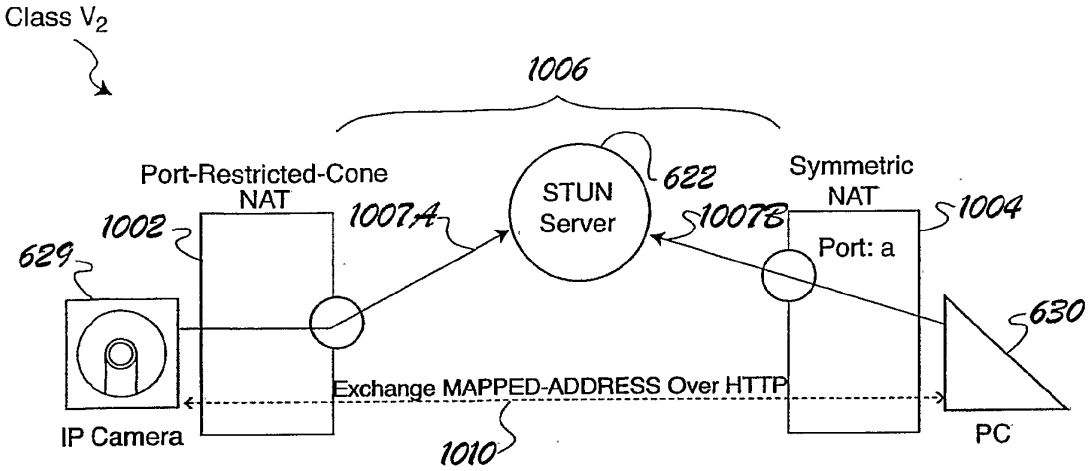


FIG. 10A

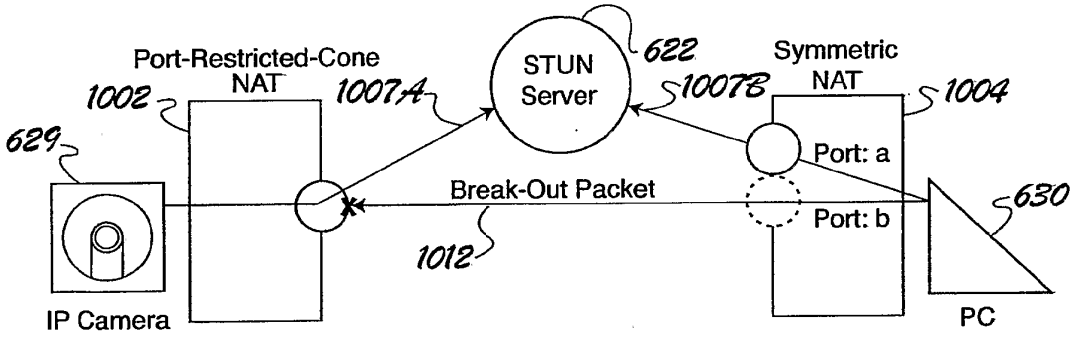


FIG. 10B

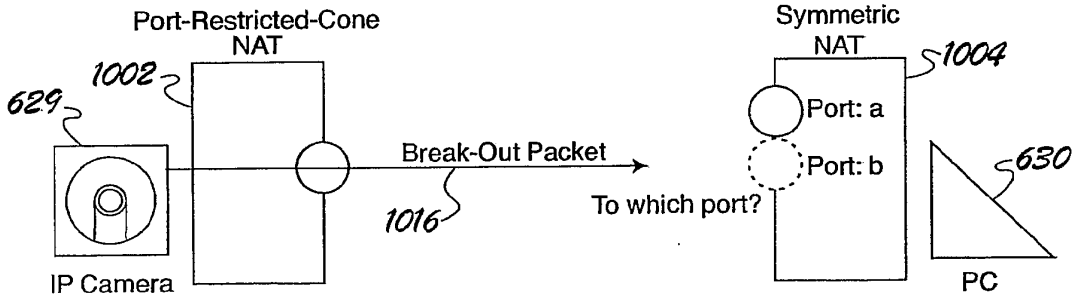


FIG. 10C

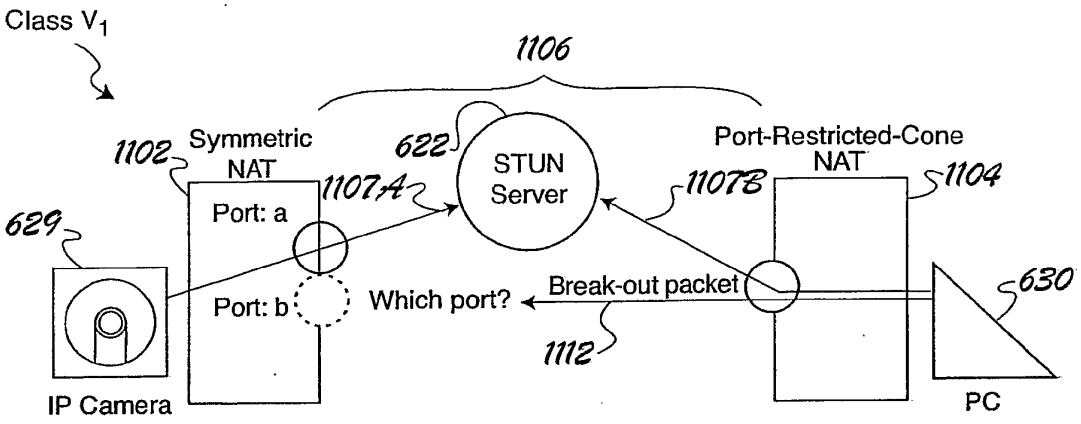

Class V_1
1106
1102
Symmetric NAT
622
STUN Server
Port-Restricted-Cone NAT
1107A
1107B
1104
629
Port: a
Port: b
Which port?
Break-out packet
630
1112
IP Camera
PC

FIG. 11

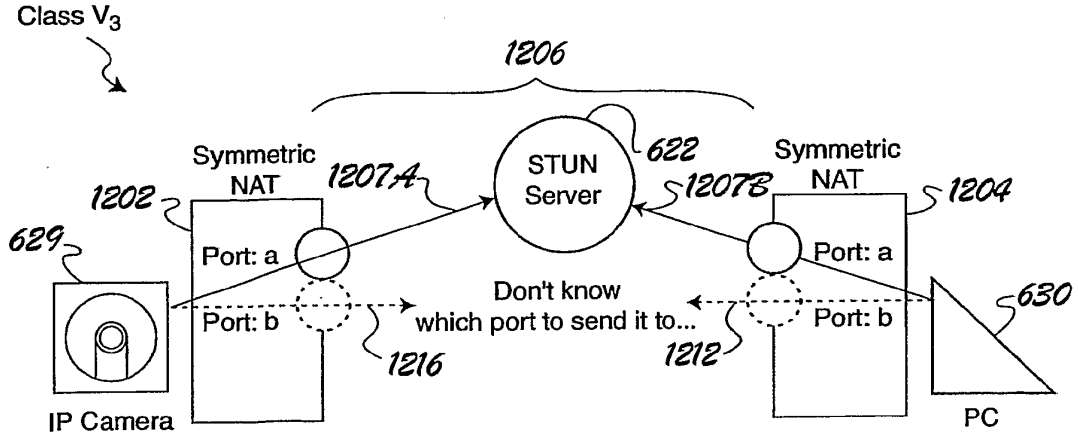

Class V_3
1206
622
Symmetric NAT
1207A
STUN Server
1207B
Symmetric NAT
1202
1204
629
Port: a
Port: a
Don't know
which port to send it to...
Port: b
Port: b
630
1216
1212
IP Camera
PC

FIG. 12

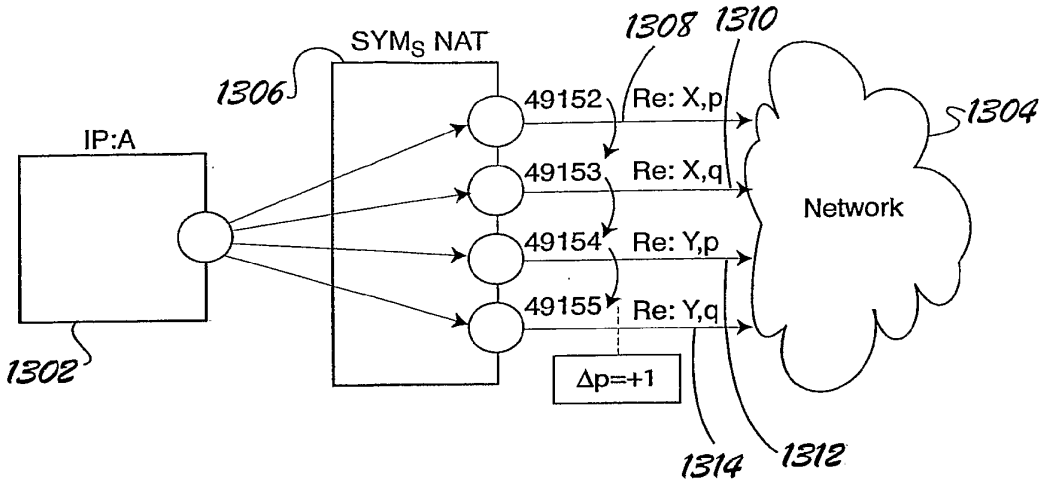


FIG. 13A

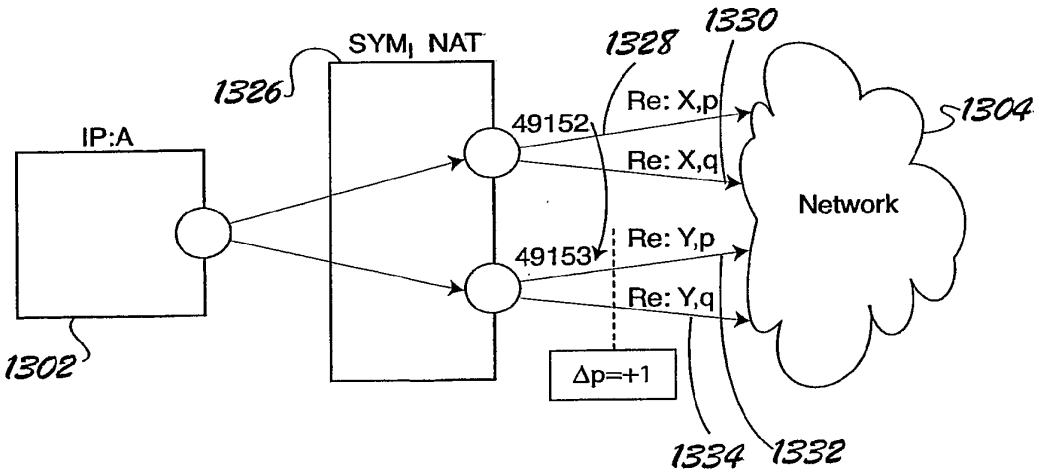


FIG. 13B

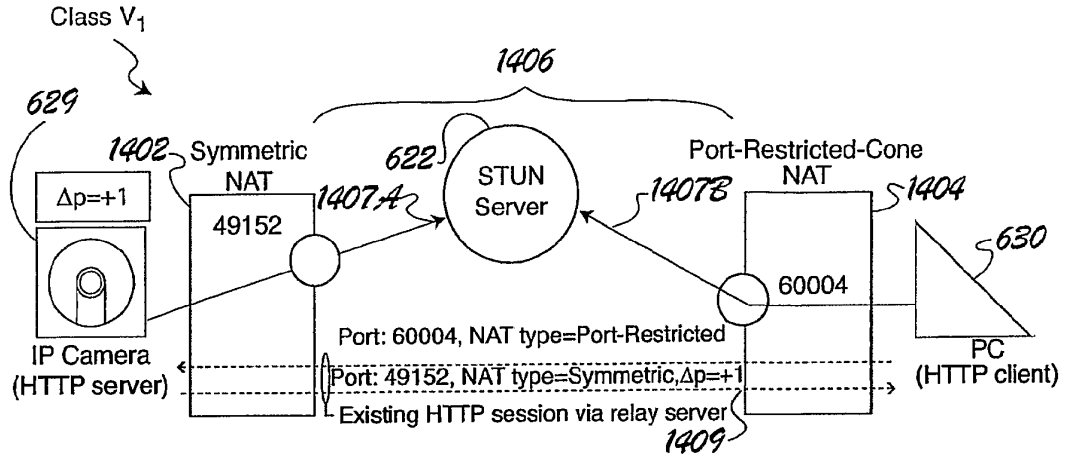


FIG. 14A

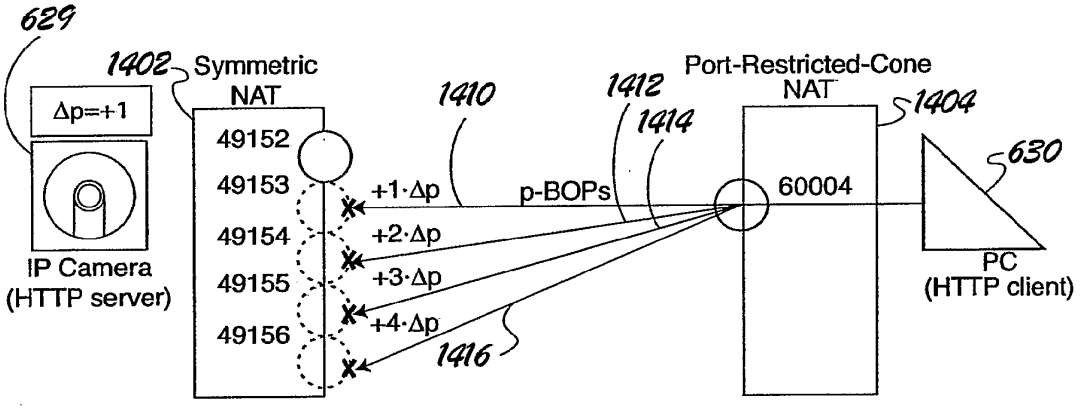


FIG. 14B

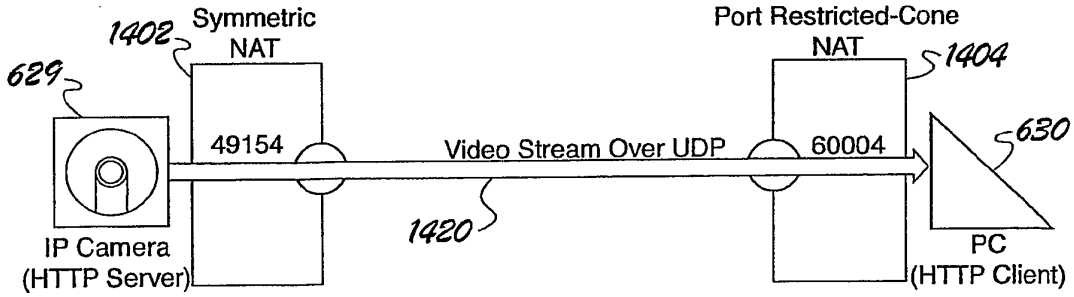


FIG. 14C

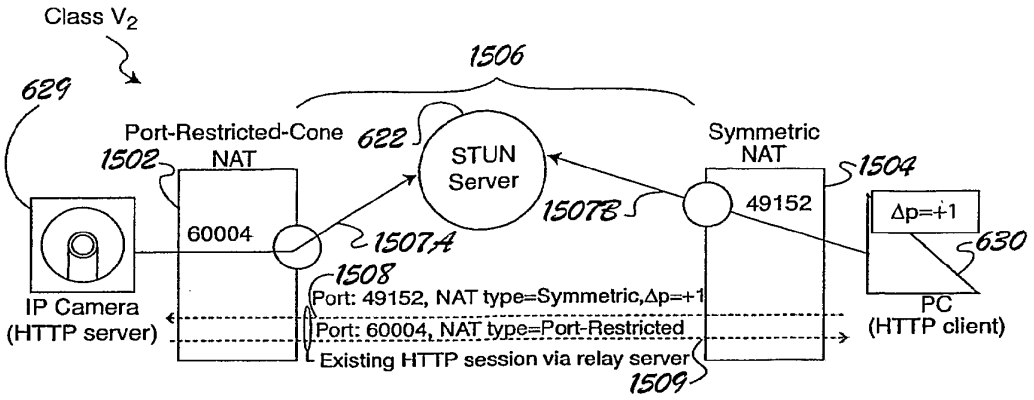


FIG. 15A

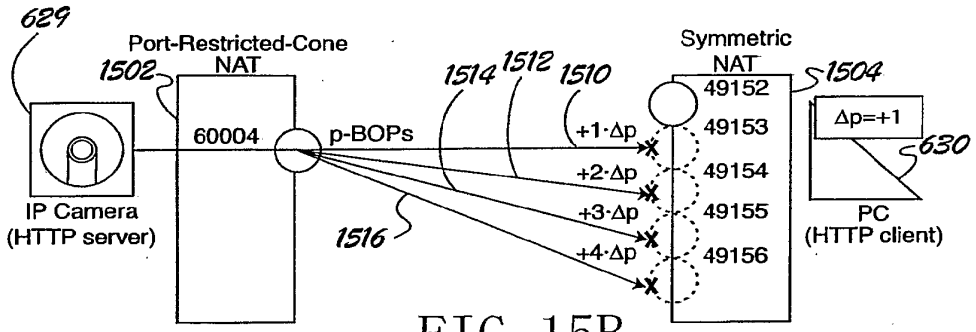


FIG. 15B

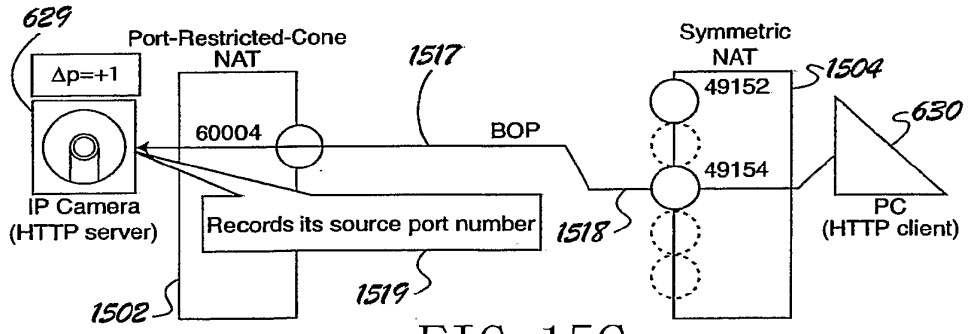


FIG. 15C

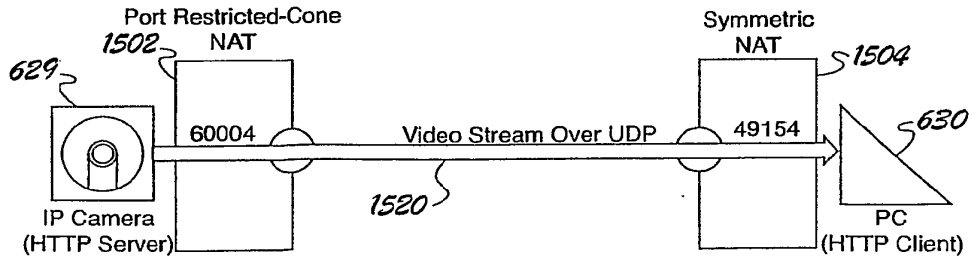


FIG. 15D

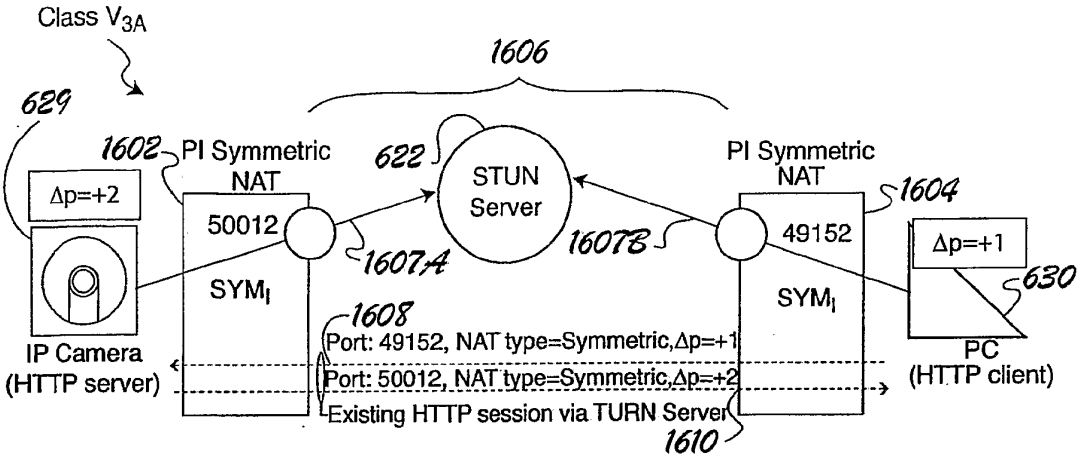


FIG. 16A

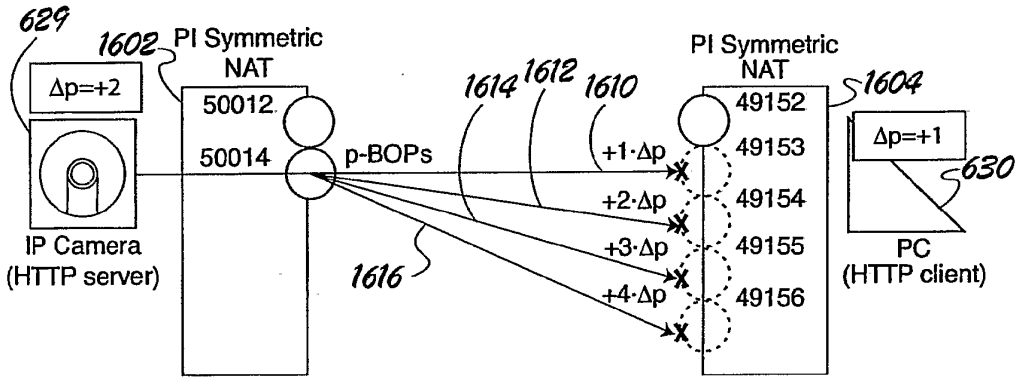


FIG. 16B

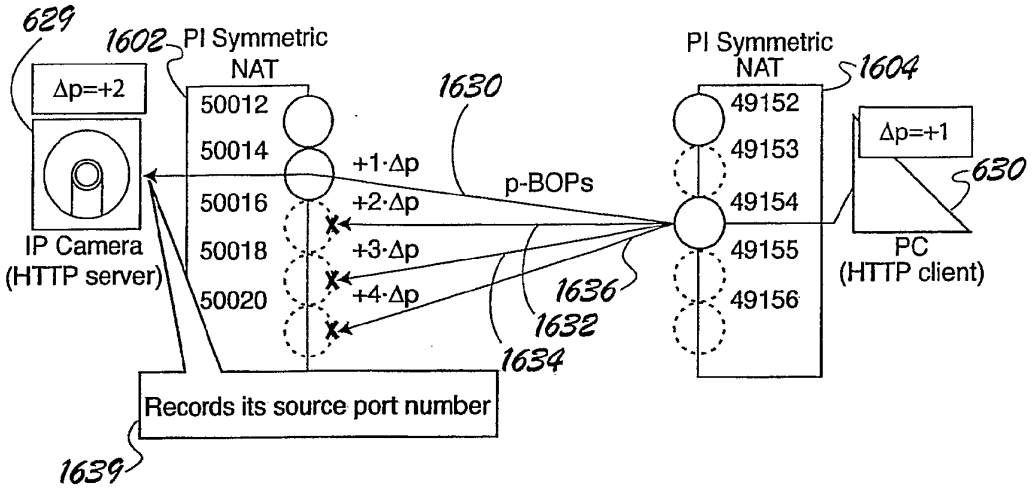


FIG. 16C

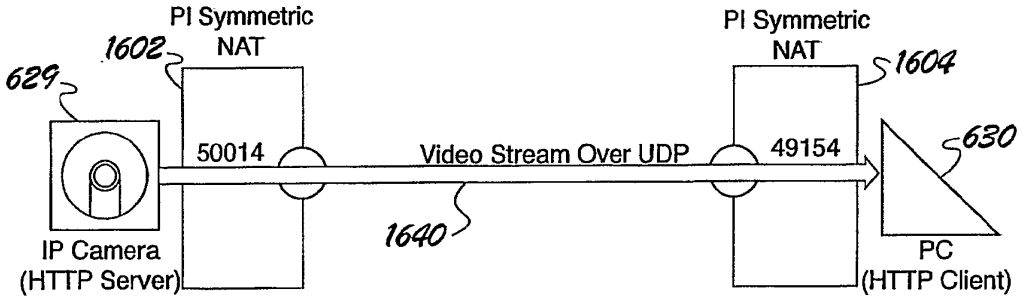


FIG. 16D

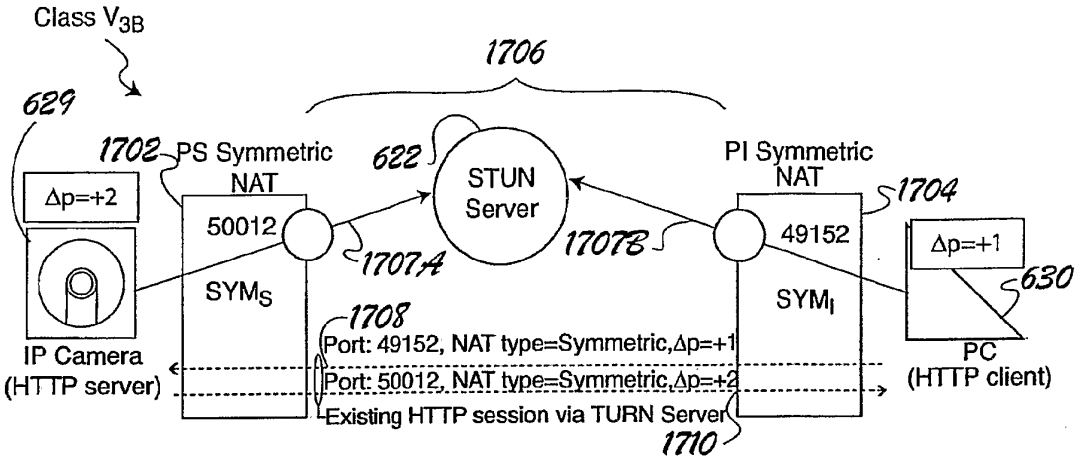


FIG. 17A

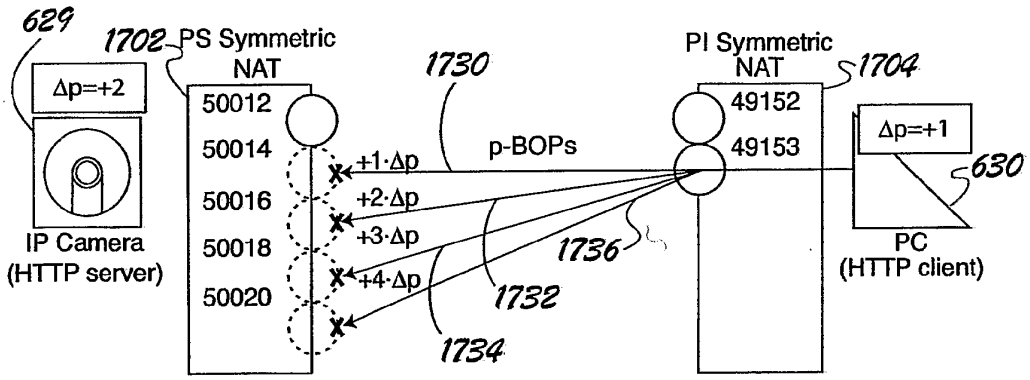


FIG. 17B

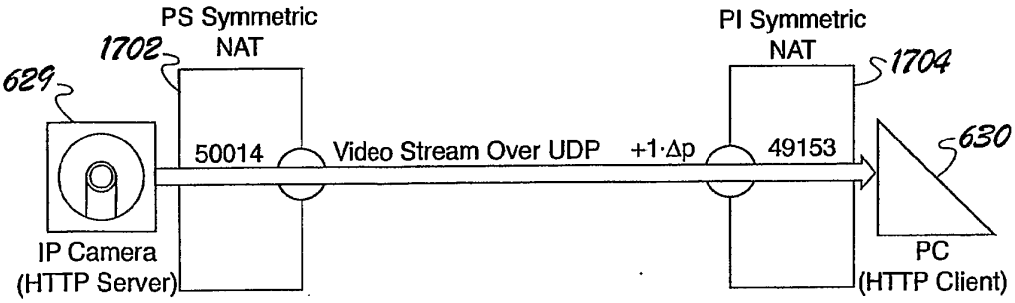


FIG. 17C

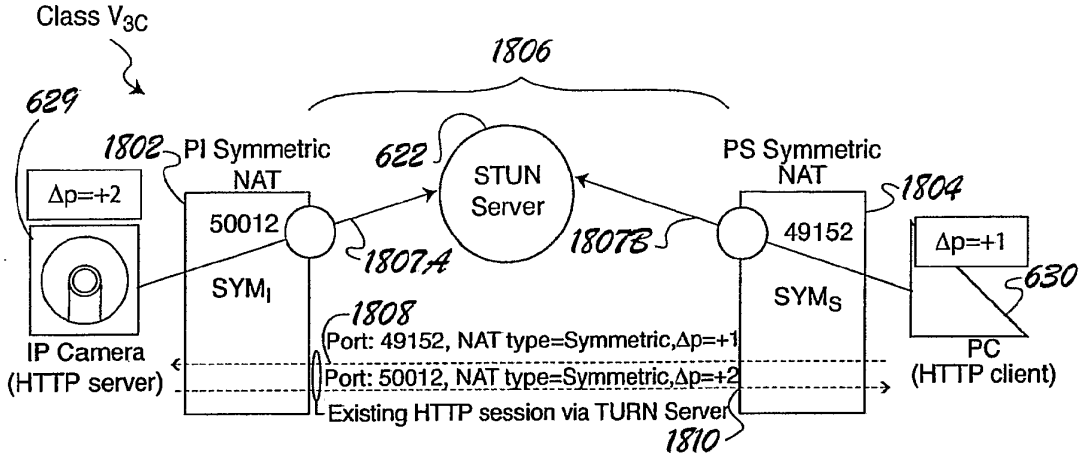


FIG. 18A

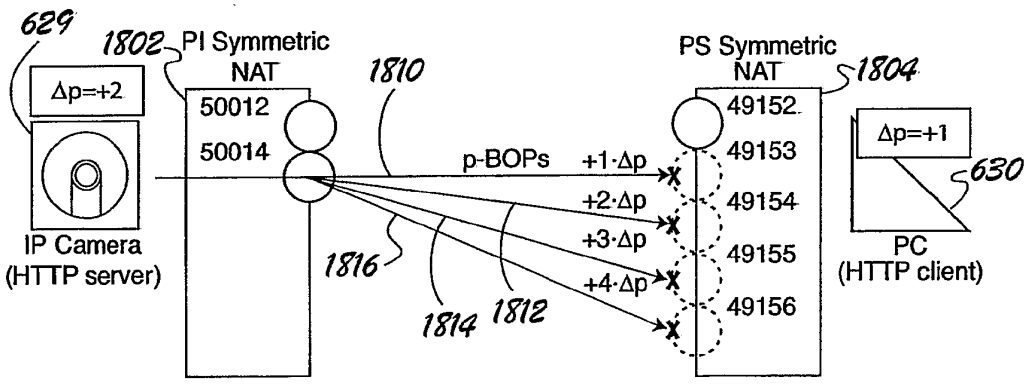


FIG. 18B

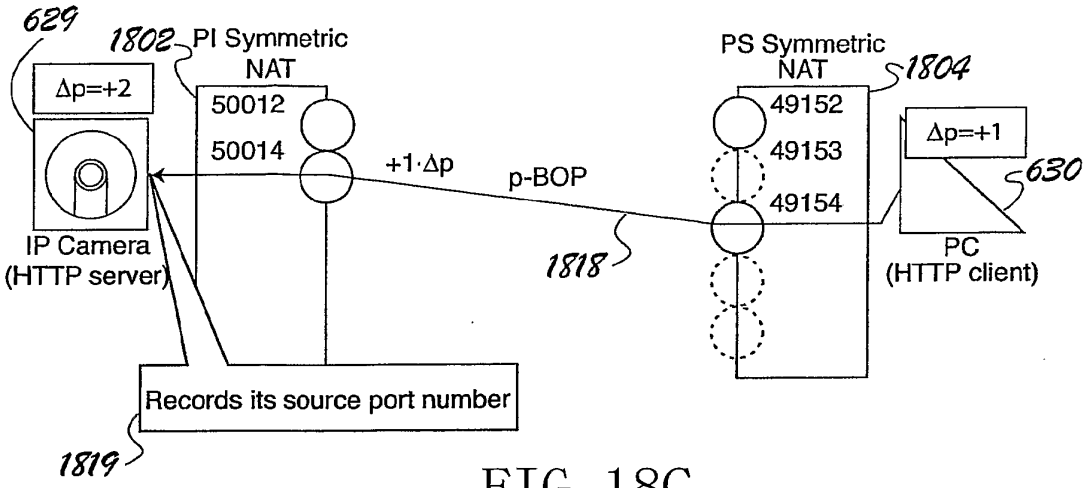


FIG. 18C

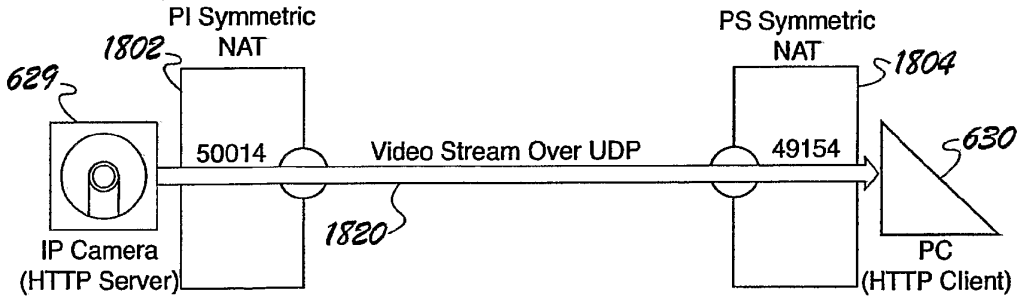


FIG. 18D

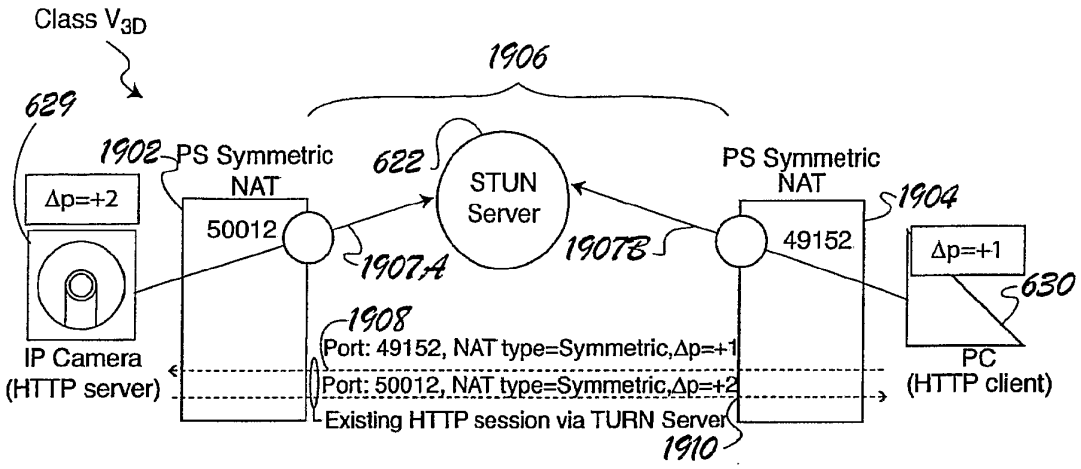


FIG. 19A

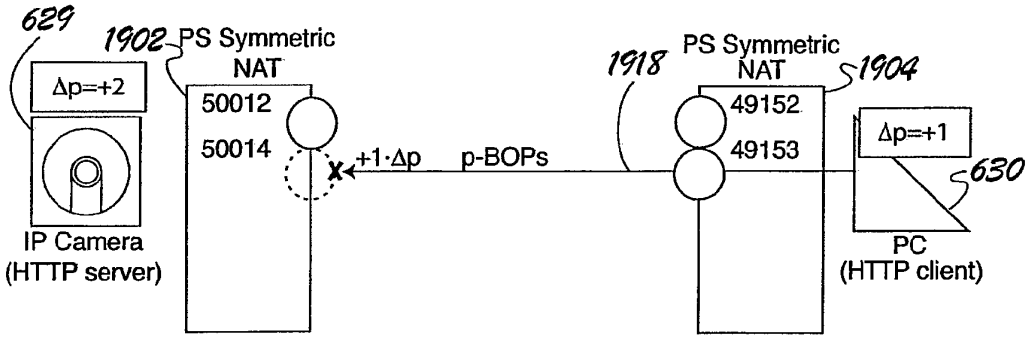


FIG. 19B

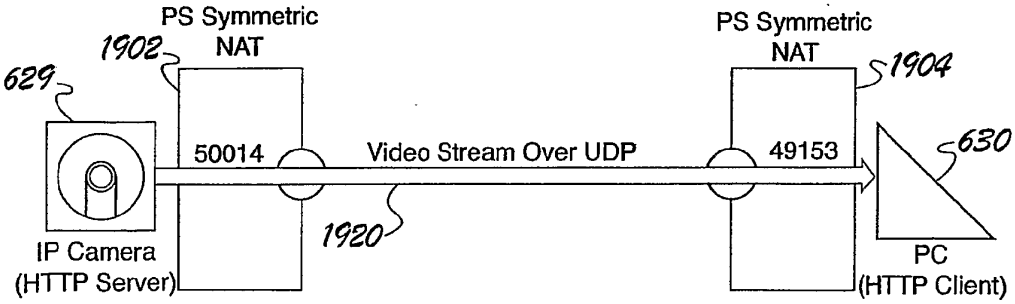


FIG. 19C

Class			Endpoint Server				Browser Client
			BOP	SR	Note	BOP	Note
I			-	-		-	
II			-	-		X	
III			-	X		X	Send a BOP repeatedly until it receives a packet.
IV						X	
V	V_1		-	-		X	Sends N p-BOPs to predetected ports with Dp, repeatedly until it receives a packet. (+n·Δp; n=1..N)
	V_2		X	X	May send N p-BOPs to subsequent ports. (+n·Δp; n=1..N)	X	Sends a p-BOP repeatedly until it receives a packet
	V_3	V_{3A}	X	X	May send N BOPs to predetected ports with Δp.. (+n·Δp; n=1..N)	X	Sends N p-BOPs to predetected ports with Dp, repeatedly until it receives a packet. (+n·Δp; n=1..N)
		V_{3B}	-	-		X	
		V_{3C}	X	X	May send N p-BOPs to subsequent ports. (+n·Δp; n=1..N)	X	Sends a p-BOP repeatedly until it receives a packet.
		V_{3D}	-	-		X	

SR: Source port recording

FIG. 20

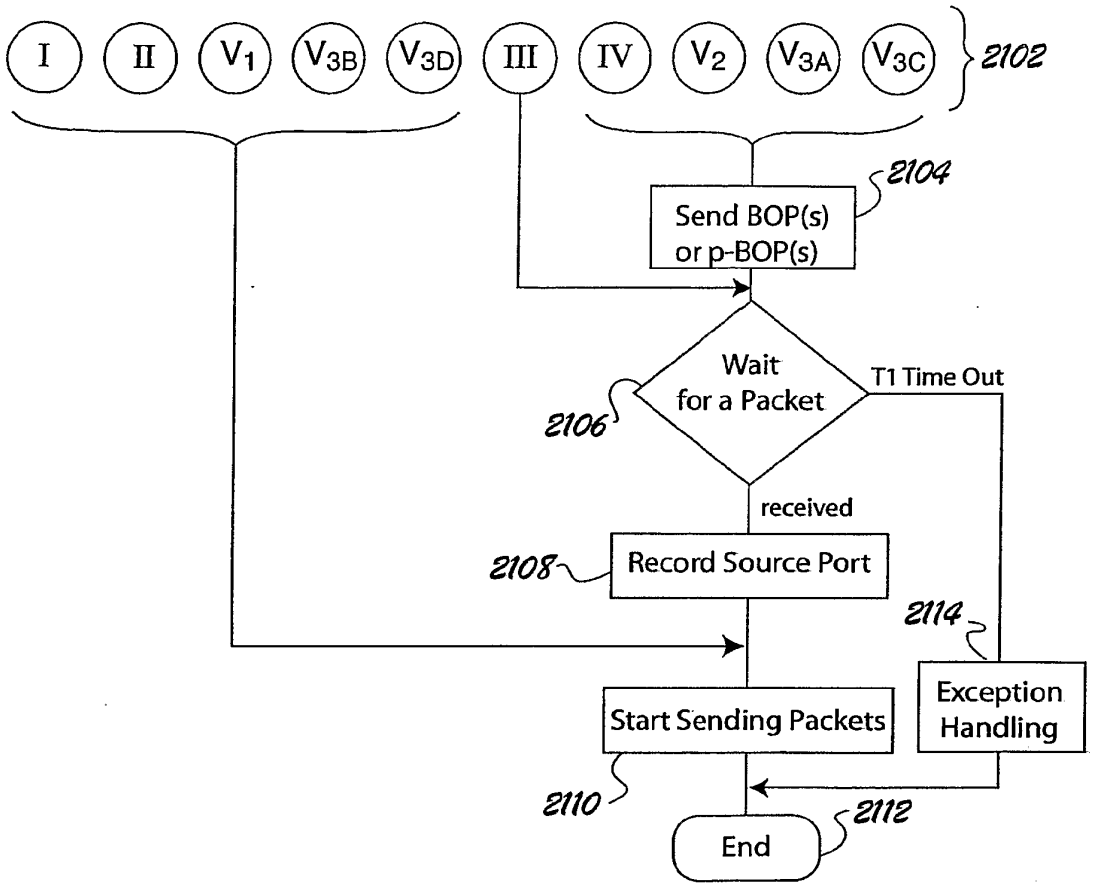

I
II
V1
V3B
V3D
III
IV
V2
V3A
V3C
2102
2104
Send BOP(s) or p-BOP(s)
Wait for a Packet
2106
T1 Time Out
received
2108
Record Source Port
2114
Exception Handling
Start Sending Packets
2110
2112
End

FIG. 21

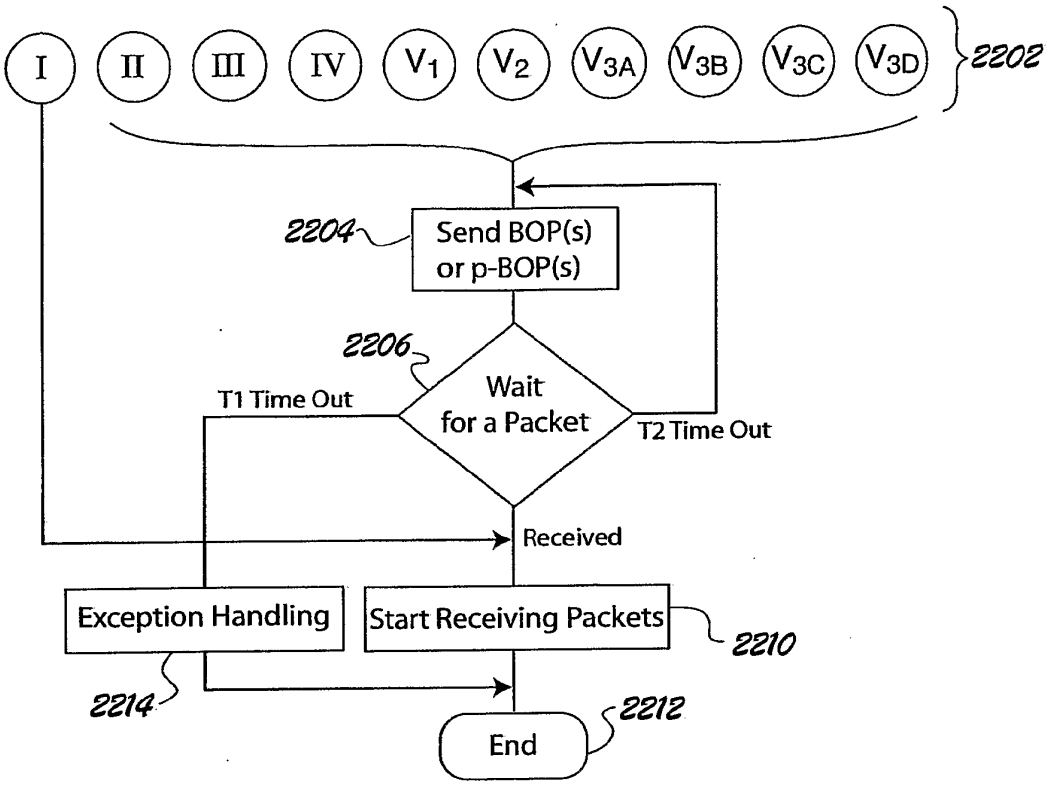

I
II
III
IV
V1
V2
V3A
V3B
V3C
V3D
2202
2204
Send BOP(s) or p-BOP(s)
2206
Wait for a Packet
T1 Time Out
T2 Time Out
Received
Exception Handling
Start Receiving Packets
2210
2214
2212
End

FIG. 22

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
27 January 2005 (27.01.2005)

PCT

(10) International Publication Number
WO 2005/009019 A2

(51) International Patent Classification[7]: H04M 7/00, 3/38, 15/00, H04L 29/06, 9/00

(21) International Application Number: PCT/IB2004/002282

(22) International Filing Date: 14 July 2004 (14.07.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/487,242 16 July 2003 (16.07.2003) US

(71) Applicant *(for all designated States except US)*: **SKYPER LTD.** [GB/GB]; 28-30 The Parade, St. Helier, Jersey FE4 8XY, Channel Islands (GB).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **HEINLA, Ahti** [EE/EE]; Juhkentali 8-5, EE10132 Tallinn (EE). **KASESALU, Priit** [EE/EE]; Mahtra 25-57, EE13811 Tallinn (EE).

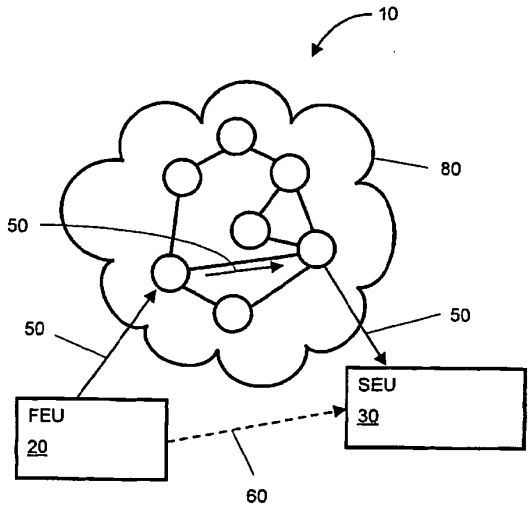
(74) Agent: **PLOUGMANN & VINGTOFT A/S**; Sundkrogsgade 9, Post Office Box 831, DK-2100 Copenhagen Ø (DK).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

[Continued on next page]

(54) Title: PEER-TO-PEER TELEPHONE SYSTEM



(57) Abstract: There is provided a peer-to-peer telephone system (10) comprising a plurality of end-users (20, 30) and a communication structure (80) through which one or more end-users (20, 30) are couplable for communication purposes. The system (10) is distinguished in that: (a) the communication structure (80) is substantially de-centralized with regard to communication route switching therein for connecting said one or more end-users (20, 30); (b) said one or more end-users (20, 30) are operable to establish their own communication routes through the structure (80) based on exchange of one or more authorisation certificates, namely User Identity Certificates (UIC), to acquire access to the structure (80); and (c) said structure (80) includes an administration arrangement (100) for issuing said one or more certificates to said one or more end-users (20, 30).

WO 2005/009019 A2

Published:
— *without international search report and to be republished upon receipt of that report*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

PEER-TO-PEER TELEPHONE SYSTEM

Field of the invention

The present invention relates to telecommunications systems, for example to telephone systems as well as to decentralized telecommunications systems operating according to a peer-to-peer principle. Moreover, the invention also relates to methods of operating such telephone systems and telecommunications systems.

Background to the invention

Contemporary telecommunications systems presently deployed, for example "public switched telephony network" (PSTN), mobile telephone and "Voice over Internet protocol" (VoIP), are substantially centralized in nature. They often employ central exchanges linked to users through trunk lines, local metro-rings and similar distribution structures. More recently, software-operated end-user devices have become available for connecting to such contemporary telephone systems, for example desk telephones, mobile telephones and VoIP devices. However, for performing almost any function offered by the telephony service provider, end-user devices are obliged to communicate with a central telephone exchange and/or branch exchange which executes one or more desired functions for them. In most cases, two end-user telephones of such a contemporary telephone system are not able to communicate directly to one another without a central exchange of the system linking the two end-user telephones together. For example, two people using their mobile telephones to converse together is facilitated by their two telephones communicating by radio via one or more mobile base stations, such base station communication being required even when the two people and their associated mobile telephones are in the same building. In another example, two people using "Voice over IP" software to converse together over the public Internet is facilitated by their software applications communicating via a central server, such server being required even though a connection can be established directly between the two people.

The use of centralized telephone systems places considerable demands on central switching exchanges. Such central exchanges are increasingly dependent on wide bandwidth optical connections employing dense wavelength division multiplexing (DWDM) with up to 120 optical channels distributed into wavelength bands of 50 GHz frequency spacing at an optical carrier frequency in the order of 300 THz. Such centralized exchanges are extremely costly and complex items of equipment which are susceptible to occasional malfunction, such malfunction potentially resulting in loss of communication traffic therethrough with potential corresponding compensation payments due to

customers. Moreover, the cost of operating such central exchanges scales proportionally with the number of end users.

The inventors of the present invention have appreciated that such a centralized approach is sub-optimal in many situations and that advantages arise from the deployment of other alternative telephone system architectures.

In order to address issues arising from adoption of such alternative architectures, the inventors have devised the present invention.

Summary of the invention

A first object of the invention is to provide a substantially decentralized telephone network system.

A second object of the invention is to provide such a decentralized telephone system in which subscriber authentication, network access control and accounting are performable in a more robust and reliable manner.

A third object of the invention is to provide a decentralised telephone system operable to reduce concentration of communication traffic therein by transferring responsible for establishing connections to end-users of the system.

According to a first aspect of the present invention, there is provided a peer-to-peer telephone system comprising a plurality of end-users and a communication structure through which one or more end-users are couplable for communication purposes, characterised in that:

(a) the communication structure is substantially de-centralized with regard to communication route switching therein for connecting said one or more end-users;

(b) said one or more end-users are operable to establish their own communication routes through the structure based on verification of one or more authorisation certificates to acquire access to the structure; and

(c) said structure includes administrating means for issuing said one or more certificates to said one or more end-users.

The invention is of advantage in that it is capable of addressing at least one of the aforementioned objects of the invention.

The invention is capable of addressing issues associated with less-centralized architectures, namely issues of control and user-authorisation, for example for billing/invoicing purposes to which the present invention is directed.

Preferably, in the system, the administrating means is operable to administer at least one of end-user sign-up and end-user payment for access to the communication structure.

More preferably, for example to try to circumvent unauthorised free and/or fraudulent use of the system, the administrating means is operable to generate one or more private-public key pairs, the administrating means being operable to maintain said one or more private keys secret and to distribute said one or more corresponding public keys within the system for certificate authentication purposes. Yet more preferably in the system, the administrating means is operable to generate private-public key pairs using a Rivest-Shamir-Adelman (RSA) method.

Preferably, for purposes of enhancing network robustness in the system, the structure includes a peer-to-peer communication network through which the end-users are mutually connectable. More preferably, the peer-to-peer network is implemented as a combination of interfacing nodes and storage nodes, said storage nodes being configured in one or more slots for database access purposes. Beneficially, the structure is implemented by way of a proprietary Global Index peer-to-peer network technology.

Preferably, in the system, the administrating means is arranged to perform one or more of:

(a) providing an end-user accounts database;
(b) providing a synchronizing time reference for the communication structure;
(c) providing globally-configurable settings for the system;
(d) providing peer discovery during bootstrap of the structure;
(e) handling new end-user registration; and
(f) monitoring operation of the structure for controlling desired modes of operation thereof.

Preferably, in the system, a plurality of end-users are operable to mutually exchange their authorisation certificates prior to commencing communication therebetween where at least one of said certificates is identified to be authentic.

Preferably, for example to assist adoption of the system in practice, the structure is arranged to support end-user free-trial use of the system, such free-trial use being subject to administration from the administrating means by repeated issuing of authorisations.

Ex.1002 / Page 266 of 1008
Cisco Systems, Inc.

Preferably, the administrating means is operable to invoice one or more end-users on a flat-fee rate substantially irrespective of use of the system exercised by said one or more end-users.

Preferably, in order to promote usage of the system in existing deployed equipment, the system is arranged to be configurable to operate concurrently with POTS and/or PSTN. Abbreviations POTS and PSTN correspond to "Plain Old Telephone System" and "Public Switch Telephone Network" respectively.

Preferably, the administrating means is implemented by way of one or more central computer servers. Such an implementation is especially beneficial when the system is configured in conjunction with the public Internet. Alternatively, the administrating means is otherwise susceptible to being implemented in a substantially de-centralized manner.

Preferably, the administrating means is operable to apply an heuristics fraud detection analysis of end-user registration and system usage data for detecting fraudulent access to the system by end-users.

According to a second aspect of the present invention, there is provided a method of operating a peer-to-peer telephone system comprising a plurality of end-users and a communication structure through which one or more end-users are couplable for communication purposes, characterised in that the method includes steps of:

(a) arranging for the communication structure to be substantially de-centralized with regard to communication route switching therein for connecting said one or more end-users;

(b) arranging for said one or more end-users to be operable to establish their own communication routes through the structure based on verification of one or more authorisation certificates to acquire access to the structure; and

(c) arranging for said structure to include administrating means for issuing said one or more certificates to said one or more end-users.

The method is of advantage in that its application to the system is capable of addressing at least one of the objects of the invention.

Preferably, in the method, the administrating means is operable to administer at least one of end-user sign-up and end-user payment for access to the communication structure.

Preferably, in the method, the administrating means is operable to generate one or more private-public key pairs, the administrating means being operable to maintain said one or more private keys secret and to distribute said one or more corresponding public keys within the system for certificate authentication purposes.

Preferably, in the method, the administrating means is operable to generate private-public key pairs using a Rivest-Shamir-Adelman (RSA) method. However, other approaches to private-public key generation are also susceptible to being used in the method.

Preferably, in the method, the structure includes a peer-to-peer communication network through which the end-users are mutually connectable. More preferably, the peer-to-peer network is implemented as a combination of interfacing nodes and storage nodes, said storage nodes being configured in one or more slots for database access purposes.

Preferably, in the method, the administrating means is arranged to perform one or more of:

(a) providing an end-user accounts database;
(b) providing a synchronizing time reference for the communication structure;
(c) providing globally-configurable settings for the system;
(d) providing peer discovery during bootstrap of the structure;
(e) handling new end-user registration; and
(f) monitoring operation of the structure for controlling desired modes of operation thereof.

Preferably, in the method, a plurality of end-users are operable to mutually exchange their authorisation certificates prior to commencing communication therebetween where at least one of said certificates is identified to be authentic.

Preferably, to encourage adoption of the system, the method is implemented such that the structure is arranged to support end-user free-trial use of the system, such free-trial use being subject to administration from the administrating means by repeated issuing of authorisations.

Preferably, in the method, the administrating means is operable to invoice one or more end-users on a flat-fee rate substantially irrespective of use of the system exercised by said one or more end-users.

Preferably, in order to encourage use of the system where existing telephone infrastructure exists, the method is implemented such that the system is arranged to be configurable to operate concurrently with POTS and/or PSTN. Abbreviations POTS and PSTN correspond to "Plain Old Telephone System" and "Public Switched Telephone Network" respectively.

Preferably, in the method, the administrating means is implemented by way of one or more central computer servers.

Ex.1002 / Page 268 of 1008
Cisco Systems, Inc.

Preferably, in order to avoid fraudulent use of the system when implementing the method, the administrating means is operable to apply an heuristics fraud detection analysis of end-user registration and system usage data for detecting fraudulent access to the system by end-users.

According to a third aspect of the present invention, there is provided software operable to implement at least part of the telephone system according to the first aspect of the invention.

According to a fourth aspect of the invention, there is provided software operable to execute at least part of the method according to the second aspect of the invention.

It will be appreciated that features of the invention are susceptible to being combined in any combination without departing from the scope of the invention.

Diagrams of embodiments of the invention

Embodiments of the invention will now be described, by way of example only, with reference to the following diagrams wherein:

Figure 1 is a schematic diagram of a telephone system according to the present invention; and

Figure 2 is a schematic representation of a per-to-peer structure of the system of Figure 1.

Description of embodiments of the invention

A telephone system according to the present invention is substantially a decentralised structure comprising a spatially distributed array of end-users connected by way of a peer-to-peer communication network. The structure is substantially devoid of any form of centralized exchange except for one or more administration nodes for performing some specific network administration functions such as subscriber sign-up and payment for communication network usage. In the decentralised structure, most routine functions, for example placing a telephone call, are handled entirely by end-user devices operable to communicate substantially directly to each other or via some form of local exchange such as an optical metro ring or distributed relay nodes on the public Internet.

In a system according to the present invention, the system indicated generally by 10 in Figure 1, a first end-user (FEU) 20 of the system 10 desiring to send a message to a second end-user (SEU) 30 thereof adopts a method of communication as follows:

(a) the first end-user 20 locates the second end-user 30; such location is executed by way of peer-to-peer technologies, for example using a "Global Index" (GI) proprietary peer-to-peer technology which will be described later and/or contemporary "Distributed Hash Table" technology, arranged to provide node look-up functionality;

(b) the first end-user 20 receives information regarding the address of the second end-user 30 and also details of one or more communication path-ways 50, 60 which may be used for making a connection from the first end-user 20 to the second end-user 30; and

(c) the first end-user 10 then follows a protocol to establish the one or more communication pathways 50, 60 to the second end-user 30.

In the GI peer-to-peer technology, there is provided a network of participating nodes interlinked through a distributed communication network. The participating nodes are allocated to be either interfacing nodes or storage nodes. Preferably, the number of storage nodes is arranged to be considerably less than the number of interfacing nodes, for example 100 times more interfacing nodes than storage nodes. Moreover, the storage nodes are responsible for storing data records whereas the interfacing nodes are responsible for processing queries and sending requests to the storage nodes for sending data records therefrom in response to the queries. Moreover, the interfacing nodes are also responsible for receiving data records to be stored and determining one or more appropriate groups of storage nodes to receive the data records for storage therein. The storage nodes are arranged in groups known as slots wherein association of a given storage node with a particular slot is dependent upon address data held in each of the storage nodes. The GI technology is described in a patent application approximately contemporary with the present patent application, the contents of the GI technology patent application herewith being incorporated by reference for purposes of describing the telephone system of the present invention.

In the system 10, there is a considerable requirement for subscriber authentication, access control and accounting. Using major system functions of the system 10 is only possible if one or more end-users thereof have paid or otherwise have authorized access to such functions. In a contemporary conventional telephone system, end-user access to one or more major system functions is checked by a central office thereof in a manner of centralised control. In contradistinction, in the system 10, access is checked by end-user devices using public-key cryptography. In such cryptography, each end-user, also referred to as subscriber, has associated therewith a cryptography key pair which is created by the end-user's device. Upon subscriber sign-up or payment, a central office of

Ex.1002 / Page 270 of 1008
Cisco Systems, Inc.

the system 10 issues to the subscriber a digital certificate, such certificate also being referred to as a User Identity Certificate (UIC), whereby the central office certifies that the owner of this key pair is an authorised subscriber.

In step (c) of the aforementioned method, when the first end-user 20 communicates with other subscriber devices, namely the second end-user 30, the first end-user 20 provides the certificate, namely the aforementioned UIC, as a proof of subscription. In the system 10, end-user devices are arranged to refuse to mutually communicate where there exists an absence of such proof of subscription. Moreover, using public-key cryptography, end-user devices of the system 10 are arranged to be operable to verify each other's certificates (UIC's) without needing to communicate with the aforesaid central office of the system 10 responsible for issuing certificates (UIC's). The system 10 thus functions in a de-centralized manner on account of the end-users 20, 30 not needing to communicate with the central office of the system 10 when establishing a communication route between the end-users 20, 30.

When a subscribing device of the system, for example the first end-user 20, has located a recipient, for example the second end-user 30, they will subsequent need to mutually communicate. Such communication is preferably by a direct route, for example along the path-way 60 illustrated in Figure 1. However, for example for reasons of spatial separation and/or terrain, such a direct route is not always technically feasible; for example, if communication is desired from the first end-user 20 to the second end-user 30 via the public Internet, such communication is not feasible when the second end-user 30 has a private address that is not accessible from outside a local network of the system 10. In a situation where direct communication is not feasible, the system 10 is operable to route communication via one or more peer nodes in its peer-to-peer structure 80 to assist the first and second end-users 20, 30 to mutually communicate. These one or more peer nodes are preferably implemented by subscriber devices that need not necessarily belong to the first and second end-users 20, 30 involved in making a telephone call therebetween. Thus, for example, in such a scenario where direct connection is not feasible, a subscriber communicates to another device that is directly accessible, and this other device communicates directly with the final recipient.

Architectural aspects of the system 10 will now be described in further detail. The peer-to-peer structure 80 is subdivided into two sections as illustrated in Figure 2, namely central servers (CS) 100 on the one hand and a peer-to-peer network (P2PN) 110 on the other hand.

The central servers 100 are preferably operated by the proprietor of the structure 80. These servers 100 are arranged to execute one or more of the following tasks:

(i) providing an end-user accounts database for recording end-users' accounting details;

(ii) providing a synchronizing time reference for the structure 80;

(iii) providing globally-configurable settings for the system 10;

(iv) providing peer discovery during bootstrap of the structure 80 and handling new end-user registration;

(v) electronically signing critical information pertinent to the system 10, for example signing end-user identities as described in the foregoing, for example the aforementioned User Identity Certificates (UIC's), using digital signatures using secret cryptographic keys known only to the proprietor of the system 10;

(vi) providing add-on services from one or more of the proprietor's infrastructure, rented infrastructure and outsourced infrastructure; and

(vii) monitoring operation of the central servers 100 and the network 110 for ensuring desired modes of operation thereof.

The add-on services referred in (vi) above relate to one or more of:

(1) "Public Switched Telephone Network" (PSTN) and/or "plain old telephone system" (POTS) connectivity, to "Voice over Internet Protocol " (VoIP) traffic termination and reverse thereof, for example from POTS to the proprietor's system 10;

(2) handling "Instant Message" (IM) to "Short Message Service" (SMS) connectivity; and

(3) handling end-user conferencing, voicemail and similar activities couplable to back-end servers included within the central servers 100.

The peer-to-peer network 110 preferably comprises end-user computing devices arranged to execute thereon software provided by the proprietor of the system 10. The network 110 is also preferably based on a version of the aforementioned GI protocol customized by the proprietor of the system 10. The network 110 is operable to perform functions preferably including one or more of:

(a) administering end-user buddy lists;

(b) handling end-user preferences, for example buddy online/offline notification;

(c) providing end-user identification by way of one or more of the following: node identification (ID), username, end-user profile data;

(d) maintaining basic statistics, for example a number of end-users currently actively communicating within the system 10; and

(e) maintaining firewall and/or "Network Address Translation" (NAT) traversal via random peer nodes within the network 110 functioning as ad hoc proxies supporting communication therethrough.

In (c) above pertaining to the peer-to-peer network 110, the username is effectively useable as a "telephone number" within the system 10. Moreover, the end-user profile data relates to data records if provided by the end-users, such records including one or more of: real name (e.g. Roger Smith, Annie Hansen), spatial location (e.g. Washington USA; Copenhagen, Denmark), date of birth and e-mail address.

The inventors have appreciated that operation of the system 10 is dependent on security provided by, for example, the use of public key encryption therein. In devising the system 10, the inventors have further anticipated that a peer-to-peer IM/VoIP system is inherently less secure than POTS or any comparable telephone system reliant on one or more central servers; as in the foregoing, abbreviations IM, VoIP and POTS refer to "Instant Messaging", "Voice over Internet Protocol" and "Plain Old Telephone System" respectively. In the system 10, the inventors have arranged for the use of contemporary Rivest-Shamir-Adelman (RSA) public key encryption and associated digital signatures to cater for most basic security requirements within the system 10. However, it will be appreciated that other types of public-private key encryption are susceptible to being employed in the system 10.

Upon an end-user, for example one of the end-users 20, 30, seeking registration at the central servers 100, the end-user proceeds to generate a RSA encryption key pair, namely complementary private and public keys wherein said private key is not derivable from said public key and vice versa. The end-user's public key appears in the User Identity Certificate (UIC) provided to the end-user, whereas the private key is stored locally at the end-users premises.

During a call set-up from the first end-user 20 to the second end-user 30, similarly during an Instant Message (IM) sending, prior to commencing communication, both end-users 20, 30 present their User Identity Certificate (UIC), or Temporary Identification Number (TIN) where the system 10 is set up to accept these, as appropriate to the other; if they have a user name, they present their UIC. If a UIC is presented from a primary one of the end-users 20, 30 to a secondary one thereof, the secondary end-user verifies the signature provided by the primary end-user, such verification not requiring any contact with the central servers 100. Moreover, the secondary end-user verifies that the primary end-user has the corresponding secret key by issuing a challenge data packet for the primary end-user's public key and checks that the primary end-user is capable of decrypting it. After completion of such activities, the primary end-user is in a position to safely believe that the primary end-user legitimately has the username it claims to hold.

When calls are made within the system 10, additional checking is required because calls require payment unless permission for a limited trial period has been granted. In the system 10, it is difficult to monitor in a secure manner duration of calls or number of calls

made; in this respect, the inventors have appreciated that it is advantageous to employ a time-based subscription as a basis of billing/invoicing within the system 10. Thus, in order to implement such time-based subscription, User Identity Certificate (UIC) privileges are checked and non-trial calls are not communicated through the peer-to-peer network 110 if neither of the end-users 20, 30 in the above example has a User Identity Certificate (UIC) with non-expired subscription privileges. In other words, a call will propagate through the peer-to-peer network 110 if one or more of the end-users 20, 30 has a valid subscription or trial.

To keep their subscriptions from expiring, end-users of the system 10 are obliged to renew their User Identity Certificate (UIC) periodically for instance by paying a fee for a coming month/year; it will be appreciated that other payment periods are possible or that UICs may be extended based on other criteria than payment. Upon receipt of renewal payments, the central servers 100 are operable to issue new UIC's in response in the earlier end-users' names, the new UIC's having associated new subscription privilege expiry details. When credit/debit card billing/invoicing has been authorised by one or more of the end-users of the system 10, billing/invoicing is susceptible to being performed automatically by the central servers 100 without the need for associated end-user intervention.

Thus, in the system 10, a preferred method of payment for calls made is by flat-fee monthly or yearly subscription entitling the user to an unlimited number of calls in the system 10. Such a billing/invoicing arrangement is acceptable in the system 10 from a business perspective because calls made do not incur operating expenses to the proprietor of the system 10 as central exchange resources are substantially not utilized when making such calls. In contradistinction, calls to or from POTS/PSTN incur real per-minute operating costs and are therefore appropriately charged separately and distinctly from calls made according to the invention in the system 10.

When the peer-to-peer structure 80 is implemented in the manner of the aforementioned GI protocol, the end-users 20, 30 in Figure 1 together with other end-users not shown, the central servers 100 and the peer-to-peer network 110 are effectively participating nodes. In such a configuration, each end-user advertises its presence to GI storage nodes by periodically sending thereto its information about its identity or Temporary Identification Number (TIN) when the system 10 is configured to accept such TIN's. When one or more end-users make GI queries, for example akin to telephone directory enquiries, the storage nodes are responsive to send such stored User Identity Certificates (UIC) or Temporary Identification Numbers (TIN) as data packets in response to such queries.

In the case of UIC's, corresponding data packets despatched by the GI storage nodes are received at end-users which sign off the data packets with their end-user private keys;

Ex.1002 / Page 274 of 1008
Cisco Systems, Inc.

one or more querying end-users are thereby capable of verifying authenticity of the data packets received thereat, for example in response to making an enquiry, using a corresponding public key. Such an arrangement is advantageous because it is substantially capable of guaranteeing that no-one is able to fake User Identity Certificate (UIC) end-user directory entries. The rationale of such an approach is that a participating node who owns a User Identity Certificate (UIC) is operable, for example when advertising its presence, to send its private-key-signed data packets corresponding to its UIC to one or more storage nodes and another participating node if required. The signed UIC received from one or more of the storage nodes and stored therein for subsequent release is verifiable at an enquiring participating node by using a corresponding public key. Such an arrangement is capable of circumventing tampering with UIC and even faked UIC's.

The system 10 is further provided with a free-trial facility, such a facility being of commercial advantage for purposes of attracting new end-users to the system 10. Preferably, such a free-trial facility pertains to X_1 free days or, alternatively or additionally, X_2 free calls. For such free-trial days or calls, the central servers 100 are required to provide explicit permission for each free call made. Preferably, all permissions given or requested are recorded in a database of the system 10, for example for heuristic fraud detection purposes as described later. If the end-user has already used up free days and/or free calls allocated thereto, permission is not granted from the central servers 100 and the end-user is subsequently requested to pay if it still desires to make calls within the system 10.

The system 10 is capable of being operated concurrently within, or in combination with, a conventional telephone system, for example a conventional telephone system capable of implementing the Internet.

The aforementioned free-trial permission scheme is intended by the inventors only to pertain to the system 10. For conventional paid subscription calls undertaken in connection with the system 10, a normal conventional subscription regime applies and per-call permissions are neither requested nor recorded. For PSTN calls, a free-trial scheme does not pertain although it is potentially capable of being provided in connection with the system 10.

For each free-call permission request received in the system 10, the central servers 100 are operable to record at least one of the following parameters with regard to a call:

(a) calling end-user's identity in the form of a username or Temporary Identification Number (TIN);

(b) calling end-user's computer identification (ID);

(c) calling end-user's Internet Protocol (IP) address;

(d) called end-user's identity in the form of a username or TIN;
(e) called end-user's computer ID;
(f) called end-user's IP address;
(g) time and date of the call;
(h) whether or not permission was granted for the call.

Thus, in the system 10, a "trial user" explicit status is not accommodated; preferably, there is merely a need for an end-user to make some free calls from a defined starting date D. Any end-user is entitled to make free calls if its first free calls were less than X_1 days ago (or the end-user has not yet exercised a free-call option within the system 10). Alternatively, the system 10 may be set up in such a way as to allow a free-trial period to consist of X number of free calls as opposed to X days.

Hacked version of system 10 software enables fraudulent end-users to omit free-trial permission asking and permission checking provisions employed within the system 10. However, on account of the system 10 implementing both calling end-user and called end-user permission checking, such hacking only enables fraudulent end-users to call other fraudulent end-users free of charge; in other words, pirated fraudulent end-user software is only capable of providing very limited benefit when employed on the system 10. In many cases, such limited fraudulent use of the system 10 can be accommodated without significant financial loss to the proprietor of the system 10.

The inventors have appreciated that a major opportunity of fraud exists in the system 10 when a hacker attempts to fake a username or computer ID and repetitively starts new free trials. Such a major opportunity of fraud requires the hacker to omit from system 10 compatible software all local shareware-type checks. In order to counteract such fraud, the central servers 100 are programmed to perform heuristic fraud detection to identify repetitive fraud patterns. For example, the central servers 100 are operable to detect a fraudulent end-user seeking free-call provisions Z times and then subsequently seeking with the same IP address and new computer ID for new free-call permission to call the same people. Since explicit permission for free calls in the system 10 is required from the central servers 100, there is considerable information available within the system 10 for input to such heuristics fraud detection software executing within the system 10. However, the inventors are aware that such heuristics fraud detection is unlikely to detect all cases of hacking occurring within the system 10.

It will be appreciated that embodiments of the invention described above are susceptible to being modified without departing from the scope of the invention.

In the foregoing, the system 10 is described as being able to support the use of Temporary Identification Numbers (TINs). However, the system 10 is capable of being

modified so that TINs are not utilized therein, such that user names and associated User Identity Certificates (UIC's) with associated time-limited substantially cost-free privileges are employed for free-trial purposes. If required, the system 10 is even susceptible to being configured so that free-trial usage as described earlier is not provided to end-users; alternatively, other arrangements for free trials can be utilized, for example reimbursement of initial paid subscription fee.

The system 10 is preferably implemented, at least in part, using software executable on computing hardware. Such software can be distributed to users via a communication network such as the Internet and/or via the software stored on a suitable data carrier such as a CD ROM supplied to users.

In the foregoing description of embodiments of the invention relating to the telephone system 10, it will be appreciated that the invention is relevant to telecommunications systems in general and the term "telephone" should therefore be construed accordingly. Specifically, other forms of communication susceptible to being performed with the system include video calls, conference calls and text messaging.

In the foregoing, terms such as "contain", "include", comprise", "have", "has", "is", "are", "incorporate" and "encompass" are intended to be construed as being non-exclusive, namely other items not disclosed are also potentially present.

CLAIMS

1. A peer-to-peer telephone system (10) comprising a plurality of end-users (20, 30) and a communication structure (80) through which one or more end-users (20, 30) are couplable for communication purposes, characterised in that:

(a) the communication structure (80) is substantially de-centralized with regard to communication route switching therein for connecting said one or more end-users (20, 30);

(b) said one or more end-users (20, 30) are operable to establish their own communication routes through the structure (80) based on verification of one or more authorisation certificates to acquire access to the structure (80); and

(c) said structure (80) includes administrating means (100) for issuing said one or more certificates to said one or more end-users (20, 30).

2. A system (10) according to Claim 1, wherein the administrating means (100) is operable to administer at least one of end-user sign-up and end-user payment for access to the communication structure (80).

3. A system (10) according to Claim 1 or 2, wherein the administrating means (100) is operable to generate one or more private-public key pairs, the administrating means (100) being operable to maintain said one or more private keys secret and to distribute said one or more corresponding public keys within the system (10) for certificate authentication purposes.

4. A system (10) according to Claim 3, wherein the administrating means (100) is operable to generate private-public key pairs using a Rivest-Shamir-Adelman (RSA) method.

5. A system (10) according to Claim 1, 2, 3 or 4, wherein the structure (80) includes a peer-to-peer communication network (110) through which the end-users (20, 30) are mutually connectable.

6. A system (10) according to Claim 5, wherein the peer-to-peer network (110) is implemented as a combination of interfacing nodes and storage nodes, said storage nodes being configured in one or more slots for database access purposes.

7. A system (10) according to any one of the previous claims, wherein the administrating means (100) is arranged to perform one or more of:

(a) providing an end-user (20, 30) accounts database;

Ex.1002 / Page 278 of 1008
Cisco Systems, Inc.

(b) providing a synchronizing time reference for the communication structure (80);
(c) providing globally-configurable settings for the system (10);
(d) providing peer discovery during bootstrap of the structure (80);
(e) handling new end-user (20, 30) registration; and
(f) monitoring operation of the structure (80) for controlling desired modes of operation thereof.

8. A system (10) according to any one of the preceding claims, wherein a plurality of end-users are operable to mutually exchange their authorisation certificates prior to commencing communication therebetween where at least one of said certificates is identified to be authentic.

9. A system (10) according to any one of the preceding claims, wherein the structure (80) is arranged to support end-user free-trial use of the system (10), such free-trial use being subject to administration from the administrating means (10) by repeated issuing of authorisations.

10. A system (10) according to any one of the preceding claims, wherein the administrating means (100) is operable to invoice one or more end-users (20, 30) on a flat-fee rate substantially irrespective of use of the system (10) exercised by said one or more end-users (20, 30).

11. A system (10) according to any one of the preceding claims arranged to be configurable to operate concurrently with POTS and/or PSTN.

12. A system (10) according to any one of the preceding claims, wherein the administrating means (100) is implemented by way of one or more central computer servers.

13. A system (10) according to any one of the preceding claims, wherein the administrating means (100) is operable to apply an heuristics fraud detection analysis of end-user registration and system (10) usage data for detecting fraudulent access to the system (10) by end-users (20, 30).

14. A method of operating a telephone system (10) comprising a plurality of end-users (20, 30) and a communication structure (80) through which one or more end-users (20, 30) are couplable for communication purposes, characterised in that the method includes steps of:
(a) arranging for the communication structure (80) to be substantially de-centralized with regard to communication route switching therein for connecting said one or more end-users (20, 30);

(b) arranging for said one or more end-users (20, 30) to be operable to establish their own communication routes through the structure (80) based on exchange of one or more authorisation certificates to acquire access to the structure (80); and

(c) arranging for said structure (80) to include administrating means (100) for issuing said one or more certificates to said one or more end-users (20, 30).

15. A method according to Claim 1, wherein the administrating means (100) is operable to administer at least one of end-user sign-up and end-user payment for access to the communication structure (80).

16. A method according to Claim 14 or 15, wherein the administrating means (100) is operable to generate one or more private-public key pairs, the administrating means (100) being operable to maintain said one or more private keys secret and to distribute said one or more corresponding public keys within the system (10) for certificate authentication purposes.

17. A method according to Claim 16, wherein the administrating means (100) is operable to generate private-public key pairs using a Rivest-Shamir-Adelman (RSA) method.

18. A method according to Claim 14, 15, 16 or 17, wherein the structure (80) includes a peer-to-peer communication network (110) through which the end-users (20, 30) are mutually connectable.

19. A method according to Claim 18, wherein the peer-to-peer network (110) is implemented as a combination of interfacing nodes and storage nodes, said storage nodes being configured in one or more slots for database access purposes.

20. A method according to any one of Claims 14 to 19, wherein the administrating means (100) is arranged to perform one or more of:

(a) providing an end-user (20, 30) accounts database;

(b) providing a synchronizing time reference for the communication structure (80);

(c) providing globally-configurable settings for the system (10);

(d) providing peer discovery during bootstrap of the structure (80);

(e) handling new end-user (20, 30) registration; and

(f) monitoring operation of the structure (80) for controlling desired modes of operation thereof.

21. A method according to any one of Claims 14 to 20, wherein a plurality of end-users are operable to mutually exchange their authorisation certificates prior to

commencing communication therebetween where at least one of said certificates is identified to be authentic.

22. A method according to any one of Claims 14 to 21, wherein the structure (80) is arranged to support end-user free-trial use of the system (10), such free-trial use being subject to administration from the administrating means (10) by repeated issuing of authorisations.

23. A method according to any one of the Claims 14 to 22, wherein the administrating means (100) is operable to invoice one or more end-users (20, 30) on a flat-fee rate substantially irrespective of use of the system (10) exercised by said one or more end-users (20, 30).

24. A method according to any one of Claims 14 to 23 wherein the system (10) is arranged to be configurable to operate concurrently with POTS and/or PSTN.

25. A method according to any one of the preceding Claims 14 to 24, wherein the administrating means (100) is implemented by way of one or more central computer servers.

26. A method according to any one of Claims 14 to 25, wherein the administrating means (100) is operable to apply an heuristics fraud detection analysis of end-user registration and system (10) usage data for detecting fraudulent access to the system (10) by end-users (20, 30).

27. Software for implementing at least a part of the system (10) according to Claim 1.

28. Software executable on computing hardware for implementing one or more steps of the method according to Claim 14.

29. Software according to Claim 27 or 28 communicable to end-users (20, 30) via a communication network and/or stored on a data carrier.

Ex.1002 / Page 281 of 1008
Cisco Systems, Inc.

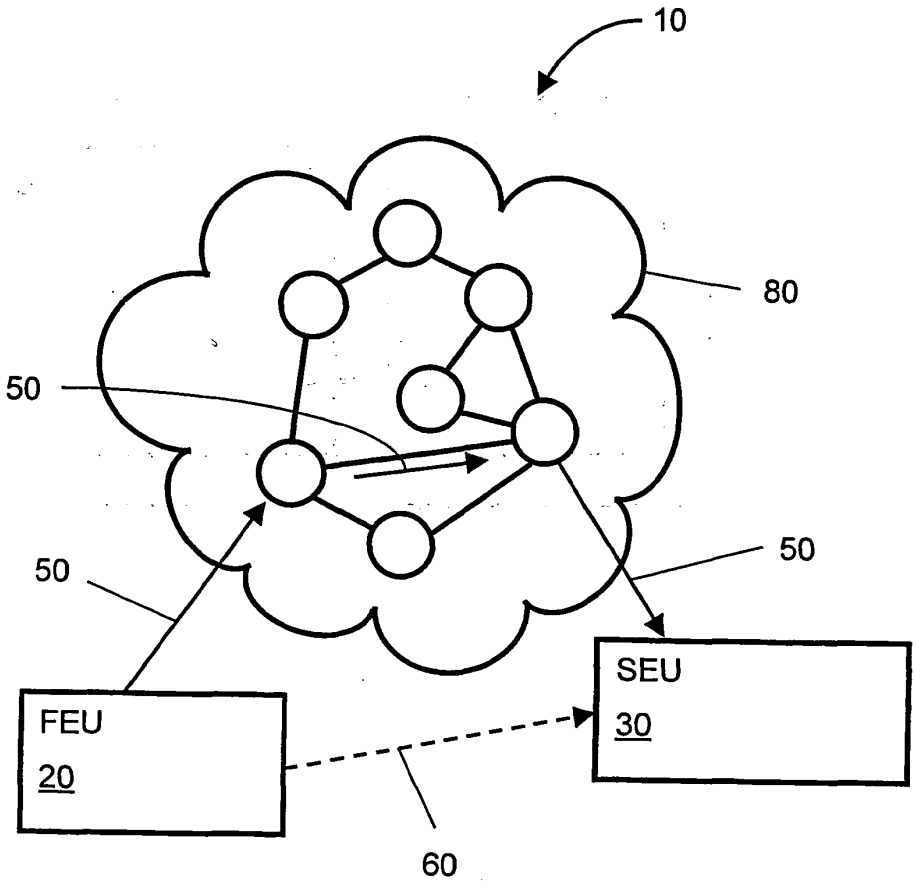


Fig. 1

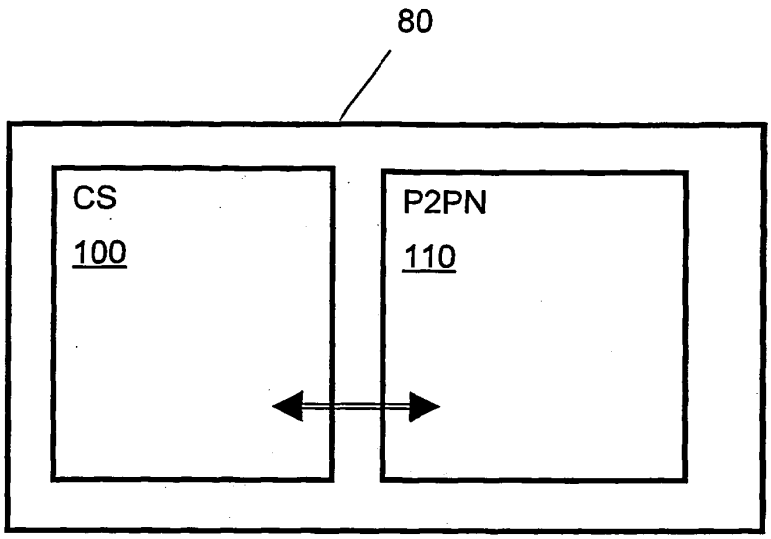


Fig. 2

BNSDOCID: <WO_____2005009019A2_I_>

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
27 January 2005 (27.01.2005)

PCT

(10) International Publication Number
WO 2005/009019 A3

(51) International Patent Classification[7]: H04M 7/00, 3/38, 15/00, H04L 29/06, 9/00

(21) International Application Number: PCT/IB2004/002282

(22) International Filing Date: 14 July 2004 (14.07.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/487,242 16 July 2003 (16.07.2003) US

(71) Applicant *(for all designated States except US)*: **SKYPER LTD.** [GB/GB]; 28-30 The Parade, St. Helier, Jersey FE4 8XY, Channel Islands (GB).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **HEINLA, Ahti** [EE/EE]; Juhkentali 8-5, EE10132 Tallinn (EE). **KASESALU, Priit** [EE/EE]; Mahtra 25-57, EE13811 Tallinn (EE).

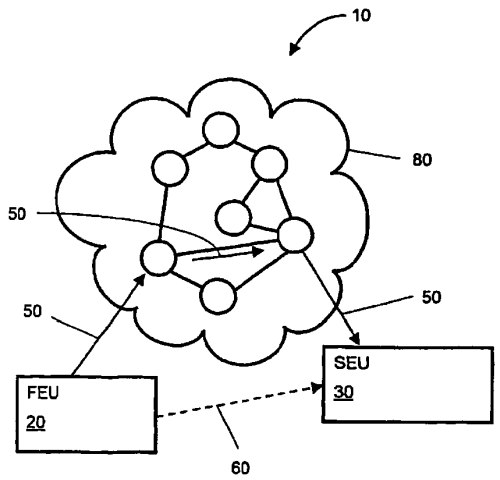
(74) Agent: **PLOUGMANN & VINGTOFT A/S**; Sundkrogsgade 9, Post Office Box 831, DK-2100 Copenhagen Ø (DK).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

[Continued on next page]

(54) Title: PEER-TO-PEER TELEPHONE SYSTEM AND METHOD



(57) Abstract: There is provided a peer-to-peer telephone system (10) comprising a plurality of end-users (20, 30) and a communication structure (80) through which one or more end-users (20, 30) are couplable for communication purposes. The system (10) is distinguished in that: (a) the communication structure (80) is substantially de-centralized with regard to communication route switching therein for connecting said one or more end-users (20, 30); (b) said one or more end-users (20, 30) are operable to establish their own communication routes through the structure (80) based on exchange of one or more authorisation certificates, namely User Identity Certificates (UIC), to acquire access to the structure (80); and (c) said structure (80) includes an administration arrangement (100) for issuing said one or more certificates to said one or more end-users (20, 30).

WO 2005/009019 A3

Published:
— *with international search report*
— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

(88) Date of publication of the international search report:
28 April 2005

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

INTERNATIONAL SEARCH REPORT

International Application No
PCT/IB2004/002282

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04M7/00 H04M3/38 H04M15/00 H04L29/06 H04L9/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 H04M H04L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CHARAS P: "Peer-to-peer mobile network architecture" PEER-TO-PEER COMPUTING, 2001. PROCEEDINGS. FIRST INTERNATIONAL CONFERENCE ON LINKOPING, SWEDEN 27-29 AUG. 2001, LOS ALAMITOS, CA, USA,IEEE COMPUT. SOC, US, 27 August 2001 (2001-08-27), pages 55-61, XP010583975 ISBN: 0-7695-1503-7 paragraph '03.5! paragraphs '04.2! - '04.3!	1-29
A	US 6 061 794 A (DRISCOLL DAN J ET AL) 9 May 2000 (2000-05-09) column 6, line 65 - column 7, line 38 column 9, line 48 - column 10, line 43	1-29

-/--

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
9 March 2005	17/03/2005

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Willems, B

Form PCT/ISA/210 (second sheet) (January 2004)

ISDOCID: <WO_____2005009019A3_I_>

INTERNATIONAL SEARCH REPORT

International Application No
PCT/IB2004/002282

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 03/014955 A (GIGAMEDIA ACCESS CORP) 20 February 2003 (2003-02-20) abstract	
P,X	WO 03/079635 A (IBM UK ;IBM (US)) 25 September 2003 (2003-09-25) page 13, line 27 - line 36; figures 1,3	1-29
P,X	ES 2 192 942 A (VIARGA VAI S L) 16 October 2003 (2003-10-16) the whole document	1-29
A	US 2002/184311 A1 (ABDELAZIZ MOHAMED M ET AL) 5 December 2002 (2002-12-05) The whole document	
P,X	US 2003/163697 A1 (PABLA KULDIP SINGH ET AL) 28 August 2003 (2003-08-28) paragraph '0013!	1,14
A	CHATHAPURAM U S: "Security in Peer-to-Peer Networks" PEER-TO-PEER COMPUTING, 'Online! 8 August 2001 (2001-08-08), XP002251813 Retrieved from the Internet: URL:http://netserver.cerc.wvu.edu/classes/cs491h_summer2_2001/sankaran_securityoverv> 'retrieved on 2003-08-20! the whole page	
A	WO 01/13201 A (SARNOFF CORP) 22 February 2001 (2001-02-22) the whole document	

Form PCT/ISA/210 (continuation of second sheet) (January 2004)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/IB2004/002282

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 6061794 A	09-05-2000	NONE	
WO 03014955 A	20-02-2003	EP 1423796 A1	02-06-2004
		WO 03014955 A1	20-02-2003
		US 2003105812 A1	05-06-2003
WO 03079635 A	25-09-2003	US 2003177186 A1	18-09-2003
		AU 2003207337 A1	29-09-2003
		CA 2477197 A1	25-09-2003
		WO 03079635 A1	25-09-2003
ES 2192942 A	16-10-2003	ES 2192942 A1	16-10-2003
US 2002184311 A1	05-12-2002	US 2002156893 A1	24-10-2002
		EP 1229442 A2	07-08-2002
		EP 1229443 A2	07-08-2002
		WO 02057917 A2	25-07-2002
		US 2002143944 A1	03-10-2002
		US 2002143855 A1	03-10-2002
		US 2002184310 A1	05-12-2002
		US 2002184357 A1	05-12-2002
		US 2003002521 A1	02-01-2003
		US 2002152299 A1	17-10-2002
		US 2002184358 A1	05-12-2002
		US 2002188657 A1	12-12-2002
		US 2002147810 A1	10-10-2002
		US 2002147771 A1	10-10-2002
		US 2003041141 A1	27-02-2003
		EP 1282289 A2	05-02-2003
		US 2003028585 A1	06-02-2003
		US 2003070070 A1	10-04-2003
		US 2003055894 A1	20-03-2003
		US 2003055898 A1	20-03-2003
US 2003163697 A1	28-08-2003	NONE	
WO 0113201 A	22-02-2001	AU 6522200 A	05-03-2001
		AU 6537400 A	13-03-2001
		EP 1203479 A2	08-05-2002
		JP 2003529126 T	30-09-2003
		WO 0111817 A2	15-02-2001
		WO 0113201 A2	22-02-2001

ISDOCID: <WO_____2005009019A3_I_>

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2005-094600
(43)Date of publication of application : 07.04.2005

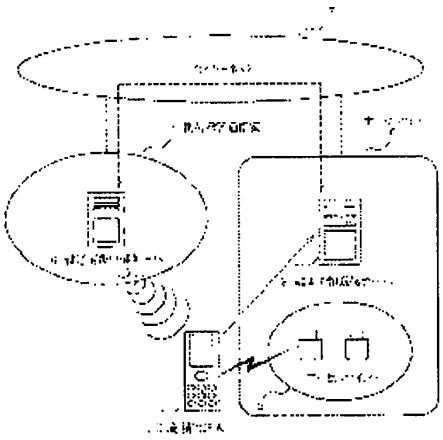
(51)Int.Cl. H04L 12/28
H04Q 7/38

(21)Application number : 2003-327855
(22)Date of filing : 19.09.2003

(71)Applicant : NEC CORP
(72)Inventor : MURATSU FUMITAKE

(54) AUTOMATIC WIRELESS LAN CONNECTION SYSTEM

(57)Abstract:
PROBLEM TO BE SOLVED: To provide an automatic wireless LAN connection system wherein setup information required for connection to a wireless LAN system is automatically transferred to a radio information terminal by giving notice of a terminal ID by the radio information terminal.
SOLUTION: A wireless information terminal 1 is connected to the Internet 7, LAN services and the like. An access point 2 associates the wireless information terminal 1 and provides connection of a wireless LAN level. A terminal information transmission server 3 acquires the terminal ID of the radio information terminal 1 and notifies the outside of setting information for connection to a hot spot service and the terminal ID. A setup information relay server 4 receives the ID of the wireless information terminal 1 and the setup information, determines a transmission destination on the basis of the terminal ID and transmits the setup information to the wireless information terminal 1. A cellular phone communication network 5 includes the setup information relay server 4. A hot spot 6 includes the access point 2 and the terminal information transmission server 3.



(19)日本国特許庁(JP)　(12)公開特許公報(A)　(11)特許出願公開番号
特開2007-43598
(P2007-43598A)
(43)公開日　平成19年2月15日(2007.2.15)

(51)Int.Cl.		F I			テーマコード（参考）
H04L 9/08	(2006.01)	H04L	9/00	601B	5J104
		H04L	9/00	601E	

審査請求 未請求　請求項の数 63　OL　（全 27 頁）

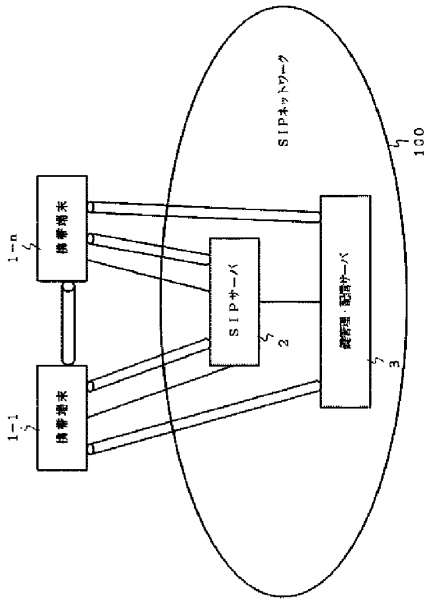
(21)出願番号　特願2005-227592 (P2005-227592)
(22)出願日　平成17年8月5日 (2005.8.5)

(71)出願人　000004237
日本電気株式会社
東京都港区芝五丁目７番１号
(74)代理人　100088812
弁理士　▲柳▼川　信
(72)発明者　坂口　泰彦
東京都港区芝五丁目７番１号　日本電気株式会社内
(72)発明者　三栖　利之
東京都港区芝五丁目７番１号　日本電気株式会社内
(72)発明者　冨山　卓二
東京都港区芝五丁目７番１号　日本電気株式会社内

最終頁に続く

(54)【発明の名称】通信システム、鍵管理・配信サーバ、端末装置及びそれらに用いるデータ通信方法並びにそのプログラム

Ex.1002 / Page 290 of 1008
Cisco Systems, Inc.



<1> 本発明は通信システム、鍵管理・配信サーバ、端末装置及びそれらに用いるデータ通信方法並びにそのプログラムに関し、特に動的生成された暗号鍵を安全に取得してデータ通信を行う方法に関する。

<2> 近年、携帯電話機等の携帯端末装置においては、その多機能化に伴って無線基地局を介した無線通信以外にも、携帯端末装置間を近距離無線通信等で直接接続してデータ通信を行う方法も提案されている（例えば、特許文献１参照）。

<3> その際、上記のように、携帯端末同士をＰ２Ｐ（Ｐｅｅｒ　ｔｏ　Ｐｅｅｒ：端末間の直接通信）通信（近距離無線通信等によるＰ２Ｐも含む）で接続する場合には、携帯端末装置が持っている秘密鍵を使って通信しようとすると、通信相手の携帯端末装置に対して自端末の秘密鍵を公開するか、公開鍵暗号化方式を使う必要がある。但し、近距離無線通信によるＰ２Ｐ通信は、端末装置同士が遠距離の場合、Ｐ２Ｐ通信を実現することはできない。

<4> 【特許文献 1】 特開２００３－０８７２６７号公報

<5> 上述した従来のデータ通信方法では、秘密鍵を公開する場合、自分の秘密鍵を複数人が持つことになるので、不正利用される恐れがあるという問題がある。また、公開鍵暗号化方式を使う場合には、複雑な暗号復号処理が必要となり、携帯端末装置のような小規模端末での処理には適さない。

<6> さらに、秘密鍵を通信相手毎に複数持つことは、それらの秘密鍵を記憶する携帯端末装置のメモリの記憶領域を圧迫し、通信相手のうちの誰か一人が携帯端末装置を紛失すると、そのメモリ内に記憶された複数の秘密鍵が漏洩することとなり、大きな問題となる。

<7> 一方、従来のデータ通信方法では、ＨＴＴＰ（ＨＴＴＰＳ）［Ｈｙｐｅｒ　Ｔｅｘｔ　Ｔｒａｎｓｆｅｒ　Ｐｒｏｔｏｃｏｌ（Ｈｙｐｅｒ　Ｔｅｘｔ　Ｔｒａｎｓｆｅｒ　Ｐｒｏｔｏｃｏｌ　ｏｖｅｒ　ｔｒａｎｓｐｏｒｔ　ｌａｙｅｒ　ｓｅｃｕｒｉｔｙ／ｓｅｃｕｒｅ　ｓｏｃｋｅｔｓ　ｌａｙｅｒ）］を使って鍵配送をする方法もあるが、リアルタイム性にかけることと、発信者が通信を開始したいという契機で通信相手に対しても同じ鍵を配送しなければならない。しかしながら、ＨＴＴＰ（ＨＴＴＰＳ）の性質上、鍵管理・配送サーバ側から端末装置（ＨＴＴＰクライアント）に対して鍵配送のトリガをかけることは困難である。

<8> そこで、本発明の目的は上記の問題点を解消し、暗号鍵の紛失による不正利用を防止することができ、暗号鍵を用いて端末間の直接通信を安全に行うことができる通信システム、鍵管理・配信サーバ、端末装置及びそれらに用いるデータ通信方法並びにそのプログラムを提供することにある。

Ex.1002 / Page 291 of 1008
Cisco Systems, Inc.

<9> 本発明による通信システムは、第１の端末装置及び第２の端末装置各々が共有する暗号鍵を基に前記第１の端末装置と前記第２の端末装置との間にピアツーピアのデータ通信を実現する通信システムであって、

前記第１の端末装置及び前記第２の端末装置のうちの一方が前記ピアツーピアのデータ通信開始のトリガを第１の通信方法による通信路にて前記第１の端末装置及び前記第２の端末装置のうちの他方に通知し、

前記第１の端末装置及び前記第２の端末装置各々が前記データ通信開始トリガの送受信に応答してそれぞれ前記暗号鍵を中継する中継サーバとの間に第２の通信方法による通信路を形成しかつ前記第１の通信方法による通信路から前記第２の通信方法による通信路に切替えて前記中継サーバを介して前記第１の端末装置と前記第２の端末装置との間で前記暗号鍵を共有している。

<10> 本発明による他の通信システムは、鍵管理・配信サーバから第１の端末装置及び第２の端末装置に配信される暗号鍵を基に前記第１の端末装置と前記第２の端末装置との間にピアツーピアのデータ通信を実現する通信システムであって、

前記第１の端末装置及び前記第２の端末装置のうちの一方が前記ピアツーピアのデータ通信開始のトリガを、前記鍵管理・配信サーバを経由してかつ第１の通信方法による通信路にて前記第１の端末装置及び前記第２の端末装置のうちの他方に通知し、

前記第１の端末装置及び前記第２の端末装置各々が前記データ通信開始トリガの送受信に応答してそれぞれ前記鍵管理・配信サーバとの間に第２の通信方法による通信路を形成しかつ前記第１の通信方法による通信路から当該第２の通信方法による通信路に切替えて前記鍵管理・配信サーバから前記第１の端末装置及び前記第２の端末装置各々に前記暗号鍵を配信している。

<11> 本発明による鍵管理・配信サーバは、第１の端末装置と第２の端末装置との間にピアツーピアのデータ通信を実現する通信システムにおいて前記第１の端末装置及び前記第２の端末装置各々に暗号鍵を配信する鍵管理・配信サーバであって、

前記第１の端末装置及び前記第２の端末装置のうちの一方が送信する前記ピアツーピアのデータ通信開始のトリガを、第１の通信方法による通信路にて受信した時に当該データ通信開始のトリガを前記第１の端末装置及び前記第２の端末装置のうちの他方に転送する手段と、前記第１の端末装置及び前記第２の端末装置各々が前記ピアツーピアのデータ通信開始のトリガの送受信に応答して切替えかつそれぞれ自装置との間に形成した第２の通信方法による通信路にて前記暗号鍵を配信する手段とを備えている。

<12> 本発明による端末装置は、自装置及び他の端末装置各々が共有する暗号鍵を基に自装置と前記他の端末装置との間にピアツーピアのデータ通信を行う端末装置であって、

前記ピアツーピアのデータ通信開始のトリガを、前記暗号鍵を中継する中継サーバを経由してかつ第１の通信方法による通信路にて前記他の端末装置に送信し、自装置からの前記ピアツーピアのデータ通信開始のトリガの送信及び前記他の端末装置からの前記ピアツーピアのデータ通信開始のトリガの受信のいずれかに応答して前記中継サーバとの間に第２の通信方法による通信路を形成しかつ前記第１の通信方法による通信路から前記第２の通信方法による通信路に切替えて前記中継サーバを介して前記暗号鍵の送信及び受信のいずれかを行っている。

<13> 本発明による他の端末装置は、鍵管理・配信サーバから自装置及び他の端末装置に配信される暗号鍵を基に自装置と前記他の端末装置との間でピアツーピアのデータ通信を行う端末装置であって、

前記ピアツーピアのデータ通信開始のトリガを、前記鍵管理・配信サーバを経由してかつ第１の通信方法による通信路にて前記他の端末装置に送信し、自装置からの前記ピアツーピアのデータ通信開始のトリガの送信及び前記他の端末装置からの前記ピアツーピアのデータ通信開始のトリガの受信のいずれかに応答して前記鍵管理・配信サーバとの間に第２の通信方法による通信路を形成しかつ前記第１の通信方法による通信路から当該第２の通信方法による通信路に切替えて前記鍵管理・配信サーバから前記暗号鍵を受信している。

<14> 本発明によるデータ通信方法は、自装置及び他の端末装置各々が共有する暗号鍵を基に自装置と前記他の端末装置との間にピアツーピアのデータ通信を行うシステムに用いられるデータ通信方法であって、

前記端末装置が、

前記ピアツーピアのデータ通信開始のトリガを、前記暗号鍵を中継する中継サーバを経由してかつ第１の通信方法による通信路にて前記他の端末装置に送信する処理と、自装置からの前記ピアツーピアのデータ通信開始のトリガの送信及び前記他の端末装置からの前記ピアツーピアのデータ通信開始のトリガの受信のいずれかに応答して前記中継サーバとの間に第２の通信方法による通信路を形成しかつ前記第１の通信方法による通信路から前記第２の

Ex.1002 / Page 292 of 1008
Cisco Systems, Inc.

通信方法による通信路に切替えて前記中継サーバを介して前記暗号鍵の送信及び受信のいずれかを行う処理とを実行している。

<15> 本発明による他のデータ通信方法は、鍵管理・配信サーバから端末装置及び他の端末装置に配信される暗号鍵を基に前記端末装置と前記他の端末装置との間でピアツーピアのデータ通信を行うシステムに用いられるデータ通信方法であって、

前記端末装置が、前記ピアツーピアのデータ通信開始のトリガを、前記鍵管理・配信サーバを経由してかつ第１の通信方法による通信路にて前記他の端末装置に送信する処理と、前記ピアツーピアのデータ通信開始のトリガの送受信に応答して前記鍵管理・配信サーバとの間に第２の通信方法による通信路を形成しかつ前記第１の通信方法による通信路から当該第２の通信方法による通信路に切替えて前記鍵管理・配信サーバから前記暗号鍵を受信する処理とを実行している。

<16> 本発明によるデータ通信方法のプログラムは、自装置及び他の端末装置各々が共有する暗号鍵を基に自装置と前記他の端末装置との間にピアツーピアのデータ通信を行うシステムに用いられるデータ通信方法のプログラムであって、

前記ピアツーピアのデータ通信開始のトリガを、前記暗号鍵を中継する中継サーバを経由してかつ第１の通信方法による通信路にて前記他の端末装置に送信する処理と、自装置からの前記ピアツーピアのデータ通信開始のトリガの送信及び前記他の端末装置からの前記ピアツーピアのデータ通信開始のトリガの受信のいずれかに応答して前記中継サーバとの間に第２の通信方法による通信路を形成しかつ前記第１の通信方法による通信路から前記第２の通信方法による通信路に切替えて前記中継サーバを介して前記暗号鍵の送信及び受信のいずれかを行う処理とを前記端末装置のコンピュータに実行させている。

<17> 本発明による他のデータ通信方法のプログラムは、鍵管理・配信サーバから端末装置及び他の端末装置に配信される暗号鍵を基に前記端末装置と前記他の端末装置との間でピアツーピアのデータ通信を行うシステムに用いられるデータ通信方法のプログラムであって、

前記ピアツーピアのデータ通信開始のトリガを、前記鍵管理・配信サーバを経由してかつ第１の通信方法による通信路にて前記他の端末装置に送信する処理と、前記ピアツーピアのデータ通信開始のトリガの送受信に応答して前記鍵管理・配信サーバとの間に第２の通信方法による通信路を形成しかつ前記第１の通信方法による通信路から当該第２の通信方法による通信路に切替えて前記鍵管理・配信サーバから前記暗号鍵を受信する処理とを前記端末装置のコンピュータに実行させている。

<18> すなわち、本発明の通信システムは、端末装置が常にＳＩＰ（Ｓｅｓｓｉｏｎ　Ｉｎｉｔｉａｔｉｏｎ　Ｐｒｏｔｏｃｏｌ）サーバにロケーション情報を登録することによって、端末装置が通信要求を発行時に、鍵管理・配信サーバがそれを受領して着信側の端末装置に対して通信要求をリアルタイムに送信することが可能となる。

<19> 本発明の通信システムでは、鍵管理・配信サーバが通信要求をトリガとして、端末間の通信毎にユニークな秘密鍵を、通信する両者の端末装置に配信することによって、毎回違う秘密鍵（暗号鍵）で通信を行うため、秘密鍵の安全性が高くなり、また端末装置側でも毎回違う秘密鍵を使うにも関わらず、それらの秘密鍵を記憶しておく必要がなくなる。よって、本発明の通信システムでは、端末装置同士、特に携帯電話端末同士で安全なＰ２Ｐ（Ｐｅｅｒ　ｔｏ　Ｐｅｅｒ：端末間の直接通信）のデータ通信を可能とする。

<20> 本発明による端末装置は、ＳＩＰ（Ｓｅｓｓｉｏｎ　Ｉｎｉｔｉａｔｉｏｎ　Ｐｒｏｔｏｃｏｌ）を使用して通信を行う端末であり、常にＳＩＰサーバに対して端末装置のロケーション情報を登録している。ある端末装置から別の端末装置へのＰ２Ｐ通信を要求する時には、その登録されたロケーション情報を用いるＳＩＰサーバが通信開始要求を発信側の端末装置から着信側の端末装置へプロキシすることで、これら両方の端末装置は、ＩＰｓｅｃ［ＩＰ（Ｉｎｔｅｒｎｅｔ　Ｐｒｏｔｏｃｏｌ）　ｓｅｃｕｒｉｔｙ　ｐｒｏｔｏｃｏｌ］を使用したシグナリングセッションを再構築するロケーション情報登録処理を行う。この動作によって、本発明による端末装置は、端末装置とＳＩＰサーバとの間に安全な情報の送受信を行うためのトンネルを形成することが可能となる。

<21> 本発明による端末装置は、ＳＩＰサーバを経由して鍵管理・配送する鍵管理・配信サーバに対して、端末装置とＳＩＰサーバとの間にトンネル形成が完了したことを通知するメッセージを送信することによって、鍵管理・配信サーバからＳＩＰサーバを経由して発信側の端末装置及び着信側の端末装置に対して安全なデータセッションの確立を行う信号を送信し、鍵配送に使用するデータセッションの確立を可能とする。

<22> 本発明による端末装置は、鍵管理：配信サーバから安全なデータセッションを通して、その通信のみに適用可能な秘密鍵を受領するとともに受領完了を示すメッセージを送信することによって、鍵管理・配信サーバから発信側の端末装置と着信側の端末装置とをＰ２Ｐで接続するためのデータセッション切替え要求［Ｐ２Ｐのセッションへ

Ex.1002 / Page 293 of 1008
Cisco Systems, Inc.

の張替え要求（これはセッションの送り先アドレスの書換えを示し、Ｐ２Ｐのセッションの追加を含んでいる）］の受信が可能となる。

<23> 本発明による端末装置は、データセッション切替え要求を受信すると、配送済みの秘密鍵を使用して、相手端末との間の暗号化されたデータセッションを確立することが可能となる。

<24> 本発明による端末装置は、ＳＩＰサーバとの間の安全なシグナリングセッション確立及び鍵管理・配信サーバとの間の暗号化された安全なデータセッションの確立のために、事前に交換した暗号化鍵を持っていてもよいし、公開鍵を互いに持っていてもよい。

<25> これによって、本発明の通信システムでは、端末装置をＳＩＰモジュールを搭載した端末とすることによって、発信側の端末装置がＳＩＰサーバ、鍵管理・配信サーバを経由して着信側の端末装置に対してデータ通信開始のトリガを送信することで、着信側の端末装置がリアルタイムにこのトリガを受信することが可能となる。

<26> 発信側の端末装置及び着信側の端末装置とがともに、上記のデータ通信開始トリガを送受信した契機で、ＳＩＰサーバに対するロケーション情報登録処理をやり直すと同時に、端末装置とＳＩＰサーバとの間のシグナリングセッションをＩＰｓｅｃを使用して確立する。この動作によって、本発明の通信システムでは、ＳＩＰサーバと携帯端末装置との間のＩＰｓｅｃセッションの確立時間とＩＰｓｅｃセッションの確立端末装置の数とを減らすことが可能となり、ネットワーク負荷及びサーバ負荷を減らすことが可能となる。このＩＰｓｅｃセッション上でシグナリングを行うことで、ユーザ情報やシグナリングに必要なデータの暗号化を行い、安全に通信することが可能となる。

<27> 上記のＩＰｓｅｃ上のシグナリングセッションで、発信側の端末装置と着信側の端末装置との間のＰ２Ｐデータ通信に使用する秘密鍵を交換することも可能であるが、鍵管理・配信サーバと発信側の端末装置及び着信側の端末装置との間のデータセッションをＩＰｓｅｃ上で確立し、このセッション上で秘密鍵の交換を行うことで、ＳＩＰサーバをはじめとしたサーバ装置で秘密鍵の入ったデータをプロキシすることがなくなるため、秘密鍵を参照することが不可能となり、さらに安全に秘密鍵を配送管理することが可能となる。

<28> Ｐ２Ｐデータ通信で使用する秘密鍵は、鍵管理・配信サーバが一通信毎に生成する秘密鍵を発信側の端末装置及び着信側の端末装置に配送して使用するため、毎回使用する秘密鍵が違うものとなる。そのため、本発明の通信システムでは、一度使った秘密鍵をさらに不正に利用し続けたり、秘密鍵の紛失による不正利用を防止することが可能となる。

<29> 本発明は、以下に述べるような構成及び動作とすることで、暗号鍵の紛失による不正利用を防止することができ、暗号鍵を用いて端末間の直接通信を安全に行うことができるという効果が得られる。

<30> 次に、本発明の実施例について図面を参照して説明する。図１は本発明の一実施例による通信システムの構成を示すブロック図である。図１において、本発明の一実施例による通信システムは携帯端末装置１－１～１－ｎと、ＳＩＰ（Ｓｅｓｓｉｏｎ　Ｉｎｉｔｉａｔｉｏｎ　Ｐｒｏｔｏｃｏｌ）サーバ２と、鍵管理・配信サーバ３とから構成されている。ここで、ＳＩＰサーバ２と鍵管理・配信サーバ３とはＳＩＰネットワーク１００を構成し、携帯端末装置１－１～１－ｎとしては、携帯電話機やＰＤＡ（Ｐｅｒｓｏｎａｌ　Ｄｉｇｉｔａｌ　Ａｓｓｉｓｔａｎｔ）、及びノート型のＰＣ（Ｐｅｒｓｏｎａｌ　Ｃｏｍｐｕｔｅｒ）端末等の携帯端末を指している。尚、図１においては、携帯端末装置１－１，１－ｎ間のＰ２Ｐ（Ｐｅｅｒ　ｔｏ　Ｐｅｅｒ：端末間の直接通信）通信を示しており、携帯端末装置１－１，１－ｎ間の無線通信のための無線基地局や無線通信網についてはそれらの図示を省略しており、またそれらの動作についても公知であるのでその説明を省略する。

<31> 図２は図１の携帯端末装置１の構成例を示すブロック図である。図２において、携帯端末装置１はＰ２Ｐ通信アプリケーション１１と、鍵管理モジュール１２と、ＳＩＰモジュール１３と、ＩＰｓｅｃ［ＩＰ（Ｉｎｔｅｒｎｅｔ Ｐｒｏｔｏｃｏｌ）　ｓｅｃｕｒｉｔｙ　ｐｒｏｔｏｃｏｌ］モジュール１４とを備えている。尚、上記の購入者携帯端末１の各モジュールは図示せぬＣＰＵ（中央処理装置）がプログラム（コンピュータで動作可能なプログラム）を実行することでも実現可能である。また、上記の携帯端末装置１－１～１－ｎはこの携帯端末装置１と同様の構成で、同様の動作を行うものとする。

<32> 携帯端末装置１はＳＩＰモジュールを実装し、定期的に、ＳＩＰサーバ２に対して接続先ＩＰ（Ｉｎｔｅｒｎｅｔ Ｐｒｏｔｏｃｏｌ）アドレスを登録する機能であるロケーション登録処理を行っている。また、携帯端末装置１はＳＩＰサーバ２との間で通信を行うためにロケーション登録処理時に既に秘密鍵を共有しており、新たに秘密鍵の交換を行うことなく、安全なシグナリングセッションを確立する。携帯端末装置１は他の携帯端末装置との間でデータのやりとり（授受）を行うためのデータセッションを確立する。携帯端末装置１が他の携帯端末装置との間にデータセッションを確立した時には、携帯端末装置１と他の携帯端末装置との間での秘密鍵の交換が必要となるが

Ex.1002 / Page 294 of 1008
Cisco Systems, Inc.

、この秘密鍵は鍵管理・配信サーバ３から安全なデータセッションを通して鍵配送されるので、それを使用する。尚、鍵配送の方法としては、例えば、ＤＨ（Ｄｉｆｆｉｅ－Ｈｅｌｌｍａｎ）法等がある。

<33> 図３は図１のＳＩＰサーバ２の構成例を示すブロック図である。図３において、ＳＩＰサーバ２はプロキシサーバモジュール２１と、ロケーションサーバモジュール２２と、レジストレーションモジュール２３と、ＳＩＰモジュール２４と、ＩＰｓｅｃモジュール２５とを備えている。尚、上記のＳＩＰサーバ２の各モジュールは図示せぬＣＰＵがプログラムを実行することでも実現可能である。

<34> ＳＩＰサーバ２は携帯端末装置１－１，１－ｎのＩＰアドレス情報を保持し、携帯端末装置１－１，１－ｎから発信されたメッセージを鍵管理・配信サーバ３や別の携帯端末へと転送する機能を持つ。ＳＩＰサーバ２は携帯端末装置１－１，１－ｎ間がＰ２Ｐ通信に入っていない間、安全なシグナリングセッションを張ることなく、ＩＰアドレス情報のみを保持している。また、ＳＩＰサーバ２は、携帯端末装置１－１，１－ｎから安全なシグナリングセッションを張るための再レジストレーションを受信すると、携帯端末装置１－１，１－ｎとの間の安全なシグナリングセッションを確立する。

<35> その後、ＳＩＰサーバ２はこのセッションを使用し、携帯端末装置１－１，１－ｎ間、携帯端末装置１－１，１－ｎと鍵管理・配信サーバ３との間の暗号化された安全なデータセッションを確立するためのメッセージを送受信する。ＳＩＰサーバ２では携帯端末装置１－１，１－ｎと鍵管理・配信サーバ３との対地情報のみを管理するものとし、個人情報等が全てデータセッションを通してやりとりされ、ＳＩＰサーバ２で復号化されることはない。

<36> 図４は図１の鍵管理・配信サーバ３の構成例を示すブロック図である。図４において、鍵管理・配信サーバ３は鍵生成モジュール３１と、ＳＩＰモジュール３２と、ＩＰｓｅｃモジュール３３とを備えている。尚、上記の鍵管理・配信サーバ３の各モジュールは図示せぬＣＰＵがプログラムを実行することでも実現可能である。

<37> 鍵管理・配信サーバ３はＳＩＰモジュールを実装しており、常に、ＳＩＰサーバ２との間で安全なシグナリングセッションを張っている。鍵管理・配信サーバ３は携帯端末装置１－１からの通信開始要求を受信し、携帯端末装置１－１，１－ｎとＳＩＰサーバ２との間の安全なシグナリングセッションの確立を確認すると、携帯端末装置１－１，１－ｎの両方に対して安全なデータセッションを確立するためのメッセージを送信する。

<38> 鍵管理・配信サーバ３はそのセッションを使用し、携帯端末装置１－１，１－ｎの両携帯端末間のＰ２Ｐ通信で使用するための鍵配送を行う。その後、鍵管理・配信サーバ３は携帯端末装置１－１，１－ｎ間の安全なデータセッションを確立するためのシグナリングを行う。すなわち、鍵管理・配信サーバ３は携帯端末装置１－１，１－ｎ間のＰ２Ｐのセッションへの張替え（これはセッションの送り先アドレスの書換えを示し、Ｐ２Ｐのセッションの追加を含んでいる）、一通信毎にＰ２Ｐのセッション（ＩＰｓｅｃ）確立のための暗号鍵の配送制御を実施している。

<39> 図５及び図６は本発明の一実施例による通信システムの動作例を示すシーケンスチャートである。これら図１～図６を参照して本発明の一実施例による移動通信システムの動作について説明する。尚、図５及び図６における携帯端末装置（＃１）１－１，（＃ｎ）１－ｎ、鍵管理・配信サーバ３の動作は図示せぬＣＰＵがプログラムを実行することでも実現可能である。

<40> 携帯端末装置（＃１）１－１はＳＩＰモジュール１３からＳＩＰサーバ２のレジストレーションモジュール２３に対し、自端末のロケーション登録処理を行い（図５のａ１参照）、ＳＩＰサーバ２のロケーションサーバモジュール２２にそのロケーション情報を保持させる。携帯端末装置（＃ｎ）１－ｎも、上記の携帯端末装置（＃１）１－１と同様に、ロケーション登録処理を実施し（図５のａ２参照）、ＳＩＰサーバ２のロケーションサーバモジュール２２にそのロケーション情報を保持させる。

<41> 携帯端末装置（＃１）１－１がＰ２Ｐ通信のトリガとなるメッセージをＳＩＰサーバ２のプロキシサーバモジュール２１に送信すると（図５のａ３参照）、ＳＩＰサーバ２のプロキシサーバモジュール２１はそのメッセージを鍵管理・配信サーバ３へと転送する（図５のａ４参照）。鍵管理・配信サーバ３は携帯端末装置（＃１）１－１からのＰ２Ｐ通信のトリガとなるメッセージを折り返し、ＳＩＰサーバ２のプロキシサーバモジュール２１に送信する（図５のａ５参照）。ＳＩＰサーバ２はロケーションサーバモジュール２２で保持している携帯端末装置（＃ｎ）１－ｎのロケーション情報に基づき、そのメッセージを携帯端末装置（＃ｎ）１－ｎへと転送する（図５のａ６参照）。この場合、上記のＰ２Ｐ通信のトリガは個人情報を含まないため、ＩＰｓｅｃセッションを張る前の状態で送信可能となっている。

<42> 携帯端末装置（＃１）１－１，（＃ｎ）１－ｎは上記のメッセージ送信／受信をトリガとして、ＳＩＰモジュール１３によるロケーション登録処理を再度実施するが、その処理の中でＩＰｓｅｃモジュール１２を各々起動し、ＳＩＰサーバ２のＩＰｓｅｃモジュール２５との間のＩＰｓｅｃトンネルを形成する（図５のａ７～ａ１０参照

Ex.1002 / Page 295 of 1008
Cisco Systems, Inc.

）。このロケーション情報登録（図５のａ７，ａ９参照）時には、シグナリングセッションが確立する。

<43> 携帯端末装置（＃１）１－１，（＃ｎ）１－ｎはＳＩＰサーバ２との間のＩＰｓｅｃトンネル形成を完了すると、鍵管理・配信サーバ３宛てのメッセージを送信し、ＳＩＰサーバ２にＩＰｓｅｃトンネル形成が完了したことを通知する（図５のａ１１，ａ１３参照）。ＳＩＰサーバ２はこの通知を鍵管理・配信サーバ３へ転送する（図５のａ１２，ａ１４参照）。

<44> 鍵管理・配信サーバ３はＳＩＰサーバ２を介して携帯端末装置（＃１）１－１に対してＩＰｓｅｃデータセッションの確立を要求するメッセージを送信し（図５のａ１５，ａ１６参照）、鍵管理・配信サーバ３と携帯端末装置（＃１）１－１との間にＩＰｓｅｃデータセッションを確立し（図５のａ１７参照）、ＩＰｓｅｃデータセッションを利用して鍵生成モジュール３１で生成した秘密鍵Ａを携帯端末装置（＃１）１－１に配送する。

<45> 同様に、鍵管理・配信サーバ３はＳＩＰサーバ２を介して携帯端末装置（＃ｎ）１－ｎに対してＩＰｓｅｃデータセッションの確立を要求するメッセージを送信し（図５のａ１８，ａ１９参照）、鍵管理・配信サーバ３と携帯端末装置（＃ｎ）１－ｎとの間にＩＰｓｅｃデータセッションを確立し（図５のａ２０参照）、ＩＰｓｅｃデータセッションを利用して鍵生成モジュール３１で生成した秘密鍵Ａを携帯端末装置（＃ｎ）１－ｎに配送する。

<46> 携帯端末装置（＃１）１－１，（＃ｎ）１－ｎは同じ秘密鍵ＡをＳＩＰサーバ２を介して鍵管理・配信サーバ３から受信すると、鍵受信完了メッセージをＳＩＰサーバ２を介して鍵管理・配信サーバ３に送信する（図５のａ２１～ａ２４参照）。鍵管理・配信サーバ３は鍵受信完了メッセージを受取ると、携帯端末装置（＃１）１－１，（＃ｎ）１－ｎにＳＩＰサーバ２を介してＰ２Ｐ通信データセッション確立要求を送信する（図６のａ２５～ａ２８参照）。これによって、携帯端末装置（＃１）１－１，（＃ｎ）１－ｎ間にはＩＰｓｅｃデータセッションが確立される（図６のａ２９参照）。

<47> このように、本実施例では、携帯端末装置（＃１）１－１，（＃ｎ）１－ｎをＳＩＰモジュールを搭載した端末とすることによって、発信側の携帯端末装置（＃１）１－１がＳＩＰサーバ２、鍵管理・配信サーバ３を経由して着信側の携帯端末装置（＃ｎ）１－ｎに対してデータ通信開始のトリガを送信することで、着信側の携帯端末装置（＃ｎ）１－ｎがリアルタイムにこのトリガを受信することができる。

<48> 発信側の携帯端末装置（＃１）１－１及び着信側の携帯端末装置（＃ｎ）１－ｎがともに、上記のデータ通信開始トリガを送受信した契機で、ＳＩＰサーバ２に対するロケーション情報登録処理をやり直すと同時に、携帯端末装置（＃１）１－１，（＃ｎ）１－ｎとＳＩＰサーバ２との間のシグナリングセッションをＩＰｓｅｃを使用して確立する。この動作によって、本実施例では、ＳＩＰサーバ２と携帯端末装置（＃１）１－１，（＃ｎ）１－ｎとの間のＩＰｓｅｃセッションの確立時間とＩＰｓｅｃセッションの確立端末装置の数とを減らすことができ、ネットワーク負荷及びサーバ負荷を減らすことができる。このＩＰｓｅｃセッション上でシグナリングを行うことで、ユーザ情報やシグナリングに必要なデータの暗号化を行い、安全に通信することができる。

<49> 上記のＩＰｓｅｃ上のシグナリングセッションで、発信側の携帯端末装置（＃１）１－１と着信側の携帯端末装置（＃ｎ）１－ｎとの間のＰ２Ｐデータ通信に使用する秘密鍵を交換することも可能であるが、鍵管理・配信サーバ３と発信側の携帯端末装置（＃１）１－１及び着信側の携帯端末装置（＃ｎ）１－ｎとの間のデータセッションをＩＰｓｅｃ上で確立し、このセッション上で秘密鍵の交換を行うことで、ＳＩＰサーバ２をはじめとしたサーバ装置で秘密鍵の入ったデータをプロキシすることがなくなるため、秘密鍵を参照することができなくなり、さらに安全に秘密鍵を配送管理することができる。

<50> Ｐ２Ｐデータ通信で使用する秘密鍵は、鍵管理・配信サーバ３が一通信毎に生成する秘密鍵を発信側の携帯端末装置（＃１）１－１及び着信側の携帯端末装置（＃ｎ）１－ｎに配送して使用するため、毎回使用する秘密鍵が違うものとなる。そのため、本実施例では、一度使った秘密鍵をさらに不正に利用し続けたり、秘密鍵の紛失による不正利用を防止することができる。

<51> 図７は本発明の他の実施例による通信システムの構成を示すブロック図である。図７において、本発明の他の実施例による通信システムは、携帯端末装置１－１の代わりに、ゲートウェイサーバ４とＳＩＰ未対応端末［例えば、デスクトップ型のＰＣ（Ｐｅｒｓｏｎａｌ　Ｃｏｍｐｕｔｅｒ）端末等の固定端末や携帯端末を含む端末］５とを設けた以外は図１に示す本発明の一実施例による通信システムと同様の構成となっており、同一構成要素には同一符号を付してある。ここで、ＳＩＰサーバ２と鍵管理・配信サーバ３とゲートウェイサーバ４とはＳＩＰネットワーク１００を構成している。

<52> 図８は図７のＳＩＰ未対応端末５の構成例を示すブロック図である。図８において、ＳＩＰ未対応端末５はＰ２Ｐ通信アプリケーション５１と、ＨＴＴＰ／ＨＴＴＰＳ（Ｈｙｐｅｒ　Ｔｅｘｔ　Ｔｒａｎｓｆｅｒ　Ｐｒｏｔｏｃｏｌ　ｏｖｅｒ　ｔｒａｎｓｐｏｒｔ　ｌａｙｅｒ　ｓｅｃｕｒｉｔｙ／ｓｅｃｕｒｅ　ｓｏｃｋｅｔｓ　ｌａｙｅ

Ex.1002 / Page 296 of 1008
Cisco Systems, Inc.

ｒ）モジュール５２とを備えている。尚、上記のＳＩＰ未対応端末５の各モジュールは図示せぬＣＰＵがプログラムを実行することでも実現可能である。

<53> 図９は図７のゲートウェイサーバ４の構成例を示すブロック図である。図９において、ゲートウェイサーバ４はＨＴＴＰ／ＨＴＴＰＳモジュール４１と、ＳＩＰモジュール４２と、ＩＰｓｅｃモジュール４３とを備えている。尚、上記のゲートウェイサーバ４の各モジュールは図示せぬＣＰＵがプログラムを実行することでも実現可能である。

<54> ゲートウェイサーバ４はＰ２Ｐ通信に使用されるＳＩＰ未対応端末５がＳＩＰモジュールを実装していない場合に、ＳＩＰモジュールを実装している端末（携帯端末装置１－ｎ）との間のＰ２Ｐ通信を可能とするためのプロトコル変換サーバである。ゲートウェイサーバ４はＨＴＴＰＳによって要求されたＳＩＰ未対応端末５からのＰ２Ｐ通信要求を受信し、ＳＩＰサーバ２に対して自ＩＰアドレスを接続先ＩＰアドレスとしてレジストレーション処理を行い、Ｐ２Ｐ通信要求のメッセージをＳＩＰサーバ２及び鍵管理・配信サーバ３経由で携帯端末装置１－ｎに送信する。

<55> ゲートウェイサーバ４は鍵管理・配信サーバ３からの要求を受けて、携帯端末装置１－ｎあるいは鍵管理・配信サーバ３との間のデータセッションを確立する。ゲートウェイサーバ４は携帯端末装置１－ｎとのデータセッション確立時に、ゲートウェイサーバ４と携帯端末装置１－ｎとの間での秘密鍵の交換が必要となるが、この秘密鍵は鍵管理・配信サーバ３を介して鍵配送されるので、それを使用する。

<56> ＳＩＰ未対応端末５はゲートウェイサーバ４を通して携帯端末装置１－ｎとの間のデータセッションの確立によるＰ２Ｐ通信を行う。その際、ゲートウェイサーバ４はＳＩＰ未対応端末５に対してＰ２Ｐ通信の内容をＨＴＴＰＳで通知する。

<57> 図１０及び図１１は本発明の他の実施例による通信システムの動作を示すシーケンスチャートである。これら図３と図４と図７～図１１とを参照して本発明の他の実施例による通信システムの動作について説明する。尚、図１０及び図１１における携帯端末装置１－ｎ、鍵管理・配信サーバ３、ゲートウェイサーバ４、ＳＩＰ未対応端末５の動作は図示せぬＣＰＵがプログラムを実行することでも実現可能である。

<58> ＳＩＰモジュールを持たないＳＩＰ未対応端末５は、ゲートウェイサーバ４のＨＴＴＰ／ＨＴＴＰＳモジュール４１に対してＨＴＴＰＳトンネルを形成し、ＳＩＰサーバ２に対してロケーション登録処理を行うためのトリガを送信し（図１０のｂ１参照）、ゲートウェイサーバ４がＳＩＰモジュール４２によってＳＩＰ未対応端末５の代理でＳＩＰサーバ２に対してロケーション登録処理を行い（図１０のｂ２参照）、ＳＩＰサーバ２のロケーションサーバモジュール２２にそのロケーション情報を保持させる。携帯端末装置（＃ｎ）１－ｎも、このゲートウェイサーバ４と同様に、ロケーション登録処理を実施し（図１０のｂ３参照）、ＳＩＰサーバ２のロケーションサーバモジュール２２にそのロケーション情報を保持させる。

<59> ＳＩＰ未対応端末５は決済要求のトリガとなるメッセージをＨＴＴＰ／ＨＴＴＰＳモジュール５２から送信し（図１１のｂ４参照）、それを受取ったゲートウェイサーバ４のＨＴＴＰ／ＨＴＴＰＳモジュール４１はそのメッセージをＳＩＰモジュール４２に渡す。ＳＩＰモジュール４２はメッセージをＳＩＰサーバ２のプロキシサーバモジュール２１に送信すると（図１０のｂ５参照）、ＳＩＰサーバ２のプロキシサーバモジュール２１はそのメッセージを鍵管理・配信サーバ３へと転送する（図１０のｂ６参照）。鍵管理・配信サーバ３４はＳＩＰ未対応端末５からのＰ２Ｐ通信の要求のトリガとなるメッセージを折り返し、ＳＩＰサーバ２のプロキシサーバモジュール２１に送信すると（図１０のｂ７参照）、ＳＩＰサーバ２はロケーションサーバモジュール２２で保持している携帯端末装置（＃ｎ）１－ｎのロケーション情報に基づき、そのメッセージを携帯端末装置（＃ｎ）１－ｎへと転送する（図１０のｂ８参照）。この場合、上記の決済要求のトリガは個人情報を含まないため、ＩＰｓｅｃセッションを張る前の状態で送信可能となっている。

<60> ゲートウェイサーバ４及び携帯端末装置（＃ｎ）１－ｎは上記のメッセージ送信／受信をトリガとして、ＳＩＰモジュール４２，１３によるロケーション登録処理を再度実施するが（図１０のｂ９，ｂ１１参照）、その処理の中でＩＰｓｅｃモジュール４３，１４を各々起動し、ＳＩＰサーバ２のＩＰｓｅｃモジュール２５との間にＩＰｓｅｃトンネルを形成する（図１０のｂ１０，ｂ１２参照）。このロケーション情報登録時には、シグナリングセッションが確立する。ゲートウェイサーバ４及び携帯端末装置（＃ｎ）１－ｎはＳＩＰサーバ２との間のＩＰｓｅｃトンネル形成を完了すると、鍵管理・配信サーバ３宛てのメッセージを送信し、ＳＩＰサーバ２にＩＰｓｅｃトンネル形成が完了したことを通知する（図１０のｂ１３，ｂ１５参照）。ＳＩＰサーバ２はこの通知を鍵管理・配信サーバ３へ転送する（図１０のｂ１４，ｂ１６参照）。

<61> 鍵管理・配信サーバ３はＳＩＰサーバ２を介してゲートウェイサーバ４に対してＩＰｓｅｃデータセッションの確立を要求するメッセージを送信し（図１１のｂ１７，ｂ１８参照）、鍵管理・配信サーバ３とゲートウェイサ

Ex.1002 / Page 297 of 1008
Cisco Systems, Inc.

ーバ４との間にＩＰｓｅｃデータセッションを確立し（図１１のｂ２１参照）、ＩＰｓｅｃデータセッションを利用して鍵生成モジュール３１で生成した秘密鍵Ａをゲートウェイサーバ４に配送する。同様に、鍵管理・配信サーバ３と携帯端末装置（＃ｎ）１－ｎとの間にもＩＰｓｅｃデータセッションが確立され（図１１のｂ１９，ｂ２０，ｂ２２参照）、ＩＰｓｅｃデータセッションを利用して鍵生成モジュール３１で生成した秘密鍵Ａが携帯端末装置（＃ｎ）１－ｎに配送される。尚、鍵管理・配信サーバ３とゲートウェイサーバ４との間にはＩＰｓｅｃを用いないデータセッションの確立も可能である。

<62> ゲートウェイサーバ４及び携帯端末装置（＃ｎ）１－ｎは同じ秘密鍵ＡをＳＩＰサーバ２を介して鍵管理・配信サーバ３から受信すると、鍵受信完了メッセージをＳＩＰサーバ２を介して鍵管理・配信サーバ３に送信する（図１１のｂ２３～ｂ２６参照）。鍵管理・配信サーバ３は鍵受信完了メッセージを受取ると、ゲートウェイサーバ４及び携帯端末装置（＃ｎ）１－ｎにＳＩＰサーバ２を介してＰ２Ｐ通信データセッション確立要求を送信する（図１１のｂ２７～ｂ３０参照）。これによって、ゲートウェイサーバ４と携帯端末装置（＃ｎ）１－ｎとの間にはＩＰｓｅｃデータセッションが確立される（図１１のｂ３１参照）。

<63> この場合、ＳＩＰ未対応端末５とゲートウェイサーバ４との間にはＨＴＴＰＳトンネルが形成されているので、携帯端末装置（＃ｎ）１－ｎとゲートウェイサーバ４との間のＩＰｓｅｃデータセッションの確立によるＰ２Ｐ通信が行われると、ゲートウェイサーバ４がその情報をＨＴＴＰＳに載せ換えてＳＩＰ未対応端末５へ送信する（図１１のｂ３２参照）。

<64> このように、本実施例では、ＳＩＰモジュールを未搭載のＳＩＰ未対応端末５をＳＩＰモジュールを搭載するゲートウェイサーバ４を介して着信側の携帯端末装置（＃ｎ）１－ｎとの間にＩＰｓｅｃトンネルを形成することで、ＳＩＰモジュールを未搭載のＳＩＰ未対応端末５においても、上記の本発明の一実施例と同様に、暗号鍵の紛失による不正利用を防止することができ、その暗号鍵を用いて端末間の直接通信を安全に行うことができる。

<65> 図１２は本発明の別の実施例による通信システムの構成を示すブロック図である。図１２において、本発明の別の実施例による決済システムは、携帯端末装置１－ｎの代わりに、ゲートウェイサーバ６とＳＩＰ未対応端末７とを設けた以外は図８に示す本発明の他の実施例による通信システムと同様の構成となっており、同一構成要素には同一符号を付してある。ここで、ＳＩＰサーバ２と鍵管理・配信サーバ３とゲートウェイサーバ４，６とはＳＩＰネットワーク１００を構成している。尚、上記のＳＩＰ未対応端末５，７は図８に示すＳＩＰ未対応端末５と同様の構成となっており、ゲートウェイサーバ４，６は図９に示すゲートウェイサーバ４と同様の構成となっており、それらの動作は上記と同様である。

<66> 図１３及び図１４は本発明の別の実施例によるモバイル決済システムの動作を示すシーケンスチャートである。これら図３と図４と図８と図９と図１２～図１４とを参照して本発明の別の実施例による通信システムの動作について説明する。尚、図１３及び図１４における鍵管理・配信サーバ３、ゲートウェイサーバ４，６、ＳＩＰ未対応端末５，７の動作は図示せぬＣＰＵがプログラムを実行することでも実現可能である。

<67> ＳＩＰモジュールを持たないＳＩＰ未対応端末５は、ゲートウェイサーバ４のＨＴＴＰ／ＨＴＴＰＳモジュール４１に対してＨＴＴＰＳトンネルを形成し、ＳＩＰサーバ２に対してロケーション登録処理を行うためのトリガを送信し（図１３のｃ１参照）、ゲートウェイサーバ４がＳＩＰモジュール４２によってＳＩＰ未対応端末５の代理でＳＩＰサーバ２に対してロケーション登録処理を行い（図１３のｃ２参照）、ＳＩＰサーバ２のロケーションサーバモジュール２２にそのロケーション情報を保持させる。同様に、ＳＩＰモジュールを持たないＳＩＰ未対応端末７は、ゲートウェイサーバ６のＨＴＴＰ／ＨＴＴＰＳモジュール４１に対してＨＴＴＰＳトンネルを形成し、ＳＩＰサーバ２に対してロケーション登録処理を行うためのトリガを送信し（図１３のｃ３参照）、ゲートウェイサーバ６がＳＩＰモジュール４３によってＳＩＰ未対応端末７の代理でＳＩＰサーバ２に対してロケーション登録処理を行い（図１３のｃ４参照）、ＳＩＰサーバ２のロケーションサーバモジュール２２にそのロケーション情報を保持させる。

<68> ＳＩＰ未対応端末５は決済要求のトリガとなるメッセージをＨＴＴＰ／ＨＴＴＰＳモジュール５２から送信し（図１３のｃ５参照）、それを受取ったゲートウェイサーバ４のＨＴＴＰ／ＨＴＴＰＳモジュール４１はそのメッセージをＳＩＰモジュール４２に渡す。ＳＩＰモジュール４２はメッセージをＳＩＰサーバ２のプロキシサーバモジュール２１に送信すると（図１３のｃ６参照）、ＳＩＰサーバ２のプロキシサーバモジュール２１はそのメッセージを鍵管理・配信サーバ３へと転送する（図１３のｃ７参照）。

<69> 鍵管理・配信サーバ３はＳＩＰ未対応端末５からの決済要求のトリガとなるメッセージを折り返し、ＳＩＰサーバ２のプロキシサーバモジュール２１に送信すると（図１３のｃ８参照）、ＳＩＰサーバ２はロケーションサーバモジュール２２で保持しているゲートウェイサーバ６のロケーション情報に基づき、そのメッセージをゲートウェイサーバ６へと転送する（図１３のｃ９参照）。ゲートウェイサーバ６はそのメッセージをＨＴＴＰＳトンネルにてＳＩＰ未対応端末７に送信する（図１３のｃ１０参照）。この場合、上記の決済要求のトリガは個人情報を

Ex.1002 / Page 298 of 1008
Cisco Systems, Inc.

含まないため、ＩＰｓｅｃセッションを張る前の状態で送信可能となっている。

<70> ゲートウェイサーバ４，６は上記のメッセージ送信／受信をトリガとして、ＳＩＰモジュール４２によるロケーション登録処理を再度実施するが（図１３のｃ１１，ｃ１３参照）、その処理の中でＩＰｓｅｃモジュール４３を各々起動し、ＳＩＰサーバ２のＩＰｓｅｃモジュール２５との間のＩＰｓｅｃトンネルを形成する（図１３のｃ１２，ｃ１４参照）。このロケーション情報登録時には、シグナリングセッションが確立する。ゲートウェイサーバ４，６はＳＩＰサーバ２との間にＩＰｓｅｃトンネル形成を完了すると、ＳＩＰサーバ２に鍵管理・配信サーバ３宛てのメッセージを送信し、ＩＰｓｅｃトンネル形成が完了したことを通知する（図１３のｃ１５，ｃ１７参照）。ＳＩＰサーバ２はこの通知を鍵管理・配信サーバ３へ転送する（図１３のｃ１６，ｃ１８参照）。

<71> 鍵管理・配信サーバ３はＳＩＰサーバ２を介してゲートウェイサーバ４に対してＩＰｓｅｃデータセッションの確立を要求するメッセージを送信し（図１４のｃ１９，ｃ２０参照）、鍵管理・配信サーバ３とゲートウェイサーバ５との間にＩＰｓｅｃデータセッションを確立し（図１４のｃ２３参照）、ＩＰｓｅｃデータセッションを利用して鍵生成モジュール３１で生成した秘密鍵Ａをゲートウェイサーバ４に配送する。同様に、鍵管理・配信サーバ３とゲートウェイサーバ６との間にもＩＰｓｅｃデータセッションが確立され（図１４のｃ２１，ｃ２２，ｃ２４参照）、ＩＰｓｅｃデータセッションを利用して鍵生成モジュール３１で生成した秘密鍵Ａがゲートウェイサーバ６に配送される。尚、鍵管理・配信サーバ３とゲートウェイサーバ４，６との間にはＩＰｓｅｃを用いないデータセッションの確立も可能である。

<72> ゲートウェイサーバ４，６は同じ秘密鍵ＡをＳＩＰサーバ２を介して鍵管理・配信サーバ３から受信すると、鍵受信完了メッセージをＳＩＰサーバ２を介して鍵管理・配信サーバ３に送信する（図１４のｃ２５～ｃ２８参照）。鍵管理・配信サーバ３は鍵受信完了メッセージを受取ると、ゲートウェイサーバ４，６にＳＩＰサーバ２を介してＰ２Ｐ通信データセッション確立要求を送信する（図１４のｃ２９～ｃ３２参照）。これによって、ゲートウェイサーバ４，６間にはＩＰｓｅｃデータセッションが確立される（図１４のｃ３３参照）。

<73> この場合、ＳＩＰ未対応端末５とゲートウェイサーバ４との間、ＳＩＰ未対応端末７とゲートウェイサーバ６との間にはそれぞれＨＴＴＰＳトンネルが形成されているので、ゲートウェイサーバ４，６間のＩＰｓｅｃデータセッションの確立によるＰ２Ｐ通信の内容が、ゲートウェイサーバ４，６にてその情報をＨＴＴＰＳに載せ換えられてＳＩＰ未対応端末５，７へと送信される（図１４のｃ３４，ｃ３５参照）。

<74> このように、本実施例では、ＳＩＰモジュールを未搭載のＳＩＰ未対応端末５，７の間にＳＩＰモジュールを搭載するゲートウェイサーバ４，６を介してＩＰｓｅｃトンネルを形成することで、ＳＩＰモジュールを未搭載のＳＩＰ未対応端末５，７の間においても、上記の本発明の一実施例と同様に、暗号鍵の紛失による不正利用を防止することができ、その暗号鍵を用いて端末間の直接通信を安全に行うことができる。

<75> 本発明では、各実施例において、鍵管理・配信サーバ３を設け、Ｐ２Ｐ通信を行う端末各々に鍵管理・配信サーバ３で生成した秘密鍵（暗号鍵）を配信しているが、Ｐ２Ｐ通信を行う端末の一方が秘密鍵を生成し、その秘密鍵を中継する中継サーバを介してＰ２Ｐ通信を行う端末の他方に渡すことも可能であり、実施例に限定されるものではない。この場合、中継サーバは秘密鍵を中継するだけで、暗号化には関与しない。また、秘密鍵は定期的に使い捨てにすることで、より安全な通信路を確保することができる。

<76> また、本発明では、上記の各実施例において、ＳＩＰモジュールを実装していない端末とゲートウェイサーバとの間の通信方法としてＨＴＴＰについて述べているが、近距離無線通信［例えば、Ｂｌｕｅｔｏｏｔｈ（登録商標）、ＺｉｇＢｅｅ（国際登録商標）等］、UWB（Ｕｌｔｒａ　ＷｉｄｅＢａｎｄ）、赤外線通信［ＩｒＤＡ（Ｉｎｆｒａｒｅｄ　Ｄａｔａ　Ａｓｓｏｃｉａｔｉｏｎ）］等の通信方法にも適用可能である。

<78> １，１－１～１－ｎ　携帯端末装置
２　ＳＩＰサーバ
３　鍵管理・配信サーバ
４，６　ゲートウェイサーバ
５，７　ＰＣ端末
１１，５１　Ｐ２Ｐ通信アプリケーション
１２　鍵管理モジュール

Ex.1002 / Page 299 of 1008
Cisco Systems, Inc.

１３，２４，３２，４２　ＳＩＰモジュール

１４，２５，３３，４３　ＩＰｓｅｃモジュール

２１　プロキシサーバモジュール

２２　ロケーションサーバモジュール

２３　レジストレーションモジュール

３１　鍵生成モジュール

４１，５２　ＨＴＴＰ／ＨＴＴＰＳモジュール

１００　ＳＩＰネットワーク

【請求項 1】

第１の端末装置及び第２の端末装置各々が共有する暗号鍵を基に前記第１の端末装置と前記第２の端末装置との間にピアツーピアのデータ通信を実現する通信システムであって、

前記第１の端末装置及び前記第２の端末装置のうちの一方が前記ピアツーピアのデータ通信開始のトリガを第１の通信方法による通信路にて前記第１の端末装置及び前記第２の端末装置のうちの他方に通知し、

前記第１の端末装置及び前記第２の端末装置各々が前記データ通信開始トリガの送受信に応答してそれぞれ前記暗号鍵を中継する中継サーバとの間に第２の通信方法による通信路を形成しかつ前記第１の通信方法による通信路から前記第２の通信方法による通信路に切替えて前記中継サーバを介して前記第１の端末装置と前記第２の端末装置との間で前記暗号鍵を共有することを特徴とする通信システム。

【請求項 2】

前記第１の端末装置及び前記第２の端末装置各々は、それぞれ自装置の所在を示すロケーション情報を予め登録しておき、

前記第２の通信方法は、前記ロケーション情報を用いて装置間の通信路を形成する通信方法にて前記暗号鍵を用いた暗号通信路を前記第１の端末装置及び前記第２の端末装置各々と前記中継サーバとの間にそれぞれ形成する通信方法であることを特徴とする請求項１記載の通信システム。

【請求項 3】

前記第１の端末装置及び前記第２の端末装置各々がその所在を示すロケーション情報を予め登録するサーバ装置を含み、

前記サーバ装置は、前記第１の端末装置及び前記第２の端末装置各々と前記中継サーバとの間に前記第２の通信方法にて、前記ロケーション情報を用いて装置間の通信路を形成する通信方法にて前記暗号鍵を用いた暗号通信路をそれぞれ形成することを特徴とする請求項１記載の通信システム。

【請求項 4】

前記第１の端末装置及び前記第２の端末装置のうちの少なくとも一方が移動自在な携帯端末であることを特徴とする請求項１から請求項３のいずれか記載の通信システム。

【請求項 5】

前記第１の通信方法は、少なくともＳＩＰ（Ｓｅｓｓｉｏｎ　Ｉｎｉｔｉａｔｉｏｎ　Ｐｒｏｔｏｃｏｌ）を含む通信方法であり、

前記第２の通信方法は、少なくともＳＩＰとＩＰｓｅｃ［ＩＰ（Ｉｎｔｅｒｎｅｔ　Ｐｒｏｔｏｃｏｌ）　ｓｅｃｕｒｉｔｙ　ｐｒｏｔｏｃｏｌ］との組合せを含む通信方法であることを特徴とする請求項１から請求項４のいずれか記載の通信システム。

Ex.1002 / Page 300 of 1008
Cisco Systems, Inc.

【請求項 6】

前記第１の端末装置及び前記第２の端末装置のうちの少なくとも一方が前記第２の通信方法に未対応な端末であり、

前記第２の通信方法と前記未対応な端末で使用可能な第３の通信方法との変換を行うゲートウェイを含み、

前記ゲートウェイは、前記未対応な端末の代わりに前記第２の通信方法による通信路を他端末との間に形成することを特徴とする請求項１から請求項５のいずれか記載の通信システム。

【請求項 7】

前記第３の通信方法は、少なくともＨＴＴＰ（Ｈｙｐｅｒ　Ｔｅｘｔ　Ｔｒａｎｓｆｅｒ　Ｐｒｏｔｏｃｏｌ）、近距離無線通信、ＵＷＢ（Ｕｌｔｒａ　ＷｉｄｅＢａｎｄ）、赤外線通信のいずれかを使用する通信方法であることを特徴とする請求項６記載の決済システム。

【請求項 8】

鍵管理・配信サーバから第１の端末装置及び第２の端末装置に配信される暗号鍵を基に前記第１の端末装置と前記第２の端末装置との間にピアツーピアのデータ通信を実現する通信システムであって、

前記第１の端末装置及び前記第２の端末装置のうちの一方が前記ピアツーピアのデータ通信開始のトリガを、前記鍵管理・配信サーバを経由してかつ第１の通信方法による通信路にて前記第１の端末装置及び前記第２の端末装置のうちの他方に通知し、

前記第１の端末装置及び前記第２の端末装置各々が前記データ通信開始トリガの送受信に応答してそれぞれ前記鍵管理・配信サーバとの間に第２の通信方法による通信路を形成しかつ前記第１の通信方法による通信路から前記第２の通信方法による通信路に切替えて前記鍵管理・配信サーバから前記第１の端末装置及び前記第２の端末装置各々に前記暗号鍵を配信することを特徴とする通信システム。

【請求項 9】

前記第１の端末装置及び前記第２の端末装置各々は、それぞれ自装置の所在を示すロケーション情報を予め登録しておき、

前記第２の通信方法は、前記ロケーション情報を用いて装置間の通信路を形成する通信方法にて前記暗号鍵を用いた暗号通信路を前記第１の端末装置及び前記第２の端末装置各々と前記鍵管理・配信サーバとの間にそれぞれ形成する通信方法であることを特徴とする請求項８記載の通信システム。

【請求項 10】

前記第１の端末装置及び前記第２の端末装置各々がその所在を示すロケーション情報を予め登録するサーバ装置を含み、

前記サーバ装置は、前記第１の端末装置及び前記第２の端末装置各々と前記鍵管理・配信サーバとの間に前記第２の通信方法にて、前記ロケーション情報を用いて装置間の通信路を形成する通信方法にて前記暗号鍵を用いた暗号通信路をそれぞれ形成することを特徴とする請求項８記載の通信システム。

【請求項 11】

前記鍵管理・配信サーバは、前記第１の端末装置と前記第２の端末装置との間に前記第２の通信方法による通信路を形成させるために前記第１の端末装置及び前記第２の端末装置に対して前記第２の通信方法による通信路のセッションの送り先アドレスの書換えを指示する手段と、前記セッションの送り先アドレスの書換えのための暗号鍵の配送を前記ピアツーピアのデータ通信毎に行う手段とを含むことを特徴とする請求項８から請求項１０のいずれか記載の通信システム。

Ex.1002 / Page 301 of 1008
Cisco Systems, Inc.

【請求項 12】

前記第１の端末装置及び前記第２の端末装置は、前記鍵管理・配信サーバからの前記セッションの送り先アドレスの書換えの指示に応答しかつ前記鍵管理・配信サーバから配送される暗号鍵を用いて相互の間に前記第２の通信方法による通信路を形成することを特徴とする請求項１１記載の通信システム。

【請求項 13】

前記鍵管理・配信サーバは、前記第１の端末装置と前記第２の端末装置との間に前記第２の通信方法による通信路を形成させるために前記第１の端末装置及び前記第２の端末装置に対して前記第１の端末装置と前記第２の端末装置との間の前記第２の通信方法による通信路のセッションの追加を指示する手段と、前記セッションの追加のための暗号鍵の配送を前記ピアツーピアのデータ通信毎に行う手段とを含むことを特徴とする請求項８から請求項１０のいずれか記載の通信システム。

【請求項 14】

前記第１の端末装置及び前記第２の端末装置は、前記鍵管理・配信サーバからの前記セッションの追加の指示に応答しかつ前記鍵管理・配信サーバから配送される暗号鍵を用いて相互の間に前記第２の通信方法による通信路を形成することを特徴とする請求項１３記載の通信システム。

【請求項 15】

前記第１の端末装置及び前記第２の端末装置のうちの少なくとも一方が移動自在な携帯端末であることを特徴とする請求項８から請求項１４のいずれか記載の通信システム。

【請求項 16】

前記第１の通信方法は、少なくともＳＩＰ（Ｓｅｓｓｉｏｎ　Ｉｎｉｔｉａｔｉｏｎ　Ｐｒｏｔｏｃｏｌ）を含む通信方法であり、

前記第２の通信方法は、少なくともＳＩＰとＩＰｓｅｃ［ＩＰ（Ｉｎｔｅｒｎｅｔ　Ｐｒｏｔｏｃｏｌ）　ｓｅｃｕｒｉｔｙ　ｐｒｏｔｏｃｏｌ］との組合せを含む通信方法であることを特徴とする請求項８から請求項１５のいずれか記載の通信システム。

【請求項 17】

前記第１の端末装置及び前記第２の端末装置のうちの少なくとも一方が前記第２の通信方法に未対応な端末であり、

前記第２の通信方法と前記未対応な端末で使用可能な第３の通信方法との変換を行うゲートウェイを含み、

前記ゲートウェイは、前記未対応な端末の代わりに前記第２の通信方法による通信路を他端末との間に形成することを特徴とする請求項８から請求項１６のいずれか記載の通信システム。

【請求項 18】

前記第３の通信方法は、少なくともＨＴＴＰ（Ｈｙｐｅｒ　Ｔｅｘｔ　Ｔｒａｎｓｆｅｒ　Ｐｒｏｔｏｃｏｌ）、近距離無線通信、ＵＷＢ（Ｕｌｔｒａ　ＷｉｄｅＢａｎｄ）、赤外線通信のいずれかを使用する通信方法であることを特徴とする請求項１７記載の決済システム。

【請求項 19】

第１の端末装置と第２の端末装置との間にピアツーピアのデータ通信を実現する通信システムにおいて前記第１の端末装置及び前記第２の端末装置各々に暗号鍵を配信する鍵管理・配信サーバであって、

前記第１の端末装置及び前記第２の端末装置のうちの一方が送信する前記ピアツーピアのデータ通信開始のトリガを、第１の通信方法による通信路にて受信した時に前記データ通信開始のトリガを前記第１の端末装置及び前記第２の端末装置のうちの他方に転送する手段と、前記第１の端末装置及び前記第２の端末装置各々が前記ピアツ

Ex.1002 / Page 302 of 1008
Cisco Systems, Inc.

ーピアのデータ通信開始のトリガの送受信に応答して切替えかつそれぞれ自装置との間に形成した第２の通信方法による通信路にて前記暗号鍵を配信する手段とを有することを特徴とする鍵管理・配信サーバ。

【請求項 20】

前記第２の通信方法による通信路は、前記第１の端末装置及び前記第２の端末装置各々がそれぞれ登録している前記第１の端末装置及び前記第２の端末装置各々の所在を示すロケーション情報を用いて装置間の通信路を形成する通信方法にて暗号鍵を用いた暗号通信路として前記第１の端末装置及び前記第２の端末装置各々と自装置との間にそれぞれ形成されることを特徴とする請求項１９記載の鍵管理・配信サーバ。

【請求項 21】

前記第２の通信方法による通信路は、前記第１の端末装置及び前記第２の端末装置各々がその所在を示すロケーション情報を予め登録するサーバ装置が、前記第１の端末装置及び前記第２の端末装置各々と自装置との間に、前記ロケーション情報を用いて装置間の通信路を形成する通信方法にて暗号鍵を用いた暗号通信路としてそれぞれ形成されることを特徴とする請求項１９記載の鍵管理・配信サーバ。

【請求項 22】

前記第１の端末装置と前記第２の端末装置との間に前記第２の通信方法による通信路を形成させるために前記第１の端末装置及び前記第２の端末装置に対して前記第２の通信方法による通信路のセッションの送り先アドレスの書換えを指示する手段と、前記セッションの送り先アドレスの書換えのための暗号鍵の配送を前記ピアツーピアのデータ通信毎に行う手段とを含むことを特徴とする請求項１９から請求項２１のいずれか記載の鍵管理・配信サーバ。

【請求項 23】

前記第１の端末装置と前記第２の端末装置との間に前記第２の通信方法による通信路を形成させるために前記第１の端末装置及び前記第２の端末装置に対して前記第２の通信方法による通信路のセッションの追加を指示する手段と、前記セッションの追加のための暗号鍵の配送を前記ピアツーピアのデータ通信毎に行う手段とを含むことを特徴とする請求項１９から請求項２１のいずれか記載の鍵管理・配信サーバ。

【請求項 24】

前記第１の端末装置及び前記第２の端末装置のうちの少なくとも一方が移動自在な携帯端末であることを特徴とする請求項１９から請求項２３のいずれか記載の鍵管理・配信サーバ。

【請求項 25】

前記第１の通信方法は、少なくともＳＩＰ（Ｓｅｓｓｉｏｎ　Ｉｎｉｔｉａｔｉｏｎ　Ｐｒｏｔｏｃｏｌ）を含む通信方法であり、

前記第２の通信方法は、少なくともＳＩＰとＩＰｓｅｃ［ＩＰ（Ｉｎｔｅｒｎｅｔ　Ｐｒｏｔｏｃｏｌ）　ｓｅｃｕｒｉｔｙ　ｐｒｏｔｏｃｏｌ］との組合せを含む通信方法であることを特徴とする請求項１９から請求項２４のいずれか記載の鍵管理・配信サーバ。

【請求項 26】

前記第１の端末装置及び前記第２の端末装置のうちの少なくとも一方が前記第２の通信方法に未対応な端末であり、

前記第２の通信方法と前記未対応な端末で使用可能な第３の通信方法との変換を行うゲートウェイが、前記未対応な端末の代わりに前記第２の通信方法による通信路を他端末との間に形成することを特徴とする請求項１９から請求項２５のいずれか記載の鍵管理・配信サーバ。

Ex.1002 / Page 303 of 1008
Cisco Systems, Inc.

【請求項 27】
前記第３の通信方法が、少なくともＨＴＴＰ（Ｈｙｐｅｒ　Ｔｅｘｔ　Ｔｒａｎｓｆｅｒ　Ｐｒｏｔｏｃｏｌ）、近距離無線通信、ＵＷＢ（Ｕｌｔｒａ　ＷｉｄｅＢａｎｄ）、赤外線通信のいずれかを使用する通信方法であることを特徴とする請求項２６記載の鍵管理・配信サーバ。

【請求項 28】
自装置及び他の端末装置各々が共有する暗号鍵を基に自装置と前記他の端末装置との間にピアツーピアのデータ通信を行う端末装置であって、

前記ピアツーピアのデータ通信開始のトリガを、前記暗号鍵を中継する中継サーバを経由してかつ第１の通信方法による通信路にて前記他の端末装置に送信し、自装置からの前記ピアツーピアのデータ通信開始のトリガの送信及び前記他の端末装置からの前記ピアツーピアのデータ通信開始のトリガの受信のいずれかに応答して前記中継サーバとの間に第２の通信方法による通信路を形成しかつ前記第１の通信方法による通信路から前記第２の通信方法による通信路に切替えて前記中継サーバを介して前記暗号鍵の送信及び受信のいずれかを行うことを特徴とする端末装置。

【請求項 29】
自装置の所在を示すロケーション情報を予め登録しておき、

前記第２の通信方法が、前記ロケーション情報を用いて装置間の通信路を形成する通信方法にて暗号鍵を用いた暗号通信路を前記中継サーバとの間に形成する通信方法であることを特徴とする請求項２８記載の端末装置。

【請求項 30】
自装置の所在を示すロケーション情報を予め登録するサーバ装置が、自装置と前記中継サーバとの間に前記第２の通信方法を用いて、前記ロケーション情報を用いて装置間の通信路を形成する通信方法にて暗号鍵を用いた暗号通信路を形成することを特徴とする請求項２８記載の端末装置。

【請求項 31】
自装置及び前記他の端末装置のうちの少なくとも一方が移動自在な携帯端末であることを特徴とする請求項２８から請求項３０のいずれか記載の端末装置。

【請求項 32】
前記第１の通信方法は、少なくともＳＩＰ（Ｓｅｓｓｉｏｎ　Ｉｎｉｔｉａｔｉｏｎ　Ｐｒｏｔｏｃｏｌ）を含む通信方法であり、

前記第２の通信方法は、少なくともＳＩＰとＩＰｓｅｃ［ＩＰ（Ｉｎｔｅｒｎｅｔ　Ｐｒｏｔｏｃｏｌ）　ｓｅｃｕｒｉｔｙ　ｐｒｏｔｏｃｏｌ］との組合せを含む通信方法であることを特徴とする請求項２８から請求項３１のいずれか記載の端末装置。

【請求項 33】
自装置及び前記他の端末装置のうちの少なくとも一方が前記第２の通信方法に未対応な端末であり、

前記第２の通信方法と前記未対応な端末で使用可能な第３の通信方法との変換を行うゲートウェイが、前記未対応な端末の代わりに前記第２の通信方法による通信路を他端末との間に形成することを特徴とする請求項２８から請求項３２のいずれか記載の端末装置。

【請求項 34】
前記第３の通信方法は、少なくともＨＴＴＰ（Ｈｙｐｅｒ　Ｔｅｘｔ　Ｔｒａｎｓｆｅｒ　Ｐｒｏｔｏｃｏｌ）、近距離無線通信、ＵＷＢ（Ｕｌｔｒａ　ＷｉｄｅＢａｎｄ）、赤外線通信のいずれかを使用する通信方法であることを特徴とする請求項３３記載の端末装置。

Ex.1002 / Page 304 of 1008
Cisco Systems, Inc.

【請求項 35】

鍵管理・配信サーバから自装置及び他の端末装置に配信される暗号鍵を基に自装置と前記他の端末装置との間でピアツーピアのデータ通信を行う端末装置であって、

前記ピアツーピアのデータ通信開始のトリガを、前記鍵管理・配信サーバを経由してかつ第１の通信方法による通信路にて前記他の端末装置に送信し、自装置からの前記ピアツーピアのデータ通信開始のトリガの送信及び前記他の端末装置からの前記ピアツーピアのデータ通信開始のトリガの受信のいずれかに応答して前記鍵管理・配信サーバとの間に第２の通信方法による通信路を形成しかつ前記第１の通信方法による通信路から前記第２の通信方法による通信路に切替えて前記鍵管理・配信サーバから前記暗号鍵を受信することを特徴とする端末装置。

【請求項 36】

自装置の所在を示すロケーション情報を予め登録しておき、

前記第２の通信方法が、前記ロケーション情報を用いて装置間の通信路を形成する通信方法にて暗号鍵を用いた暗号通信路を前記鍵管理・配信サーバとの間に形成する通信方法であることを特徴とする請求項３５記載の端末装置。

【請求項 37】

自装置の所在を示すロケーション情報を予め登録するサーバ装置が、自装置と前記鍵管理・配信サーバとの間に前記第２の通信方法を用いて、前記ロケーション情報を用いて装置間の通信路を形成する通信方法にて暗号鍵を用いた暗号通信路を形成することを特徴とする請求項３５記載の端末装置。

【請求項 38】

前記鍵管理・配信サーバからの指示によって前記他の端末装置との間に前記第２の通信方法による通信路のセッションの送り先アドレスの書換えを行い、前記セッションの送り先アドレスの書換えを前記鍵管理・配信サーバから前記ピアツーピアのデータ通信毎に配送される暗号鍵を用いて行うことを特徴とする請求項３５から請求項３７のいずれか記載の端末装置。

【請求項 39】

前記鍵管理・配信サーバからの指示によって前記他の端末装置との間に前記第２の通信方法による通信路のセッションの追加を行い、前記セッションの追加を前記鍵管理・配信サーバから前記ピアツーピアのデータ通信毎に配送される暗号鍵を用いて行うことを特徴とする請求項３５から請求項３７のいずれか記載の端末装置。

【請求項 40】

自装置及び前記他の端末装置のうちの少なくとも一方が移動自在な携帯端末であることを特徴とする請求項３５から請求項３９のいずれか記載の端末装置。

【請求項 41】

前記第１の通信方法は、少なくともＳＩＰ（Ｓｅｓｓｉｏｎ　Ｉｎｉｔｉａｔｉｏｎ　Ｐｒｏｔｏｃｏｌ）を含む通信方法であり、

前記第２の通信方法は、少なくともＳＩＰとＩＰｓｅｃ［ＩＰ（Ｉｎｔｅｒｎｅｔ　Ｐｒｏｔｏｃｏｌ）　ｓｅｃｕｒｉｔｙ　ｐｒｏｔｏｃｏｌ］との組合せを含む通信方法であることを特徴とする請求項３５から請求項４０のいずれか記載の端末装置。

【請求項 42】

自装置及び前記他の端末装置のうちの少なくとも一方が前記第２の通信方法に未対応な端末であり、

前記第２の通信方法と前記未対応な端末で使用可能な第３の通信方法との変換を行うゲートウェイが、前記未対

Ex.1002 / Page 305 of 1008
Cisco Systems, Inc.

応な端末の代わりに前記第２の通信方法による通信路を他端末との間に形成することを特徴とする請求項３５から請求項４１のいずれか記載の端末装置。

【請求項 43】

前記第３の通信方法は、少なくともＨＴＴＰ（Ｈｙｐｅｒ　Ｔｅｘｔ　Ｔｒａｎｓｆｅｒ　Ｐｒｏｔｏｃｏｌ）、近距離無線通信、ＵＷＢ（Ｕｌｔｒａ　ＷｉｄｅＢａｎｄ）、赤外線通信のいずれかを使用する通信方法であることを特徴とする請求項４２記載の端末装置。

【請求項 44】

自装置及び他の端末装置各々が共有する暗号鍵を基に自装置と前記他の端末装置との間にピアツーピアのデータ通信を行うシステムに用いられるデータ通信方法であって、

前記端末装置が、

前記ピアツーピアのデータ通信開始のトリガを、前記暗号鍵を中継する中継サーバを経由してかつ第１の通信方法による通信路にて前記他の端末装置に送信する処理と、自装置からの前記ピアツーピアのデータ通信開始のトリガの送信及び前記他の端末装置からの前記ピアツーピアのデータ通信開始のトリガの受信のいずれかに応答して前記中継サーバとの間に第２の通信方法による通信路を形成しかつ前記第１の通信方法による通信路から前記第２の通信方法による通信路に切替えて前記中継サーバを介して前記暗号鍵の送信及び受信のいずれかを行う処理とを実行することを特徴とするデータ通信方法。

【請求項 45】

前記端末装置及び前記他の端末装置各々が、それぞれ自装置の所在を示すロケーション情報を予め登録しておき、

前記第２の通信方法が、前記ロケーション情報を用いて装置間の通信路を形成する通信方法にて前記暗号鍵を用いた暗号通信路を前記端末装置及び前記他の端末装置各々と前記中継サーバとの間にそれぞれ形成する通信方法であることを特徴とする請求項４４記載のデータ通信方法。

【請求項 46】

前記第１の端末装置及び前記第２の端末装置各々がその所在を示すロケーション情報を予め登録するサーバ装置を含み、

前記サーバ装置は、前記第１の端末装置及び前記第２の端末装置各々と前記中継サーバとの間に前記第２の通信方法にて、前記ロケーション情報を用いて装置間の通信路を形成する通信方法にて前記暗号鍵を用いた暗号通信路をそれぞれ形成することを特徴とする請求項４４記載のデータ通信方法。

【請求項 47】

前記第１の端末装置及び前記第２の端末装置のうちの少なくとも一方が移動自在な携帯端末であることを特徴とする請求項４４から請求項４６のいずれか記載のデータ通信方法。

【請求項 48】

前記第１の通信方法は、少なくともＳＩＰ（Ｓｅｓｓｉｏｎ　Ｉｎｉｔｉａｔｉｏｎ　Ｐｒｏｔｏｃｏｌ）を含む通信方法であり、

前記第２の通信方法は、少なくともＳＩＰとＩＰｓｅｃ［ＩＰ（Ｉｎｔｅｒｎｅｔ　Ｐｒｏｔｏｃｏｌ）　ｓｅｃｕｒｉｔｙ　ｐｒｏｔｏｃｏｌ］との組合せを含む通信方法であることを特徴とする請求項４４から請求項４７のいずれか記載のデータ通信方法。

【請求項 49】

前記第１の端末装置及び前記第２の端末装置のうちの少なくとも一方が前記第２の通信方法に未対応な端末であり、

Ex.1002 / Page 306 of 1008
Cisco Systems, Inc.

前記第２の通信方法と前記未対応な端末で使用可能な第３の通信方法との変換を行うゲートウェイを含み、

前記ゲートウェイが、前記未対応な端末の代わりに前記第２の通信方法による通信路を他端末との間に形成することを特徴とする請求項４４から請求項４８のいずれか記載のデータ通信方法。

【請求項 50】

前記第３の通信方法は、少なくともＨＴＴＰ（Ｈｙｐｅｒ　Ｔｅｘｔ　Ｔｒａｎｓｆｅｒ　Ｐｒｏｔｏｃｏｌ）、近距離無線通信、ＵＷＢ（Ｕｌｔｒａ　ＷｉｄｅＢａｎｄ）、赤外線通信のいずれかを使用する通信方法であることを特徴とする請求項４９記載のデータ通信方法。

【請求項 51】

鍵管理・配信サーバから端末装置及び他の端末装置に配信される暗号鍵を基に前記端末装置と前記他の端末装置との間でピアツーピアのデータ通信を行うシステムに用いられるデータ通信方法であって、

前記端末装置が、前記ピアツーピアのデータ通信開始のトリガを、前記鍵管理・配信サーバを経由してかつ第１の通信方法による通信路にて前記他の端末装置に送信する処理と、前記ピアツーピアのデータ通信開始のトリガの送受信に応答して前記鍵管理・配信サーバとの間に第２の通信方法による通信路を形成しかつ前記第１の通信方法による通信路から前記第２の通信方法による通信路に切替えて前記鍵管理・配信サーバから前記暗号鍵を受信する処理とを実行することを特徴とするデータ通信方法。

【請求項 52】

前記端末装置及び前記他の端末装置各々が、それぞれ自装置の所在を示すロケーション情報を予め登録しておき、

前記第２の通信方法が、前記ロケーション情報を用いて装置間の通信路を形成する通信方法にて前記暗号鍵を用いた暗号通信路を前記端末装置及び前記他の端末装置各々と前記鍵管理・配信サーバとの間にそれぞれ形成する通信方法であることを特徴とする請求項５１記載のデータ通信方法。

【請求項 53】

前記端末装置及び前記他の端末装置各々がその所在を示すロケーション情報を予め登録するサーバ装置を含み、

前記サーバ装置が、前記端末装置及び前記他の端末装置各々と前記鍵管理・配信サーバとの間に前記第２の通信方法にて、前記ロケーション情報を用いて装置間の通信路を形成する通信方法にて前記暗号鍵を用いた暗号通信路をそれぞれ形成することを特徴とする請求項５１記載のデータ通信方法。

【請求項 54】

前記鍵管理・配信サーバが、前記第１の端末装置と前記第２の端末装置との間に前記第２の通信方法による通信路を形成させるために前記第１の端末装置及び前記第２の端末装置に対して前記第２の通信方法による通信路のセッションの送り先アドレスの書換えを指示する処理と、前記セッションの送り先アドレスの書換えのための暗号鍵の配送を前記ピアツーピアのデータ通信毎に行う処理とを実行することを特徴とする請求項５１から請求項５３のいずれか記載のデータ通信方法。

【請求項 55】

前記端末装置及び前記他の端末装置は、前記鍵管理・配信サーバからの前記セッションの送り先アドレスの書換えの指示に応答しかつ前記鍵管理・配信サーバから配送される暗号鍵を用いて相互の間に前記第２の通信方法による通信路を形成することを特徴とする請求項５４記載のデータ通信方法。

【請求項 56】

前記鍵管理・配信サーバが、前記第１の端末装置と前記第２の端末装置との間に前記第２の通信方法による通信路を形成させるために前記第１の端末装置及び前記第２の端末装置に対して前記第１の端末装置と前記第２の端末装置との間の前記第２の通信方法による通信路のセッションの追加を指示する処理と、前記セッションの追加のた

Ex.1002 / Page 307 of 1008
Cisco Systems, Inc.

めの暗号鍵の配送を前記ピアツーピアのデータ通信毎に行う処理とを実行することを特徴とする請求項５１から請求項５３のいずれか記載のデータ通信方法。

【請求項 57】

前記端末装置及び前記他の端末装置は、前記鍵管理・配信サーバからの前記セッションの追加の指示に応答しかつ前記鍵管理・配信サーバから配送される暗号鍵を用いて相互の間に前記第２の通信方法による通信路を形成することを特徴とする請求項５６記載のデータ通信方法。

【請求項 58】

前記端末装置及び前記他の端末装置のうちの少なくとも一方が移動自在な携帯端末であることを特徴とする請求項５１から請求項５７のいずれか記載のデータ通信方法。

【請求項 59】

前記第１の通信方法は、少なくともＳＩＰ（Ｓｅｓｓｉｏｎ　Ｉｎｉｔｉａｔｉｏｎ　Ｐｒｏｔｏｃｏｌ）を含む通信方法であり、

前記第２の通信方法は、少なくともＳＩＰとＩＰｓｅｃ［ＩＰ（Ｉｎｔｅｒｎｅｔ　Ｐｒｏｔｏｃｏｌ）　ｓｅｃｕｒｉｔｙ　ｐｒｏｔｏｃｏｌ］との組合せを含む通信方法であることを特徴とする請求項５１から請求項５８のいずれか記載のデータ通信方法。

【請求項 60】

前記端末装置及び前記他の端末装置のうちの少なくとも一方が前記第２の通信方法に未対応な端末であり、

前記第２の通信方法と前記未対応な端末で使用可能な第３の通信方法との変換を行うゲートウェイを含み、

前記ゲートウェイが、前記未対応な端末の代わりに前記第２の通信方法による通信路を他端末との間に形成することを特徴とする請求項５１から請求項５９のいずれか記載のデータ通信方法。

【請求項 61】

前記第３の通信方法は、少なくともＨＴＴＰ（Ｈｙｐｅｒ　Ｔｅｘｔ　Ｔｒａｎｓｆｅｒ　Ｐｒｏｔｏｃｏｌ）、近距離無線通信、ＵＷＢ（Ｕｌｔｒａ　ＷｉｄｅＢａｎｄ）、赤外線通信のいずれかを使用する通信方法であることを特徴とする請求項６０記載のデータ通信方法。

【請求項 62】

自装置及び他の端末装置各々が共有する暗号鍵を基に自装置と前記他の端末装置との間にピアツーピアのデータ通信を行うシステムに用いられるデータ通信方法のプログラムであって、

前記ピアツーピアのデータ通信開始のトリガを、前記暗号鍵を中継する中継サーバを経由してかつ第１の通信方法による通信路にて前記他の端末装置に送信する処理と、自装置からの前記ピアツーピアのデータ通信開始のトリガの送信及び前記他の端末装置からの前記ピアツーピアのデータ通信開始のトリガの受信のいずれかに応答して前記中継サーバとの間に第２の通信方法による通信路を形成しかつ前記第１の通信方法による通信路から前記第２の通信方法による通信路に切替えて前記中継サーバを介して前記暗号鍵の送信及び受信のいずれかを行う処理とを前記端末装置のコンピュータに実行させるためのプログラム。

【請求項 63】

鍵管理・配信サーバから端末装置及び他の端末装置に配信される暗号鍵を基に前記端末装置と前記他の端末装置との間でピアツーピアのデータ通信を行うシステムに用いられるデータ通信方法のプログラムであって、

前記ピアツーピアのデータ通信開始のトリガを、前記鍵管理・配信サーバを経由してかつ第１の通信方法による通信路にて前記他の端末装置に送信する処理と、前記ピアツーピアのデータ通信開始のトリガの送受信に応答して前記鍵管理・配信サーバとの間に第２の通信方法による通信路を形成しかつ前記第１の通信方法による通信路から

前記第２の通信方法による通信路に切替えて前記鍵管理・配信サーバから前記暗号鍵を受信する処理とを前記端末装置のコンピュータに実行させるためのプログラム。

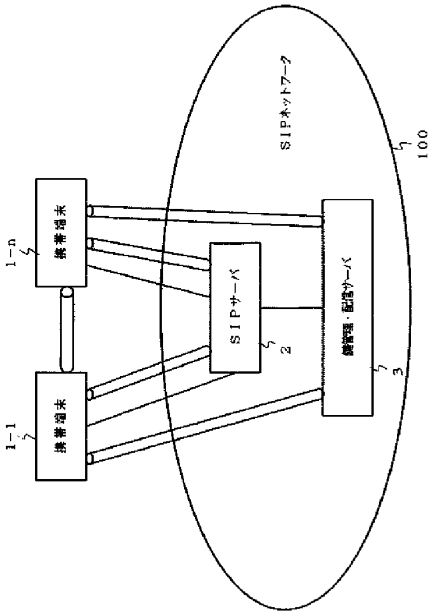
(57)【要約】

【課題】　暗号鍵の紛失による不正利用を防止し、その暗号鍵を用いて端末間の直接通信を安全に行うことが可能な移動通信システムを提供する。

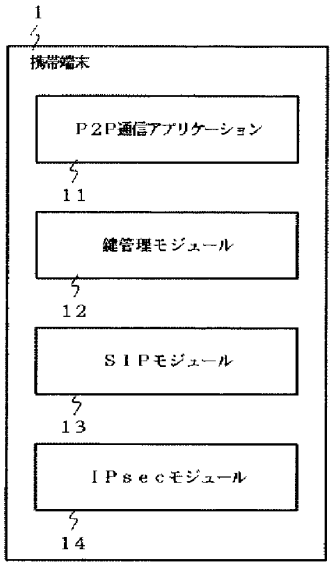
【解決手段】　携帯端末装置１－１は鍵管理・配信サーバ３を通して携帯端末装置１－ｎにＰ２Ｐ通信のトリガを送る。このトリガの送受信に応答して携帯端末装置１－１，１－ｎはＳＩＰサーバ２を通して鍵管理・配信サーバ３との間にＩＰｓｅｃデータセッションを確立して鍵管理・配信サーバ３から携帯端末装置１－１，１－ｎに一通信毎の秘密鍵を配信する。携帯端末装置１－１，１－ｎはその秘密鍵を用いて互いの間にＩＰｓｅｃデータセッションを確立してＰ２Ｐ通信を行う。鍵管理・配信サーバ３は携帯端末装置１－１，１－ｎに対してセッションへの張替え、セッション確立のための鍵配送制御を実施する。

【選択図】　図１

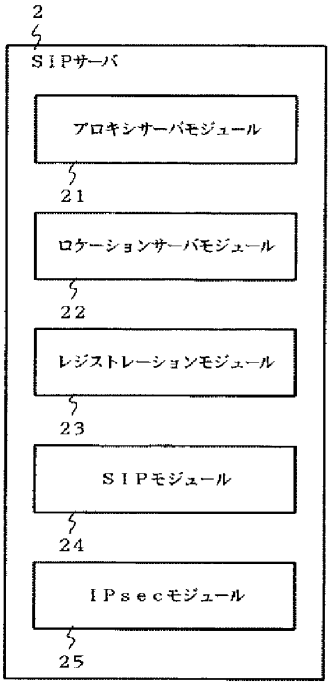
【圖 1】



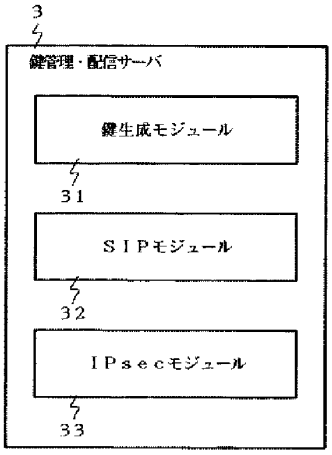
【圖 2】


1
携帯端末
P2P通信アプリケーション
11
鍵管理モジュール
12
ＳＩＰモジュール
13
ＩＰｓｅｃモジュール
14

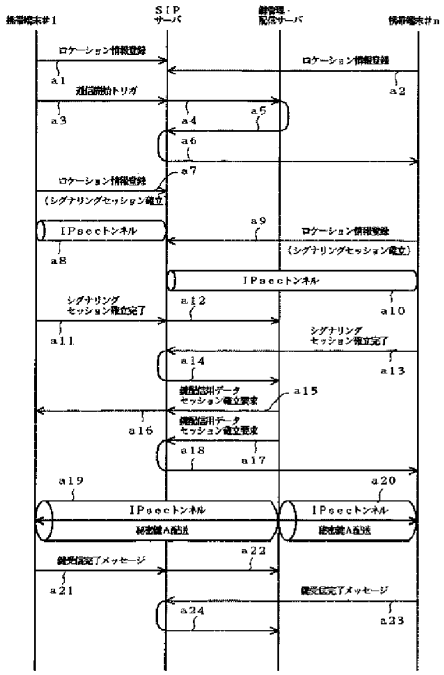
【圖 3】


2
ＳＩＰサーバ
プロキシサーバモジュール
21
ロケーションサーバモジュール
22
レジストレーションモジュール
23
ＳＩＰモジュール
24
ＩＰｓｅｃモジュール
25

【圖 4】

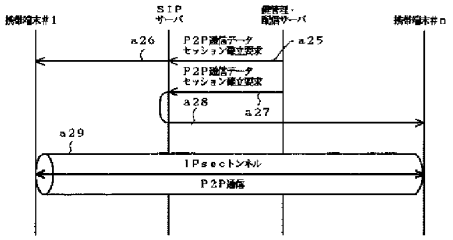


【圖 5】

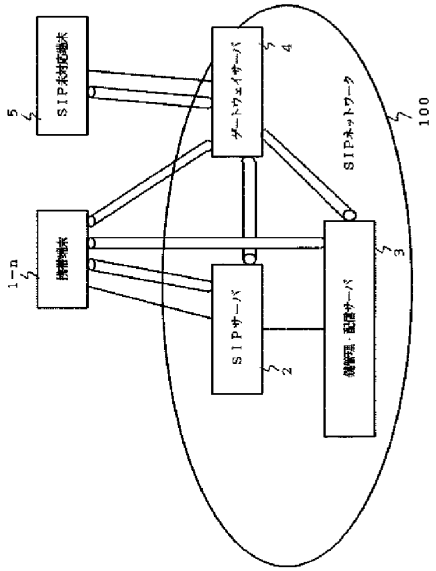


Ex.1002 / Page 311 of 1008
Cisco Systems, Inc.

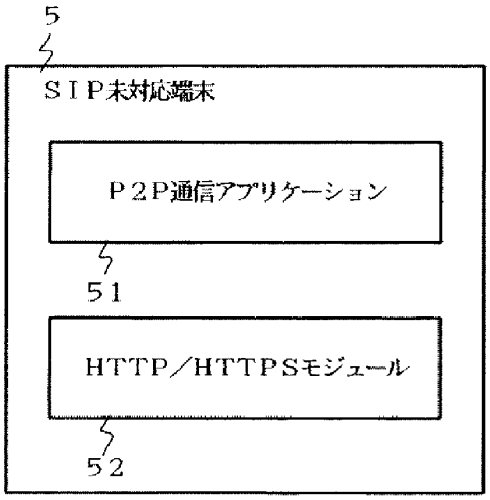
【圖 6】


携帯端末#1
SIP
サーバ
携帯端末#n
a26
P2P通信データ
セッション確立要求
a25
P2P通信データ
セッション確立要求
a28
a27
a29
IPsecトンネル
P2P通信

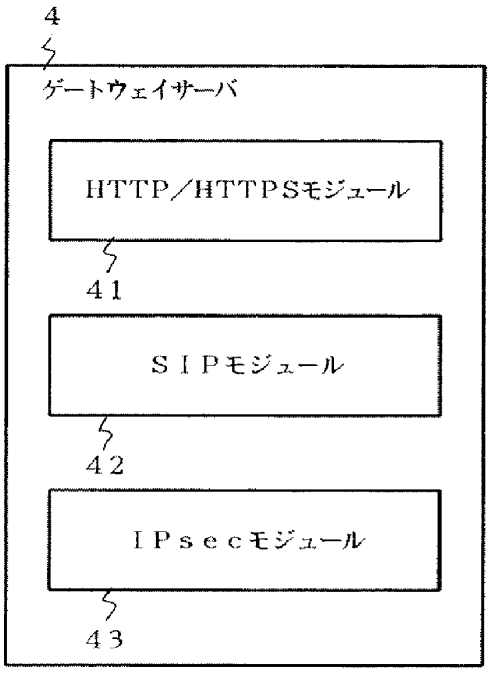
【圖 7】


SIP未対応端末
5
ゲートウェイサーバ
4
SIPネットワーク
100
携帯端末
1-n
SIPサーバ
2
3

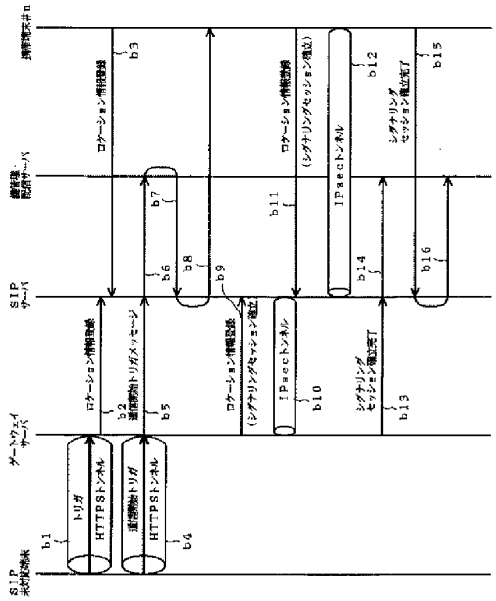
【圖 8】


5
ＳＩＰ未対応端末
Ｐ２Ｐ通信アプリケーション
51
HTTP／HTTPSモジュール
52

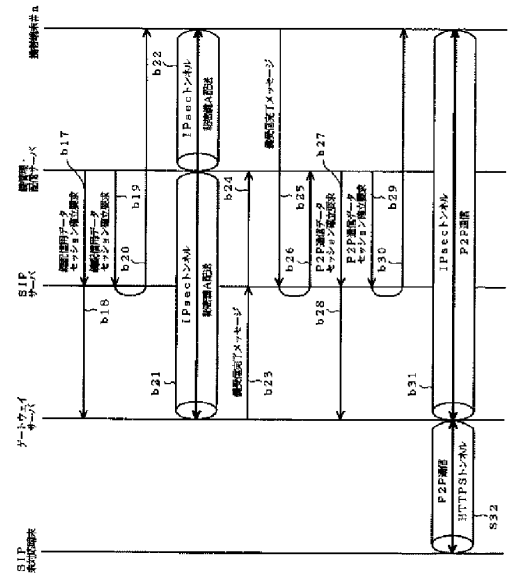
【圖 9】


4
ゲートウェイサーバ
HTTP／HTTPSモジュール
41
ＳＩＰモジュール
42
ＩＰｓｅｃモジュール
43

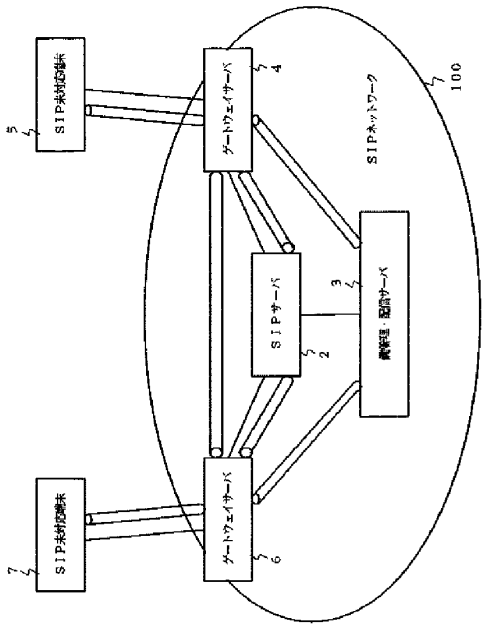
【図 10】



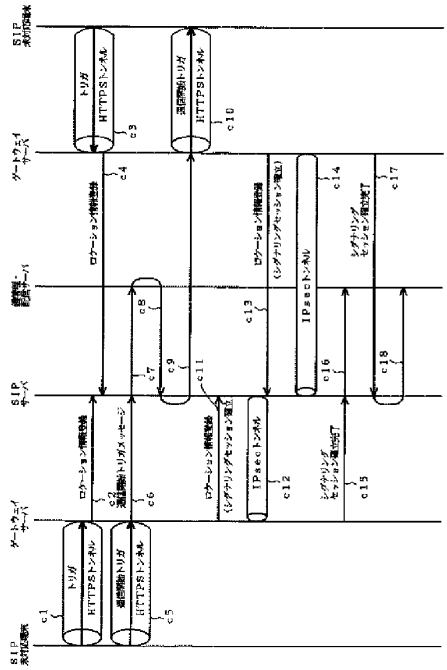
【図 11】



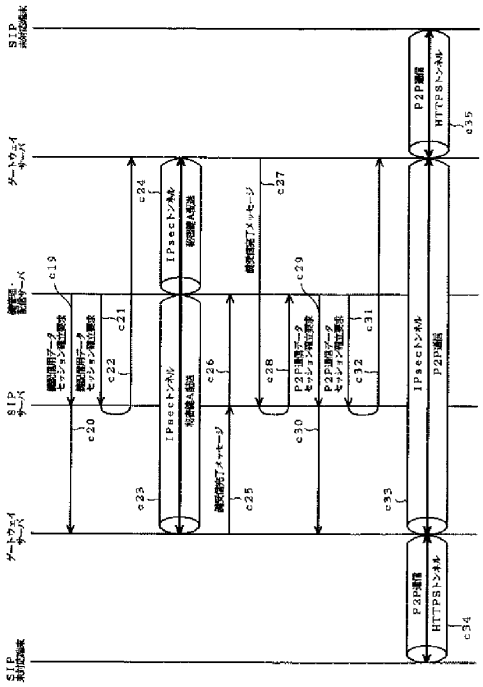
【図 12】


SIP未対応端末
ゲートウェイサーバ
SIPネットワーク
SIPサーバ
SIP未対応端末
ゲートウェイサーバ

【図 13】


SIP
ゲートウェイ
SIP
ゲートウェイ
トリガ
HTTPSトンネル
IPsecトンネル

【図 14】



(72)発明者　藤田　直毅

東京都港区芝五丁目７番１号　日本電気株式会社内

Ｆターム(参考) 5J104 AA01　AA16　EA04　EA15　EA16　EA17　EA18　JA03　MA05　NA02

NA37

Ex.1002 / Page 316 of 1008
Cisco Systems, Inc.

(19) 대한민국특허청(KR)
(12) 공개특허공보(A)

(51) Int. Cl.[7]
G06F 15/00

(11) 공개번호 10-2005-0030548
(43) 공개일자 2005년03월30일

(21) 출원번호	10-2004-0074456
(22) 출원일자	2004년09월17일
(30) 우선권주장	10/671,397 2003년09월25일 미국(US)
(71) 출원인	마이크로소프트 코포레이션 미국 워싱턴주 (우편번호 : 98052) 레드몬드 원 마이크로소프트 웨이
(72) 발명자	다니엘리데이먼브이. 미국 98004 워싱턴주 클라이드 힐 84번 플레이스 노쓰이스트 2685
(74) 대리인	주성민, 백만기, 이중희

심사청구 : 없음

(54) 피어-투-피어 통신의 서버 제어

요약

서버는 클라이언트들 간의 피어-투-피어 통신을 확립하기 위한 보안 환경을 제공한냐. 서버의 2개의 클라이언트가 피어-투-피어 통신을 확립하기를 원할 때, 이들은 우선 서버에 접속한다. 서버는 각각의 클라이언트를 인증하고, 인증된 클라이언트에 정보를 제공하여 피어-투-피어 통신을 확립할 수 있게 한다. 피어-투-피어 통신의 특권을 악용하는 모든 클라이언트는 인증된 권리를 상실할 수 있다. 실시예에서, 서버는 게임 서버이며, 클라이언트는 바람직하게는 음성 기반의 피어-투-피어 통신을 사용하여 게임 플레이에 참여한다. 상이한 허가 레벨이 상이한 클라이언트에 허가되어 클라이언트들 간의 인터랙션을 제한할 수 있다.

대표도

도5

색인어

피어-투-피어 통신, 서버 제어, 보안 환경, 액세스 허가

명세서

도면의 간단한 설명

도 1은 게임 콘솔, 및 4개까지의 사용자 입력 디바이스를 위한 지원을 포함하는 예시적인 전자 게임 시스템을 도시한 도면.

도 2는 게임 시스템의 구성요소들을 더 상세하게 나타낸 기능 블럭도.

도 3은 네트워크를 통하여 다수의 게임 시스템을 상호 접속하는 예시적인 네트워크 게임 환경을 도시한 도면.

도 4는 온라인 서비스를 위한 예시적인 시스템에서 사용되는 종래의 서버 컴퓨터 형태의 범용 컴퓨팅 디바이스의 기능 블럭도.

도 5는 서버의 클라이언트들 간의 피어-투-피어 접속의 확립을 용이하게 하는 신뢰되는 환경을 제공하는 서버를 개략적으로 도시한 도면.

도 6은 서버가 자신의 클라이언트들 간의 피어-투-피어 접속의 확립을 용이하게 하는 신뢰되는 환경을 제공할 수 있게 하기 위하여 본 발명에서 사용되는 논리를 나타낸 흐름도.

도 7은 도 5에 기초하는 것으로서, 서버가 게임 서버이고 각각의 클라이언트가 플레이어인 본 발명의 바람직한 실시예를 나타낸 도면.

도 8은 도 3의 예시적인 네트워크 게임 환경의 구성요소들을 더 상세하게 나타낸 기능 블럭도.

Ex.1002 / Page 317 of 1008
Cisco Systems, Inc.

도 9는 게임 플레이 동안 플레이어들 간의 피어-투-피어 접속을 용이하게 하기 위하여 게임 서버에 의해 사용되는 논리를 나타낸 흐름도.

도 10은 게임 플레이 동안 플레이어들 간의 피어-투-피어 접속을 용이하게 하기 위하여 게임 서버에 의해 사용되는 논리에 관한 추가의 세부 사항을 나타낸 흐름도.

도 11은 핵심 기능이 클라이언트들 간의 피어-투-피어 접속의 확립을 용이하게 하는 것인 호스팅 서버를 포함하며, 클라이언트 클래스에 따라 호스팅 서버에 대한 액세스 권한이 상이한 경우의 예시적인 네트워크의 개략도.

<도면의 주요 부분에 대한 부호의 설명>

510 : 네트워크

512 : 서버

514, 516, 518 : 클라이언트

발명의 상세한 설명

발명의 목적

발명이 속하는 기술분야 및 그 분야의 종래기술

본 발명은 일반적으로 피어-투-피어 통신에 관한 것으로, 더 상세하게는 서버를 사용하여 허가된 클라이언트를 인증하고, 인증된 클라이언트들 간에서 피어-투-피어 통신이 확립될 수 있게 하는 것에 관한 것이다.

현재, 전자 디바이스의 사용자들에게 있어서, 다른 사용자와 전자적으로 인터랙션하고, 또한 채팅 세션, 인스턴스 메시징, 합동 작업 프로젝트 및 멀티플레이어 게임을 비롯한 그룹 활동에 참여하는 것은 흔한 일이다. 특히, 게임 및 기타 전자 활동을 위한 음성 통신은 인터넷 또는 기타 네트워크를 통해 접속된 개인들에게 점점 더 인기를 얻어가고 있다. 멀티플레이어 게임에 참여하는 개인들에게 있어서, 음성 통신은 즐거움의 깊이 및 게임 플레이어들 간의 사회적인 인터랙션을 크게 확장시키고 있다.

이와 같은 많은 응용 분야에서, 사용자는 그룹에 참여하는 동안 익명으로 남아있음으로써, 민감한 그룹 토론에 참여하거나, 관습에 어긋나는 견해를 표현하거나, 또는 자신의 신분이 그룹 내의 다른 사람들에게 알려져 있었다면 하지 않았을 사회적으로 위험한 다른 행동들을 하는 것에 관한 걱정을 덜 수 있다. 따라서, 이와 같은 전자 통신 및 그룹 세션을 통한 다른 사용자와의 인터랙션은 종종 개별 사용자 및 그룹 양자 모두의 생산성, 교육적 경험 및 엔터테인먼트를 강화한다.

불행하게도, 공개 포럼의 악용은, 선택된 일부를 제외한 모두에 대하여 이러한 공공 포럼의 유용성 및 즐거움을 파괴시킨다. 예를 들어, 공용 인터넷 통신 디렉토리의 채용은 "성인 자료"에 의하여 방해받아 왔다 (파괴되지 않은 경우). 경험에 의하여, 그룹 내 회원들의 디렉토리가 공용으로 이용가능한 경우, "성인" 회사들이 이러한 디렉토리를 이용하여 성적으로 노골적인 자료를 광고하거나 전송한다는 것을 알고 있다. 이러한 디렉토리를 유지하는 그룹의 호스트들은, 이와 같은 광고의 내용이 일부 사용자들을 몰아내는 것은 물론, 그룹 내 회원들을 대상으로 하는 이러한 성인 광고의 양이 지나치게 많아서, 다른 주제에 관한 대화를 설정하고자 하는 사용자들이 실제로 성적으로 노골적이지 않은 주제에 관심이 있는 합법적인 회원을 식별하는 데에 어려움을 겪는다는 것을 경험해왔다. 마이크로소프트사는 마이크로소프트 회사 서버 상에서의 피어-투-피어 통신을 위한 공용 ILS(Internet Lookup Service)를 유지했었다. 최초 공개 후, 성인 자료는 점점 더 대량으로 나타나기 시작했고, 결국에는 디렉토리 내의 컨텐츠의 대부분이 원래의 관심있는 주제가 아니라, 성적으로 노골적인 자료에 관한 것이 되었다. 이러한 원하지 않는 자료가 원래의 의도된 개인 또는 사업 통신 사용에 대한 디렉토리의 유용성에 심각한 부정적인 영향을 미쳤기 때문에, 마이크로소프트사는 디렉토리 서비스를 중단했다.

온라인 커뮤니티의 대두사구 규정되거나 암묵적인 행동 규약을 따르는 경우에서도, 참가자들 간의 행동 규범을 스스로 구현하고 강제할 수 있는 사용자들의 커뮤니티는 거의 존재하지 않는다. 물론, 전자 그룹의 통신이 제3자 호스트의 총괄적인 제어 하에 있다면, 그 호스트는 커뮤니티 규범을 제정하여 필요에 따라 개입할 수 있다. 개별 회원들 각각의 서버의 클라이언트이고, 클라이언트의 환경 사용을 제어할 수 있는 충분한 권한을 갖는 서버 및 호스트에 의하여 클라이언트들 간의 통신이 관리되는 종래의 클라이언트/서버 환경에서는, 이러한 방식이 효과가 있다. 온라인 게임에서는 각각의 게이머가 게임 서버의 클라이언트이므로, 온라인 게임 플레이는 이러한 패러다임의 대표적인 예이다. 게임 서버(들)가 상이한 플레이어들 간에 택스트 및/또는 음성 통신 서비스를 제공하는 한, 호스트는 서버에 대한 클라이언트 액세스를 통제함으로써 제어를 행할 수 있다. 마찬가지로, 개별 사용자들 간의 피어-투-피어 통신의 확립을 용이하게 하는 신뢰할 수 있는 환경을 형성하는 방법 및 시스템을 제공하는 것이 바람직할 것이다.

특히, 서버의 주된 역할이 클라이언트들 간의 통신을 관리하는 것 이외의 것인 경우, 클라이언트들 간의 통신의 총량은 서버에 바람직하지 못한 부담을 줄 정도로 크게 증가할 수 있다. 서버가 온라인 게임 플레이를 호스트하는 예에서, 플레이어들 간의 음성 통신을 관리하는 데에 요구되는 서버 오버헤드의 양은 상당히 많을 수 있다.

예를 들어, 대규모 멀티플레이어 게임은 중앙화된 대형 서버(또는 서버 그룹)에 의해 호스트되며, 여기에는 수천의 클라이언트가 접속될 수 있다. 중앙화된 서버는 "세계 상태(world state)"를 담당하고, 클라이언트(즉, 플레이어의 컴퓨터 또는 게임 콘솔)는 플레이어의 관점에서 본 세계(일반적으로 전체 세계의 일부분일 뿐임)를 디스플레이하는 것을 담당한다. 클라이언트는 플레이어의 입력과 상태를 계속적으로 서버에 송신한다. 서버는 세계를 업데이트하고, 새로운 세계의 정보를 클라이언트에 계속적으로 리턴시킨다.

현재, 알려져 있는 모든 대규모 멀티플레이어 게임 네트워크는 모든 통신을 중앙 서버를 통하여 라우팅한

다. 즉, 플레이어 A가 플레이어 B에 텍스트 메시지를 보내고자 하는 경우, 플레이어 A는 메시지를 서버에 보내고, 서버는 그 메시지를 플레이어 B에 중계한다. 이와 같은 방식을 택하는 데에는 다음과 같은 좋은 이유가 있다.

· 텍스트 채팅에서, 추가의 대역폭은 상당량의 서버 오버헤드를 부과하지 않는다.

· 피어-투-피어 접속을 확립하는 데에는 시간이 소요된다.

· 피어-투-피어 접속은 서버에 의한 추가의 도움없이는 작동하지 않을 수도 있다.

· 다수의 플레이어에게 메시지를 "패닝(panning)"하는 것은 서버 상에서 효율적으로 행해질 수 있다.

· 송신측 플레이어의 IP 어드레스는 수신측 플레이어에게 "히든" 상태로 된다.

그러나, 음성 채팅은 텍스트 채팅보다 훨씬 큰 대역폭을 필요로 하기 때문에, 대규모 멀티플레이어 게임 네트워크에서 음성 채팅 기능을 추가하는 것은 게임을 호스트하는 중앙 서버에 막대한 부담이 될 수 있다. 그러므로, 게임 서버가 플레이어들 간의 피어-투-피어 통신을 용이하게 하여, 이러한 피어-투-피어 통신이 시작될 수 있는 보안 환경을 제공하면서, 서버 자원에 대한 요구를 감소시킬 수 있게 하는 시스템 및 방법을 제공하는 것이 바람직하다.

발명이 이루고자 하는 기술적 과제

본 발명은, 그에 대한 액세스를 갖는 사용자들 간에서의 피어-투-피어 통신의 확립을 용이하게 하는 신뢰되는 환경을 제공하는 방법 및 시스템에 관한 것이다. 특히, 서버는 각각의 사용자가 그에 대한 액세스를 허가받기 전에 소정의 규범에 따를 것을 확실하게 함으로써, 사용자를 위한 신뢰되는 세션 환경을 제공한다. 서버는 한 세션을 호스트하고, 그 세션에 액세스하려고 시도하는 각각의 사용자의 자격을 검사하여, 서버에 의해 자격을 승인받은 사용자만이 세션에 들어오게 한다. 세션동안, 사용자들은 현재 서버에 의해 승인받은 한명 이상의 다른 사용자를 식별하는 리스트에 대한 액세스를 허가받는다. 리스트는 현재 세션에 액세스하고 있는 사용자를 포함하는 것이 바람직하다. 제1 사용자는 이러한 리스트로부터 제2 사용자를 선택하고, 제1 사용자와 제2 사용자 간에 형성될 피어-투-피어 접속을 용이하게 하기 위한 정보를 제공할 것을 서버에 요청한다. 서버는 제1 사용자에게 필요한 정보를 전송하고, 제1 사용자는 제2 사용자와의 피어-투-피어 통신 링크를 확립하려고 시도한다. 시도가 실패하는 경우, 제1 사용자는 서버에 실패를 알리고, 서버는 제2 사용자에게 정보를 전송하여, 제2 사용자가 피어-투-피어 통신의 확립을 시도할 수 있게 한다.

서버는 상이한 세션들을 동시에 호스트할 수 있고, 사용자는 개별 사용자에게 허가된 액세스 레벨에 따라 이러한 세션들 전부보다 적은 수의 세션에 액세스할 수 있다. 예를 들어, 서버는 복수의 상이한 게임 세션을 호스트할 수 있고, 각각의 사용자는 동일한 게임 세션에 액세스하는 다른 사용자하고만 통신하도록 제한될 수 있다.

피어-투-피어 통신의 확립을 용이하게 하기 위하여 서버에 의해 제공되는 정보는 사용자의 외부 IP 어드레스, 사용자와 연관된 임의의 내부 IP 어드레스, 및 사용자와 연관된 임의의 포트 어드레스를 포함한다. 각각의 사용자가 서버에 액세스할 때, 서버에 의해 해당 사용자에게 고유 사용자 키가 할당되는 것이 바람직하다. 그런 경우, 사용자 키는 서버에 의해 제공되는 정보에 추가되어, 피어-투-피어 통신을 수락하도록 하는 요청을 수신한 사용자가, 그 요청이 신뢰되는 소스로부터 온 것임을 확인할 수 있게 한다.

일 실시예에서, 보안 세션을 호스트하는 서버는 사용자들 간의 피어-투-피어 통신을 용이하게 하는 것과는 다른 핵심 기능을 갖는다. 본 실시예에 대한 바람직한 구현은, 서버가 멀티플레이어 게임을 호스트하는 네트워크 게임 환경이다. 서버의 주된 기능은 게임을 호스트하는 것이며, 피어-투-피어 통신을 용이하게 하는 것은 게임 환경에 대한 향상이다.

다른 실시예에서, 서버의 핵심 기능은 사용자들 간의 피어-투-피어 통신을 사용자가 확립할 수 있게 하는 보안 환경을 제공하는 것이다. 이러한 제2 실시예의 구현에서, 서버는 사용자의 자격 또는 관심에 기초하여 서비스의 상이한 세션들 또는 서브세트들에 대한 개별 액세스를 허가한다. 개별 사용자의 행동에 대한 불만이 다른 사용자들로부터 수신되면, 서버는 그 사용자가 이후의 세션에 참가하는 것을 금지할 수 있다.

본 발명의 다른 양태는, 이하에 더 상세하게 설명되는 본 발명에 따라 전술한 단계들을 수행하기 위한 기계 명령들을 저장하는 메모리 매체에 관한 것이다.

발명의 구성 및 작용

상기와 같은 본 발명의 양태 및 다수의 부수적인 이점은 첨부 도면과 함께 이하의 상세한 설명을 참조함으로써 더 쉽게 이해될 수 있을 것이다.

본 발명의 바람직한 실시예는, 서버를 사용하여 일반 클라이언트들 간의 피어-투-피어 통신에 대한 어느 정도의 제어를 용이하게 하고 수행한다. 서버는 피어-투-피어 통신의 컨텐트를 실시간으로 모니터링하고 제어하는 데에는 관여하지 않지만, 참가자들을 인증 및 허가하며, 이에 의하여 참가자들은 서버에 의하여 유사하게 인증 및 허가된 다른 참가자들에 대한 액세스를 허용받는다. 서버는 인증된 사용자들 간의 피어-투-피어 통신 링크의 확립을 용이하게 하는 데에 사용될 수 있다.

본 발명의 제1 실시예에서, 서버의 핵심 기능을 소정의 다른 기능을 클라이언트에게 제공하는 것이고, 피어-투-피어 통신을 용이하게 하는 것은 2차적인 기능이다. 제1 실시예에서, 서버의 주요 기능을 온라인 게임 플레이를 호스트하는 것이고, 게임 서버에 의해 가능하게 되는 피어-투-피어 통신은 게임 플레이어의 경험을 향상시키기 위해 제공된다.

본 발명의 제2 실시예에서, 서버의 핵심 기능을 신뢰되는 클라이언트들 간의 피어-투-피어 통신을 용이하게 하는 신뢰되는 환경을 제공하는 것이다. 제2 실시예에서, 관심사를 공유하는 회원들 간의 피어-투-피

어 통신을 용이하게 하기 위하여, 공용 인터넷 디렉토리가 만들어진다. 이러한 공용 인터넷 디렉토리는 종래에도 존재했지만, 기존의 디렉토리는 신뢰되는 환경에서 만들어진 것이 아니었으며, 곧바로 성적으로 노골적인 컨텐트를 공급하는 사람들에 의해 악용되었고, 이들로 인해 해당 디렉토리의 본래 목적에 관심이 있던 다른 클라이언트들이 급속하게 떠나게 되었다. 본 실시예의 한 양태에서, 서버는 상이한 "등급"의 엔티티(익명 사용자, 인증된 사용자, 사업자, 대학 등)이 보안 방식으로 강요될 수 있는 상이한 액세스 권한을 할당받게 함으로써, 보안 환경을 제공한다.

네트워크화된 게임 환경에서 피어-투-피어 통신을 용이하게 하는 것은 본 발명의 바람직한 기능을 대표하므로, 이하의 상세한 설명은 예시적인 게임 시스템을 설명한다. 게임 서버 실시예가 바람직한 응용이긴 하지만, 본 발명은 여기에 상세하게 설명된 게임 서버 실시예, 또는 서버의 주요 기능이 피어-투-피어 통신을 용이하게 하는 것 이외의 것인 실시예로만 한정되는 것이 아님에 주의해야 한다. 이하의 상세한 설명 및 그 이후의 특허 청구 범위에 기술된 핵심 개념은 각각의 실시예에 적용되며, 게임 서버 실시예는 본 발명을 한정하기 위한 것이 아니라 예시적인 것으로만 고려되어야 한다. 본 기술 분야의 숙련된 자라면, 본 발명이 네트워크화된 게임 시스템을 비롯한 다양한 컴퓨팅 디바이스를 사용하여 구현될 수 있음을 알 것이다. 따라서, 본 발명은 셋탑 박스를 사용하여, 아케이드 게임에서, 핸드헬드형 디바이스를 사용하여, 퍼스널 컴퓨터(PC) 상에서 실행되는 어플리케이션과 관련하여, 그리고 공통 서버를 공유하는 신뢰되는 클라이언트들 간에서 피어-투-피어 통신을 용이하게 하고자 하는 요구가 있는 기타 네트워크화된 환경에서 구현될 수 있다.

예시적인 게임 시스템

도 1에 도시된 바와 같이, 본 발명을 구현하는 데에 적합한 예시적인 전자 게임 시스템(100)은 게임 콘솔(102), 및 4개까지의 사용자 입력 디바이스를 위한 컨트롤러(104a 및 104b) 등의 지원을 포함한다. 게임 콘솔(102)에는 내부 하드 디스크 드라이브(도면에는 도시되지 않음), 및 광 저장 디스크(108)로 표시된 것과 같은 다양한 형태의 휴대형 광 저장 매체를 판독하는 광 매체 드라이브(106)를 포함한다. 적합한 휴대형 저장 매체의 예는 DVD(digital versatile disc) 및 CD-ROM(compact disk-read only memory disc)를 포함한다. 이러한 게임 시스템에서, 게임 프로그램은 게임 콘솔을 갖는 사용자에게 DVD 디스크 형태로 배포되는 것이 바람직하지만, 여기에 개시된 것과 그 이외의 본 발명을 채용하는 시스템의 유형에서 다른 저장 매체가 대신하여 사용될 수 있을 것으로 예상된다.

게임 콘솔(102)의 전면(前面)에는, 지원되는 컨트롤러와의 접속을 위한 4개의 슬롯(110)이 배치되지만, 슬롯의 개수 및 배열은 보다 많은 수 또는 보다 적은 수의 컨트롤러를 지원하기 위하여 필요에 따라 수정될 수 있다. 전원 버튼(112) 및 인출 버튼(114)도 게임 콘솔(102)의 전면에 배치된다. 전원 버튼(112)은 게임 콘솔로의 전력 인가를 제어하며, 인출 버튼(114)은 광 매체 드라이브(106)의 트레이(도시되지 않음)를 교대로 열고 닫음으로써 저장 디스크(108)를 삽입 및 인출할 수 있게 하여, 사용자가 디스크 상의 디지탈 데이터를 게임 콘솔에 의해 판독할 수 있게 한다.

게임 콘솔(102)은 A/V(audio/visual) 인터페이스 케이블(120)을 통하여 텔레비젼(121)이나 기타 디스플레이 모니터 또는 스크린에 접속된다. 파워 케이블 플러그(122)는 종래의 교류선 소스(도시되지 않음)에 접속될 때, 게임 콘솔에 전력을 공급한다. 게임 콘솔(102)은, 예를 들어 허브 또는 스위치(도시되지 않음)로의 접속을 통하는 네트워크 상에서, 또는 예를 들어 xDSL 인터페이스, 케이블 모뎀 또는 기타 광대역 인터페이스(도시되지 않음)에의 접속을 통한 인터넷 상에서 데이터를 송수신하기 위한 이더넷 데이터 커넥터(124)를 포함한다. 본 발명을 구현하는 다른 유형의 게임 콘솔들은, 종래의 전화 모뎀을 이용하여 통신함으로써, 서로 연결될 수도 있고 원격 서버에 연결될 수도 있다.

각각의 컨트롤러(104a 및 104b)는 리드를 통해 (또는 무선 인터페이스를 통해) 게임 콘솔(102)에 연결된다. 도시된 구현에에서는, 컨트롤러가 USB 호환가능하며, USB 케이블(130)을 통해 게임 콘솔(102)에 접속되어 있지만, 다른 유형의 데이터 인터페이스가 그를 대신하여 채용될 수 있음을 예상할 수 있다. 게임 콘솔9102)에는 게임 소프트웨어와 인터랙션하고 게임 소프트웨어를 제어하는 매우 다양한 사용자 디바이스 중 어느 것이라도 장착될 수 있다. 도 1에 도시된 바와 같이, 각각의 컨트롤러(104a 및 104b)에는 2개의 썸스틱(thumbstick)(132a 및 132b), D 패드(134), 버튼(136) 및 2개의 트리거(138)가 장착된다. 이러한 컨트롤러들은 단지 예시적인 것일 뿐이며, 다른 게임 입력 및 제어 디바이스가 도 1에 도시된 디바이스를 대체하거나 그에 추가되어 게임 콘솔(102)에서 사용될 수 있다.

추가의 특징 및 기능을 제공하기 위하여, 분리가능한 기능 유닛(140)이 각각의 컨트롤러(104a 및 104b)에 선택적으로 삽입될 수 있다. 예를 들어, 휴대형 메모리 유닛(MU)은, 사용자가 게임 파라미터를 저장할 수 있게 하고, 또한 다른 게임 콘솔에 접속된 컨트롤러에 휴대형 MU를 삽입하여 그 다른 게임 콘솔에서 플레이할 수 있도록 게임 파라미터를 운반할 수 있게 한다. 다른 분리가능한 기능 유닛은, 사용자가 다른 사용자들과 국부적으로 및/또는 네트워크 상으로 구두로 통신할 수 있게 하는 음성 통신 유닛을 포함한다. 음성 통신 유닛에는, 붐 마이크로폰(boom microphone)(144)을 포함하는 헤드셋(142)이 접속된다. 이와 달리, 음성 통신 유닛의 회로가 컨트롤러에 일체화될 수 있으며, 붐 마이크로폰을 갖는 헤드셋은 컨트롤러에 분리가능하게 접속될 수도 있고 영구적으로 접속될 수도 있다. 각각의 컨트롤러는 2개의 분리가능한 기능 유닛을 수용하도록 구성되는 것이 바람직하지만, 더 많은 수 또는 더 적은 수의 분리가능한 기능 유닛 또는 모듈이 대신 채용될 수도 있다.

게임 시스템(100)은 예를 들어 게임, 음악 및 비디오를 플레이할 수 있다. 하드 디스크 드라이브 상에 저장되어 있거나 드라이브(106) 내의 광 저장 디스크(108)로부터 판독된 디지탈 데이터를 사용하여, 또는 온라인 소스나 MU로부터 획득된 디지탈 데이터를 사용하여, 다른 기능들이 구현될 수 있는 것으로 예상된다. 예를 들어, 게임 시스템(100)은 잠재적으로 다음과 같은 것들을 재생할 수 있다.

· 광 매체 드라이브에 의해 판독되는 CD 및 DVD 상에 저장되거나, 하드 디스크 드라이브 상에 저장되거나, 또는 온라인 소스로부터 다운로드된 게임 타이틀;

· 광 매체 드라이브(106)에 의해 판독되는 CD 상에 저장되어 있거나, 또는 하드 디스크 드라이브 상의 파일[예를 들어, WINDOWS MEDIA AUDIO™(WMA) 포맷]에 저장되어 있거나, 인터넷 또는 다른 네트워크 상의 온

라인 스트리밍 소스로부터 유도된 디지탈 음악;

·광 매체 드라이브(106)에 의해 판독되는 DVD 디스크 상에 저장되어 있거나, 또는 하드 디스크 드라이브 상의 파일(예를 들어, 액티브 스트리밍 포맷)에 저장되어 있거나, 인터넷 또는 다른 네트워크 상의 온라인 스트리밍 소스로부터 액세스된 디지탈 A/V 데이터.

도 2는 게임 시스템(100)의 기능적 구성요소들을 더 상세하게 도시하고 있다. 게임 콘솔(102)은 CPU(200), ROM(204)에 대한 CPU 액세스를 용이하게 하는 메모리 컨트롤러(202), RAM(206), 하드 디스크 드라이브(208), 휴대형 광 매체 드라이브(106)를 포함한다. CPU(200)에는, 요구되는 메모리 액세스 사이클의 수를 감소시키도록 일시적으로 데이터를 저장하여 게임 시스템의 처리 속도 및 처리량을 증가시키기 위한 레벨 1 캐시(210) 및 레벨 2 캐시(212)가 장착된다. CPU(200), 메모리 컨트롤러(202) 및 다양한 메모리 디바이스는, 다양한 버스 아키텍쳐 중 임의의 것을 사용하는 프로세서 또는 로컬 버스, 주변 버스, 메모리 버스, 직렬/병렬 버스를 비롯한 하나 이상의 버스를 통하여 상호 접속된다. 예를 들어, 이러한 아키텍쳐는 ISA(Industry Standard Architecture) 버스, MCA(micro channel architecture) 버스, EISA(enhanced ISA) 버스, VESA(Video Electronics Standards Association) 로컬 버스, 및 PCI(peripheral component interconnect) 버스를 포함할 수 있다.

적절한 구현의 일례로서, CPU(200), 메모리 컨트롤러(202), ROM(204) 및 RAM(206)은 공통 모듈(214) 상에 일체화된다. 이러한 구현예에서, ROM(204)은 PCI 버스 및 ROM 버스(양자 모두 도시되지 않음)를 통해 메모리 컨트롤러(202)에 접속되는 플래시 ROM으로서 구성된다. RAM(206)은 별도의 버스(도시되지 않음)를 통해 메모리 컨트롤러(202)에 의하여 독립적으로 제어되는 다수의 DDR SDRAM(double data rate synchronous dynamic RAM) 모듈로서 구현된다. 하드 디스크 드라이브(208) 및 광 매체 드라이브(106)는 PCI 버스 및 ATA(advanced technology attachment) 버스(216)를 통해 메모리 컨트롤러에 접속된다.

3D 그래픽 프로세스 유닛(GPU)(220) 및 비디오 인코더(222)는 고속 고해상도 그래픽 프로세스를 위한 비디오 프로세스 파이프라인을 형성한다. 데이터는 디지탈 비디오 버스(도시되지 않음)를 통해 GPU(220)로부터 비디오 인코더(222)로 전달된다. 오디오 프로세스 유닛(224) 및 오디오 인코더/디코더(CODEC)(226)는 하이파이 스테레오 오디오 데이터 프로세스를 위한 대응 오디오 프로세스 파이프라인을 형성한다. 오디오 데이터는 오디오 프로세스 유닛(224)과 CODEC(226) 간에서 통신 링크(도시되지 않음)를 통해 전달된다. 비디오 및 오디오 프로세스 파이프라인은 텔레비전 또는 다른 디스플레이 모니터로의 전송을 위하여 데이터를 A/V 포트(228)에 출력한다. 도시된 구현에에서, 비디오 및 오디오 프로세스 구성요소(220-228)는 모듈(214) 상에 실장된다.

모듈(214) 상에는, USB 호스트 컨트롤러(230) 및 네트워크 인터페이스(232)도 구현된다. USB 호스트 컨트롤러(230)는 버스(예를 들어, PCI 버스)를 통해 CPU(200) 및 메모리 컨트롤러(202)에 연결되고, 주변 게임 컨트롤러(104a-104d)를 위한 호스트로서 기능한다. 네트워크 인터페이스(232)는 네트워크(인터넷, 홈 네트워크 등)에 대한 액세스를 제공하며, 이더넷 카드, 전화 모뎀 인터페이스, 블루투스 모듈, 케이블 모뎀 인터페이스, xDSL 인터페이스 등을 비롯하여 다양한 유선 또는 무선 인터페이스 구성요소 중 임의의 것을 포함할 수 있다.

게임 콘솔(102)은 2개의 듀얼 컨트롤러 지원 서브어셈블리(240a 및 240b)를 포함하고, 각각의 서브어셈블리는 게임 컨트롤러들(104a-104d) 중 2개를 지원한다. 프론트 패널 입출력(I/O) 서브어셈블리(242)는 전원 버튼(112) 및 인출 버튼(114)의 기능성은 물론, 게임 콘솔의 외측 표면에 노출된 임의의 발광 다이오드(LED) 또는 기타 표시기를 지원한다. 서브어셈블리(240a, 240b, 242)는 하나 이상의 케이블 어셈블리(244)를 통하여 모듈(214)에 연결된다.

8개의 기능 유닛(140a-140h)이 4개의 컨트롤러(104a-104d)에 접속가능한 것으로 도시되어 있다. 즉, 각각의 컨트롤러에 2개의 기능 유닛이 접속가능하다. 각각의 기능 유닛은 게임, 게임 파라미터 및 기타 데이터를 위한 추가의 기능 또는 저장공간을 제공한다. MU가 컨트롤러에 삽입되면, MU는 메모리 컨트롤러(202)에 의하여 액세스될 수 있다.

시스템 전력 공급 모듈(250)은 게임 시스템(100)의 구성요소들에 전력을 제공한다. 팬(252)은 게임 콘솔(102) 내의 구성요소들 및 회로를 냉각시킨다.

본 발명을 구현하기 위하여, DVD 또는 기타 저장 매체 상에 저장되어 있는 (또는 네트워크를 통해 다운로드된) 기계 명령들을 포함하는 게임 소프트웨어 어플리케이션(260)이 CPU(200)에 의해 실행되기 위하여 RAM(206) 및/또는 캐시(210 및/또는 212)에 로드된다. 소프트웨어 어플리케이션(260)의 부분들이 필요한 때에만 RAM에 로드될 수도 있고, 소프트웨어 어플리케이션 전체가 (그 크기에 따라) RAM(206)에 로드될 수도 있다. 소프트웨어 어플리케이션(260), 및 그 소프트웨어 어플리케이션이 본 발명을 구현하기 위하여 수행하는 관련 기능들이 이하에 더 상세하게 설명된다.

게임 시스템(100)을 텔레비전 또는 다른 디스플레이 모니터에 단순히 접속하는 것에 의하여, 게임 시스템(100)은 독립형 시스템으로서 동작할 수 있다. 이러한 독립형 모드에서, 게임 시스템(100)은 한명 이상의 사용자가 게임을 플레이하거나 영화를 보거나 음악을 들을 수 있게 한다. 그러나, 네트워크 인터페이스(232)를 통하여 이용가능하게 되는 인터넷 또는 기타 네트워크로의 접속에 의하여, 게임 시스템(100)은 보다 큰 네트워크 게임 커뮤니티의 구성요소로서 동작하여, 인터넷 또는 기타 네트워크를 통하여 플레이되는 게임에서 다른 게임 시스템을 사용하는 플레이어들과의 온라인 멀티플레이어 인터액션이 가능하게 할 수 있다. 게임 시스템(100)은 네트워크 인터페이스 및 적합한 케이블(도시되지 않음)을 사용하여 다른 게임 시스템과 피어-투-피어 통신으로 연결될 수 있다.

제1 실시예를 위한 예시적인 게임 네트워크

도 3은 네트워크(302)를 통하여 다수의 게임 시스템(100a, ...100n)을 상호접속한 예시적인 네트워크 게임 환경(300)을 도시하고 있다. 바람직하게는, 각각의 게임 시스템은, 플레이어들 간에서의 음성 통신을 위하여, 적어도 하나의 대응 헤드셋(142a, ...142n) 및 대응 마이크로폰(144a, ...144n)을 포함한다. 네트워크(302)는 다양한 데이터 통신 네트워크 중 임의의 것을 나타내며, 공용 부분(예를 들어, 인터넷)은 물

론 전용 부분(예를 들어, 주거용 또는 상업용 LAN)을 포함할 수 있다. 네트워크(302)는 유선 타입 및 무선 타입 양자 모두를 비롯하여 다양한 종래의 통신 구성 중 임의의 하나 또는 그 이상을 사용하여 구현될 수 있다. 공용 및 전용 프로토콜을 비롯하여, 다양한 통신 프로토콜 중 어느 것이라도 네트워크(302)를 통하여 데이터를 통신하는 데에 사용될 수 있다. 이러한 프로토콜의 예는 TCP/IP, IPX/SPX, NetBEUI 등을 포함한다.

게임 시스템(100a, ...100n)에 더하여, 온라인 게임을 서비스 및/또는 호스트하는 것, 다운로드가능한 음악 또는 비디오 파일을 서비스하는 것, 게임 경쟁을 호스트하는 것, 스트리밍 A/V 파일을 서비스하는 것, 이메일 또는 기타 메체 통신의 교환을 가능하게 하는 것과 같은 다양한 서비스를 참가자들에게 제공하기 위하여, 하나 이상의 온라인 서비스(304a,...304s)가 네트워크(302)를 통하여 액세스 될 수 있다. 네트워크 게임 환경(300)은, 개별 플레이어 및/또는 게임 시스템(100a,...100n)이 온라인 서비스(304a,...304s)에는 물론 다른 플레이어 및/또는 게임 시스템에 상호접속할 수 있게 하는 인증에 있어서 중요한 역할을 하는 키 분배 센터(306)를 더 포함할 수 있다. 분배 센터(306)는 키 및 서비스 티켓을 정당한 참가자들에게 분배하고, 이러한 키 및 서비스 티켓은 다수의 플레이어를 포함하는 게임 플레이 그룹을 형성하거나 온라인 서비스(304a,...304s)로부터 서비스를 구입하는 데에 사용될 수 있다.

네트워크 게임 환경(300)은 개별 게임 시스템(100a, ...100n)에 이용가능한 다른 메모리 소스, 즉 온라인 저장소를 도입한다. 광 저장 디스크(108), 하드 디스크 드라이브(208) 및 기능 유닛(140) 상의 데이터에 액세스하는 것에 더하여, 게임 시스템(100a, ...100n)은, 온라인 서비스(304s)의 원격 저장소(308)에 의해 예시된 바와 같이, 네트워크(302)를 통하여 원격 저장 위치에서 이용가능한 데이터 파일에도 액세스할 수 있다.

네트워크 게임 환경은, 강화된 보안을 제공하고 다른 컴퓨팅 디바이스에 의한 액세스를 제한하기 위하여, 예를 들어 가상 전용 네트워크 터널을 통한 통신을 이용하여, 다른 게임 시스템 및 게임 환경으로의 액세스만을 제공하는 폐쇄된 네트워크일 수 있음에 유의해야 한다.

<u>온라인 서비스 및 서버 컴퓨터를 위한 예시적인 시스템</u>

도 4를 참조하면, 본 발명에 따른 온라인 서비스(304a, ...304s)를 위한 예시적인 시스템은, 프로세싱 유닛(421), 시스템 메모리(422) 및 시스템 버스(423)를구비하는 종래의 서버 컴퓨터(SC)(420) 형태의 범용 컴퓨팅 디바이스를 포함한다. 시스템 버스는 시스템 메모리를 비롯한 다양한 시스템 컴포넌트들을 프로세싱 유닛(421)에 연결하며, 다양한 버스 아키텍처 중 임의의 것을 사용하는 로컬 버스, 주변 버스, 및 메모리 버스 또는 메모리 컨트롤러를 포함하는 여러 유형의 버스 아키텍쳐 중 임의의 것일 수 있다. 시스템 메모리는 ROM(424) 및 RAM(425)을 포함한다. 기동시에 SC(420) 내의 소자들 간의 정보 전송을 돕는 기본 루틴을 포함하는 기본 입출력 시스템(BIOS)(426)은 ROM(424) 내에 저장된다. SC(420)는 하드 디스크(도시되지 않음)에 대한 판독 및 기입을 위한 하나 이상의 하드 디스크 드라이브(427), 분리가능한 자기 디스크(429)에 대한 판독 및 기입을 위한 자기 디스크 드라이브(428), 및 CD-ROM 또는 기타 광 매체와 같은 분리가능한 광 디스크(431)에 대한 판독 및 기입을 위한 광 디스크 드라이브(430)를 더 포함할 수 있다. 하드 디스크 드라이브(427), 자기 디스크 드라이브(428) 및 광 디스크 드라이브(430)는 하드 디스크 드라이브 인터페이스(432), 자기 디스크 드라이브 인터페이스(433) 및 광 디스크 드라이브 인터페이스(434)를 통하여 각각 시스템 버스(423)에 접속된다. 드라이브 및 그 관련 컴퓨터 판독가능 매체는 컴퓨터 판독가능한 기계 명령, 데이터 구조, 프로그램 모듈 및 SC(420)를 위한 기타 데이터에 대한 비휘발성 저장소를 제공한다. 여기에 개시된 예시적인 환경에서는 하드 디스크, 분리가능한 자기 디스크(429) 및 분리가능한 광 디스크(431)를 이용하지만, 본 기술 분야의 숙련된 기술자라면, 자기 카세트, 플래시 메모리 카드, DVD(digital video disc), 베르누이 카트리지, RAM, ROM 등과 같이, 컴퓨터에 의해 액세스가능한 데이터 및 기계 명령을 저장할 수 있는 다른 유형의 컴퓨터 판독가능 매체도 예시적인 오퍼레이팅 환경에서 이용될 수 있음을 알 것이다.

오퍼레이팅 시스템(435), 하나 이상의 어플리케이션 프로그램(436), 기타 프로그램 모듈(437) 및 프로그램 데이터(438)를 비롯한 다수의 프로그램 모듈이 하드 디스크, 자기 디스크(429), 광 디스크(431), ROM(424) 또는 RAM(425) 상에 저장될 수 있다. 사용자는 SC(420)에 명령 및 정보를 입력할 수 있고, 키보드(440) 및 포인팅 디바이스(442)와 같은 입력 디바이스를 통하여 제어 입력을 제공할 수 있다. 포인팅 디바이스(442)는 마우스, 스타일러스, 무선 리모콘 또는 기타 커서 컨트롤을 포함할 수 있다. 이하에서, "마우스"라는 용어는 스크린 상에서 커서의 위치를 제어하는 데에 유용한 임의의 포인팅 디바이스를 모두 포괄하도록 의도된 것이다. 다른 입력 디바이스(도시되지 않음)로는, 마이크로폰, 조이스틱, 햅틱 조이스틱, 요크(yoke), 풋 페달, 게임 패드, 위성 접시, 스캐너 등이 있을 수 있다. 여기에 개시된 것과 그 이외의 I/O 디바이스는, 시스템 버스에 연결된 I/O 인터페이스(446)를 통해 프로세싱 유닛(421)에 접속된다. I/O 인터페이스라는 용어는, 직렬 포트, 병렬 포트, 게임 포트, 키보드 포트 및/또는 USB 포트에 전용으로 사용되는 각각의 인터페이스를 포괄하도록 의도된 것이다. 모니터(447) 또는 다른 유형의 디스플레이 디바이스도, 비디오 어댑터(448)와 같은 적합한 인터페이스를 통하여 시스템 버스(423)에 접속되며, 어플리케이션 프로그램, 그래픽 이미지, 웹 페이지 및/또는 다른 정보를 디스플레이하는 데에 사용될 수 있다. 모니터에 더하여, SC는 스피커(사운드 카드 또는 기타 오디오 인터페이스를 통함, 도시되지 않음) 및 프린터와 같은 다른 주변 출력 디바이스(도시되지 않음)에 연결될 수 있다.

SC(420)는 원격 컴퓨터(449) 또는 전술한 게임 시스템과 같은 하나 이상의 원격 컴퓨팅 디바이스로의 논리적 접속을 이용하여 네트워크화된 환경에서 동작하는 것이 바람직하다. 따라서, 원격 컴퓨터(449)는 다른 SC, 게임 콘솔, 퍼스널 컴퓨터[일반적으로 SC(420)와 거의 유사하게 구성됨], 라우터, 네트워크 PC, 피어 디바이스, 또는 위성 또는 기타 통신 네트워크 노드일 수 있으며, 도 4에는 외부 메모리 저장 디바이스(450)만이 도시되어 있지만, 전형적으로 SC(420)과 관련하여 기술된 요소의 다수 또는 전부를 포함한다. 도 3의 네트워크(302)와 관련하여 전술한 바와 같이, 도 4에 도시된 논리적 접속은 근거리 네트워크(LAN)(451) 및 광역 네트워크(WAN)(452)를 포함한다. 이러한 네트워크 환경은 현재 가정에서 비교적 일반적으로 사용되며, 사무실, 기업내 컴퓨터 네트워크, 인트라넷 및 인터넷에서는 매우 흔하다.

LAN 네트워크 환경에서 이용하기 위하여, SC(420)는 네트워크 인터페이스 또는 어댑터(453)를 통하여 LAN(451)에 접속된다. WAN 네트워크 환경에서 이용될 때, SC(420)는 전형적으로 인터넷 등의 WAN(452)을

통한 통신을 확립하기 위하여, 모뎀(454), 케이블 모뎀과 같은 다른 수단, DSL 인터페이스 또는 ISDN(Integrated Service Digital Network)를 포함한다. 내장형 또는 외장형일 수 있는 모뎀(454)은, I/O 디바이스 인터페이스(446)를 통해, 즉 직렬 포트를 통해 시스템 버스(423)에 접속되거나 버스에 연결된다. 네트워크화된 환경에서, SC(420)와 관련하여 나타난 프로그램 모듈 또는 그 일부는 원격 메모리 저장 디바이스에 저장될 수 있다. 여기에 도시된 네트워크 접속은 예시적인 것이며, 무선 통신 및 광대역 네트워크 링크와 같이, 컴퓨터/컴퓨팅 디바이스들 간의 통신 링크를 확립하기 위한 다른 수단들도 사용될 수 있음을 알 것이다.

제1 및 제2 실시예에 적용될 수 있는 핵심 개념

도 5에 도시된 바와 같이, 네트워크(510)는 서버(512) 및 클라이언트(514, 516 및 518)를 포함한다. 서버(512)는 서버에 의해 호스트되는 세션에 대한 액세스를 허가받은 클라이언트들을 제어함으로써 신뢰되는 환경을 제공한다. 서버(512)는 각각의 클라이언트가 서버에 의해 호스트되는 세션으로의 액세스에 대한 요금을 지불하는 가입 서비스로서 동작할 수 있다. 다르게는, 세션으로의 액세스를 위한 요금이 클라이언트에게 부과되지는 않지만, 서버가 자신이 호스트하는 각각의 세션에 어떤 클라이언트들이 액세스하는지를 제어하도록, 클라이언트가 각각의 세션에 등록할 것이 요구된다. 예를 들어, 등록 프로세스에서, 클라이언트는 피어-투-피어 컨텍스트에서 다른 클라이언트와의 성적인 주제에 관한 통신을 금지하는 것과 같은 커뮤니티 정책에 동의해야 한다. 다른 클라이언트가 이러한 정책의 악용을 보고하면, 위반을 행한 클라이언트는 이후로는 서버로부터 추방될 수 있다. 서버는 복수의 세션을 조작할 수 있으며, 일부 세션에 대해서만 클라이언트의 액세스를 제한할 수 있다. 예를 들어, 서버(512)는 십대용 세션, 모델 트레이닝을 강조하는 취미 세션, 및 클라이언트들간의 성적으로 노골적인 통신의 허용도가 큰 성인용 세션을 동시에 호스트할 수 있다. 18세 미만의 등록 클라이언트들은 십대용 세션 및 취미 세션에 대한 액세스는 허가받지만, 성인용 세션에 대한 액세스는 허가받지 못한다. 성인 클라이언트 등록자는 원하는 경우에 성인 세션에서 나올 것을 선택할 수 있다. 서버(512)가 게임 서버인 경우, 상이한 게임 및 상이한 난이도에서의 게임 플레이에 대응하는 복수의 상이한 세션이 이용가능할 수 있다.

본 발명의 하나의 핵심적인 개념은, 서버에 의해 호스트되는 세션에 대한 액세스를 제어함으로써, 서버가 정한 행동 지침을 위반한 클라이언트가 이후의 세션에서 추방될 수 있다는 것이다. 위반은 여러 컨텍스트에서 발생할 수 있다. 클라이언트는 서버에 의해 지원되지 않는 주제(예를 들어, 성 관련 주제 또는 정치 관련 주제)에 관한 피어-투-피어 통신에 참여하도록 하는 요청을 서버 상에 발송할 수 있다. 서버는 발송된 것을 삭제하고, 그 클라이언트가 이후에 서버에 액세스하는 것을 금지할 수 있다. 다른 컨텍스트에서, 클라이언트는 피어-투-피어 컨텍스트에서 다른 클라이언트와 무례하거나 귀찮은 통신에 참가할 수 있다. 서버는 이러한 행위에 관하여 다른 클라이언트들로부터의 피드백을 수집하고, 요구에 따라 위반을 행한 클라이언트를 추방한다. 공동 양도된 미국 특허 출원 10/151,793호 "자동 피드백 및 플레이어 거부"는 온라인 게임 환경에서 플레이어의 행위에 관한 피드백을 수집하는 시스템 및 방법을 개시하고 있다. 여기에 개시된 시스템 및 방법은 서버(512)의 클라이언트에 관한 피드백을 수집하고 필요에 따라 클라이언트를 추방하는 데에 사용될 수 있다.

서버(512)에 의해 호스트되는 세션은 광범위하게 변화할 수 있다. 전술한 바와 같이, 제1 실시예에서, 서버의 가장 중요한 기능은 피어-투-피어 통신을 용이하게 하는 것이 아니라, 온라인 게임을 호스트하는 등의 다른 기능을 수행하는 것이다. 이러한 실시예에서, 클라이언트(플레이어)들 간의 피어-투-피어 통신을 확립하는 것은 게임 경험을 강화한다. 제2 실시예에서, 서버의 핵심 기능은 클라이언트가 피어-투-피어 통신을 확립하고자 하는 다른 클라이언트를 찾을 수 있게 하는 것이다. 어떤 실시예가 구현되는지와 무관하게, 서버(512)는, 자신에 의하여 인에이블된 세션으로의 액세스를 허가받은 클라이언트에 대한 제어를 서버 자신이 행하는 신뢰되는 환경을 제공한다.

서버(512)는 다수의 상이한 하드웨어 구성을 이용하여 구현될 수 있음을 알아야 한다. 서버(512)는 단일 컴퓨팅 플랫폼으로서 구현될 수도 있고, 서로 협력적으로 기능하는 복수의 컴퓨팅 플랫폼으로서 구현될 수도 있다. "서버"라는 용어는 단일 컴퓨팅 디바이스로만 한정하기 위한 것이 아니라, "서버"의 기능을 수행하는 복수의 컴퓨팅 디바이스를 포괄하도록 더 넓은 의미를 갖는다는 점에 유의해야 한다.

다시 도 5를 참조하면, 클라이언트(514, 516, 518)는 각각 서버(512)와 서버/클라이언트 접속(520)을 확립하고 있다. 서버(512)에 의해 제공되는 정보에 기초하여, 클라이언트(514)는 클라이언트(516)과 피어-투-피어 접속(522)을 확립한다. 마찬가지로, 클라이언트(518)는 클라이언트(516)과 피어-투-피어 접속(522)을 확립한다.

도 6은 서버를 이용하여, 클라이언트들 간의 피어-투-피어 통신이 서버에 의하여 용이하게 되는 보안 환경을 제공하는 논리를 개괄적으로 나타낸 흐름도(610)이다. 논리는 블럭(612)에서 시작하고, 블럭(614)에서 서버는 자신이 호스트하는 세션에 액세스하려고 시도하는 각각의 클라이언트를 인증 및 허가하여 해당 세션에 참가시킨다. 블럭(616)에서, 서버는 세션에 현재 액세스하고 있는 다른 허가된 클라이언트들을 포함하는 리스트를 클라이언트에게 제공한다. 일부 상황에서는, 피어-투-피어 통신을 원하지만 현재는 세션에 포함되어 있지 않은 클라이언트들을 포함하는 것이 바람직하다. 그러나, 대부분의 상황에서, 이러한 리스트 내의 각각의 클라이언트는 서버에 로그인하여 온라인 상태이며, 피어-투-피어 통신을 확립할 수 있을 것이다. 리스트는 단일 클라이언트만을 포함할 수도 있지만, 일반적으로는 복수의 클라이언트를 포함할 것이다.

리스트가 클라이언트들에게 제공되는 방식은 광범위하게 달라질 수 있다. 리스트의 컨텐트도 다양한 방식으로 구성될 수 있다. 예를 들어, 서버가 게임 서버인 경우, 리스트는 제1 클라이언트의 "팀"의 회원인 클라이언트들로만 한정될 수 있고, 그 결과 리스트는 세션에 참가하고 있는 모든 클라이언트를 포함하지는 않을 것이다. 클라이언트들 간의 피어-투-피어 통신을 용이하게 하는 것을 주된 기능으로 하는 서버와 관련하여, 리스트는 특정 클라이언트에 연관된 인증에 기초할 수 있다. 성인용 세션, 십대용 세션 및 취미 세션을 호스트하는 서버의 경우를 고찰하기로 한다. 제1 클라이언트의 연령에 기초하여, 리스트는 성인용 세션으로부터의 임의의 클라이언트를 포함하지 않을 수 있다. 특히, 피어-투-피어 통신을 용이하게 하기 위한 전용 서버와 관련하여, 클라이언트들이 특정 관심사를 공유하는 다른 클라이언트들을 식별하도록 리스트를 좁게 정의할 수 있게 하는 것이 바람직하다. 예를 들어, 제1 클라이언트는 성인용 세션에 참여하

는 데에 충분한 연령이지만, 실제로 자신이 거주하는 동일 지역 내의 취미 생활자들과만 통신하기를 원할 수 있다. 이 경우, 서버에 의해 제공되는 리스트는 주제 및 지역에 의해 한정될 것이다. 본 기술 분야의 통상적인 지식을 가진 자라면, 많은 다른 변경이 가능함을 알 것이다.

다시 도 6의 흐름도(610)를 참조하면, 블럭(618)에서, 제1 클라이언트는 리스트로부터 제2 클라이언트를 선택할 수 있게 된다. 그러면, 서버는 블럭(620)에 나타난 바와 같이 제2 클라이언트에 대한 접속 정보를 제1 클라이언트에게 송신한다. 이러한 접속 정보는 적어도 제2 클라이언트와의 피어-투-피어 통신을 확립하기 위하여 제1 클라이언트에게 필요한 정보를 포함한다. 예를 들어, 제2 클라이언트의 외부 IP 어드레스가 포함될 것이다. 제2 클라이언트가 내부 IP 어드레스와 연관되고/되거나(예를 들어 공유 인터넷 접속 네트워크 상에 있음) 특정 포트 어드레스와 연관되는 경우에는, 그 정보도 포함될 것이다. 정보는 서버에 의해 제공되는 사용자 키를 포함하여, 제2 클라이언트가 제1 클라이언트와의 피어-투-피어 통신을 확립하기 위한 요청을 수신한 때에, 제1 클라이언트가 서버에 의해 제2 클라이언트에 할당된 사용자 키를 갖는다는 사실이 제1 클라이언트가 서버에 의해 신뢰된다는 것을 나타내도록 하는 것이 바람직하다.

블럭(622)에서, 제1 클라이언트는 서버로부터 수신된 제2 클라이언트에 관한 접속 정보를 사용하여, 제2 클라이언트와의 피어-투-피어 통신의 확립을 시도한다. 결정 블럭(624)은 그 시도가 성공적이었는지를 결정한다. 성공적이었던 경우에는, 블럭(626)에 나타난 바와 같이, 참가자들 중 한 명에 의하여 (또는 네트워크 실패에 의하여) 해제될 때까지 접속이 유지된다. 시도가 성공적이지 않았던 경우에는, 블럭(628)에 나타난 바와 같이, 서버는 제1 클라이언트의 접속 정보를 제2 클라이언트에 전송한다. 블럭(630)에서, 제2 클라이언트는 제1 클라이언트의 접속 정보를 사용하여, 제1 클라이언트와의 피어-투-피어 통신의 확립을 시도한다. 결정 블럭(632)은 시도가 성공적이었는지를 결정한다. 마찬가지로, 블럭(626)에 나타나 있는 바와 같이, 접속은 참가자들 중 한 명에 의하여 (또는 네트워크 실패에 의하여) 해제될 때까지 유지된다. 논리는 블럭(636)에서 종료한다. 피어-투-피어 통신을 확립하기 위한 제2의 시도가 성공적이지 않은 경우, 논리는 블럭(618)로 되돌아가서, 서버가 제2 클라이언트의 접속 정보를 제1 클라이언트에게 다시 송신하게 하거나[블럭(632)을 블럭(618)에 연결시키는 점선에 의해 나타나 있는 바와 같이], 서버가 선택 블럭(634)에 나타나 있는 바와 같이 서버를 통한 음성 트래픽(또는 클라이언트들 간의 다른 통신)을 선택적으로 라우팅할 수 있게 한다. 블럭(630)에서 피어-투-피어 접속이 확립되지 않은 경우의 또다른 선택안은, 단순하게 시도된 통신이 성공적이지 않았음을 표시하고 블럭(636)에서 논리를 종료하는 것이다.

제1 실시예의 게임 서버 구현에 관한 세부 사항

도 7은 도 5에 기초하는 것으로서, 본 발명의 개념이 온라인 게임 환경과 관련하여 어떻게 적용되는지를 나타내고 있다. 네트워크(710)는 대규모 멀티플레이어(massively multi player) 게임 서버(712) 및 플레이어(714, 716, 718, 719)를 포함한다. 도 7에 나타난 바와 같이, 바람직한 구현에서, 각각의 클라이언트는 도 1 및 도 2와 관련하여 설명된 것과 같은 게임 콘솔을 사용하는 플레이어이다. 본 기술 분야의 통상의 지식을 가진 자라면, 도 7의 각각의 플레이어가 상이한 유형의 게임 디바이스 또는 퍼스널/랩탑 컴퓨터를 사용하여 게임 서버에 액세스할 수 있음을 알 것이다.

각각의 플레이어는 서버/클라이언트 접속(720)을 사용하여 게임 서버(712)에 의해 호스트되는 게임 세션에 액세스한다. 서버(712)에 의해 제공되는 정보에 기초하여, 플레이어(714)는 플레이어(716)와의 피어-투-피어 접속(722)을 확립한다. 마찬가지로, 플레이어(714)는 플레이어(718)와의 피어-투-피어 접속(722)을 확립한다.

게임 네트워크(300)와 관련하여, 각각의 플레이어(714-719)는 전술한 것과 같이 4명까지의 플레이어를 지원할 수 있는 게임 콘솔(102)을 사용하는 것이 바람직하다. 따라서, 도 7에 도시된 각각의 클라이언트/플레이어는 실질적으로 4명까지의 개별 플레이어를 포함할 수 있고, 이들 각각이 다른 게임 콘솔을 사용하여 선택된 개별 플레이어들과의 피어-투-피어 통신을 확립할 수 있기 때문에, 도 7은 다소 단순화된 것이다. 하나의 접속은 각각의 네트워크 엔티티(즉, 각각의 게임 콘솔 또는 각각의 컴퓨터)로 이루어지는 것이 바람직하고, 해당 엔티티 상의 모든 플레이어는 동일한 피어-투-피어 접속을 사용할 것이다. 도 8은 게임 콘솔(102)이 세션 내의 11명의 플레이어 간의 통신을 어떻게 지원하는지를 설명하는 추가의 세부 사항을 제공한다. 도 8을 참조할 때, 도시된 게임 콘솔(832)(즉, 게임 콘솔 2)이 2명의 플레이어를 지원하고 있고, 게임 콘솔(836)(즉, 게임 콘솔 3)이 1명의 플레이어를 지원하고 있지만, 도 8의 각각의 게임 콘솔은 4명까지의 플레이어를 지원할 수 있음에 유의해야 한다. 따라서, 도 8에 도시된 세션에서는 11명의 플레이어만이 통신하고 있지만, 이러한 구성에서는 16명의 플레이어[게임 콘솔(832)에 2명의 플레이어를 추가하고 게임 콘솔(836)에 3명의 플레이어를 추가]까지의 통신이 지원될 수 있다.

도시된 예에서는, 게임 콘솔(102)을 사용하는 플레이어들은 메시지를 타이핑할 키보드를 갖지 않기 때문에, 음성 채팅을 포함하는 기능은 중요하다. 게임 콘솔(102)에서 사용될 게임 타이틀을 개발하는 게임 설계자들이 음성 채팅을 지원하는 것과 관련한 많은 다른 기능을 제공할 수 있지만, 게임 콘솔(102)을 사용하는 음성 채팅은 다음과 같은 기능들을 포함하는 것이 바람직하다.

· 플레이어는 자신의 음성을 다른 플레이어들에게 전혀 들리지 않도록 뮤트시키는 기능을 가져야 한다.

· 플레이어는 게임 동안 다른 플레이어들이 자신에게 말하는 것을 뮤트시킬 수 있어야 한다.

· 플레이어는 다른 플레이어가 미래의 임의의 게임에서 자신에게 말하는 것을 뮤트시키는 기능을 가져야 한다. 이에 의하여, 한 플레이어를 영구적으로 뮤트시키면, 그 사람과는 절대로 다시 대화하지 않게 된다.

· 사람의 음성은, 성별 및 연령과 같은 특성을 식별하는 것을 비롯하여, 통상적으로 텍스트 채팅에 의해서는 드러나지 않는 개인의 상세한 정보를 드러낸다. 따라서, 플레이어는 자신의 음성을 마스크할 수 있어야 한다. 사용자가 음성 마스크가 적용된 자신의 음성을 들을 수 있게 하는 기능이 추천된다. 음성 마스크는 디폴트로 턴온되고, 사용자에 의하여 언제라도 온/오프될 수 있는 것이 바람직하다.

· 게임 콘솔(102) 상에서 플레이되는 게임에서, 플레이어가 판타지에 기초를 둔 롤 플레잉 게임에서의 드레곤 또는 엘프와 같은 자신의 온스크린 캐릭터에 일치하도록, 자신의 음성을 변경하는 것이 선택적으로

허용될 수 있다.

도 8은 게임 콘솔(810)이 음성 채팅을 어떻게 지원하는지를 나타내는 세부도이다. 음성 채팅의 품질을 유지하기 위하여, 음성 채팅 세션은 게임 타이틀에 의하여 일정한 비율로 업데이트되어야 한다. 게임이 규칙적인 비디오 프레임 레이트를 유지해야만 하는 것과 마찬가지로, 규칙적인 프레임 레이트도 유지되어야만 한다. 그렇지 않은 경우, 음성 품질이 저하될 것이고, 그에 따라 사용자의 경험도 저하될 것이다. 게임 콘솔(810)은 통상적으로 만날 수 있는 다양한 시나리오에서 양호하게 음성 채팅을 수행하도록 최적화된다. 주된 제한 요인은 음성 프레임 당 행해질 수 있는 인코드 및 디코드의 수이다. 게임 콘솔(810)은 게임 콘솔(102)과 대체적으로 동일하다는 것을 알아야 한다. 전술한 바와 같이, 게임 콘솔(102)은 오디오 프로세스 유닛(224) 및 오디오 CODEC(226)을 포함한다. 게임 콘솔(810)에서는, 구현되는 오디오 프로세스를 보다 더 명확하게 설명하기 위하여, 오디오 프로세스 유닛(224)과 오디오 CODEC(226)은 추가의 기능 블럭으로 분리되어 있다. 예를 들어, 게임 콘솔(102)과 관련하여 기술된 오디오 CODEC(226)은 인코더와 디코더 양자 모두를 포함하지만, 음성 채팅 동안 발생하는 오디오 신호 프로세스를 보다 더 명확하게 설명하기 위하여, 게임 콘솔(810) 내에서는 인코더와 디코더가 별개의 기능 블럭으로 도시된다. [게임 콘솔(102)와 관련하여 설명된] 오디오 프로세스 유닛(224)은 복수의 네트워크 큐(816a, 816b, 816c)를 포함하며, 임의의 네트워크 레이턴시는 엔티티들 사이에 존재하므로, 상이한 네트워크 엔티티와의 각각의 접속마다 하나의 큐를 갖는 것이 바람직하다. 필요한 구성요소이지만, 게임 콘솔(102)에 관련해서는 특별히 논의되지 않은 입력 라우터(826) 및 출력 라우터(820)가 도 8에 도시되어 있다. 게임 콘솔(810)은 16명까지의 화자(talker)(즉, 네트워크를 통해 4개까지의 게임 콘솔이 링크되고, 게임 콘솔마다 4명까지의 통화자를 가짐)를 동시에 신뢰할 수 있게 지원하도록 설계되어 있다. 게임 콘솔(810)은 평활한 게임 프레임 레이트를 지원하기 위하여 음성 프레임당 소정량의 데이터를 인코딩 및 디코딩할 수 있는 것이 바람직하다.

게임 콘솔(810)은 각각의 플레이어(828a-828d)의 헤드셋 상의 마이크로폰으로부터 각각의 플레이어에 대한 가정 음성 스트림을 수신하도록 구성된 입력부(824a-824d)를 포함한다. 입력부(824a-824d)는 어떤 플레이어가 말할 수 있는지를 결정하여 그러한 말할 수 있는 플레이어에 대응하는 음성 스트림만을 포워드하도록 구성된 입력 라우터(826)에 연결된다. 포워드된 음성 스트림은 입력 라우터(826)에 논리적으로 연결된 인코더(814)에 의해 수신된다. 인코더(814)는 가청 스피치를 네트워크(83)를 통해 수신측 게임 콘솔(832, 836 또는 840)에 요구되는 대로 송신할 수 있는 음성 데이터로 압축한다. 또한, 인코더(814)는, 네트워크(830)를 통해 게임 및 음성 트래픽을 송신하는 것을 담당하는 네트워크 계층(812)에 논리적으로 연결된다.

게임 콘솔(810)은 네트워크(830)를 통해 게임 콘솔(810)에 링크된 각각의 다른 게임 콘솔에 대한 네트워크 큐를 포함한다. 바람직하게는, 게임 콘솔(810)은 3개까지의 다른 게임 콘솔[즉, 콘솔(832, 836 및 840)]과 통신할 수 있다. 따라서, 게임 콘솔(810)은 3개의 네트워크 큐(816a, 816b 및 816c)를 확립하기 위한 충분한 메모리 및 처리 자원을 할당할 수 있다. 데이터를 송신하는 각각의 네트워크 엔티티에 대하여, 수신 엔티티에 대한 단일의 큐가 존재하는 것이 바람직하다. 게임 콘솔(836)은 단 한명의 플레이어(838)만을 지원하며, 네트워크 큐(816b)는 플레이어(838)로부터의 데이터만을 큐잉할 것이다. 네트워크 큐(816c)는 4명의 플레이어(842a-842d)를 지원하는 게임 콘솔(840)로부터의 데이터를 수신하기 때문에, 보다 많은 자원을 필요로 한다. 네트워크 큐는 인터넷 또는 기타 상호접속 네트워크를 통해 송신되는 패킷의 도달 시간 차이에 의해 유발되는 "지터" 효과를 제거한다. 네트워크 큐는 음성 데이터를 그대로 저장하고 음성 데이터의 플레이백을 평활화하기 때문에, 청취자는 네트워크를 통해 전파되는 음성 패킷의 임의의 지연에 의하여 유발되는 "팝(pops)"을 듣지 않는다.

각각의 네트워크 큐는 디코더(818)에 논리적으로 연결된다. 인코더(814)를 제어하는 알고리즘과 디코더(818)를 제어하는 알고리즘은 상보적이다. 디코더(818)는 디코딩된 가청 스트림을 수신하여 그것을 플레이어마다의 정확한 출력 오브젝트에 송신하는 출력 라우터(820)에 논리적으로 연결된다. 따라서, 출력 라우터(820)는 플레이어(828a-828d) 중 적절한 사람들에게 오디오 스트림을 제공하는 출력부(822a-822d)에 논리적으로 연결된다. 각각의 출력부는 모든 적합한 스트림을 혼합하여 그들을 적합한 플레이어의 헤드셋에 송신하는 것을 담당한다.

게임 콘솔(810)과의 음성 채팅을 지원하기 위해 요구되는 것을 분석할 때에, 게임 기반의 음성 채팅을 3개의 주요 시나리오로 분할하는 것이 도움이 된다. 포인트-투-포인트 시나리오에서는, 게임 콘솔당 한 사람씩 채팅하고, 2개의 게임 콘솔이 존재한다. 멀티포인트 시나리오에서는, 게임 콘솔당 한 사람씩 채팅하고, 16개까지의 게임 콘솔이 존재한다. 최종적으로, 멀티플레이어-온-멀티게임 콘솔 시나리오에서는, 게임 콘솔당 4명까지의 화자가 있고, 4개까지의 게임 콘솔이 존재한다. 대부분의 게임은 이러한 시나리오 중 하나에 해당할 것이다.

포인트-투-포인트는, 하나의 게임 콘솔 상의 단일 플레이어가 다른 게임 콘솔 상의 다른 단일 플레이어와 대화하는 것에 해당한다. 일반적인 예는, 단 2명의 플레이어만이 존재하며 플레이어들이 게임 진행 동안 통신하기를 원하는 체스 등의 게임이다. 이러한 경우에서, 각각의 게임 콘솔은 하나의 인코더와 하나의 디코더를 인스턴스화한다. 음성 프레임 업데이트 동안, 각각의 게임 콘솔은 임의의 인코딩과 임의의 디코딩을 필요에 따라 업데이트한다. 이러한 경우에서, 뮤트는, 뮤트된 플레이어의 음성 스트림을 디코딩하지 않는 것에 의해 간단하게 행해진다.

멀티포인트 시나리오에서는, 각각의 게임 콘솔 상에 한명의 플레이어가 존재하지만, 세션 내에 복수의 게임 콘솔이 존재한다. 예를 들면, 콘솔당 단일 플레이어만을 허용하는 4 플레이어용 브리지 게임이 있다. 게임은, 모든 플레이어가 모두에게 말하는지 또는 팀이 존재하는지를 결정할 수 있고, 플레이어의 서브세트가 서로 말할 수 있는지를 결정할 수 있다. 이러한 경우에서, 각각의 게임 콘솔은 하나의 인코더와 하나의 4-인-1(4 in 1) 디코더를 인스턴스화한다. 음성 프레임 업데이트 동안, 각각의 게임 콘솔은 (게임 콘솔 상의 단일 사용자에 대한) 임의의 인코딩과 (다른 게임 콘솔들로부터의 3명까지의 사용자에 대한) 임의의 디코딩을 업데이트한다. 4 in 1 디코더는, 복수의 입력 스트림을 취하고, 그들을 주파수 영역에서 조합하고, 그 조합에 단일 동작을 수행하여 하나의 단일 출력 스트림으로 변환하는 멀티스트림 병렬 디코더로서 구현된다. 이러한 최적화에 의하여, 각각의 단일 스트림에 대한 개별 동작들은, 스트림들을 결합한 후에 모든 스트림에 적용되는 단일 동작으로 보다 더 효율적으로 조합될 수 있다.

Ex.1002 / Page 325 of 1008
Cisco Systems, Inc.

멀티플레이어-온-멀티게임 콘솔 시나리오에 대하여, 각각의 게임 콘솔은 복수의 플레이어와 복수의 게임 콘솔이 접속되는 것을 허용한다. 예를 들어, 각 콘솔 상의 4명까지의 플레이어와 4개까지의 콘솔을 허용하는 16 플레이어용 게임이 있다.

게임 설계자는 모든 플레이어가 서로 대화할 수 있는지, 또는 팀이 존재하여 플레이어들의 서브세트만이 서로 말할 수 있는지를 결정할 수 있다. 16명의 플레이어에 있어서, 대화가 알기 어려워지지 않도록, 동시에 말할 수 있는 사람의 수(예를 들어, 단 4명)를 제한하는 것이 바람직하다.

각 게임 콘솔 내에서 음성 프레임당 플레이어당 하나의 인코더 및 4개의 4-인-1 디코더를 인스턴스화하고 처리하는 것은, 각각의 게임 콘솔 내의 프로세서를 압도할 가능성이 있다. 그러나, 이러한 상황을 관리하기 위하여, 다음과 같은 가정이 이루어진다.

· 4명 이상의 말을 한꺼번에 듣는 것은 다루기 어렵고 바람직하지 않은 것으로 가정한다. 이러한 가정은 한꺼번에 디코딩되는 음성의 수를 제한하는 데에 사용된다. 바람직한 알고리즘은 게임 콘솔 상의 청취자당 4개의 "가장 큰" 음성을 선택한다. 따라서, 최악의 시나리오는 게임 콘솔 당 2명의 청취자가 있고, 각각 4명(가능하면 그 청취자에 고유함)의 상이한 화자를 한꺼번에 듣는 것이다.

· 인코딩시에, 실제로 음성을 인코딩할 시간이 존재하지 않는 경우, 음성 프레임이 복제될 수 있는 것으로 가정한다. 이러한 가정에 기초하면, 2개의 인코더와 "라운드-로빈" 시스템(나중에 설명됨)을 사용하여, 모든 4개의 음성이 각각의 음성 프레임 내에서 처리될 수 있다.

· 음성 채널은 양방향 라디오 상의 채널과 같이 간단하게 사용된다. 즉, (개별적인 뮤트가 고려되기 전에는) 채널 상의 모든 화자가 서로 말하는 것을 들을 수 있다. 채팅할 플레이어가 세션에 들어오면, 그 플레이어는 그들이 이용하고 있는 채널을 명시적으로 설정해야만 한다. 일반적으로, 채널은 "팀" 내의 모든 회원이 서로 말할 수 있게 하는 데에 사용된다 (디폴트로서, 게임 내의 모든 플레이어에 대하여 하나의 채널이 사용될 수 있다). 채널은 음성을 위한 네트워크 트래픽을 최적화하는 데에 사용될 수 있다.

· 추가의 프로세서 전력을 사용할 것을 선택하는 타이틀은 추가의 디코더를 사용가능하게 하는 옵션을 가질 것이며, 이는 하나의 음성 프레임동안 추가의 음성을 동시에 들을 수 있게 할 것이다.

따라서, 멀티플레이어-온-멀티게임 콘솔 시나리오에서, 각각의 게임 콘솔은 하나의 4-대-4 디코더를 인스턴스화한다. 음성 프레임 업데이트 동안, 각각의 게임 콘솔은 (게임 콘솔 상의 4명까지의 사용자에 대한) 임의의 인코딩 및 (다른 게임 콘솔 상의 4명까지의 사용자에 대한) 임의의 디코딩을 업데이트한다. 이러한 음성 프레임 동안 4개 이상의 상이한 음성 스트림이 이용가능한 경우, 4개의 가장 큰 음성 스트림이 디코딩용으로 선택된다. 게임 설계자가 보다 더 많은 프로세스 전력이 채팅이 사용되는 것을 허용한 경우, 프레임당 디코딩되는 다중 음성 스트림의 수를 증가시키기 위하여, 추가의 디코더가 인스턴스화될 수 있다.

단 2개의 인코더만을 이용하는 인코딩은 다음과 같이 행해진다 (즉, 4개의 인코더 인스턴스가 있지만, 한 음성 간격에서 2개만이 작동함). 플레이어 1, 2, 3, 4 모두가 동시에 말하고, 최근에 인코딩되었던 2개의 음성에 관한 이력이 유지되는 것으로 가정한다. 현재의 마이크로폰 패킷은 플레이어 1의 음성에 대하여 분석되고, 플레이어 1의 음성이 존재하는 경우에는 그것이 인코딩된다. 다음으로, 현재의 마이크로폰 패킷은 플레이어 2의 음성에 대하여 다음에 분석되며, 플레이어 2의 음성이 존재하는 경우에는 그것이 인코딩된다. 프로세스가 중단되고, 이력은 {3, 4, 1, 2}로 업데이트된다. 후속 마이크로폰 간격(통상적으로 40 마이크로초) 동안, 마이크로폰 패킷은 플레이어 3 및 4(즉, 선행 마이크로폰 패킷 동안 처리되지 않았던 2명의 플레이어)에 대하여 분석된다. 마이크로폰 패킷이 분석되고, 플레이어 3의 음성이 발견되지 않은 경우, 인코딩은 수행되지 않는다. 플레이어 4의 음성이 발견되는 경우, 인코딩이 수행되며, 이력은 {3, 1, 2, 4}로 업데이트된다. 동일한 마이크로폰 패킷 동안, 플레이어 1의 음성이 존재하는 경우에 그것이 인코딩되고, 이력은 {3, 2, 4, 1}로 된다. 마이크로폰 패킷 간격 동안, 분석은 플레이어 3 및 2로부터의 음성을 찾는다. 플레이어 3이 여전히 음성을 갖지 않는 경우, 인코딩은 플레이어 2 및 플레이어 4에 대하여 행해지며, 이력은 {3, 1, 2, 4}로 업데이트된다.

라운드 로빈 인코딩 방식은 한번에 2 프레임의 스피치에 대해서만 행해지고, 현재 인코딩되고 있지 않은 스트림의 다른 프레임들에 대해 반복한다. 최종 결과는 4명의 플레이어 모두가 말할 때의 음향 저하이지만, 그 때 추가의 프로세스 전력은 사용되지 않는다.

제1 실시예를 위한 예시적인 방법

도 9는 본 발명의 본 실시예의 바람직한 구현에 따라, 게임 플레이 동안 플레이어들 간의 피어-투-피어 통신을 용이하게 하기 위하여, 게임 서버에 의해 사용되는 논리를 나타낸 흐름도(910)이다. 논리는 블럭(912)에서 시작하고, 블럭(914)에서는, 이용되는 게임 콘솔[예를 들어, 게임 콘솔(102)]을 위해 개발된 표준에 따라, 특정 게임을 위한 통신 컨트롤이 설정된다. 블럭(916)에 나타난 바와 같이, 표준에 기초하여, 특정 게임에 의해 지원될 통신의 타입(예를 들어, 텍스트 전용, 텍스트 및 음성, 메뉴에 의해 선택할 수 있는 녹음된 음성 응답, 또는 실시간 음성)이 지원된다. 블럭(914) 및 블럭(916)을 둘러싸고 있는 점선(913)에 의해 나타나는 바와 같이, 블럭(914 및 916)과 관련된 단계들은 게임 설계자에 의하여 구현된다.

그리고나서, 블럭(918)에 나타나 있는 바와 같이, 게임 서버는 이와 같이 설정된 게임 파라미터에 기초하여 게임 세션을 호스트할 수 있다. 블럭(920)에서, 게임 서버에 의해 호스트되는 게임 세션에 액세스하는 각각의 플레이어는, 게임 서버에 의하여 인증 및 허가된다. 블럭(922)에 나타난 바와 같이, 게임 서버는 자신에 액세스하는 각각의 게임 콘솔을 식별하는 것은 물론, 특정 게임 콘솔에 의해 서비스되는 각각의 개별 플레이어도 식별해야 한다. 바람직하게, 게임 서버는 각각의 개별 플레이어에게 로그온 시에 사용자 키를 제공하며, 그 사용자 키는 게임 서버에 의해 신뢰되는 플레이어들 간의 피어-투-피어 통신의 확립을 용이하게 하는 데에 사용된다.

블럭(924)에서, 서버는 플레이어들이 다른 플레이어와 원하는 대로 피어-투-피어 통신을 확립할 수 있게 한다. 블럭(924)와 관련된 특정 세부사항들은 이하에 설명되는 도 10에 제공된다. 블럭(926)에 나타난

바와 같이, 플레이어들 간의 피어-투-피어 통신을 허용하는 게임 플레이는 원하는 기간 동안 계속된다. 플레이어가 게임 환경에서 나가면, 논리는 종료 블럭(928)에서 종료된다.

도 10의 흐름도(1010)에서, 게임 서버는 블럭(1012)에 나타난 바와 같이 각각의 플레이어에게 다른 플레이어들의 리스트를 제공함으로써, 플레이어들 간의 피어-투-피어 통신의 확립을 용이하게 한다. 전형적으로, 게임 환경 내에서 플레이어들 간의 통신이 바람직하고 실현가능하도록 하기 위하여, 이러한 리스트는 동일 팀에 속하는 플레이어들, 또는 게임 세계 내에서 서로 충분히 인접한 플레이어들로 한정될 것이다. 블럭(1014)에서, 서버는 CONSOLE1-P1으로 식별되는 플레이어(즉, 제1 게임 콘솔을 사용하여 게임 서버에 액세스하는 제1 플레이어)가 음성 통신을 위하여 CONSOLE2-P4로 식별되는 플레이어(즉, 제2 게임 콘솔을 사용하여 게임 서버에 액세스하는 제4 플레이어)를 선택할 수 있게 한다. 이러한 선택은, 다른 플레이어들에 관한 스크롤가능한 리스트를 디스플레이하여, CONSOLE1-P1이 리스트를 스크롤하여 CONSOLE2-P4를 선택할 수 있게 함으로써 용이하게 행해질 수 있다.

그 다음, 서버는 블럭(1016)에 나타난 바와 같이 CONSOLE1-P1에 CONSOLE2-P4에 관한 정보를 제공한다. 정보는 CONSOLE2의 외부 IP 어드레스, CONSOLE2의 내부 IP 어드레스(내부 어드레스를 갖는 경우에만), 및 CONSOLE2의 제4 플레이어가 접속한 포트 번호를 포함한다. 바람직하게는, 서버는 CONSOLE2-P4가 게임 서버에 로그온할 때 CONSOLE2-P4에 할당되었던 사용자 키를 CONSOLE1-P1에 송신하여, CONSOLE2-P4가 CONSOLE1-P1으로부터 피어-투-피어 통신을 확립하기 위한 요청을 수신한 때에, CONSOLE2-P4가 CONSOLE1-P1이 서버에 의해 신뢰되는 것으로 인식할 수 있게 한다. CONSOLE1-P1이 신뢰되지 않았다면, 게임 서버는 CONSOLE1-P1이 CONSOLE2-P4의 사용자 키에 액세스하는 것을 허용하지 않았을 것이다. 블럭(1018)에서, CONSOLE1-P1은 CONSOLE2-P4와의 피어-투-피어 통신 링크를 확립하려고 시도한다. 이 단계는 게임 콘솔 CONSOLE1에 의해 자동적으로 수행된다.

판정 블럭(1020)은 시도가 성공적이었는지를 판정한다. CONSOLE1-P1과 CONSOLE2-P4 간의 피어-투-피어 통신이 확립된 경우에는, 블럭(1024)에 나타난 바와 같이, 플레이어 중 한명에 의해 (또는 네트워크 실패에 의해) 해제될 때까지 접속이 유지된다. 시도가 성공적이지 않았던 경우에는, 블럭(1022)에 나타난 바와 같이, 게임 서버는 제1 플레이어(즉, CONSOLE1-P1)의 접속 정보를 제2 플레이어(즉, CONSOLE2-P4)에 전송한다. 도 6과 관련하여 설명한 바와 같이, 피어-투-피어 통신 링크를 확립하기 위한 제2의 시도가 성공적이지 않은 경우, 논리는 블럭(1016)으로 진행하여 게임 서버가 제2 플레이어의 접속 정보를 제1 플레이어에게 다시 송신하게 하거나, 또는 게임 서버가 플레이어들 간의 모든 통신을 자신을 통해 라우팅할 수 있게 하거나, 또는 게임 서버가 피어-투-피어 관계 접속의 실패를 표시할 수 있게 한다.

제2 실시예에 관한 세부사항

도 11은, 클라이언트들 간의 피어-투-피어 통신의 확립을 용이하게 하는 것을 주요 기능으로 하는 서버(1114a-1114s)를 포함하는 예시적인 네트워크(1110)를 나타내고 있다. 본 발명의 본 실시예의 바람직한 구현에서, 서버는 호스트 서버에 대한 액세스 권한이 다를 수 있는 상이한 클라이언트 등급을 인식하도록 구성된다.

도 11에 도시된 실시예는, 보안 방식으로 강제될 수 있는 상이한 액세스 정책을 상이한 엔티티 "등급"(익명 사용자, 인증된 사용자, 사업, 대학 등)에 제공함으로써, 피어-투-피어 통신을 확립하고자 하는 클라이언트들의 공용 인터넷 디렉토리의 관리를 용이하게 한다. 예를 들어, 서버는 익명 사용자(1116)가 서버에 접속할 때, 익명 사용자(1116)가 서버에 의해 호스트되고 있는 세션 1에 액세스하는 것만을 허용하도록 구성된다. 세션 1은 다수의 상이한 방식으로 구성될 수 있다. 세션 1에 액세스하는 각각의 클라이언트는, 자신의 사이트로 트래픽을 유도하기를 원하는 웹사이트 운영 홍보자를 나타낼 수 있다. 따라서, 익명 사용자(1116)는 피어-투-피어 통신을 원하는 개인들에 관한 접속 정보를 얻을 수 있는 것과는 달리, 이러한 웹사이트에 액세스하기 위해서만 네트워크(1110)를 사용할 수 있다. 대안적으로, 세션 1은 거의 또는 전혀 제한없이 피어-투-피어 통신을 확립하는 것에 대한 선호를 표명한 클라이언트들을 포함할 수 있다.

네트워크(1110) 내의 서버는 제한적으로 인증된 사용자를 인식하여, 제한적으로 인증된 사용자(1118)가 서버에 액세스할 때 세션 1 및 세션 2에 대한 액세스가 제공되게 할 수 있도록 구성된다. 따라서, 제한적으로 인증된 사용자(1118)는 익명 사용자(1116)가 액세스할 수 없는 클라이언트들(즉, 세션 2에 액세스하는 클라이언트들)에 액세스할 수 있다. 또한, 서버는 또 다른 액세스 권한을 허가받은 인증된 사용자를 인식하도록 구성된다. 인증된 사용자(1120)는 세션 1, 세션 2 또는 세션 3에 대한 액세스를 허가받을 수 있으며, 세션 3은 또 다른 옵션을 제공한다. 또한, 네트워크(1110)는, 다른 클라이언트에 대한 자신의 접속을 광고하는 것을 서버에 의해 허가받은 리스트 엔티티(list entity)(1122a 및 1122b)를 더 포함한다.

바람직하게, 통신 네트워크에 접속하기를 원하는 각각의 클라이언트는 인증 및 허가되어야 한다. 인증 및 허가(A&A)는, 마이크로소프트사의 Passport, 신뢰 계층을 이용한 증명을 채용하는 공용 키 암호화, 또는 TA(Trusted Authoruty)를 사용하여 "티켓"을 허여하는 Kerberos[RFC(1510)] 등의 보안 프로토콜에서와 같이, 웹 사이트 사인-인(sign-in)에 기초할 수 있다. 이러한 메커니즘들 중 임의의 것, 또는 이러한 메커니즘들의 조합이 본 발명의 본 양태와 관련하여 사용될 수 있다.

인증은 서버에 대한 액세스를 시도하는 클라이언트의 신분을 확인하는 프로세스이다. 인증은 사용자명/패스워드 조합과 같은 보안 증명서, 또는 클라이언트에 연관된 스마트 카드 및/또는 패스워드의 소유를 제공함으로써 달성될 수 있다. 또한, 인증은 클라이언트를 "보증(vouch)"할 수 있는 소정의 엔티티에도 의존할 수 있다. 예를 들어, 새로운 클라이언트가 다른 클라이언트들에 대한 액세스를 획득하기 위하여 서버에 등록할 때, 인증은 신용카드, 루트 인증기관(root certificate authority), 또는 기타 제3의 신뢰되는 인증기관을 사용하여 달성될 수 있다.

인증은 클라이언트에게 서비스(또는 서비스의 서브세트) 사용에 대한 허가를 제공한다. 도 11에서, 익명 사용자(1116), 제한적으로 인증된 사용자(1118) 및 인증된 사용자(1120)는 각각 상이한 허가를 할당받은 상태이다. 클라이언트가 인증되고 나면, 그 클라이언트의 인증 데이터는 서비스 및 서비스의 상이한 서브세트(들)(즉, 세션 1, 세션 2 및/또는 세션 3)로의 액세스에 대한 허가를 포함한다. 인증은 액세스를 허용하며, 정책을 강요한다. 디렉토리의 정책은 서비스의 설계자에 의해 결정될 수 있으며, 폭넓게 달라질 수 있다. 예를 들어, 네트워크(1110)에서, 바람직하게, 익명 사용자는 인증을 필요로 하지 않으며, 세션

1은 서비스의 매우 제한적인 서브세트일 뿐이다. 일반적으로, 익명 사용자는 (옐로우 페이지에 액세스하는 것과 같이) 익명 접속을 허락하는 제한된 공개용 리스트 엔티티(즉, 광고자, 회사 및/또는 대학)를 브라우징하는 것을 허가받을 것이다. 익명 접속의 접속 타입은 리스트 엔티티에 의해 결정되며, 온라인 컨텐트를 듣고 보고 읽는 것과 같은 단방향 통신으로만 제한될 수 있다.

도 11의 사용자(1118)와 같이 제한적으로 인증된 사용자는 보안 증명서를 제시함으로써 자신의 신분을 증명한 사용자이다. 제한적으로 인증된 사용자는 제한된 공개용 리스트 엔티티를 보고 그에 접속할 수 있으며, 그러한 엔티티와 양방향으로 통신하는 것도 허용된다. 또한, 이들은 부적절한 컨텐트를 리스트화한 엔티티의 위반을 보고하는 것도 할 수 있다.

인증된 사용자[즉, 도 11의 사용자(1120)]는 보안 증명서를 제시함으로써 자신의 신분을 증명하고, 또한 기업 인증기관과 사업 관계를 가지며, 따라서 제한적으로 인증된 사용자보다 더 많은 액세스를 허가하는 인증의 수퍼세트를 허여받은 사용자이다. 인증된 사용자는 제한적으로 인증된 사용자의 허가를 전부 갖지만, 보다 안전한 통신을 원하는 클라이언트들을 포함하는 것과 같은 추가 세션에 대해서도 액세스할 수 있다 (예를 들어, 회사의 인트라넷 디렉토리에 대한 액세스).

바람직하게, 리스트 엔티티는 자신의 접속을 익명 사용자, 제한적으로 인증된 사용자 및 인증된 사용자 중 누구에게라도 광고할 수 있는 엔티티이다. 리스트 엔티티는 개인, 기업, 교회, 대학 및 기타 기관일 수 있다. 리스트 엔티티는 사용자 세트에 기초하여 자신의 액세스를 설정할 수 있다. 예를 들어, 고객 지원을 제공하는 리스트 엔티티는 익명 사용자가 컴퓨터로부터의 자동화된 도움을 얻을 수 있게 하고, 제한적으로 인증된 사용자에 대해 제한된 고객 지원을 허용하며, 그들과 지원 계약을 맺은 인증된 사용자에 대해 프리미어 지원을 허용한다.

본 발명이 바람직한 실시 형태 및 그에 대한 수정과 관련하여 설명되었지만, 본 기술 분야의 숙련된 기술자라면, 이하의 특허청구범위 내에서 많은 다른 수정이 본 발명에 행해질 수 있음을 알 것이다. 예를 들어, 네트워크화된 게임 서비스에 독립적인 게임 시스템의 로컬 네트워크 내에서, 화자는 시각적으로 식별될 수 있다. 또한, 논리 흐름 내에서 구현되고 상기에 설명된 결정 단계들은 다른 구성으로 배열될 수 있다. 따라서, 상기의 설명은 본 발명의 범위를 어떤 방식으로든 제한하기 위한 것이 아니며, 본 발명의 범위는 이하의 특허청구범위를 참조하여 전체적으로 결정되어야 한다.

발명의 효과

본 발명에 따르면, 개별 사용자들 간의 피어-투-피어 통신의 확립을 용이하게 하는 신뢰할 수 있는 환경을 형성하는 방법 및 시스템이 제공된다.

청구의 범위

청구항 1

서버를 사용하여, 클라이언트들이 서로 피어-투-피어 통신을 확립할 수 있게 되는 신뢰되는 세션 환경을 확립하는 방법에 있어서,

(a) 상기 서버를 사용하여, 상기 클라이언트들이 피어-투-피어 통신을 확립하기 전에 처음에 액세스하는 세션을 호스트하는 단계,

(b) 상기 서버에 의해 호스트되는 세션에 액세스하려고 시도하는 각각의 클라이언트의 자격을 검사하여, 상기 서버에 의해 승인받은 자격을 갖는 클라이언트들만이 상기 세션에 대한 액세스를 허가받도록 하는 단계,

(c) 상기 세션에 대한 액세스를 허가받은 제1 클라이언트에게, 현재 상기 세션에 대한 액세스를 허가받은 하나 이상의 다른 클라이언트를 식별하는 리스트를 제공하는 단계,

(d) 상기 제1 클라이언트가 상기 리스트로부터 제2 클라이언트를 선택할 수 있게 하는 단계 - 상기 제1 클라이언트에 의해 선택된 제2 클라이언트는 상기 서버에 알려짐 -, 및

(e) 상기 제2 클라이언트에 관한 정보를 상기 서버로부터 상기 제1 클라이언트로 전송하는 단계 - 상기 정보는 상기 제1 클라이언트와 상기 제2 클라이언트 간에서 피어-투-피어 통신이 확립될 수 있게 하는 상기 제2 클라이언트에 대한 어드레스를 포함함 -

를 포함하는 방법.

청구항 2

제1항에 있어서,

(a) 상기 세션에 액세스하려고 시도하는 각 클라이언트의 자격을 검사하는 단계는,

각각의 클라이언트를 인증하는 단계, 및

각각의 인증된 클라이언트가 상기 세션의 특정 부분에 액세스하는 것을 허가하는 단계

를 포함하고,

(b) 상기 제1 클라이언트에게 제공된 리스트는, 상기 제1 클라이언트와 동일한 세션 부분에 액세스하는 것을 허가받은 클라이언트만을 식별하는 방법.

청구항 3

제2항에 있어서,

한 클라이언트의 상기 서버의 다른 클라이언트들과의 피어-투-피어 통신에서의 상기 클라이언트의 행동에 관하여 상기 서버에 의해 수신된 피드백에 응답하여, 상기 한 클라이언트의 상기 세션의 특정 부분에 대한 액세스 허가를 변경하는 단계를 더 포함하는 방법.

청구항 4

제1항에 있어서,

상기 서버는, 클라이언트들이 피어-투-피어 통신을 확립할 수 있게 되는 신뢰되는 세션 환경을 확립하는 것 이외의 기능을 클라이언트에게 제공하는 방법.

청구항 5

제4항에 있어서,

상기 서버는 게임 서버를 포함하고, 각각의 클라이언트는 네트워크화된 게임 플레이용 컴퓨팅 디바이스를 사용하여 상기 서버에 액세스하는 방법.

청구항 6

제5항에 있어서,

상기 제1 클라이언트에게 제공된 하나 이상의 클라이언트의 리스트는, 상기 게임 서버에 의해 제어되는 게임 환경에서 인터랙션하는 클라이언트들만을 포함하는 방법.

청구항 7

제5항에 있어서,

하나의 게임 플레이용 컴퓨팅 디바이스가 복수의 상이한 클라이언트를 지원할 수 있는 방법.

청구항 8

제1항에 있어서,

상기 제2 클라이언트에 관한 정보를 상기 서버로부터 상기 제1 클라이언트로 전송하는 단계는, 상기 제2 클라이언트의 외부 IP 어드레스, 상기 제2 클라이언트와 연관된 임의의 내부 IP 어드레스, 및 상기 제2 클라이언트와 피어-투-피어 통신을 하는 데에 요구되는 임의의 포트 어드레스를 전송하는 단계를 포함하는 방법.

청구항 9

제8항에 있어서,

상기 각각의 클라이언트의 자격을 검사하는 단계는, 각각의 클라이언트에게 고유한 사용자 키를 할당하는 단계를 포함하고,

상기 서버로부터 상기 제1 클라이언트에게 전송된 상기 제2 클라이언트에 관한 정보는 제2 클라이언트의 사용자 키를 포함하여, 상기 제1 클라이언트와의 피어-투-피어 통신을 열게 하는 요청이 신뢰되는 소스로부터 온 것임을 상기 제2 클라이언트에게 확신시키는 방법.

청구항 10

제1항에 있어서,

상기 제2 클라이언트에 관한 정보를 수신한 후에, 상기 제1 클라이언트가 상기 제2 클라이언트와의 피어-투-피어 통신을 확립할 수 없는 경우,

(a) 상기 피어-투-피어 통신을 확립하기 위한 상기 제1 클라이언트의 시도가 실패했음을 상기 서버에 통지하는 단계,

(b) 상기 제1 클라이언트에 관한 정보를 상기 서버로부터 상기 제2 클라이언트로 전송하는 단계 - 상기 정보는, 상기 제1 클라이언트와 상기 제2 클라이언트 간에서 피어-투-피어 통신이 확립될 수 있게 하는 상기 제1 클라이언트에 대한 어드레스를 포함함 -, 및

(c) 상기 제2 클라이언트에게 상기 제1 클라이언트와의 피어-투-피어 통신을 확립할 것을 요청하는 단계

를 더 포함하는 방법.

청구항 11

제10항에 있어서,

상기 제1 클라이언트에 관한 정보를 수신한 후, 상기 제2 클라이언트가 상기 제1 클라이언트와의 피어-투-피어 통신을 확립할 수 없는 경우, 상기 제1 클라이언트와 상기 제2 클라이언트 간의 모든 통신을 상기 서버를 통해 라우팅하는 단계를 더 포함하는 방법.

청구항 12

제1항에 따른 단계들을 실행하기 위한 기계 명령들이 저장되어 있는 메모리 매체.

청구항 13

Ex.1002 / Page 329 of 1008
Cisco Systems, Inc.

사용자들이 서로 피어-투-피어 통신을 확립할 수 있는 신뢰되는 세션 환경을제공하는 시스템에 있어서,

(a) 프로세서, 및

(b) 상기 프로세서와 통신하며, 상기 프로세서가 복수의 기능을 수행하게 하는 기계 명령들을 저장하는 메모리

를 포함하고,

상기 복수의 기능은,

(ⅰ) 사용자의 자격을 검사함으로써, 상기 시스템에 의해 호스트되는 세션에 액세스하려고 시도하는 각각의 사용자를 스크리닝(screening)하여, 스크리닝된 사용자들만이 상기 세션에 대한 액세스를 허가받게 하는 기능,

(ⅱ) 제1 스크리닝된 사용자에게, 현재 상기 세션에 대한 액세스를 허가받은 적어도 한명의 다른 스크리닝된 사용자를 포함하는 리스트를 제공하는 기능, 및

(ⅲ) 상기 제1 스크리닝된 사용자로부터의 요청에 응답하여, 상기 리스트 내에 포함된 제2 스크리닝된 사용자에 관한 정보를 상기 제1 스크리닝된 사용자에게 제공하는 기능 - 상기 정보는 상기 제2 스크리닝된 사용자와의 피어-투-피어 통신을 확립하는 데에 요구되는 임의의 어드레스를 포함함 -

을 포함하는 시스템.

청구항 14

제13항에 있어서,

상기 기계 명령들은, 상기 프로세서가,

(a) 상기 제2 스크리닝된 사용자와의 피어-투-피어 통신을 확립하기 위한 상기 제1 스크리닝된 사용자의 시도가 실패했음을 통지받은 경우, 상기 제1 스크리닝된 사용자에 관한 정보를 상기 제2 스크리닝된 사용자에게 제공하는 기능 - 상기 정보는 상기 제1 스크리닝된 사용자와의 피어-투-피어 통신을 확립하는 데에 요구되는 임의의 어드레스를 포함함 -, 및

(b) 상기 제2 스크리닝된 사용자에게 상기 제1 스크리닝된 사용자와의 피어-투-피어 통신을 확립할 것을 요청하는 기능

을 더 수행하게 하는 시스템.

청구항 15

제14항에 있어서,

상기 기계 명령들은, 상기 프로세서가,

상기 제1 스크리닝된 사용자와의 피어-투-피어 통신을 확립하기 위한 상기 제2 스크리닝된 사용자의 시도가 실패했음을 통지받은 경우, 상기 제1 스크리닝된 사용자와 상기 제2 스크리닝된 사용자 간의 모든 통신을 상기 시스템을 통해 라우팅하게 하는 기능

을 더 수행하게 하는 시스템.

청구항 16

서버를 사용하여, 상기 서버의 클라이언트들 간의 피어-투-피어 통신을 용이하게 하는 보안 환경을 제공하는 방법에 있어서,

(a) 상기 서버를 사용하여, 클라이언트가 상기 보안 환경에 액세스하는 것을 허가하기 전에 각각의 클라이언트를 인증 및 허가하는 단계,

(b) 상기 서버를 사용하여, 상기 보안 환경에 대한 액세스를 허가받은 제1 클라이언트에게, 상기 보안 환경에 대한 액세스를 허가받은 제2 클라이언트에 연관된 식별자를 제공하는 단계, 및

(c) 상기 제1 클라이언트에 의한 요청에 응답하여, 상기 서버를 사용하여, 상기 서버에 의한 또다른 인터랙션을 요구하지 않고서 상기 제1 클라이언트와 상기 제2 클라이언트 간의 피어-투-피어 통신이 확립될 수 있게 하기 위한 정보를, 상기 제1 클라이언트에게 제공하는 단계

를 포함하는 방법.

청구항 17

제16항에 있어서,

상기 서버에 의하여, 각각의 상이한 클라이언트 등급마다 상이한 액세스 정책이 적용되도록, 각각의 클라이언트에게 등급을 할당하는 단계를 더 포함하고,

상기 서버를 사용하여 각각의 클라이언트를 인증 및 허가하는 단계는, 클라이언트가 속하는 등급을 결정하는 단계를 포함하는 방법.

청구항 18

제17항에 있어서,

Ex.1002 / Page 330 of 1008
Cisco Systems, Inc.

상기 각각의 클라이언트에게 등급을 할당하는 단계는,

클라이언트가 익명 사용자인지를 결정하는 단계, 및

익명 사용자인 경우, 상기 보안 환경에 액세스하기 위한 상기 클라이언트의 허가를 정의하는 소정의 허가를 상기 클라이언트에게 할당하는 단계

를 포함하고,

상기 각각의 익명 사용자의 허가를 정의하는 허가는, 익명 사용자인 하나의 클라이언트가 익명이 아닌 다른 클라이언트와의 제한적인 피어-투-피어 통신을 확립하여, 상기 다른 클라이언트가 상기 하나의 클라이언트에게 데이터에 대한 단방향 액세스를 제공하는 서버의 역할을 할 수 있게 하는 방법.

청구항 19

제17항에 있어서,

상기 각각의 클라이언트에게 등급을 할당하는 단계는,

클라이언트가 제한적으로 인증된 사용자인지를 결정하는 단계, 및

제한적으로 인증된 사용자인 경우, 상기 보안 환경에 액세스하기 위한 상기 클라이언트의 허가를 정의하는 소정의 허가를 상기 클라이언트에게 할당하는 단계

를 포함하고,

상기 소정의 허가는, 제한적으로 인증된 사용자인 클라이언트가, 제한적으로 인증된 사용자와의 피어-투-피어 통신을 허가하는 데에 동의한 다른 클라이언트와의 피어-투-피어 통신을 확립할 수 있도록, 각각의 제한적으로 인증된 사용자의 허가를 정의하는 방법.

청구항 20

제17항에 있어서,

상기 각각의 클라이언트에게 등급을 할당하는 단계는,

클라이언트가 인증된 사용자인지를 결정하는 단계, 및

인증된 사용자인 경우, 상기 보안 환경에 액세스하기 위한 상기 클라이언트의 허가를 정의하는 소정의 허가를 상기 클라이언트에게 할당하는 단계

를 포함하고,

상기 각각의 인증된 사용자의 허가를 정의하는 허가는, 인증된 사용자인 클라이언트가, 인증된 사용자와의 피어-투-피어 통신을 허가하는 데에 동의한 다른 클라이언트와의 피어-투-피어 통신을 확립할 수 있게 하는 방법.

청구항 21

제17항에 있어서,

상기 각각의 클라이언트에게 등급을 할당하는 단계는,

클라이언트가 리스트 엔티티(listing entity)인지를 결정하는 단계, 및

리스트 엔티티인 경우, 상기 보안 환경에 액세스하기 위한 상기 클라이언트의 허가를 정의하는 소정의 허가를 상기 클라이언트에 할당하는 단계

를 포함하고,

상기 각각의 리스트 엔티티의 허가를 정의하는 허가는, 리스트 엔티티인 클라이언트가, 다른 클라이언트와의 통신을 상기 다른 클라이언트에 등급에 기초하여 지향시킬 수 있게 하는 방법.

청구항 22

제17항에 있어서,

상기 서버를 사용하여, 상기 제2 클라이언트에 연관된 식별자를 상기 제1 클라이언트에게 제공하는 단계는, 상기 제1 클라이언트와 동일한 등급에 속하는 클라이언트들에 연관된 식별자만을 상기 제1 클라이언트에게 제공하는 단계를 포함하는 방법.

청구항 23

제16항에 있어서,

(a) 상기 서버는, 클라이언트가 관여하기를 원하는 피어-투-피어 통신의 주제에 기초하여, 복수의 상이한 클라이언트 그룹을 설정하고,

(b) 상기 서버를 사용하여 상기 서버에 액세스하는 각각의 클라이언트를 인증하는 단계는, 특정 클라이언트가 어느 그룹에 연관되는지를 결정하는 단계를 포함하고,

(c) 상기 서버를 사용하여, 상기 제2 클라이언트에 연관된 식별자를 상기 제1 클라이언트에게 제공하는 단계는, 상기 제1 클라이언트와 적어도 하나의 그룹을 공유하는 클라이언트들에 연관된 식별자만을 상기 제1 클라이언트에게 제공하는 단계를 포함하는 방법.

Ex.1002 / Page 331 of 1008
Cisco Systems, Inc.

청구항 24

제16항에 있어서,

상기 서버를 사용하여, 상기 서버에 액세스하는 각각의 클라이언트를 인증 및 허가하는 단계는,

(a) 웹 사이트의 사인-인(sign-in)을 사용하여 각각의 클라이언트를 인증 및 허가하는 단계,

(b) 공용 키 암호를 사용하여 각각의 클라이언트를 인증 및 허가하는 단계, 및

(c) 신뢰되는 인증기관을 사용하여, 인증을 위해 클라이언트에 의해 사용되는 티켓을 제공하는 단계

중 적어도 하나를 포함하는 방법.

청구항 25

제16항에 있어서,

상기 서버는, 피어-투-피어 통신이 확립될 수 있게 하는 것 이외의 기능을 클라이언트에게 제공하는 방법.

청구항 26

제25항에 있어서,

상기 서버는 게임 서버를 포함하는 방법.

청구항 27

제26항에 있어서,

상기 서버를 사용하여, 상기 제2 클라이언트와 연관된 식별자를 상기 제1 클라이언트에게 제공하는 단계는, 상기 게임 서버에 의해 제어되는 게임 환경 내에서 상기 제1 클라이언트와 인터랙션하는 클라이언트들에 대한 식별자를 상기 제1 클라이언트에게 제공하여, 상기 클라이언트들과 상기 제1 클라이언트 간의 피어-투-피어 통신을 가능하게 하는 단계를 포함하는 방법.

청구항 28

제16항에 있어서,

상기 정보는 상기 제2 클라이언트의 외부 IP 어드레스, 상기 제2 클라이언트에 연관된 임의의 내부 IP 어드레스, 및 상기 제2 클라이언트와의 피어-투-피어 통신에 요구되는 임의의 포트 어드레스를 포함하는 방법.

청구항 29

제28항에 있어서,

상기 서버를 사용하여, 상기 서버에 액세스하는 각각의 클라이언트를 인증 및 허가하는 단계는, 각각의 클라이언트에게 고유한 사용자 키를 할당하는 단계를 포함하고,

상기 정보는 상기 제2 클라이언트의 사용자 키를 포함하여, 피어-투-피어 통신을 열도록 하는 요청이 신뢰되는 소스로부터 온 것임을 상기 제2 클라이언트에게 확신시키는 방법.

청구항 30

제28항에 있어서,

상기 제2 클라이언트에 대한 정보를 수신한 후, 상기 제1 클라이언트가 상기 제2 클라이언트와의 피어-투-피어 통신을 확립할 수 없는 경우,

(a) 상기 제2 클라이언트와의 피어-투-피어 통신을 확립하기 위한 상기 제1 클라이언트의 시도가 실패했음을 상기 서버에 통지하는 단계,

(b) 상기 서버를 사용하여, 상기 제2 클라이언트가 상기 제1 클라이언트와의 피어-투-피어 통신을 확립할 수 있게 하는 데에 요구되는 상기 제1 클라이언트에 관한 정보를 상기 제2 클라이언트에게 제공하는 단계, 및

(c) 상기 제2 클라이언트에게 상기 제1 클라이언트와의 피어-투-피어 통신을 확립할 것을 요청하는 단계

를 더 포함하는 방법.

청구항 31

제30항에 있어서,

상기 제1 클라이언트에 관한 정보를 수신한 후, 상기 제2 클라이언트가 상기 제1 클라이언트와의 피어-투-피어 통신을 확립할 수 없는 경우, 상기 제1 클라이언트와 상기 제2 클라이언트 간의 각각의 통신을 상기 서버를 통해 라우팅하는 단계를 더 포함하는 방법.

청구항 32

제16항의 단계들을 수행하기 위한 기계 명령들이 저장되어 있는 메모리 매체.

청구항 33

Ex.1002 / Page 332 of 1008
Cisco Systems, Inc.

대규모 멀티플레이어(massively multiplayer) 게임을 호스트하는 게임 서버의 작업 부하를 실질적으로 감소시키기 위하여, 상기 대규모 멀티플레이어 게임 내의 플레이어들이 피어-투-피어 관계로 서로 통신할 수 있게 하는 방법에 있어서,

(a) 상기 대규모 멀티플레이어 게임의 플레이에 플레이어로서 참여하기를 원하는 사람 각각에게, 우선 상기 게임 서버를 운영하는 게임 서비스에 등록할 것을 요구하는 단계,

(b) 플레이어가 상기 게임 서비스에 등록했는지를 결정함으로써 상기 게임 서버에 액세스하려고 시도하는 각각의 플레이어를 인증하여, 등록한 사람만이 상기 게임 서버에 플레이어로서 액세스할 수 있게 하는 단계,

(c) 제1 플레이어에게, 상기 게임 서버에 의해 호스트되는 대규모 멀티플레이어 게임 내에서 상기 제1 플레이어와 인터랙션할 수 있는 적어도 한명의 다른 플레이어를 식별하는 리스트를 제공하는 단계,

(d) 상기 제1 플레이어가 상기 리스트로부터 제2 플레이어를 선택할 수 있게 하는 단계 - 선택된 상기 제2 플레이어는 상기 게임 서버에게 알려짐 -, 및

(e) 상기 제2 플레이어에 관한 정보를 상기 게임 서버로부터 상기 제1 플레이어로 전송하는 단계 - 상기 정보는 상기 제1 플레이어와 상기 제2 플레이어 간에서 피어-투-피어 통신이 확립될 수 있게 하는 데에 요구됨 -

를 포함하는 방법.

청구항 34

제33항에 있어서,

상기 게임 서버에 액세스하려고 시도하는 각각의 플레이어를 인증하는 단계는, 각각의 플레이어에게 고유한 사용자 키를 할당하는 단계를 포함하고,

상기 제2 플레이어에 관한 정보를 상기 서버로부터 상기 제1 플레이어로 전송하는 단계는, 상기 제2 플레이어의 사용자 키를 전송하여, 상기 피어-투-피어 통신을 열게 하는 요청이 상기 게임 서버에 의해 호스트되는 대규모 멀티플레이어 게임에 참여하고 있는 신뢰되는 플레이어로부터 온 것임을, 상기 제2 플레이어에게 확신시키는 단계를 포함하는 방법.

청구항 35

제33항에 있어서,

상기 제2 플레이어에 대한 정보를 수신한 후, 상기 제1 플레이어가 상기 제2 플레이어와의 피어-투-피어 통신을 확립할 수 없는 경우,

(a) 피어-투-피어 통신을 확립하기 위한 상기 제1 플레이어의 시도가 실패했음을 상기 게임 서버에 통지하는 단계,

(b) 상기 제1 플레이어에 관한 정보를 상기 서버로부터 상기 제2 플레이어로 전송하는 단계 - 상기 정보는 상기 제1 플레이어와 상기 제2 플레이어 간의 피어-투-피어 통신이을 확립될 수 있게 하는 데에 요구됨 -, 및

(c) 상기 제2 플레이어에게 상기 제1 플레이어와의 피어-투-피어 통신을 확립할 것을 요청하는 단계

를 더 포함하는 방법.

청구항 36

제35항에 있어서,

상기 제1 플레이어에 관한 정보를 수신한 후, 상기 제2 플레이어가 상기 제1 플레이어와의 피어-투-피어 통신을 확립할 수 없는 경우, 상기 제1 플레이어와 상기 제2 플레이어 간의 각각의 통신을 상기 게임 서버를 통해 라우팅하는 단계를 더 포함하는 방법.

청구항 37

제33항의 단계들을 수행하기 위한 기계 명령들이 저장되어 있는 메모리 매체.

청구항 38

게임 플레이 동안, 허가된 플레이어들만이 다른 허가된 플레이어와의 피어-투-피어 통신을 확립하도록 허용되는 게임 환경을 제공하여, 진행중인 플레이어들 간의 통신을 관리하기 위해 네트워크화된 게임 시스템으로부터의 자원을 요구하지 않으면서 게임 플레이를 향상시키는 네트워크화된 게임 시스템에 있어서,

(a) 프로세서, 및

(b) 상기 프로세서와 통신하며, 상기 프로세서가 복수의 기능을 수행하게 하는 기계 명령들을 저장하는 메모리

를 포함하고,

상기 복수의 기능은,

(ⅰ) 상기 게임 시스템에 의해 호스트되는 게임 환경에 액세스하려고 시도하는 각각의 플레이어를 스크리닝하여, 허가된 플레이어들만이 상기 게임 시스템에 의해 호스트되는 게임 환경에 액세스할 수 있는 기능,

Ex.1002 / Page 333 of 1008
Cisco Systems, Inc.

(ii) 제1 허가된 플레이어에게, 상기 게임 환경에 참여하고 있는 적어도 한명의 다른 허가된 플레이어를 포함하는 리스트를 제공하는 기능,

(iii) 상기 제1 허가된 플레이어가 상기 리스트로부터 제2 허가된 플레이어를 식별할 수 있게 하는 기능, 및

(iv) 상기 제2 허가된 플레이어에 관한 정보를 상기 게임 시스템으로부터 상기 제1 허가된 플레이어로 전송하는 기능 - 상기 정보는 상기 제1 허가된 플레이어와 상기 제2 허가된 플레이어 간에 피어-투-피어 통신이 확립될 수 있게 하는 데에 요구되는 임의의 어드레스를 포함함 -

를 포함하는 네트워크화된 게임 시스템.

청구항 39

제38항에 있어서,

상기 정보는 상기 게임 시스템에 의해 상기 제2 허가된 플레이어에 할당된 사용자 키를 포함하여, 상기 피어-투-피어 통신을 열게 하는 요청이 신뢰되는 플레이어로부터 온 것임을 상기 제2 허가된 플레이어에게 확신시키는 네트워크화된 게임 시스템.

청구항 40

제38항에 있어서,

상기 기계 명령들은, 상기 프로세서가,

(a) 상기 제2 허가된 플레이어와의 피어-투-피어 통신을 확립하기 위한 상기 제1 허가된 플레이어의 시도가 실패했음을 통지받은 경우, 상기 제2 허가된 플레이어에게 상기 제1 허가된 플레이어에 관한 정보를 제공하는 기능 - 상기 정보는 상기 제1 허가된 플레이어와 상기 제2 허가된 플레이어 간에 피어-투-피어 통신이 확립될 수 있게 하는 데에 요구되는 임의의 어드레스를 포함함 -, 및

(b) 상기 제2 허가된 플레이어에게 상기 제1 허가된 플레이어와의 피어-투-피어 통신을 확립할 것을 요청하는 기능

을 더 수행하게 하는 네트워크화된 게임 시스템.

청구항 41

서버를 사용하여, 클라이언트들이 서로 피어-투-피어 통신을 확립할 수 있게 하는 신뢰되는 세션 환경을 확립하는 방법에 있어서,

(a) 서버를 사용하여, 상기 클라이언트들이 피어-투-피어 통신을 확립하기 전에 처음에 액세스하는 세션을 호스트하는 단계,

(b) 상기 서버에 의해 호스트되는 상기 세션에 액세스하려고 시도하는 각 클라이언트의 자격을 검사하여, 상기 서버에 의해 승인받은 자격을 갖는 클라이언트들만이 상기 세션에 대한 액세스를 허가받도록 하는 단계,

(c) 상기 세션에 대한 액세스를 허가받은 제1 클라이언트에게, 상기 서버에 의해 승인받은 자격을 갖는 하나 이상의 다른 클라이언트를 식별하는 리스트를 제공하는 단계,

(d) 상기 제1 클라이언트가 상기 리스트로부터 제2 클라이언트를 선택할 수 있게 하는 단계 - 상기 제1 클라이언트에 의해 선택된 제2 클라이언트는 상기 서버에 알려짐 -, 및

(e) 상기 제2 클라이언트에 관한 접속 정보를 상기 서버로부터 상기 제1 클라이언트로 전송하는 단계 - 상기 접속 정보는 상기 제1 클라이언트와 상기 제2 클라이언트 간에서 피어-투-피어 통신이 확립될 수 있게 함 -

를 포함하는 방법.

청구항 42

제41항에 있어서,

상기 제2 클라이언트에 관한 정보를 수신한 후에, 상기 제1 클라이언트가 상기 제2 클라이언트와의 피어-투-피어 통신을 확립할 수 없는 경우,

(a) 피어-투-피어 통신을 확립하기 위한 상기 제1 클라이언트의 시도가 실패했음을 상기 서버에 통지하는 단계,

(b) 상기 제1 클라이언트에 관한 정보를 상기 서버로부터 상기 제2 클라이언트로 전송하는 단계 - 상기 정보는 상기 제1 클라이언트와 상기 제2 클라이언트 간에 피어-투-피어 통신이 확립될 수 있게 하는 데에 요구됨 -, 및

(c) 상기 제2 클라이언트에게 상기 제1 클라이언트와의 피어-투-피어 통신을 확립할 것을 요청하는 단계

를 더 포함하는 방법.

청구항 43

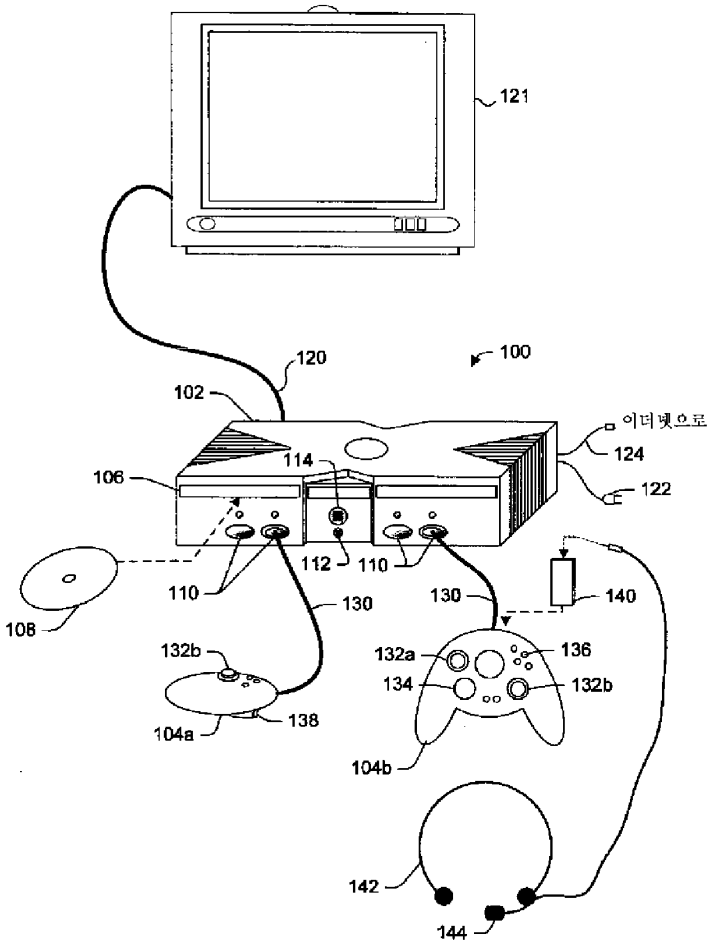
제41항에 있어서,

상기 제1 클라이언트에 관한 정보를 수신한 후, 상기 제2 클라이언트가 상기 제1 클라이언트와의 피어-투-

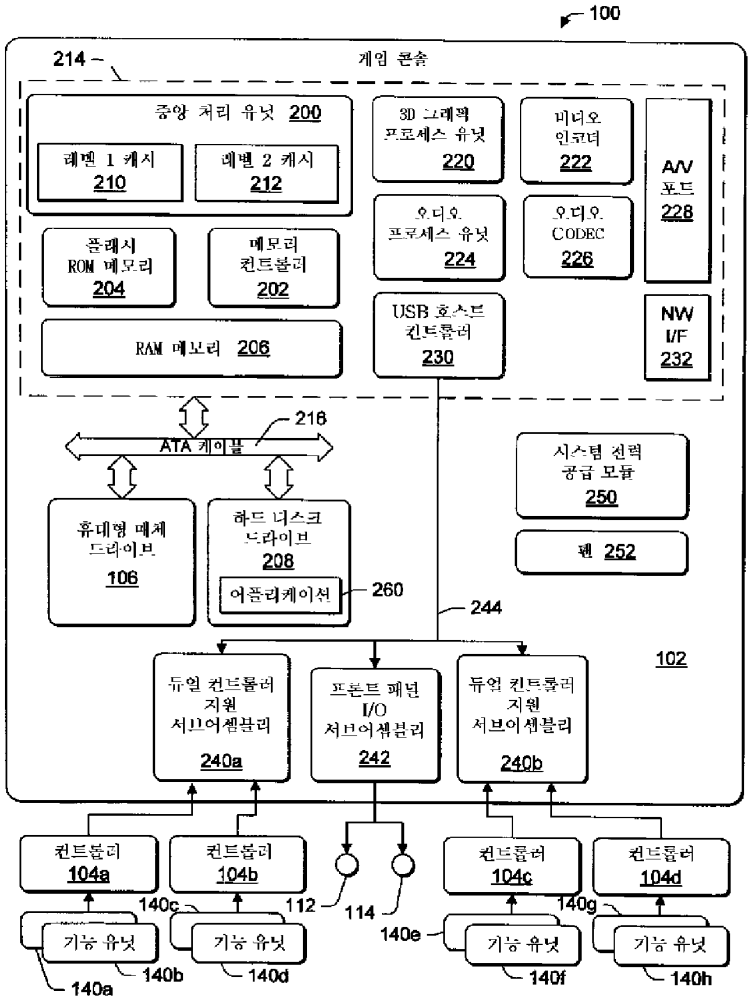
피어 통신을 확립할 수 없는 경우, 상기 제1 클라이언트와 상기 제2 클라이언트 간의 모든 통신을 상기 서버를 통해 라우팅하는 단계를 더 포함하는 방법.

도면

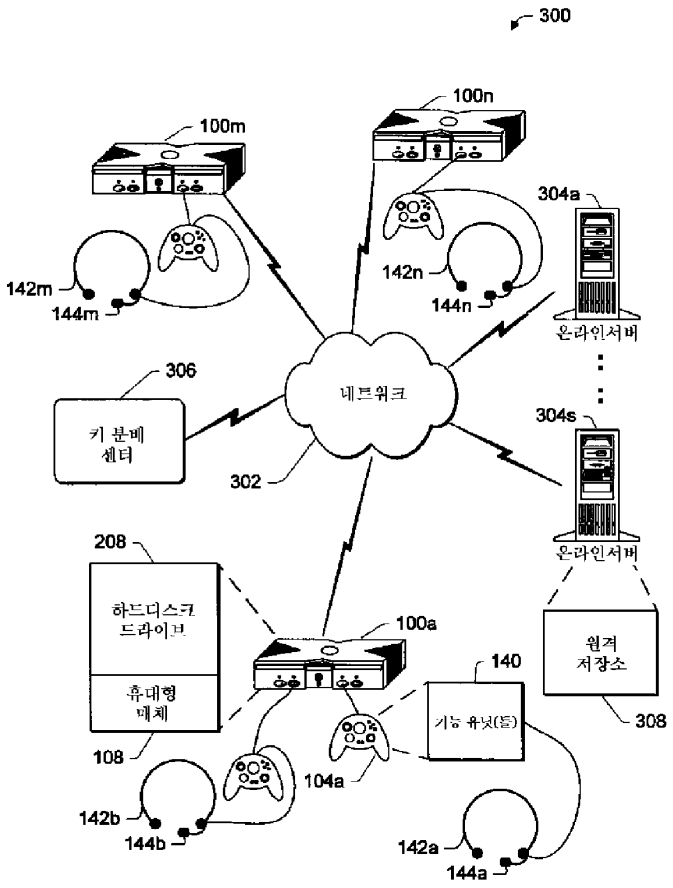
도면1



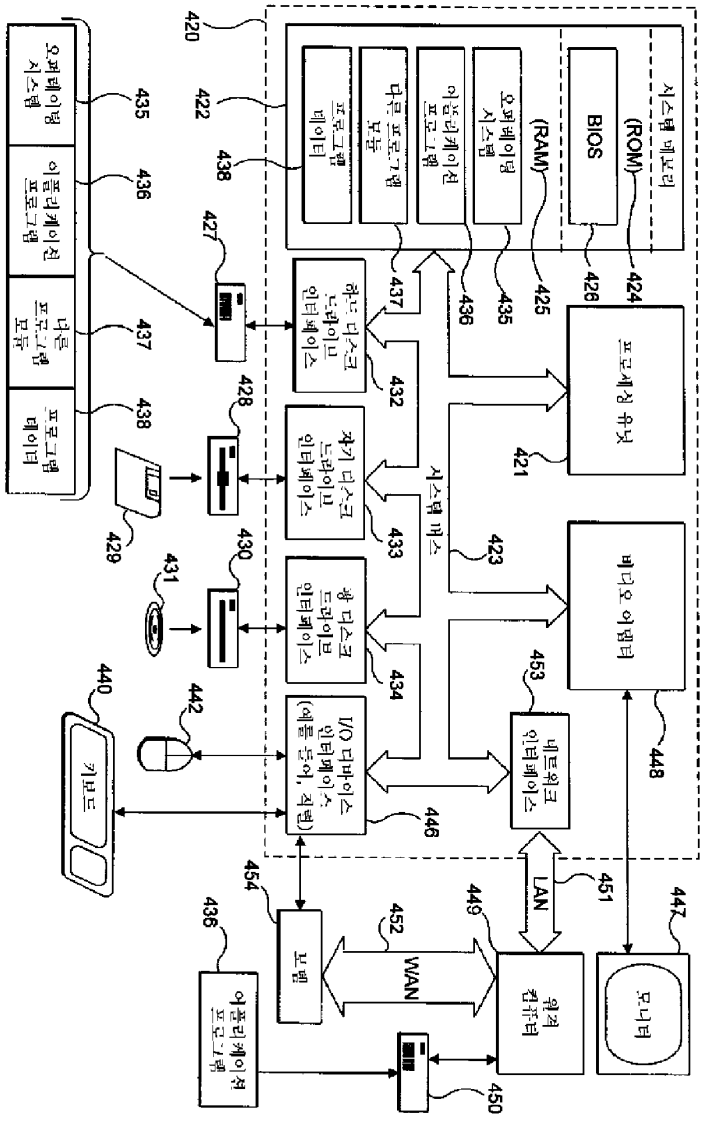
도면2


100
214
게임 콘솔
중앙 처리 유닛 200
레벨 1 캐시 210
레벨 2 캐시 212
3D 그래픽 프로세스 유닛 220
비디오 인코더 222
A/V 포트 228
오디오 프로세스 유닛 224
오디오 CODEC 226
플래시 ROM 메모리 204
메모리 컨트롤러 202
USB 호스트 컨트롤러 230
NW I/F 232
RAM 메모리 206
216
ATA 케이블
시스템 전력 공급 모듈 250
휴대형 메체 드라이브 106
하드 디스크 드라이브 208
팬 252
어플리케이션 260
244
102
듀얼 컨트롤러 지원 서브어셈블리 240a
프론트 패널 I/O 서브어셈블리 242
듀얼 컨트롤러 지원 서브어셈블리 240b
컨트롤러 104a
컨트롤러 104b
컨트롤러 104c
컨트롤러 104d
112
114
140a
140b
140c
140d
140e
140f
140g
140h
기능 유닛

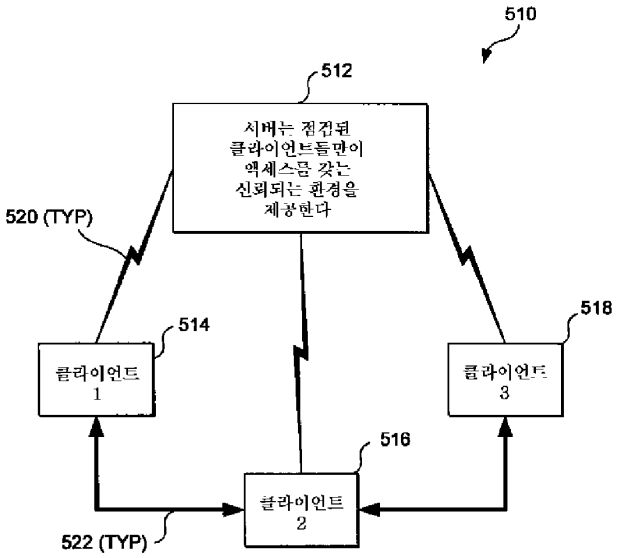
도면3


300
100m
100n
142m
144m
142n
144n
304a
온라인서버
306
키 분배 센터
네트워크
302
304s
온라인서버
208
하드디스크 드라이브
휴대형 매체
108
100a
140
기능 유닛(들)
원격 저장소
308
104a
142b
144b
142a
144a

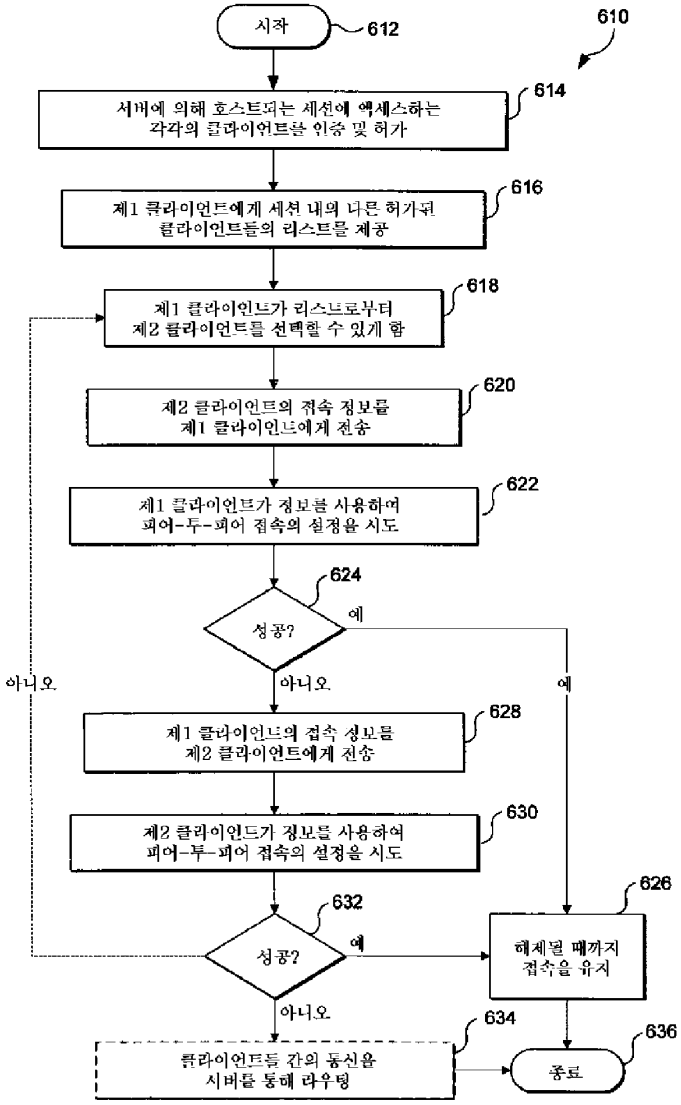
도면4


420
422
438
427
428
429
430
431
440
442
435
436
437
438
시스템 메모리
BIOS
(ROM)
(RAM)
오퍼레이팅 시스템
어플리케이션 프로그램
다른 프로그램 모듈
프로그램 데이터
424
426
425
435
436
437
프로세싱 유닛
421
시스템 버스
423
비디오 어댑터
448
453
네트워크 인터페이스
446
I/O 디바이스 인터페이스 (에를 들어, 직렬)
434
광 디스크 드라이브 인터페이스
433
자기 디스크 드라이브 인터페이스
432
하드 디스크 인터페이스
437
키보드
LAN
451
449
WAN
452
454
모뎀
원격 컴퓨터
447
모니터
450
어플리케이션 프로그램
436

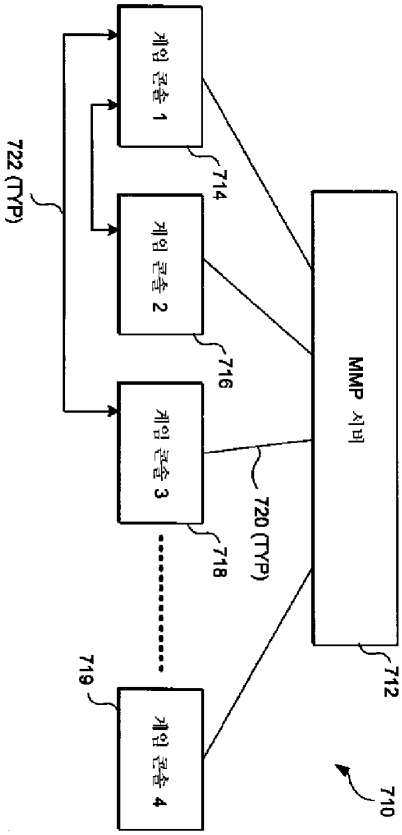
도면5


510
512
서버는 접근된
클라이언트들만이
액세스를 갖는
신뢰되는 환경을
제공한다
520 (TYP)
514
518
클라이언트
1
클라이언트
3
516
클라이언트
2
522 (TYP)

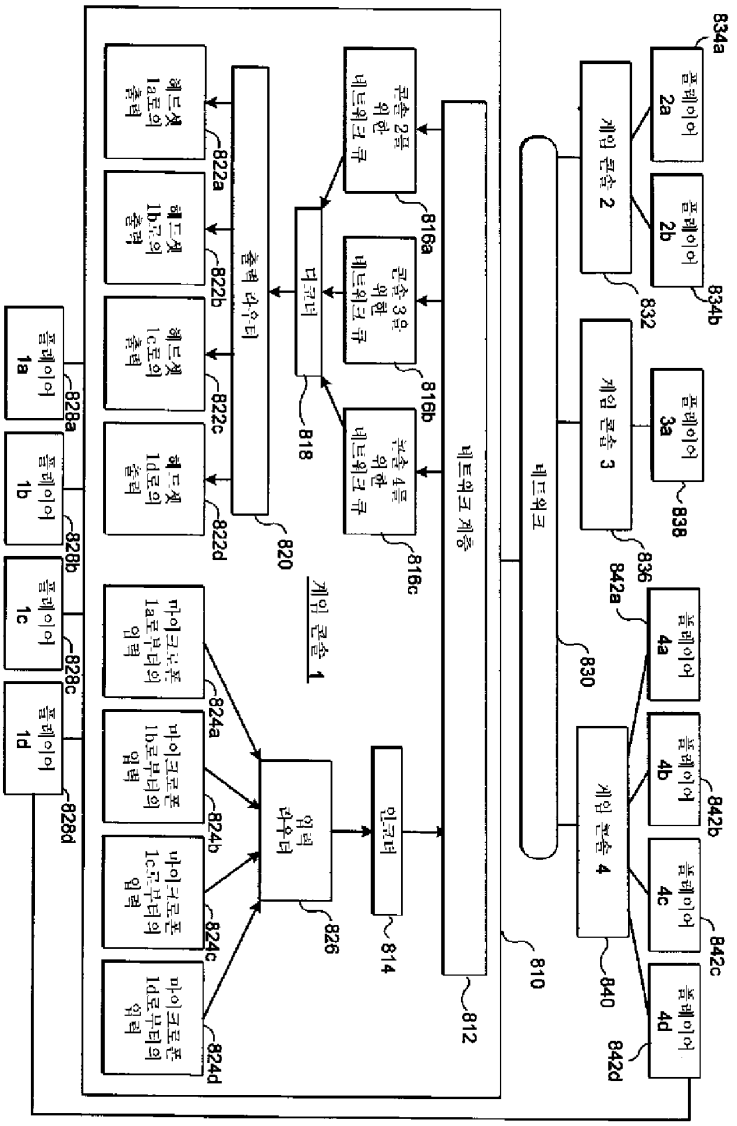
도면6


610
시작
612
서버에 의해 호스트되는 세션에 액세스하는 각각의 클라이언트를 인증 및 허가
614
제1 클라이언트에게 세션 내의 다른 허가된 클라이언트들의 리스트를 제공
616
제1 클라이언트가 리스트로부터 제2 클라이언트를 선택할 수 있게 함
618
제2 클라이언트의 접속 정보를 제1 클라이언트에게 전송
620
제1 클라이언트가 정보를 사용하여 피어-투-피어 접속의 설정을 시도
622
성공?
624
예
아니오
아니오
예
제1 클라이언트의 접속 정보를 제2 클라이언트에게 전송
628
제2 클라이언트가 정보를 사용하여 피어-투-피어 접속의 설정을 시도
630
성공?
632
예
해제될 때까지 접속을 유지
626
아니오
클라이언트들 간의 통신을 서버를 통해 라우팅
634
종료
636

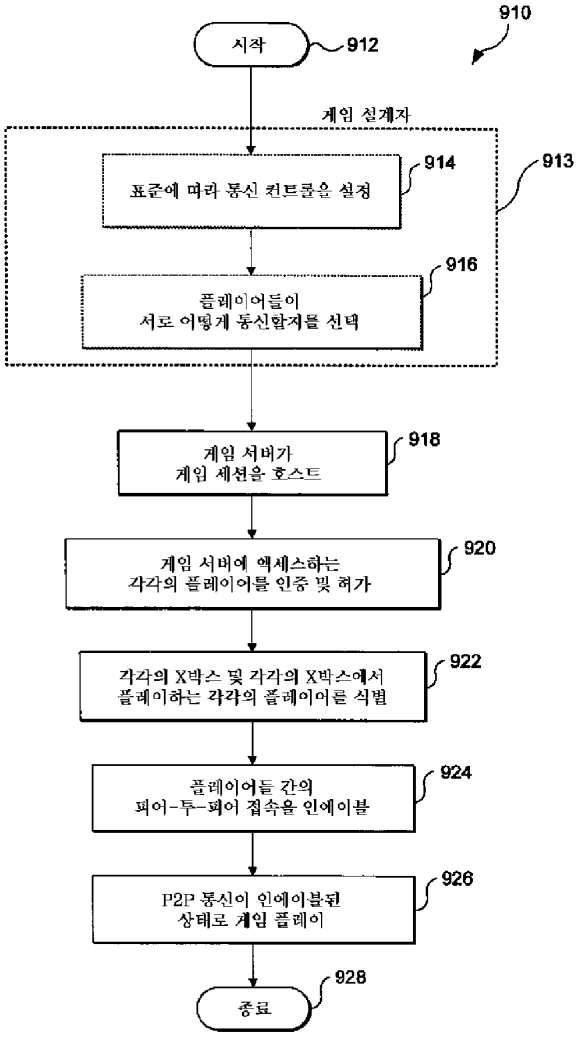
도면7


게임 콘솔 1
게임 콘솔 2
게임 콘솔 3
게임 콘솔 4
MMP 서버
710
712
714
716
718
719
720 (TYP)
722 (TYP)

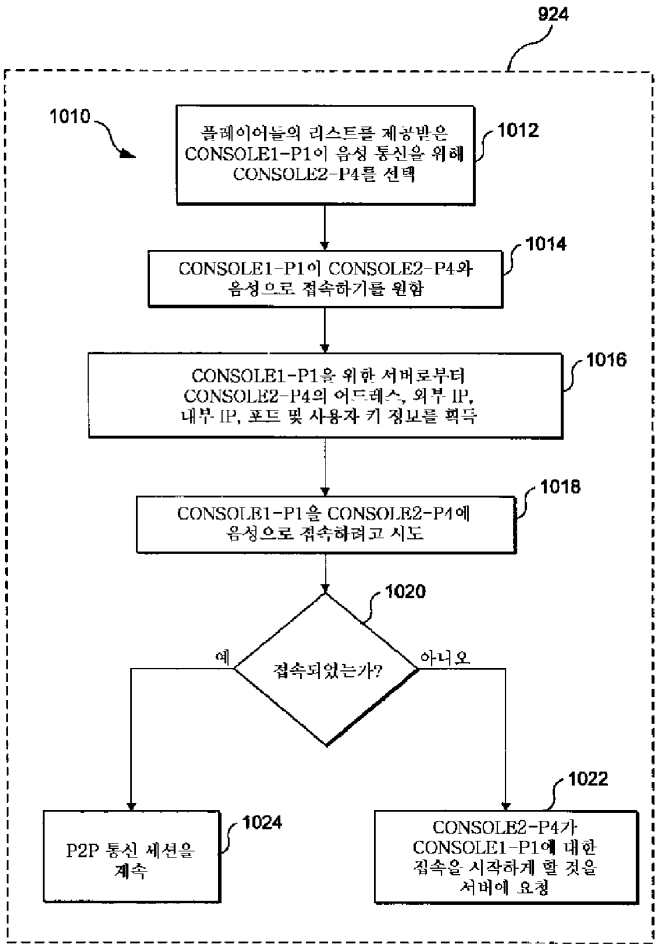
도면8


834a
플레이어 2a
플레이어 2b
834b
게임 콘솔 2
832
게임 콘솔 3
838
플레이어 3a
836
842a
플레이어 4a
플레이어 4b
842b
플레이어 4c
842c
플레이어 4d
842d
게임 콘솔 4
840
네트워크
830
810
812
네트워크 계층
콘솔 2을 위한 네트워크 큐
콘솔 3을 위한 네트워크 큐
콘솔 4을 위한 네트워크 큐
816a
816b
816c
디큐어
818
출력 라우터
820
게임 콘솔 1
헤드셋 1a로의 출력
헤드셋 1b로의 출력
헤드셋 1c로의 출력
헤드셋 1d로의 출력
822a
822b
822c
822d
마이크로폰 1a로부터의 입력
마이크로폰 1b로부터의 입력
마이크로폰 1c로부터의 입력
마이크로폰 1d로부터의 입력
824a
824b
824c
824d
입력 라우터
826
인큐어
814
플레이어 1a
플레이어 1b
플레이어 1c
플레이어 1d
828a
828b
828c
828d

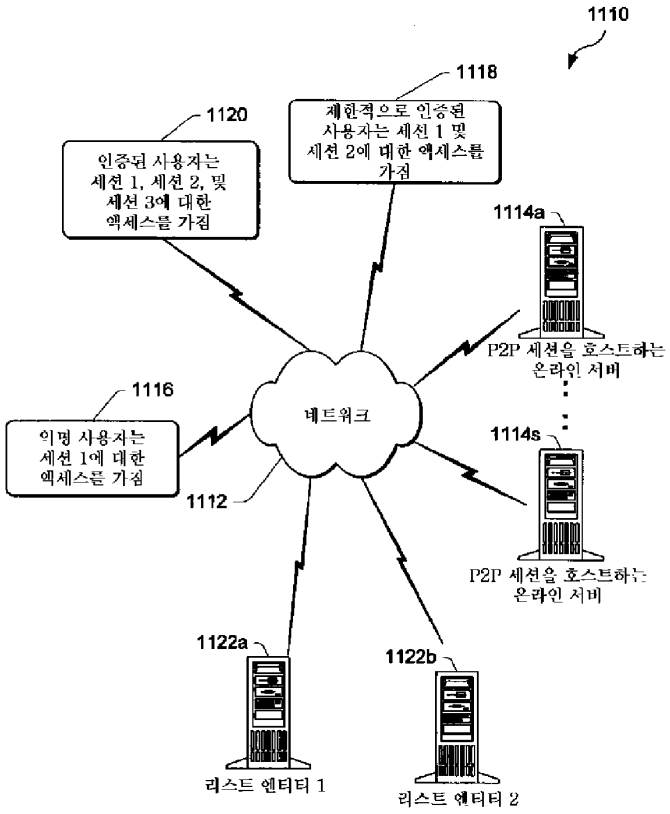
도면9


910
시작
912
게임 설계자
914
913
표준에 따라 통신 컨트롤을 설정
916
플레이어들이
서로 어떻게 통신할지를 선택
918
게임 서버가
게임 세션을 호스트
920
게임 서버에 액세스하는
각각의 플레이어를 인증 및 허가
922
각각의 X박스 및 각각의 X박스에서
플레이하는 각각의 플레이어를 식별
924
플레이어들 간의
피어-투-피어 접속을 인에이블
926
P2P 통신이 인에이블된
상태로 게임 플레이
928
종료

도면10


924
1010
플레이어들의 리스트를 제공받은 CONSOLE1-P1이 음성 통신을 위해 CONSOLE2-P4를 선택
1012
CONSOLE1-P1이 CONSOLE2-P4와 음성으로 접속하기를 원함
1014
CONSOLE1-P1을 위한 서버로부터 CONSOLE2-P4의 어드레스, 외부 IP, 내부 IP, 포트 및 사용자 키 정보를 획득
1016
CONSOLE1-P1을 CONSOLE2-P4에 음성으로 접속하려고 시도
1018
1020
접속되었는가?
예
아니오
P2P 통신 세션을 계속
1024
CONSOLE2-P4가 CONSOLE1-P1에 대한 접속을 시작하게 할 것을 서버에 요청
1022

도면11


1110
1118
제한적으로 인증된 사용자는 세션 1 및 세션 2에 대한 액세스를 가짐
1120
인증된 사용자는 세션 1, 세션 2, 및 세션 3에 대한 액세스를 가짐
1114a
P2P 세션을 호스트하는 온라인 서비
1116
익명 사용자는 세션 1에 대한 액세스를 가짐
네트워크
1114s
P2P 세션을 호스트하는 온라인 서비
1112
1122a
1122b
리스트 엔티티 1
리스트 엔티티 2

(12) 特許協力条約に基づいて公開された国際出願

(19) 世界知的所有権機関
国際事務局

(43) 国際公開日
2006 年7 月20 日 (20.07.2006)

PCT

(10) 国際公開番号
WO 2006/075677 A1

(51) 国際特許分類:
H04L 12/56 (2006.01) *H04Q 7/38* (2006.01)

(21) 国際出願番号: PCT/JP2006/300324

(22) 国際出願日: 2006 年1 月13 日 (13.01.2006)

(25) 国際出願の言語: 日本語

(26) 国際公開の言語: 日本語

(30) 優先権データ:
特願2005-009301 2005 年1 月17 日 (17.01.2005) JP

(71) 出願人 (米国を除く全ての指定国について): シャープ株式会社 (SHARP KABUSHIKI KAISHA) [JP/JP]; 〒5458522 大阪府大阪市阿倍野区長池町２２番２２号 Osaka (JP).

(72) 発明者; および

(75) 発明者/出願人 (米国についてのみ): 山田 昇平 (YAMADA, Shohei) [JP/JP]; 〒2610004 千葉県千葉市美浜区高洲３－６－２－７０４ Chiba (JP). 森脇 鉄朗 (MORIWAKI, Tetsuro) [JP/JP]; 〒3300071 埼玉県さいたま市浦和区上木崎５－１４－２５ Saitama (JP). 日比 慶一 (HIBI, Keiichi) [JP/JP]; 〒2700034 千葉県松戸市新松戸３－３２８ Ｂ－２１１ Chiba (JP).

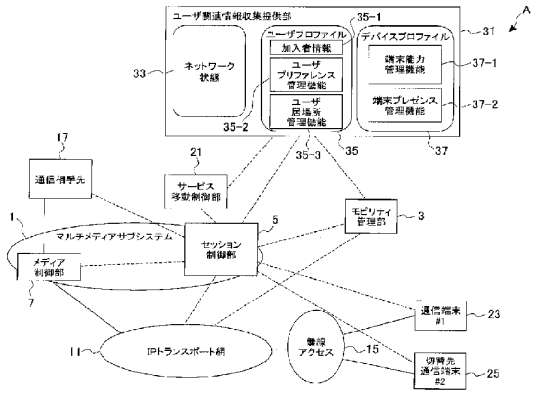
(74) 代理人: 平木 祐輔 (HIRAKI, Yusuke); 〒1050001 東京都港区虎ノ門４丁目３番２０号 神谷町ＭＴビル１９階 Tokyo (JP).

(81) 指定国 (表示のない限り、全ての種類の国内保護が可能): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LC, LK,

[続葉有]

(54) Title: COMMUNICATION NETWORK CONTROL SYSTEM

(54) 発明の名称: 通信ネットワーク制御システム



31 USER-ASSOCIATED INFORMATION COLLECTING/PROVIDING UNIT
33 NETWORK STATE
35 USER PROFILE
35-1 SUBSCRIBER INFORMATION
35-2 USER PREFERENCE MANAGEMENT FUNCTION
35-3 USER LOCATION MANAGEMENT FUNCTION
37 DEVICE PROFILE
37-1 TERMINAL ABILITY MANAGEMENT FUNCTION
37-2 TERMINAL PRESENCE MANAGEMENT FUNCTION
17 COMMUNICATION PARTNER
21 SERVICE SHIFT CONTROL UNIT
3 MOBILITY MANAGEMENT UNIT
1 MULTIMEDIA SUBSYSTEM
7 MEDIA CONTROL UNIT
5 SESSION CONTROL UNIT
11 IP TRANSPORT NETWORK
15 RADIO ACCESS
23 COMMUNICATION TERMINAL #1
25 SWITCHING DESTINATION COMMUNICATION TERMINAL #2

(57) **Abstract:** A communication network control system realizes a smooth and seamless terminal switching guaranteeing continuity of communication in the application level. The communication network control system includes: a mobility management unit (3) for setting and managing a physical and logical transmission route with a communication terminal (23) and a communication partner (17) by performing route control of the data packet transmission; a session control unit (5) for controlling a session with a communication terminal (23) and a communication partner (17) on the transmission path; a service shift control unit (21) for transmitting a session switching request signal instructing switching of the session from the communication terminal (23) to a switching destination communication terminal (25), to the session control unit (5); and a user-associated information collecting/providing unit (31) for collecting a user profile including user location information, a user network state, and user's hobby and taste, and a device profile including a device type and a device network connection state, from various function elements of the network , the user, the user terminal, and a user peripheral device so as to provide user-associated information.

[続葉有]

WO 2006/075677 A1

LR, LS, LT, LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) 指定国 (表示のない限り、全ての種類の広域保護が可能): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), ユーラシア (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), ヨーロッパ (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

添付公開書類:
国際調査報告書

２文字コード及び他の略語については、定期発行される各*PCT*ガゼットの巻頭に掲載されている「コードと略語のガイダンスノート」を参照。

(57) 要約:

アプリケーションのレベルでの通信の連続性を保証したスムーズでシームレスな端末切り替えを実現する。

データパケット転送の経路制御を行って通信端末２３と通信相手先１７との物理的、論理的な伝送経路を設定し管理するモビリティ管理部３と、伝送経路上で通信端末２３と通信相手先１７とのセッションを制御するセッション制御部５と、セッションを通信端末２３から切替先通信端末２５へ切替えることを指示するセッション切替要求信号をセッション制御部５に対し送信するサービス移動制御部２１と、ユーザの居場所情報とユーザのネットワーク状態とユーザの趣味趣向を含むユーザプロファイルとデバイスの種類や各デバイスのネットワーク接続状態を含むデバイスプロファイルとをネットワークの各機能要素やユーザやユーザ端末やユーザの周辺デバイスから収集し、ユーザ関連情報を提供するユーザ関連情報収集提供部３１と、を備える。

明 細 書

通信ネットワーク制御システム

技術分野

[0001] 本発明は、移動通信サービスを提供する通信ネットワークにおける端末切り替え技術に関し、より詳細には、ユーザが、利用している端末を通信中に異なる端末に切り替えた際にも、途切れることなく通信を継続できるシームレスな端末切り替え技術に関する。

背景技術

[0002] 近年、インターネットに代表されるネットワークサービスや、携帯電話の急速な普及拡大により、更に高度な通信サービスの実現が期待されている。携帯電話では、ユーザが端末を持ちながら移動しても通信が継続される、いわゆるハンドオーバ機能、モビリティ管理機能が提供されているが、この機能を更に発展、高度化させて、通信中に端末を変更しても通信が継続できる機能の実現などが望まれている。

[0003] 通信ネットワークが拡大、発展して、様々な端末がネットワークに接続可能になると、ユーザは通信ネットワークに接続可能な多種の通信端末を所有するようになる。これらの通信端末としては、携帯電話のような可搬型の端末だけでなく、例えばテレビ受像機のような家庭内に設置される据え置き型の家電機器などの情報機器(以下、情報機器と称する)も通信端末として用いられるようになると考えられる。

[0004] 一方、通信ネットワーク側では、インターネットの発展によって構築されたIP(Internet Protocol)通信技術を活用した共通IPバックボーンを設けることによって、無線、有線などのアクセス手段や、ネットワークのオペレータ、サービスのプロバイダの違いを意識せずに各種の通信端末で共通のサービスを享受することが容易となる。

[0005] このようになると、ユーザは、例えば、移動通信端末、PDA、パーソナルコンピュータなどの情報機器などの自己が所有する通信端末を、ユーザの現在状況や好みなどに応じて自由に使い分けることができるようになると、同じサービスであっても、その時点で自分が保有、選択する端末によって当該サービスを利用したいとの要求が生じる。さらに、通信中に、端末を別の端末に切り替えたい場面も想定される。その際には

、通信を一旦切断して、別の端末から改めて接続するのではなく、通信の状態を維持したままで途切れることなくシームレスに別の端末へ切り替えたいというユーザの要求を実現する必要がある。

[0006] 具体的には、自宅のパーソナルコンピュータにより映像コンテンツをストリーミング配信で視聴していたが、外出時には、受信端末を移動通信端末やPDAに切り替えて、外出先へ携帯する端末で同一コンテンツを引き続き視聴する例がある。また、外出中にテレビ電話で相手と通信している途中で帰宅したため、自宅のテレビに切り替えて相手とのテレビ電話の通信を継続する例なども考えられる。

[0007] 上述したようなシームレスな端末切り替えを実現するにあたり、マルチキャスト型の配信を受信している場合は、送信側端末から同一コンテンツのデータが複数(不特定多数)の通信端末に向けて同時に配信されているため、切り替え先の端末でも当該データを受信するように当該受信端末をその送信側端末へ接続すれば良く、比較的容易に端末切り替えが実現できる。

[0008] しかしながら、ある特定の端末だけに配信されるユニキャスト型配信、あるいは1対1の通信の場合には、送信側端末に対して、一旦通信の中断を指示して、切り替え先の端末をその送信側端末に接続してから、受信側の端末を切り替えたことを通知した上で、通信を再開するという手順が必要となる。

[0009] このような従来の通信ネットワークの制御システムにおける端末切り替えの例を図7に示す。図7の例では、ユーザは、通信に利用していた通信端末(＃1)203を通信端末(＃2)205に切り替える場合を示す。まず、ユーザは、データを受信中の通信端末(＃1)203から配信側のサーバ装置201に対して、矢印221で示すように制御情報を送信して、配信の中断を指示する。次に、通信ネットワーク内の制御装置213に対して、サーバ装置201との通信接続の切断を要求する矢印224aに示す制御情報を送出して、通信を切断する。

[0010] 次に、ユーザは、切り替え先である通信端末(＃2)205から通信ネットワークの制御装置213に対して、矢印225に示すように前述のサーバ装置201への接続要求を送出すると、制御装置213は通信ネットワーク内に通信端末(＃2)205とサーバ装置201との通信経路を設定して、当該装置間での接続を設定する。続いて通信端末(＃

2）213からサーバ装置201に対して、矢印224bに示す配信の再開を指示する制御情報を送出すると、サーバ装置201は、上記配信を中断された時点からのデータを送出することによって、ユーザは通信端末（＃2）205を用いて、続きのデータを受信することができ、すなわち端末切り替えが実行できる。

[0011] ここで、切り替え先の通信端末（＃2）205がサーバ装置201と接続するためのサーバ装置201のアドレス情報は、電話番号やURLなどの形式により、ユーザが通信端末（＃2）205を操作して入力するなどの手段によって指定される。この例では、通信ネットワークの制御装置213は、通信端末（＃1）203または通信端末（＃2）205とサーバ装置201との間の接続および切断のみを行い、端末を切り替えるための制御機能を有しておらず、通信端末およびサーバ装置における通信の中断、再開機能によって端末の切り替えが実現される。

[0012] 端末切り替えのもう一つの方法の従来例を、図8に示す。受信側の通信端末（＃1）303は、端末の切り替えにあたって、矢印321に示すように配信側サーバ装置301に対して配信の中断を指示する制御情報を送出する。サーバ装置301との通信が保留された後にユーザが転送操作を行なうと、通信端末（＃1）303は、矢印332に示すように通信ネットワークの制御装置313に対して、サーバ装置301との間の接続を通信端末（＃2）305へ転送することを要求する制御情報を送出する。

[0013] その制御情報を受信した制御装置313は、矢印333に示すように通信端末（＃2）305に対してサーバ装置301との接続を指示する制御情報を送出することによって通信端末（＃2）305へ発呼して、矢印334に示すように通信端末（＃2）305が当該発呼に対して応答すると、通信端末（＃2）305とサーバ装置301との間に通信経路を設定することによって接続を確立する。

[0014] その後、矢印335に示すように、転送元の通信端末（＃1）303と制御装置313との間での制御情報の送受によって、通信端末（＃1）303とサーバ装置301との接続が切断されると共に、通信端末（＃2）305は上記サーバ装置301に対して、矢印324に示す保留中の通信の再開を要求する制御情報を送出することによって、通信端末（＃2）305が続きのデータを受信する。この例においては、通信ネットワーク内の制御装置313は、呼を別の端末へ転送するための制御機能は有しているものの、当該

制御装置313は、通信端末／サーバ装置間でのデータ送受信の中断、再開を制御する機能は備えておらず、通信の連続性、即ちシームレスな切り替えを保証するものではない(非特許文献1)。

[0015] また、従来の通信ネットワーク構成として、3GPPで規格が定められている第三世代移動体通信の構成例を図2に示す。IMS(IP Multimedida CN Subsystem)は、IPマルチメディアサービスをパケット交換システムで提供することを目的としており、そのためにネットワーク101内にセッション制御機能を配置する。セッション制御プロトコルとしてはSIP(Session Initiation Protocol)が採用されている。CSCF105は呼状態制御機能であり、SIPの登録サーバとしてHSS103(Home Subscriber Server)とやり取りし、ユーザ登録処理を行なうとともに、セッション情報を転送し、呼接続制御を行う。また、サービスを提供するために、アプリケーションサーバとやり取りを行うインターフェイスも持つ。また、HSS103は、ユーザの加入者情報や、ロケーション情報を管理する。MRF107(Media Resource Function)は、メディアストリームのリソース制御を行い、マルチメディア会議などでのメディア合成や、メディアストリームの変換などを行う。また、MGCF(MediaGateway Control Function)とMGW(MediaGateway)とにより、PSTN(Public Switched Telephone Network)と接続する際のメディア変換を行う。しかし、通信相手先117とネットワーク101、パケット網111を介して無線アクセス115を行う端末123／125に対して変更後もサービスを提供し続けるという仕組みはない(非特許文献2参照)。

非特許文献1:藪崎他「モバイルネットワークAll－IP化特集」、NTT DoCoMo テクニカルジャーナル Vol. 10 No. 4 2003年1月、p. 6－34。

非特許文献2:3GPP TS22. 228 V5. 6. 0。

発明の開示

発明が解決しようとする課題

[0016] しかしながら、上述したいずれの従来例においても、端末切り替え時には、通信端末とサーバ装置との間、すなわち、エンド・エンド間での通信の保留と再開とによって連続性が確保されているものであり、途切れのないシームレスな切り替えを保証する技術ではない。つまり、上述したいずれの従来例も、サーバ装置に通信、即ちデータ

伝送を保留する機能を設けておき、保留にした後に別の通信端末からデータ伝送の再開を要求することによって、見かけ上、端末切り替えを実現しているだけである。サーバ装置に蓄積されたコンテンツを通信端末へ一方向に配信するような場合や、テレビ電話のような1対1の双方向型のリアルタイム通信を行なう場合などには、ある程度の機能を実現できる。

[0017] しかしながら、上位の通信アプリケーションが伝送データに応じた状態を持つ場合、例えば、通信型のゲームの続きを別の端末で実行したり、通信しながら同一文書を編集する共同作業を行ったりする場合には、上記通信アプリケーションの状態を切り替え先の端末へ通知することが困難であるという問題点があった。

[0018] すなわち、テレビ電話やコンテンツ配信のようなサービスであっても、多数のメディアを同時に利用するアプリケーションや、各種のコンテンツ／情報を連携して利用するアプリケーションなど、エンド・エンドのアプリケーション間で複数の通信（コネクション）を設定している場合には、別の端末への切り替えの処理、手順が煩雑になるという問題点があった。

[0019] 加えて、以下のような問題点がある。

[0020] 1）端末の切り替えに併せて、端末能力に応じた最適な通信形態（ビットレート、解像度など）でコンテンツを受信するために、ネットワークのサービス品質（ビットレート、遅延、その他）を適切に制御するような通信ネットワーク制御と連携したサービスの提供が困難である。

[0021] 2）また、上記のサービス品質の適切な切替をネットワーク制御側で行うのか、通信相手側で行うのか判断を行なったり、ユーザの好みに合わせてサービス品質の切替を決定することが困難である。

[0022] 3）また、周辺にどのような端末が存在し、どの端末に切り替えるべきか制御するようなサービスの提供が困難であるという問題があった。

[0023] 本発明は、ユーザは従来型の有線・無線のネットワークやサービスの違い、通信端末の種別の違い等を意識する必要がない、シームレスでユビキタスなサービス環境を提供することを目的とする。

課題を解決するための手段

[0024] 本発明に係る通信ネットワークの制御システムは、データパケット転送の経路制御を行って前記通信端末と通信相手先との物理的、論理的な伝送経路を設定し管理するモビリティ管理手段と、前記伝送経路上で前記通信端末と通信相手先とのセッションを制御するセッション制御手段と、セッションを前記通信端末から切替先通信端末へ切替えることを指示するセッション切替要求信号を前記セッション制御手段に対し送信するサービス移動制御手段と、を有する通信ネットワークシステムにおいて、ネットワーク状態とユーザの居場所情報とユーザの趣味趣向とを含むユーザプロファイルと、デバイスの種類や各デバイスのネットワーク接続状態を含むデバイスプロファイルと、をネットワークの各機能要素やユーザやユーザ端末やユーザの周辺デバイスから収集し、ユーザ関連情報を提供するユーザ関連情報収集提供手段と、を備えている。

[0025] 前記サービス移動制御手段は、前記通信端末から端末切替要求信号を受信するかまたは前記ユーザ関連情報に基づいて端末切替を行うか判断することにより、セッション切替要求信号を生成し、前記セッション制御手段は、セッション切替要求信号を受信して、セッションを中断する機能と、前記モビリティ管理手段に対して前記切替先通信端末との伝送経路を設定するよう指示する機能と、前記切替先通信端末との間でセッションを確立する機能と、前記セッション確立後、前記通信相手先との間でセッションを再開する機能と、を発揮する。これにより通信端末間の通信を中断させることなく、当該通信を行っている少なくとも一つの通信端末を、前記通信を行っていない他の通信端末へ切替えて前記通信を継続させる制御を行うことができ、通信ネットワークにおいて、データの伝送経路を設定、管理する機能に加えて、エンド・エンドでのセッション、即ち伝送されたデータを利用するアプリケーション間での論理的な伝送路の管理、制御機能と前記セッションの転送機能が発揮されるので、セッションおよびアプリケーションの状態管理まで含めた通信端末のスムーズかつシームレスな切り替えを実現することが可能となる。

[0026] また、ユーザの環境に適応して、端末切替を行うか否かの判断が可能となり、ユーザの居場所やネットワークの状態に応じて、ネットワーク側でサービスの制御を提供することが可能となる。また、サービスに関するユーザ関連情報やサービスの提供を

維持しながら端末を切り替える指示を行う手段と端末間でのセッションを張る手段を分離することにより、より効率的なネットワーク制御が可能となる。さらに既存の3GPPのシステムでのセッション制御を行うCSCFに対し、サービス移動制御手段を追加することにより実現が可能となる。

[0027] また、本発明に係る通信ネットワークの制御システムは、前記サービス移動制御手段は、前記ユーザ関連情報から前記通信端末と前記切替先端末のデバイスプロファイルと、前記通信相手先からメディア切替能力情報を取得し、メディアの変換をメディア制御手段にて行うか、前記通信相手先にセッションを変更するように指示するか判断するメディア変換先判定機能と、どのようなメディア変換を行うかを判断するメディア変換処理判定機能を有し、前記サービス移動制御手段は前記メディア変換先判定と前記メディア変換処理判定に基づき、セッションの変更指示メディア変換指示情報を生成すること特徴としている。

[0028] これにより、通信相手先のメディア切替能力と、通信端末と切替先通信端末の端末能力を考慮して、ネットワーク側でメディアの変換を行うべきか、通信相手先で行うべきか、よりサービスの状態が保たれるように自動的に判断することが可能となる。

[0029] また、本発明に係る通信ネットワークの制御システムは、前記ユーザ関連情報収集提供手段は、ユーザのメディア変換先とメディア変換処理に対する判定基準をユーザプリファレンスとして管理し、前記サービス移動制御手段は、ユーザプリファレンスに基づいてメディア変換指示情報を生成することを特徴としている。

[0030] これにより、ユーザが予め自分の好みを設定して、どのサービス提供者にメディア変換をしてもらいたいのか、どのようなメディア変換処理をしてほしいのかを設定することができ、ユーザに対してもサービス提供者に対しても拡張性、柔軟性のあるサービスを提供できる。

[0031] また、本発明に係る通信ネットワークの制御システムは、前記通信端末は、前記切替先通信端末との通信を行う手段を有し、前記切替先通信端末から前記切替先通信端末の状態やアドレスを示す端末プレゼンス情報と前記切替先通信端末の種別、属性、処理および利用可能なビットレート、メディア種別、およびコーデック種別を含む端末能力情報を取得し、前記端末切替要求信号は、前記切替先通信端末の端末

プレゼンス情報と端末能力情報を含み、サービス移動制御手段は、前記端末切替要求信号に基づいて前記セッション切替要求信号を生成するとともに端末プレゼンス情報と端末能力情報とをデバイスプロファイルに登録することを特徴としている。

[0032] これにより、通信ネットワーク側で切替先通信端末の情報を持っていない場合でも、セッションの制御が可能となり、新たなデバイス登録も同時に行うことができる。

[0033] また、本発明に係る通信ネットワークの制御システムは、前記通信端末は、前記切替先通信端末として動作し、端末切替要求信号にて端末の切替ではなく接続経路の変更のみを要求する指示を送信するかまたは前記ユーザ関連情報に基づいて経路切替を行うか判断することにより、前記サービス移動制御手段は、前記通信端末内のセッションの切替を行うように指示するセッション切替信号を生成し、セッション制御部に送信することを特徴としている。

[0034] これにより、通信端末にて、異なるアクセス方法や異なるオペレータのネットワークに接続を切り替える際に、サービスを維持したまま切替が可能となる。

発明の効果

[0035] 本発明によれば、ユーザは、自己の状況の変化に応じて、切替要求時の簡単なボタン操作などだけで、使用する通信端末の切り替えを、従来に比べて大幅に操作の手間と時間的なロスを軽減して実現することができ、より高度なサービスを享受することができる。また、配信側のサーバ装置においても特別に新規の機能を実装しなくても配信サービスが続けられるという利点がある。さらに、受信側の通信端末間の能力が異なっても、データ形式が個々の通信端末に応じて最適化されて伝送されるので、通信端末側にもサーバ装置側にも負荷を与えることがないという利点がある。こうしたサービス提供基盤の共通化により、ユーザは従来型の有線・無線のネットワークやサービスの違い、通信端末の種別の違い等を意識することがなくなり、シームレスでユビキタスなサービス環境を享受可能となる。

図面の簡単な説明

[0036] [図1]本発明の第1の実施の形態による通信ネットワークの制御システムの概略構成例を示す図である。

[図2]従来の通信ネットワークの制御システムの構成例の概略図である。

[図3]ユーザ関連情報収集提供部のデータベース構成例を示す図である。

[図4]本実施の形態による通信ネットワークの制御システムにおける端末切替の実行手順を示す図である。

[図5]本発明の第2の実施の形態によるアクセス方法の切替に関する通信ネットワークの制御システムの概略図である。

[図6]本実施の形態のアクセス方法の切替に係る通信ネットワークの制御システムにおける経路切替の実現手順を示す図である。

[図7]通信ネットワークの制御システムにおける端末切り替えの例を示す図である。

[図8]通信ネットワークの制御システムにおける端末切り替えの例を示す図である。

符号の説明

[0037] A…通信ネットワークの制御システム、3…モビリティ管理部、5…セッション制御部、11…IPトランスポート網、21…サービス移動制御部、31…ユーザ関連情報収集提供部、33…ネットワーク状態、35…ユーザプロファイル、37…デバイスプロファイル。

発明を実施するための最良の形態

[0038] 本発明に係る通信ネットワークの制御システムは、通信ネットワーク内の制御装置に、データの伝送経路を設定、管理する機能に加えて、エンド・エンドでのセッション、即ち伝送されたデータを利用するアプリケーション間での論理的な伝送路の管理、制御機能と前記セッションの転送機能を発揮する。これらの機能によって、セッションおよびアプリケーションの状態管理まで含めた通信端末のスムーズかつシームレスな切り替えを実現する。

[0039] また、本発明に係る通信端末は、端末切り替えを実行するためにセッション、アプリケーションの状態を通知する機能、および、前記通知された状態に基づいてセッション、アプリケーションを当該状態に設定して、再開する機能を発揮する。これらの機能によって、セッションの状態を的確に保持したままでのスムーズかつシームレスな端末切り替えを実現する。

[0040] 更に、移動通信ネットワークなどで提供されている通信端末の位置やアドレス情報の変更に追従して伝送経路を適切に切り替えていくハンドオーバ、モビリティ管理機能を活用し、上記セッション制御機能と連携させることによって、通信端末を切り替え

る際の伝送経路の設定機能を、従来技術からの最小限の変更で実現する。そして、柔軟性、拡張性が高いセッション制御機能を実現する。

[0041] 次世代の移動通信ネットワークにおいては、すべてのデータがIPパケットの形で伝送、交換されるオールIPベースのプラットフォームを構築して利用することが想定されている。また、データ伝送の機能と、呼設定、ルーティング管理などの制御機能とを明確に分離した、いわゆる呼制御分離型のアーキテクチャとすることが検討されている。このようなアーキテクチャでは、下位層であるトランスポート層がデータ、即ち、IPパケットを高速かつ効率的に伝送する機能に専念し、経路(ルーティング)制御やトラフィック制御などの機能は接続制御層に分担させて、その接続制御層からトランスポート層に対してIPパケットのルーティング、リソース割り当て等を指示する構成とすることによって、システム全体としての高速化、高効率化を図っている。また、オールIPベースのプラットフォームでは、呼制御などの制御信号、シグナリングもIPパケットの形で伝送されることが想定されている。

[0042] さらに、オールIPベースの上記アーキテクチャでは、ネットワークの高度化、高付加価値化を図り、様々な通信サービスを柔軟かつ自由に提供できるようにするためのサービスサポート機能を設けることが検討されている。これは、以前の音声電話を中心としたネットワークでは、エンド・エンドでの物理的、論理的な伝送経路(パス)を設定する呼制御機能が主体であったのに対し、次世代のネットワークでは、エンド・エンドの通信アプリケーション間の論理的な接続であるセッション制御の機能をネットワーク内に設けることを意味している。

[0043] ここで、呼あるいは呼接続とは、エンド・エンドの端末間で相手へデータを伝送するための物理的、論理的なパス(が設定されていること)を示し、セッションとは、端末の通信アプリケーションが通信相手の端末上のアプリケーションからのデータを受信して処理できる(処理している)状態にあることを示す。つまり、相手端末との間でデータの送受信はできるが、どのアプリケーションを用いるかが決定していないか準備ができていない状態は、呼接続されているがセッションが接続されていない状態であり、反対に、アプリケーションはデータの送受信の準備ができているが、データ伝送パスが失われた(例えば、携帯電話機が圏外へ移動するなど)状態は、セッションは接続

されているが呼接続されていない状態ということとなる。

[0044] ここまでは、主として呼接続について説明してきた。従来の音声電話では、呼接続とセッションとは特に区別されないが、マルチメディア通信やデータ通信などの場合には、呼接続の設定後にエンド・エンドで確立された伝送経路上で通信端末のアプリケーション間でのセッションが設定される。次世代の移動通信ネットワークでは、ネットワーク内にセッション制御機能を含めることが検討されている。これは、通信の多様化、高度化により様々な通信の形態、モード、メディアなどに応じた接続制御、通信制御などの機能をネットワークから提供する必要が生じてきたためである。例えば、音声のみの通話かテレビ電話かの区別や、テレビ電話における解像度やビットレートなどの品質、端末能力を指定して相手に発呼するようなケースでは、これらの要求に合致した端末を指定するためのアドレス解決、適切な品質の伝送路の設定(呼制御、経路制御)など、エンド・エンドのネゴシエーションでは不充分な機能をネットワークの能力によって実現する必要がある。

[0045] そこで、セッション制御を行うセッション制御部を設け、セッション、即ち、エンド・エンドのアプリケーション間の通信状態、モードなどを管理、制御すると共に、そのセッション制御機能からモビリティ管理部の呼制御機能や経路制御機能に対して、適切な帯域、品質での伝送パスを設定するように指示、制御を行なうように構成する。この時、通信端末のアプリケーションからの接続要求(セッション設定要求)は、前記セッション制御機能へ送られて、処理されることとなる。

[0046] 図1に本発明の第1の実施の形態による通信ネットワークの制御システムの一構成例を示す。図1に示すように、本実施の形態による通信ネットワークの制御システムAは、IPパケットを転送するIPトランスポート網11と、IPトランスポート網11を制御し、上述したように通信端末の物理的な位置の管理、呼制御、ハンドオーバ制御(経路制御)を行なうモビリティ管理部3およびセッションの確立・管理するセッション制御部5と、セッションを維持させながら通信端末を切り替えるなどのユーザの高度な要求への対応を担当するサービス移動制御部21を含んでいる。

[0047] モビリティ管理部3は、図2におけるIMSのHSS103に相当し、特にIPトランスポート網の制御に特化した機能要素である。セッション制御部5は、図2におけるIMSのC

SCF105に相当し、サービス移動制御部21は、図2におけるIMSに対して新たな機能要素である。但し、サービス移動制御部21は図2におけるCSCF105の機能拡張によって実現されたと解釈することも可能である。サービス移動制御部21は、サービスを継続しながら端末切替を行うために、端末から端末切替の指示がセッション制御部に要求され、端末切替要求をセッション制御部から受け、セッション制御部にセッション切替要求信号を送信したり、ユーザの状態をユーザ関連情報収集提供部31とやり取りして、ユーザの状態に応じて自動的にセッション切替要求信号を送信したりすることができる。

[0048] ユーザ関連情報収集提供部31は、ネットワーク状態33と、ユーザに関するユーザプロファイル35と、デバイスに関するデバイスプロファイル37と、を管理し、様々なネットワークの機能要素から情報収集を行い、各サービスやネットワークの機能要素に対して情報を提供する。これは、図2に示すIMS101のHSS103をさらに拡張した機能であり、モビリティ管理部3と統合して、図2に示すHSS103の機能を拡張することによって実現されてもよい。ユーザプロファイル35は、加入者情報35－1、ユーザのプリファレンス管理機能35－2、ユーザの居場所管理機能35－3、からなる。ユーザの居場所に関する情報は、モビリティ管理部3からのアクセスポイントの情報や移動速度情報やその周辺のRFIDや通信端末に搭載したGPSなどの情報により取得することができる。

[0049] ユーザの趣味趣向は、ユーザの居場所や移動速度や使用デバイスの種類に対応した無線アクセスの種類やサービスの種類やローミングの方法やメディア変換の実行先やメディア変換の方法を、ユーザが予め設定するか、ネットワーク側で上記のような利用の履歴を管理し、履歴から判断してユーザの趣味趣向を推定して設定するなどの方法で管理される。

[0050] デバイスプロファイル37は、端末の形状、データ変換方式、動画対応、画面サイズなどを含む端末能力情報37－1と、端末の現在状況（居場所）を含む端末プレゼンス情報37－2とを有している。デバイスプロファイル37は、ユーザが予め登録するか、端末をネットワークに接続した際に、端末から情報を送信し、ネットワーク側で自動的に管理することにより取得される。また、切替先通信端末が登録されていない場合

は、近距離通信を利用して、切替先通信端末の端末能力情報を取得し、端末切替要求信号に含めて通信端末から送信され、デバイスプロファイル37に登録されるようにすることもできる。

[0051] デバイスプロファイル37とユーザプロファイル35とは、ユーザの居場所情報、デバイス所有者情報に応じて関連付けられる。従って、ユーザの所有デバイスではない公共のデバイスや共有デバイスとユーザとが関連付けられる場合もある。

[0052] 端末能力管理機能37－1が管理する端末能力に関する端末能力情報は、端末の種別、属性、処理、IPアドレスおよび利用可能なビットレート、メディア種別およびコーデック種別、画面サイズ、CPU能力、接続可能ネットワークなどを示す情報である。端末プレゼンス管理機能37－2が管理する端末プレゼンス情報は、現在実行中のアプリケーションの種類や状態、現在の端末の居場所情報などを示す。ネットワーク状態33は、モビリティ管理部3からの無線アクセスの種類に関する情報、セッション制御部5からのQoSの情報やセッションの状態情報やメディア変換部のメディア変換の状態情報や通信端末で実行中のアプリケーションの状態情報によって取得され、通信端末のネットワーク状態だけではなく、デバイスプロファイルに登録されている端末が現在接続中のネットワークの状態（伝送レートや無線方式やQoSなど）も管理する。尚、上記のうちで、必須構成は、ネットワーク状態33、加入者情報35－1、端末能力機能37－1である。

[0053] 図3は、ネットワーク状態、ユーザプロファイル、デバイスプロファイルのデータベースの例を示す図であり、データベースは例えばXML（eXtensible Markup Language）などの言語を利用して抽象的な記述により管理され、データベースの情報はサービス移動制御部21（図1、以下図番号を略して説明する。）に提供される。

[0054] 図3に示すように、例えば、ネットワーク状態41と、ユーザプロファイル43と、デバイスプロファイル45と、が関連付けされている。ネットワーク状態41は、端末（1）41－1と、端末（2）41－2と、端末（3）41－3と、から構成され、例えば、端末（1）41－1に関しては、アクセス方法としてW－CDMA、QoSクラスとしてマルチメディアが、セッション状態として音声通信、ファイル交換が、ビットレートとして10Mbpsが、ロケーションとして基地局1が、経路情報A－B－C…が、記載されている。ユーザプロファイ

ル43においては、例えば、端末(1)41－1の所有者であるユーザ(1)43－1に関する情報であって、加入者情報とプリファレンスと、居場所情報等とが記載されている。この場合には、端末(2)41－2の所有者もユーザ1であることを示している。デバイスプロファイル45は、端末(1)41－1の端末能力情報である、移動通信端末、画面サイズ、CPUクロック数、コーデック、アクセス方法、IPアドレスなどが記載されている。端末プレゼンス情報としては、経度・緯度情報、場所情報、移動速度、通信状態、起動中アプリケーションの有無と種類などが記載されている。端末(2)41－2の情報も、端末能力情報として、例えば固定端末である旨が、端末プレゼンス情報として通信可能であるか否かなどの情報が記載されている。そして、これらの情報41・43・45は、所有者、通信状況、位置などに基づいて関連付けされている。

[0055] あるユーザの情報をサービス移動制御部21から要求されると、ユーザの所有する端末、ユーザの居場所の近傍にある端末などが関連づけられ、関連付けが行なわれた情報群としてサービス移動制御部21に提供される。

[0056] また、メディア制御部7は、IMS101のMRF、MGCF／MGW107、を拡張したものに相当する。セッション制御部5からのメディア変換要求に応じてコンテンツのビットレートやコーデックや画像サイズやメディアフォーマットなどのメディア変換を制御、実行する。端末切替後にメディアを変換する場合には、セッションが再開された後に、メディアを変換できる単位までバッファリングして、メディア変換を行う。この際、再エンコードすることになるため、電子透かし等の認証機能をコンテンツに付加しても良い。

[0057] これらの通信ネットワーク制御システムの機能要素は、説明を簡単にするために、各図においては単一のモジュールとして示しているが、実際には、ローミングの場合や、通信相手が同一ネットワーク外の場合を考慮し、上記のような機能要素は各ネットワーク先、ローミング先にあり、1つのモジュールで実現しているわけではない。実施例における説明では、そのようなやり取りをまとめて一つの処理としてみなすことにより簡略化している。

[0058] また、通信端末は、図示しない画像表示装置および入力装置などから構成されるユーザインタフェースと、赤外線、ブルートゥース(登録商標)、あるいは将来実現が有望視されているUWBなどの無線通信方式またはUSB方式などの有線通信などを

用いた近距離通信部とを備えており、端末切替要求機能、端末ID通知機能、セッション状態再現機能、セッション管理機能、セッション状態送出機能、発呼要求・応答機能、および位置登録機能を発揮する。通信相手先は、アプリケーションサーバ装置でも良いし、通信端末でもよい。

[0059] 次に、図4を参照しつつ端末切替の手順について説明する。適宜図1を参照する。まず、通信端末23は端末切替要求信号を生成するが、その際にどの端末に切り替えるか指定する必要がある。近距離無線を利用して切替先端末25と通信して切替先通信端末25の端末情報を取得し、端末切替要求信号を作成する方法(C300)、通信端末25が切替可能な端末リストをユーザ関連情報収集提供部31から取得している状態で、ユーザが切替先通信端末25を選択して、端末切替要求信号の作成指示を出す方法を用いることができる(C301)。端末切替要求信号には、通信端末23のセッション状態や、アプリケーションの状態などが含まれていてもよい。もしくは、サービス移動制御部21がユーザ関連情報収集提供部31と定期的に情報のやり取りを行い、ユーザ環境が、端末切替を実行すべき状態になったか否かを判断するようにしても良い(C301')。

[0060] 端末切替を実行すべき状態の例としては、ネットワーク状態情報により、通信端末(#1)23のネットワークの状態よりも、切替先通信端末(#2)25のネットワークの状態のほうが安定している場合又は切替先通信端末(#2)25のネットワークの方が高速な場合に切替を行なう可能性が高い。或いは、ユーザプリファレンス情報とユーザ居場所情報と端末プレゼンス情報とを利用して、現在のユーザの居場所には、ユーザの利用できる端末が2台あり、ユーザがこの場所で優先して使用する(ユーザプリファレンス情報から判断)のは切替先端末(#2)25であると判断される場合に、切替を行なうようにすることもできる。

[0061] サービス移動制御部21は、ユーザ関連情報収集提供部31に対し、ユーザプロファイル35、デバイスプロファイル37、ネットワーク状態33に関する情報を要求し取得する。上記C301の端末切替要求信号に切替先の通信端末の端末情報が含まれている場合は、デバイスプロファイル37に端末情報を登録する作業も行う(C302)。サービス移動制御部21は、次に、ユーザ関連情報収集提供部31、端末切替要求信号か

ら取得したユーザプロファイル35、デバイスプロファイル37、ネットワーク状態33により、メディア変換の必要性を判断する。

[0062] ユーザの趣味指向や通信端末23と切替先通信端末25の能力の差などからメディア変換の必要があると判断されると、通信相手先17でメディア変換が可能か否かを問い合わせるようにセッション制御部5に要求する(C303)。但し、上記ユーザプロファイル35、デバイスプロファイル37、ネットワーク状態31の取得時に、通信相手先のメディア変換能力を取得している場合は、この手続きを省くことができる。

[0063] セッション制御部5は、メディア変換能力を通信相手先17に問い合わせ、メディア変換能力情報を取得し、メディア変換能力情報をサービス移動制御部21に通知する(C304, C305, C306)。

[0064] サービス移動制御部21は、メディア変換能力情報を受け取ると、これまで取得した情報からメディア変換先の選定、メディア変換処理の内容の選定、セッション状態の変更の必要性を判断し、それらを含んだセッション切替要求信号をセッション制御部5に対して送信し(C307)、セッション制御部5は、モビリティ管理部3に対して経路設定を指示する(C308)。経路設定が終了するとモビリティ管理部3から応答(ACK)が返る(C309)。この経路設定時には、切替先通信端末25がアクティブでない場合は発呼処理を行う。この時点で通信相手先17と通信端末23、通信相手先17と切替先通信端末25の2つの経路が設定されていることになり、マルチキャストなどの同時に2つの経路の設定が可能な場合は、そのままでいいが、2つの経路の設定が可能でない場合には、どちらかを保留するなどの処理が必要となる。

[0065] 次に、セッション制御部5は、通信端末23に対し、セッションの切替を行う準備が整ったことを示すセッション切替準備信号を送信し、通信端末23はセッションの切替を了承するか否かを返答する(C310、C311)。ネットワーク側から自動的に端末切替を行う際には、これが通信端末23に対して端末切替を行なってもよいかどうかを確認するメッセージとなる。セッション制御部5は、通信相手先17にセッションの中断を要求し、通信相手先17からACKがかえってくると、切替先通信端末25とのセッションの確立を行い、この間に切替先通信端末25はアプリケーションの起動を行う(C312～C315)。

[0066] セッション制御部5は、セッション切替要求信号に含まれていたメディア変換指示に従い、メディア制御部7又は通信相手先17に対しメディア変換を指示する(C316, C317, C316', C317')。続いて、セッションを再開し、通信端末とのセッションを切断する(C318, C319, C320)。この際、モビリティ管理部3による伝送経路の切断も行われる。最後に、サービス移動制御部21に対しセッション制御部5からセッション切替が終了したことを示す信号が送信される(C321)。これにより、通信相手先17と切り替え先端末25との通信を開始することができる。

[0067] 次に、本発明の第2の実施の形態による通信ネットワークの制御システムの一構成例を示す。図6に示すように、本実施の形態による通信ネットワークの制御システムBは、基本的には図1に示す構成と同様であるが、通信端末22が1つであり、アクセス方法(1)22－1とアクセス方法(2)22－2とを切り替えるものである。尚、図6に示すユーザ関連情報収集提供部31のうちの必須構成は、ネットワーク状態33、加入者情報35－1、ユーザ居場所管理機能35－3、端末能力管理機能37－1である。

[0068] 図5は、同一端末におけるアクセス方法の切替の手順を示す図である。これまでは、図1及び図4を参照して、通信端末(#1)23と切替先通信端末(＃2)25との間で切替を行なう手順について説明したが、図5ではアクセス方法1とアクセス方法2との間で経路およびセッションを切り替える手順について示す。通信端末22は、例えばW-CDMAの移動体通信手段に基づくアクセス方法1と、無線LANなどのホットスポットで高速の通信を行なうための無線通信手段に基づくアクセス方法2との2つのアクセス方法を具備しているものとする。異なるアクセス方法をアクセス方法1(22－1)とアクセス方法2(22－2)として示している。

[0069] 通信端末22がどのようなアクセス方法を具備しているかは、ユーザ関連情報収集提供部31の端末能力管理機能37－1において管理されている。ユーザ関連情報収集提供部31におけるネットワーク状態33は、アクセス方法1(22－1)の経路、アクセス方法2(22－2)の経路、それぞれのネットワークの状態を管理し、QoSや伝送レートや無線アクセス方式の種類などをサービス移動制御部21に提供する。

[0070] アクセス方法1(22－1)とアクセス方法2(22－2)とでは、マルチメディアサブシステムやモビリティ管理などの管理・制御の運営システムが異なる可能性がある。ユー

ザ関連情報収集提供部31は、ネットワークオペレータとは別のサードパーティの企業が運営し、ネットワークオペレータから情報を収集することにより、サービス移動制御部21に対し情報を提供する役割を担ってもよい。また、一つのネットワークオペレータがユーザ関連情報収集提供部31、サービス移動制御部21、異なるアクセス方法ともすべて管理を行ってもよい。そのため、ユーザ関連情報収集提供部31と各ネットワークノードとの間のインターフェイスは標準化されていることが望ましい。ユーザプロファイルのユーザ居場所管理機能35－3は、利用できるアクセス方法がユーザの居場所によって設定されている場合に使用される。例えば、ホットスポットの場所とユーザの位置を関連させて、ユーザがホットスポットのサービス範囲内にいることを示す情報を管理する。また、端末プレゼンス管理情報により、端末の位置を特定し、ホットスポットのサービス範囲内に端末があること管理してもよい。

[0071] 図4における手順の説明においては、端末切替について説明を行ったが、図6を参照しつつ同一端末における経路変更について説明する。基本的なフローは、同じものを利用可能である。但し、上記端末切替要求信号は経路切替要求信号に変更される。上記端末切替要求信号には、切替先通信端末の能力が含まれていたが、同一端末内での切替の場合はこの情報は必要とされない。経路切替要求信号は、切替先のアクセス方法や、切替先の電波状況、切替先のルーティングアドレス、切替先のドメイン名、切替先のビットレートなどを含んでいる(C401)。

[0072] また、図4で説明したようにネットワーク側から自動的に経路変更を行うことも可能であり、その場合には、ユーザ関連情報収集提供部31とサービス移動制御部21とによって切替の判断を行う(C401')。切替の判断は、主としてネットワーク状態と端末プレゼンス管理機能とから提供される情報で行なわれ、例えば、通信端末が2つのアクセス方法を利用でき、現在使用中のアクセス方法よりも、もう一方のアクセス方法のほうが高いビットレートで通信できることを検知した際に切替を命令する。ビットレートやQoSに応じてメディア変換が必要な場合には、メディア変換の手続きを行う。但し、同一端末であるため、図4の場合のように、端末の種別や属性の相違による変換の必要はない。またセッションの中断処理については、メディア変換が行われないときには省略も可能であり、アプリケーションの起動処理も必要ない。例えば、セッションに

関する情報をまったく変更する必要がない場合には、モビリティ管理部に対して経路変更を指示するだけでアクセス方法の切替が行われる場合もある。その指示は、サービス移動制御部で作成され、具体的な指示を含んだセッション切替要求信号が送信される。これにより、同じ端末においてアクセス方法をスムーズに変更することができる。

[0073] 本発明の実施の形態によれば、ユーザは、自己の状況の変化に応じて、切替要求時の簡単なボタン操作などだけで、使用する通信端末の切り替えを簡単にすることができ、従来より大幅に操作の手間と時間的なロスを軽減することができ、より高度なサービスを享受することができる。

[0074] また、配信側のサーバ装置においても、特別に新規の機能を実装せずに配信サービスが続けられるという利点がある。加えて、受信側の通信端末間の能力が異なっても、データ形式が個々の通信端末に応じて最適化されて伝送されるため、通信端末側にもサーバ装置側にも大きな負荷を与えることがないという利点がある。こうしたサービス提供基盤の共通化により、ユーザは従来型の有線・無線のネットワークやサービスの違い、通信端末の種別の違い等を意識することがなくなり、シームレスでユビキタスなサービス環境を享受が可能となる。

産業上の利用可能性

[0075] 本発明は端末自体又は端末の通信方式の切り替えに利用できる。

請求の範囲

[1] 第1の通信端末と該第1の通信端末と通信を行っている第2の通信端末との間の通信を中断させることなく、前記第2の通信端末を該第2の通信端末とは異なる第3の通信端末に切替えて第1の通信端末と第3の通信端末との通信を継続させる制御を行う通信ネットワーク制御システムであって、

通信端末間における物理的、論理的な伝送経路を設定し管理するモビリティ管理手段と、

前記伝送経路上において通信端末間のセッションを制御するセッション制御手段と、

セッションの切り替えを前記セッション制御手段に対して指示するサービス移動制御手段と、

セッションの切り替え時に用いられるユーザ関連情報であって、ネットワーク状態と、ユーザに関するユーザプロファイルと、デバイスに関するデバイスプロファイルと、のうちの少なくともいずれかを含むユーザ関連情報を収集し前記サービス移動制御手段に対して提供するユーザ関連情報収集提供手段と

を備える通信ネットワーク制御システム。

[2] 前記サービス移動制御手段は、前記第2の通信端末から端末切替要求信号を受信するかまたは前記ユーザ関連情報に基づいて端末切替を行うか判断することにより、セッション切替要求信号を生成し、

前記セッション制御手段は、前記セッション切替要求信号を受信して、セッションを中断する機能と、前記モビリティ管理手段に対して前記第3の通信端末との伝送経路を設定するよう指示する機能と、前記第3の通信端末との間でセッションを確立する機能と、前記セッション確立後、前記通信相手先との間でセッションを再開する機能と、を有することを特徴とする請求項1に記載の通信ネットワーク制御システム。

[3] 前記ユーザプロファイルは、ユーザの加入者情報とユーザの居場所情報とユーザの趣味趣向の少なくともいずれかを含み、前記デバイスプロファイルは、デバイスの種類や各デバイスの状態情報の少なくともいずれかを含むことを特徴とする請求項1又は2に記載の通信ネットワーク制御システム。

[4] 前記サービス移動制御手段は、前記ユーザ関連情報収集提供手段からの情報又は前記第2の通信端末からの端末切替要求に基づいて、セッション切替要求を前記セッション制御手段に指示することを特徴とする請求項1又は2に記載の通信ネットワーク制御システム。

[5] 前記ユーザ関連情報収集提供手段は、前記サービス移動制御手段からユーザに関する情報提供要求があった際に所有者情報と位置情報とに基づいて関連する情報を提供することを特徴とする請求項1又は2に記載の通信ネットワーク制御システム。

[6] ネットワーク主導の通信端末切替処理は、ユーザ関連情報収集提供手段から提供される前記第2の通信端末と前記第3の通信端末とのネットワーク状態と端末能力情報とに基づいて起動されることを特徴とする請求項5に記載の通信ネットワーク制御システム。

[7] さらにネットワーク上にメディア変換手段を有し、

前記サービス移動制御手段がメディアに関して指示する情報を生成し、セッション切替要求とともに前記セッション制御手段に送ることを特徴とする請求項1又は2に記載の通信ネットワーク制御システム。

[8] 前記メディアの変換処理を行うか否かを、前記第2の通信端末と前記第3の通信端末との端末能力とネットワーク状態とに基づいて判断することを特徴とする請求項7に記載の通信ネットワーク制御システム。

[9] 前記メディアの変換先と、前記メディアの変換処理の方法に関する指示を、ユーザプリファレンスに基づいて判断することを特徴とする請求項7に記載の通信ネットワーク制御システム。

[10] 前記メディアの変換先は、通信相手のメディア変換能力とネットワーク上のメディア変換手段の変換能力に基づいて判断されることを特徴とする請求項7に記載の通信ネットワーク制御システム。

[11] 前記サービス移動制御手段は、メディア変換能力を取得する要求を前記第1の通信端末に接続されるネットワークに要求するよう指示する情報を生成することを特徴とする請求項10に記載の通信ネットワーク制御システム。

[12] 前記第2の通信端末は切替先の通信端末を指定し、端末切替要求とともにネットワークに送ることを特徴とする請求項1又は2に記載の通信ネットワーク制御システム。

[13] 近距離通信により前記第3の通信端末との間で予め情報のやり取りを行なって取得した前記第3の通信端末の端末能力又は端末プレゼンス情報のうちの少なくともいずれか一方を前記端末切替要求に含めることを特徴とする請求項12に記載の通信ネットワーク制御システム。

[14] メディア変換先、メディア変換処理方法の指示情報を端末切替要求とともに行うことを特徴とする請求項12に記載の通信ネットワーク制御システム。

[15] 第1の通信端末と該第1の通信端末と通信を行っている第2の通信端末であって、複数のアクセス方法を有する第2の通信端末との間の通信を中断させることなく、当該通信を行っている少なくとも一つのアクセス方法を、前記通信を行っていない他のアクセス方法へ切替えて前記通信を継続させる制御を行う通信ネットワーク制御システムであって、

通信端末間における物理的、論理的な伝送経路を設定し管理するモビリティ管理手段と、

前記伝送経路上において通信端末間のセッションを制御するセッション制御手段と、

セッションの切替えを前記セッション制御手段に対して指示するサービス移動制御手段と、

ネットワーク状態と、ユーザに関するユーザプロファイルと、デバイスに関するデバイスプロファイルと、のうちの少なくともいずれかを含むユーザ関連情報を収集し提供するユーザ関連情報収集提供手段と、を有し、

前記サービス移動制御手段は、該ユーザ関連情報収集提供手段からの情報、または、通信端末からのアクセス方法切替要求信号に基づいて、セッション切替要求信号を生成し、前記セッション制御手段に命令することを特徴とする通信ネットワーク制御システム。

[16] 前記ユーザ関連情報収集提供手段は、前記サービス移動制御手段からユーザに関する情報の要求があった際に、所有者情報と位置情報とに基づいて関連する情報

を前記サービス移動制御手段へ提供することを特徴とする請求項15に記載の通信ネットワーク制御システム。

[17] ネットワーク主導によるアクセス方法の切替処理の起動を、前記通信端末のプレゼンス情報とネットワーク状態との少なくともいずれか一方に基づいて判断することを特徴とする請求項15に記載の通信ネットワーク制御システム。

[18] ネットワーク主導のアクセス方法の切替は、ユーザの居場所情報とユーザプリファレンスとに基づいて行われることを特徴とする請求項17に記載の通信ネットワーク制御システム。

[19] さらに、メディア変換手段をネットワーク内に有しており、該メディア変換手段において、前記サービス移動制御手段がメディア変換先とメディア変換処理方法について指示する情報を生成することを特徴とする請求項15に記載の通信ネットワーク制御システム。

[20] 前記メディア変換処理方法は、現在のアクセス方法と切替先のアクセス方法とのネットワーク状態に基づいて判断されることを特徴とする請求項19に記載の通信ネットワーク制御システム。

[21] 前記メディア変換先、前記メディア変換処理方法に関する指示を、前記ユーザプリファレンスに基づいて行うことを特徴とする請求項20に記載の通信ネットワーク制御システム。

[22] 前記メディア変換先は、通信相手のメディア変換能力とネットワークのメディア変換手段の変換能力との少なくともいずれか一方に基づいて判断されることを特徴とする請求項21に記載の通信ネットワーク制御システム。

[23] 前記サービス移動制御手段は、メディア変換能力取得する要求を通信相手のネットワークに要求するよう指示することを特徴とする請求項22に記載の通信ネットワーク制御システム。

[24] 前記第2の通信端末が切替先のアクセス方法を指定し、アクセス方法切替要求信号に含めてネットワークへ送信することを特徴とする請求項15に記載の通信ネットワーク制御システム。

[25] 前記メディア変換先、前記メディア変換処理方法の指示情報のうちの少なくともい

ずれか一方を、アクセス方法切替要求に含めることを特徴とする請求項24に記載の通信ネットワーク制御システム。

[26] 第1の通信端末と該第1の通信端末と通信を行っている第2の通信端末との間において物理的、論理的な伝送経路を設定された状態において、セッションの切り替え時に用いられるユーザ関連情報であって、ネットワーク状態と、ユーザに関するユーザプロファイルと、デバイスに関するデバイスプロファイルと、のうちの少なくともいずれかを含むユーザ関連情報を収集するステップと、

前記伝送経路上において通信端末間におけるセッションの切替えが指示された場合に、該セッションの切替え指示に応じて、収集された前記ユーザ関連情報に基づいて前記第1の通信端末と前記第2の通信端末との間の通信を中断させることなく、前記第2の通信端末を該第2の通信端末とは異なる第3の通信端末に切替えて第1の通信端末と第3の通信端末間において通信を継続させるためのセッションの切り替えを行うステップと

を備える通信ネットワーク制御方法。

[27] ユーザに関する情報の要求があった際に、所有者情報と位置情報とに基づいて関連する情報を提供するステップを有することを特徴とする請求項26に記載の通信ネットワーク制御方法。

[28] ネットワーク主導の端末切替の起動を、前記第2の通信端末と前記第3の通信端末との間のネットワーク状態と端末能力情報とのうちの少なくともいずれか一方に基づいて行なうことを特徴とする請求項26に記載の通信ネットワーク制御方法。

[29] メディア変換先とメディア変換処理方法について指示する情報を生成するステップと、 該情報に基づいてセッション切替に関するセッションの指示を行うことを特徴とする請求項26に記載の通信ネットワーク制御方法。

[30] 前記メディア変換先を、通信相手のメディア変換能力とネットワークのメディア変換手段との変換能力とに基づいて判断することを特徴とする請求項29に記載の通信ネットワーク制御方法。

[31] メディア変換能力を取得するための要求を通信相手のネットワークに要求するように指示する情報を生成するステップを有することを特徴とする請求項30に記載の通

信ネットワーク制御方法。

[32] 第1の通信端末と該第1の通信端末と通信を行っており複数のアクセス方法を有する第2の通信端末との間において物理的、論理的な伝送経路を設定された状態において、セッションの切り替え時に用いられるユーザ関連情報であって、ネットワーク状態と、ユーザに関するユーザプロファイルと、デバイスに関するデバイスプロファイルと、のうちの少なくともいずれかを含むユーザ関連情報を収集するステップと、

前記伝送経路上において通信端末間のおけるセッションの切替えが指示された場合に、該セッションの切替え指示に応じて、収集された前記ユーザ関連情報に基づいて前記第1の通信端末と前記第2の通信端末との間の通信を中断させることなく、前記第2の通信端末におけるアクセス方法を切替えて通信を継続させるためのセッションの切り替えを行うステップと

を備える通信ネットワーク制御方法。

[33] ユーザに関する情報の要求があった際に、前記通信端末の所有者情報と位置情報とに基づいて関連する情報を提供するステップを有することを特徴とする請求項32に記載の通信ネットワーク制御方法。

[34] ネットワーク主導によるアクセス方法の切替処理の起動を、前記通信端末のプレゼンス情報とネットワーク状態との少なくともいずれか一方に基づいて判断することを特徴とする請求項32に記載の通信ネットワーク制御システム。

[35] メディア変換先とメディア変換処理方法について指示する情報を生成するステップと、

該情報に基づいてセッション切替に関するセッションの指示を行うことを特徴とする請求項32に記載の通信ネットワーク制御方法。

[36] 前記メディア変換先を、通信相手のメディア変換能力とネットワークのメディア変換手段との変換能力とに基づいて判断することを特徴とする請求項35に記載の通信ネットワーク制御方法。

[37] メディア変換能力を取得するための要求を通信相手のネットワークに要求するように指示する情報を生成するステップを有することを特徴とする請求項36に記載の通信ネットワーク制御方法。

[38] 通信端末間における物理的、論理的な伝送経路を設定し管理するモビリティ管理手段と、前記伝送経路上において通信端末間のセッションを制御するセッション制御手段と、セッションの切替えを前記セッション制御手段に対して指示するサービス移動制御手段と、セッションの切り替え時に用いられるユーザ関連情報であって、ネットワーク状態と、ユーザに関するユーザプロファイルと、デバイスに関するデバイスプロファイルと、のうちの少なくともいずれかを含むユーザ関連情報を収集し前記サービス移動制御手段に対して提供するユーザ関連情報収集提供手段とを備える通信ネットワーク制御システムにおいて用いられる通信端末であって、

前記サービス移動制御手段への端末切り替え要求を行い、前記通信端末は、切替先の通信端末を指定し、端末切替要求に含めてネットワークへ送信することを特徴とする通信端末。

[39] 前記通信端末は、近距離通信により切替先の通信端末との間で予め情報のやり取りを行なって、切替先の端末能力や端末プレゼンス情報を端末切替要求に含めることを特徴とする請求項38に記載の通信端末。

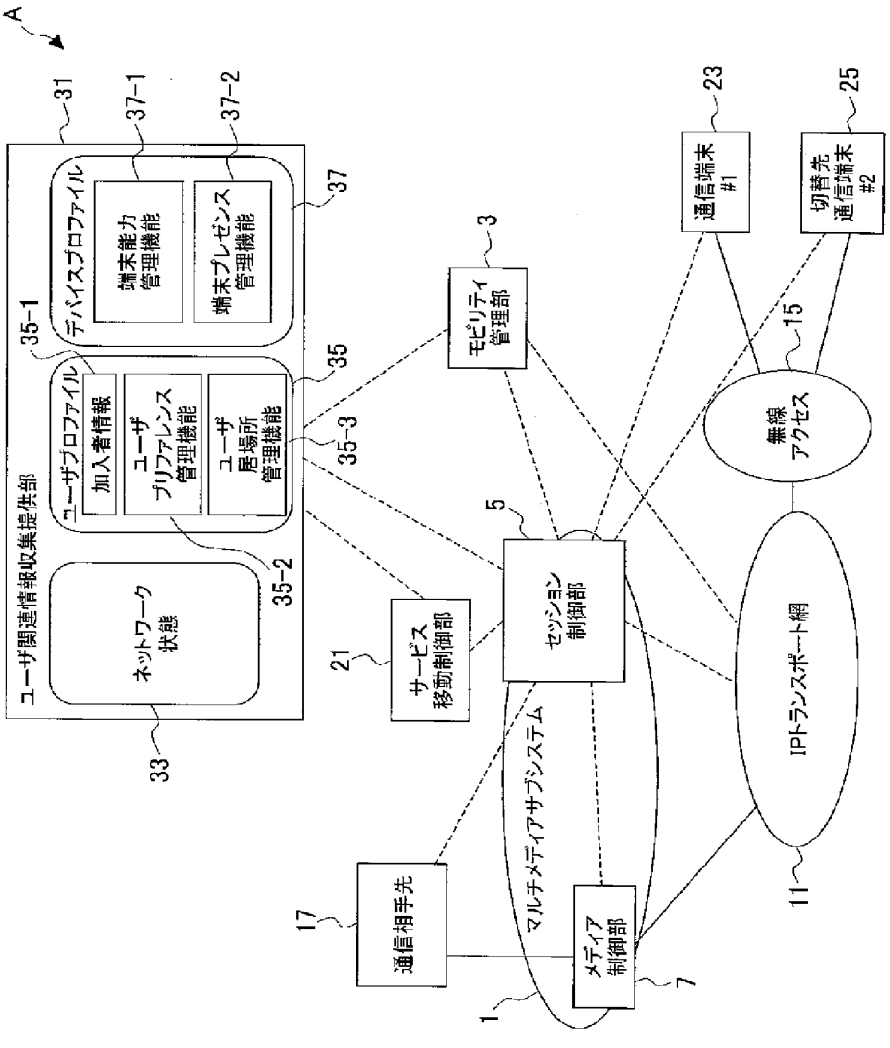
[40] メディア変換先、メディア変換処理方法の指示情報を前記端末切替要求に含めることを特徴とする請求項38に記載の通信端末。

[41] 通信端末間における物理的、論理的な伝送経路を設定し管理するモビリティ管理手段と、前記伝送経路上において通信端末間のセッションを制御するセッション制御手段と、セッションの切替えを前記セッション制御手段に対して指示するサービス移動制御手段と、セッションの切り替え時に用いられるユーザ関連情報であって、ネットワーク状態と、ユーザに関するユーザプロファイルと、デバイスに関するデバイスプロファイルと、のうちの少なくともいずれかを含むユーザ関連情報を収集し前記サービス移動制御手段に対して提供するユーザ関連情報収集提供手段とを備える通信ネットワーク制御システムにおいて、第1の通信端末と該第1の通信端末と通信を行っている第2の通信端末であって複数のアクセス方法を有する第2の通信端末との間の通信を中断させることなく、当該通信を行っている少なくとも一つのアクセス方法を、前記通信を行っていない他のアクセス方法へ切替えて前記通信を継続させる制御を行う第2の通信端末であって、 前記第2の通信端末が切替先のアクセス方法を指定

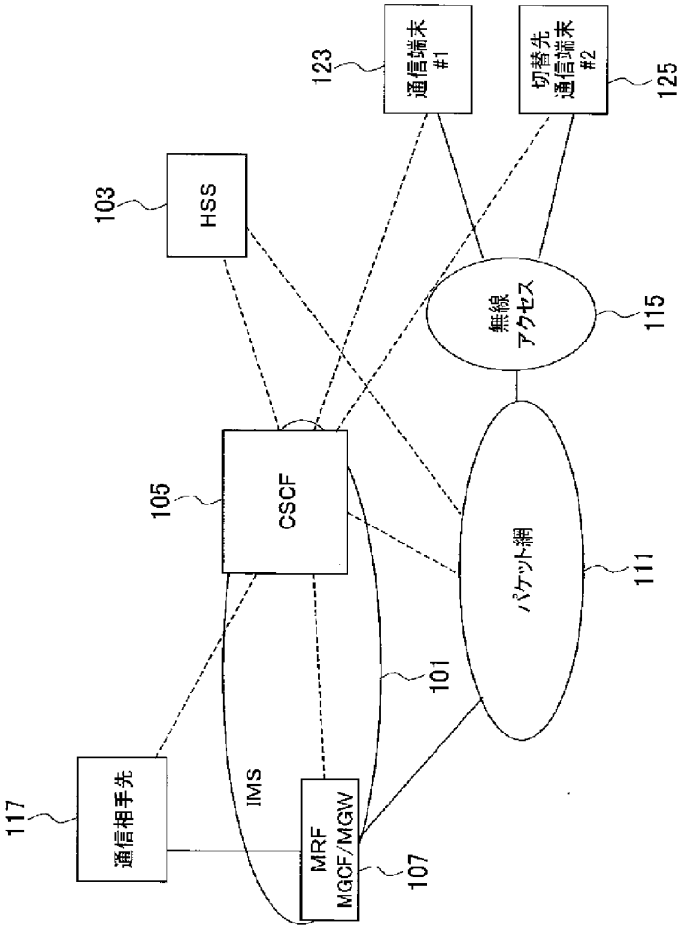
し、アクセス方法切替要求信号に含めてネットワークへ送信することを特徴とする第2の通信端末。

[42] メディア変換先、前記メディア変換処理方法の指示情報のうちの少なくともいずれか一方を、アクセス方法切替要求に含めることを特徴とする請求項41に記載の第2の通信端末。

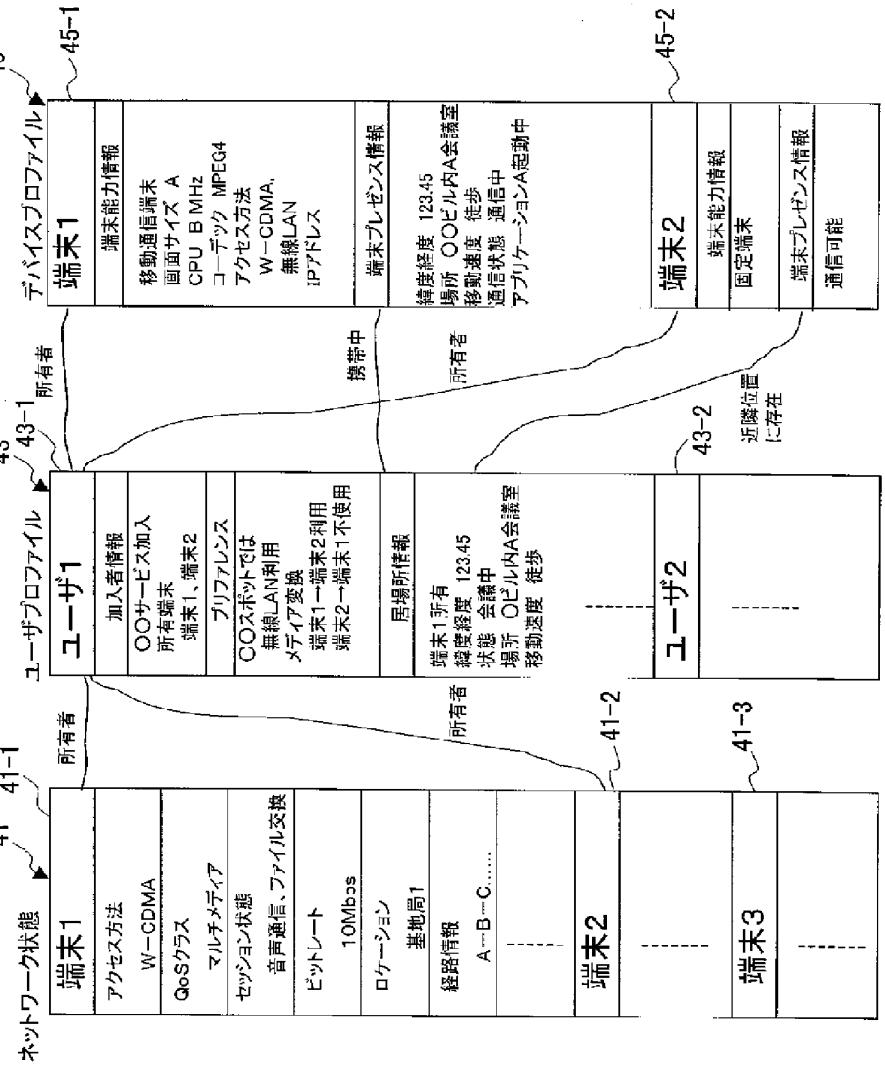
[図1]


A
31
37-1
37-2
37
35-1
35
35-3
35-2
33
ユーザ関連情報収集提供部
デバイスプロファイル
端末能力管理機能
端末プレゼンス管理機能
ユーザプロファイル
加入者情報
ユーザプリファレンス管理機能
ユーザ居場所管理機能
ネットワーク状態
3
モビリティ管理部
5
セッション制御部
21
サービス移動制御部
17
通信相手先
1
マルチメディアサブシステム
メディア制御部
7
23
通信端末#1
25
切替先通信端末#2
15
無線アクセス
IPトランスポート網
11

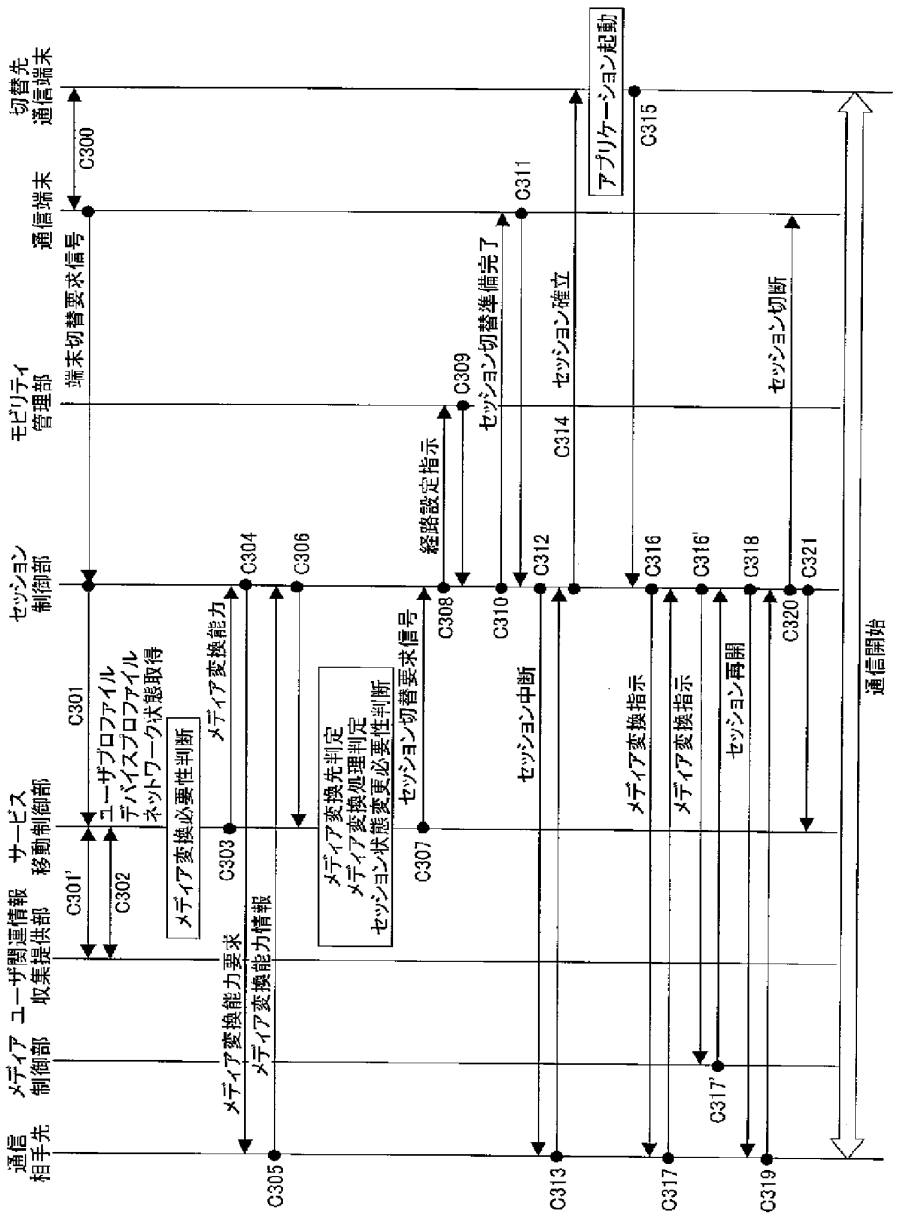
[図2]


通信端末
#1
123
切替先
通信端末
#2
125
HSS
103
無線
アクセス
115
CSCF
105
パケット網
111
101
IMS
通信相手先
117
MRF
MGCF/MGW
107

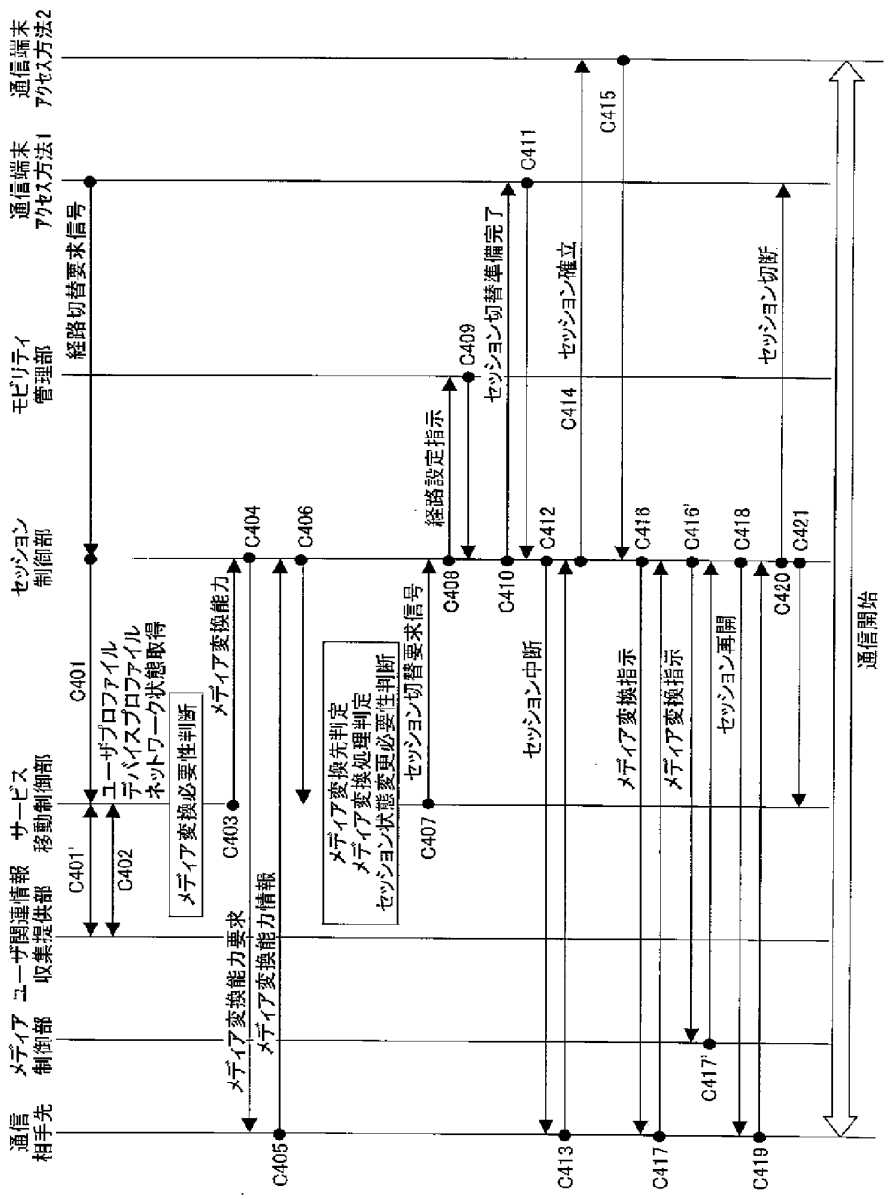
[図3]


ネットワーク状態
41
41-1
端末1
アクセス方法
W-CDMA
QoSクラス
マルチメディア
セッション状態
音声通信、ファイル交換
ビットレート
10Mbps
ロケーション
基地局1
経路情報
A-B-C……
端末2
端末3
41-2
41-3
所有者
ユーザプロファイル
43
43-1
ユーザ1
加入者情報
○○サービス加入
所有端末
端末1、端末2
プリファレンス
○○スポットでは
無線LAN利用
メディア変換
端末1→端末2利用
端末2→端末1不使用
居場所情報
端末1所有
緯度経度 123.45
状態 会議中
場所 ○○ビル内A会議室
移動速度 徒歩
ユーザ2
43-2
所有者
携帯中
所有者
近隣位置
に存在
デバイスプロファイル
45
45-1
端末1
端末能力情報
移動通信端末
画面サイズ A
CPU B MHz
コーデック MPEG4
アクセス方法
W-CDMA,
無線LAN
IPアドレス
端末プレゼンス情報
緯度経度 123.45
場所 ○○ビル内A会議室
移動速度 徒歩
通信状態 通信中
アプリケーションA起動中
端末2
45-2
端末能力情報
固定端末
端末プレゼンス情報
通信可能

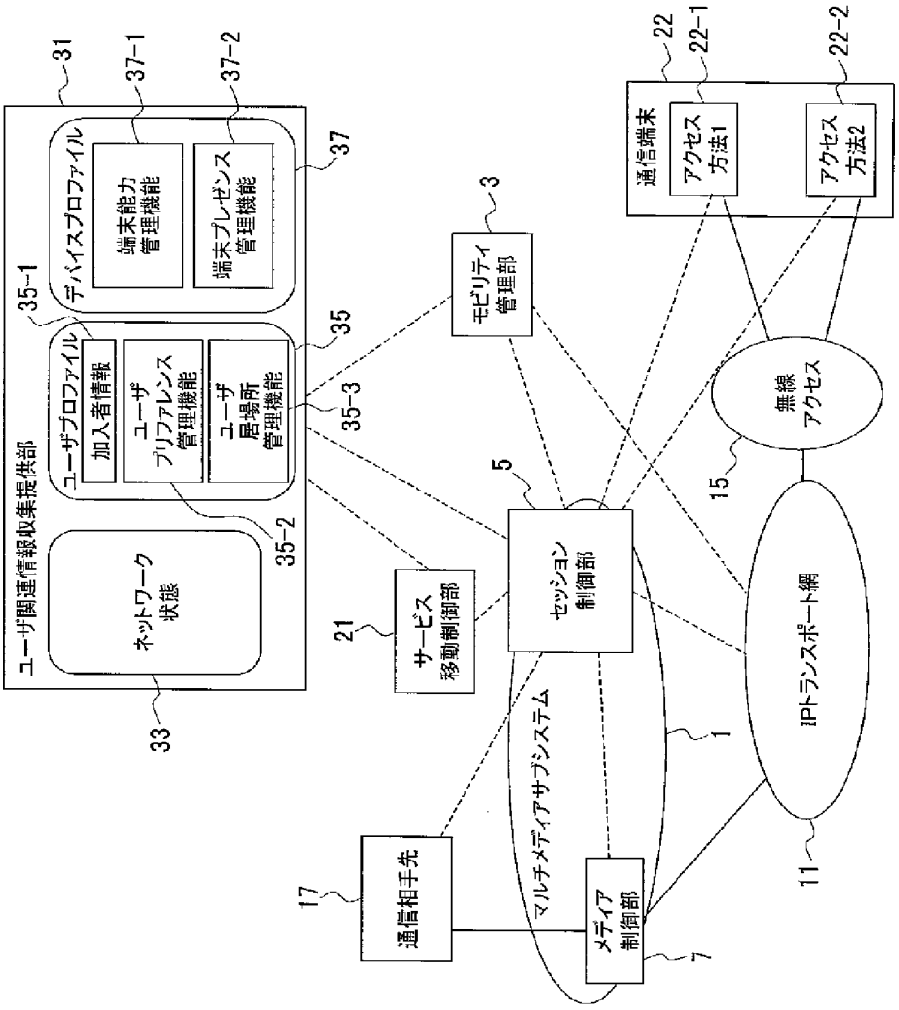
[図4]


通信相手先
メディア制御部
ユーザ関連情報収集提供部
サービス移動制御部
セッション制御部
モビリティ管理部
通信端末
切替先通信端末
C300
端末切替要求信号
C301
C301'
ユーザプロファイル
デバイスプロファイル
ネットワーク状態取得
C302
メディア変換必要性判断
C303
メディア変換能力要求
メディア変換能力情報
C304
メディア変換能力
C305
C306
メディア変換先判定
メディア変換処理判定
セッション状態変更必要性判断
C307
セッション切替要求信号
C308
経路設定指示
C309
セッション切替準備完了
C310
C311
セッション中断
C312
C313
セッション確立
C314
アプリケーション起動
C315
C316
メディア変換指示
C316'
メディア変換指示
C317
C317'
セッション再開
C318
セッション切断
C319
C320
C321
通信開始

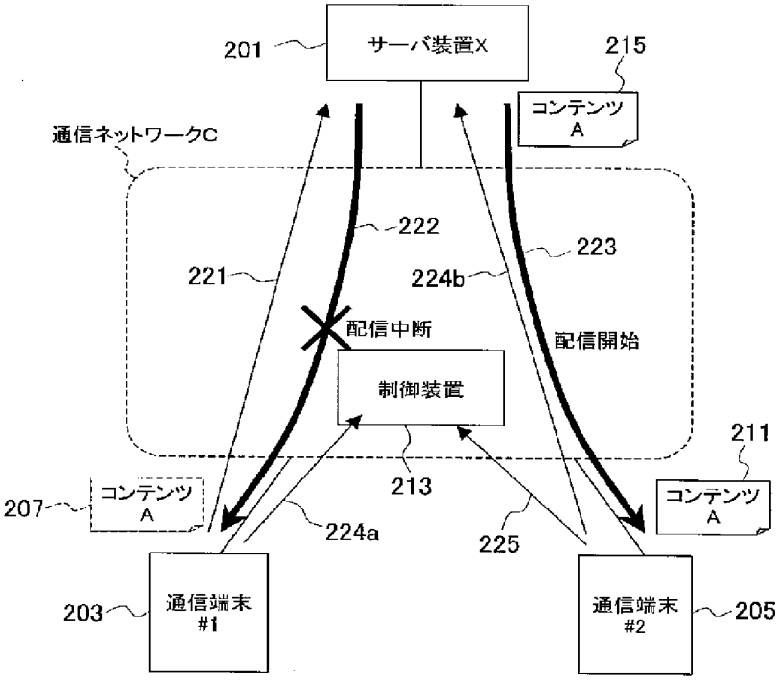
[図5]


通信相手先
メディア制御部
ユーザ関連情報収集提供部
サービス移動制御部
セッション制御部
モビリティ管理部
通信端末アクセス方法1
通信端末アクセス方法2
C401'
C401
C402
ユーザプロファイル
デバイスプロファイル
ネットワーク状態取得
メディア変換必要性判断
C403
メディア変換能力要求
メディア変換能力情報
C404
C405
C406
メディア変換先判定
メディア変換処理判定
セッション状態変更必要性判断
C407
セッション切替要求信号
C408
経路設定指示
C409
セッション切替準備完了
C410
C411
セッション中断
C412
C413
セッション確立
C414
C415
メディア変換指示
C416
C417
メディア変換指示
C416'
C417'
セッション再開
C418
C419
セッション切断
C420
C421
通信開始

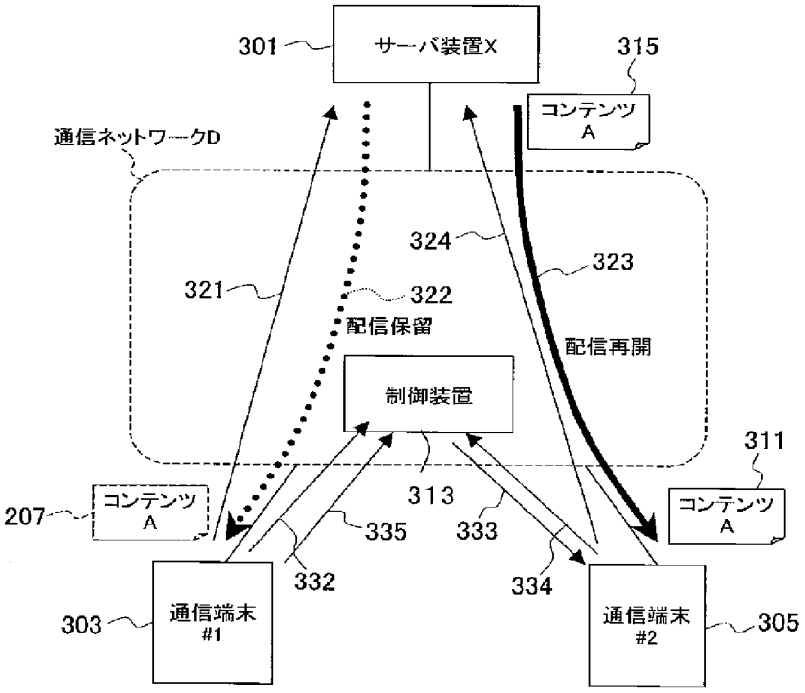
[図6]


ユーザ関連情報収集提供部
31
ユーザプロファイル
35-1
加入者情報
ユーザ
プリファレンス
管理機能
ユーザ
居場所
管理機能
35
35-2
35-3
デバイスプロファイル
37
37-1
端末能力
管理機能
37-2
端末プレゼンス
管理機能
ネットワーク
状態
33
モビリティ
管理部
3
サービス
移動制御部
21
セッション
制御部
5
マルチメディアサブシステム
1
メディア
制御部
7
通信相手先
17
通信端末
22
22-1
アクセス
方法1
22-2
アクセス
方法2
無線
アクセス
15
IPトランスポート網
11

[図7]


201
サーバ装置X
215
コンテンツ
A
通信ネットワークC
222
223
221
224b
配信中断
配信開始
制御装置
211
213
207
コンテンツ
A
224a
225
コンテンツ
A
203
通信端末
#1
通信端末
#2
205

[図8]


301
サーバ装置X
315
コンテンツ
A
通信ネットワークD
324
323
321
322
配信保留
配信再開
制御装置
311
313
207
コンテンツ
A
335
333
コンテンツ
A
332
334
303
通信端末
#1
通信端末
#2
305

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2006/300324

A. CLASSIFICATION OF SUBJECT MATTER
H04L12/56(2006.01), ***H04Q7/38***(2006.01)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
H04L12/56(2006.01), ***H04Q7/38***(2006.01)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Jitsuyo Shinan Koho	1922-1996	Jitsuyo Shinan Toroku Koho	1996-2006
Kokai Jitsuyo Shinan Koho	1971-2006	Toroku Jitsuyo Shinan Koho	1994-2006

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	Takayuki WARABINO et al., "Tanmatsukan no Seamless na Kirikae o Jitsugen suru Device Hand-off Hoshiki no Teian", Information Processing Society of Japan Kenkyu Hokoku 2003-MBL-27-15, 14 November, 2003 (14.11.03), page 107, left column, line 22 to page 108, left column, line 23; page 109, left column, lines 8 to 18	1-14,26-31,38-40 15-25,32-37,41,42
X Y	Masatoshi KAWARAZAKI et al., "Meta Data o Riyo shita Contents Hand-over System -MetaPORT-, IEICE Technical Report IN2003-3, 09 May, 2003 (09.05.03), page 14, left column, line 9 to page 15, left column, line 8; page 15, right column, line 6 to page 17, left column, line 7	1-12,14,26-31,38,40 15-25,32-37,41,42

☒ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
09 March, 2006 (09.03.06)	20 March, 2006 (20.03.06)
Name and mailing address of the ISA/ Japanese Patent Office Facsimile No.	Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2006/300324

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	JP 2004-336310 A (Nippon Telegraph And Telephone Corp.), 25 November, 2004 (25.11.04), Par. Nos. [0009] to [0010], [0016], [0018], [0024] (Family: none)	1-6,12, 26-28,38 15-18,24, 32-34,41
Y	JP 2004-208001 A (Sharp Corp.), 22 July, 2004 (22.07.04), Abstract; Fig. 2 & WO 2004/062310 A1 & EP 1585354 A1	15-25,32-37, 41,42

Form PCT/ISA/210 (continuation of second sheet) (April 2005)

国際調査報告

国際出願番号　ＰＣＴ／ＪＰ２００６／３００３２４

A.　発明の属する分野の分類（国際特許分類（ＩＰＣ））

Int.Cl.　*H04L12/56(2006.01), H04Q7/38(2006.01)*

B.　調査を行った分野

調査を行った最小限資料（国際特許分類（ＩＰＣ））

Int.Cl.　*H04L12/56(2006.01), H04Q7/38(2006.01)*

最小限資料以外の資料で調査を行った分野に含まれるもの

日本国実用新案公報	１９２２－１９９６年
日本国公開実用新案公報	１９７１－２００６年
日本国実用新案登録公報	１９９６－２００６年
日本国登録実用新案公報	１９９４－２００６年

国際調査で使用した電子データベース（データベースの名称、調査に使用した用語）

C.　関連すると認められる文献

引用文献のカテゴリー＊	引用文献名　及び一部の箇所が関連するときは、その関連する箇所の表示	関連する請求の範囲の番号
X	蕨野貴之他，端末間のシームレスな切り換えを実現するデバイスハンドオフ方式の提案，情報処理学会研究報告 2003-MBL-27-15, 2003.11.14	1-14, 26-31, 38-40
Y	第 107 頁左欄第 22 行－第 108 頁左欄第 23 行，第 109 頁左欄第 8－18 行	15-25, 32-37, 41, 42

☑　Ｃ欄の続きにも文献が列挙されている。

☐　パテントファミリーに関する別紙を参照。

＊　引用文献のカテゴリー

「Ａ」特に関連のある文献ではなく、一般的技術水準を示すもの

「Ｅ」国際出願日前の出願または特許であるが、国際出願日以後に公表されたもの

「Ｌ」優先権主張に疑義を提起する文献又は他の文献の発行日若しくは他の特別な理由を確立するために引用する文献（理由を付す）

「Ｏ」口頭による開示、使用、展示等に言及する文献

「Ｐ」国際出願日前で、かつ優先権の主張の基礎となる出願の日の後に公表された文献

「Ｔ」国際出願日又は優先日後に公表された文献であって出願と矛盾するものではなく、発明の原理又は理論の理解のために引用するもの

「Ｘ」特に関連のある文献であって、当該文献のみで発明の新規性又は進歩性がないと考えられるもの

「Ｙ」特に関連のある文献であって、当該文献と他の１以上の文献との、当業者にとって自明である組合せによって進歩性がないと考えられるもの

「＆」同一パテントファミリー文献

国際調査を完了した日 ０９．０３．２００６	国際調査報告の発送日 ２０．０３．２００６
国際調査機関の名称及びあて先 日本国特許庁（ＩＳＡ／ＪＰ） 郵便番号１００－８９１５ 東京都千代田区霞が関三丁目４番３号	特許庁審査官（権限のある職員）　５Ｘ　２９４７ 高橋　真之 電話番号　０３－３５８１－１１０１　内線　３５９６

様式ＰＣＴ／ＩＳＡ／２１０（第２ページ）（２００５年４月）

Ｃ（続き）．　関連すると認められる文献

引用文献のカテゴリー＊	引用文献名　及び一部の箇所が関連するときは、その関連する箇所の表示	関連する請求の範囲の番号
X Y	川原崎雅敏他，メタデータを利用したコンテンツハンドオーバシステムーMetaPORTー，電子情報通信学会技術研究報告 IN2003-3，2003.05.09 第14頁左欄第9行ー第15頁左欄第8行， 第15頁右欄第6行ー第17頁左欄第7行	1-12,14, 26-31,38,40 15-25,32-37, 41,42
X Y	JP 2004-336310 A（日本電信電話株式会社）2004.11.25（ファミリーなし） 段落0009ー0010，段落0016，段落0018，段落0024	1-6,12, 26-28,38 15-18,24, 32-34,41
Y	JP 2004-208001 A（シャープ株式会社）2004.07.22，要約，図2 & WO 2004/062310 A1 & EP 1585354 A1	15-25,32-37, 41,42

PATENT COOPERATION TREATY

RECEIVED
AUG 15 2005
HAYNES & BOONE L.L.P.

PCT

From the INTERNATIONAL SEARCHING AUTHORITY

To:
HAYNES AND BOONE, LLP
Attn. Bliss, Timothy F.
901 Main Street, Suite 3100
Dallas, TX 75202
UNITED STATES OF AMERICA

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT AND THE WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

Applicant's or agent's file reference 36244.5	Date of mailing (day/month/year) 05/08/2005 **FOR FURTHER ACTION** See paragraphs 1 and 4 below
International application No. PCT/IB2005/000821	International filing date (day/month/year) 29/[illegible]/2005
Applicant DAMAKA, INC.	

DOCKETING COMPLETE
DATE: 8/16/05
BY: RMT 36244.5

1. [x] The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

   Filing of amendments and statement under Article 19:
   The applicant is entitled, if he so wishes, to amend the claims of the International Application (see Rule 46):

   When? The time limit for filing such amendments is normally 2 months from the date of transmittal of the International Search Report; however, for more details, see the notes on the accompanying sheet.

   Where? Directly to the International Bureau of WIPO, 34 chemin des Colombettes 1211 Geneva 20, Switzerland, Fascimile No.: (41-22) 740.14.35

   For more detailed instructions, see the notes on the accompanying sheet.

2. [ ] The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3. [ ] **With regard to the protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

   [ ] the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.

   [ ] no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Reminders**

   Shortly after the expiration of **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in Rules 90*bis*.1 and 90*bis*.3, respectively, before the completion of the technical preparations for international publication.

   The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. These comments would also be made available to the public but not before the expiration of 30 months from the priority date.

   Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase until **30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

   In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19 months.

   See the Annex to Form PCT/IB/301 and, for details about the applicable time limits, Office by Office, see the *PCT Applicant's Guide*, Volume II, National Chapters and the WIPO Internet site.

Name and mailing address of the International Searching Authority	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Ainhoa Barrio Baranano

Form PCT/ISA/220 (January 2004) *(See notes on accompanying sheet)*

NOTES TO FORM PCT/ISA/220

These Notes are intended to give the basic instructions concerning the filing of amendments under article 19. The Notes are based on the requirements of the Patent Cooperation Treaty, the Regulations and the Administrative Instructions under that Treaty. In case of discrepancy between these Notes and those requirements, the latter are applicable. For more detailed information, see also the PCT Applicant's Guide, a publication of WIPO.

In these Notes, "Article", "Rule", and "Section" refer to the provisions of the PCT, the PCT Regulations and the PCT Administrative Instructions respectively.

INSTRUCTIONS CONCERNING AMENDMENTS UNDER ARTICLE 19

The applicant has, after having received the international search report, one opportunity to amend the claims of the international application. It should however be emphasized that, since all parts of the international application (claims, description and drawings) may be amended during the international preliminary examination procedure, there is usually no need to file amendments of the claims under Article 19 except where, e.g. the applicant wants the latter to be published for the purposes of provisional protection or has another reason for amending the claims before international pbulication. Furthermore, it should be emphasized that provisional protection is available in some States only.

What parts of the international application may be amended?

Under Article 19, only the claims may be amended.

During the international phase, the claims may also be amended (or further amended) under Article 34 before the International Preliminary Examining Authority. The description and drawings may only be amended under Article 34 before the International Examining Authority.

Upon entry into the national phase, all parts of the international application may be amended under Article 28 or, where applicable, Article 41.

When? Within 2 months from the date of transmittal of the international search report or 16 months from the priority date, whichever time limit expires later. It should be noted, however, that the amendments will be considered as having been received on time if they are received by the International Bureau after the expiration of the applicable time limit but before the completion of the technical preparations for international publication (Rule 46.1).

Where not to file the amendments?

The amendments may only be filed with the International Bureau and not with the receiving Office or the International Searching Authority (Rule 46.2).

Where a demand for international preliminary examination has been/is filed, see below.

How? Either by cancelling one or more entire claims, by adding one or more new claims or by amending the text of one or more of the claims as filed.

A replacement sheet must be submitted for each sheet of the claims which, on account of an amendment or amendments, differs from the sheet originally filed.

All the claims appearing on a replacement sheet must be numbered in Arabic numerals. Where a claim is cancelled, no renumbering of the other claims is required. In all cases where claims are renumbered, they must be renumbered consecutively (Administrative Instructions, Section 205(b)).

The amendments must be made in the language in which the international application is to be published.

What documents must/may accompany the amendments?

Letter (Section 205(b)):

The amendments must be submitted with a letter.

The letter will not be published with the international application and the amended claims. It should not be confused with the "Statement under Article 19(1)" (see below, under "Statement under Article 19(1)").

The letter must be in English or French, at the choice of the applicant. However, if the language of the international application is English, the letter must be in English; if the language of the international application is French, the letter must be in French.

3NSDOCID: <XS ISA220NOENP4 1 >

Ex.1002 / Page 388 of 1008
Cisco Systems, Inc.

NOTES TO FORM PCT/ISA/220 (continued)

The letter must indicate the differences between the claims as filed and the claims as amended. It must, in particular, indicate, in connection with each claim appearing in the international application (it being understood that identical indications concerning several claims may be grouped),whether

(i) the claim is unchanged;

(ii) the claim is cancelled;

(iii) the claim is new;

(iv) the claim replaces one or more claims as filed;

(v) the claim is the result of the division of a claim as filed.

The following examples illustrate the manner in which amendments must be explained in the accompanying letter:

1. [Where originally there were 48 claims and after amendment of some claims there are 51]:
"Claims 1 to 29, 31, 32, 34, 35, 37 to 48 replaced by amended claims bearing the same numbers; claims 30, 33 and 36 unchanged; new claims 49 to 51 added."

2. [Where originally there were 15 claims and after amendment of all claims there are 11]:
"Claims 1 to 15 replaced by amended claims 1 to 11."

3. [Where originally there were 14 claims and the amendments consist in cancelling some claims and in adding new claims]:
"Claims 1 to 6 and 14 unchanged; claims 7 to 13 cancelled; new claims 15, 16 and 17 added." or
"Claims 7 to 13 cancelled; new claims 15, 16 and 17 added; all other claims unchanged."

4. [Where various kinds of amendments are made]:
"Claims 1-10 unchanged; claims 11 to 13, 18 and 19 cancelled; claims 14, 15 and 16 replaced by amended claim 14; claim 17 subdivided into amended claims 15, 16 and 17; new claims 20 and 21 added."

"Statement under article 19(1)" (Rule 46.4)

The amendments may be accompanied by a statement explaining the amendments and indicating any impact that such amendments might have on the description and the drawings (which cannot be amended under Article 19(1)).

The statement will be published with the international application and the amended claims.

It must be in the language in which the international appplication is to be published.

It must be brief, not exceeding 500 words if in English or if translated into English.

It should not be confused with and does not replace the letter indicating the differences between the claims as filed and as amended. It must be filed on a separate sheet and must be identified as such by a heading, preferably by using the words "Statement under Article 19(1)."

It may not contain any disparaging comments on the international search report or the relevance of citations contained in that report. Reference to citations, relevant to a given claim, contained in the international search report may be made only in connection with an amendment of that claim.

Consequence if a demand for international preliminary examination has already been filed

If, at the time of filing any amendments under Article 19, a demand for international preliminary examination has already been submitted, the applicant must preferably, at the same time of filing the amendments with the International Bureau, also file a copy of such amendments with the International Preliminary Examining Authority (see Rule 62.2(a), first sentence).

Consequence with regard to translation of the international application for entry into the national phase

The applicant's attention is drawn to the fact that, where upon entry into the national phase, a translation of the claims as amended under Article 19 may have to be furnished to the designated/elected Offices, instead of, or in addition to, the translation of the claims as filed.

For further details on the requirements of each designated/elected Office, see Volume II of the PCT Applicant's Guide.

INSDOCID: <XS ISA220NOENP4 1 >

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	**FOR FURTHER ACTION**	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
36244.5		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/IB2005/000821	29/03/2005	29/06/2004
Applicant		
DAMAKA, INC.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 4 sheets.

[X] It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**
   a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
      [ ] The international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).
   b. [ ] With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. [ ] **Certain claims were found unsearchable** (See Box II).

3. [ ] **Unity of invention is lacking** (see Box III).

4. With regard to the **title**,
   [X] the text is approved as submitted by the applicant.
   [ ] the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,
   [X] the text is approved as submitted by the applicant.
   [ ] the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regard to the **drawings**,
   a. the figure of the **drawings** to be published with the abstract is Figure No. 4
      [ ] as suggested by the applicant.
      [ ] as selected by this Authority, because the applicant failed to suggest a figure.
      [X] as selected by this Authority, because this figure better characterizes the invention.
   b. [ ] none of the figures is to be published with the abstract.

Form PCT/ISA/210 (first sheet) (January 2004)

INTERNATIONAL SEARCH REPORT

International Application No
PCT/IB2005/000821

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04L29/06 H04L12/58

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 H04L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data, PAJ, INSPEC, COMPENDEX, IBM-TDB

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2002/150110 A1 (INBAR SHLOMO ET AL) 17 October 2002 (2002-10-17) abstract paragraphs '0002!, '0007! - '0017!, '0028! - '0034!, '0047! - '0054!, '0062! - '0073!, '0082! - '0089!	1-28
Y	WO 03/079635 A (INTERNATIONAL BUSINESS MACHINES CORPORATION; IBM UNITED KINGDOM LIMITE) 25 September 2003 (2003-09-25) abstract page 12, line 27 - page 15, line 2	1-28
A	US 2003/009565 A1 (ARAO SHINYA) 9 January 2003 (2003-01-09) abstract paragraphs '0002!, '0003!, '0005!, '0006!, '0021! - '0023!; figure 1	1-28

-/--

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
18 July 2005	05/08/2005

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Lopez Monclus, I.

2

Form PCT/ISA/210 (second sheet) (January 2004)

Ex.1002 / Page 391 of 1008
Cisco Systems, Inc.

INTERNATIONAL SEARCH REPORT

International Application No
PCT/IB2005/000821

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	J. ROSENBERG: "STUN - Simple Traversal of UDP Through NAT" INTERNET, September 2002 (2002-09), XP015005058 the whole document	1-28
A	US 2003/135569 A1 (KHAKOO SHABBIR A ET AL) 17 July 2003 (2003-07-17) abstract paragraphs '0002!, '0006! - '0009!	1-28
A	CHATHAPURAM U S: "Security in Peer-to-Peer Networks" INTERNET, 8 August 2001 (2001-08-08), XP002251813 page 1 page 5 - page 7	1-28
P,X	WO 2005/009019 A (SKYPER LTD; HEINLA, AHTI; KASESALU, PRIIT) 27 January 2005 (2005-01-27) abstract page 1, lines 5-10 page 2, line 12 - page 3, line 35 page 6, line 30 - page 8, line 3 page 8, line 34 - page 10, line 24	1-28
P,X	SALMAN A. BASET & HENNING SCHULZRINNE: ""An Analysis of the Skype Peer-to-Peer Internet Telephony Protocol" INTERNET, 15 September 2005 (2005-09-15), XP002336407 Retrieved from the Internet: URL:http://www1.cs.columbia.edu/{salman/publications/cucs-039-04.pdf> 'retrieved on 2005-07-18! the whole document	1-28
P,X	KUNDAN SINGH & HENNING SCHULZRINNE: "Peer-to-Peer Internet Telephony using SIP" INTERNET, 31 October 2004 (2004-10-31), XP002336408 Retrieved from the Internet: URL:http://www1.cs.columbia.edu/{library/TR-repository/reports/reports-2004/cucs-044-04.pdf> 'retrieved on 2005-07-18! the whole document	1-28
P,A	US 2004/139228 A1 (TAKEDA YUTAKA ET AL) 15 July 2004 (2004-07-15) abstract paragraphs '0053! - '0063!, '0078! - '0089!	1-28

2

Form PCT/ISA/210 (continuation of second sheet) (January 2004)

Ex.1002 / Page 392 of 1008
Cisco Systems, Inc.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/IB2005/000821

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2002150110 A1	17-10-2002	AU 4680001 A	23-10-2001
		EP 1281129 A1	05-02-2003
		WO 0177853 A1	18-10-2001
WO 03079635 A	25-09-2003	US 2003177186 A1	18-09-2003
		AU 2003207337 A1	29-09-2003
		CA 2477197 A1	25-09-2003
		WO 03079635 A1	25-09-2003
		TW 221979 B	11-10-2004
US 2003009565 A1	09-01-2003	JP 2003022250 A	24-01-2003
US 2003135569 A1	17-07-2003	AU 2003203027 A1	30-07-2003
		WO 03061227 A2	24-07-2003
WO 2005009019 A	27-01-2005	WO 2005009019 A2	27-01-2005
		US 2005122965 A1	09-06-2005
US 2004139228 A1	15-07-2004	US 2004139227 A1	15-07-2004
		WO 2004063843 A2	29-07-2004
		WO 2004064356 A2	29-07-2004

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

see form PCT/ISA/220

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference	FOR FURTHER ACTION
see form PCT/ISA/220	See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/IB2005/000821	29.03.2005	29.06.2004

International Patent Classification (IPC) or both national classification and IPC
H04L29/06, H04L12/58

Applicant
DAMAKA, INC.

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☒ Box No. VI Certain documents cited
- ☒ Box No. VII Certain defects in the international application
- ☒ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notifed the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

DOCKETING COMPLETE
DATE: 8/16/05
BY: RMT 36244.5

Name and mailing address of the ISA:	Authorized Officer
European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Lopez Monclus, I. Telephone No. +49 89 2399-7113

Form (PCT/ISA/237) (Cover Sheet) (January 2004)

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

   ☐ This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).

2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

   a. type of material:

   ☐ a sequence listing

   ☐ table(s) related to the sequence listing

   b. format of material:

   ☐ in written format

   ☐ in computer readable form

   c. time of filing/furnishing:

   ☐ contained in the international application as filed.

   ☐ filed together with the international application in computer readable form.

   ☐ furnished subsequently to this Authority for the purposes of search.

3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-28
	No:	Claims	
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-28
Industrial applicability (IA)	Yes:	Claims	1-28
	No:	Claims	

2. Citations and explanations

see separate sheet

Box No. VI Certain documents cited

1. Certain published documents (Rules 43*bis*.1 and 70.10)

and / or

2. Non-written disclosures (Rules 43*bis*.1 and 70.9)

see form 210

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to the following documents:

D1: US 2002/150110 A1 (INBAR SHLOMO ET AL) 17 October 2002 (2002-10-17)
D2: WO 03/079635 A (INTERNATIONAL BUSINESS MACHINES CORPORATION; IBM UNITED KINGDOM LIMITE) 25 September 2003 (2003-09-25)
D3: US 2003/009565 A1 (ARAO SHINYA) 9 January 2003 (2003-01-09)
D4: J. ROSENBERG: "STUN - Simple Traversal of UDP Through NAT" INTERNET, September 2002 (2002-09), XP015005058
D5: US 2003/135569 A1 (KHAKOO SHABBIR A ET AL) 17 July 2003 (2003-07-17)
D6: CHATHAPURAM U S: "Security in Peer-to-Peer Networks" INTERNET, 8 August 2001 (2001-08-08), XP002251813

1. First of all, it is to be noted that due to the broad formulation of its subject-matter, independent claim 1 does not meet the requirements of Article 33(3) PCT regarding inventive step. Document D1 discloses,

   A computer-implemented method for establishing and maintaining a communication session between first and second endpoints in a peer to peer network using a non-proprietary protocol (Paragraphs 9 and 62: "Preferred embodiments of the present invention create smart end points, that is to say intelligent communication terminals that can support peer to peer communication and do not require intermediate servers...The present embodiments provide a peer to peer configuration for communication using any kind of media. The configuration uses querying to obtain an IP address from a central server, and then allows for a direct peer to peer connection to be formed using the IP address obtained."), the method comprising:

   retrieving a profile and a routing table from an access server by the first endpoint during an authentication process, wherein the routing table contains address information needed for the first endpoint to communicate directly with the second

endpoint (Paragraphs 10, 12, 28-31: "According to a first aspect of the present invention there is thus provided a subscriber end digital communication management unit for managing digital and analog communications with remote subscribers, the device comprising:... an IP address manager for formulating a request for an IP address corresponding to a user defined remote subscriber, submitting said request to an external location and recording a response thereto...According to a second aspect of the present invention there is provided an internet connection management unit for supporting end to end Internet connections between subscribers, said unit comprising: a database for storing user identification names of said subscribers in a first field and respective assigned user IP addresses in a second field, a database manager for determining assigned user IP addresses of ones of said subscribers currently connected and dynamically updating said second field therewith, and a request manager for receiving external requests specifying at least one user identification request, interrogating said database and responding with respective IP addresses."); and

sending a notification message from the first endpoint directly to the second endpoint using the address information to inform the second endpoint that the first endpoint is online (Paragraph 13: "a packet addresser, associated with said IP address manager, for addressing data packets to said user defined remote subscriber using an IP address taken from said recorded response, thereby to set up a peer to peer connection with said user defined remote subscriber.").

The subject matter of claim 1 therefore differs from the method disclosed by D1 merely in that the access server does not contain profiles identifying other endpoints as endpoints with which one endpoint has permission to communicate.

The problem to be solved by the present invention may be regarded as authorizing an endpoint through an access server before giving him the address of another endpoint with which he wants to communicate.

This problem is already known in the art or peer to peer networks and, in consulting the prior art the skilled person would come across for example of D2 ,which discloses the usage of "seed lists" in the access server that describe the peers with which a

peer has the right to communicate (Page 12 line 35 - page 13, line 25).

To a skilled person, therefore, starting from the method defined by D1 and aware of the disclosure of D2 it would be obvious to apply the approach described in D2 to the method of D1, in order to improve it and he would thus arrive at the method corresponding to the subject-matter of claim 1.

The subject-matter of claim 1, therefore, does not involve an inventive step and does not meet the requirements of Article 33(3) PCT.

2. Regarding claim 12, the same reasoning applies as in section 1, since in document D1 the first peer contacts directly the second peer for the establishment of a session, and in claim 12 this is done with the aim of being included in its buddy list. In any case, having both independent claims is not concise (see section VIII) and could even be considered non unitary.

3. The same reasoning applies, mutatis mutandis, to the subject-matter of the corresponding independent claims 16 and 23, which therefore are also considered not inventive.

4. Dependent claims 2-11, 13-15, 17-22 and 24-28 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty and/or inventive step, see documents D3-D6 and the corresponding passages cited in the search report.

Re Item VI
Certain documents cited

Certain published documents (Rule 70.10):

D7: WO 2005/009019 A (SKYPER LTD; HEINLA, AHTI; KASESALU, PRIIT) 27 January 2005 (2005-01-27)

D8: SALMAN A. BASET & HENNING SCHULZRINNE: ""An Analysis of the Skype Peer-to-Peer Internet Telephony Protocol" INTERNET, 15 September 2005 (2005-09-15), XP002336407 Retrieved from the Internet: URL:http://www1.cs.columbia.edu/~salman/pu blications/cucs-039-04.pdf> [retrieved on 2005-07-18]

D9: KUNDAN SINGH & HENNING SCHULZRINNE: "Peer-to-Peer Internet Telephony using SIP" INTERNET, 31 October 2004 (2004-10-31), XP002336408 Retrieved from the Internet: URL:http://www1.cs.columbia.edu/~library/T R-repository/reports/reports-2004/cucs-044 -04.pdf> [retrieved on 2005-07-18]

D10: US 2004/139228 A1 (TAKEDA YUTAKA ET AL) 15 July 2004 (2004-07-15)

The priority document of the application was not available in the moment this opinion was written. This written opinion is therefore assuming that all the claims enjoy the priority right of the priority document. If this is not the case, documenst D7-10, cited in the International Search Report, could become relevant for the evaluation of Article 33(1) PCT.

Re Item VII
Certain defects in the international application (form or content).

1. The independent claims are not properly cast in the two-part form (Rule 6.3(b) PCT), with those features which in combination are part of the prior art (see document D1) being placed in the preamble.

2. Documents D1-D6 are not identified in the description and the relevant background art disclosed therein has not been briefly discussed (Rule 5.1(a)(ii) PCT).

3. Reference signs in parentheses have not been inserted in the claims to increase their intelligibility, Rule 6.2(b) PCT. This applies to both the preamble and characterising portion.

4. Following from the disclosure of documents D1-D6, the statement indicating the technical problem to be solved by the invention has not been revised taking the requirements of Rule 5.1(a)(iii) PCT into account.

Re Item VIII

Certain observations on the international application (clarity).

1. The various definitions of the invention given in independent method claims 1 and 12 and in independent system claims 16 and 23 are such that the claims as a whole are not clear and concise, contrary to Article 6 PCT. The claims should be recast to include only the minimum necessary number of independent claims in any category. Moreover, lack of clarity of the claims as a whole arises, since the plurality of definitions of the independent claims makes it difficult, if not impossible, to determine the matter for which protection is sought, and places an undue burden on others seeking to establish the extent of the protection.

   In the present case it is considered appropriate to use only **one** independent claim in any category.

2. The application does not meet the requirements of Article 6 PCT, because claims 1,

16 and 23 are not clear.

The expression "...using a non-proprietary protocol...", corresponds to a disclaimer which is not allowable according to the PCT Guidelines 5.41. A claim should be defined by means of **positive** features, otherwise the disclosure would just word the "result to be achieved", which is also not allowable (cf. PCT Guidelines 5.35.).

3. The same objection as in section 2 applies to claim 23 and the expression "...and do not pass through the access server".

4. The vague formulation "identifying...based on the profile" used in claim 3 is in this case not sufficient to clearly define the invention, as the formulation does not clearly specify for the skilled person in what way the invention should be carried out.

   It is rather the structural means for achieving the objective of providing information which should appear in claim 3.

5. Claims 4 and 17 are not clear because of the incorrect use of the parentheses.

   According to the PCT Guidelines 5.11, when references to the drawings are made in the claims, the appropriate reference signs should be placed in parentheses after the corresponding features. A lack of clarity arises because of the use of the parentheses in claims 4 and 17, which are and should not be reference to any drawing.

6. The term "relationship" used first in claim 12 has no well recognised meaning in the context of peer to peer networks and leaves the reader in doubt as to the meaning of the technical feature to which it refers, thereby rendering the definition of the subject-matter of said claim unclear (Article 6 PCT). The meaning of the terms of a claim should be clear for the person skilled in the art from the wording of the claim alone (PCT Guidelines 5.31).

The same objection is valid for all the occurrences of this wording in the claims of the present application.

7. The features of independent method claim 1 and system claim 16 do not completely correspond. Independent claims should correspond to meet the requirement following from Article 6 PCT taken in combination with Rule 6.3(b) PCT that any independent claim must contain all the technical features essential to the definition of the invention.

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2006/032791

A. CLASSIFICATION OF SUBJECT MATTER
INV. H04L29/12 H04L29/08

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
H04L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data, INSPEC, IBM-TDB, COMPENDEX

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2005/033985 A1 (XU CHEN [US] ET AL) 10 February 2005 (2005-02-10) abstract paragraph [0009] paragraph [0018] - paragraph [0022] paragraph [0052] - paragraph [0053] paragraph [0081] - paragraph [0104] figures 1,2b	1-20
Y	WO 2004/063843 A2 (MATSUSHITA ELECTRIC IND CO LTD [JP]; TAKEDA YUTAKA; BOIRI YOUSSEF KAMA) 29 July 2004 (2004-07-29) page 3, line 11 - line 13 page 15, line 18 - page 16, line 3 page 22, line 1 - page 14, line 16 page 27, line 19 - page 28, line 5	1-20

-/--

[X] Further documents are listed in the continuation of Box C. [X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
18 December 2006	27/12/2006

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Tx. 31 651 epo nl, Fax: (+31–70) 340–3016	Hes, Ronald

Form PCT/ISA/210 (second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2006/032791

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2004/139225 A1 (TAKAHASHI MASAYUKI [JP]) 15 July 2004 (2004-07-15) abstract paragraph [0012] paragraph [0020] - paragraph [0023] paragraph [0027] - paragraph [0028] paragraph [0037] - paragraph [0041] paragraph [0045] figures 1,2	1-20
A	EP 1 404 082 A2 (NORTEL NETWORKS LTD [CA]) 31 March 2004 (2004-03-31) abstract paragraph [0004] paragraph [0014] - paragraph [0015] paragraph [0048]	1-20
A	US 2004/034793 A1 (YUAN WEI [US]) 19 February 2004 (2004-02-19) abstract paragraph [0020] - paragraph [0024] paragraph [0043] paragraph [0052] - paragraph [0053] paragraph [0064] - paragraph [0065] figures 3-5	1-20

Form PCT/ISA/210 (continuation of second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/US2006/032791

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2005033985 A1	10-02-2005	NONE	
WO 2004063843 A2	29-07-2004	NONE	
US 2004139225 A1	15-07-2004	JP 2004173240 A	17-06-2004
EP 1404082 A2	31-03-2004	CA 2435699 A1 US 2004057385 A1	24-03-2004 25-03-2004
US 2004034793 A1	19-02-2004	NONE	

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

see form PCT/ISA/220

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY
(PCT Rule 43*bis*.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2006/032791	21.08.2006	30.08.2005

International Patent Classification (IPC) or both national classification and IPC
INV. H04L29/12 H04L29/08

Applicant
DAMAKA, INC.

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☒ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notifed the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA:	Date of completion of this opinion	Authorized Officer
European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016	see form PCT/ISA/210	Hes, Ronald Telephone No. +31 70 340-3879

Form (PCT/ISA/237) (Cover Sheet) (April 2005)

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of:

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1 (b)).

2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

   a. type of material:

      ☐ a sequence listing

      ☐ table(s) related to the sequence listing

   b. format of material:

      ☐ on paper

      ☐ in electronic form

   c. time of filing/furnishing:

      ☐ contained in the international application as filed.

      ☐ filed together with the international application in electronic form.

      ☐ furnished subsequently to this Authority for the purposes of search.

3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

Box No. II Priority

1. ☒ The validity of the priority claim has not been considered because the International Searching Authority does not have in its possession a copy of the earlier application whose priority has been claimed or, where required, a translation of that earlier application. This opinion has nevertheless been established on the assumption that the relevant date (Rules 43*bis*.1 and 64.1) is the claimed priority date.

2. ☐ This opinion has been established as if no priority had been claimed due to the fact that the priority claim has been found invalid (Rules 43*bis*.1 and 64.1). Thus for the purposes of this opinion, the international filing date indicated above is considered to be the relevant date.

3. Additional observations, if necessary:

Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-20
	No:	Claims	
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-20
Industrial applicability (IA)	Yes:	Claims	1-20
	No:	Claims	

2. Citations and explanations

see separate sheet

Re Item V.

1 Reference is made to the following documents:
D1 : US 2005/033985 A1 (XU CHEN [US] ET AL) 10 February 2005 (2005-02-10)
D2 : WO 2004/063843 A2 (MATSUSHITA ELECTRIC IND CO LTD [JP]; TAKEDA YUTAKA; BOIRI YOUSSEF KAMA) 29 July 2004 (2004-07-29)

2 INDEPENDENT CLAIM 1

2.1 The present application does not meet the criteria of Article 33(1) PCT, because the subject matter of claim 1 does not involve an inventive step in the sense of Article 33(3)PCT.

2.1.1 Document D1, which is considered to represent the most relevant state of the art to the subject matter of claim 1, discloses (the references in parentheses applying to this document):

A method for enabling a first endpoint (figure 1, client 14) to traverse a network address translation device (paragraph 40) associated with a second endpoint (figure 1, client 16) in a peer-to-peer communications system (paragraph 11), wherein the NAT device includes a pinhole maintained between the NAT device and a server (paragraphs 18 and 19), comprising

(if the determining indicates that the second endpoint must first send a message (paragraph 50)), sending a first message to a stateless reflector for reflection to the second endpoint (paragraph 83), wherein the first message includes a message header identifying the stateless reflector as the message destination and the first endpoint as the message source (paragraph 85),

modifying the message header by the stateless reflector, wherein the modifying inserts the second endpoint as the message destination and the server as the message source (paragraphs 89-91 and 94), and

sending the modified first message to the second endpoint via the pinhole in the

NAT device (paragraphs 98-99).

2.1.2 The subject-matter of independent claim 1 differs from the disclosure of D1 in:

determining whether a message send to the second endpoint from an external source will only pass through the NAT device if the second endpoint must first send a message to the external source.

2.1.3 The problem to be solved by the present invention may therefore be regarded as how to determine properties of a NAT.

2.1.4 In view of D2 the solution proposed in claim 1 of the present application cannot be considered as involving an inventive step (Article 33(3) PCT) for the following reasons:

Document D1 applies the method steps above in the case that a message send to the second endpoint from an external source will only pass through the NAT device if the second endpoint must first send a message to the external source; see paragraph 50 in D1.
To know whether he should apply these steps, the skilled man would first look whether this condition is fulfilled, i.e. to solve the problem of determining the NAT properties. This problem is already solved in a similar system for peer-to-peer NAT traversal, document D2, see page 24, lines 6-16 therein.

2.1.5 Therefore the features disclosed in D1 and D2 would be combined by the skilled person, without exercise of any inventive skills in order to solve the problem posed. The proposed solution in independent claim 1 thus cannot be considered inventive (Article 33(3) PCT).

3 INDEPENDENT CLAIM 13

Claim 13 is a representation of claim 1 in terms for a reflector. Therefore, the above arguments with respect to obviousness of the subject-matter of claim 1 similarly apply

to claim 13.

4 INDEPENDENT CLAIM 15

Claim 15 is a representation of claim 1 in terms for a system. The additional features of receiving a second message and sending additional messages directly are disclosed in D1, paragraph 104 Therefore, the above arguments with respect to obviousness of the subject-matter of claim 1 similarly apply to claim 15.

5 DEPENDENT CLAIMS 2-12, 14, 16-20

The additional features of claims 2-12 are either disclosed in D1 (claims 2-3, paragraph 104; claims 6-8, paragraphs 105-114) or D2 (claim 4, p- 27, l. 19- p.28, l. 5; claims 11-12, page 24, 9-25) or represent well-known modifications without inventive significance (claims 9, 10). The further dependent claims 14 and 16-20 correspond to claims 2-12.
Dependent claims 2-12, 14, 16-20 thus do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of inventive step (Article 33(3) PCT).

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 06/40312

A. CLASSIFICATION OF SUBJECT MATTER
IPC(8) - H04L 12/66 (2007.01)
USPC - 370/352
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
USPC - 370/352

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
USPC: 370/351, 353, 389

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
USPTO WEST (PGPB, USPT, EPAB, JPAB); DIALOG PRO; Google Scholar
Search terms: peer-to-peer, endpoint, route, gateway, PSTN, softswitch

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2005/0195802 A1 (KLEIN et al.) 08 September 2005 (08.09.2005) entire document	1-2, 5
A	US 2003/0076815 A1 (MILLER et al.) 24 April 2003 (24.04.2003) entire document	1-20

☐ Further documents are listed in the continuation of Box C. ☐

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
2 March 2007 (02.03.2007)	18 MAY 2007
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201	Authorized officer: Lee W. Young PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

Form PCT/ISA/210 (second sheet) (April 2005)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To: TIMOTHY F. BLISS
PO BOX 793968
DALLAS, TEXAS 75379-3968

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing *(day/month/year)*	18 MAY 2007

Applicant's or agent's file reference	FOR FURTHER ACTION
1000.7WO	See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US 06/40312	16 October 2006 (16.10.2006)	17 October 2005 (17.10.2005)

International Patent Classification (IPC) or both national classification and IPC
IPC(8) - H04L 12/66 (2007.01)
USPC - 370/352

Applicant DAMAKA, INC.

1. This opinion contains indications relating to the following items:

- [X] Box No. I Basis of the opinion
- [ ] Box No. II Priority
- [ ] Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- [ ] Box No. IV Lack of unity of invention
- [X] Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- [ ] Box No. VI Certain documents cited
- [ ] Box No. VII Certain defects in the international application
- [ ] Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/US	Date of completion of this opinion	Authorized officer:
Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201	2 March 2007 (02.03.2007)	Lee W. Young PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

Form PCT/ISA/237 (cover sheet) (April 2005)

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US 06/40312

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into _____ , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

   a. type of material

      ☐ a sequence listing

      ☐ table(s) related to the sequence listing

   b. format of material

      ☐ on paper

      ☐ in electronic form

   c. time of filing/furnishing

      ☐ contained in the international application as filed

      ☐ filed together with the international application in electronic form

      ☐ furnished subsequently to this Authority for the purposes of search

3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US 06/40312

Box No. V **Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Claims	1-20	YES
	Claims	NONE	NO
Inventive step (IS)	Claims	3-4, 6-20	YES
	Claims	1-2, 5	NO
Industrial applicability (IA)	Claims	1-20	YES
	Claims	NONE	NO

2. Citations and explanations:

Claims 1-2 and 5 lack an inventive step under PCT Article 33(3) as being obvious over US 2005/0195802 A1 to Klein et al. (hereinafter Klein).

As per claim 1, Klein teaches a method comprising (1) providing source endpoint for performing digit collection (the substitute telephone number is obtained from a call management module which determines the number based on various factors and receiving an indication of a telephone call being initiated by a caller, the telephone call having a dialed telephone number, see Abstract, para [0009], [0013] and claim 1); (2) providing source endpoint for performing digit analysis on the collected digits (passing the dialed telephone number to a call management module; obtaining, from the call management module, a substitute telephone number, see claim 1); (3) providing source endpoint for identifying a route based on the analyzed digits and information (routing the telephone call to the substitute telephone number, see claim 1). Klein does not specifically disclose identifying the route based on information present in at least one lookup tabbed downloaded from the server. Lookup tables are well known. Further Klein discloses a service database (para [0071]). Therefore, one skilled in the art would find it obvious to use information in a lookup table to indentify the route.

As per claim 2, Klein dose not explicitly discloses identifying the route includes the location of gateway, time zone of the source endpoint, time zone of the gateway, rate representing a cost obtained from the lookup table. However Klein discloses the call is routed to callee based on rules stored in service database and the callee can specify that different incoming calls should be routed to any of a number of different delivery devices, based on any combination of factors including the number the caller dialed, the identity of the caller, the location of the caller, environmental conditions at the callee's location, and real-time callee and/or callee input at the time the call is attempted (see para[0071], [0085]). It would have been obvious to one of ordinary skill in the art to present these parameters identified by callee, i.e. the source endpoint, because these parameters are the basic settings and factors for managing a call through network.

As per claim 5, Klein teaches selecting a gateway based on the identified route (routing module causes the call to be routed to another computer or to a NANP device such as telephone connected to PSTN via an IP/PSTN gateway, see para [0157]).

Claims 3-4 and 6-20 meet the criteria set out in PCT Article 33(2)-(3), as the cited art fails to teach or suggest the claimed invention.

As per claims 3 and 4, Klein teaches the call is routed to callee based on rules stored in service database and incoming calls routed based on factors including location, time, etc. as provided previously with respect to claims 1, 2 and 5. US 20030076815 A1 to Miller et al. (hereinafter Miller) teaches a Session state may include feature and services implementation associated with a CLASS 5 switch, namely a calling name lookup associated with the display of caller ID information or local number portability initiated by call manager software on a line interface card associated with the specific subscriber interface (see para [0100]). The cited art fails to teach or fairly suggest the parameters are arranged so that the route equals g(f(CN), LO, TZc, RA) as recited by claims 3 and 4.

As per claims 6-20, Klein and Miller fail to teach or fairly suggest creating a third port on a media router, determining whether radio received at the third port is from the first address, capturing the first port if the audio received at the third port is from the first address as recited by claims 6-20.

Claims 1-20 have industrial applicability as defined by PCT Article 33(4) because the subject matter can be made or used in industry.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2006/047841

A. CLASSIFICATION OF SUBJECT MATTER
IPC(8) - G06Q 40/00 (2008.04)
USPC - 705/37
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC(8) - G06Q 40/00 (2008.04)
USPC - 705/37

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
PatBase, Google Patents

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2002/0038282 A1 (MONTGOMERY) 28 March 2002 (28.03.2002) entire document	1-20

☐ Further documents are listed in the continuation of Box C. ☐

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
12 September 2008	24 SEP 2008

Name and mailing address of the ISA/US	Authorized officer:
Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201	Blaine R. Copenheaver PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

Form PCT/ISA/210 (second sheet) (April 2005)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
TIMOTHY F. BLISS
PO BOX 793968
DALLAS, TX 75379-3968

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing *(day/month/year)*	24 SEP 2008

Applicant's or agent's file reference	FOR FURTHER ACTION
1000.8WO	See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2006/047841	13 December 2006	14 December 2005

International Patent Classification (IPC) or both national classification and IPC
IPC(8) - G06Q 40/00 (2008.04)
USPC - 705/37

Applicant
DAMAKA, INC.

1. This opinion contains indications relating to the following items:

- [X] Box No. I Basis of the opinion
- [ ] Box No. II Priority
- [ ] Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- [ ] Box No. IV Lack of unity of invention
- [X] Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability: citations and explanations supporting such statement
- [ ] Box No. VI Certain documents cited
- [ ] Box No. VII Certain defects in the international application
- [ ] Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/US	Date of completion of this opinion	Authorized officer:
Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201	12 September 2008	Blaine Copenheaver PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

Form PCT/ISA/237 (cover sheet) (April 2007)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2006/047841

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:

   ☒ the international application in the language in which it was filed.

   ☐ a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of:

   a. type of material

      ☐ a sequence listing

      ☐ table(s) related to the sequence listing

   b. format of material

      ☐ on paper

      ☐ in electronic form

   c. time of filing/furnishing

      ☐ contained in the international application as filed

      ☐ filed together with the international application in electronic form

      ☐ furnished subsequently to this Authority for the purposes of search

4. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

Form PCT/ISA/237 (Box No. I) (April 2007)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2006/047841

Box No. V **Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Claims	16	YES
	Claims	1-15, 17-20	NO
Inventive step (IS)	Claims	None	YES
	Claims	1-20	NO
Industrial applicability (IA)	Claims	1-20	YES
	Claims	None	NO

2. Citations and explanations:

Claims 1-15 and 17-20 lack novelty under PCT Article 33(2) as being anticipated by Montgomery (US 2002/0038282 A1).

Regarding claim 1, Montgomery discloses a method for use by a selling endpoint in a peer-to-peer network to provide an auction to a plurality ofendpoints using a peer-to-peer commerce (p-commerce) server, the method comprising: initiating the auction by notifying the p-commerce server of at least the auction's start time (para. 0020, start time), end time (para. 0020, end time), and item being auctioned (para. 0018, products that are listed for sale through dynamic price competitive bidding); receiving a bid for the auction directly from one of the plurality of endpoints (para. 0072, all buyers and can determine which bids are ready to execute); directly notifying all endpoints of the plurality of endpoints that have previously submitted a bid in the auction of the received bid (para. 0011; para. 0072); instructing the p-commerce server to stop the auction after determining that the auction has ended (para. 0020, end time); identifying a highest bid from the submitted bids (para. 0072, high bid); and directly notifying the endpoint that submitted the highest bid that it has won the auction (para. 0013, notifying the Buyer when an auction has been won).

Regarding claim 2, Montgomery discloses the method of claim 1 further comprising reviewing the received bid (para. 0081, bid is received) to determine whether the received bid satisfies at least one predefined criterion (para. 0012, bid parameters).

Regarding claim 3, Montgomery discloses the method of claim 2 wherein the predefined criterion is a minimum bid increment (para. 0072, a bid based on computing the minimum incremental amount plus the current bid).

Regarding claim 4, Montgomery discloses the method of claim 2 wherein the predefined criterion (para. 0016, programmed bidding parameters) is a buyout price (para. 0016, lowest market price based on reviewing prevailing market prices).

Regarding claim 5, Montgomery discloses the method of claim 2 further comprising: rejecting the received bid if it does not satisfy the at least one performance criterion (para. 0020, bid parameters, rejected); directly notifying the endpoint that submitted the received bid that the received bid has been rejected (para. 0011, notifying the Buyer via a messaging center of any changes in relevant aspects of the current status of any of the plurality of product auctions that would prevent an initial bid from being placed by the bid proxy) without notifying all endpoints (para. 0026, nodes) of the plurality of endpoints (para. 0026, nodes) that have previously (para. 0025, previously configured as support servers to the site) submitted a bid in the auction of the received bid (para. 0081, bid object is received); and instructing the p-commerce server to delete the received bid from the p-commerce server (para. 0073, the item is logged as a lost bid. The item is then set to inactive in the bid portfolio and flow proceeds to agent proxy; also see para. 0075, the remaining cascade items are deleted).

Regarding claim 6, Montgomery discloses the method of claim 1 further comprising notifying the p-commerce server (para. 0025, peer servers) of the highest bid and the endpoint that submitted the highest bid (para. 0072, The bid engine can then scan the targeted auction site to determine the current high bid and bidder).

Regarding claim 7, Montgomery discloses the method of claim I further comprising notifying the p-commerce server that the selling endpoint is going offline (para. 0025, detects the agent cannot access the auction site because the agent is not receiving a response to inquiries including at least one of a Post and a Get, wherein the peer servers are previously configured as support servers to the site and information about the peer servers is stored in a directory on a master node at the site), wherein the p-commerce server will directly notify all endpoints of the plurality of endpoints that have previously submitted a bid in the auction of an incoming bid (para. 0082).

Regarding claim 8, Montgomery discloses the method of claim 1 further comprising ignoring a late bid received after the selling endpoint has determined the auction has ended (para. 0024) and instructing the p-commerce server to delete the late bid from the p-commerce server (para. 0063, deletion).

(Cont. in Supplemental Box)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2006/047841

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of:
Box No. V
2. Citations and explanations:

Regarding claim 9, Montgomery discloses a method for use in a peer-to-peer network to provide an auction by a first endpoint to a plurality of endpoints using a peer-to-peer commerce (p-commerce) server, the method comprising: initiating the auction'by the first endpoint by notifying the p-commerce server of auction information necessary to start the auction (para. 0020, start); obtaining at least a portion of the auction information (para. 0020, parameters of the current auction) from the p-commerce server (para. 0044, sever) by second and third endpoints of the plurality of endpoints (para. 0026, network nodes), wherein the portion includes information needed to directly communicate with the first endpoint (para. 0025,master node) via the peer-to-peer-network (para. 0077, design of the bid agent can also support distribution of a bid object to another server, see proxied peer-to-peer distributed server bid engine); submitting a bid (para. 0020, placing a bid) by the second endpoint (para. 0026, nodes) directly to the first endpoint (para. 0025, master node) and directly to the p-commerce server (para. 0044, server); and directly notifying (para. 0082, notification), by the first endpoint (para. 0025, master node), the third endpoint(para. 0026, nodes) of the received bid (para. 0081, bid object is received).

Regarding claim 10, Montgomery discloses the method of claim 9 wherein the third endpoint (para. 0026, network nodes) is only notified (para. 0016, the buyer desires to be notified) of the received bid if the third endpoint (para. 0026, network nodes) has previously submitted a bid in the auction (para. 0072) to the first endpoint (para. 0025, master node) and to the p-commerce server (para. 0044, server).

Regarding claim 11, Montgomery discloses the method of claim 10 further comprising: determining, by the first endpoint (para. 0025, master node), that the auction has ended (para. 0020, end); and instructing the p-commerce server (para. 0044, software driven, server based) to stop the auction (para. 0020, end).

Regarding claim 12, Montgomery discloses the method ofclaim 11 further comprising: receiving, by the first endpoint (para. 0025, master node), a late bid (para. 0073) from one of the plurality of endpoints (para. 0026, nodes) after determining that the auction has ended (para. 0020, end); rejecting (para. 0020, reject) the late bid (para. 0073) by the first endpoint (para. 0025, master node); and instructing, by the first endpoint (para. 0025, master node), the p-commerce server to delete the late bid from the p-commerce server (para. 0073, the item is logged as a lost bid, the item is then set to inactive in the bid portfolio and flow proceeds to agent proxy. also see para. 0075, the remaining cascade items are deleted).

Regarding claim 13, Montgomery discloses the method of claim 11 further comprising instructing, by the p-commerce server (para. 0044, server), the second and third endpoints (para. 0026, nodes) to delete the portion of information (para. 0063) needed to directly communicate with the first endpoint (para. 0025, master node) after being instructed to stop the auction (para. 0025, end) by the first endpoint (para. 0025, master node).

Regarding claim 14, Montgomery discloses the method of claim 10 further comprising: selecting, by the first endpoint (para. 0025, master node), a winning bid from the bids submitted (para. 0011, won) by the second and third endpoints (para. 0026, nodes); and directly notifying (para. 0013, notifying), by the first endpoint (para. 0025, master node), the second or third endpoint that submitted the winning bid that it won the auction (para. 0013, notifying the Buyer when an auction has been won using at least one of a bid proxy of the Buyer and a programmed bid).

Regarding claim 15, Montgomery discloses the method of claim 14 further comprising notifying the p-commerce server (para. 0044, server), by the first endpoint, of the winning bid (para. 0025, win).

Regarding claim 17, Montgomery discloses the method of claim 10 further comprising: notifying the p-commerce server (para. 0044, server), by the first endpoint (para. 0025, master node), that the first endpoint is going offline (para. 0025, detects the agent cannot access the auction site because the agent is not receiving a response to inquiries including at least one of a Post and a Get, offline); and directly notifying, by the p-commerce server, any endpoint of the plurality of endpoints that has previously submitted a bid in the auction of an incoming bid (para. 0082), wherein the p-commerce engine continues such notifying until the auction ends (para. 0020, ends) or the first endpoint comes online (para. 0025, master node).

Regarding claim 18, Montgomery discloses a method for use by a bidding endpoint in an auction in a peer-to-peer network, the method comprising: obtaining auction information from a p-commerce server (para. 0018, specific electronic auctions on a targeted auction site is set forth including: a. providing a programmable search agent, from a server, that searches auction catalogs of a plurality of auction sites), wherein the information includes information needed to directly communicate with a selling endpoint via the peer-to-peer-network (para. 0080, a bid object is passed to the local server's proxied server bid engine, then the proxied peer-to-peer distributed server bid engine component ("proxied server") process can look at a local copy of the LRUS table to select the most available, active server); submitting a bid directly to the selling endpoint and directly to the p-commerce server (para. 0080, bid object is passed to the local server's proxied server bid engine, then the proxied peer-to-peer distributed server); and receiving a notification of another bid for the auction directly from the selling endpoint if the other bid is received by the selling endpoint from another endpoint (para. 0020, another bidder) within the peer-to-peer network (para. 0041, peer-to-peer server).

(Cont. in Next Supplemental Box)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2006/047841

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of:
Previous Supplemental Box:

Regarding claim 19, Montgomery discloses the method of claim 18 further comprising receiving a notice directly from the selling endpoint (para. 0023, retrieving using the scan agent the latest auction site characterization information available for that auction site), if the selling endpoint is online (para. 0023, scanning online auctions), that the bidding endpoint has either won or lost the auction (para. 0020, win/loss status of the auction and storing the win/loss status in portfolio).

Regarding claim 20, Montgomery discloses the method of claim 18 further comprising deleting the information on the bidding endpoint after the auction is over based on instructions (para. 0063) from the p-commerce server (para. 0041, peer-to-peer distributed server).

Claim 16 lacks an inventive step under PCT Article 33(3) as being obvious over Montgomery in view of Montgomery.

Regarding claim 16, Montgomery discloses the method of claim 15 further comprising processing a payment transaction (para. 0014) for the winning bid (para. 0020) by the p-commerce server (para. 0044, server), wherein payment information (para. 0014) corresponding to the winning bid (para. 0020), but is silent on is not transferred to the first endpoint. However not transferring to an endpoint is a known practice in the art and the specifics of it is a matter of design choice. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the above features in the invention of Montgomery in order to prevent transfer of unauthorized information.

Claims 1-20 meet the criteria set out in PCT Article 33(4), and thus have industrial applicability because the subject matter claimed can be made or used in industry.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US07/02424

A. CLASSIFICATION OF SUBJECT MATTER
IPC(8) - H04L 12/28(2007.01)
USPC - 370/389
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC(8) - H04L 12/28 (2007.01)
USPC - 370/389

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
MicroPatent

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2005/0286519 A1 (RAVIKUMAR et al) 29 December 2005 (29.12.2005) entire document	1, 8-11, 19-22
Y		2-7, 12--18
Y	SINHA, S. and OGLIELSKI, A., A TCP Tutorial, November 1998 (Date posted on Internet: 19 April 2001) [Retrieved from the Internet <URL: http://www.ssfnet.org/Exchange/tcp/tcpTutorialNotes.html>] entire document.	2-4, 6-7, 12-14, 16-18
Y	US 6,031,818 A (LO et al) 29 February 2000 (29.02.2000) entire document	5, 15

☐ Further documents are listed in the continuation of Box C. ☐

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
14 August 2007	24 OCT 2007
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201	Authorized officer: Blaine R. Copenheaver PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

Form PCT/ISA/210 (second sheet) (April 2007)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To: TIMOTHY BLISS
P.O. BOX 793968
DALLAS, TEXAS 75379-3968

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

	Date of mailing *(day/month/year)* 24 OCT 2007
Applicant's or agent's file reference 1000.9WO	FOR FURTHER ACTION See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US07/02424	27 January 2007	27 January 2006

International Patent Classification (IPC) or both national classification and IPC
IPC(8) - H04L 12/28(2007.01)
USPC - 370/389

Applicant DAMAKA, INC.

1. This opinion contains indications relating to the following items:

- [X] Box No. I Basis of the opinion
- [ ] Box No. II Priority
- [ ] Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- [ ] Box No. IV Lack of unity of invention
- [X] Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- [ ] Box No. VI Certain documents cited
- [ ] Box No. VII Certain defects in the international application
- [ ] Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/US	Date of completion of this opinion	Authorized officer:
Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201	14 August 2007	Blaine Copenheaver PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

Form PCT/ISA/237 (cover sheet) (April 2007)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US07/02424

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:

   ☒ the international application in the language in which it was filed.

   ☐ a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of:

   a. type of material

      ☐ a sequence listing

      ☐ table(s) related to the sequence listing

   b. format of material

      ☐ on paper

      ☐ in electronic form

   c. time of filing/furnishing

      ☐ contained in the international application as filed

      ☐ filed together with the international application in electronic form

      ☐ furnished subsequently to this Authority for the purposes of search

4. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US07/02424

Box No. V **Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Claims	2-7, 12-18	YES
	Claims	1, 8-11, 19-22	NO
Inventive step (IS)	Claims	NONE	YES
	Claims	1-22	NO
Industrial applicability (IA)	Claims	1-22	YES
	Claims	NONE	NO

2. Citations and explanations:

Claims 1, 8-11, and 19-22 lack novelty under PCT Article 33(2) as being anticipated by Ravikumar et al. (US 2005/0286519 A1).

Regarding claims 1, 11, and 19, Ravikumar et al discloses A method for transferring data directly from a first endpoint to a second endpoint in a peer-to-peer network, the method comprising: retrieving a profile and a routing table from an access server by the first endpoint during an authentication process, wherein the profile identifies the second endpoint as an endpoint with which the first endpoint has permission to communicate, and the routing table contains address information needed for the first endpoint to communicate directly with the second endpoint (claim 1; retrieving a profile and a routing table from an access server by the first endpoint during an authentication process, wherein the profile identifies the second endpoint as an endpoint with which the first endpoint has permission to communicate, and the routing table contains address information needed for the first endpoint to communicate directly with the second endpoint); sending a data transfer request message from the first endpoint directly to the second endpoint using the address information (claim 2; sending a request message from the first endpoint directly to the second endpoint using the address information to request the establishment of the communication session); establishing a data transfer link directly between the first endpoint and the second endpoint (claim 2 lines 7-8; establishing the communication session by the first endpoint directly with the second endpoint) and sending a plurality of packets from the first endpoint to the second endpoint via the data transfer link (paragraph 0106; Once the request is accepted (as indicated in step 1810), the data stream is sent out to all buddies that have accepted the request for the data stream (steps 1812 and 1814)).

Regarding claims 8 and 20, Ravikumar et al discloses traversing, by the first endpoint, a network address translation (NAT) device associated with the second endpoint (paragraph 0068; endpoint 104 sends request to STUN server 214, which returns an outbound IP address, port, and type of NAT for endpoint 106, enabling endpoint 104 to connect to endpoint 106 through the NAT).

Regarding claim 9, Ravikumar et al discloses wherein the NAT device includes a pinhole maintained between the NAT device and a server, the traversing comprising: determining whether a packet sent to the second endpoint from an external source will only pass through the NAT device if the second endpoint has first sent a packet to the external source (paragraph 0067; the access server 102 identifies the NAT type associated with the endpoint 106 as being a type that requires an outbound packet to be sent before an inbound packet is allowed to enter); if the determining indicates that the second end point must first send a packet, sending a first packet by the first endpoint to a stateless reflector for reflection to the second endpoint (paragraph 0068; in step 616, endpoint 104 sends an authentication request to access server 102. Broadly defined, access server 102 is a 'stateless reflector.' Access server 102 retrieves the buddy list for the endpoint 104 and identifies the endpoint 106 as being associated with a NAT type that will block communications from the endpoint 104.), wherein the first packet includes a packet header identifying the stateless reflector as the packet destination and the first endpoint as the packet source (inherently IP packets have headers with the destination and source pre-filled); modifying the packet header by the stateless reflector, wherein the modifying inserts the second endpoint as the packet destination and the server as the packet source (inherently IP packet forwarding strips the first header to reveal an encapsulated header with the final packet destination); and sending the modified first packet to the second endpoint via the pinhole in the NAT device (paragraph 0068; the assist message instructs the endpoint 106 to send a message to the endpoint 104, which opens a pinhole in the NAT device for the endpoint 104).

Regarding claim 10, Ravikumar et al discloses periodically sending a packet to maintain a pinhole established through the NAT device between the first and second endpoints (paragraph 0067; access server 102 instructs the endpoint 106 to send periodic messages to the access server 102 to establish and maintain a pinhole through the NAT device).

Regarding claim 21, Ravikumar et al discloses the NAT device includes a pinhole maintained between the NAT device and a server (paragraph 0067; access server 102 instructs the endpoint 106 to send periodic messages to the access server 102 to establish and maintain a pinhole through the NAT device).

(Cont. in Supplemental Box)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US07/02424

Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**
Continuation of:
Box No. V
2. citations and explanations:

Regarding claim 22, Ravikumar et al discloses if the NA T device is of a restricted type, port restricted type, or symmetric type (paragraph 0062; The type of NAT may be, for example, full cone, restricted cone, port restricted cone, or symmetric), sending a first packet to the stateless reflector for reflection to the second endpoint (paragraph 0068; in step 616, endpoint 104 sends an authentication request to access server 102. Broadly defined, access server 102 is a 'stateless reflector' and all packets from 104 are destined for 106), wherein the first packet includes a first header identifying the stateless reflector as the destination and the first endpoint as the source (inherently IP packets include first header with the source/destination of the intermediate node and an encapsulated header including the original source and final destination), and a second header identifying the second endpoint as the destination and the server as the source(inherently IP packets include first header with the source/destination of the intermediate node and an encapsulated header including the original source and final destination); receiving a second packet directly from the second endpoint by the first endpoint in response to the first packet (paragraph 0068; The assist message instructs the endpoint 106 to send a message to the endpoint 104); and sending additional packets directly from the first endpoint to the second endpoint after receiving the second packet (paragraph 0068; which opens a pinhole in the NAT device for the endpoint- allowing direct traversal of the NAT from 104 to 106).

Claims 2-4, 6, 7 12-14, and 16-18 lack an inventive step under PCT Article 33(3) as being obvious over Ravikumar et al. in view of Sinha, S. and Ogielski, A (Transmission Control Protocol; heareinafter, Sinha).

Regarding claim 16, Ravikumar discloses A method for execution on a second endpoint for receiving a plurality of data packets directly from a first endpoint in a peer-to-peer network, wherein the second endpoint has previously granted permission for communication with the first endpoint and the first endpoint has access to address information needed to communicate directly with the second endpoint (claim 1; retrieving a profile and a routing table from an access server by the first endpoint during an authentication process, wherein the profile identifies the second endpoint as an endpoint with which the first endpoint has permission to communicate, and the routing table contains address information needed for the first endpoint to communicate directly with the second endpoint); the method comprising: receiving one of the plurality of packets directly from the first endpoint (paragraph 0106; Once the request is accepted (as indicated in step 1810), the data stream is sent out to all buddies that have accepted the request for the data stream (steps 1812 and 1814). Ravikumar discloses utilizing UDP for media traffic (paragraph 0034), but is silent on determining whether the packet was received correctly; and sending an acknowledgement packet directly to the first endpoint if the packet was received correctly. However, Sinha discloses TCP determines whether the packet was received correctly; and sends an acknowledgement packet directly to the first endpoint if the packet was received correctly (Reliability: TCP assigns a sequence number to each byte transmitted, and expects a positive acknowledgment (ACK) from the receiving TCP. If the ACK is not received within a timeout interval, the data is retransmitted. The receiving TCP uses the sequence numbers to rearrange the segments when they arrive out of order, and to eliminate duplicate segments.) Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to include in the invention of Ravikumar a step of determining whether the packet was received correctly; and sending an acknowledgement packet directly to the first endpoint if the packet was received correctly as taught by Sinha in order to enhance reliability through transmission control protocol.

Regarding claims 2 and 12, Ravikumar (as discussed in the lack of novelty of claims 1 and 11, similarly applicable hereto) is silent on placing, by the first endpoint, a packet on a list upon sending the packet to the second endpoint; receiving a response from the second endpoint regarding the packet; and removing the packet from the list if the response indicates that the packet was correctly received by the second endpoint. Sinha discloses placing, by the first endpoint, a packet on a list upon sending the packet to the second endpoint; receiving a response from the second endpoint regarding the packet; and removing the packet from the list if the response indicates that the packet was correctly received by the second endpoint (Paragraph 4; Reliability: TCP assigns a sequence number to each byte transmitted, and expects a positive acknowledgment (ACK) from the receiving TCP. If the ACK is not received within a timeout interval, the data is retransmitted. The current window is a list of packet sequence numbers, as packets are sent, the window slides to the next window of packets to be sent. If an ack is not received for a given packet, it is to be included in the next transmission window). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to include in the invention of Ravikumar a step of placing, by the first endpoint, a packet on a list upon sending the packet to the second endpoint; receiving a response from the second endpoint regarding the packet; and removing the packet from the list if the response indicates that the packet was correctly received by the second endpoint as taught by Sinha in order to enhance reliability through the use of transmission control protocol (TCP).

Regarding claims 3 and 13, Ravikumar (as discussed in the lack of inventive step of claims 2 and 12, similarly applicable hereto) is silent on sending the plurality of packets a first time, resending all packets that appear on the list. Sinha teaches sending the plurality of packets a first time, resending all packets that appear on the list (paragraph 4; The current window is a list of packet sequence numbers, as packets are sent, the window slides to the next window of packets to be sent. If an ack is not received for a given packet, it is to be included in the next transmission window, or re-sent). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to include in the invention of Ravikumar a step of sending the plurality of packets a first time, resending all packets that appear on the list as taught by Sinha in order to enhance reliability through the use of transmission control protocol (TCP).

Regarding claims 4 and 14, Ravikumar (as discussed in the lack of novelty of claims 1 and 11, similarly applicable hereto) is silent on resending a packet if the first endpoint receives a response from the second endpoint that the packet was not correctly received. Sinha teaches resending a packet if the first endpoint receives a response from the second endpoint that the packet was not correctly received (paragraph 4; If the ACK is not received within a timeout interval, the data is retransmitted. Thus the lack of an ACK comprises a response from the second endpoint that the packet was not correctly received). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to include in the invention of Ravikumar a step of resending a packet if the first endpoint receives a response from the second endpoint that the packet was not correctly received as taught by Sinha in order to enhance reliability through the use of transmission control protocol (TCP).

(Cont. in next Supplemental Box)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US07/68820

A. CLASSIFICATION OF SUBJECT MATTER
IPC: **G06F 15/16**(2006.01);**H04L 12/16**(2006.01)

USPC: 709/246;370/260
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
U.S. : 709/246; 370/260

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2005/0091407 A1 (VAZIRI et al) 28 April 2005 (28.04.2005) paragraph 010,0126,0130,0209	claims 1-20
Y	US 6,940,826 B1 (SIMARD et al) 06 September 2005 (06.09.205) colum 19 line 60-col 20 line 55	claims 1-20

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
11 June 2008 (11.06.2008)	10 NOV 2008
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (571) 273-3201	Authorized officer Thong Vu Telephone No. 703-305-3333

Form PCT/ISA/210 (second sheet) (April 2007)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
TIMOTHY F. BLISS
P.O. BOX 793968
DALLAS, TX 75379-3968

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

	Date of mailing *(day/month/year)* 10 NOV 2008
Applicant's or agent's file reference 1001.11WO	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US07/68820	11 May 2007 (11.05.2007)	15 May 2006 (15.05.2006)

International Patent Classification (IPC) or both national classification and IPC

IPC: **G06F 15/16**(2006.01);**H04L 12/16**(2006.01)
USPC: 709/246;370/260

Applicant

DAMAKA,INC.

1. This opinion contains indications relating to the following items:

- ☒ Box No. I — Basis of the opinion
- ☐ Box No. II — Priority
- ☐ Box No. III — Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV — Lack of unity of invention
- ☒ Box No. V — Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI — Certain documents cited
- ☐ Box No. VII — Certain defects in the international application
- ☐ Box No. VIII — Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1*bis*(*b*) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/ US	Date of completion of this opinion	Authorized officer
Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (571) 273-3201	11 June 2008 (11.06.2008)	Thong Vu Telephone No. 703-305-3333

Form PCT/ISA/237 (cover sheet) (April 2007)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US07/68820

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:

☒ the international application in the language in which it was filed

☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of:

a. type of material

☐ a sequence listing

☐ table(s) related to the sequence listing

b. format of material

☐ on paper

☐ in electronic form

c. time of filing/furnishing

☐ contained in the international application as filed.

☐ filed together with the international application in electronic form.

☐ furnished subsequently to this Authority for the purposes of search.

4. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US07/68820

Box No. V Reasoned statement under Rule 43 *bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims 1-20	YES
	Claims NONE	NO
Inventive step (IS)	Claims NONE	YES
	Claims 1-20	NO
Industrial applicability (IA)	Claims 1-20	YES
	Claims NONE	NO

2. Citations and explanations:

Please See Continuation Sheet

Form PCT/ISA/237 (Box No. V) (April 2007)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US07/68820

Supplemental Box
In case the space in any of the preceding boxes is not sufficient.

V. 2. Citations and Explanations:
Claims 1-20 lack an inventive step under PCT Article 33(3) as being obvious over Vaziri et al (2005/0091407 A1) in view of Simard et al (6,940,826 B1).

Claim 1, Vaziri discloses A method for execution by a first endpoint to establish a conference session in a peer-to-peer hybrid network [Vaziri, two peers, 0040; hybrid, 0101; multimedia conferences, 0126, 0130, 0209] comprising:
requesting that a conference session be established on a host [Vaziri, multimedia conference, 0126,0130,0209];
receiving information needed to connect to the conference session [Vaziri, password, 0161];
joining the conference session on the host using the information [Vaziri, creating, modifying and terminating session with one or more participants, 0126]; and

Vaziri also taught a multi network exchange bridge has second and third addresses with and extension indicates the an portable device may communicate directly with said multi network exchange bridge [Vaziri, claim 4]
However Vaziri does note explicitly detail

sending at least a portion of the information to second and third endpoints so that the second and third endpoints can join the conference session on the host using the portion of the information, wherein the first endpoint sends signaling information for the conference session directly to the second and third endpoints, and wherein the first endpoint receives signaling information for the conference session directly from the second and third endpoints.

Simard taught an conference bridge receiving data from three difference sources, those being direct from participant A and from both the second and third conference bridges [Simard, col 12 line 60-col 13 line 55]

Therefore it would have been obvious to an ordinary skill in the art at the time the invention was made to incorporate the technique of using a portion of information or criteria of the bridges to establish the session directly from the second and third sources as taught by Simard into the Vaziri's apparatus in order to utilize the conference bridges.

Doing so would reduce in transcoding, latency and/or required signal processing power within the conference bridge.

Claim 2, the combination of Vaziri and Simard discloses receiving a message directly from the second endpoint indicating that the

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No. PCT/US07/68820

Supplemental Box
In case the space in any of the preceding boxes is not sufficient.

second endpoint is leaving the conference session; and informing the third endpoint that the second endpoint has left the conference session [Vaziri, creating, modifying and terminating session with one or more participants, 0126].

Claim 3, Vaziri discloses requesting that the conference session be established includes sending the request to a conference controller coupled to the host, wherein the conference controller communicates with the host to set up the conference session and responds to the first endpoint after the conference session is established [Vaziri, creating, modifying and terminating session with one or more participants, 0126].

Claim 4, the combination of Vaziri and Simard discloses of the first, second, and third endpoints, only the first endpoint communicates with the conference controller during the conference session [Simard, col 12 line 60-col 13 line 55].

Claim 5, Vaziri discloses sending a message directly from the first endpoint to the second and third endpoints instructing the first and second endpoints to disconnect from the host [Vaziri, a single host, 0213].

Claim 6, the combination of Vaziri and Simard discloses sending at least a portion of the information to the second and third endpoints includes sending an invitation directly from the first endpoint to each of the second and third endpoints to join the conference session [Simard, col 12 line 60-col 13 line 55].

Claim 7, the combination of Vaziri and Simard discloses receiving a response to the invitation directly from the second and third endpoints [Simard, col 12 line 60-col 13 line 55].

Claim 8, Vaziri discloses A peer-to-peer hybrid system for a conference session [Vaziri, two peers, 0040; hybrid, 0101; multimedia conferences, 0126, 0130, 0209] comprising:
a first endpoint coupled to second and third endpoints; a host coupled to the first, second, and third endpoints [Vaziri, one or more participants, 0209]; and
a plurality of instructions for establishing and maintaining the conference session [Vaziri, a single host with multi host configuration, 0213], including instructions for:
establishing a conference session on the host at the request of the first endpoint [Vaziri, creating, modifying and terminating sessions with one or more participants, 0126];

However Vaziri does note explicitly detail

sending a message directly from the first endpoint to the second and third endpoints inviting the second and third endpoints to join the conference session;
routing conference session media traffic between the first, second, and third endpoints via the host; and sending signaling messages for the conference session directly from the first endpoint to the second and third endpoints and directly from the second and third endpoints to the first endpoint.

Simard taught an conference bridge receiving data from three difference sources, those being direct from participant A and from both the second and third conference bridges [Simard, col 12 line 60-col 13 line 55]

Therefore it would have been obvious to an ordinary skill in the art at the time the invention was made to incorporate the technique of using a portion of information or criteria of the bridges to establish the session directly from the second and third sources as taught by Simard into the Vaziri's apparatus in order to utilize the conference bridges.

Doing so would reduce in transcoding, latency and/or required signal processing power within the conference bridge.

Claim 9, Vaziri discloses a conference controller coupled to the first endpoint and the host, wherein the instructions for establishing the conference session include instructions for sending a request for the conference session from the first endpoint to the conference controller; sending a request for the conference session from the conference controller to the host; sending a response to the conference controller's request from the host to the conference controller; and
sending a response to the first endpoint's request from the conference controller to the first endpoint based on the response received by the conference controller from the host [Vaziri, a single host, 0213].

Claim 10, the combination of Vaziri and Simard discloses of the first, second, and third endpoints, only the first endpoint communicates with the conference controller during the conference session [Simard, col 12 line 60-col 13 line 55].

Claim 11, Vaziri discloses the conference controller and the host are combined in a single device [Vaziri, a single host, 0213].

Claim 12, Vaziri discloses instructions for sending a notification directly from the second endpoint to the first endpoint that the second endpoint is leaving the conference session; and sending a notification directly from the first endpoint to the third endpoint that the second endpoint has left the conference session [Vaziri, creating, modifying and terminating session with one or more participants, 0126.

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US07/68820

Supplemental Box
In case **the space in any of the preceding boxes is not sufficient**.

Claim 13, Vaziri discloses instructions for sending a notification from the second endpoint to the host that the second endpoint is leaving the conference session [Vaziri, creating, modifying and terminating session with one or more participants, 0126].

Claim 14, Vaziri discloses instructions for determining, by the second endpoint, whether the first endpoint has dropped from the conference session; and
sending a notification from the second endpoint to the host that the second endpoint is leaving the conference session if the first endpoint has dropped [Vaziri, creating, modifying and terminating session with one or more participants, 0126].

Claim 15, the combination of Vaziri and Simard discloses instructions for sending a notification directly from the first endpoint to the second and third endpoints that the first endpoint is leaving the conference session [Simard, col 12 line 60-col 13 line 55].

Claim 16, Vaziri discloses A method for conducting a conference session in a peer-to-peer hybrid network [Vaziri, two peers, 0040; hybrid, 0101; multimedia conferences, 0126, 0130, 0209] comprising:
establishing, by a first endpoint, a conference session on a host; joining, by the first endpoint, the conference session; and sending an invitation to join the conference session from the first endpoint directly to second and third endpoints [Vaziri, creating, modifying and terminating sessions with one or more participants, 0126],

However Vaziri does note explicitly detail

wherein signaling information during the conference session is sent from the first endpoint directly to the second and third endpoints, and wherein media traffic for the conference session is sent by each endpoint through the host.

Simard taught an conference bridge receiving data from three difference sources, those being direct from participant A and from both the second and third conference bridges [Simard, col 12 line 60-col 13 line 55]

Therefore it would have been obvious to an ordinary skill in the art at the time the invention was made to incorporate the technique of using a portion of information or criteria of the bridges to establish the session directly from the second and third sources as taught by Simard into the Vaziri's apparatus in order to utilize the conference bridges.

Doing so would reduce in transcoding, latency and/or required signal processing power within the conference bridge.

Claim 17, the combination of Vaziri and Simard discloses sending a notification from the second endpoint directly to the first endpoint that the second endpoint is leaving the conference session; and sending a notification from the first endpoint directly to the third endpoint that the second endpoint has left the conference session [Simard, col 12 line 60-col 13 line 55].

Claim 18, Vaziri discloses detecting, by the second endpoint, whether the first endpoint has dropped from the call; and informing the host that the second endpoint is leaving the call if the first endpoint has dropped [Vaziri, creating, modifying and terminating session with one or more participants, 0126].

Claim 19, Vaziri discloses establishing the conference session on the host includes sending a request for the conference session from the first endpoint; and receiving information corresponding to the conference session at the first endpoint, wherein the information includes a port and address for the conference session [Vaziri, invite request, port number, Ip address, 0188].

Claim 20, the combination of Vaziri and Simard discloses sending the invitation to join the conference session from the first endpoint directly to the second and third endpoints includes sending the port and address information [Simard, col 12 line 60-col 13 line 55].

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US07/68821

A. CLASSIFICATION OF SUBJECT MATTER
IPC: G10L 11/00(2006.01)

USPC: 704/277
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
U.S. : 704/277, 7, 9, 235 and 715/264

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EAST - network, language, translation, communication, peer, human, plurality, natural languages

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X --- Y	US 2004/0267527 A1 (CREAMER et al.) 30 December 2004 (30.12.2004), [0027] & Fig. 2-5 US 2003/0061025 A1 (ABIR) 27 March 2003 (27.03.2003), [0024] & [0033]	1-5, 7, 8, 11-23
Y	US 6,360,196 B1 (POZNANSKI et al.) 19 March 2002 (19.03.2002), Col. 8 line 61 – Col. 9 line 11	6, 9
Y	US 2004/0268257 A1 (MUDUSURU) 30 December 2004 (30.12.2004), [0033]	10

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
14 June 2008 (14.06.2008)	06 AUG 2008
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US Commissioner of Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (571) 273-3201	Authorized officer Richemond Dorvil Telephone No. (571)272-2600

Form PCT/ISA/210 (second sheet) (July 1998)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
TIMOTHY F. BLISS
P.O. BOX 793968
DALLAS, TX 75379-3968

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Applicant's or agent's file reference 1000.12WO	Date of mailing (*day/month/year*) 06 AUG 2008 FOR FURTHER ACTION See paragraph 2 below

International application No.	International filing date (*day/month/year*)	Priority date (*day/month/year*)
PCT/US07/68821	11 May 2007 (11.05.2007)	15 May 2006 (15.05.2006)

International Patent Classification (IPC) or both national classification and IPC

IPC: **G10L 11/00**(2006.01)
USPC: 704/277

Applicant

DAMAKA, INC.

1. This opinion contains indications relating to the following items:

- ☒ Box No. I — Basis of the opinion
- ☐ Box No. II — Priority
- ☐ Box No. III — Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV — Lack of unity of invention
- ☒ Box No. V — Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI — Certain documents cited
- ☐ Box No. VII — Certain defects in the international application
- ☐ Box No. VIII — Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1*bis*(*b*) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/ US	Date of completion of this opinion	Authorized officer
Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (571) 273-3201	13 June 2008 (13.06.2008)	Richemond Dorvil Telephone No. (571)272-2600

Form PCT/ISA/237 (cover sheet) (April 2007)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US07/68821

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:

☒ the international application in the language in which it was filed

☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of:

a. type of material

☐ a sequence listing

☐ table(s) related to the sequence listing

b. format of material

☐ on paper

☐ in electronic form

c. time of filing/furnishing

☐ contained in the international application as filed.

☐ filed together with the international application in electronic form.

☐ furnished subsequently to this Authority for the purposes of search.

4. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US07/68821

Box No. V Reasoned statement under Rule 43 *bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims 1-23	YES
	Claims NONE	NO
Inventive step (IS)	Claims NONE	YES
	Claims 1-23	NO
Industrial applicability (IA)	Claims 1-23	YES
	Claims NONE	NO

2. Citations and explanations:

Please See Continuation Sheet

Form PCT/ISA/237 (Box No. V) (April 2007)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US07/68821

Supplemental Box
In case the space in any of the preceding boxes is not sufficient.

V. 2. Citations and Explanations:

1. Claims 1-5, 7, 8, and 11-23 lack an inventive step under PCT Article 33(3) as being obvious Creamer et al. US 20040267527 A1 (hereinafter Creamer) in view of Abir US 20030061025 A1 (hereinafter Abir).

Re claims 1 and 18, Creamer teaches a method for natural language processing in a peer-to-peer hybrid network comprising:

identifying a first language used by a first endpoint (Fig. 5 item 52) and a second language used by a second endpoint (Fig. 5 item 62);

determining whether the first and second languages are compatible (Fig. 5 item 66);

comparing a first language profile (Fig. 2 item 25) of the first endpoint and a second language profile of the second endpoint if the first and second languages are not compatible (Fig. 5 items 102 and 104) to identify whether a common language exists in the first and second language profiles (Fig. 5 item 102);

selecting the common language for communications between the first and second endpoints if the common language exists (Fig. 5 item 66)

However, Creamer fails to teach several languages that are available for translation from various databases or modules that can be either written or spoken.

Abir teaches that the present invention manipulates documents in a first state, i.e., containing information expressed in one system of expression, to produce documents in a second state, i.e., containing substantially the same information expressed using a second system of expression. Thus, the present invention can manipulate or translate documents between systems of expression, for example, written and spoken languages such as English, Hebrew, and Cantonese, into other languages (Abir [0024]).

Further Abir teaches that the present invention will also return other Chinese language associations for the English words or word-strings, and the user may manipulate those associations as desired. For example, the word "mountain," when operated on according to the present invention may return a list of Chinese language words and word strings in the language being examined. The Chinese language equivalents of the word "mountain" will most likely be ranked the highest; however, the present invention will return other foreign language words or word-strings associated with "mountain," such as "snow", "ski", "a dangerous sport"...(Abir [0033]).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention having a database of list of spoken or written languages that are specific to a user profile for the purposes of creating a system that can handle any user, wherein a user can create his/her own profile to accelerate processing during communication rather than waiting for a system to translate any user, where the profile of a user can generate an updatable set of translations (learning network) specific to selected languages.

Re claim 2, Creamer teaches the method of claim 1 further comprising:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US07/68821

Supplemental Box
In case **the space in any of the preceding boxes is not sufficient.**

determining whether a translation module is available if the common language does not exist (Fig. 5 item 66); and

translating communications sent between the first and second endpoints from the first language to the second language and from the second language to the first language using the translation module if the translation module is available (Fig. 5 items 10 2 and 104)

Re claim 3, Creamer teaches the method of claim 2 further comprising selecting the translation module from a plurality of available translation modules (Fig. 2).

However, Creamer fails to teach several languages that are available for translation from various databases or modules that can be either written or spoken.

Abir teaches that the present invention manipulates documents in a first state, i.e., containing information expressed in one system of expression, to produce documents in a second state, i.e., containing substantially the same information expressed using a second system of expression. Thus, the present invention can manipulate or translate documents between systems of expression, for example, written and spoken languages such as English, Hebrew, and Cantonese, into other languages (Abir [0024]).

Further Abir teaches that the present invention will also return other Chinese language associations for the English words or word-strings, and the user may manipulate those associations as desired. For example, the word "mountain," when operated on according to the present invention may return a list of Chinese language words and word strings in the language being examined. The Chinese language equivalents of the word "mountain" will most likely be ranked the highest; however, the present invention will return other foreign language words or word-strings associated with "mountain," such as "snow", "ski", "a dangerous sport"...(Abir [0033]).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention having a database of list of spoken or written languages that are specific to a user profile for the purposes of creating a system that can handle any user, wherein a user can create his/her own profile to accelerate processing during communication rather than waiting for a system to translate any user, where the profile of a user can generate an updatable set of translations (learning network) specific to selected languages.

Re claim 4, Creamer teaches the method of claim 3 wherein the translation module is selected based on a priority of the translation module compared to the other translation modules of the plurality of available translation modules (Fig. 5 item 6, where the language is identified and therefore prioritized as the identified translated language).

Re claim 5, Creamer teaches the method of claim 4 wherein the priority of the translation module is defined in one of the first and second language profiles ([0027] & Fig. 5).

Re claims 13 and 22, Creamer teaches a peer-to-peer hybrid system comprising:

an access server ([0027]);

an endpoint coupled to the access server ([0027]); and

a language profile associated with the endpoint, wherein the language profile is used to select at least one of a written language and a spoken language for use in communicating with another endpoint (Fig. 2 item 25), the language profile including:

a listing of written languages, wherein the listing includes a user assigned priority level for each written language identifying which of the written languages is preferred by a user of the first endpoint (Fig. 5); and

a listing of spoken languages, wherein the listing includes a user assigned priority level for each spoken language identifying which of the spoken languages is preferred by the user of the first endpoint (Fig. 5)

However, Creamer fails to teach several languages that are available for translation from various databases or modules that can be either written or spoken.

Abir teaches that the present invention manipulates documents in a first state, i.e., containing information expressed in one system of expression, to produce documents in a second state, i.e., containing substantially the same information expressed using a second system of expression. Thus, the present invention can manipulate or translate documents between systems of expression, for example, written and spoken languages such as English, Hebrew, and Cantonese, into other languages (Abir [0024]).

Further Abir teaches that the present invention will also return other Chinese language associations for the English words or word-strings, and the user may manipulate those associations as desired. For example, the word "mountain," when operated on according to the present invention may return a list of Chinese language words and word strings in the language being examined. The Chinese language equivalents of the word "mountain" will most likely be ranked the highest; however, the present invention will return other foreign language words or word-strings associated with "mountain," such as "snow", "ski", "a dangerous sport"...(Abir [0033]).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention having a database of list of spoken or written languages that are specific to a user profile for the purposes of creating a system that can handle any user, wherein a user can create his/her own profile to accelerate processing during communication rather than waiting for a system to translate any user, where the profile of a user can generate an updatable set of translations (learning network) specific to selected languages.

Re claim 7, Creamer teaches the method of claim 1 wherein a plurality of common languages are identified (Fig. 5), and wherein a single common language is selected from the plurality of common languages based on a priority (Fig. 5 item 6, where the language is identified and therefore prioritized as the identified translated language) assigned to each of the plurality of common languages in at least one of the first and second language profiles (Fig. 2).

Re claim 8, Creamer teaches the method of claim 1 wherein at least one of the first and second language profiles includes a translation module (Fig. 2 item 25), and wherein identifying whether a common language exists in the first and second language profiles

International application No.
PCT/US07/68821

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

Supplemental Box
In case the space in any of the preceding boxes is not sufficient.

includes determining whether the translation module provides the common language (Fig. 5).

Re claim 11, Creamer teaches the method of claim 1 wherein selecting the common language for communications between the first and second endpoints includes configuring the first and second endpoints to communicate using the common language (Fig. 5 items 102 and 66).

Re claim 12, Creamer teaches the method of claim 1 further comprising configuring the first endpoint to default to the common language when communicating with the second endpoint in future communication sessions (Fig. 5 items 102 and 66).

Re claim 14, Creamer teaches the system of claim 13 wherein the language profile further includes information corresponding to a translation module, wherein the information identifies first and second languages translatable by the translation module.

Re claim 15, Creamer teaches the system of claim 14 wherein the first and second languages are included in the listing of written languages and the listing of spoken languages (Fig. 5).

However, Creamer fails to teach a listing of written languages, wherein several languages that are available for translation from various databases or modules that can be either written or spoken.

Abir teaches that the present invention manipulates documents in a first state, i.e., containing information expressed in one system of expression, to produce documents in a second state, i.e., containing substantially the same information expressed using a second system of expression. Thus, the present invention can manipulate or translate documents between systems of expression, for example, written and spoken languages such as English, Hebrew, and Cantonese, into other languages (Abir [0024]).

Further Abir teaches that the present invention will also return other Chinese language associations for the English words or word-strings, and the user may manipulate those associations as desired. For example, the word "mountain," when operated on according to the present invention may return a list of Chinese language words and word strings in the language being examined. The Chinese language equivalents of the word "mountain" will most likely be ranked the highest; however, the present invention will return other foreign language words or word-strings associated with "mountain," such as "snow", "ski", "a dangerous sport"...(Abir [0033]).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention having a database of list of spoken or written languages that are specific to a user profile for the purposes of creating a system that can handle any user, wherein a user can create his/her own profile to accelerate processing during communication rather than waiting for a system to translate any user, where the profile of a user can generate an updatable set of translations (learning network) specific to selected languages.

Re claim 16, Creamer teaches the system of claim 13 wherein the language profile is stored on the endpoint ([0027] & Fig. 5 item 25).

Re claim 17, Creamer teaches the system of claim 13 wherein the language profile is stored on the access server ([0027] & Fig. 5 item 25).

Re claim 19, Creamer teaches the method of claim 18 wherein comparing the plurality of language preferences in the first language profile (Fig. 2 item 25) with the plurality of language preferences in the second language profile includes identifying whether a translation module is accessible for use in establishing a common language (Fig. 5 item 66).

Re claim 20, Creamer teaches the method of claim 18 wherein configuring the first and second endpoints includes activating a translation module on one of the first and second endpoints (Fig. 5)

Re claim 21, Creamer teaches the method of claim 18 further comprising:

translating a first language to the common language by the first endpoint; and translating a second language to the common language by the second endpoint (Fig. 5).

Re claim 23, Creamer teaches the system of claim 22 wherein the language profile designates at least one of a first written and a first spoken language for the second endpoint (Fig. 5 item 102), and at least one of a second written and a second spoken language for the third endpoint (Fig. 5 items 102 and 104), wherein the first and second written languages are different and wherein the first and second spoken languages are different (Fig. 5 item 66)

2. Claims 6 and 9 lack an inventive step under PCT Article 33(3) as being obvious over Creamer et al. US 20040267527 A1 (hereinafter Creamer) in view of Abir US 20030061025 A1 (hereinafter Abir) and further in view of Poznanski et al. US 6360196 B1 (hereinafter Poznanski).

Re claim 6, Creamer in view of Abir fails to teach the method of claim 2 wherein, if no translation module is available to the first endpoint, the first endpoint notifies the second endpoint that the first endpoint cannot perform a translation.

Poznanski teaches that there may be many examples of source language query terms which cannot be translated by the multilingual resource into target language query terms. A common example of this is where queries contain proper names. For example, it is unlikely that the multilingual resource would be able to translate proper names such as "Dagmar Dwehus". However, such query terms may be very useful in retrieving relevant documents, for example where it is desired to retrieve only documents containing such a proper name. In order to deal with this situation, it is possible for terms for which the multilingual resource cannot find a translation to be passed without change into the target language query (Col. 8 line 61 – Col. 9 line 11).

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US07/68821

Supplemental Box
In case the space in any of the preceding boxes is not sufficient.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention if no translation module is available to the first endpoint, the first endpoint notifies the second endpoint that the first endpoint cannot perform a translation for the purposes of preserving proper words that may not necessarily have a translation but can still be semantically and syntactically acceptable.

Re claim 9, Creamer teaches the method of claim 1 further comprising:

communicating with a server if the common language does not exist; and translating communications sent between the first and second endpoints from the first language to the second language and from the second language to the first language using translation functionality provided by the server ([0027] & Fig. 5).

However Creamer in view of Abir fails to teach communicating with a server if the common language does not exist

Poznanski teaches that there may be many examples of source language query terms which cannot be translated by the multilingual resource into target language query terms. A common example of this is where queries contain proper names. For example, it is unlikely that the multilingual resource would be able to translate proper names such as "Dagmar Dwehus". However, such query terms may be very useful in retrieving relevant documents, for example where it is desired to retrieve only documents containing such a proper name. In order to deal with this situation, it is possible for terms for which the multilingual resource cannot find a translation to be passed without change into the target language query (Col. 8 line 61 – Col. 9 line 11).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention communicating with a server if the common language does not exist; and translating communications sent between the first and second endpoints from the first language to the second language and from the second language to the first language using translation functionality provided by the server for the purposes of preserving proper words that may not necessarily have a translation but can still be semantically and syntactically acceptable.

3. **Claim 10 lacks an inventive step under PCT Article 33(3) as being obvious over Creamer et al. US 20040267527 A1 (hereinafter Creamer) in view of Abir US 20030061025 A1 (hereinafter Abir) and further in view of Mudusuru US 20040268257 A1 (hereinafter Mudusuru).**

Re claim 10, Creamer in view of Abir fails to teach the method of claim 1 further comprising:

communicating with a human translation service if the common language does not exist; and

translating communications sent between the first and second endpoints from the first language to the second language and from the second language to the first language using translation functionality provided by the human translation service.

Mudusuru teaches the routine 300 continues to operation 306 where the character strings in a source language, such as English, are extracted from the string definition files 10 into intermediate text files 12. Each intermediate text file 12 extracted into represents a destination language received in operation 305. Additional details regarding the extraction operation 306 will be described below with respect to FIGS. 3B, 4, and 5. From operation 306, the routine 300 continues to operation 307 where the character strings in the intermediate text files 12 are converted to the destination languages via a language translation module 14 or a human translator (Mudusuru [0033]). After translation, the intermediate text files 12 become converted intermediate text files 16, now containing the translated version of the character strings.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention communicating with a human translation service if the common language does not exist and translating communications sent between the first and second endpoints from the first language to the second language and from the second language to the first language using translation functionality provided by the human translation service for the purposes of having a backup process where one can interact with a human to have a walkthrough of proper translation, wherein instances of proper words that may not necessarily have a translation but can still be semantically and syntactically acceptable.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US07/68823

A. CLASSIFICATION OF SUBJECT MATTER
IPC: **H04L 12/26**(2006.01)

USPC: 370/252
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
U.S. : 370/252

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2002/0150110 A1 (INBAR et al) 17 October 2002, See figure 1, section 009, 0026, 0027, 0062, 0072, 0085	1-21
Y	US 2003/0177186 A1 (GOODMAN et al) 18 September 2003, See figures 1-3, sections 0015, 0016, 0028, 0031, 0038-0039	1-21

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
01 June 2008 (01.06.2008)	15 AUG 2008
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US Commissioner of Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (571) 273-3201	Authorized officer Hoy D. Vu Telephone No. (571) 270-1413

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
TIMOTHY F. BLISS
P.O. BOX 793968
DALLAS, TX 75379-3968

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing (*day/month/year*)	15 AUG 2008
Applicant's or agent's file reference 1000.13WO	FOR FURTHER ACTION See paragraph 2 below

International application No.	International filing date (*day/month/year*)	Priority date (*day/month/year*)
PCT/US07/68823	11 May 2007 (11.05.2007)	15 May 2006 (15.05.2006)

International Patent Classification (IPC) or both national classification and IPC

IPC: **H04L 12/26**(2006.01)
USPC: 370/252

Applicant

DAMAKA, INC

1. This opinion contains indications relating to the following items:

- [x] Box No. I — Basis of the opinion
- [ ] Box No. II — Priority
- [ ] Box No. III — Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- [ ] Box No. IV — Lack of unity of invention
- [x] Box No. V — Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- [ ] Box No. VI — Certain documents cited
- [ ] Box No. VII — Certain defects in the international application
- [ ] Box No. VIII — Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1*bis*(*b*) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/ US	Date of completion of this opinion	Authorized officer
Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (571) 273-3201	01 June 2008	Huy D. Vu Telephone No. (571) 270-1413

Form PCT/ISA/237 (cover sheet) (April 2007)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US07/68823

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:
   - ☒ the international application in the language in which it was filed
   - ☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).
2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))
3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of:

   a. type of material
      - ☐ a sequence listing
      - ☐ table(s) related to the sequence listing

   b. format of material
      - ☐ on paper
      - ☐ in electronic form

   c. time of filing/furnishing
      - ☐ contained in the international application as filed.
      - ☐ filed together with the international application in electronic form.
      - ☐ furnished subsequently to this Authority for the purposes of search.

4. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US07/68823

Box No. V Reasoned statement under Rule 43 *bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims 1-21	YES
	Claims NONE	NO
Inventive step (IS)	Claims NONE	YES
	Claims 1-21	NO
Industrial applicability (IA)	Claims 1-21	YES
	Claims NONE	NO

2. Citations and explanations:

Please See Continuation Sheet

Form PCT/ISA/237 (Box No. V) (April 2007)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US07/68823

Supplemental Box
In case the space in any of the preceding boxes is not sufficient.

V. 2. Citations and Explanations:

Claims 1-21 lack an inventive step under PCT Article 33(2) as being obvious over Inbar et al. (US 2002/0150110) in view of Goodman et al. (US 2003/0177186).

As per claim 1, Inbar et al. discloses a method for execution in a peer-to-peer hybrid network comprising: determining that the unique user identification information is concurrently associated with a second endpoint currently logged into the network (see section 14, unique identification, section 29, database); and sending a message directly from the first endpoint to the second endpoint to notify the second endpoint that the first endpoint is logged into the network using the unique user identification information (see section 9, 47, 62 and 85, end to end peer to peer).

Goodman et al. discloses logging a first endpoint into the network, wherein the login associates the first endpoint with unique user identification information required for authentication with the network (see figure 3, sections 39-40, client and password).

As per claim 2, Inbar et al. discloses designating one of the first and second endpoints as a slave endpoint and designating the other of the first and second endpoints as a master endpoint (see section 26 and 27).

As per claim 3, Goodman et al. discloses identifying the first or second endpoint designated as the master endpoint as the endpoint associated with the unique user identification information that is visible to a third endpoint on the network, wherein the third endpoint is not associated with the unique user information of the first and second endpoints (see section 31 and 38, policy based).

As per claim 4, Goodman et al. discloses sending a message directly from the first or second endpoint designated as the master endpoint to the third endpoint to notify the third endpoint that the first or second endpoint designated as the master endpoint is logged into the network, wherein the third endpoint is not notified that the first or second endpoint designated as the slave endpoint is logged into the network (see section 28, hybrid p2p, section 31, limited number of other clients based on user identification, section 38, policy based on a number of criteria, e.g. engineering, sales, distance etc.).

As per claim 5, Goodman et al. discloses sending a login notification from a fourth endpoint directly to the first or second endpoint designated as the master endpoint when the fourth endpoint logs into the network after the first and second endpoints, wherein the fourth endpoint is not associated with the unique user information of the first and second endpoints, and wherein the login notification is not sent to the first or second endpoint designated as the slave endpoint (see section 31, 34, and 38, periodically updates).

As per claim 6, Goodman et al. discloses sending a login notification from the fourth endpoint directly to the third endpoint (see section 38).

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US07/68823

Supplemental Box
In case the space in any of the preceding boxes is not sufficient.

As per claim 7, Goodman et al. discloses sending a login notification from a fifth endpoint directly to the first and second endpoints when the fifth endpoint logs into the network using the unique user information of the first and second endpoints, wherein the login notification is not sent to the third endpoint (see section 31, 34, and 38, periodically updates).

As per claim 8, Goodman et al. discloses comprising: determining whether the message is received from a second endpoint that is authenticated with the network using the unique user identification information of the first endpoint or from a third endpoint that is authenticated with the network using unique user identification information different from the unique user identification information of the first endpoint (see section 28, hybrid p2p, section 31, limited number of other clients based on user identification, section 38, policy based on a number of criteria, e.g. Engineering, sales, distance etc.); and applying a policy based on whether the message is from the second endpoint or the third endpoint (see section 28, hybrid p2p, section 31, limited number of other clients based on user identification, section 38, policy based on a number of criteria, e.g. engineering, sales, distance etc.).

Inbar et al. furthermore discloses receiving a message by a first endpoint, wherein the first endpoint is associated with unique user identification information required for authentication with the network (see section 9, end point as clients and as server, section 26, master, and section 38, to a group or all subscribers).

As per claim 9, Goodman et al. discloses wherein applying the policy includes forwarding the message to all endpoints that are authenticated with the network using the unique user identification information of the first endpoint (see section 38).

As per claim 10, Goodman et al. discloses further comprising determining whether the policy requires forwarding of the message (see section 38).

As per claim 11, Goodman et al. discloses further comprising determining whether a forwarding destination is provided in the policy if forwarding is required (see section 38).

As per claim 12, Goodman et al. discloses further comprising forwarding the message to the provided destination if forwarding is required (see section 38).

As per claim 13, Goodman et al. discloses further comprising identifying an active endpoint if a forwarding destination is not provided (see section 31 and 38, seed list).

As per claim 14, Goodman et al. discloses identifying an active endpoint includes sending the message to the second endpoint, wherein the second endpoint displays the most recent activity of all endpoints that are authenticated with the network using the unique user identification information of the first endpoint (see section 34, periodically updating).

As per claim 15, Goodman et al. discloses wherein the message is from the second endpoint and includes a request for file access to an endpoint that is authenticated with the network using the unique user identification information of the first endpoint (see section 31 and 38, seed list).

As per claim 16, Goodman et al. discloses further comprising providing the second endpoint with the file access (see section 31 and 38, seed list).

As per claim 17, Inbar et al. discloses a method for routing a message in a peer-to-peer hybrid network comprising: retrieving a profile and a routing table from an access server by a first endpoint during an authentication process, wherein the profile identifies a second endpoint as an endpoint with which the first endpoint has permission to communicate (see section 14, unique identification, section 29, database), and the routing table contains address information needed for the first endpoint to communicate directly with the second endpoint; receiving, by the second endpoint, a message sent directly from the first endpoint (see section 9, 47, 62 and 85, end to end peer to peer)

Goodman et al. discloses identifying, by the second endpoint, information associated with the message to be used in routing the message, wherein the information does not identify a specific destination (no ip address , see section 15, section 34, download list of ip or seed list); and sending the message from the second endpoint directly to at least a third endpoint based on the application of a policy to the identified information (see section 28, hybrid p2p, section 31, limited number of other clients based on user identification, section 38, policy based on a number of criteria, e.g. engineering, sales, distance etc.).

As per claim 18, Goodman et al. discloses assigning the third endpoint to a group of endpoints based on a skill of a user associated with the third endpoint (see section 31 and 38); and selecting the third endpoint when application of the policy to the identified information identifies the skill as needed by a user of the first endpoint (see section 38).

As per claim 19, Goodman et al. discloses a peer-to-peer hybrid system comprising: a server/client endpoint and a client endpoint concurrently logged into a network using a first set of login information (see section 39 and figure 3); an outside endpoint logged into the network using a second set of login information; a first profile associated with the master and slave endpoints, wherein the first profile (see section 31, seed list) designates the master endpoint as being able to communicate directly with other endpoints not part of the concurrent login using the first set of login information, and designates the slave endpoint as being able to communicate directly only with the server/client endpoint and other endpoints part of the concurrent login using the first set of login information (see figure 3, sections 31, 39-40, client and password, determines the number of clients authorized to connect to); and a second profile (see figure 3, sections 31, 39-40, client and password, determines the number of clients authorized to connect to) associated with the outside endpoint, wherein the second profile designates the outside endpoint as being able to communicate directly only with the server/client endpoint and other endpoints not part of the concurrent login using the first set of login information, wherein the slave endpoint is not available for direct communication with the outside endpoint (see section 28, hybrid p2p, section 31, limited number of other clients based on user identification, section 38,

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
BLISS, Timothy F.

HOWISON & ARNOTT, L.L.P. P.O. Box 741715 Dallas, Texas 75374-1715 USA

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing *(day/month/year)*	**27 MARCH 2009 (27.03.2009)**
Applicant's or agent's file reference: DAMA-29,173	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2008/078142	**29 SEPTEMBER 2008 (29.09.2008)**	28 SEPTEMBER 2007 (28.09.2007)

International Patent Classification (IPC) or both national classification and IPC

H04L 12/28(2006.01)i, H04L 12/66(2006.01)i

Applicant

DAMAKA, INC. et al

1. This opinion contains indications relating to the following items:

- [x] Box No. I Basis of the opinion
- [ ] Box No. II Priority
- [ ] Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- [ ] Box No. IV Lack of unity of invention
- [x] Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- [ ] Box No. VI Certain documents cited
- [ ] Box No. VII Certain defects in the international application
- [ ] Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.
For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/KR	Date of completion of this opinion	Authorized officer
Korean Intellectual Property Office Government Complex-Daejeon, 139 Seonsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	27 MARCH 2009 (27.03.2009)	Lee Hyoung Il Telephone No.82-42-481-8195

Form PCT/ISA/237 (cover sheet) (April 2007)

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2008/078142

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of :

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into _____ , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

   a. type of material
   - ☐ a sequence listing
   - ☐ table(s) related to the sequence listing

   b. format of material
   - ☐ on paper
   - ☐ in electronic form

   c. time of filing/furnishing
   - ☐ contained in the international application as filed.
   - ☐ filed together with the international application in electronic form.
   - ☐ furnished subsequently to this Authority for the purposes of search.

5. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additioanl copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2008/078142

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	None	YES
	Claims	1-9	NO
Inventive step (IS)	Claims	None	YES
	Claims	1-9	NO
Industrial applicability (IA)	Claims	1-9	YES
	Claims	None	NO

2. Citations and explanations :

Reference is made to following documents:

D1: US 2006-0183476 A1 (MORITA, J. et al) 17 August 2006

1. Novelty and Inventive Step

1.1 Independent Claim 1

D1, which is considered to represent the most relevant state of the art, discloses a method comprising: determining the cellular phone is within the region of a hot spot or not based on the detected position information and region information, issuing an instruction to the resumption control portion to activate the wireless LAN communication module, receiving a registration completion notification from WCDMA server, and transmitting the registration completion notification to cellular phone.

As all of the features of claim 1 are disclosed in D1, this claim is anticipated by D1. Therefore, claim 1 lacks novelty under PCT Article 33(2).

1.2 Dependent Claims 2-5

1.2.1 Concerning Claim 2

The additional feature of claim 2 dependent on claim 1 is identical to the feature of D1 that the source terminal in the region of a hot spot can communicate with the destination terminal in the region out of a hot spot region via the WCDMA communication network. Accordingly, claim 2 is substantially the same as D1. Therefore, claim 2 lacks novelty under PCT Article 33(2).

1.2.2 Concerning Claim 3

The additional feature of claim 3 dependent on claim 1 is identical to the feature of D1 that a communication session can be hold in establishing a wireless lan connection. Accordingly, claim 3 is substantially the same as D1. Therefore, claim 3 lacks novelty under PCT Article 33(2).

1.2.3 Concerning Claim 4

The additional feature of claim 4 dependent on claim 1 is identical to the feature of D1 that a WCDMA connection request message is sent to the WCDMA server when the cellular phone is out of the region of a hot spot. Accordingly, claim 4 is substantially the same as D1. Therefore, claim 4 lacks novelty under PCT Article 33(2).

1.2.4 Concerning Claim 5

The additional feature of claim 5 dependent on claim 4 is identical to the feature of D1 that a

[Continued on Supplemental Box]

Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**
Continuation of :

[Box V]

wireless lan cut-off request message is sent. Accordingly, claim 5 is substantially the same as D1. Therefore, claim 5 lacks novelty under PCT Article 33(2).

1.3 Independent Claim 6

D1, which is considered to represent the most relevant state of the art, discloses a method comprising: detecting position information, determining the cellular phone is within the region of a hot spot or not based on the detected position information, making the wireless lan connection based on SIP and communicating the source terminal in the region of a hot spot with the destination terminal in the region out of a hot spot region via the WCDMA communication network.

As all of the features of claim 6 are disclosed in D1, this claim is anticipated by D1. Therefore, claim 6 lacks novelty under PCT Article 33(2).

1.4 Dependent Claims 7-9

1.4.1 Concerning Claim 7

The additional feature of claim 7 dependent on claim 6 is identical to the feature of D1 that the source terminal in the region of a hot spot can communicate with the destination terminal in the region out of a hot spot region via the WCDMA communication network. Accordingly, claim 7 is substantially the same as D1. Therefore, claim 7 lacks novelty under PCT Article 33(2).

1.4.2 Concerning Claim 8

The additional feature of claim 8 dependent on claim 6 is identical to the feature of D1 that a wireless lan cut-off request message is sent. Accordingly, claim 8 is substantially the same as D1. Therefore, claim 8 lacks novelty under PCT Article 33(2).

1.4.3 Concerning Claim 9

The additional feature of claim 9 dependent on claim 6 is identical to the feature of D1 that a WCDMA connection request is sent to the WCDMA server and a connection completion notification is received from the WCDMA server. Accordingly, claim 9 is substantially the same as D1. Therefore, claim 9 lacks novelty under PCT Article 33(2).

2. Industrial Applicability

Claims 1-9 are industrially applicable under PCT Article 33(4).

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	FOR FURTHER ACTION	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
DAMA-29,173		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/US2008/078142	**29 SEPTEMBER 2008 (29.09.2008)**	28 SEPTEMBER 2007 (28.09.2007)

Applicant

DAMAKA, INC. et al

This International search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 3 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**
   a. With regard to the **language**, the international search was carried out on the basis of :
      ☒ the international application in the language in which it was filed
      ☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))
   b. ☐ This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6*bis*(a)).
   c. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.
2. ☐ **Certain claims were found unsearchable** (See Box No. II)
3. ☐ **Unity of invention is lacking** (See Box No. III)
4. With regard to the **title,**
   ☒ the text is approved as submitted by the applicant.
   ☐ the text has been established by this Authority to read as follows:
5. With regard to the **abstract,**
   ☒ the text is approved as submitted by the applicant.
   ☐ the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.
6. With regard to the drawings,
   a. the figure of the **drawings** to be published with the abstract is Figure No. 1
      ☐ as suggested by the applicant.
      ☒ as selected by this Authority, because the applicant failed to suggest a figure.
      ☐ as selected by this Authority, because this figure better characterizes the invention.
   b. ☐ none of the figure is to be published with the abstract.

Form PCT/ISA/210 (first sheet) (July 2008)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2008/078142

A. CLASSIFICATION OF SUBJECT MATTER

H04L 12/28(2006.01)i, H04L 12/66(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 8: H04L, H04W, H04B, H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models since 1975.
Japanese utility models and applications for utility models since 1975.

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKIPASS(KIPO internal), Google Scholar: "hot spot", "cellular", "connection", "SIP", "session initiation protocol", "session", "connection", "response", "network"

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2006-0183476 A1 (MORITA, J. et al) 17 August 2006 See abstract; figure 2; page 1, paragraph 8 - page 3, paragraph 33	1-9
A	JP 2005-94600 A (NEC CORP.) 7 April 2005 See abstract; figure 1; claim 1	1-9
A	US 2003-0220121 A1 (KONISHI, T. et al.) 27 November 2003 See abstract; figure 1, page 1, paragraph 9 - page 4, paragraph 33	1-9
A	Pejman Khadivi, Terence D. Todd and Dongmei Zhao, "Handoff trigger nodes for hybrid IEEE 802.11 WLAN/cellular networks," Proc. of IEEE International Conference on Quality of Service in Heterogeneous Wired/Wireless Networks, pp. 164-170, 18 October 2004.	1-9

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents,such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
27 MARCH 2009 (27.03.2009)	**27 MARCH 2009 (27.03.2009)**

Name and mailing address of the ISA/KR	Authorized officer
Korean Intellectual Property Office Government Complex-Daejeon, 139 Seonsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	Lee Hyoung Il Telephone No. 82-42-481-8199

Form PCT/ISA/210 (second sheet) (July 2008)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/US2008/078142

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2006-0183476 A1	17.08.2006	None	
JP 2005-094600 A	07.04.2005	None	
US 2003-0220121 A1	27.11.2003	CN 1461163 A	10.12.2003
		EP 1363425 A2	19.11.2003
		EP 1363425 A3	25.01.2006
		JP 2003-333654 A	21.11.2003
		US 7076269 B2	11.07.2006

PCT/US2008/084950

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
BLISS TIMOTHY F.

HOWISON & ARNOTT, L.L.P. P.O. BOX 741715 DALLAS TX 75374-1715 USA

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing *(day/month/year)*	**06 MAY 2009 (06.05.2009)**
Applicant's or agent's file reference: DAMA-29,253	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2008/084950	**26 NOVEMBER 2008 (26.11.2008)**	28 NOVEMBER 2007 (28.11.2007)

International Patent Classification (IPC) or both national classification and IPC

H04W 36/24(2009.01)i, H04W 60/00(2009.01)i

Applicant

DAMAKA, INC. et al

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.
For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/KR	Date of completion of this opinion	Authorized officer
Korean Intellectual Property Office Government Complex-Daejeon, 139 Seonsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	27 APRIL 2009 (27.04.2009)	IM, DAE SHIK Telephone No. 82-42-481-5947

Form PCT/ISA/237 (cover sheet) (April 2007)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2008/084950

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of:

   a. type of material
   - ☐ a sequence listing
   - ☐ table(s) related to the sequence listing

   b. format of material
   - ☐ on paper
   - ☐ in electronic form

   c. time of filing/furnishing
   - ☐ contained in the international application as filed.
   - ☐ filed together with the international application in electronic form.
   - ☐ furnished subsequently to this Authority for the purposes of search.

4. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additioanl copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2008/084950

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-15	YES
	Claims	None	NO
Inventive step (IS)	Claims	None	YES
	Claims	1-15	NO
Industrial applicability (IA)	Claims	1-15	YES
	Claims	None	NO

2. Citations and explanations :

Reference is made to the following document:

D1: Hao Wang, Skype VoIP service-architecture and comparison, In: INFOTECH Seminar Advanced Communication Services (ACS). 2005, pp. 4, 7, 8.

1. Novelty and Inventive Step

1.1 Concerning Claim 1

D1, which is considered to be the closest prior art to the subject matter of claim 1, discloses that an ordinary host must connect to a super node and must register itself with the Skype login server for a successful login; while in Skype login is perhaps the most critical function to the Skype operation; it is during this process an SC authenticates its user name and password with the login server, advertises its presence to other peers and its buddies, determines the type of NAT and firewall, and discovers online Skype nodes with public IP address; and when both users are behind port restricted NAT and UDT-restricted firewall, both caller and callee SC exchange signaling information over TCP with another online Skype node and caller SC sends media over TCP to an online node, which forwards it to callee SC over TCP and vice versa.

Claim 1 differs from D1 in receiving session parameters. However, it can readily be foreseen from the feature of exchanging signaling information over TCP with another online Skype node in D1. Thus, the subject matter of claim 1 is novel under PCT Article 33(2), but does not involve an inventive step under PCT Article 33(3).

1.2 Concerning Claim 2

D1 discloses that an SC behind a port-restricted NAT and UDP-restricted firewall sends the search request over TCP to its SN. SN then performs the search query and informed SC of the search results. The additional feature of claim 2 is obvious to a person skilled in the art from D1. Thus, the subject matter of claim 2 does not involve an inventive step, nor does it satisfy the criterion set forth in PCT Article 33(3).

Continued on Supplemental Box

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2008/084950

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of :

Box V

1.3 Concerning Claims 3-5

The additional features of claims 3-5 can readily be foreseen from a SIP by the skilled person in the art. Thus, the subject matter of claims 3-5 does not involve an inventive step, nor does it satisfy the criterion set forth in PCT Article 33(3).

1.4 Concerning Claim 6

D1 discloses that user names and passwords are stored at a login server, and user authentication at login is also done at this server. Thus, the subject matter of claim 6 does not involve an inventive step, nor does it satisfy the criterion set forth in PCT Article 33(3).

1.5 Concerning Claims 7-9

D1 discloses that audio data is carried by RTP and there are heavy software based DSP operations at Skype clients, including codecs, mixer and fancy echo cancellation. Thus, the subject matter of claims 7-9 does not involve an inventive step, nor does it satisfy the criterion set forth in PCT Article 33(3).

1.6 Concerning Claims 10-15

Claims 10-15 of the present invention relate to a computer readable medium containing a plurality of instructions for execution of the method of claims 1-9. Therefore, claims 10-15 do not meet the requirement of PCT Article 33(3) with respect to inventive step for the reasons given in claims 1-9.

2. Industrial Applicability

Claims 1-15 of the present invention are considered to be industrially applicable (PCT Article 33(4)).

PCT/US2008/084950

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference DAMA-29,253	FOR FURTHER ACTION	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
International application No. **PCT/US2008/084950**	International filing date *(day/month/year)* **26 NOVEMBER 2008 (26.11.2008)**	(Earliest) Priority Date *(day/month/year)* 28 NOVEMBER 2007 (28.11.2007)
Applicant **DAMAKA, INC. et al**		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 3 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**
   a. With regard to the **language**, the international search was carried out on the basis of:
      ☒ the international application in the language in which it was filed
      ☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))
   b. ☐ This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6*bis*(a)).
   c. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.
2. ☐ **Certain claims were found unsearchable** (See Box No. II)
3. ☐ **Unity of invention is lacking** (See Box No. III)
4. With regard to the **title**,
   ☒ the text is approved as submitted by the applicant.
   ☐ the text has been established by this Authority to read as follows:
5. With regard to the **abstract**,
   ☒ the text is approved as submitted by the applicant.
   ☐ the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.
6. With regard to the drawings,
   a. the figure of the **drawings** to be published with the abstract is Figure No. 1
      ☐ as suggested by the applicant.
      ☒ as selected by this Authority, because the applicant failed to suggest a figure.
      ☐ as selected by this Authority, because this figure better characterizes the invention.
   b. ☐ none of the figure is to be published with the abstract.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2008/084950

A. CLASSIFICATION OF SUBJECT MATTER

H04W 36/24(2009.01)i, H04W 60/00(2009.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC H04Q 7/24, G06F 15/16, H04L 9/08

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean Utility Models and applications for Utility Models since 1975
Japanese Utility Models and applications for Utility Models since 1975

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

e-KIPASS(KIPO internal) & keyword: VoIP, SIP, endpoint

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	Hao Wang, Skype VoIP service-architecture and comparison, In: INFOTECH Seminar Advanced Communication Services(ACS), 2005, pp. 4, 7, 8.	1-15
A	JP 2007-043598 A (NEC Corporation) 15 February 2007 See the abstract and claim 1.	1-15
A	US 2004-0139228 A1 (YUTAKA TAKEDA et al.) 15 July 2004 See the abstract, figures 6-7 and claim 1.	1-15
A	KR 10-2005-0030548 A (MICROSOFT CORP.) 30 March 2005 See the abstract, figure 9 and claim 1.	1-15

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
27 APRIL 2009 (27.04.2009)	**06 MAY 2009 (06.05.2009)**
Name and mailing address of the ISA/KR Korean Intellectual Property Office Government Complex-Daejeon, 139 Seonsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	Authorized officer IM, DAE SHIK Telephone No. 82-42-481-5947

Form PCT/ISA/210 (second sheet) (July 2008)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/US2008/084950

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP 2007-043598 A	15.02.2007	EP 1921792 A1	14.05.2008
		WO 2007-018277 A1	15.02.2007
US 2004-0139228 A1	15.07.2004	US 7328280 B2	05.02.2008
		WO 2004-063843 A2	29.07.2004
		WO 2004-063843 A3	31.03.2005
KR 10-2005-0030548 A	30.03.2005	EP 1519531 A2	30.03.2005
		EP 1519531 A3	24.05.2006
		JP 2005-100419 A	14.04.2005
		US 7464272 B2	09.12.2008

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
BLISS, TIMOTHY F.

P.O. Box 741715 Dallas Texas 75374-1715 USA

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing *(day/month/year)*	**05 MARCH 2009 (05.03.2009)**
Applicant's or agent's file reference	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2008/075141	**03 SEPTEMBER 2008 (03.09.2008)**	03 SEPTEMBER 2007 (03.09.2007)

International Patent Classification (IPC) or both national classification and IPC

H04L 12/28(2006.01)i, H04L 12/24(2006.01)i

Applicant

DAMAKA, INC. et al

1. This opinion contains indications relating to the following items:

- [x] Box No. I Basis of the opinion
- [ ] Box No. II Priority
- [ ] Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- [ ] Box No. IV Lack of unity of invention
- [x] Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- [ ] Box No. VI Certain documents cited
- [ ] Box No. VII Certain defects in the international application
- [ ] Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.
For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/KR	Date of completion of this opinion	Authorized officer
Korean Intellectual Property Office Government Complex-Daejeon, 139 Seonsa-ro, Seo-gu, Daejeon 302 -701, Republic of Korea Facsimile No. 82-42-472-7140	05 MARCH 2009 (05.03.2009)	JUN, Young Sang Telephone No.82-42-481-5653

Form PCT/ISA/237 (cover sheet) (April 2007)

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2008/075141

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

   a. type of material
   - ☐ a sequence listing
   - ☐ table(s) related to the sequence listing

   b. format of material
   - ☐ on paper
   - ☐ in electronic form

   c. time of filing/furnishing
   - ☐ contained in the international application as filed.
   - ☐ filed together with the international application in electronic form.
   - ☐ furnished subsequently to this Authority for the purposes of search.

4. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additioanl copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2008/075141

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-19	YES
	Claims	NONE	NO
Inventive step (IS)	Claims	8- 19	YES
	Claims	1- 7	NO
Industrial applicability (IA)	Claims	1-19	YES
	Claims	NONE	NO

2. Citations and explanations :

Reference is made to the following documents:

D1: US 6766373 B1 (BRUCE A. BEADLE et al.) 20 July 2004
D2: QIAN ZHANG; CHUANXIONG GUO; ZIHUA GUO; WENWU ZHU, 'Efficient mobility management for vertical handoff between WWAN and WLAN', Communications Magazine, IEEE, vol. 41, issue 11, NOVEMBER 2003, pages: 102 - 108
D3: WO 2006/075677 A1 (SHARP KABUSHIKI KAISHA) 20 July 2006
D4: SETA, N.; MIYAJIMA, H.; ZHANG, L.; HAYASHI, H.; FUJII, T., 'All-SIP Mobility: Session Continuity on Handover in Heterogeneous Access Environment', Vehicular Technology Conference, 2007. VTC 2007-Spring. IEEE 65th, 22-25 April 2007, pages: 1121 - 1126

1. Novelty and Inventive Step

1.1. Concerning Claims 1-7

Independent Claim 1

Claim 1 of the present invention relates to a method comprising: monitoring a first connection with a first network to determine disconnection; establishing a second connection with a second network, wherein establishing the second connection includes obtaining an address and port assignment; and maintaining a communication session.
D1, which is considered to represent the most relevant state of the art, relates to a seamless switching of a network session. D1 discloses the method of monitoring, establishing and switching connections between two different networks depending on network conditions. Also, D1 describes the technique for maintaining a session when the networks are switched. Although an address and port assignment for establishing the second connection is not disclosed in D1, it can be readily inferred from the 'connection information' of D2 (See "Local Connection Translation", p. 106 in D2) by a person skilled in the art. **Thus, claim 1 does not involve an inventive step under PCT Article 33(3).**

Dependent Claims 2-7

The additional feature of claim 2, dependent on claim 1, is establishing the second connection only if the signal strength exceeds the threshold. However, it is merely a description of a handover condition in a wireless communication system.

< Continued on Supplemental Sheet >

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of :

<Box No. V>

The additional feature of claim 3, dependent on claim 1, is determining a rate at which the signal strength is weakening for switching. However, the technique is obvious to a person skilled art in the field of a wireless communication system (a handover prediction technique).
The additional feature of claim 4, dependent on claim 1, is reestablishing the communication session. However, it is disclosed in D1.
The additional features of claims 5 and 6, dependent on claim 4, are relate to 'breaking connection prior to establishing another connection' and 'breaking connection after establishing another connection', respectively. However, they can be referred from the 'soft handover' and the 'hard handover' of a wireless communication system.
The additional feature of claim 7, dependent on claim 1, are saving and refreshing the current state of the connection. However, it is disclosed in the abstract of D1.
Thus, claims 2-7 do not involve an inventive step under PCT Article 33(3).

1.2. Concerning Claims 8-19

Independent Claims 8 and 17

The subject matter of claims 8 and 17 differs from these prior at documents in that claims 8 and 17 describe the technique of sending a notification directly to the endpoint of the address and port assignment. And it is not obvious to a person skilled in the art by the documents, taken alone or in combination. Therefore, **claims 8 and 17 meet the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.**

Dependent Claims 9-16 and 18-19

Claims 9-16 and 18-19 are dependent on claims 8 and 17, respectively, and therefore also **meet the requirements of PCT Article 33(2) and (3).**

2. Industrial Applicability

Claims 1-19 relate to a method and a device for maintaining a session during a network switching. The technique of the claims can be applied to seamless data services in a wireless communication system. Therefore, **claims 1-19 of the present invention are industrially applicable (PCT Article 33(4)).**

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	FOR FURTHER ACTION	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/US2008/075141	**03 SEPTEMBER 2008 (03.09.2008)**	03 SEPTEMBER 2007 (03.09.2007)
Applicant		
DAMAKA, INC. et al		

This International search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of **3** sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**
   a. With regard to the **language**, the international search was carried out on the basis of :
      ☒ the international application in the language in which it was filed
      ☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))
   b. ☐ This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6*bis*(a)).
   c. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. ☐ **Certain claims were found unsearchable** (See Box No. II)

3. ☐ **Unity of invention is lacking** (See Box No. III)

4. With regard to the **title,**
   ☒ the text is approved as submitted by the applicant.
   ☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract,**
   ☒ the text is approved as submitted by the applicant.
   ☐ the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regard to the drawings,
   a. the figure of the **drawings** to be published with the abstract is Figure No. **1**
      ☒ as suggested by the applicant.
      ☐ because the applicant failed to suggest a figure.
      ☐ because this figure better characterizes the invention.
   b. ☐ none of the figure is to be published with the abstract.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2008/075141

A. CLASSIFICATION OF SUBJECT MATTER

H04L 12/28(2006.01)i, H04L 12/24(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: G06F, H04B, H04L, H04W

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean Utility models and applications for Utility models since 1975
Japanese Utility models and applications for Utility models since 1975

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EKIPASS (KIPO internal), IEEE xplore

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 6766373 B1 (BRUCE A. BEADLE et al.) 20 July 2004 See the abstract, fig. 8, and Column 9, Line 53 - Colum 11, Line 54.	1- 7
A		8-19
Y	QIAN ZHANG; CHUANXIONG GUO; ZIHUA GUO; WENWU ZHU, 'Efficient mobility management for vertical handoff between WWAN and WLAN', Communications Magazine,	1- 7
A	IEEE, vol. 41, issue 11, NOVEMBER 2003, pages: 102 - 108	8-19
A	WO 2006/075677 A1 (SHARP KABUSHIKI KAISHA) 20 July 2006 See the abstract and paragraphs [0008]-[0013].	1- 19
A	SETA, N.; MIYAJIMA, H.; ZHANG, L.; HAYASHI, H.; FUJII, T., 'All-SIP Mobility: Session Continuity on Handover in Heterogeneous Access Environment', Vehicular Technology Conference, 2007. VTC 2007-Spring. IEEE 65th, 22-25 April 2007, pages: 1121 - 1126 See the abstract and sections I-V.	1-19

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents,such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
05 MARCH 2009 (05.03.2009)	**05 MARCH 2009 (05.03.2009)**

Name and mailing address of the ISA/KR	Authorized officer
Korean Intellectual Property Office Government Complex-Daejeon, 139 Seonsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea	JUN, Young Sang
Facsimile No. 82-42-472-7140	Telephone No. 82-42-481-5653

Form PCT/ISA/210 (second sheet) (July 2008)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/US2008/075141

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 6766373 B1	20.07.2004	NONE	
WO 2006/075677 A1	20.07.2006	EP 1848163 A1	24.10.2007

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44*bis*)

Applicant's or agent's file reference DAMA-29,253	**FOR FURTHER ACTION** See item 4 below	
International application No. PCT/US2008/084950	International filing date *(day/month/year)* 26 November 2008 (26.11.2008)	Priority date *(day/month/year)* 28 November 2007 (28.11.2007)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant DAMAKA, INC.		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 *bis*.1(a).

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

   In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

☒	Box No. I	Basis of the report
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☐	Box No. VII	Certain defects in the international application
☐	Box No. VIII	Certain observations on the international application

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44*bis*.3(c) and 93*bis*.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44*bis* .2).

	Date of issuance of this report 01 June 2010 (01.06.2010)
The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. +41 22 338 82 70	Authorized officer Yoshiko Kuwahara e-mail: pt07.pct@wipo.int

Form PCT/IB/373 (January 2004)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
BLISS TIMOTHY F.

HOWISON & ARNOTT, L.L.P. P.O. BOX 741715 DALLAS
TX 75374-1715 USA

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing *(day/month/year)*	**06 MAY 2009 (06.05.2009)**
Applicant's or agent's file reference DAMA-29,253	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2008/084950	**26 NOVEMBER 2008 (26.11.2008)**	28 NOVEMBER 2007 (28.11.2007)

International Patent Classification (IPC) or both national classification and IPC

H04W 36/24(2009.01)i, H04W 60/00(2009.01)i

Applicant

DAMAKA, INC. et al

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.
For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/KR	Date of completion of this opinion	Authorized officer
Korean Intellectual Property Office Government Complex-Daejeon, 139 Seonsa-ro, Seo-gu, Daejeon 302 -701, Republic of Korea Facsimile No. 82-42-472-7140	27 APRIL 2009 (27.04.2009)	IM, DAE SHIK Telephone No.82-42-481-5947

Form PCT/ISA/237 (cover sheet) (April 2007)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2008/084950

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of :

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into _____ , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of:

   a. type of material
   - ☐ a sequence listing
   - ☐ table(s) related to the sequence listing

   b. format of material
   - ☐ on paper
   - ☐ in electronic form

   c. time of filing/furnishing
   - ☐ contained in the international application as filed.
   - ☐ filed together with the international application in electronic form.
   - ☐ furnished subsequently to this Authority for the purposes of search.

4. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additioanl copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2008/084950

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-15	YES
	Claims	None	NO
Inventive step (IS)	Claims	None	YES
	Claims	1-15	NO
Industrial applicability (IA)	Claims	1-15	YES
	Claims	None	NO

2. Citations and explanations :

Reference is made to the following document:

D1: Hao Wang, Skype VoIP service–architecture and comparison, In: INFOTECH Seminar Advanced Communication Services (ACS), 2005, pp. 4, 7, 8.

1. Novelty and Inventive Step

1.1 Concerning Claim 1

D1, which is considered to be the closest prior art to the subject matter of claim 1, discloses that an ordinary host must connect to a super node and must register itself with the Skype login server for a successful login; while in Skype login is perhaps the most critical function to the Skype operation; it is during this process an SC authenticates its user name and password with the login server, advertises its presence to other peers and its buddies, determines the type of NAT and firewall, and discovers online Skype nodes with public IP address; and when both users are behind port restricted NAT and UDT–restricted firewall, both caller and callee SC exchange signaling information over TCP with another online Skype node and caller SC sends media over TCP to an online node, which forwards it to callee SC over TCP and vice versa.

Claim 1 differs from D1 in receiving session parameters. However, it can readily be foreseen from the feature of exchanging signaling information over TCP with another online Skype node in D1. Thus, the subject matter of claim 1 is novel under PCT Article 33(2), but does not involve an inventive step under PCT Article 33(3).

1.2 Concerning Claim 2

D1 discloses that an SC behind a port–restricted NAT and UDP–restricted firewall sends the search request over TCP to its SN. SN then performs the search query and informed SC of the search results. The additional feature of claim 2 is obvious to a person skilled in the art from D1. Thus, the subject matter of claim 2 does not involve an inventive step, nor does it satisfy the criterion set forth in PCT Article 33(3).

Continued on Supplemental Box

Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**
Continuation of :

Box V

1.3 Concerning Claims 3-5

The additional features of claims 3-5 can readily be foreseen from a SIP by the skilled person in the art. Thus, the subject matter of claims 3-5 does not involve an inventive step, nor does it satisfy the criterion set forth in PCT Article 33(3).

1.4 Concerning Claim 6

D1 discloses that user names and passwords are stored at a login server, and user authentication at login is also done at this server. Thus, the subject matter of claim 6 does not involve an inventive step, nor does it satisfy the criterion set forth in PCT Article 33(3).

1.5 Concerning Claims 7-9

D1 discloses that audio data is carried by RTP and there are heavy software based DSP operations at Skype clients, including codecs, mixer and fancy echo cancellation. Thus, the subject matter of claims 7-9 does not involve an inventive step, nor does it satisfy the criterion set forth in PCT Article 33(3).

1.6 Concerning Claims 10-15

Claims 10-15 of the present invention relate to a computer readable medium containing a plurality of instructions for execution of the method of claims 1-9. Therefore, claims 10-15 do not meet the requirement of PCT Article 33(3) with respect to inventive step for the reasons given in claims 1-9.

2. Industrial Applicability

Claims 1-15 of the present invention are considered to be industrially applicable (PCT Article 33(4)).

PTO/SB/08a (01-10)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	2819
	Examiner Name	
	Attorney Docket Number	DAMA-31813

U.S.PATENTS						Remove
Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	6031818	A	2000-02-29	LO ET AL.	
	2	6311150	B1	2001-10-30	RAMASWAMY ET AL.	
	3	6999932	B1	2006-02-14	ZHOU, GUOJUN	
	4	7272377	B2	2007-09-18	COX ET AL.	
	5	7412374	B1	2008-08-12	SEILER ET AL.	
	6	6766373	B1	2004-07-20	BEADLE, BRUCE A.	
	7	7304985	B2	2007-12-04	SOJKA ET AL.	
	8	7353255	B2	2008-04-01	ACHARYA ET AL.	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	2819
	Examiner Name	
	Attorney Docket Number	DAMA-31813

	9	7477282	B2	2009-01-13	FIRESTONE ET AL.	
	10	5442637	A	1995-08-01	NGUYEN, MAI-HUONG	
	11	6343067	B1	2002-01-01	DROTTAR ET AL.	
	12	6473425	B1	2002-10-01	BELLATON ET AL.	
	13	6574668	B1	2003-06-01	GUBBI ET AL.	
	14	6850769	B2	2005-02-01	GROB ET AL.	
	15	7080158	B1	2006-07-01	SQUIRE, MATTHEW	
	16	5889762		1999-03-30	PAJUVIRTA ET AL	
	17	7184415	B2	2007-02-01	CHANEY ET AL.	
	18	5790637	A	1998-08-01	JOHNSON ET AL.	
	19	6836765	B1	2004-12-01	SUSSMAN, LESTER	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	2819
	Examiner Name	
	Attorney Docket Number	DAMA-31813

	20	7613171	B2	2009-11-00	ZEHAVI ET AL.	
	21	6842460	B1	2005-01-00	OLKKONEN ET AL.	
	22	6987756		2006-01-00	RAVINDRANATH ET AL.	
	23	7512652		2009-03-00	APPELMAN ET AL.	

If you wish to add additional U.S. Patent citation information please click the Add button. Add

U.S.PATENT APPLICATION PUBLICATIONS Remove

Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20020184310	A1	2002-12-01	TRAVERSAT ET AL.	
	2	20030076815	A1	2003-04-23	MILLER ET AL.	
	3	20040034793	A1	2004-02-19	YUAN, WEI	
	4	20040139225	A1	2004-07-15	TAKAHASHI, MASAYUKI	
	5	20050033985	A1	2005-02-10	XU ET AL.	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	2819
	Examiner Name	
	Attorney Docket Number	DAMA-31813

	6	20050091407	A1	2005-04-28	VAZIRI ET AL.	
	7	20050195802	A1	2005-09-08	KLEIN ET AL.	
	8	20050286519	A1	2005-12-29	RAVIKUMAR ET AL.	
	9	20070016921	A1	2007-01-01	LEVI ET AL.	
	10	20030046056	A1	2003-03-06	GODOY ET AL.	
	11	20040158471	A1	2004-08-12	DAVIS ET AL.	
	12	20050086309	A1	2005-04-21	GALLI ET AL.	
	13	20040162871	A1	2004-08-19	PABLA ET AL.	
	14	20030115251	A1	2003-06-19	FREDRICKSON ET AL.	
	15	20020178087	A1	2002-11-28	HENDERSON ET AL.	
	16	20060183476	A1	2006-08-17	MORITA, J. ET AL.	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	2819
	Examiner Name	
	Attorney Docket Number	DAMA-31813

	17	20030220121	A1	2003-11-27	KONISHI, T. ET AL.	
	18	20080192756	A1	2008-08-14	DAMOLA ET AL.	
	19	20030072485	A1	2003-04-17	GUERIN ET AL.	
	20	20050008024	A1	2005-01-13	NEWPOL ET AL.	
	21	20020176404	A1	2002-11-28	GIRARD, GREGORY D.	
	22	20030137939	A1	2003-07-24	DUNNING ET AL.	
	23	20040100973	A1	2004-05-01	PRASAD, ANAND R.	
	24	20020080719	A1	2002-06-27	PARKVALL ET AL.	
	25	20040228279	A1	2004-11-18	MIDTUN ET AL.	
	26	20050050227	A1	2005-03-01	MICHELMAN, ERIC H.	
	27	20030217171	A1	2003-11-01	VON STUERMER ET AL.	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	2819
	Examiner Name	
	Attorney Docket Number	DAMA-31813

	28	20040267938	A1	2004-12-01	SHOROFF ET AL.	
	29	20020087887	A1	2002-07-01	BUSAM ET AL.	
	30	20020120757	A1	2002-08-01	SUTHERLAND ET AL.	
	31	20020166053	A1	2002-11-01	WILSON, RODGER P.	
	32	20030044020	A1	2003-03-01	ABOBA ET AL.	
	33	20030163697	A1	2003-08-01	PABLA ET AL.	
	34	20030177422	A1	2003-09-01	TARAROUKHINE ET AL.	
	35	20040260952	A1	2004-12-01	NEWMAN ET AL.	
	36	20050249196	A1	2005-11-01	ANSARI ET AL.	
	37	20060148516	A1	2006-07-01	REDDY ET AL.	
	38	20070110043	A1	2007-05-01	GIRARD, GREGORY D.	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	2819
	Examiner Name	
	Attorney Docket Number	DAMA-31813

	39	20080069105	A1	2008-03-01	COSTA ET AL.	
	40	20080320096	A1	2008-12-01	SZETO, CHRISTOPHER	
	41	20090192976	A1	2009-07-01	SPIVACK ET AL.	
	42	20050119005	A1	2005-06-00	SEGAL ET AL.	
	43	20060246903	A1	2006-11-00	KONG ET AL.	
	44	20030031210	A1	2003-02-00	HARRIS, JOHN M.	
	45	20030035441	A1	2003-02-00	CHENG ET AL.	
	46	20030174707	A1	2003-09-00	GROB ET AL.	
	47	20050138119	A1	2005-06-00	SARIDAKIS, TITOS	

If you wish to add additional U.S. Published Application citation information please click the Add button. Add

FOREIGN PATENT DOCUMENTS Remove

Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] ¡	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]

EFS Web 2.1.17

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	2819
	Examiner Name	
	Attorney Docket Number	DAMA-31813

	1							☐

If you wish to add additional Foreign Patent Document citation information please click the Add button Add

NON-PATENT LITERATURE DOCUMENTS Remove

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T5
	1	PCT: International Preliminary Report on Patentability of PCT/US2008/075141; 09 March 2010; 5 pgs.	☐
	2	PCT: International Preliminary Report on Patentability of PCT/US2007/068820; 31December 2008; 8 pgs.	☐
	3	PCT: International Preliminary Report on Patentability of PCT/US2007/068823; 27 November 2008; 8 pgs.	☐
	4	PCT: International Preliminary Report on Patentability of PCT/US2006/047841; 06 November 2008; 7 pgs.	☐
	5	PCT: International Preliminary Report on Patentability of PCT/US2007/002424; 07 August 2008; 6 pgs.	☐
	6	PCT: International Preliminary Report on Patentability of PCT/US2006/040312; 02 May 2008; 5 pgs.	☐
	7	PCT: International Preliminary Report on Patentability of PCT/IB2005/000821; 19 October 2006; 10 pgs.	☐

If you wish to add additional non-patent literature document citation information please click the Add button Add

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	2819
	Examiner Name	
	Attorney Docket Number	DAMA-31813

EXAMINER SIGNATURE			
Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	2819
	Examiner Name	
	Attorney Docket Number	DAMA-31813

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☐ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☐ See attached certification statement.

☐ Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ None

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Timothy F. Bliss Reg. #50925/	Date (YYYY-MM-DD)	2013-12-11
Name/Print	TIMOTHY F. BLISS	Registration Number	50925

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these record s.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44*bis*)

Applicant's or agent's file reference	**FOR FURTHER ACTION**	See item 4 below
International application No. PCT/US2008/075141	International filing date *(day/month/year)* 03 September 2008 (03.09.2008)	Priority date *(day/month/year)* 03 September 2007 (03.09.2007)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant DAMAKA, INC.		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 *bis*.1(a).

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

   In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

☒	Box No. I	Basis of the report
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☐	Box No. VII	Certain defects in the international application
☐	Box No. VIII	Certain observations on the international application

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44*bis*.3(c) and 93*bis*.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44*bis* .2).

	Date of issuance of this report 09 March 2010 (09.03.2010)
The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. +41 22 338 82 70	Authorized officer Athina Nickitas-Etienne e-mail: pt04.pct@wipo.int

Form PCT/IB/373 (January 2004)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
BLISS, TIMOTHY F.

P.O. Box 741715 Dallas Texas 75374-1715 USA

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing *(day/month/year)*	**05 MARCH 2009 (05.03.2009)**
Applicant's or agent's file reference	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2008/075141	**03 SEPTEMBER 2008 (03.09.2008)**	03 SEPTEMBER 2007 (03.09.2007)

International Patent Classification (IPC) or both national classification and IPC

H04L 12/28(2006.01)i, H04L 12/24(2006.01)i

Applicant

DAMAKA, INC. et al

1. This opinion contains indications relating to the following items:
   - ☒ Box No. I Basis of the opinion
   - ☐ Box No. II Priority
   - ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - ☐ Box No. IV Lack of unity of invention
   - ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   - ☐ Box No. VI Certain documents cited
   - ☐ Box No. VII Certain defects in the international application
   - ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**
   If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

   If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.
   For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/KR	Date of completion of this opinion	Authorized officer
Korean Intellectual Property Office Government Complex-Daejeon, 139 Seonsa-ro, Seo-gu, Daejeon 302 -701 Republic of Korea Facsimile No. 82-42-472-7140	05 MARCH 2009 (05.03.2009)	JUN, Young Sang Telephone No.82-42-481-565

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2008/075141

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of :

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

   a. type of material

   ☐ a sequence listing

   ☐ table(s) related to the sequence listing

   b. format of material

   ☐ on paper

   ☐ in electronic form

   c. time of filing/furnishing

   ☐ contained in the international application as filed.

   ☐ filed together with the international application in electronic form.

   ☐ furnished subsequently to this Authority for the purposes of search.

4. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additioanl copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2008/075141

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-19	YES
	Claims	NONE	NO
Inventive step (IS)	Claims	8- 19	YES
	Claims	1- 7	NO
Industrial applicability (IA)	Claims	1-19	YES
	Claims	NONE	NO

2. Citations and explanations :

Reference is made to the following documents:

D1: US 6766373 B1 (BRUCE A. BEADLE et al.) 20 July 2004
D2: QIAN ZHANG; CHUANXIONG GUO; ZIHUA GUO; WENWU ZHU, 'Efficient mobility management for vertical handoff between WWAN and WLAN', Communications Magazine, IEEE, vol. 41, issue 11, NOVEMBER 2003, pages: 102 - 108
D3: WO 2006/075677 A1 (SHARP KABUSHIKI KAISHA) 20 July 2006
D4: SETA, N.; MIYAJIMA, H.; ZHANG, L.; HAYASHI, H.; FUJII, T., 'All-SIP Mobility: Session Continuity on Handover in Heterogeneous Access Environment', Vehicular Technology Conference, 2007. VTC 2007-Spring. IEEE 65th, 22-25 April 2007, pages: 1121 - 1126

1. Novelty and Inventive Step

1.1. Concerning Claims 1-7

Independent Claim 1

Claim 1 of the present invention relates to a method comprising: monitoring a first connection with a first network to determine disconnection; establishing a second connection with a second network, wherein establishing the second connection includes obtaining an address and port assignment; and maintaining a communication session.
D1, which is considered to represent the most relevant state of the art, relates to a seamless switching of a network session. D1 discloses the method of monitoring, establishing and switching connections between two different networks depending on network conditions. Also, D1 describes the technique for maintaining a session when the networks are switched. Although an address and port assignment for establishing the second connection is not disclosed in D1, it can be readily inferred from the 'connection information' of D2 (See "Local Connection Translation", p. 106 in D2) by a person skilled in the art. **Thus, claim 1 does not involve an inventive step under PCT Article 33(3).**

Dependent Claims 2-7

The additional feature of claim 2, dependent on claim 1, is establishing the second connection only if the signal strength exceeds the threshold. However, it is merely a description of a handover condition in a wireless communication system.

< Continued on Supplemental Sheet >

Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**
Continuation of :

<Box No. V>

The additional feature of claim 3, dependent on claim 1, is determining a rate at which the signal strength is weakening for switching. However, the technique is obvious to a person skilled art in the field of a wireless communication system (a handover prediction technique).
The additional feature of claim 4, dependent on claim 1, is reestablishing the communication session. However, it is disclosed in D1.
The additional features of claims 5 and 6, dependent on claim 4, are relate to 'breaking connection prior to establishing another connection' and 'breaking connection after establishing another connection', respectively. However, they can be referred from the 'soft handover' and the 'hard handover' of a wireless communication system.
The additional feature of claim 7, dependent on claim 1, are saving and refreshing the current state of the connection. However, it is disclosed in the abstract of D1.
Thus, claims 2-7 do not involve an inventive step under PCT Article 33(3).

1.2. Concerning Claims 8-19

Independent Claims 8 and 17

The subject matter of claims 8 and 17 differs from these prior at documents in that claims 8 and 17 describe the technique of sending a notification directly to the endpoint of the address and port assignment. And it is not obvious to a person skilled in the art by the documents, taken alone or in combination. Therefore, **claims 8 and 17 meet the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.**

Dependent Claims 9-16 and 18-19

Claims 9-16 and 18-19 are dependent on claims 8 and 17, respectively, and therefore also **meet the requirements of PCT Article 33(2) and (3).**

2. Industrial Applicability

Claims 1-19 relate to a method and a device for maintaining a session during a network switching. The technique of the claims can be applied to seamless data services in a wireless communication system. Therefore, **claims 1-19 of the present invention are industrially applicable (PCT Article 33(4)).**

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION CONCERNING TRANSMITTAL OF COPY OF INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY (CHAPTER I OF THE PATENT COOPERATION TREATY)
(PCT Rule 44bis.1(c))

To:

REC'D FEB 17 2009

BLISS, Timothy F.
P.O. Box 793968
Dallas, Texas 75379-3968
ETATS-UNIS D'AMERIQUE

Date of mailing *(day/month/year)* 31 December 2008 (31.12.2008)	
Applicant's or agent's file reference 1001.11WO	**IMPORTANT NOTICE**

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2007/068820	11 May 2007 (11.05.2007)	15 May 2006 (15.05.2006)

Applicant
DAMAKA, INC. et al

The International Bureau transmits herewith a copy of the international preliminary report on patentability (Chapter I of the Patent Cooperation Treaty)

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer Beate Giffo-Schmitt
Facsimile No. +41 22 338 82 70	e-mail: pt03.pct@wipo.int

Form PCT/IB/326 (January 2004)

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44*bis*)

Applicant's or agent's file reference 1001.11WO	**FOR FURTHER ACTION**	See item 4 below
International application No. PCT/US2007/068820	International filing date *(day/month/year)* 11 May 2007 (11.05.2007)	Priority date *(day/month/year)* 15 May 2006 (15.05.2006)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant DAMAKA, INC.		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 *bis*.1(a).

2. This REPORT consists of a total of 7 sheets, including this cover sheet.

   In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

☒	Box No. I	Basis of the report
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☐	Box No. VII	Certain defects in the international application
☐	Box No. VIII	Certain observations on the international application

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44*bis*.3(c) and 93*bis*.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44*bis* .2).

	Date of issuance of this report 16 December 2008 (16.12.2008)
The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. +41 22 338 82 70	Authorized officer Beate Giffo-Schmitt e-mail: pt03.pct@wipo.int

Form PCT/IB/373 (January 2004)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
TIMOTHY F. BLISS
P.O. BOX 793968
DALLAS, TX 75379-3968

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing (*day/month/year*)	10 NOV 2008
Applicant's or agent's file reference 1001.11WO	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date (*day/month/year*)	Priority date (*day/month/year*)
PCT/US07/68820	11 May 2007 (11.05.2007)	15 May 2006 (15.05.2006)

International Patent Classification (IPC) or both national classification and IPC

IPC: **G06F 15/16**(2006.01);**H04L 12/16**(2006.01)
USPC: 709/246;370/260

Applicant

DAMAKA,INC.

1. This opinion contains indications relating to the following items:

- ☒ Box No. I — Basis of the opinion
- ☐ Box No. II — Priority
- ☐ Box No. III — Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV — Lack of unity of invention
- ☒ Box No. V — Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI — Certain documents cited
- ☐ Box No. VII — Certain defects in the international application
- ☐ Box No. VIII — Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1*bis*(*b*) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/ US	Date of completion of this opinion	Authorized officer
Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (571) 273-3201	11 June 2008 (11.06.2008)	Thong Vu Telephone No. 703-305-3333

Form PCT/ISA/237 (cover sheet) (April 2007)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US07/68820

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:
   - ☒ the international application in the language in which it was filed
   - ☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).
2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))
3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of:

   a. type of material
      - ☐ a sequence listing
      - ☐ table(s) related to the sequence listing

   b. format of material
      - ☐ on paper
      - ☐ in electronic form

   c. time of filing/furnishing
      - ☐ contained in the international application as filed.
      - ☐ filed together with the international application in electronic form.
      - ☐ furnished subsequently to this Authority for the purposes of search.

4. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US07/68820

Box No. V Reasoned statement under Rule 43 *bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims 1-20	YES
	Claims NONE	NO
Inventive step (IS)	Claims NONE	YES
	Claims 1-20	NO
Industrial applicability (IA)	Claims 1-20	YES
	Claims NONE	NO

2. Citations and explanations:

Please See Continuation Sheet

Form PCT/ISA/237 (Box No. V) (April 2007)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US07/68820

Supplemental Box
In case the space in any of the preceding boxes is not sufficient.

V. 2. Citations and Explanations:
Claims 1-20 lack an inventive step under PCT Article 33(3) as being obvious over Vaziri et al (2005/0091407 A1) in view of Simard et al (6,940,826 B1).

Claim 1, Vaziri discloses A method for execution by a first endpoint to establish a conference session in a peer-to-peer hybrid network [Vaziri, two peers, 0040; hybrid, 0101; multimedia conferences, 0126, 0130, 0209] comprising:
requesting that a conference session be established on a host [Vaziri, multimedia conference, 0126,0130,0209];
receiving information needed to connect to the conference session [Vaziri, password, 0161];
joining the conference session on the host using the information [Vaziri, creating, modifying and terminating session with one or more participants, 0126]; and

Vaziri also taught a multi network exchange bridge has second and third addresses with and extension indicates the an portable device may communicate directly with said multi network exchange bridge [Vaziri, claim 4]
However Vaziri does note explicitly detail

sending at least a portion of the information to second and third endpoints so that the second and third endpoints can join the conference session on the host using the portion of the information, wherein the first endpoint sends signaling information for the conference session directly to the second and third endpoints, and wherein the first endpoint receives signaling information for the conference session directly from the second and third endpoints.

Simard taught an conference bridge receiving data from three difference sources, those being direct from participant A and from both the second and third conference bridges [Simard, col 12 line 60-col 13 line 55]

Therefore it would have been obvious to an ordinary skill in the art at the time the invention was made to incorporate the technique of using a portion of information or criteria of the bridges to establish the session directly from the second and third sources as taught by Simard into the Vaziri's apparatus in order to utilize the conference bridges.

Doing so would reduce in transcoding, latency and/or required signal processing power within the conference bridge.

Claim 2, the combination of Vaziri and Simard discloses receiving a message directly from the second endpoint indicating that the

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No. PCT/US07/68820

Supplemental Box
In case **the space in any of the preceding boxes is not sufficient.**

second endpoint is leaving the conference session; and informing the third endpoint that the second endpoint has left the conference session [Vaziri, creating, modifying and terminating session with one or more participants, 0126].

Claim 3, Vaziri discloses requesting that the conference session be established includes sending the request to a conference controller coupled to the host, wherein the conference controller communicates with the host to set up the conference session and responds to the first endpoint after the conference session is established [Vaziri, creating, modifying and terminating session with one or more participants, 0126].

Claim 4, the combination of Vaziri and Simard discloses of the first, second, and third endpoints, only the first endpoint communicates with the conference controller during the conference session [Simard, col 12 line 60-col 13 line 55].

Claim 5, Vaziri discloses sending a message directly from the first endpoint to the second and third endpoints instructing the first and second endpoints to disconnect from the host [Vaziri, a single host, 0213].

Claim 6, the combination of Vaziri and Simard discloses sending at least a portion of the information to the second and third endpoints includes sending an invitation directly from the first endpoint to each of the second and third endpoints to join the conference session [Simard, col 12 line 60-col 13 line 55].

Claim 7, the combination of Vaziri and Simard discloses receiving a response to the invitation directly from the second and third endpoints [Simard, col 12 line 60-col 13 line 55].

Claim 8, Vaziri discloses A peer-to-peer hybrid system for a conference session [Vaziri, two peers, 0040; hybrid, 0101; multimedia conferences, 0126, 0130, 0209] comprising:
a first endpoint coupled to second and third endpoints; a host coupled to the first, second, and third endpoints [Vaziri, one or more participants, 0209]; and
a plurality of instructions for establishing and maintaining the conference session [Vaziri, a single host with multi host configuration, 0213], including instructions for:
establishing a conference session on the host at the request of the first endpoint [Vaziri, creating, modifying and terminating sessions with one or more participants, 0126];

However Vaziri does note explicitly detail

sending a message directly from the first endpoint to the second and third endpoints inviting the second and third endpoints to join the conference session;
routing conference session media traffic between the first, second, and third endpoints via the host; and sending signaling messages for the conference session directly from the first endpoint to the second and third endpoints and directly from the second and third endpoints to the first endpoint.

Simard taught an conference bridge receiving data from three difference sources, those being direct from participant A and from both the second and third conference bridges [Simard, col 12 line 60-col 13 line 55]

Therefore it would have been obvious to an ordinary skill in the art at the time the invention was made to incorporate the technique of using a portion of information or criteria of the bridges to establish the session directly from the second and third sources as taught by Simard into the Vaziri's apparatus in order to utilize the conference bridges.

Doing so would reduce in transcoding, latency and/or required signal processing power within the conference bridge.

Claim 9, Vaziri discloses a conference controller coupled to the first endpoint and the host, wherein the instructions for establishing the conference session include instructions for sending a request for the conference session from the first endpoint to the conference controller; sending a request for the conference session from the conference controller to the host; sending a response to the conference controller's request from the host to the conference controller; and
sending a response to the first endpoint's request from the conference controller to the first endpoint based on the response received by the conference controller from the host [Vaziri, a single host, 0213].

Claim 10, the combination of Vaziri and Simard discloses of the first, second, and third endpoints, only the first endpoint communicates with the conference controller during the conference session [Simard, col 12 line 60-col 13 line 55].

Claim 11, Vaziri discloses the conference controller and the host are combined in a single device [Vaziri, a single host, 0213].

Claim 12, Vaziri discloses instructions for sending a notification directly from the second endpoint to the first endpoint that the second endpoint is leaving the conference session; and sending a notification directly from the first endpoint to the third endpoint that the second endpoint has left the conference session [Vaziri, creating, modifying and terminating session with one or more participants, 0126.

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US07/68820

Supplemental Box
In case **the space in any of the preceding boxes is not sufficient.**

Claim 13, Vaziri discloses instructions for sending a notification from the second endpoint to the host that the second endpoint is leaving the conference session [Vaziri, creating, modifying and terminating session with one or more participants, 0126].

Claim 14, Vaziri discloses instructions for determining, by the second endpoint, whether the first endpoint has dropped from the conference session; and
sending a notification from the second endpoint to the host that the second endpoint is leaving the conference session if the first endpoint has dropped [Vaziri, creating, modifying and terminating session with one or more participants, 0126].

Claim 15, the combination of Vaziri and Simard discloses instructions for sending a notification directly from the first endpoint to the second and third endpoints that the first endpoint is leaving the conference session [Simard, col 12 line 60-col 13 line 55].

Claim 16, Vaziri discloses A method for conducting a conference session in a peer-to-peer hybrid network [Vaziri, two peers, 0040; hybrid, 0101; multimedia conferences, 0126, 0130, 0209] comprising:
establishing, by a first endpoint, a conference session on a host; joining, by the first endpoint, the conference session; and sending an invitation to join the conference session from the first endpoint directly to second and third endpoints [Vaziri, creating, modifying and terminating sessions with one or more participants, 0126],

However Vaziri does note explicitly detail

wherein signaling information during the conference session is sent from the first endpoint directly to the second and third endpoints, and wherein media traffic for the conference session is sent by each endpoint through the host.

Simard taught an conference bridge receiving data from three difference sources, those being direct from participant A and from both the second and third conference bridges [Simard, col 12 line 60-col 13 line 55]

Therefore it would have been obvious to an ordinary skill in the art at the time the invention was made to incorporate the technique of using a portion of information or criteria of the bridges to establish the session directly from the second and third sources as taught by Simard into the Vaziri's apparatus in order to utilize the conference bridges.

Doing so would reduce in transcoding, latency and/or required signal processing power within the conference bridge.

Claim 17, the combination of Vaziri and Simard discloses sending a notification from the second endpoint directly to the first endpoint that the second endpoint is leaving the conference session; and sending a notification from the first endpoint directly to the third endpoint that the second endpoint has left the conference session [Simard, col 12 line 60-col 13 line 55].

Claim 18, Vaziri discloses detecting, by the second endpoint, whether the first endpoint has dropped from the call; and informing the host that the second endpoint is leaving the call if the first endpoint has dropped [Vaziri, creating, modifying and terminating session with one or more participants, 0126].

Claim 19, Vaziri discloses establishing the conference session on the host includes sending a request for the conference session from the first endpoint; and receiving information corresponding to the conference session at the first endpoint, wherein the information includes a port and address for the conference session [Vaziri, invite request, port number, Ip address, 0188].

Claim 20, the combination of Vaziri and Simard discloses sending the invitation to join the conference session from the first endpoint directly to the second and third endpoints includes sending the port and address information [Simard, col 12 line 60-col 13 line 55].

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION CONCERNING TRANSMITTAL OF COPY OF INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY (CHAPTER I OF THE PATENT COOPERATION TREATY)
(PCT Rule 44bis.1(c))

To:

RECD DEC 2 2 2008

BLISS, Timothy F.
P.O. Box 793968
Dallas, Texas 75379-3968
ETATS-UNIS D'AMERIQUE

Date of mailing *(day/month/year)*	
27 November 2008 (27.11.2008)	
Applicant's or agent's file reference 1000.13WO	**IMPORTANT NOTICE**
International application No. PCT/US2007/068823	International filing date *(day/month/year)* 11 May 2007 (11.05.2007)
Priority date *(day/month/year)* 15 May 2006 (15.05.2006)	
Applicant DAMAKA, INC. et al	

The International Bureau transmits herewith a copy of the international preliminary report on patentability (Chapter I of the Patent Cooperation Treaty)

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No. +41 22 338 82 70

Authorized officer
Beate Giffo-Schmitt

e-mail: pt03.pct@wipo.int

Form PCT/IB/326 (January 2004)

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44*bis*)

Applicant's or agent's file reference 1000.13WO	**FOR FURTHER ACTION**	See item 4 below
International application No. PCT/US2007/068823	International filing date *(day/month/year)* 11 May 2007 (11.05.2007)	Priority date *(day/month/year)* 15 May 2006 (15.05.2006)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant DAMAKA, INC.		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 *bis*.1(a).

2. This REPORT consists of a total of 7 sheets, including this cover sheet.

   In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

☒	Box No. I	Basis of the report
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☐	Box No. VII	Certain defects in the international application
☐	Box No. VIII	Certain observations on the international application

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44*bis*.3(c) and 93*bis*.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44*bis* .2).

	Date of issuance of this report 17 November 2008 (17.11.2008)
The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer Beate Giffo-Schmitt
Facsimile No. +41 22 338 82 70	e-mail: pt03.pct@wipo.int

Form PCT/IB/373 (January 2004)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
TIMOTHY F. BLISS
P.O. BOX 793968
DALLAS, TX 75379-3968

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing (*day/month/year*)	15 AUG 2008
Applicant's or agent's file reference 1000.13WO	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date (*day/month/year*)	Priority date (*day/month/year*)
PCT/US07/68823	11 May 2007 (11.05.2007)	15 May 2006 (15.05.2006)

International Patent Classification (IPC) or both national classification and IPC

IPC: **H04L 12/26**(2006.01)
USPC: 370/252

Applicant

DAMAKA, INC

1. This opinion contains indications relating to the following items:

- ☒ Box No. I — Basis of the opinion
- ☐ Box No. II — Priority
- ☐ Box No. III — Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV — Lack of unity of invention
- ☒ Box No. V — Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI — Certain documents cited
- ☐ Box No. VII — Certain defects in the international application
- ☐ Box No. VIII — Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1*bis*(*b*) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/ US	Date of completion of this opinion	Authorized officer
Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (571) 273-3201	01 June 2008	Huy D. Vu Telephone No. (571) 270-1413

Form PCT/ISA/237 (cover sheet) (April 2007)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US07/68823

Box No. I Basis of this opinion

I. With regard to the **language**, this opinion has been established on the basis of:

☒ the international application in the language in which it was filed

☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of:

a. type of material

☐ a sequence listing

☐ table(s) related to the sequence listing

b. format of material

☐ on paper

☐ in electronic form

c. time of filing/furnishing

☐ contained in the international application as filed.

☐ filed together with the international application in electronic form.

☐ furnished subsequently to this Authority for the purposes of search.

4. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US07/68823

Box No. V Reasoned statement under Rule 43 *bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims 1-21	YES
	Claims NONE	NO
Inventive step (IS)	Claims NONE	YES
	Claims 1-21	NO
Industrial applicability (IA)	Claims 1-21	YES
	Claims NONE	NO

2. Citations and explanations:

Please See Continuation Sheet

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US07/68823

Supplemental Box
In case the space in any of the preceding boxes is not sufficient.

V. 2. Citations and Explanations:

Claims 1-21 lack an inventive step under PCT Article 33(2) as being obvious over Inbar et al. (US 2002/0150110) in view of Goodman et al. (US 2003/0177186).

As per claim 1, Inbar et al. discloses a method for execution in a peer-to-peer hybrid network comprising: determining that the unique user identification information is concurrently associated with a second endpoint currently logged into the network (see section 14, unique identification, section 29, database); and sending a message directly from the first endpoint to the second endpoint to notify the second endpoint that the first endpoint is logged into the network using the unique user identification information (see section 9, 47, 62 and 85, end to end peer to peer).

Goodman et al. discloses logging a first endpoint into the network, wherein the login associates the first endpoint with unique user identification information required for authentication with the network (see figure 3, sections 39-40, client and password).

As per claim 2, Inbar et al. discloses designating one of the first and second endpoints as a slave endpoint and designating the other of the first and second endpoints as a master endpoint (see section 26 and 27).

As per claim 3, Goodman et al. discloses identifying the first or second endpoint designated as the master endpoint as the endpoint associated with the unique user identification information that is visible to a third endpoint on the network, wherein the third endpoint is not associated with the unique user information of the first and second endpoints (see section 31 and 38, policy based).

As per claim 4, Goodman et al. discloses sending a message directly from the first or second endpoint designated as the master endpoint to the third endpoint to notify the third endpoint that the first or second endpoint designated as the master endpoint is logged into the network, wherein the third endpoint is not notified that the first or second endpoint designated as the slave endpoint is logged into the network (see section 28, hybrid p2p, section 31, limited number of other clients based on user identification, section 38, policy based on a number of criteria, e.g. engineering, sales, distance etc.).

As per claim 5, Goodman et al. discloses sending a login notification from a fourth endpoint directly to the first or second endpoint designated as the master endpoint when the fourth endpoint logs into the network after the first and second endpoints, wherein the fourth endpoint is not associated with the unique user information of the first and second endpoints, and wherein the login notification is not sent to the first or second endpoint designated as the slave endpoint (see section 31, 34, and 38, periodically updates).

As per claim 6, Goodman et al. discloses sending a login notification from the fourth endpoint directly to the third endpoint (see section 38).

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US07/68823

Supplemental Box
In case **the space in any of the preceding boxes is not sufficient.**

As per claim 7, Goodman et al. discloses sending a login notification from a fifth endpoint directly to the first and second endpoints when the fifth endpoint logs into the network using the unique user information of the first and second endpoints, wherein the login notification is not sent to the third endpoint (see section 31, 34, and 38, periodically updates).

As per claim 8, Goodman et al. discloses comprising: determining whether the message is received from a second endpoint that is authenticated with the network using the unique user identification information of the first endpoint or from a third endpoint that is authenticated with the network using unique user identification information different from the unique user identification information of the first endpoint (see section 28, hybrid p2p, section 31, limited number of other clients based on user identification, section 38, policy based on a number of criteria, e.g. Engineering, sales, distance etc.); and applying a policy based on whether the message is from the second endpoint or the third endpoint (see section 28, hybrid p2p, section 31, limited number of other clients based on user identification, section 38, policy based on a number of criteria, e.g. engineering, sales, distance etc.).

Inbar et al. furthermore discloses receiving a message by a first endpoint, wherein the first endpoint is associated with unique user identification information required for authentication with the network (see section 9, end point as clients and as server, section 26, master and section 38, to a group or all subscribers).

As per claim 9, Goodman et al. discloses wherein applying the policy includes forwarding the message to all endpoints that are authenticated with the network using the unique user identification information of the first endpoint (see section 38).

As per claim 10, Goodman et al. discloses further comprising determining whether the policy requires forwarding of the message (see section 38).

As per claim 11, Goodman et al. discloses further comprising determining whether a forwarding destination is provided in the policy if forwarding is required (see section 38).

As per claim 12, Goodman et al. discloses further comprising forwarding the message to the provided destination if forwarding is required (see section 38).

As per claim 13, Goodman et al. discloses further comprising identifying an active endpoint if a forwarding destination is not provided (see section 31 and 38, seed list).

As per claim 14, Goodman et al. discloses identifying an active endpoint includes sending the message to the second endpoint, wherein the second endpoint displays the most recent activity of all endpoints that are authenticated with the network using the unique user identification information of the first endpoint (see section 34, periodically updating).

As per claim 15, Goodman et al. discloses wherein the message is from the second endpoint and includes a request for file access to an endpoint that is authenticated with the network using the unique user identification information of the first endpoint (see section 31 and 38, seed list).

As per claim 16, Goodman et al. discloses further comprising providing the second endpoint with the file access (see section 31 and 38, seed list).

As per claim 17, Inbar et al. discloses a method for routing a message in a peer-to-peer hybrid network comprising: retrieving a profile and a routing table from an access server by a first endpoint during an authentication process, wherein the profile identifies a second endpoint as an endpoint with which the first endpoint has permission to communicate (see section 14, unique identification, section 29, database), and the routing table contains address information needed for the first endpoint to communicate directly with the second endpoint; receiving, by the second endpoint, a message sent directly from the first endpoint (see section 9, 47, 62 and 85, end to end peer to peer).

Goodman et al. discloses identifying, by the second endpoint, information associated with the message to be used in routing the message, wherein the information does not identify a specific destination (no ip address , see section 15, section 34, download list of ip or seed list); and sending the message from the second endpoint directly to at least a third endpoint based on the application of a policy to the identified information (see section 28, hybrid p2p, section 31, limited number of other clients based on user identification, section 38, policy based on a number of criteria, e.g. engineering, sales, distance etc.).

As per claim 18, Goodman et al. discloses assigning the third endpoint to a group of endpoints based on a skill of a user associated with the third endpoint (see section 31 and 38); and selecting the third endpoint when application of the policy to the identified information identifies the skill as needed by a user of the first endpoint (see section 38).

As per claim 19, Goodman et al. discloses a peer-to-peer hybrid system comprising: a server/client endpoint and a client endpoint concurrently logged into a network using a first set of login information (see section 39 and figure 3); an outside endpoint logged into the network using a second set of login information; a first profile associated with the master and slave endpoints, wherein the first profile (see section 31, seed list) designates the master endpoint as being able to communicate directly with other endpoints not part of the concurrent login using the first set of login information, and designates the slave endpoint as being able to communicate directly only with the server/client endpoint and other endpoints part of the concurrent login using the first set of login information (see figure 3, sections 31, 39-40, client and password, determines the number of clients authorized to connect to); and a second profile (see figure 3, sections 31, 39-40, client and password, determines the number of clients authorized to connect to) associated with the outside endpoint, wherein the second profile designates the outside endpoint as being able to communicate directly only with the server/client endpoint and other endpoints not part of the concurrent login using the first set of login information, wherein the slave endpoint is not available for direct communication with the outside endpoint (see section 28, hybrid p2p, section 31, limited number of other clients based on user identification, section 38,

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US07/68823

Supplemental Box
In case **the space in any of the preceding boxes is not sufficient.**

policy based on a number of criteria, e.g. engineering, sales, distance etc. the other clients being able to communicate with managerial resources as mentioned in section 41).

Inbar et al. discloses a master endpoint and a slave endpoint (see section 26, 27 and 85).

As per claim 20, Goodman et al. discloses further comprising a routing table associated with the master, slave, and outside endpoints, wherein the routing table for the master endpoint contains address information needed for the master endpoint to communicate directly with the slave and outside endpoints, and wherein the routing table for the slave and outside endpoints contains address information needed for each of the slave and outside endpoints to communicate directly with the master endpoint but not with each other (see section 31, seed list).

As per claim 21, Goodman et al. discloses wherein each of the master and slave endpoints is associated with a tag different from the other endpoint, wherein the tags enable the master and slave endpoints to be differentiated on the network (see section 38, common attribute).

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION CONCERNING TRANSMITTAL OF COPY OF INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY (CHAPTER I OF THE PATENT COOPERATION TREATY)
(PCT Rule 44bis.1(c))

To:

REC'D DEC 2 2 2008

BLISS, Timothy, F.
PO Box 793968
Dallas, TX 75379-3968
ETATS-UNIS D'AMERIQUE

Date of mailing *(day/month/year)* 06 November 2008 (06.11.2008)	
Applicant's or agent's file reference 1000.8WO	**IMPORTANT NOTICE**

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2006/047841	13 December 2006 (13.12.2006)	14 December 2005 (14.12.2005)

Applicant
DAMAKA, INC. et al

The International Bureau transmits herewith a copy of the international preliminary report on patentability (Chapter I of the Patent Cooperation Treaty)

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No. +41 22 338 82 70

Authorized officer
Athina Nickitas-Etienne

e-mail: pt04.pct@wipo.int

Form PCT/IB/326 (January 2004)

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44*bis*)

Applicant's or agent's file reference 1000.8WO	**FOR FURTHER ACTION**	See item 4 below
International application No. PCT/US2006/047841	International filing date *(day/month/year)* 13 December 2006 (13.12.2006)	Priority date *(day/month/year)* 14 December 2005 (14.12.2005)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant DAMAKA, INC.		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 *bis*.1(a).

2. This REPORT consists of a total of 6 sheets, including this cover sheet.

   In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

☒	Box No. I	Basis of the report
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☐	Box No. VII	Certain defects in the international application
☐	Box No. VIII	Certain observations on the international application

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44*bis*.3(c) and 93*bis*.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44*bis* .2).

	Date of issuance of this report 28 October 2008 (28.10.2008)
The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer Athina Nickitas-Etienne
Facsimile No. +41 22 338 82 70	e-mail: pt04.pct@wipo.int

Form PCT/IB/373 (January 2004)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
TIMOTHY F. BLISS
PO BOX 793968
DALLAS, TX 75379-3968

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing *(day/month/year)* 24 SEP 2008

Applicant's or agent's file reference
1000.8WO

FOR FURTHER ACTION
See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2006/047841	13 December 2006	14 December 2005

International Patent Classification (IPC) or both national classification and IPC
IPC(8) - G06Q 40/00 (2008.04)
USPC - 705/37

Applicant
DAMAKA, INC.

1. This opinion contains indications relating to the following items:

- [X] Box No. I Basis of the opinion
- [ ] Box No. II Priority
- [ ] Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- [ ] Box No. IV Lack of unity of invention
- [X] Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- [ ] Box No. VI Certain documents cited
- [ ] Box No. VII Certain defects in the international application
- [ ] Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/US	Date of completion of this opinion	Authorized officer:
Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201	12 September 2008	Blaine Copenheaver PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

Form PCT/ISA/237 (cover sheet) (April 2007)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2006/047841

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:

   ☒ the international application in the language in which it was filed.

   ☐ a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of:

   a. type of material

      ☐ a sequence listing

      ☐ table(s) related to the sequence listing

   b. format of material

      ☐ on paper

      ☐ in electronic form

   c. time of filing/furnishing

      ☐ contained in the international application as filed

      ☐ filed together with the international application in electronic form

      ☐ furnished subsequently to this Authority for the purposes of search

4. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2006/047841

Box No. V **Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Claims	16	YES
	Claims	1-15, 17-20	NO
Inventive step (IS)	Claims	None	YES
	Claims	1-20	NO
Industrial applicability (IA)	Claims	1-20	YES
	Claims	None	NO

2. Citations and explanations:

Claims 1-15 and 17-20 lack novelty under PCT Article 33(2) as being anticipated by Montgomery (US 2002/0038282 A1).

Regarding claim 1, Montgomery discloses a method for use by a selling endpoint in a peer-to-peer network to provide an auction to a plurality ofendpoints using a peer-to-peer commerce (p-commerce) server, the method comprising: initiating the auction by notifying the p-commerce server of at least the auction's start time (para. 0020, start time), end time (para. 0020, end time), and item being auctioned (para. 0018, products that are listed for sale through dynamic price competitive bidding); receiving a bid for the auction directly from one of the plurality of endpoints (para. 0072, all buyers and can determine which bids are ready to execute); directly notifying all endpoints of the plurality of endpoints that have previously submitted a bid in the auction of the received bid (para. 0011; para. 0072); instructing the p-commerce server to stop the auction after determining that the auction has ended (para. 0020, end time); identifying a highest bid from the submitted bids (para. 0072, high bid); and directly notifying the endpoint that submitted the highest bid that it has won the auction (para. 0013, notifying the Buyer when an auction has been won).

Regarding claim 2, Montgomery discloses the method of claim 1 further comprising reviewing the received bid (para. 0081, bid is received) to determine whether the received bid satisfies at least one predefined criterion (para. 0012, bid parameters).

Regarding claim 3, Montgomery discloses the method of claim 2 wherein the predefined criterion is a minimum bid increment (para. 0072, a bid based on computing the minimum incremental amount plus the current bid).

Regarding claim 4, Montgomery discloses the method of claim 2 wherein the predefined criterion (para. 0016, programmed bidding parameters) is a buyout price (para. 0016, lowest market price based on reviewing prevailing market prices).

Regarding claim 5, Montgomery discloses the method of claim 2 further comprising: rejecting the received bid if it does not satisfy the at least one performance criterion (para. 0020, bid parameters, rejected); directly notifying the endpoint that submitted the received bid that the received bid has been rejected (para. 0011, notifying the Buyer via a messaging center of any changes in relevant aspects of the current status of any of the plurality of product auctions that would prevent an initial bid from being placed by the bid proxy) without notifying all endpoints (para. 0026, nodes) of the plurality of endpoints (para. 0026, nodes) that have previously (para. 0025, previously configured as support servers to the site) submitted a bid in the auction of the received bid (para. 0081, bid object is received); and instructing the p-commerce server to delete the received bid from the p-commerce server (para. 0073, the item is logged as a lost bid. The item is then set to inactive in the bid portfolio and flow proceeds to agent proxy; also see para. 0075, the remaining cascade items are deleted).

Regarding claim 6, Montgomery discloses the method of claim 1 further comprising notifying the p-commerce server (para. 0025, peer servers) of the highest bid and the endpoint that submitted the highest bid (para. 0072, The bid engine can then scan the targeted auction site to determine the current high bid and bidder).

Regarding claim 7, Montgomery discloses the method of claim 1 further comprising notifying the p-commerce server that the selling endpoint is going offline (para. 0025, detects the agent cannot access the auction site because the agent is not receiving a response to inquiries including at least one of a Post and a Get, wherein the peer servers are previously configured as support servers to the site and information about the peer servers is stored in a directory on a master node at the site), wherein the p-commerce server will directly notify all endpoints of the plurality of endpoints that have previously submitted a bid in the auction of an incoming bid (para. 0082).

Regarding claim 8, Montgomery discloses the method of claim 1 further comprising ignoring a late bid received after the selling endpoint has determined the auction has ended (para. 0024) and instructing the p-commerce server to delete the late bid from the p-commerce server (para. 0063, deletion).

(Cont. in Supplemental Box)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2006/047841

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of:
Box No. V
2. Citations and explanations:

Regarding claim 9, Montgomery discloses a method for use in a peer-to-peer network to provide an auction by a first endpoint to a plurality of endpoints using a peer-to-peer commerce (p-commerce) server, the method comprising: initiating the auction'by the first endpoint by notifying the p-commerce server of auction information necessary to start the auction (para. 0020, start); obtaining at least a portion of the auction information (para. 0020, parameters of the current auction) from the p-commerce server (para. 0044, sever) by second and third endpoints of the plurality of endpoints (para. 0026, network nodes), wherein the portion includes information needed to directly communicate with the first endpoint (para. 0025,master node) via the peer-to-peer-network (para. 0077, design of the bid agent can also support distribution of a bid object to another server, see proxied peer-to-peer distributed server bid engine); submitting a bid (para. 0020, placing a bid) by the second endpoint (para. 0026, nodes) directly to the first endpoint (para. 0025, master node) and directly to the p-commerce server (para. 0044, server); and directly notifying (para. 0082, notification), by the first endpoint (para. 0025, master node), the third endpoint(para. 0026, nodes) of the received bid (para. 0081, bid object is received).

Regarding claim 10, Montgomery discloses the method of claim 9 wherein the third endpoint (para. 0026, network nodes) is only notified (para. 0016, the buyer desires to be notified) of the received bid if the third endpoint (para. 0026, network nodes) has previously submitted a bid in the auction (para. 0072) to the first endpoint (para. 0025, master node) and to the p-commerce server (para. 0044, server).

Regarding claim 11, Montgomery discloses the method of claim 10 further comprising: determining, by the first endpoint (para. 0025, master node), that the auction has ended (para. 0020, end); and instructing the p-commerce server (para. 0044, software driven, server based) to stop the auction (para. 0020, end).

Regarding claim 12, Montgomery discloses the method ofclaim 11 further comprising: receiving, by the first endpoint (para. 0025, master node), a late bid (para. 0073) from one of the plurality of endpoints (para. 0026, nodes) after determining that the auction has ended (para. 0020, end); rejecting (para. 0020, reject) the late bid (para. 0073) by the first endpoint (para. 0025, master node); and instructing, by the first endpoint (para. 0025, master node), the p-commerce server to delete the late bid from the p-commerce server (para. 0073, the item is logged as a lost bid, the item is then set to inactive in the bid portfolio and flow proceeds to agent proxy. also see para. 0075, the remaining cascade items are deleted).

Regarding claim 13, Montgomery discloses the method of claim 11 further comprising instructing, by the p-commerce server (para. 0044, server), the second and third endpoints (para. 0026, nodes) to delete the portion of information (para. 0063) needed to directly communicate with the first endpoint (para. 0025, master node) after being instructed to stop the auction (para. 0025, end) by the first endpoint (para. 0025, master node).

Regarding claim 14, Montgomery discloses the method of claim 10 further comprising: selecting, by the first endpoint (para. 0025, master node), a winning bid from the bids submitted (para. 0011, won) by the second and third endpoints (para. 0026, nodes); and directly notifying (para. 0013, notifying), by the first endpoint (para. 0025, master node), the second or third endpoint that submitted the winning bid that it won the auction (para. 0013, notifying the Buyer when an auction has been won using at least one of a bid proxy of the Buyer and a programmed bid).

Regarding claim 15, Montgomery discloses the method of claim 14 further comprising notifying the p-commerce server (para. 0044, server), by the first endpoint, of the winning bid (para. 0025, win).

Regarding claim 17, Montgomery discloses the method of claim 10 further comprising: notifying the p-commerce server (para. 0044, server), by the first endpoint (para. 0025, master node), that the first endpoint is going offline (para. 0025, detects the agent cannot access the auction site because the agent is not receiving a response to inquiries including at least one of a Post and a Get, offline); and directly notifying, by the p-commerce server, any endpoint of the plurality of endpoints that has previously submitted a bid in the auction of an incoming bid (para. 0082), wherein the p-commerce engine continues such notifying until the auction ends (para. 0020, ends) or the first endpoint comes online (para. 0025, master node).

Regarding claim 18, Montgomery discloses a method for use by a bidding endpoint in an auction in a peer-to-peer network, the method comprising: obtaining auction information from a p-commerce server (para. 0018, specific electronic auctions on a targeted auction site is set forth including: a. providing a programmable search agent, from a server, that searches auction catalogs of a plurality of auction sites), wherein the information includes information needed to directly communicate with a selling endpoint via the peer-to-peer-network (para. 0080, a bid object is passed to the local server's proxied server bid engine, then the proxied peer-to-peer distributed server bid engine component ("proxied server") process can look at a local copy of the LRUS table to select the most available, active server); submitting a bid directly to the selling endpoint and directly to the p-commerce server (para. 0080, bid object is passed to the local server's proxied server bid engine, then the proxied peer-to-peer distributed server); and receiving a notification of another bid for the auction directly from the selling endpoint if the other bid is received by the selling endpoint from another endpoint (para. 0020, another bidder) within the peer-to-peer network (para. 0041, peer-to-peer server).

(Cont. in Next Supplemental Box)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No
PCT/US2006/047841

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of:
Previous Supplemental Box:

Regarding claim 19, Montgomery discloses the method of claim 18 further comprising receiving a notice directly from the selling endpoint (para. 0023, retrieving using the scan agent the latest auction site characterization information available for that auction site), if the selling endpoint is online (para. 0023, scanning online auctions), that the bidding endpoint has either won or lost the auction (para. 0020, win/loss status of the auction and storing the win/loss status in portfolio).

Regarding claim 20, Montgomery discloses the method of claim 18 further comprising deleting the information on the bidding endpoint after the auction is over based on instructions (para. 0063) from the p-commerce server (para. 0041, peer-to-peer distributed server).

Claim 16 lacks an inventive step under PCT Article 33(3) as being obvious over Montgomery in view of Montgomery

Regarding claim 16, Montgomery discloses the method of claim 15 further comprising processing a payment transaction (para. 0014) for the winning bid (para. 0020) by the p-commerce server (para. 0044, server), wherein payment information (para. 0014) corresponding to the winning bid (para. 0020), but is silent on is not transferred to the first endpoint. However not transferring to an endpoint is a known practice in the art and the specifics of it is a matter of design choice. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the above features in the invention of Montgomery in order to prevent transfer of unauthorized information.

Claims 1-20 meet the criteria set out in PCT Article 33(4), and thus have industrial applicability because the subject matter claimed can be made or used in industry.

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION CONCERNING TRANSMITTAL OF COPY OF INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY (CHAPTER I OF THE PATENT COOPERATION TREATY)
(PCT Rule 44bis.1(c))

To:

REC'D SEP 1 0 2008

BLISS, Timothy
P.O. Box 793968
Dallas, Texas 75379-3968
ETATS-UNIS D'AMERIQUE

Date of mailing *(day/month/year)*	
07 August 2008 (07.08.2008)	
Applicant's or agent's file reference	**IMPORTANT NOTICE**
1000.9WO	

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2007/002424	27 January 2007 (27.01.2007)	27 January 2006 (27.01.2006)

Applicant
DAMAKA, INC. et al

The International Bureau transmits herewith a copy of the international preliminary report on patentability (Chapter I of the Patent Cooperation Treaty)

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No. +41 22 338 82 70

Authorized officer
Beate Giffo-Schmitt

e-mail: pt03.pct@wipo.int

Form PCT/IB/326 (January 2004)

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44*bis*)

Applicant's or agent's file reference 1000.9WO	**FOR FURTHER ACTION**	See item 4 below
International application No. PCT/US2007/002424	International filing date (*day/month/year*) 27 January 2007 (27.01.2007)	Priority date (*day/month/year*) 27 January 2006 (27.01.2006)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant DAMAKA, INC.		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 *bis*.1(a).

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

   In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

☒	Box No. I	Basis of the report
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☐	Box No. VII	Certain defects in the international application
☐	Box No. VIII	Certain observations on the international application

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44*bis*.3(c) and 93*bis*.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44*bis* .2).

	Date of issuance of this report 29 July 2008 (29.07.2008)
The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer Beate Giffo-Schmitt
Facsimile No. +41 22 338 82 70	e-mail: pt03.pct@wipo.int

Form PCT/IB/373 (January 2004)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To: TIMOTHY BLISS
P.O. BOX 793968
DALLAS, TEXAS 75379-3968

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing *(day/month/year)*	24 OCT 2007
Applicant's or agent's file reference: 1000.9WO	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US07/02424	27 January 2007	27 January 2006

International Patent Classification (IPC) or both national classification and IPC
IPC(8) - H04L 12/28(2007.01)
USPC - 370/389

Applicant DAMAKA, INC.

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/US	Date of completion of this opinion	Authorized officer:
Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201	14 August 2007	Blaine Copenheaver PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

Form PCT/ISA/237 (cover sheet) (April 2007)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US07/02424

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:

   ☒ the international application in the language in which it was filed.

   ☐ a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of:

   a. type of material

      ☐ a sequence listing

      ☐ table(s) related to the sequence listing

   b. format of material

      ☐ on paper

      ☐ in electronic form

   c. time of filing/furnishing

      ☐ contained in the international application as filed

      ☐ filed together with the international application in electronic form

      ☐ furnished subsequently to this Authority for the purposes of search

4. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US07/02424

Box No. V **Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Claims	2-7, 12-18	YES
	Claims	1, 8-11, 19-22	NO
Inventive step (IS)	Claims	NONE	YES
	Claims	1-22	NO
Industrial applicability (IA)	Claims	1-22	YES
	Claims	NONE	NO

2. Citations and explanations:

Claims 1, 8-11, and 19-22 lack novelty under PCT Article 33(2) as being anticipated by Ravikumar et al. (US 2005/0286519 A1).

Regarding claims 1, 11, and 19, Ravikumar et al discloses A method for transferring data directly from a first endpoint to a second endpoint in a peer-to-peer network, the method comprising: retrieving a profile and a routing table from an access server by the first endpoint during an authentication process, wherein the profile identifies the second endpoint as an endpoint with which the first endpoint has permission to communicate, and the routing table contains address information needed for the first endpoint to communicate directly with the second endpoint (claim 1; retrieving a profile and a routing table from an access server by the first endpoint during an authentication process, wherein the profile identifies the second endpoint as an endpoint with which the first endpoint has permission to communicate, and the routing table contains address information needed for the first endpoint to communicate directly with the second endpoint); sending a data transfer request message from the first endpoint directly to the second endpoint using the address information (claim 2; sending a request message from the first endpoint directly to the second endpoint using the address information to request the establishment of the communication session); establishing a data transfer link directly between the first endpoint and the second endpoint (claim 2 lines 7-8; establishing the communication session by the first endpoint directly with the second endpoint) and sending a plurality of packets from the first endpoint to the second endpoint via the data transfer link (paragraph 0106; Once the request is accepted (as indicated in step 1810), the data stream is sent out to all buddies that have accepted the request for the data stream (steps 1812 and 1814)).

Regarding claims 8 and 20, Ravikumar et al discloses traversing, by the first endpoint, a network address translation (NAT) device associated with the second endpoint (paragraph 0068; endpoint 104 sends request to STUN server 214, which returns an outbound IP address, port, and type of NAT for endpoint 106, enabling endpoint 104 to connect to endpoint 106 through the NAT).

Regarding claim 9, Ravikumar et al discloses wherein the NAT device includes a pinhole maintained between the NAT device and a server, the traversing comprising: determining whether a packet sent to the second endpoint from an external source will only pass through the NAT device if the second endpoint has first sent a packet to the external source (paragraph 0067; the access server 102 identifies the NAT type associated with the endpoint 106 as being a type that requires an outbound packet to be sent before an inbound packet is allowed to enter); if the determining indicates that the second end point must first send a packet, sending a first packet by the first endpoint to a stateless reflector for reflection to the second endpoint (paragraph 0068; in step 616, endpoint 104 sends an authentication request to access server 102. Broadly defined, access server 102 is a 'stateless reflector.' Access server 102 retrieves the buddy list for the endpoint 104 and identifies the endpoint 106 as being associated with a NAT type that will block communications from the endpoint 104.), wherein the first packet includes a packet header identifying the stateless reflector as the packet destination and the first endpoint as the packet source (inherently IP packets have headers with the destination and source pre-filled); modifying the packet header by the stateless reflector, wherein the modifying inserts the second endpoint as the packet destination and the server as the packet source (inherently IP packet forwarding strips the first header to reveal an encapsulated header with the final packet destination); and sending the modified first packet to the second endpoint via the pinhole in the NAT device (paragraph 0068; the assist message instructs the endpoint 106 to send a message to the endpoint 104, which opens a pinhole in the NAT device for the endpoint 104).

Regarding claim 10, Ravikumar et al discloses periodically sending a packet to maintain a pinhole established through the NAT device between the first and second endpoints (paragraph 0067; access server 102 instructs the endpoint 106 to send periodic messages to the access server 102 to establish and maintain a pinhole through the NAT device).

Regarding claim 21, Ravikumar et al discloses the NAT device includes a pinhole maintained between the NAT device and a server (paragraph 0067; access server 102 instructs the endpoint 106 to send periodic messages to the access server 102 to establish and maintain a pinhole through the NAT device).

(Cont. in Supplemental Box)

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US07/02424

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of:
Box No. V
2. citations and explanations:

Regarding claim 22, Ravikumar et al discloses if the NA T device is of a restricted type, port restricted type, or symmetric type (paragraph 0062; The type of NAT may be, for example, full cone, restricted cone, port restricted cone, or symmetric), sending a first packet to the stateless reflector for reflection to the second endpoint (paragraph 0068; in step 616, endpoint 104 sends an authentication request to access server 102. Broadly defined, access server 102 is a 'stateless reflector' and all packets from 104 are destined for 106), wherein the first packet includes a first header identifying the stateless reflector as the destination and the first endpoint as the source (inherently IP packets include first header with the source/destination of the intermediate node and an encapsulated header including the original source and final destination), and a second header identifying the second endpoint as the destination and the server as the source(inherently IP packets include first header with the source/destination of the intermediate node and an encapsulated header including the original source and final destination); receiving a second packet directly from the second endpoint by the first endpoint in response to the first packet (paragraph 0068; The assist message instructs the endpoint 106 to send a message to the endpoint 104); and sending additional packets directly from the first endpoint to the second endpoint after receiving the second packet (paragraph 0068; which opens a pinhole in the NAT device for the endpoint- allowing direct traversal of the NAT from 104 to 106).

Claims 2-4, 6, 7 12-14, and 16-18 lack an inventive step under PCT Article 33(3) as being obvious over Ravikumar et al. in view of Sinha, S. and Ogielski, A (Transmission Control Protocol; heareinafter, Sinha).

Regarding claim 16, Ravikumar discloses A method for execution on a second endpoint for receiving a plurality of data packets directly from a first endpoint in a peer-to-peer network, wherein the second endpoint has previously granted permission for communication with the first endpoint and the first endpoint has access to address information needed to communicate directly with the second endpoint (claim 1; retrieving a profile and a routing table from an access server by the first endpoint during an authentication process, wherein the profile identifies the second endpoint as an endpoint with which the first endpoint has permission to communicate, and the routing table contains address information needed for the first endpoint to communicate directly with the second endpoint); the method comprising:
receiving one of the plurality of packets directly from the first endpoint (paragraph 0106; Once the request is accepted (as indicated in step 1810), the data stream is sent out to all buddies that have accepted the request for the data stream (steps 1812 and 1814). Ravikumar discloses utilizing UDP for media traffic (paragraph 0034), but is silent on determining whether the packet was received correctly; and sending an acknowledgement packet directly to the first endpoint if the packet was received correctly. However, Sinha discloses TCP determines whether the packet was received correctly; and sends an acknowledgement packet directly to the first endpoint if the packet was received correctly (Reliability: TCP assigns a sequence number to each byte transmitted, and expects a positive acknowledgment (ACK) from the receiving TCP. If the ACK is not received within a timeout interval, the data is retransmitted. The receiving TCP uses the sequence numbers to rearrange the segments when they arrive out of order, and to eliminate duplicate segments.) Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to include in the invention of Ravikumar a step of determining whether the packet was received correctly; and sending an acknowledgement packet directly to the first endpoint if the packet was received correctly as taught by Sinha in order to enhance reliability through transmission control protocol.

Regarding claims 2 and 12, Ravikumar (as discussed in the lack of novelty of claims 1 and 11, similarly applicable hereto) is silent on placing, by the first endpoint, a packet on a list upon sending the packet to the second endpoint; receiving a response from the second endpoint regarding the packet; and removing the packet from the list if the response indicates that the packet was correctly received by the second endpoint. Sinha discloses placing, by the first endpoint, a packet on a list upon sending the packet to the second endpoint; receiving a response from the second endpoint regarding the packet; and removing the packet from the list if the response indicates that the packet was correctly received by the second endpoint (Paragraph 4; Reliability: TCP assigns a sequence number to each byte transmitted, and expects a positive acknowledgment (ACK) from the receiving TCP. If the ACK is not received within a timeout interval, the data is retransmitted. The current window is a list of packet sequence numbers, as packets are sent, the window slides to the next window of packets to be sent. If an ack is not received for a given packet, it is to be included in the next transmission window). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to include in the invention of Ravikumar a step of placing, by the first endpoint, a packet on a list upon sending the packet to the second endpoint; receiving a response from the second endpoint regarding the packet; and removing the packet from the list if the response indicates that the packet was correctly received by the second endpoint as taught by Sinha in order to enhance reliability through the use of transmission control protocol (TCP).

Regarding claims 3 and 13, Ravikumar (as discussed in the lack of inventive step of claims 2 and 12, similarly applicable hereto) is silent on sending the plurality of packets a first time, resending all packets that appear on the list. Sinha teaches sending the plurality of packets a first time, resending all packets that appear on the list (paragraph 4; The current window is a list of packet sequence numbers, as packets are sent, the window slides to the next window of packets to be sent. If an ack is not received for a given packet, it is to be included in the next transmission window, or re-sent). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to include in the invention of Ravikumar a step of sending the plurality of packets a first time, resending all packets that appear on the list as taught by Sinha in order to enhance reliability through the use of transmission control protocol (TCP).

Regarding claims 4 and 14, Ravikumar (as discussed in the lack of novelty of claims 1 and 11, similarly applicable hereto) is silent on resending a packet if the first endpoint receives a response from the second endpoint that the packet was not correctly received. Sinha teaches resending a packet if the first endpoint receives a response from the second endpoint that the packet was not correctly received (paragraph 4; If the ACK is not received within a timeout interval, the data is retransmitted. Thus the lack of an ACK comprises a response from the second endpoint that the packet was not correctly received). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to include in the invention of Ravikumar a step of resending a packet if the first endpoint receives a response from the second endpoint that the packet was not correctly received as taught by Sinha in order to enhance reliability through the use of transmission control protocol (TCP).

(Cont. in next Supplemental Box)

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION CONCERNING TRANSMITTAL OF COPY OF INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY (CHAPTER I OF THE PATENT COOPERATION TREATY)
(PCT Rule 44bis.1(c))

To:

REC'D MAY 19 2008

BLISS, Timothy, F.
PO Box 793968
Dallas, Texas 75379-3968
ETATS-UNIS D'AMERIQUE

Date of mailing *(day/month/year)* 02 May 2008 (02.05.2008)	
Applicant's or agent's file reference 1000.7WO	**IMPORTANT NOTICE**

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2006/040312	16 October 2006 (16.10.2006)	17 October 2005 (17.10.2005)

Applicant
DAMAKA, INC. et al

The International Bureau transmits herewith a copy of the international preliminary report on patentability (Chapter I of the Patent Cooperation Treaty)

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer Ellen Moyse
Facsimile No. +41 22 338 82 70	e-mail: pt02.pct@wipo.int

Form PCT/IB/326 (January 2004)

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44*bis*)

Applicant's or agent's file reference 1000.7WO	**FOR FURTHER ACTION**	See item 4 below
International application No. PCT/US2006/040312	International filing date *(day/month/year)* 16 October 2006 (16.10.2006)	Priority date *(day/month/year)* 17 October 2005 (17.10.2005)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant DAMAKA, INC.		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 *bis*.1(a).

2. This REPORT consists of a total of 4 sheets, including this cover sheet.

   In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

☒	Box No. I	Basis of the report
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☐	Box No. VII	Certain defects in the international application
☐	Box No. VIII	Certain observations on the international application

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44*bis*.3(c) and 93*bis*.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44*bis* .2).

	Date of issuance of this report 23 April 2008 (23.04.2008)
The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. +41 22 338 82 70	Authorized officer Ellen Moyse e-mail: pt02.pct@wipo.int

Form PCT/IB/373 (January 2004)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To: TIMOTHY F. BLISS
PO BOX 793968
DALLAS, TEXAS 75379-3968

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing *(day/month/year)*	18 MAY 2007
Applicant's or agent's file reference 1000.7WO	FOR FURTHER ACTION See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US 06/40312	16 October 2006 (16.10.2006)	17 October 2005 (17.10.2005)

International Patent Classification (IPC) or both national classification and IPC
IPC(8) - H04L 12/66 (2007.01)
USPC - 370/352

Applicant DAMAKA, INC.

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/US	Date of completion of this opinion	Authorized officer:
Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201	2 March 2007 (02.03.2007)	Lee W. Young PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

Form PCT/ISA/237 (cover sheet) (April 2005)

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US 06/40312

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into _____ , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

   a. type of material

      ☐ a sequence listing

      ☐ table(s) related to the sequence listing

   b. format of material

      ☐ on paper

      ☐ in electronic form

   c. time of filing/furnishing

      ☐ contained in the international application as filed

      ☐ filed together with the international application in electronic form

      ☐ furnished subsequently to this Authority for the purposes of search

3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US 05/40312

Box No. V **Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Claims	1-20	YES
	Claims	NONE	NO
Inventive step (IS)	Claims	3-4, 6-20	YES
	Claims	1-2, 5	NO
Industrial applicability (IA)	Claims	1-20	YES
	Claims	NONE	NO

2. Citations and explanations:

Claims 1-2 and 5 lack an inventive step under PCT Article 33(3) as being obvious over US 2005/0195802 A1 to Klein et al. (hereinafter Klein).

As per claim 1, Klein teaches a method comprising (1) providing source endpoint for performing digit collection (the substitute telephone number is obtained from a call management module which determines the number based on various factors and receiving an indication of a telephone call being initiated by a caller, the telephone call having a dialed telephone number, see Abstract, para [0009], [0013] and claim 1); (2) providing source endpoint for performing digit analysis on the collected digits (passing the dialed telephone number to a call management module; obtaining, from the call management module, a substitute telephone number, see claim 1); (3) providing source endpoint for identifying a route based on the analyzed digits and information (routing the telephone call to the substitute telephone number, see claim 1). Klein does not specifically disclose identifying the route based on information present in at least one lookup tabbed downloaded from the server. Lookup tables are well known. Further Klein discloses a service database (para [0071]). Therefore, one skilled in the art would find it obvious to use information in a lookup table to indentify the route.

As per claim 2, Klein dose not explicitly discloses identifying the route includes the location of gateway, time zone of the source endpoint, time zone of the gateway, rate representing a cost obtained from the lookup table. However Klein discloses the call is routed to callee based on rules stored in service database and the callee can specify that different incoming calls should be routed to any of a number of different delivery devices, based on any combination of factors including the number the caller dialed, the identity of the caller, the location of the caller, environmental conditions at the callee's location, and real-time callee and/or callee input at the time the call is attempted (see para[0071], [0085]). It would have been obvious to one of ordinary skill in the art to present these parameters identified by callee, i.e. the source endpoint, because these parameters are the basic settings and factors for managing a call through network.

As per claim 5, Klein teaches selecting a gateway based on the identified route (routing module causes the call to be routed to another computer or to a NANP device such as telephone connected to PSTN via an IP/PSTN gateway, see para [0157]).

Claims 3-4 and 6-20 meet the criteria set out in PCT Article 33(2)-(3), as the cited art fails to teach or suggest the claimed invention.

As per claims 3 and 4, Klein teaches the call is routed to callee based on rules stored in service database and incoming calls routed based on factors including location, time, etc. as provided previously with respect to claims 1, 2 and 5. US 20030076815 A1 to Miller et al. (hereinafter Miller) teaches a Session state may include feature and services implementation associated with a CLASS 5 switch, namely a calling name lookup associated with the display of caller ID information or local number portability initiated by call manager software on a line interface card associated with the specific subscriber interface (see para [0100]). The cited art fails to teach or fairly suggest the parameters are arranged so that the route equals g(f(CN), LO, TZc, RA) as recited by claims 3 and 4.

As per claims 6-20, Klein and Miller fail to teach or fairly suggest creating a third port on a media router, determining whether radio received at the third port is from the first address, capturing the first port if the audio received at the third port is from the first address as recited by claims 6-20.

Claims 1-20 have industrial applicability as defined by PCT Article 33(4) because the subject matter can be made or used in industry.

PATENT COOPERATION TREATY

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:

BLISS, Timothy, F.
P.O. Box 793968
Dallas, TX 75379-3968
ETATS-UNIS D'AMERIQUE

(FAX CONFIRMATION)

PCT

- Fax nr: 214-853-4699

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(PCT Rule 71.1)

- 16 pages -

Date of mailing *(day/month/year)*	19.10.2006
Applicant's or agent's file reference 36244.5	**IMPORTANT NOTIFICATION**

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/IB2005/000821	29.03.2005	29.06.2004

Applicant
DAMAKA, INC. et al

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary report on patentability and its annexes, if any, established on the international application.

2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.

3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

4. **REMINDER**

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary report on patentability. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

The applicant's attention is drawn to Article 33(5), which provides that the criteria of novelty, inventive step and industrial applicability described in Article 33(2) to (4) merely serve the purposes of international preliminary examination and that "any Contracting State may apply additional or different criteria for the purposes of deciding whether, in that State, the claimed inventions is patentable or not" (see also Article 27(5)). Such additional criteria may relate, for example, to exemptions from patentability, requirements for enabling disclosure, clarity and support for the claims.

Name and mailing address of the international preliminary examining authority:	Authorized Officer
European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	BARRIO BARANANO, A Tel. +49 89 2399-8621

Form PCT/IPEA/416 (January 2004)

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 36244.5	**FOR FURTHER ACTION**	See Form PCT/IPEA/416
International application No. PCT/IB2005/000821	International filing date *(day/month/year)* 29.03.2005	Priority date *(day/month/year)* 29.06.2004
International Patent Classification (IPC) or national classification and IPC INV. H04L29/06 H04L12/58		
Applicant DAMAKA, INC. et al		

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 9 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
   a. ☒ *sent to the applicant and to the International Bureau)* a total of 6 sheets, as follows:
      ☒ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
      ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
   b. ☐ *(sent to the International Bureau only)* a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in electronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

☒	Box No. I	Basis of the report
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☒	Box No. VI	Certain documents cited
☒	Box No. VII	Certain defects in the international application
☒	Box No. VIII	Certain observations on the international application

Date of submission of the demand	Date of completion of this report
28.04.2006	19.10.2006
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer LOPEZ MONCLUS, I Telephone No. +49 89 2399-7113

Form PCT/IPEA/409 (Cover Sheet) (April 2005)

Box No. I Basis of the report

1. With regard to the **language**, this report is based on

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of:
   - ☐ international search (under Rules 12.3(a) and 23.1(b))
   - ☐ publication of the international application (under Rule 12.4(a))
   - ☐ international preliminary examination (under Rules 55.2(a) and/or 55.3(a))

2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

Description, Pages	
1-22	as originally filed
Claims, Numbers	
1-22, 24, 25, 27, 28	filed with telefax on 02.05.2006
Drawings, Sheets	
1/26-26/26	as originally filed

   ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☐ The amendments have resulted in the cancellation of:
   - ☐ the description, pages
   - ☐ the claims, Nos.
   - ☐ the drawings, sheets/figs
   - ☐ the sequence listing *(specify)*:
   - ☐ any table(s) related to sequence listing *(specify)*:

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
   - ☐ the description, pages
   - ☐ the claims, Nos.
   - ☐ the drawings, sheets/figs
   - ☐ the sequence listing *(specify)*:
   - ☐ any table(s) related to sequence listing *(specify)*:

* *If item 4 applies, some or all of these sheets may be marked "superseded."*

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-22,24,25,27,28
	No:	Claims	
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-22,24,25,27,28
Industrial applicability (IA)	Yes:	Claims	
	No:	Claims	1-22,24,25,27,28

2. Citations and explanations (Rule 70.7):

see separate sheet

Box No. VI Certain documents cited

1. Certain published documents (Rule 70.10)

and / or

2. Non-written disclosures (Rule 70.9)

see separate sheet

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to the following documents:

D1: US 2002/150110 A1 (INBAR SHLOMO ET AL) 17 October 2002 (2002-10-17)
D2: WO 03/079635 A (INTERNATIONAL BUSINESS MACHINES CORPORATION; IBM UNITED KINGDOM LIMITE) 25 September 2003 (2003-09-25)
D3: US 2003/009565 A1 (ARAO SHINYA) 9 January 2003 (2003-01-09)
D4: J. ROSENBERG: "STUN - Simple Traversal of UDP Through NAT" INTERNET, September 2002 (2002-09), XP015005058
D5: US 2003/135569 A1 (KHAKOO SHABBIR A ET AL) 17 July 2003 (2003-07-17)
D6: CHATHAPURAM U S: "Security in Peer-to-Peer Networks" INTERNET, 8 August 2001 (2001-08-08), XP002251813

1. First of all, it is to be noted that due to the broad formulation of its subject-matter, independent claim 1 does not meet the requirements of Article 33(3) PCT regarding inventive step. Document D1 discloses,

   A computer-implemented method for establishing and maintaining a communication session between first and second endpoints in a peer to peer network using a non-proprietary protocol (Paragraphs 9 and 62: "Preferred embodiments of the present invention create smart end points, that is to say intelligent communication terminals that can support peer to peer communication and do not require intermediate servers...The present embodiments provide a peer to peer configuration for communication using any kind of media. The configuration uses querying to obtain an IP address from a central server, and then allows for a direct peer to peer connection to be formed using the IP address obtained."), the method comprising:

   retrieving a profile and a routing table from an access server by the first endpoint during an authentication process, wherein the routing table contains address

information needed for the first endpoint to communicate directly with the second endpoint (Paragraphs 10, 12, 28-31: "According to a first aspect of the present invention there is thus provided a subscriber end digital communication management unit for managing digital and analog communications with remote subscribers, the device comprising:... an IP address manager for formulating a request for an IP address corresponding to a user defined remote subscriber, submitting said request to an external location and recording a response thereto...According to a second aspect of the present invention there is provided an internet connection management unit for supporting end to end Internet connections between subscribers, said unit comprising: a database for storing user identification names of said subscribers in a first field and respective assigned user IP addresses in a second field, a database manager for determining assigned user IP addresses of ones of said subscribers currently connected and dynamically updating said second field therewith, and a request manager for receiving external requests specifying at least one user identification request, interrogating said database and responding with respective IP addresses."); and

sending a notification message from the first endpoint directly to the second endpoint using the address information to inform the second endpoint that the first endpoint is online (Paragraph 13: "a packet addresser, associated with said IP address manager, for addressing data packets to said user defined remote subscriber using an IP address taken from said recorded response, thereby to set up a peer to peer connection with said user defined remote subscriber.").

The subject matter of claim 1 therefore differs from the method disclosed by D1 merely in that the access server does not contain profiles identifying other endpoints as endpoints with which one endpoint has permission to communicate.

The problem to be solved by the present invention may be regarded as authorizing an endpoint through an access server before giving him the address of another endpoint with which he wants to communicate.

This problem is already known in the art or peer to peer networks and, in consulting the prior art the skilled person would come across for example of D2 ,which discloses

the usage of "seed lists" in the access server that describe the peers with which a peer has the right to communicate (Page 12 line 35 - page 13, line 25).

To a skilled person, therefore, starting from the method defined by D1 and aware of the disclosure of D2 it would be obvious to apply the approach described in D2 to the method of D1, in order to improve it and he would thus arrive at the method corresponding to the subject-matter of claim 1.

The subject-matter of claim 1, therefore, does not involve an inventive step and does not meet the requirements of Article 33(3) PCT.

2. The same reasoning applies, mutatis mutandis, to the subject-matter of the corresponding independent claim 16, which is therefore are also considered not inventive.

3. Dependent claims 2-15, 17-22 and 24, 25, 27 and 28 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of inventive step, see documents D1-D6 and the corresponding passages cited in the search report.

Re Item VI
Certain documents cited

Certain published documents (Rule 70.10):

D7: WO 2005/009019 A (SKYPER LTD; HEINLA, AHTI; KASESALU, PRIIT) 27 January 2005 (2005-01-27)

D8: SALMAN A. BASET & HENNING SCHULZRINNE: ""An Analysis of the Skype Peer-to-Peer Internet Telephony Protocol" INTERNET, 15 September 2005 (2004-09-15), XP002336407 Retrieved from the Internet: URL:http://www1.cs.columbia.edu/~salman/pu blications/cucs-039-04.pdf> [retrieved on 2005-07-18]

D9: KUNDAN SINGH & HENNING SCHULZRINNE: "Peer-to-Peer Internet Telephony using SIP" INTERNET, 31 October 2004 (2004-10-31), XP002336408 Retrieved from the Internet: URL:http://www1.cs.columbia.edu/~library/T R-repository/reports/reports-2004/cucs-044 -04.pdf> [retrieved on 2005-07-18]

D10: US 2004/139228 A1 (TAKEDA YUTAKA ET AL) 15 July 2004 (2004-07-15)

It seems that the present application introduces subject-matter which extends beyond the content of the first 3 priority documents: US 60/583536, US60/628183 and US60/628291. Hence, claims 1-28 would only enjoy priority rights from the fourth priority document, US 11/081068 (15.03.05). Therefore, documents D7-D10 can be taken into account during a regional phase for the evaluation of Article 33(1) PCT.

Re Item VII

Certain defects in the international application (form or content).

1. The independent claims are not properly cast in the two-part form (Rule 6.3(b) PCT), with those features which in combination are part of the prior art (see document D1) being placed in the preamble.

2. Documents D1-D10 are not identified in the description and the relevant background art disclosed therein has not been briefly discussed (Rule 5.1(a)(ii) PCT).

3. Reference signs in parentheses have not been inserted in the claims to increase their intelligibility, Rule 6.2(b) PCT. This applies to both the preamble and characterising portion.

4. Following from the disclosure of documents D1-D10, the statement indicating the technical problem to be solved by the invention has not been revised taking the requirements of Rule 5.1(a)(iii) PCT into account.

Re Item VIII
Certain observations on the international application (clarity).

1. The application does not meet the requirements of Article 6 PCT, because claims 1 and 16 are not clear.

   The expression "...using a non-proprietary protocol...", corresponds to a disclaimer which is not allowable according to the PCT Guidelines 5.41. A claim should be defined by means of **positive** features, otherwise the disclosure would just word the "result to be achieved", which is also not allowable (cf. PCT Guidelines 5.35.).

2. The vague formulation "identifying...based on the profile" used in claim 3 is in this case not sufficient to clearly define the invention, as the formulation does not clearly specify for the skilled person in what way the invention should be carried out.

   It is rather the structural means for achieving the objective of providing information which should appear in claim 3.

3. Claims 4 and 17 are not clear because of the incorrect use of the parentheses.

   According to the PCT Guidelines 5.11, when references to the drawings are made in the claims, the appropriate reference signs should be placed in parentheses after the corresponding features. A lack of clarity arises because of the use of the parentheses in claims 4 and 17, which are and should not be reference to any drawing.

4. The term "relationship" used first in claim 13 has no well recognised meaning in the context of peer to peer networks and leaves the reader in doubt as to the meaning of the technical feature to which it refers, thereby rendering the definition of the subject-matter of said claim unclear (Article 6 PCT). The meaning of the terms of a claim should be clear for the person skilled in the art from the wording of the claim alone (PCT Guidelines 5.31).

   The same objection is valid for all the occurrences of this wording in the claims of the present application.

5. The features of independent method claim 1 and system claim 16 do not completely correspond. Independent claims should correspond to meet the requirement following from Article 6 PCT taken in combination with Rule 6.3(b) PCT that any independent claim must contain all the technical features essential to the definition of the invention.

Electronic Acknowledgement Receipt

EFS ID:	17629112
Application Number:	14024027
International Application Number:	
Confirmation Number:	8381
Title of Invention:	SYSTEM AND METHOD FOR PROVIDING ADDITIONAL FUNCTIONALITY TO EXISTING SOFTWARE IN AN INTEGRATED MANNER
First Named Inventor/Applicant Name:	SIVAKUMAR CHATURVEDI
Customer Number:	25883
Filer:	Timothy Frank Bliss
Filer Authorized By:	
Attorney Docket Number:	DAMA-31813
Receipt Date:	13-DEC-2013
Filing Date:	11-SEP-2013
Time Stamp:	15:57:01
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	DAM31813IDS1.pdf	618307 f0b470c9d56c22f6156ef5d2f38304a5f37b3aba	no	12

Warnings:	
Information:	

2	Foreign Reference	1-DAMA-EP1404082A2-NORTEL.pdf	837934 150fd93d3ea73cbded79dfb1ff973abcf1e40d0d	no	15
Warnings:					
Information:					
3	Foreign Reference	2-DAMA-WO03079635A1-IBM.pdf	1852327 7bf82950e1471679c48e5e1946741ba897b1471a	no	44
Warnings:					
Information:					
4	Foreign Reference	3-DAMA-WO2004063843-MATSUSHITA.pdf	3856749 2a289bda74c86116abf94ad15dbde3fa5d1000f6	no	97
Warnings:					
Information:					
5	Foreign Reference	4-DAMA-WO2005009019A2-SKYPER.pdf	1257474 9a9b17a867204b43779288921812cbe287f2f07b	no	27
Warnings:					
Information:					
6	Foreign Reference	5-DAMA-JP2005-094600.pdf	43888 d449819db39d7e3b6cc337a897abefe3d4fb2484	no	1
Warnings:					
Information:					
7	Foreign Reference	7-DAMA-JP2007043598-NEC.pdf	1003024 9e85310ab0a8b44af5ed32b9c73034cf9ab7f922	no	27
Warnings:					
Information:					
8	Foreign Reference	8-DAMA-KR1020050030548-MICROSOFT.pdf	956916 c9d9a8330e98af346e10ec25b233cbdc85691d03	no	29
Warnings:					
Information:					
9	Foreign Reference	6-DAMA-WO2006075677-SHARP.pdf	1962226 18e1991a1b7d16ede3eef1c1988b59765e211c5f	no	41
Warnings:					
Information:					
10	Non Patent Literature	1-DAMA-CHATHAPURAM.pdf	348036 b42c1631c6b421ed9198567eb2619c85f2b36feb	no	10
Warnings:					
Information:					

11	Non Patent Literature	2-DAMA-ISR-000821.pdf	720648 edae77a77193f01cc2fbd3eeaaa16f84fca22921	no	17
Warnings:					
Information:					
12	Non Patent Literature	3-DAMA-ISR-032791.pdf	834159 4d794faf2222e39299bcee1d2619fa960ba883d6	no	9
Warnings:					
Information:					
13	Non Patent Literature	4-DAMA-ISR-040312.pdf	448731 89ba9b4843760e0b9912eb7ed62358d87b92aa51	no	4
Warnings:					
Information:					
14	Non Patent Literature	5-DAMA-ISR-047841.pdf	705416 37c316442848d8d89702f6d6291acee3473421a9	no	6
Warnings:					
Information:					
15	Non Patent Literature	6-DAMA-ISR-002424.pdf	758150 eb78b2a8e2941a01a154398933af7c9b5a7201f2	no	5
Warnings:					
Information:					
16	Non Patent Literature	7-DAMA-ISR-068820.pdf	709749 28bcbb03f5b780945f100e089b93c8f323ae6e21	no	7
Warnings:					
Information:					
17	Non Patent Literature	8-DAMA-ISR-068821.pdf	1076876 43ff13d257233e5ff38349ad0e61028b1f4cee53	no	8
Warnings:					
Information:					
18	Non Patent Literature	9-DAMA-ISR-068823.pdf	697093 8505fe681256488367324 2a52603a4f1f9ded5bd	no	6
Warnings:					
Information:					
19	Non Patent Literature	10-DAMA-TYSON.pdf	1081753 068a85d8ecc821d31e6443fbdb1237f22f9ba732	no	3
Warnings:					
Information:					

20	Non Patent Literature	11-DAMA-BLAND.pdf	1203881 e6103d9c8ef60bf8b501c581ce50d7751ca4d5d2	no	26
Warnings:					
Information:					
21	Non Patent Literature	12-DAMA-ROSENBERG.pdf	1209372 aad08b48f99b3f8459eb4f3726ca29f3a53c788d	no	30
Warnings:					
Information:					
22	Non Patent Literature	13-DAMA-BASET.pdf	869343 612cd4f48ecb071aa8c57ebdf6b013d1196fd5dd	no	12
Warnings:					
Information:					
23	Non Patent Literature	14-DAMA-SINGH.pdf	1031434 6d2d315c70af3f670668fa4461696a28ad720bb3	no	19
Warnings:					
Information:					
24	Non Patent Literature	15-DAMA-SINHA.pdf	252665 b029d8180f288f81d161a5b0171955da0b4adf67	no	11
Warnings:					
Information:					
25	Non Patent Literature	16-DAMA-PEJMAN.pdf	45309 0b8ea342ac13f65c5bd1b7f36d3133243d49ab96	no	1
Warnings:					
Information:					
26	Non Patent Literature	17-DAMA-WOISR2008078142.pdf	400316 6ba69469eddecf8e94154c798d06c1b87fb8e545	no	7
Warnings:					
Information:					
27	Non Patent Literature	21-DAMA-WOISR-0884950.pdf	289331 b9b77f973d38ea46d1f1bb84832a13dbfcaa5e5e	no	7
Warnings:					
Information:					
28	Non Patent Literature	22-DAMA-HaoWang.pdf	236474 b00fde24be43bcf1e80ff215098ffe9e11dee23a	no	10
Warnings:					
Information:					

29	Non Patent Literature	18-DAMA-SETA.pdf	48334 168230a55be14b7bd8bd8d04968ede18cc6ca2be	no	1
Warnings:					
Information:					
30	Non Patent Literature	19-DAMA-ISRWO-2008075141.pdf	375759 f65face5dffd7726eaa6c808013eee23f8b3d152	no	7
Warnings:					
Information:					
31	Non Patent Literature	20-DAMA-QIAN.pdf	168190 fe2bb173f6dadfe36ed8e7a10b1d8009a0aab923	no	7
Warnings:					
Information:					
32	Non Patent Literature	23-DAMA-ISAACS.pdf	2290385 c9afac48970e24a942d938b45680242bc97d5048	no	8
Warnings:					
Information:					
33	Non Patent Literature	31-IPRP-084950.pdf	237412 e4451f4823ba9c07e7aae4b2c850c897d0d4680e	no	5
Warnings:					
Information:					
34	Information Disclosure Statement (IDS) Form (SB08)	DAM31813IDS2.pdf	617052 5675785f5100d0a859bc9b51f86bec10d3bead35	no	11
Warnings:					
Information:					
35	Non Patent Literature	24-IPRP-075141.pdf	330025 15b46e24f93211e32af02113566d67df971f23e9	no	5
Warnings:					
Information:					
36	Non Patent Literature	25-IPRP-068820.pdf	410612 a1d116e958f388868891d6f6af8230d438602535	no	8
Warnings:					
Information:					
37	Non Patent Literature	26-IPRP-068823.pdf	378011 e2cd69547f5d12bce5c85b55eb5f789478946169	no	8
Warnings:					
Information:					

38	Non Patent Literature	27-IPRP-047841.pdf	332712 8ee08f3f0257c5d50ad0581009eb7975366d5486	no	7
Warnings:					
Information:					
39	Non Patent Literature	28-IPRP-002424.pdf	456035 8d7af8165a8e965ee813c7007f7fc5f57f61d4c3	no	6
Warnings:					
Information:					
40	Non Patent Literature	29-IPRP-040312.pdf	257400 784cd1a933455356a8f79690dba26aa7b2c32725	no	5
Warnings:					
Information:					
41	Non Patent Literature	30-IPRP-000821.pdf	1831746 d5253be880d410ce1fac6048174b4604c03f5702	no	10
Warnings:					
Information:					
			Total Files Size (in bytes):	33041254	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/08a (01-10)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	2819
	Examiner Name	
	Attorney Docket Number	DAMA-31813

U.S.PATENTS						Remove
Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	7778187	B2	2010-08-00	CHATURVEDI ET AL.	
	2	6438376	B1	2002-08-20	ELLIOTT ET AL.	
	3	6898413	B2	2005-05-24	YIP ET AL.	
	4	7664495	B1	2010-02-16	BONNER ET AL.	
	5	7623516	B2	2009-11-24	CHATURVEDI ET AL.	
	6	7623476	B2	2009-11-24	RAVIKUMAR ET AL.	
	7	7590758	B2	2009-09-15	TAKEDA ET AL.	
	8	6128283	A	2000-10-00	SABAA ET AL.	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	2819
	Examiner Name	
	Attorney Docket Number	DAMA-31813

	9	6389016	B1	2002-05-00	SABAA ET AL.	
	10	7345999	B2	2008-03-00	SU ET AL.	
	11	7542472	B1	2009-06-00	GERENDAI ET AL.	
	12	8009586	B2	2011-08-00	CHATURVEDI ET AL.	
	13	7302496	B1	2007-11-27	METZGER	
	14	6161082		2000-12-12	GOLDBERG ET AL.	
	15	8065418		2011-11-00	ABUAN ET AL.	
	16	7656870	B2	2010-02-00	RAVIKUMAR ET AL.	
	17	7487248	B2	2009-02-00	MORAN ET AL.	
	18	7574523	B2	2009-08-00	TRAVERSAT ET AL.	
	19	7774495	B2	2010-08-00	PABLA ET AL.	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	2819
	Examiner Name	
	Attorney Docket Number	DAMA-31813

	20	7782866	B1	2010-08-00	WALSH ET AL.	
	21	6298129		2001-10-00	CULVER ET AL.	
	22	6754181		2004-06-00	ELLIOTT ET AL.	
	23	7006508		2006-02-00	BONDY ET AL.	
	24	7010109		2006-03-00	GRITZER ET AL.	
	25	7123710		2006-10-00	RAVISHANKAR	
	26	7570743		2009-08-00	BARCLAY ET AL.	
	27	7769881		2010-08-00	MATSUBARA ET AL.	
	28	7346044	B1	2008-03-00	CHOU ET AL.	
	29	7092385		2006-08-00	GALLANT ET AL.	
	30	5818447		1998-10-00	WOLF ET AL.	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	2819
	Examiner Name	
	Attorney Docket Number	DAMA-31813

	31	7917584		2011-03-00	ARTHURSSON, DANIEL	
	32	7564843	B2	2009-07-21	MANJUNATHA ET AL.	
	33	7185114	B1	2007-02-27	HARIHARASUBRAHMANIAN	

If you wish to add additional U.S. Patent citation information please click the Add button. Add

U.S.PATENT APPLICATION PUBLICATIONS Remove

Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20030126213	A1	2003-07-03	BETZLER, BOAS	
	2	20030163525	A1	2003-08-28	HENDRIKS ET AL.	
	3	20040005877	A1	2004-01-00	VAANANEN, MIKKO KALERVO	
	4	20040249953	A1	2004-12-00	FERNANDEZ ET AL.	
	5	20080032695	A1	2008-02-07	ZHU ET AL.	
	6	20050136911	A1	2005-06-23	CSAPO ET AL.	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	2819
	Examiner Name	
	Attorney Docket Number	DAMA-31813

	7	20040203834	A1	2004-10-14	MAHANY, RONALD L.	
	8	20020173303	A1	2002-11-21	SHIBUTANI, AKIRA	
	9	20060002355	A1	2006-01-05	BAEK ET AL.	
	10	20060182100	A1	2006-08-17	LI, JIN ET AL.	
	11	20080080392	A1	2008-04-03	WALSH, RICHARD J. ET AL.	
	12	20090300673	A1	2009-12-03	BACHET, FRANCK ET AL.	
	13	20020037000	A1	2002-03-00	PARK ET AL.	
	14	20030043764	A1	2003-03-00	KIM ET AL.	
	15	20030202480	A1	2003-10-00	SWAMI, YOGESH PREM	
	16	20040052234	A1	2004-03-00	AMEIGEIRAS ET AL.	
	17	20040213184	A1	2004-10-00	HU ET AL.	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	2819
	Examiner Name	
	Attorney Docket Number	DAMA-31813

	18	20090003322	A1	2009-01-01	ISUMI, SHINYA	
	19	20090327516	A1	2009-12-31	AMISHIMA, MAKI ET AL.	
	20	20060187926	A1	2006-08-24	IMAI, NAOKI	
	21	20070019545	A1	2007-01-25	ALT, WADE R. ET AL.	
	22	20050208947	A1	2005-09-22	BAHL, PRADEEP	
	23	20070297430	A1	2007-12-27	NYKANEN, PETRI ET AL.	
	24	20030214955	A1	2003-11-20	KIM, JUN-HYEONG	
	25	20050270992	A1	2005-12-08	SANZGIRI, AJIT ET AL.	
	26	20090052399	A1	2009-02-26	SILVER ET AL.	
	27	20070206563	A1	2007-09-06	SILVER ET AL.	
	28	20030217318	A1	2003-11-00	CHOI, SUNG-KYU	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	2819
	Examiner Name	
	Attorney Docket Number	DAMA-31813

	29	20020064167	A1	2002-05-00	KHAN ET AL.	
	30	20060203750	A1	2006-09-14	RAVIKUMAR ET AL.	
	31	20060120375	A1	2006-06-08	RAVIKUMAR ET AL.	
	32	20070165629	A1	2007-07-19	CHATURVEDI ET AL.	
	33	20080235511	A1	2008-09-25	O'BRIEN, WILLIAM G. ET AL.	
	34	20100049980	A1	2010-02-25	BARRIGA, LUIS ET AL.	
	35	20080250408	A1	2008-10-09	TSUI ET AL.	
	36	20090136016	A1	2009-05-28	GORNOI ET AL.	
	37	20080235362	A1	2008-09-25	KJESBU ET AL.	
	38	20040148434	A1	2004-07-29	MATSUBARA ET AL.	
	39	20090182815	A1	2009-07-16	CZECHOWSKI ET AL.	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	2819
	Examiner Name	
	Attorney Docket Number	DAMA-31813

	40	20080273541	A1	2008-11-06	PHARN	
	41	20030046585	A1	2003-03-06	MINNICK	
	42	20040024879	A1	2004-02-05	DINGMAN ET AL.	
	43	20090006076	A1	2009-01-01	JINDAL, DINESH K.	
	44	20100223047	A1	2010-09-02	CHRIST, OLIVER	
	45	20100299150	A1	2010-11-25	FEIN ET AL.	
	46	20050198499	A1	2005-09-00	SALAPAKA ET AL.	
	47	20040139230	A1	2004-07-00	KIM, SEON KEON	
	48	20040240399	A1	2004-12-00	CORRAO ET AL.	
	49	20050201357	A1	2005-09-00	POYHONEN, PETTERI	
	50	20060121902	A1	2006-06-08	JAGADEESAN ET AL.	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	2819
	Examiner Name	
	Attorney Docket Number	DAMA-31813

	51	20060205436	A1	2006-09-00	LIU ET AL.	
	52	20050130650	A1	2005-06-16	CREAMER ET AL.	
	53	20090088150	A1	2009-04-02	CHATURVEDI ET AL.	
	54	20100011111	A1	2010-01-14	MOHAMMAD, VIZAEI	
	55	20080130639	A1	2008-06-00	COSTA-REQUENA ET AL.	
	56	20060072506	A1	2006-04-00	SAYEEDI ET AL.	
	57	20060062180	A1	2006-03-00	SAYEEDI ET AL.	
	58	20080019285	A1	2008-01-00	JOHN ET AL.	
	59	20070253435	A1	2007-11-00	KELLER ET AL.	
	60	20050120073	A1	2005-06-00	CHO, JOON-HO	
	61	20050033843	A1	2005-02-00	SHAHI ET AL.	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	2819
	Examiner Name	
	Attorney Docket Number	DAMA-31813

	62	20030088676	A1	2003-05-00	SMITH ET AL.	
	63	20070130253	A1	2007-06-00	NEWSON ET AL.	
	64	20100077023	A1	2010-03-00	ERIKSSON, ANDERS	
	65	20090055473	A1	2009-02-00	SYNNERGREN, PER	
	66	20080091813	A1	2008-04-00	BODLAENDER, MAARTEN	
	67	20070136459	A1	2007-06-00	ROCHE ET AL.	
	68	20050144288	A1	2005-06-00	LIAO, EN-YI	
	69	20040068567	A1	2004-04-00	MORAN ET AL.	
	70	20050220017	A1	2005-10-00	BRAND ET AL.	
	71	20030172145	A1	2003-09-00	NGUYEN	
	72	20110122864	A1	2011-05-26	CHERIFI ET AL.	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	2819
	Examiner Name	
	Attorney Docket Number	DAMA-31813

	73	20090257433	A1	2009-10-15	MUTIKAINEN ET AL.	
	74	20060195402	A1	2006-08-00	MALINA ET AL.	
	75	20100299313	A1	2010-11-00	ORSINI ET AL.	
	76	20060171534	A1	2006-08-00	BAUGHMAN, WILLIAM P.	
	77	20070260359	A1	2007-11-00	BENSON ET AL.	
	78	20080168440	A1	2008-07-00	REGNIER ET AL.	
	79	20020031212	A1	2002-03-00	O'NEIL ET AL.	
	80	20050132009	A1	2005-06-00	SOLIE, KEVIN	
	81	20090234967	A1	2009-09-00	YU ET AL.	
	82	20100011108	A1	2010-01-00	CLARK ET AL.	
	83	20080123685	A1	2008-05-00	VARMA ET AL.	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	2819
	Examiner Name	
	Attorney Docket Number	DAMA-31813

	84	20070082671	A1	2007-04-00	FENG ET AL.	
	85	20070025270	A1	2007-02-00	SYLVAIN, DANY	
	86	20060258289	A1	2006-11-00	DUA, ROBIN	
	87	20110099612	A1	2011-04-00	LEE ET AL.	
	88	20070274276	A1	2007-11-00	LAROIA ET AL.	
	89	20110040836	A1	2011-02-00	ALLEN ET AL.	
	90	20100312897	A1	2010-12-00	ALLEN ET AL.	
	91	20100312832	A1	2010-12-00	ALLEN ET AL.	
	92	20090156217	A1	2009-06-00	BAJPAI, RAJNEESH	
	93	20050138128	A1	2005-06-00	BANIEL ET AL.	
	94	20070116224	A1	2007-05-00	BURKE ET AL.	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	2819
	Examiner Name	
	Attorney Docket Number	DAMA-31813

	95	20050187781	A1	2005-08-00	CHRISTENSEN, TORE L.	
	96	20110314134	A1	2011-12-00	FOTI, GEORGE	
	97	20100107205	A1	2010-04-00	FOTI, GEORGE	
	98	20100279670	A1	2010-11-00	GHAI ET AL.	
	99	20120263144	A1	2012-10-00	NIX, JOHN A.	
	100	20110145687	A1	2011-06-00	GRIGSBY ET AL.	
	101	20070239892	A1	2007-10-00	OTT ET AL.	
	102	20020152325	A1	2002-10-00	ELGEBALY ET AL.	
	103	20020156844	A1	2002-10-00	MAEHIRO, KAZUTOYO	
	104	20030212772	A1	2003-11-00	HARRIS, ADAM PIERCE	
	105	20020124096	A1	2002-09-05	LOGUINOV ET AL.	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	2819
	Examiner Name	
	Attorney Docket Number	DAMA-31813

	106	20050201485	A1	2005-09-15	FAY	
	107	20060069775	A1	2006-03-30	ARTOBELLO ET AL.	
	108	20060165029	A1	2006-07-27	MELPIGNANO ET AL.	
	109	20050015502	A1	2005-01-20	KANG ET AL.	
	110	20030229715	A1	2003-12-11	BARATAKKE ET AL.	
	111	20010050923	A1	2001-12-13	PARK ET AL.	
	112	20040062267	A1	2004-04-01	MINAMI ET AL.	

If you wish to add additional U.S. Published Application citation information please click the Add button. Add

FOREIGN PATENT DOCUMENTS Remove

Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] ¡	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1	1848163	EP	A1	2007-10-24	SHARP KABUSHIKI KAISHA		☐
	2	1988698	EP	A1	2008-11-05	RESEARCH IN MOTION LIMITED		☐

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	2819
	Examiner Name	
	Attorney Docket Number	DAMA-31813

	3	1988697	EP	A1	2008-11-05	RESEARCH IN MOTION LIMITED		☐
	4	2006064047	WO	A1	2006-06-22	INTERNATIONAL BUSINESS MACHINES CORPORATION ET AL.		☐
	5	1638275	EP	A2	2006-03-22	WECOMM LIMITED		☐
	6	160339	EP	A1	2005-12-07	STMICROELECTRONICS S.R.I.		☐

If you wish to add additional Foreign Patent Document citation information please click the Add button Add

NON-PATENT LITERATURE DOCUMENTS Remove

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T5
	1	PCT: International Search Report and Written Opinion for PCT/US2011/024870; 26 October 2011; 12 pages.	☐
	2	J. ROSENBERG et al. " Session Traversal Utilities for NAT (STUN)", draft–ietf–behave–rfc3489bis–06, March 5, 2007.	☐
	3	PCT: International Search Report and Written Opinion for PCT/US2011/028685; 9 November 2011; 10 pages.	☐
	4	PCT: International Search Report and Written Opinion for PCT/US2011/029954; 24 November 2011; 8 pages.	☐
	5	PCT: International Search Report and Written Opinion for PCT/US2011/024891; 25 November 2011; 9 pages.	☐

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	2819
	Examiner Name	
	Attorney Docket Number	DAMA-31813

	6	PCT: International Search Report and Written Opinion for PCT/US2011/031245; 26 December 2011; 13 pages.	☐
	7	Wireless Application Protocol - Wireless Transport Layer Security Specification, Version 18-Feb-2000, Wireless Application Forum, Ltd. 2000; 99 pages.	☐
	8	PCT: International Search Report and Written Opinion for PCT/US2011/040864; 17 February 2012; 8 pages.	☐
	9	PCT: International Search Report and Written Opinion for PCT/US2011/041565; 5 January 2012; 7 pages.	☐
	10	PCT: International Search Report and Written Opinion for PCT/US2011/031246; 27 December 2011; 8 pages.	☐
	11	PCT: International Search Report and Written Opinion for PCT/US2011/049000; 27 March 2012; 10 pages.	☐
	12	PCT: International Search Report and Written Opinion for PCT/US2011/051877; 13 April 2012; 7 pages.	☐
	13	PCT: International Search Report and Written Opinion for PCT/US2011/055101; 22 May 2012; 9 pages.	☐
	14	Balamurugan Karpagavinayagam et al. (Monitoring Architecture for Lawful Interception in VoIP Networks, ICIMP 2007, 24 Aug 2008).	☐
	15	NiceLog User's Manual 385A0114-08 Rev. A2, March 2004.	☐
	16	WISPA: Wireless Internet Service Providers Association; WISPA-CS-IPNA-2.0; May 1, 2009.	☐

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	2819
	Examiner Name	
	Attorney Docket Number	DAMA-31813

	17	PCT: International Preliminary Report on Patentability of PCT/US2011/024870; 30 August 2012; 7 pgs.	☐
	18	RFC 5694 ("Peer-to-Peer (P2P) Architecture: Definition, Taxonomies, Examples, and Applicability", November 2009).	☐
	19	Mahy et al., The Session Initiation Protocol (SIP) "Replaces" Header, September 2004, RFC 3891, pages 1-16.	☐
	20	PCT: International Preliminary Report on Patentability of PCT/US2011/024891; 30 August 2012; 6 pgs.	☐
	21	T. Dierks & E. Rescorla, The Transport Layer Security (TLS) Protocol (Ver. 1.2, 8/2008) retrieved at http://tools.ietf.org/html/rfc5246. Relevant pages provided.	☐
	22	J. Rosenberg et al., SIP: Session Initiation Protocol (6/2008) retrieved at http://tools.ietf.org/html/rfc3261. Relevant pages provided.	☐
	23	Philippe Bazot et al., Developing SIP and IP Multimedia Subsystem (IMS) Applications (2/5/2007) retrieved at redbooks IBM form number: SG24-7255-00. Relevant pages provided.	☐
	24	PCT: International Preliminary Report on Patentability of PCT/US2011/028685; 4 October 2012; 6 pgs.	☐
	25	PCT: International Preliminary Report on Patentability of PCT/US2011/031245; 26 October 2012; 9 pgs.	☐
	26	PCT: International Preliminary Report on Patentability of PCT/US2011/029954; 11 October 2012; 5 pgs.	☐
	27	PCT: International Preliminary Report on Patentability of PCT/US2011/031246; 08 November 2012; 5 pgs.	☐

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	2819
	Examiner Name	
	Attorney Docket Number	DAMA-31813

	28	Rosenberg, J; "Interactive Connectivity Establishment (ICE): A Protocol for Network Address Translator (NAT) Traversal for Offer/Answer Protocols"; 29 October 2007; I ETF; I ETF draft of RFC 5245, draft-ietf-mmusic-ice-19; pp 1-120.	☐
	29	Blanchet et al; "IPv6 Tunnel Broker with the Tunnel Setup Protocol (TSP)"; 6 May 2008; IETF; IETF draft of RFC 5572, draftblanchet-v6ops-tunnelbroker-tsp-04; pp 1-33	☐
	30	Cooper et al; "NAT Traversal for dSIP"; 25 February 2007; IETF; IETF draft draft-matthews-p2psip-dsip-nat-traversal-00; pp 1-23	☐
	31	Cooper et al; "The Effect of NATs on P2PSIP Overlay Architecture"; IETF; IETF draft draft-matthews-p2psip-nats-and-overlays-01.txt; pp 1-20	☐
	32	Srisuresh et al; "State of Peer-to-Peer(P2P) Communication Across Network Address Translators(NATs)"; 19 November 2007; I ETF; I ETF draft for RFC 5128, draft-ietf-behave-p2p-state-06.txt; pp 1-33	☐
	33	PCT: International Search Report and Written Opinion for PCT/US2012/046026; 18 October 2012; 6 pages.	☐
	34	DUNIGAN, Tom, "Almost TCP over UDP (atou)," last modified Jan. 12, 2004; retrieved on Jan. 18, 2011 from <http://www.csm.ornl.gov/~dunigan/net100/atou.html> 18 pgs.	☐
	35	PCT: International Preliminary Report on Patentability of PCT/US2011/040864; 3 January 2013; 6 pgs.	☐
	36	PCT: International Preliminary Report on Patentability of PCT/US2011/041565; 10 January 2013; 6 pgs.	☐
	37	PCT: International Preliminary Report on Patentability of PCT/US2011/049000; 26 February 2013; 6 pgs.	☐
	38	PCT: International Preliminary Report on Patentability of PCT/US2011/051877; 26 March 2013; 5 pgs.	☐

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	2819
	Examiner Name	
	Attorney Docket Number	DAMA-31813

	39	PCT: International Preliminary Report on Patentability of PCT/US2011/055101; 16 April 2013; 7 pgs.	☐

If you wish to add additional non-patent literature document citation information please click the Add button Add

EXAMINER SIGNATURE

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14024027
	Filing Date	2013-09-11
	First Named Inventor	Sivakumar CHATURVEDI
	Art Unit	2819
	Examiner Name	
	Attorney Docket Number	DAMA-31813

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☐ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☐ See attached certification statement.

☐ Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ None

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Timothy F. Bliss Reg. #50925/	Date (YYYY-MM-DD)	2013-12-11
Name/Print	TIMOTHY F. BLISS	Registration Number	50925

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these record s.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 848 163 A1

(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 158(3) EPC

(43) Date of publication:
24.10.2007 Bulletin 2007/43

(21) Application number: **06702680.7**

(22) Date of filing: **13.01.2006**

(51) Int Cl.:
H04L 12/56 *(2006.01)* ***H04Q 7/38*** *(2006.01)*

(86) International application number:
PCT/JP2006/300324

(87) International publication number:
WO 2006/075677 (20.07.2006 Gazette 2006/29)

(84) Designated Contracting States:
DE FR GB

(30) Priority: **17.01.2005 JP 2005009301**

(71) Applicant: **Sharp Kabushiki Kaisha**
Osaka-shi, Osaka 545-8522 (JP)

(72) Inventors:
- **YAMADA, Shohei**
  Chiba, 2610004 (JP)
- **MORIWAKI, Tetsuro**
  Saitama, 3300071 (JP)
- **HIBI, Keiichi**
  Chiba 2700034 (JP)

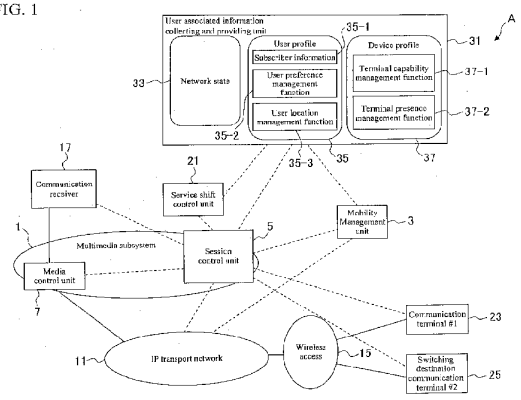
(74) Representative: **Müller, Frithjof E.**
Müller Hoffmann & Partner
Patentanwälte
Innere Wiener Strasse 17
81667 München (DE)

(54) **COMMUNICATION NETWORK CONTROL SYSTEM**

(57) Smooth and seamless terminal switching which guarantees continuity of communication at the level of application is realized.

A communication network control system includes a mobility management unit 3 for setting up and managing a physical and logical transmission path between a communication terminal 23 and a communication receiver 17 by controlling the path for transmitting data packets, a session control unit 5 for controlling a session between the communication terminal 23 and the communication receiver 17 along the transmission path, a service shift control unit 21 for transmitting to the session control unit 5 a session switching request signal which instructs the session to be switched from communication terminal 23 to a communication terminal 25 to which the connection is to be switched, and a user associated information collecting and providing unit 31 for collecting a user profile which includes information on the user's location, the state of the network of the user and the preferences and interests of the user, and a device profile which includes the type of the device and the state of connection of each device to the network from each function element of the network, the user, the user terminal and a device in the vicinity of the user, and providing user associated information.

FIG. 1



EP 1 848 163 A1

Printed by Jouve, 75001 PARIS (FR)

Description

Technical Field

[0001] The present invention relates to a technology for switching terminals in a communication network which provides mobile communication service, and in particular, to a technology for switching terminals where communication can be continued seamlessly and without interruption when a user switches the terminal he or she is using to a different terminal during communication.

Background Art

[0002] In recent years, communication service at a higher degree has been expected to be realized as network services represented by the internet, and cellular phones have quickly spread and expanded. Though a so-called handover function or a mobility management function where communication continues even when a user moves while holding a terminal have been provided to cellular phones, this function is desired to be further developed to a higher level so that a function which allows communication to continue even if the terminal is changed during communication can be realized.

[0003] When it becomes possible to connect various terminals to a communication network as a result of expansion and development of the network, users can own various types of communication terminals which can be connected to a communication network. These communication terminals are not limited to portable terminals, such as cellular phones, but it is considered that information apparatuses, such as stationary home electronics which are installed within a house, for example, a television receiver (hereinafter, referred to as information apparatus), can also be used as a communication terminal.

[0004] Meanwhile, on the communication network side, it becomes easy to provide a common service to various types of communication terminals without recognizing a difference between wireless and wired access means in the network operator or in the service provider, by providing a common IP (internet protocol) backbone where IP communication technology that has been constructed through the development of the internet is used.

[0005] As a result, users can selectively use communication terminals they own, such as information apparatuses, for example, mobile communication terminals, PDA's and personal computers, depending on the current situation or the preference of the user, and then the same service is required to be used through a terminal the user owns or selects at a point in time. Furthermore, a situation where a terminal is desired to be switched to another terminal during communication can be assumed. In this case, it is necessary to realize the demand of the user in which the terminal can be switched to another terminal seamlessly, that is, without interruption, while maintaining the state of communication instead of the communication being cut off and connected again through another terminal.

[0006] There is a concrete example where video contents are distributed through streaming and viewed on a personal computer at home, and the receiving terminal is switched to a mobile communication terminal or a PDA when the user goes out so that the same contents can be continuously viewed on the terminal which is taken out with the user. In addition, there is another possible example where the user communicates with someone on a television phone while going out, and then comes home, and therefore, the television phone is switched to a television at home so that the communication with the other person can be continued.

[0007] In the case where a multicasting type distribution is received when the seamless switching of terminals is realized as described above, the data of the same contents is simultaneously distributed to a number (unspecified large number) of communication terminals from the terminal on the transmission side. Therefore, the receiving terminal may be connected to this terminal on the transmission side such that this data is received by the switching destination terminal, and thus, switching of the terminals can be realized relatively easily.

[0008] In the case of a unicasting type distribution where the communication is distributed to only a certain terminal or one-on-one communication, a procedure becomes necessary where an interruption of communication is instructed to the terminal on the transmission side, the switching destination terminal is connected to this terminal on the transmission side, and then, it is notified that the terminal on the receiving side has been switched, and after that, the communication is resumed.

[0009] Fig 7 shows an example where terminals are switched in a control system of a conventional communication network as described above. Fig 7 shows an example in the case where a user switches a communication terminal (#1) 203, which is being used for the communication, to a communication terminal (#2) 205. First, the user transmits control information, as shown by arrow 221, from the communication terminal (#1) 203, which is receiving data, to a server apparatus 201 on the distribution side, and thus, instructs interruption of distribution. Next, the control information requesting an interruption of the communication connected to the server apparatus 201, as shown by arrow 224a, is sent out to a control apparatus 213 within the communication network, and thus, the communication is cut off.

[0010] Next, when the user sends out a request for connection to the server apparatus 201, as shown by arrow 225, to the control apparatus 213 in the communication network from the communication terminal (#2) 205, to which the connection is to be switched, the control apparatus 213 sets up a communication path between the communication terminal (#2) 205 and the server apparatus 201 within the communication network, and sets up the communication between these apparatuses. Subsequently, when the control information for instructing resumption of distribution, as shown by arrow 224b, is

Ex.1002 / Page 563 of 1008
Cisco Systems, Inc.

sent out from the communication terminal (#2) 213 to the server apparatus 201, the server apparatus 201 sends out data from the point in time when the distribution is interrupted so that the user can receive the following data using the communication terminal (#2) 205, that is, switching of the terminals can be realized.

[0011] Here, address information on the server apparatus 201 for the communication terminal (#2) 205, to which the connection is to be switched, to be connected to the server apparatus 201 is designated by means of the communication terminal (#2) 205, which is operated by the user so that the address information is inputted in the form of a telephone number, a URL or the like. In this example, the control apparatus 213 in the communication network only makes and cuts off the connection between the communication terminal (#1) 203 or the communication terminal (#2) 205 and the server apparatus 201 and does not have the control function for switching terminals. Thus, the switching of terminals can be realized by using only the communication terminals and the functions of interrupting and resuming communication in the server apparatus.

[0012] Fig 8 shows a conventional example of another method for switching terminals. A communication terminal (#1) 303 on the receiving side sends out the control information for instructing a server apparatus 301 on the distribution side to interrupt the distribution, as shown by arrow 321, when terminals are switched. When the user carries out a transfer operation after the communication with the server apparatus 301 has been suspended, the communication terminal (#1) 303 sends out the control information for requesting the transfer of the connection with the server apparatus 301 to a communication terminal (#2) 305 to a control apparatus 313 in the communication network, as shown by arrow 332.

[0013] The control apparatus 313 which has received the control information sends out the control information for instructing the communication terminal (#2) 305 to connect with the server apparatus 301, as shown by arrow 333, and thus, calls the communication terminal (#2) 305 and sets up a communication path between the communication terminal (#2) 305 and the server apparatus 301 so that a connection is established when the communication terminal (#2) 305 responds to this call, as shown by arrow 334.

[0014] Thereafter, as shown by arrow 335, upon the transmission and reception of the control information between the communication terminal (#1) 303, which is the transfer source and the control apparatus 313, the connection between the communication terminal (#1) 303 and the server apparatus 301 is cut off. At the same time, the communication terminal (#2) 305 sends out the control information for requesting resumption of the suspended communication, as shown by arrow 324, to the server apparatus 301, and thus, the communication terminal (#2) 305 receives the following data. In this example, though the control apparatus 313 within the communication network has a control function for transferring a call to another terminal, this control apparatus 313 does not have a function of controlling the interruption and resumption of data transmission and reception between the communication terminal and the server apparatus, and thus, does not guarantee the continuity of communication, that is, seamless switching (Non-Patent Document 1).

[0015] In addition, Fig 2 shows an example of a configuration of a third generation mobile communication of which the standard is defined by 3GPP as the configuration of a conventional communication network. IMS (IP Multimedia CN Subsystem) has a purpose of providing an IP multimedia service through a packet exchanging system, and to do so, a session control function is arranged within the network 101. SIP (Session Initiation Protocol) is adopted as the session control protocol. CSCF 105 is a call state control function and communicates with HSS (Home Subscriber Server) 103 as a registered server of the SIP so as to carry out a user registering process, transfer session information and control the call connection. It also has an interface for communicating with an application server in order to provide a service. In addition, the HSS 103 manages the subscriber and location information of users. MRF (Media Resource Function) 107 controls the resource of media streaming and carries out media synthesis and the conversion of media streams in a multimedia conference and the like. In addition, MGCF (MediaGateway Control Function) and MGW (MediaGateway) carry out media conversion at the time of the connection with PSTN (Public Switched Telephone Network). However, there are no mechanisms where a service is continuously provided to a terminal 123 or 125 for wireless access 115 to a receiver of communication 117 via a network 101 and a packet network 111 even after change (see Non-Patent Document 2).

Non-Patent Document 1: Yabusaki et al. "All-IP Conversion in Mobile Network, Special Issue," NTT DoCoMo Technical Journal, Vol. 10, No. 4, January 2003, pp. 6-34

Non-Patent Document 2: 3GPP TS22. 228, V5. 6. 0

Disclosure of the Invention

Problems to be Solved by the Invention

[0016] In any of the conventional examples, however, the continuity is secured by the suspension and resumption of the communication between the communication terminal and the server apparatus, that is, between both ends, when terminals are switched, and thus, a technology for guaranteeing seamless switching without interruption is not used. That is, in any of the conventional examples, a function of suspending communication, that is, data transmission, is provided in a server apparatus, and after the suspension, the resumption of data transmission is required from another communication terminal, so that the switching of terminals is realized only in appearance. In the case where contents stored in a serv-

Ex.1002 / Page 564 of 1008
Cisco Systems, Inc.

er apparatus are distributed in one direction towards a communication terminal, or in the case of two directional, one-on-one real time communication, such as a television phone, the function to a certain degree can be realized.

[0017] In the case where the communication application in an upper level has a state corresponding to the transmission data, for example, in the case where a communication type game is continued on another terminal or group work where the same document is edited through communication is done, however, there is a problem that it is difficult to inform the switching destination terminal of the state of the communication application.

[0018] More specifically, in the case where a number of communications (connections) are set up between the applications on the ends even in a service, such as communication between television phones or contents distribution, for example, in the case of an application where a large number of media are simultaneously used or an application where various types of contents or information are used in cooperation, there is a problem that a process or procedure for switching to another terminal becomes complicated.

[0019] In addition, there are problems as follows.

[0020] 1) Since contents are received in an optimal communication form (bit rate, resolution and the like) corresponding to the capability of a terminal as the terminal is switched, it is difficult to provide a service which works in cooperation with the control of the communication network so that the quality of the service (bit rate, delay and the like) in the network can be appropriately controlled.

[0021] 2) It is also difficult to determine whether the quality of the service is appropriately switched as described above on the network control side or on the receiver of communication side, or to decide that the quality of the service is switched according to the preference of the user.

[0022] 3) In addition, there is a problem that it is difficult to provide a service for finding what type of terminal exists in the periphery and controlling the switching to a terminal after it has been determined which terminal the connection should be switched to.

[0023] An object of the present invention is to provide a seamless and ubiquitous service environment where it is not necessary for a user to be aware of the difference in wireless and wire networks and service or the difference in the type of communication terminal, unlike in the prior art.

Means for Solving the Problem

[0024] A communication network control system according to the present invention has user associated information collecting and providing means for collecting a user profile which includes the state of the network, information on the user's location, and the preference and interests of the user, and a device profile which includes the type of device and the state of the connection of each device to the network from each functional element of the network, the user, the user terminal and the peripheral device of the user, and providing user associated information in a communication network system including mobility management means for setting up and managing a physical and logical transmission path between the communication terminal and the receiver of communication by controlling the path for data packet transfer, session control means for controlling a session between the communication terminal and the receiver of communication along the transmission path, and service shift control means for transmitting a session switching request signal, which instructs the session to be switched to a switching destination communication terminal from the communication terminal, to the session control means.

[0025] The service shift control means determines whether a terminal switching request signal is received from the communication terminal or the terminal is switched on the basis of the user associated information, and thus, generates a session switching requesting signal. The session control means performs a function of receiving the session switching requesting signal to interrupt the session, a function of instructing the mobility management means to set up a transmission path with the switching destination communication terminal, a function of establishing a session with the switching destination communication terminal, and a function of resuming the session with the receiver of communication after the establishment of the session. As a result, the communication can be controlled so as to be continued by switching at least one communication terminal which is being used for this communication to another communication terminal which is not being used for the communication without interrupting the communication between the communication terminals. Thus, a function of managing and controlling a session between the ends, that is, a logical transmission path between the applications using the transmitted data, and a function of transferring the session are achieved in addition to a function of setting up and managing a transmission path for data in a communication network. Therefore, it becomes possible to realize a smooth and seamless switching of a communication terminal, including the management of the session state and the application.

[0026] In addition, it becomes possible to determine whether or not a terminal is switched corresponding to the environment of the user, and it becomes possible to provide service control on the network side in accordance with the user's location and the network state. In addition, since means for instructing switching of the terminal while maintaining the provision of the user associated information concerning the service and the service and means for establishing a session between terminals are separated, a more efficient network control becomes possible. Furthermore, this can be realized by adding service shift control means to the CSCF which controls a session in the existing 3GPP system.

Ex.1002 / Page 565 of 1008
Cisco Systems, Inc.

[0027] In addition, the communication network control system according to the present invention is characterized in that the service shift control means has a function of determining media to which the media is to be converted, which acquires the device profile of the communication terminal and the switching destination terminal from the user associated information, as well as media switching capability information from the receiver of communication, and instructs conversion of the media at the media control means or change of the session to the receiver of communication, and a media conversion process determining function for determining which media conversion is carried out, wherein the service shift control means generates information on an instruction to change the session and an instruction to change media on the basis of the determination of media to which the media is to be converted and the media conversion process determination.

[0028] As a result, it becomes possible to automatically determine whether the media should be converted on the network side or in the receiver of communication, in order for the state of service to be maintained, in terms of the media switching capability of the receiver of communication and the terminal capability in the communication terminal and the switching destination communication terminal.

[0029] In addition, the communication network control system according to the present invention is characterized in that the user associated information collecting and providing means manages the determination standard for media to which the media is to be converted of the user and the media conversion process as user preference and the service shift control means generates information on media conversion instruction on the basis of the user preference.

[0030] As a result, the user can set his or her own preference in advance and set which service provider is desired to convert the media and which media conversion process is desired, and thus, service which has expandability and flexibility can be provided to the user and to the service provider.

[0031] In addition, the communication network control system according to the present invention is characterized in that the communication terminal has means for communicating with the switching destination communication terminal, and acquires information on terminal presence indicating the state and the address of the switching destination communication terminal and information on terminal capability, which includes information on of what type the switching destination communication terminal is, the attributes, the process, the available bit rate, the type of media and the type of codec from the switching destination communication terminal, the terminal switching request signal includes information on the terminal presence and information on the terminal capability of the switching destination communication terminal, and the service shift control means generates a session switching request signal on the basis of the terminal switching request signal and registers the information on the terminal presence and the information on the terminal capability in the device profile.

[0032] As a result, session control becomes possible even in the case where the communication network side does not have information on the switching destination communication terminal, and a new device can be registered at the same time.

[0033] In addition, the communication network control system according to the present invention is characterized in that the communication terminal operates as the switching destination communication terminal, an instruction requesting only change in the connection path instead of switching of the terminal is transmitted as a terminal switching request signal, or it is determined whether or not the path is switched on the basis of the user associated information, and as a result, the service shift control means generates a session switching signal which instructs switching of the session within the communication terminal and transmits the session switching signal to the session control unit.

[0034] As a result, it becomes possible to maintain the service when the connection is switched to a network having a different access method and a different operator using a communication terminal.

Effect of the Invention

[0035] According to the present invention, the user can switch the communication terminal used through a simple button operation or the like at the time when switching is requested in accordance with the change in his/her situation with the effort required for operation and loss of time greatly reduced in comparison with in the prior art, and thus, can enjoy service at a higher level. There is also an advantage such that distribution service can be continued in the server apparatus on the distribution side without mounting any special new functions. Furthermore, since the data format is optimized for individual communication terminals before being transmitted even when the capability is different between the communication terminals on the receiver side, there is an advantage such that there is no load on the communication terminal side and the server apparatus side. In this manner, the basis for providing service is shared, so that the user is not aware of the difference in the wire and wireless networks and service, or the difference in the type of communication terminal, unlike in the prior art. This makes it possible to enjoy a seamless and ubiquitous service environment.

Brief Description of the Drawings

[0036] Fig 1 is a diagram schematically showing the configuration of a communication network control system according to a first embodiment of the present invention;

Fig 2 is a schematic diagram showing an example

Ex.1002 / Page 566 of 1008
Cisco Systems, Inc.

of the configuration of a conventional communication network control system;

Fig 3 is a diagram showing an example of the configuration of a database in a user associated information collecting and providing unit;

Fig 4 is a diagram showing a procedure for switching terminals in the communication network control system according to the present embodiment;

Fig 5 is a schematic diagram showing a communication network control system in terms of switching of an access method according to a second embodiment of the present invention;

Fig 6 is a diagram showing a procedure for switching a path in the communication network control system in terms of switching of the access method according to the present embodiment;

Fig 7 is a diagram showing an example of terminal switching in the communication network control system; and

Fig 8 is a diagram showing an example of terminal switching in the communication network control system.

Explanation of Symbols

[0037] A ... communication network control system, 3 ... mobility management unit, 5 ... session control unit, 11 ... IP transport network, 21 ... service shift control unit, 31 ... user associated information collecting and providing unit, 33 ... network state, 35 ... user profile, 37 ... device profile

Best Mode for Carrying Out the Invention

[0038] A communication network control system according to the present invention has a function of managing and controlling a session at the ends, that is, a logical transmission path between applications using transmitted data, and a function of transferring the session, in addition to a function of setting up and managing a transmission path for data in a control apparatus within a communication network. These functions allow communication terminals to be switched smoothly and seamlessly, including management of the session state and the application.

[0039] In addition, the communication terminal according to the present invention has a function of making notification of the session state and the application in order to switch terminals and a function of setting the session and the application to the state of which notification has been made as described above, and then, resuming this state. These functions allow terminals to be switched smoothly and seamlessly while maintaining the session in an appropriate state.

[0040] Furthermore, handover and mobility management functions for switching to an appropriate transmission path following the changes in the location of the communication terminal and address information, which are provided through a mobile communication network or the like, are used in cooperation with the session control function, and thus, a function of setting a transmission path when the communication terminal is switched is realized with minimal change from the prior art. Thus, a session control function having high flexibility and expandability is realized.

[0041] In the next generation mobile communication networks, it is assumed that all IP based platforms where all data is transmitted and exchanged in the form of IP packets will be formed for use. In addition, provision of a so-called call and control separating type architecture where the function of transmitting data and the control function of call setting, routing management and the like are clearly separated has been examined. In such an architecture, a transport layer, which is a lower layer, is specialized in the function of transmitting data, that is, IP packets, efficiently and at high speed and the function of controlling the path (routing) and controlling traffic are allocated in the connection control layer, and this connection control layer instructs the transport layer to allocate routing and resources of the IP packets in the configuration, which enables to achieve increase in the speed and increase in the efficiency in the system as a whole. In all-IP based platforms, it is assumed that control signals, such as call control and signaling are transferred in the form of IP packets.

[0042] Furthermore, in the above-described all-IP based architecture, provision of a function for supporting service in order to increase the level of the network and add more value such that various communication services can be flexibly and freely provided has been examined. This means that a call control function for setting up a physical and logical transmission path at the ends is the main function in previous networks, which mainly handle speech sound telephone calls, while in next generation networks, a function of controlling a session, which is logical connection between communication applications at ends, will be provided within the network.

[0043] Here, call and call connection indicate (setting up of) a physical and logical path for transmitting data to a receiver between terminals at the ends, and session indicates that a communication application at a terminal is in such a state as to be able to receive and process (has processed) data from the application in the terminal of the receiver of communication. More specifically, a state where data can be transmitted to or received from a receiver terminal but it is not determined which application should be used or no application is prepared is a state in which call connection can be achieved but no session is connected. Conversely, a state where the application is prepared to transmit or receive data while the data transmission path is lost (for example when a cellular phone is moved out of range) is a state where a session is connected but no call connection is achieved.

[0044] So far, call connection has mainly been described. In conventional speech sound telephone calls, call connection and sessions are not particularly distin-

Ex.1002 / Page 567 of 1008
Cisco Systems, Inc.

guished, but in the case of multimedia communication or data communication, a session is set up between applications of communication terminals along the transmission path established at the ends after setting up of the call connection. For the next generation mobile communication networks, inclusion of a session control function within the network has been examined. This is because it has become necessary for the network to have such functions as connection control and communication control in accordance with various forms of communication, modes and media, due to diversification and increase in the level of communication. In the case where, for example, the difference between calls of only speech sound and television phone calls, the quality and the terminal capability, such as resolution and bit rate, in the television phones are designated for a receiver when a call is made, it is necessary for the capability of the network to include functions of address solution for designated terminals which satisfy these requirements and setting up of a transmission path having appropriate quality (call control, path control) and the like, which cannot sufficiently be provided through negotiation between the ends.

[0045] Therefore, a session control unit for session control is provided, so that a session, that is, a state of communication or the mode between the applications at the ends, is managed and controlled, and this session control function instructs and controls the call control function and the path control function in the mobility management unit to set up a transmission path in an appropriate band having appropriate quality in the configuration. At this time, connection request (session setup request) from the application at the communication terminal is sent to the session control function so as to be processed.

[0046] Fig 1 shows an example of the configuration of a communication network control system according to a first embodiment of the present invention. As shown in Fig 1, a communication network control system A according to the present embodiment includes an IP transport network 11 for transferring IP packets, a mobility management unit 3 for controlling the IP transport network 11 and managing the physical location of the communication terminals, controlling calls and controlling handover (controls paths), as described above, a session control unit 5 for establishing and managing sessions, and a service shift control unit 21 which is charged with dealing with higher level requirements by the user so that communication terminals are switched while maintaining the session.

[0047] The mobility management unit 3 corresponds to the HSS 103 of the IMS in Fig 2, and is a functional element which is specialized particularly to control the IP transport network. The session control unit 5 corresponds to the CSCF 105 of the IMS in Fig 2, and the service shift control unit 21 is a new functional element for the IMS in Fig 2. However, it is construable that the service shift control unit 21 is realized as a result of function expansion of the CSCF 105 in Fig 2. In order to switch terminals while maintaining the service, the service shift control unit 21 allows a terminal to request the session control unit to instruct switching of terminals, a terminal switching request to be received by the session control unit, a session switching request signal to be transmitted to the session control unit, and a user associated information collecting and providing unit 31 to be informed of the state of the user, so that a session switching request signal can be automatically transmitted in accordance with the state of the user.

[0048] The user associated information collecting and providing unit 31 manages a network state 33, a user profile 35 concerning the user, and a device profile 37 concerning the device, collects information from functional elements of various networks, and provides information to function elements of various services and networks. This is a function further expanded from the HSS 103 of the IMS 101 shown in Fig 2, and may be realized by being integrated with the mobility management unit 3 and expanding the function of the HSS 103 shown in Fig 2. The user profile 35 is made up of subscriber information 35-1, a user preference management function 35-2, and a user location management function 35-3. Information on the user's location can be acquired from information on access points from the mobility management unit 3, information on the speed of movement and information from GPS's mounted on RFID's in the periphery and the communication terminal.

[0049] The preference and interests of the user are managed in accordance with such a method that the user sets the user location, the speed of movement, the type of wireless access corresponding to the type of device used, the type of service, a method for roaming, a terminal to which media conversion is to be carried out, and a method for converting media in advance, or the history of use as described above on the network side is managed and the preference and interests of the user are guessed on the basis of the history and set.

[0050] The device profile 37 has terminal capability information 37-1 which includes the form of the terminal, the data conversion system, compatibility with animation, the size of the screen and the like, and terminal presence information 37-2 which includes the situation (location) of the terminal at the time. The device profile 37 is acquired when information is transmitted from the terminal so as to be automatically managed on the network side at the time registered by the user in advance, or when the terminal is connected to the network. In addition, in the case where the switching destination communication terminal is not registered, short distance communication is used, so that the terminal capability information on the switching destination communication terminal can be acquired so as to be included a terminal switching request signal and transmitted from the communication terminal, and thus registered in the device profile 37.

[0051] The device profile 37 and the user profile 35 are associated with information on the user's location and information on the owner of the device. Accordingly, in

Ex.1002 / Page 568 of 1008
Cisco Systems, Inc.

some cases, the user is associated with a public device which is not the user's own device, or a shared device.

[0052] Terminal capability information on terminal capability managed by the terminal capability management function 37-1 is information indicating the type, the attributes, the process, the IP address and the available bit rate of the terminal, the type of media and the type of codec, the size of the screen, the capability of the CPU, the connectable networks and the like. Terminal presence information managed by the terminal presence management function 37-2 indicates the type and state of the application currently running, information on the current terminal's location and the like. The network state 33 is acquired from information on the type of wireless access from the mobility management unit 3, information on QoS from the session control unit 5, information on the session state, information on the state of media conversion in the media converting unit and information on the state of the application currently running in the communication terminal. The terminal registered in the device profile manages not only the state of the network in the communication terminal but also the state of the network currently connected (transmission rate, wireless system, QoS and the like). Here, in the above description, indispensable configuration features are the network state 33, the subscriber information 35-1 and the terminal capability function 37-1.

[0053] Fig 3 is a diagram showing an example of a database for a network state, user profile and device profile. The database is managed through abstract descriptions using such a language as XML (extensible Markup Language), and information on the database is provided to the service shift control unit 21 (Fig 1; in the following, the figure number is omitted for description).

[0054] As shown in Fig 3, a network state 41, a user profile 43 and a device profile 45, for example, are associated with one another. The network state 41 is formed of a terminal (1) 41-1, a terminal (2) 41-2 and a terminal (3) 41-3. For the terminal (1) 41-1, for example, W-CDMA is described as the access method, multimedia is described as the QoS class, speech sound communication is described as the session state, file exchange is described, 10 Mbps is described as the bit rate, a base station 1 is described as the location and path information A-B-C... is described. In the user profile 43, subscriber information, preference, location information and the like are described, in terms of information on a user (1) 43-1 who is the owner of the terminal (1) 41-1, for example. In this case, it is also indicated that the owner of the terminal (2) 41-2 is also the user 1. In the device profile 45, the mobile communication terminal, the size of the screen, the clock number of the CPU, the codec, the access method, the IP address and the like, which are terminal capability information on the terminal (1) 41-1, are described. As the terminal presence information, information on longitude and latitude, information on the location, the speed of movement, the state of communication, the existence and type of application that has been started up and the like are described. As the information on the terminal (2) 41-2, it is described, as the terminal capability information, that the terminal is stationary, for example, and information on whether or not communication is possible is described as the terminal presence information. Thus, these pieces of information 41, 43 and 45 are associated with one another on the basis of the owner, the situation of communication, the location and the like.

[0055] When information on a certain user is requested from the service shift control unit 21, the terminal owned by the user and terminals in the vicinity of the user's location are associated with each other and provided in the service shift control unit 21 as a group of associated information.

[0056] In addition, the media control unit 7 corresponds to expanded MRF and MGCF/MGW 107 in the IMS 101. Media conversion of the bit rate, the codec, the size of the image, the media format and the like of the contents is controlled and carried out in response to the media conversion request from the session control unit 5. In the case where the media are converted after switching of the terminal, buffering is carried out in the unit, which allows for media conversion until the media are converted after resumption of the session. At this time, encoding is carried out again, and therefore, authentication function, for example, using an electronic watermark, may be added to the contents.

[0057] For the purpose of simplifying the description, these function elements of the communication network control system are shown as a single module in the respective figures. In reality, however, function elements as those described above are placed in the respective networks or the area in which the user roams by taking a case of roaming and a case where the receiver of communication is outside the same network into consideration, and thus, are not realized in one module. The description of the embodiment is simplified by regarding such use collectively as one process.

[0058] The communication terminals are also provided with a user interface formed of an image display apparatus, an input apparatus and the like (not shown), and a short distance communication unit using infrared rays, Bluetooth (registered trademark), a wireless communication system, such as UWB, which is expected to become prominent in the future, or wired communication, such as USB systems. The communication terminals have a function of requesting terminal switching, a function of making notification of a terminal ID, a function of reproducing the state of a session, a function of managing a session, a function of sending out the state of a session, a function of requesting and responding to calls, and a function of registering locations. The receiver of the communication may be an application server apparatus or a communication terminal.

[0059] Next, the procedure of switching terminals will be described with reference to Fig 4. Fig 1 is also referred to whenever necessary. First, the communication termi-

Ex.1002 / Page 569 of 1008
Cisco Systems, Inc.

nal 23 generates a terminal switching request signal, and at this time, it is necessary to designate to which terminal the connection is to be switched. Available methods include a method for communicating with a switching destination communication terminal 25 using short distance wireless communication to acquire terminal information on the switching destination communication terminal 25, and thus preparing a terminal switching request signal (C300), and a method according to which a user selects a switching destination communication terminal 25 in a state where the communication terminal 25 has acquired a switchable terminal list from the user associated information collecting and providing unit 31 so as to instruct preparation of a terminal switching request signal (C301). The terminal switching request signal may include the session state of the communication terminal 23, the state of the application and the like. Alternatively, the service shift control unit 21 may periodically exchange information with the user associated information collecting and providing unit 31 so as to determine whether or not the user environment is in such a state that the terminal should be switched (C301').

[0060] As an example of the state where the terminal should be switched, in cases where the state of the network in the communication terminal (#2) 25 is more stable than the state of the network in the communication terminal (#1) 23 according to information on the state of the network or in cases where the network in the communication terminal (#2) 25 is faster, the possibility that the terminal will be switched is high. Alternatively, the terminal can be switched in cases where it is determined that there are two terminals which can be used by the user in the current user's location using user preference information, information on the user's location and the terminal presence information, and what the user will use with priority in this location (determination from user preference information) is determined to be the switching destination terminal (#2) 25.

[0061] The service shift control unit 21 requests information on the user profile 35, the device profile 37 and the network state 33 from the user associated information collecting and providing unit 31, and acquires this. In the case where the terminal switching request signal in the C301 includes terminal information on the switching destination communication terminal, a task of registering the terminal information in the device profile 37 is also carried out (C302). Next, the service shift control unit 21 determines whether or not media conversion is necessary from the user profile 35, the device profile 37 and the network state 33 acquired from the user associated information collecting and providing unit 31 and the terminal switching request signal.

[0062] In the case where it is determined from the preference and tendencies of the user and the difference in capability between the communication terminal 23 and the switching destination communication terminal 25 that media conversion is necessary, the session control unit 5 is requested to ask whether or not media conversion is possible in the communication receiver 17 (C303). However, this procedure can be omitted in the case where the media conversion capability in the communication receiver is acquired when the user profile 35, device profile 37 and network state 31 are acquired.

[0063] The session control unit 5 makes inquiry about the media conversion capability to the communication receiver 17, acquires information on the media conversion capability, and makes notification of the information on the media conversion capability to the service shift control unit 21 (C304, C305, C306).

[0064] Upon receiving the information on the media conversion capability, the service shift control unit 21 selects media to which the media is to be converted and the content of the media conversion process and determines whether or not change in the session state is necessary from the information that has been acquired up to that point, and transmits a session switching request signal including these to the session control unit 5 (C307). The session control unit 5 instructs the mobility management unit 3 to set up a path (C308). When setting up of the path is completed, a response (ACK) is returned from the mobility management unit 3 (C309). When this path is set up, a call process is carried out in the case where the switching destination communication terminal 25 is not active. At this point in time, two paths between the communication receiver 17 and the communication terminal 23 and between the communication receiver 17 and the switching destination communication terminal 25 are set up. Thus, the settings are fine as they are in the case where it is possible to set up two paths simultaneously, for example in multicasting, while a process for suspending one of the two paths becomes necessary in the case where it is not possible to set up two paths.

[0065] Next, the session control unit 5 transmits a session switching preparation signal indicating that the preparations for switching the session are ready to the communication terminal 23, and the communication terminal 23 returns whether or not switching of the session is accepted (C310, C311). When the terminal is automatically switched from the network side, this becomes a message to confirm whether or not the connection may be switched to the communication terminal 23. The session control unit 5 requests interruption of the session to the communication receiver 17. When ACK is returned from the communication receiver 17, the session with the switching destination communication terminal 25 is established, and during this time, the switching destination communication terminal 25 starts up an application (C312 to C315).

[0066] The session control unit 5 follows the instruction to convert media included in the session switching request signal, and instructs the media control unit 7 or the communication receiver 17 to convert the media (C316, C317, C316', C317'). Subsequently, the session is resumed, and the session with the communication terminal is cut off (C318, C319, C320). At this time, the transmission path is also cut off by the mobility management unit

Ex.1002 / Page 570 of 1008
Cisco Systems, Inc.

3. Finally, a signal indicating the completion of switching of the session is transmitted from the session control unit 5 to the service shift control unit 21 (C321). As a result, communication between the communication receiver 17 and the switching destination terminal 25 can be started.

[0067] Next, one example of the configuration of a communication network control system according to a second embodiment of the present invention will be described. As shown in Fig 6, a communication network control system B according to the present embodiment basically has the same configuration as that shown in Fig 1, except that there is only one communication terminal 22 and an access method (1) 22-1 and an access method (2) 22-2 are switched. Here, essential constituent features in a user associated information collecting and providing unit 31 shown in Fig 6 are a network state 33, subscriber information 35-1, user location management function 35-3 and terminal capability management function 37-1.

[0068] Fig 5 is a diagram showing the procedure for switching in the access method in the same terminal. Though so far, the procedure for switching between the communication terminal (#1) 23 and the switching destination communication terminal (#2) 25 has been described with reference to Figs 1 and 4, Fig 5 shows the procedure for switching paths and sessions between an access method 1 and an access method 2. Assume that the communication terminal 22 is provided with two access methods: the access method 1 based on mobile communication means of, for example, W-CDMA, and an access method 2 based on wireless communication means for high speed communication in hot spots, such as wireless LAN. Different access methods are shown for the access method 1 (22-1) and the access method 2 (22-2).

[0069] What type of access method the communication terminal 22 has is managed by the terminal capability management function 37-1 in the user associated information collecting and providing unit 31. The network state 33 in the user associated information collecting and providing unit 31 manages the path for the access method 1 (22-1), the path for the access method 2 (22-2) and the state of the respective networks, and provides QoS, the transmission rate and the type of the wireless access system to the service shift control unit 21.

[0070] There is a possibility that the operation system for management and control, for example, a multimedia subsystem or mobility management, may be different between the access method 1 (22-1) and the access method 2 (22-2). The user associated information collecting and providing unit 31 is operated by a third party company which is different from the network operator, and may play a role of providing information to the service shift control unit 21 by collecting information from the network operator. In addition, one network operator may manage all of the user associated information collecting and providing unit 31, the service shift control unit 21 and the different access methods. Therefore, it is desirable for the interface between the user associated information collecting and providing unit 31 and the respective nodes in the network to be standardized. The user location management function 35-3 in the user profile is used in the case where the available access method is set up on the basis of the user's location. For example, the location of a hot spot and the user's location are associated with each other, so that information showing that the user is within the service range of the hot spot is managed. Also, the location of a terminal may be specified using terminal presence management information to manage the terminal so as to be located in the service range of the hot spot.

[0071] Switching of terminals has been described in the description of the procedure in Fig 4, and change in the path in the same terminal is described with reference to Fig 6. It is possible to use the same basic flow. However, the above-described terminal switching request signal is changed to a path switching request signal. Though the terminal switching request signal includes the capability of the switching destination communication terminal, this information is not required in the case where the connection is switched within the same terminal. The path switching request signal includes the access method in a switching destination path, the situation of radio waves in the switching destination path, the routing address in the switching destination path, the domain name in the switching destination path, the bit rate of the switching destination path and the like (C401).

[0072] In addition, as shown in Fig 4, it is possible to automatically change the path from the network side, and in this case, the user associated in formation collecting and providing unit 31 and the service shift control unit 21 determine switching (C401'). The determination on the switching is made on the basis of the information provided mainly from the state of the network and the terminal presence management function. Switching is instructed when, for example, the communication terminal can use the two access methods and a higher bit rate than in the access method currently used is detected in the communication using the other access method. In the case where media conversion is necessary in accordance with the bit rate and QoS, the procedure for media conversion is carried out. However, the media are converted in the same terminal, and therefore, conversion due to the difference in the type of terminal and the attributes is not necessary, unlike in the case of Fig 4. It is possible to omit the process for interrupting the session when the media are not converted, and a process for starting up an application is also not necessary. For example, in the case where it is not necessary to change information on the session at all, the access method is sometimes switched only by instructing the mobility management unit to change the path. This instruction is prepared in the service shift control unit, and a session switching request signal including concrete instructions is transmitted. As a result, the access method can be smoothly changed in the same terminal.

[0073] According to the embodiment of the present in-

Ex.1002 / Page 571 of 1008
Cisco Systems, Inc.

vention, the user can easily switch the communication terminal used through a simple button operation or the like when switching is required in accordance with the change in his or her own situation. Thus, the effort required for operation and loss of time can be greatly reduced in comparison with the prior art, and service can be enjoyed at a higher level.

[0074] There is also an advantage in the server apparatus on the distribution side, such that distribution service can be continued without providing any new particular function. Additionally, the data format is optimized in accordance with individual communication terminals before transmission, even when the capability is different between the communication terminals on the receiver side. For this reason, there is an advantage, such that a large burden is not imposed on the communication side and the server apparatus side. In this manner, the basis for providing a service is shared, and thus, the user is not aware of the difference in wireless and wire networks and service or the difference in the type of communication terminal, unlike in the prior art, and it becomes possible to enjoy a seamless and ubiquitous service environment.

Industrial Applicability

[0075] The present invention can be used in switching of terminals themselves or communication systems in terminals.

Claims

1. A communication network control system for controlling continuous communication between a first communication terminal and a third communication terminal in such a manner that a second communication terminal is switched to the third communication terminal which is different from the second communication terminal without interrupting communication between the first communication terminal and the second communication terminal which is communicating with the first communication terminal, comprising:

   mobility management means for setting up and managing a physical and logical transmission path between communication terminals;
   session control means for controlling a session between communication terminals along the transmission path;
   service shift control means for instructing the session control means to switch the session; and
   user associated information collecting and providing means for collecting user associated information which is used when the session is switched and includes at least one of a network state, a user profile concerning a user and a device profile concerning a device, and providing the user associated information to the service shift control means.

2. The communication network control system according to Claim 1, **characterized in that**
   the service shift control means receives a terminal switching request signal from the second communication terminal or determines whether or not the terminal is switched on the basis of the user associated information, to thereby generate a session switching request signal; and
   the session control means has a function of receiving the session switching request signal to interrupt the session, a function of instructing the mobility management means to set up a transmission path with the third communication terminal, a function of establishing a session with the third communication path, and a function of resuming the session with a communication receiver after establishing the session.

3. The communication network control system according to Claim 1 or 2, **characterized in that** the user profile includes at least one of subscriber information of the user, user location information and taste and tendencies of the user, and the device profile includes at least one of the type of the device and information on the state of each device.

4. The communication network system according to Claim 1 or 2, **characterized in that** the service shift control means instructs the session control means to request switching of the session on the basis of information from the user associated information collecting and providing means or the terminal switching request from the second communication terminal.

5. The communication network control system according to Claim 1 of 2, **characterized in that** the user associated information collecting and providing means provides associated information on the basis of owner information and location information when the service shift control means requests provision of information on the user.

6. The communication network control system according to Claim 5, **characterized in that** a communication terminal switching process which is carried out mainly by the network is started up on the basis of information on the network state between the second communication terminal and the third communication terminal, and on the terminal capability provided from the user associated information collecting and providing means.

7. The communication network control system according to Claim 1 or 2, **characterized by** further com-

Ex.1002 / Page 572 of 1008
Cisco Systems, Inc.

prising media conversion means on the network, wherein
the service shift control means generates information in terms of an instruction concerning media, and sends the information to the session control means together with a session switching request.

8. The communication network control system according to Claim 7, **characterized in that** whether or not a process for converting the media is carried out is determined on the basis of the terminal capability between the second communication terminal and aid third communication terminal and the network state.

9. The communication network control system according to Claim 7, **characterized in that** instructions in terms of media to which the media is to be converted and a method for the media conversion process determined on the basis of user preference.

10. The communication network control system according to Claim 7, **characterized in that** the media to which the media is to be converted are determined on the basis of the media conversion capability of the communication receiver and the conversion capability of the media conversion means on the network.

11. The communication network control system according to Claim 10, **characterized in that** the service shift control means generates information for instructing the network which is connected to the first communication terminal to request acquirement of the media conversion capability.

12. The communication network control system according to Claim 1 or 2, **characterized in that** the second communication terminal designates a switching destination communication terminal and sends the information to the network together with a terminal switching request.

13. The communication network control system according to Claim 12, **characterized in that** at least one of the terminal capability of the third communication terminal and terminal presence information which are acquired in advance through the exchange of information with the third communication terminal through short distance communication is included in the terminal switching request.

14. The communication network control system according to Claim 12, **characterized in that** information for instructing media to which the media is to be converted and the method for the media conversion process is provided together with a terminal switching request.

15. A communication network control system for controlling continuous communication by switching at least one access method according to which a second communication terminal having a number of access methods communicates with a first communication terminal to another access method according to which there is no communication between the first communication terminal and the second communication terminal without interrupting the communication, comprising:

mobility management means for setting up and managing a physical and logical transmission path between communication terminals;
session control means for controlling a session between communication terminals along the transmission path;
service shift control means for instructing the session control means to switch the session; and
user associated information collecting and providing means for collecting and providing user associated information which includes at least one of a network state, a user profile concerning a user and a device profile concerning a device, wherein
the service shift control means generates a session switching request signal and instructs the session control means on the basis of information from the user related information collecting and providing means or an access method switching request signal from a communication terminal.

16. The communication network control system according to Claim 15, **characterized in that** the user associated information collecting and providing means provides associated information to the service shift control means on the basis of owner information and location information when the service shift control means requests provision of information on the user.

17. The communication network control system according to Claim 15, **characterized in that** starting up of a process for switching the access method carried out mainly by the network is determined on the basis of at least one of the presence information on the communication terminal and the network state.

18. The communication network control system according to Claim 17, **characterized in that** the access method which is mainly carried out by the network is switched on the basis of user location information and user preference.

19. The communication network control system according to Claim 15, **characterized by** further comprising media conversion means within the network, where-

Ex.1002 / Page 573 of 1008
Cisco Systems, Inc.

in information instructed by the service shift control means in terms of media to which the media is to be converted and the method for the media conversion process is generated in the media conversion means.

20. The communication network control system according to Claim 19, **characterized in that** the method for the media conversion process is determined on the basis of the state of the network according to a current access method and an access method to which the access method is to be switched.

21. The communication network control system according to Claim 20, **characterized in that** instruction in terms of media to which the media is to be converted and the method for the media conversion process is made on the basis of the user preference.

22. The communication network control system according to Claim 21, **characterized in that** the media to which the media is to be converted is determined on the basis of at least one of the media conversion capability of a communication receiver and the conversion capability of the media conversion means of the network.

23. The communication network control system according to Claim 22, **characterized in that** the service shift control means instructs the network of the communication receiver to request the acquisition of the media conversion capability.

24. The communication network control system according to Claim 15, **characterized in that** the second communication terminal designates the access method to which the access method is to be switched and includes the information in the access method switching request signal to be transmitted to the network.

25. The communication network control system according to Claim 24, **characterized by** including at least one of the media to which the media is to be converted and instruction information of the method for the media conversion process in the access method switching request.

26. A communication network control method, comprising the steps of:

collecting user associated information which includes at least one of a network state, a user profile concerning a user and a device profile concerning a device, the user associated information being used when a session is switched in a state where a physical and logical transmission path is set up between a first communication terminal and a second communication terminal which is communicating with the first communication terminal; and

in the case where a session is instructed to be switched between communication terminals along the transmission path, switching the session for continuous communication between the first communication terminal and a third communication terminal by switching the second communication terminal to the third communication terminal which is different from the second communication terminal without interrupting communication between the first communication terminal and the second communication terminal on the basis of the collected user associated information in accordance with an instruction to switch the session.

27. The communication network control method according to Claim 26, **characterized by** comprising the step of providing associated information on the basis of owner information and location information when information concerning the user is requested.

28. The communication network control method according to Claim 26, **characterized in that** switching of the terminal carried out mainly by the network is started up on the basis of at least one of the network state between the second communication terminal and the third communication terminal and the terminal capability information.

29. The communication network control method according to Claim 26, **characterized by** the step of generating information which indicates the media to which the media is to be converted and the method for the media conversion process, as well as in that the session concerning the switching of the session is indicated on the basis of the infonnation.

30. The communication network control method according to Claim 29, **characterized in that** the media to which the media is to be converted is determined on the basis of the media conversion capability of a communication receiver and the conversion capability of media conversion means of the network.

31. The communication network control method according to Claim 30, **characterized by** comprising the step of generating information for instructing the network of the communication receiver to request acquisition of the media conversion capability.

32. A communication network control method, comprising the steps of:

collecting user associated information which includes at least one of a network state, a user

Ex.1002 / Page 574 of 1008
Cisco Systems, Inc.

profile concerning a user and a device profile concerning a device, the user associated information being used when a session is switched in a state where a physical and logical transmission path is set up between a first communication terminal and a second communication terminal having a number of access methods, which communicates with the first communication terminal; and

in the case where a session is instructed to be switched between the communication terminals along the transmission path, switching the session for continuous communication by switching an access method in the second communication terminal without interrupting the communication between the first.

communication terminal and the second communication terminal on the basis of the collected user associated information in accordance with an instruction to switch the session.

33. The communication network control method according to Claim 32, **characterized by** comprising the step of providing associated information on the basis of owner information and location information of the communication terminals when information concerning the user is requested.

34. The communication network control method according to Claim 32, **characterized in that** starting up of a process for switching the access method which is carried out mainly by the network is determined on the basis of at least one of the presence information of the communication terminals and the network state.

35. The communication network control method according to Claim 32, **characterized by** the step of generating information which indicates the media to which the media is to be converted and the method for the media conversion process, as well as in that the session concerning the switching of the session is indicated on the basis of the information.

36. The communication network control method according to Claim 35, **characterized in that** the media to which the media is to be converted is determined on the basis of the media conversion capability of a communication receiver and the conversion capability of media conversion means of the network.

37. The communication network control method according to Claim 36, **characterized by** comprising the step of generating information for instructing the network of the communication receiver to request acquisition of the media conversion capability.

38. A communication terminal for use in a communication network control system comprising: mobility management means for setting up and managing a physical and logical transmission path between communication terminals; session control means for controlling a session between communication terminals along the transmission path; service shift control means for instructing the session control means to switch the session; and user associated information collecting and providing means for collecting user associated information which is used when the session is switched and includes at least one of a network state, a user profile concerning a user and a device profile concerning a device, and providing the user associated information to the service shift control means, **characterized in that**

the service shift control means is requested to switch the terminal, and the communication terminal designates a switching destination communication terminal and includes the information in the terminal switching request to be transmitted to the network.

39. The communication terminal according to Claim 38, **characterized in that** the communication terminal exchanges information with the switching destination communication terminal in advance through short distance communication, and the terminal capability of a switching destination and the terminal presence information are included in the terminal switching request.

40. The communication terminal according to claim 38, **characterized in that** the media to which the media is to be converted and the instruction information of a method for a media conversion process are included in the terminal switching request.

41. A second communication terminal having a number of access methods, which communicates with a first communication terminal and controls continuous communication between the first communication terminal and the second communication terminal by switching at least one access method according to which the second communication terminal communicates with the first communication terminal to another access method according to which there is no communication without interrupting the communication in a communication network control system comprising: mobility management means for setting up and managing a physical and logical transmission path between communication terminals; session control means for controlling a session between communication terminals along the transmission path; service shift control means for instructing the session control means to switch the session; and user associated information collecting and providing means for collecting user associated information which is used when the session is switched and in-

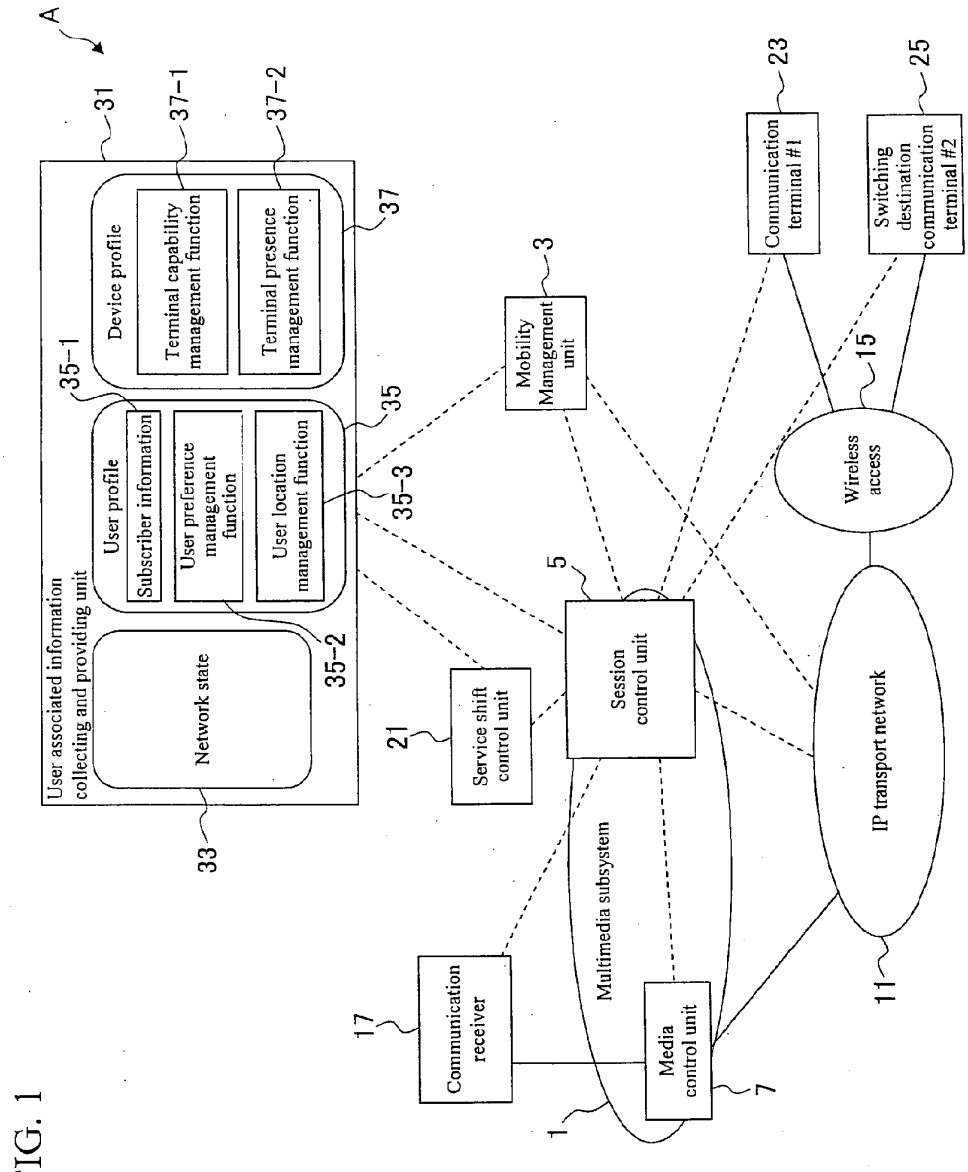
Ex.1002 / Page 575 of 1008
Cisco Systems, Inc.

cludes at least one of a network state, a user profile concerning a user and a device profile concerning a device, and providing the user associated information to the service shift control means, **characterized in that** the second communication terminal designates the access method to which the access method is to be switched and includes the information in an access method switching request signal to be transmitted to the network.

42. The second communication terminal according to Claim 41, **characterized in that** at least one of the media to which media is to be converted and the instruction information of the method for the media conversion process is included in the access method switching request.

Ex.1002 / Page 576 of 1008
Cisco Systems, Inc.

FIG. 1



Ex.1002 / Page 577 of 1008
Cisco Systems, Inc.

FIG. 2

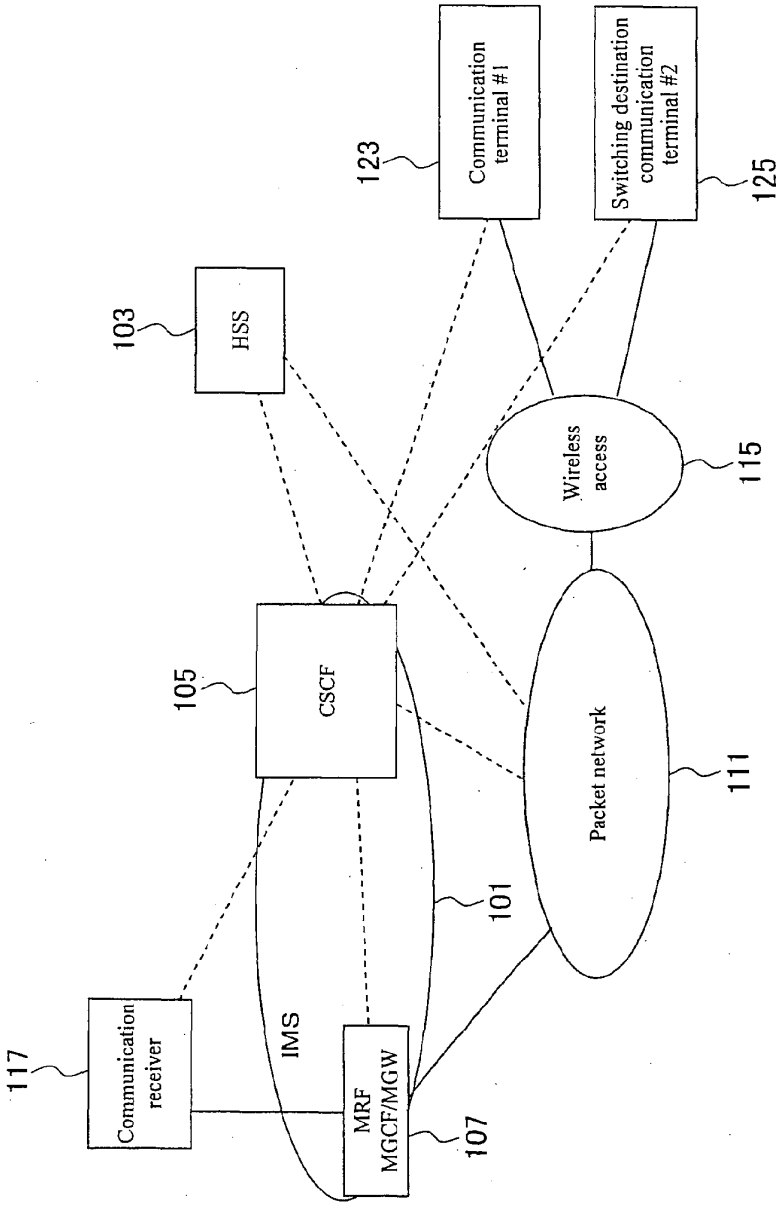
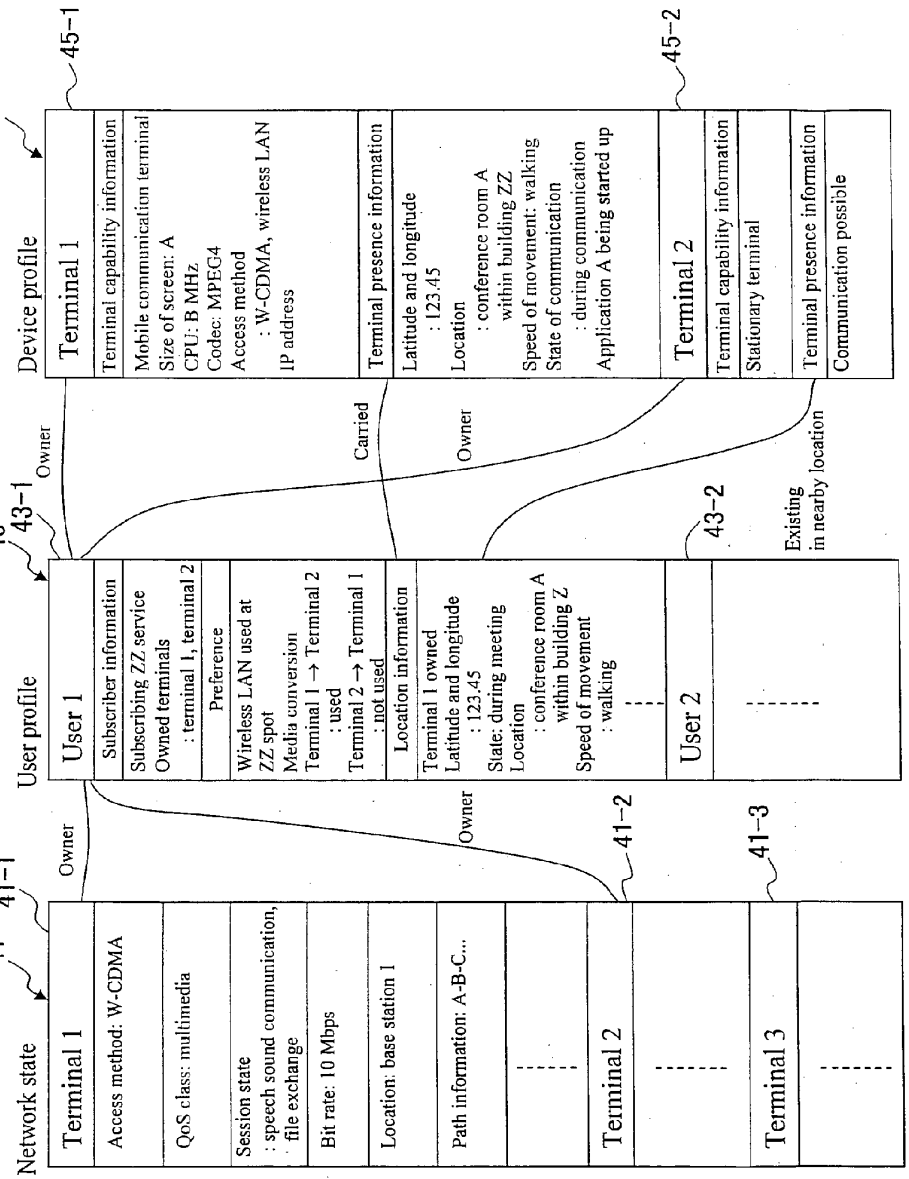
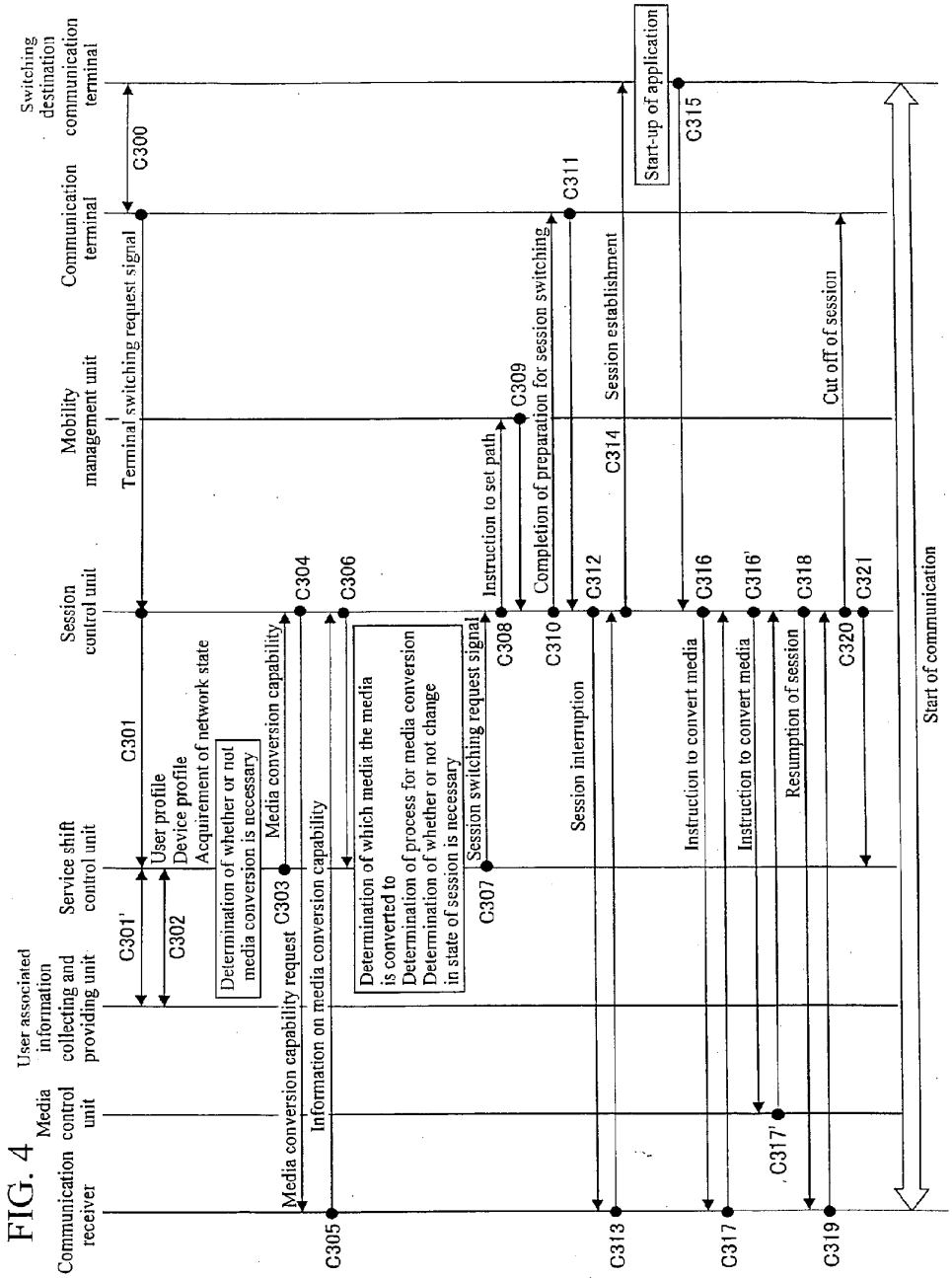

Communication terminal #1
123
Switching destination communication terminal #2
125
HSS
103
Wireless access
115
CSCF
105
Packet network
111
101
IMS
Communication receiver
117
MRF
MGCF/MGW
107

FIG. 3



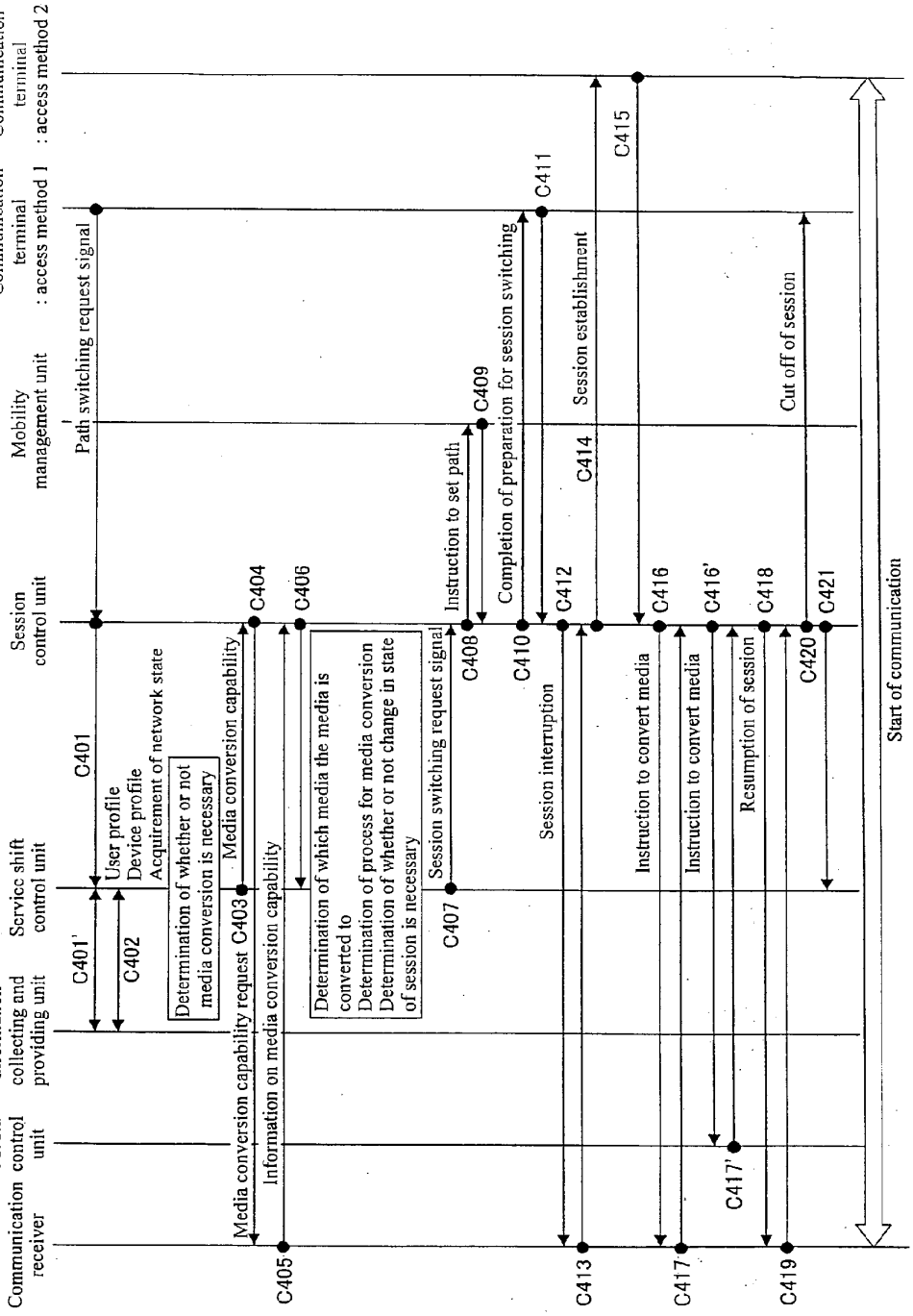
Ex.1002 / Page 579 of 1008
Cisco Systems, Inc.

FIG. 4



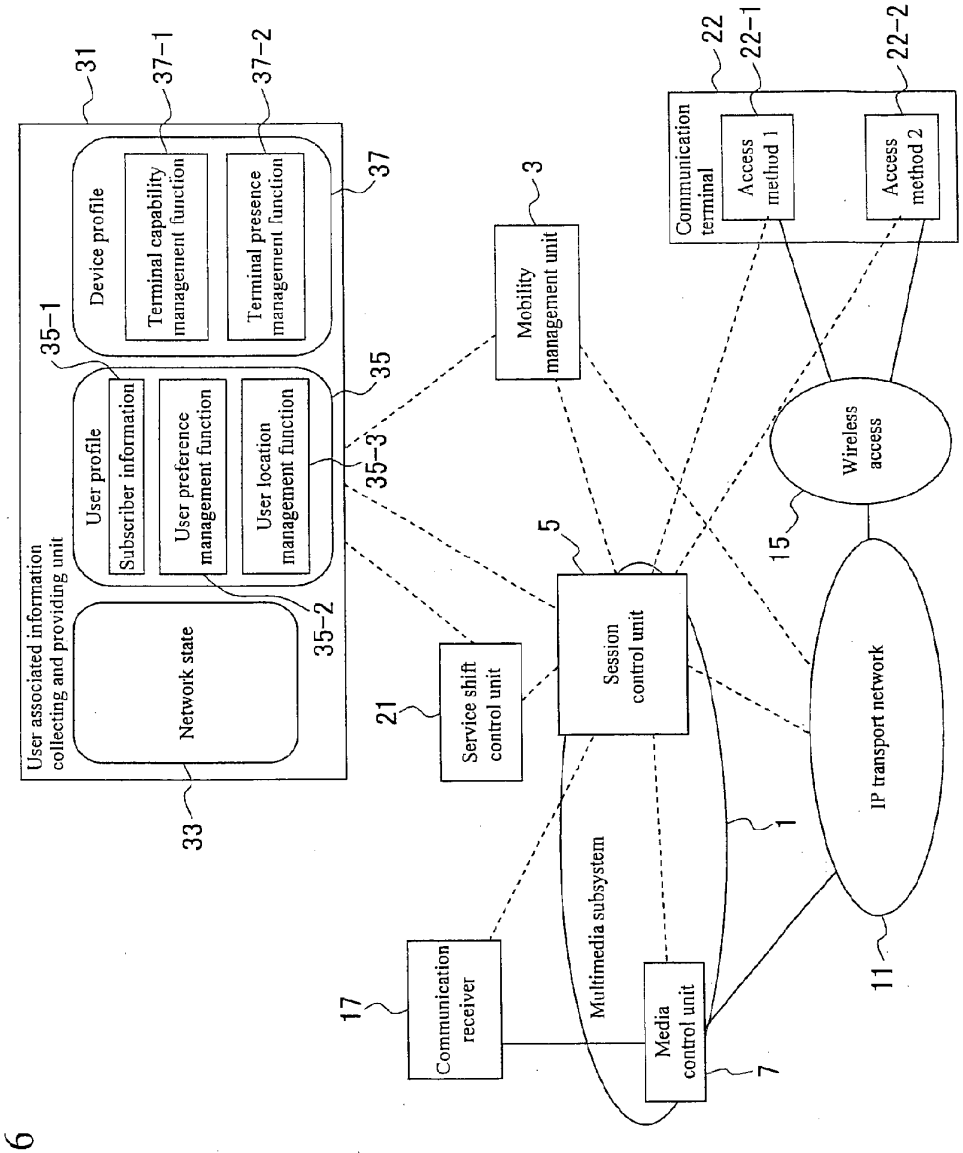
Ex.1002 / Page 580 of 1008
Cisco Systems, Inc.

FIG. 5



Ex.1002 / Page 581 of 1008
Cisco Systems, Inc.

FIG. 6



Ex.1002 / Page 582 of 1008
Cisco Systems, Inc.

FIG. 7

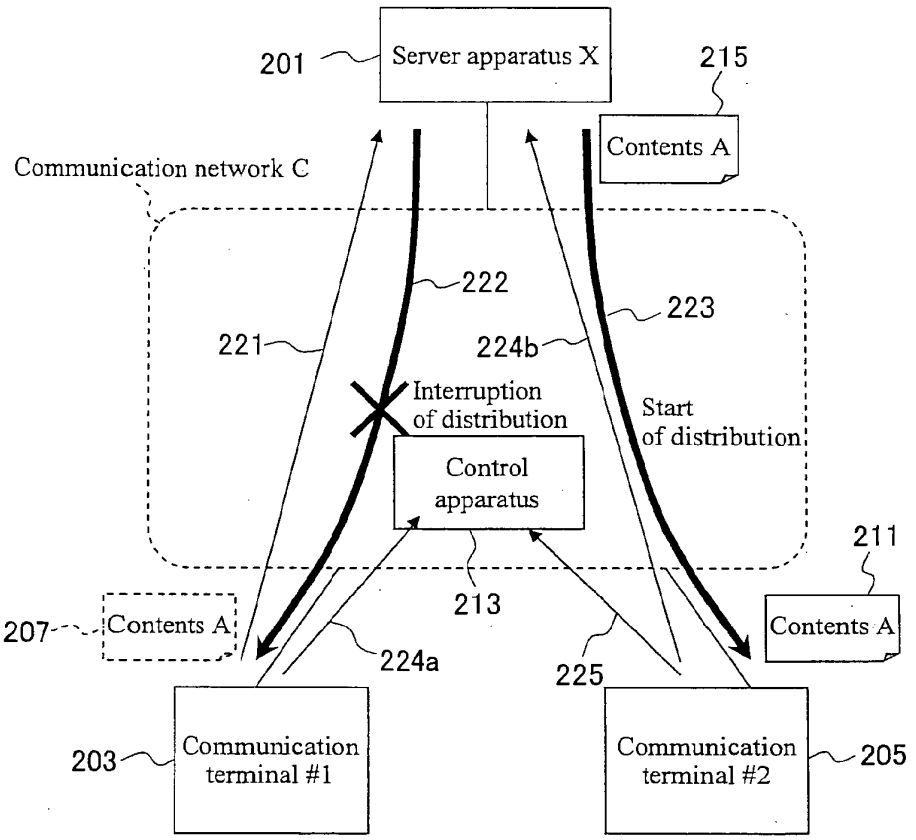
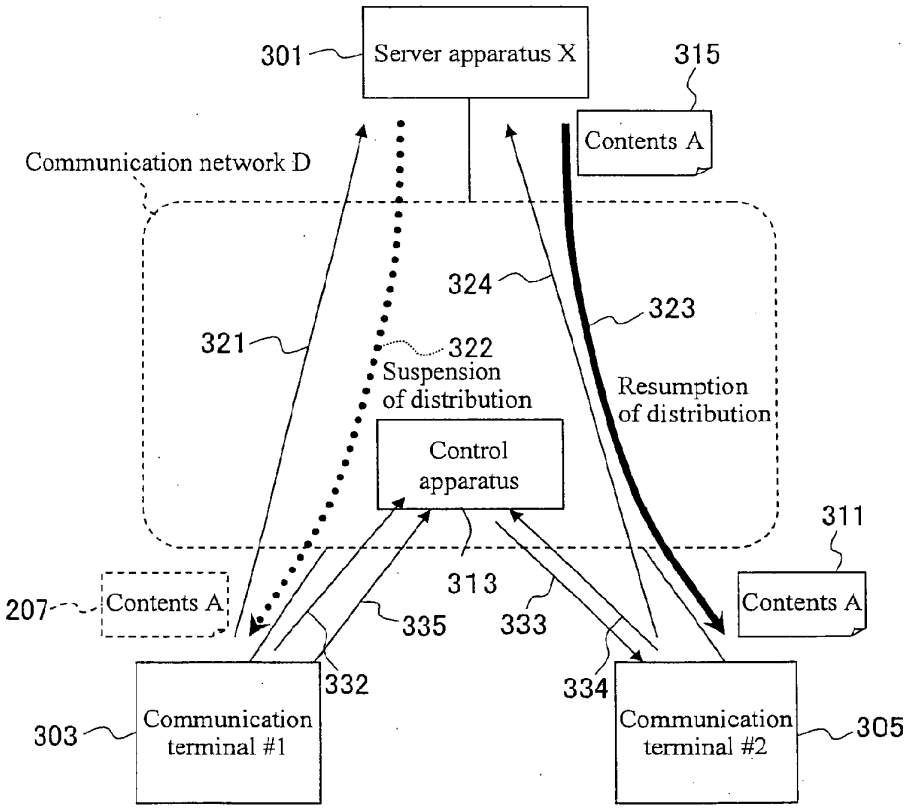

201
Server apparatus X
215
Contents A
Communication network C
222
223
221
224b
Interruption of distribution
Start of distribution
Control apparatus
211
213
207
Contents A
224a
225
Contents A
203
Communication terminal #1
Communication terminal #2
205

FIG. 8


301
Server apparatus X
315
Contents A
Communication network D
324
323
321
322
Suspension of distribution
Resumption of distribution
Control apparatus
311
313
207
Contents A
335
333
Contents A
332
334
303
Communication terminal #1
Communication terminal #2
305

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2006/300324

A. CLASSIFICATION OF SUBJECT MATTER
H04L12/56(2006.01), ***H04Q7/38***(2006.01)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
H04L12/56(2006.01), ***H04Q7/38***(2006.01)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Jitsuyo Shinan Koho	1922-1996	Jitsuyo Shinan Toroku Koho	1996-2006
Kokai Jitsuyo Shinan Koho	1971-2006	Toroku Jitsuyo Shinan Koho	1994-2006

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	Takayuki WARABINO et al., "Tanmatsukan no Seamless na Kirikae o Jitsugen suru Device Hand-off Hoshiki no Teian", Information Processing Society of Japan Kenkyu Hokoku 2003-MBL-27-15, 14 November, 2003 (14.11.03), page 107, left column, line 22 to page 108, left column, line 23; page 109, left column, lines 8 to 18	1-14,26-31, 38-40 15-25,32-37, 41,42
X Y	Masatoshi KAWARAZAKI et al., "Meta Data o Riyo shita Contents Hand-over System -MetaPORT-, IEICE Technical Report IN2003-3, 09 May, 2003 (09.05.03), page 14, left column, line 9 to page 15, left column, line 8; page 15, right column, line 6 to page 17, left column, line 7	1-12,14, 26-31,38,40 15-25,32-37, 41,42

☒ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
09 March, 2006 (09.03.06)	20 March, 2006 (20.03.06)
Name and mailing address of the ISA/ Japanese Patent Office Facsimile No.	Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (April 2005)

Ex.1002 / Page 585 of 1008
Cisco Systems, Inc.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2006/300324

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	JP 2004-336310 A (Nippon Telegraph And Telephone Corp.), 25 November, 2004 (25.11.04), Par. Nos. [0009] to [0010], [0016], [0018], [0024] (Family: none)	1-6,12, 26-28,38 15-18,24, 32-34,41
Y	JP 2004-208001 A (Sharp Corp.), 22 July, 2004 (22.07.04), Abstract; Fig. 2 & WO 2004/062310 A1 & EP 1585354 A1	15-25,32-37, 41,42

Form PCT/ISA/210 (continuation of second sheet) (April 2005)

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Non-patent literature cited in the description

- **YABUSAKI et al.** All-IP Conversion in Mobile Network, Special Issue. *NTT DoCoMo Technical Journal,* January 2003, vol. 10 (4), 6-34 **[0015]**

Ex.1002 / Page 587 of 1008
Cisco Systems, Inc.

(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 988 698 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
05.11.2008 Bulletin 2008/45

(21) Application number: **07107248.2**

(22) Date of filing: **30.04.2007**

(51) Int Cl.:
H04M 7/12 *(2006.01)* ***H04L 29/06*** *(2006.01)*
H04M 1/253 *(2006.01)* ***H04M 1/725*** *(2006.01)*

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC MT NL PL PT RO SE SI SK TR
Designated Extension States:
AL BA HR MK RS

(71) Applicant: **Research In Motion Limited**
Waterloo, Ontario N2L 3W8 (CA)

(72) Inventors:
- **Buckley, Adrian**
  Tracy, CA 95376 (US)
- **Luu, Lap**
  Markham, Ontario L6C 2X7 (CA)
- **Allen, Andrew**
  Mundelein, IL 60060 (US)
- **George, Richard**
  Waterloo, Ontario N2T 2S3 (CA)
- **Oliver, Brian**
  Ontario N1M 1C8 (CA)
- **Lee, Dalsu**
  Thornhill, Ontario L4J 7Y8 (CA)

(74) Representative: **Roberts, Gwilym Vaughan et al**
Kilburn & Strode
20 Red Lion Street
London WC1R 4PJ (GB)

Remarks:
Amended claims in accordance with Rule 137(2) EPC.

(54) Hybrid IMS-GSM system and method for establishing an outgoing GSM call as an enterprise call

(57) The application relates to systems based upon Voice-over-IP and Session Initiation Protocol-based signaling systems that utilize the existing enterprise IP infrastructure. Mobile communication devices are being enhanced to provide SIP-based communications (including VoIP) over WLAN access as well as cellular networks, thereby allowing these devices to provide mobile telephony communications capability when within the enterprise as well as when away from the enterprise. However, these networks cannot currently commercially support carrier-class VoIP telephony services. In addition, enterprise calls shall be integrated with the IMS network architecture. This is achieved by the present invention in that instead of a VoIP call, a circuit-switched call is established. In particular, a network node (404) is operable, responsive to receiving (408) a SIP INVITE request from an enterprise user (118) to initiate origination of an outgoing cellular call to a called party (120), for establishing (418) a first call leg to the enterprise user (118) by sending a circuit-switched call that identifies an enterprise address of the enterprise user (118) as a calling line identity. The network node (404) includes functionality for establishing (430) a second call leg to the called party (120). The first and second call legs are then patched to establish an end-to-end communications path between the enterprise user (118) and the called party (120), wherein the enterprise address instead of the non-enterprise address is presented to the called party (120) as a calling line identity with respect to the outgoing cellular call from the enterprise user (118).

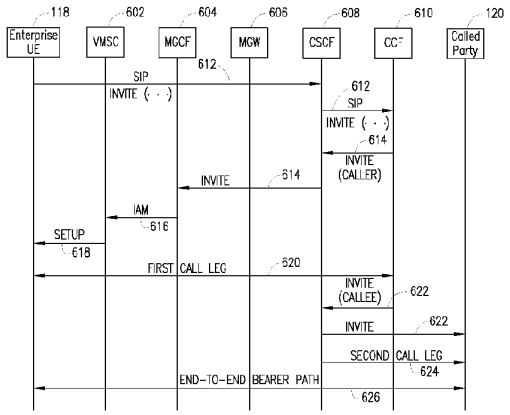


FIG. 6

EP 1 988 698 A1

Description

CROSS-REFERECE TO RELATED APPLICATION(S)

[0001] This application discloses subject matter that is related to the subject matter of the following U.S. patent application(s): (i) "SYSTEM AND METHOD FOR PRESENTING MEDIA TO MULTIPLE PARTIES IN A SIP ENVIRONMENT" (Docket No. 30761-2-US-PAT), Application No.:_____, filed even date herewith, in the name(s) of Andrew Allen, Adrian Buckley, Richard George, Brian Oliver, Lap Luu and Dalsu Lee; and (ii) "SYSTEM AND METHOD FOR INTEGRATING AN OUTGOING CELLULAR CALL AS AN ENTERPRISE CALL" (Docket No. 30761-US-PAT), Application No.:_____, filed even date herewith, in the name(s) of Andrew Allen, Adrian Buckley, Richard George, Brian Oliver, Lap Luu and Dalsu Lee, which is (are) hereby incorporated by reference.

FIELD OF THE DISCLOSURE

[0002] The present patent disclosure generally relates to communications networks. More particularly, and not by way of any limitation, the present patent disclosure is directed to a system and method for integrating an outgoing cellular call as an enterprise call in an IP Multimedia Subsystem (IMS) network environment.

BACKGROUND

[0003] Many enterprise networks are replacing their existing Private Branch Exchange (PBX)- and Central Office Exchange (CENTREX)-based telephony systems with systems based upon Voice-over-IP (VoIP) and Session Initiation Protocol (SIP)-based signaling systems that utilize the existing enterprise IP infrastructure, e.g., Local Area Network (LAN) and Wireless LAN (WLAN) technologies. It is not uncommon for enterprise employees to regularly use mobile communications devices when away from the enterprise, which interoperate with cellular networks such as, e.g., the Global System for Mobile Communications (GSM) networks, Code Division Multiple Access (CDMA) networks, and Universal Mobile Telecommunications System (UMTS) networks, to keep in touch with other employees of the enterprise and to conduct business communications with other people outside the enterprise. Additionally, mobile communications devices are being enhanced to provide SIP-based communications (including VoIP) over WLAN access as well as cellular networks, thereby allowing these devices to provide mobile telephony communications capability when within the enterprise as well as when away from the enterprise. It is expected that such developments may allow replacement of the ubiquitous wired desktop phone in the enterprise with dual-mode, WLAN-capable mobile devices.

[0004] Although cellular telephony networks have deployed IP-based data communications capabilities through exploitation of well-known technologies, it is generally understood that these networks cannot currently commercially support carrier-class VoIP telephony services due to issues of delay, Quality of Service (QoS) and efficiency, which prevent cost-effective usage of such networks for purposes of providing acceptable quality voice services. Accordingly, for the foreseeable future, telephony services based upon the existing network infrastructure are likely to continue to utilize conventional circuit-switched network technology for telephony calls.

[0005] Based on the foregoing, it should appreciated that the integration of VoIP enterprise networks with carrier cellular telephony networks in order to serve an enterprise user within the enterprise as well as while away is fraught with numerous difficulties. Moreover, in such scenarios it may be desirable for enterprises to have certain control over the calls made by their employees for tracking and monitoring purposes. In addition, it would be desirable to provide value-added enterprise call integration services within the context of ongoing development of current 3rd Generation Partnership Project (3GPP) standards which specify an Internet Protocol (IP)-based core network architecture referred to as the IP Multimedia Subsystem (IMS).

SUMMARY

[0006] The present patent disclosure is broadly directed to a scheme for integrating an outgoing cellular call as an enterprise call within an IMS environment wherein an enterprise user's enterprise address is presented to the called party instead of the enterprise user's non-enterprise address (e.g., cellular telephony number). In one aspect, disclosed herein is an embodiment of a method for integrating an outgoing cellular call as an enterprise call in an IMS environment, wherein the outgoing cellular call is originated by an enterprise user towards a called party, the enterprise user having an enterprise address and a non-enterprise address. The claimed embodiment comprises one or more of the following: receiving a SIP INVITE request from the enterprise user for initiating the outgoing cellular call to the called party; establishing a first call leg to the enterprise user, e.g., by providing a SIP INVITE message back to the enterprise user; establishing a second call leg to the called party; and patching the first and second call legs to establish an end-to-end communications path between the enterprise user and the called party, wherein the enterprise address is presented

Ex.1002 / Page 589 of 1008
Cisco Systems, Inc.

instead of the non-enterprise address to the called party as a calling line identity with respect to the outgoing cellular call from the enterprise user.

[0007] In another aspect, disclosed herein is an embodiment of an IMS network node for integrating an outgoing cellular call as an enterprise call, wherein the outgoing cellular call is originated by an enterprise user towards a called party, the enterprise user having an enterprise address and a non-enterprise address. The claimed embodiment comprises one or more of the following: means for receiving a SIP INVITE request from the enterprise user for initiating the outgoing cellular call to the called party; means for establishing a first call leg to the enterprise user; means for establishing a second call leg to the called party; and means for patching the first and second call legs to establish an end-to-end communications path between the enterprise user and the called party, wherein the enterprise address is presented instead of the non-enterprise address to the called party as a calling line identity with respect to the outgoing cellular call from the enterprise user.

[0008] In a further aspect, disclosed herein is an embodiment of an IMS-capable user equipment (UE) device operable to generate an outgoing cellular call as an enterprise call to a called party. The claimed embodiment comprises one or more of the following: means for generating a SIP INVITE request with respect to initiating an outgoing cellular call to a called party, the SIP INVITE request being directed to an IMS network node; and means for establishing a call leg with the IMS network node responsive to receiving a SIP INVITE message back from the IMS network node.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] A more complete understanding of the embodiments of the present patent disclosure may be had by reference to the following Detailed Description when taken in conjunction with the accompanying drawings wherein:

[0010] FIG. 1 depicts an exemplary network environment wherein one or more embodiments of the present patent disclosure may be practiced for purposes of integrating an outgoing cellular call as an enterprise call;

[0011] FIG. 2 depicts a flowchart of the present patent disclosure according to one embodiment;

[0012] FIG. 3 depicts another flowchart of the present patent disclosure according to one embodiment;

[0013] FIG. 4 depicts an exemplary message flow diagram according to one embodiment of the present patent disclosure;

[0014] FIG. 5 depicts an exemplary IMS network environment wherein one or more embodiments of the present patent disclosure may be practiced for purposes of integrating an outgoing cellular call as an enterprise call;

[0015] FIG. 6 depicts an exemplary message flow diagram according to another embodiment of the present patent disclosure;

[0016] FIG. 7 depicts another flowchart of the present patent disclosure according to one embodiment; and

[0017] FIG. 8 depicts a block diagram of an embodiment of a communication device operable for purposes of the present patent disclosure.

DETAILED DESCRIPTION OF THE DRAWINGS

[0018] A system and method of the present patent disclosure will now be described with reference to various examples of how the embodiments can best be made and used. Like reference numerals are used throughout the description and several views of the drawings to indicate like or corresponding parts, wherein the various elements are not necessarily drawn to scale. Referring now to the drawings, and more particularly to FIG. 1, an exemplary network environment 100 is depicted wherein one or more embodiments of the present patent disclosure may be practiced for integrating an outgoing cellular call as an enterprise call. As depicted, the network environment 100 includes a generalized network infrastructure 102 wherein certain portions may form an enterprise network whereas the remaining portions may comprise an external network arrangement such as one or several service provider networks that serve as intermediary networks with respect to the enterprise network and the well-known PSTN/PLMN infrastructure 114. For purposes herein, an enterprise network may be any communications network internal to a company, office, or organization, and may comprise wireline and/or wireless network infrastructure. Regardless of the actual implementation, the network infrastructure 102 includes an integration server (also referred to as a Unified Communications Platform (UCP) element) 104, a switching element such as a SIP-capable Private Branch Exchange (PBX) 110 and a gateway (GW) element such as a SIP/PSTN GW 112. As alluded to previously, one or more of these elements may be incorporated within an enterprise network infrastructure in one embodiment. Alternatively, one or more of these elements or their functionalities may be hosted in a service provider network. In either arrangement, the functionalities of the elements may be integrated or redistributed into separate network entities. Accordingly, for purposes of the present patent disclosure, a "network node" may comprise a generalized network entity that effectuates or facilitates at least a portion of the functionalities set forth hereinbelow with respect to call integration.

[0019] An enterprise user is operable to effectuate communications (e.g., Voice/data/Video calls or multimedia sessions, and the like) in a number of scenarios within the context of the network environment 100 with respect to a called

Ex.1002 / Page 590 of 1008
Cisco Systems, Inc.

party 120. In general, the enterprise user is capable of initiating communications using one of two addresses: an enterprise address that may be used for calls made from within the enterprise network and a non-enterprise address for calls made from outside the enterprise network. In one application, the enterprise user may be provided with two separate pieces of user equipment (UE) 118: a wireline telephony equipment having the enterprise address that is used when the enterprise user is on the enterprise premises and a mobile communications device (MCD) having a cellular telephony number (i.e., non-enterprise address) that may be used when the enterprise user is away. Alternatively, where local wireless connectivity to the enterprise network is supported, a single wireless UE device operable in two different radio access technologies (RATs) may be provided. In this scenario, when the wireless UE device is attached to the enterprise network via any known or heretofore unknown Wireless Local Area Network (WLAN) technology, calls originated by the enterprise user may have the enterprise address as the calling party number. On the other hand, calls originated when the wireless UE device is attached to a wide area cellular network (WACN) such as the Public Land Mobile Network (PLMN) 114 may have the non-enterprise address (e.g., cellular telephony number) as the calling party number. Accordingly, it should be appreciated that the enterprise user equipment 118 may be a conventional cellular phone having data channel capability (e.g., Short Message Service or SMS capability) or a dual-mode MCD having WLAN capability (for enterprise operation) and WACN capability (for remote operation). Additionally, for purposes of further generalization, the enterprise UE device 118 may also comprise any personal computer (e.g., desktops, laptops, palmtops, personal digital assistants (PDAs) or other handheld computing devices) equipped with a suitable wireless modem, as well as a communications device operable in both circuit-switched (CS) and packet-switched (PS) communications that may even be capable of effectuating an inter-technology handoff between both CS and PS domains.

[0020] Based on the foregoing, it may be realized that the enterprise and non-enterprise addresses for an enterprise user may take on different forms, depending on the equipment and service provisioning. For instance, the enterprise address may comprise a SIP Uniform Resource Identifier (URI) or an E-164 number. Likewise, the non-enterprise address and the called party address may also comprise either SIP URIs, E.164 numbers, or other identifiers.

[0021] An enterprise data server 116 may be disposed in association with at least a portion of the network 102, preferably with the UCP node 104 when provisioned as part of an enterprise network. A data communications path 122 may be effectuated between the enterprise UE 118 and the enterprise network over the PLMN data network infrastructure via the enterprise data server 116. Regardless of whether integrated within an enterprise network or disposed in a service provider network, UCP node 104 preferably includes a Call Manager functionality 106 as well as a SIP Back-to-Back User Agent (B2BUA) 108 that is operable to perform third-party call control in order to combine multiple call legs together. In general, all enterprise SIP calls may be routed via the UCP node 104 and it is the role of the UCP node 104 to trigger the routing of the incoming SIP calls to the enterprise user regardless of whether UE 118 is attached via the enterprise WLAN or via the PLMN cellular network. Further, as will be described in detail below, the enterprise data server 116 can also receive a trigger message (i.e., a request to originate an outgoing cellular call) from UE 118 that is attached to the PLMN cellular network 114 via the cellular network's data network (such as GPRS or CDMA packet data network, for example) to request that the UCP node 104 establish a call between the enterprise UE 118 and the equipment 120 of the called party.

[0022] Taking reference to FIGS. 1 and 2 together, a generalized scheme 200 for integrating outgoing calls from the enterprise UE 118 when it is attached to the cellular network may be set forth as follows. The enterprise user using its equipment sends a request message to a serving network node (i.e., the UCP element 104 shown in FIG. 1) via the cellular network's data network (block 202). Additionally or alternatively, the request message may also be mediated via an enterprise data server. In one embodiment, the request may comprise a SIP Request such as a SIP REFER message or some other SIP Request (e.g., a SIP INVITE message) either sent directly to the enterprise data server 116 via the cellular network's data network or routed to the UCP node 104 via the cellular network's SIP based infrastructure such as the IP Multimedia Subsystem (IMS). Alternatively, the message may not be a SIP Message at all and could be any message that contains the necessary information to enable the UCP node 104 to establish a call between the enterprise UE 118 and the called party's equipment 120 that the enterprise user is attempting to call (e.g., an SMS message, an Unstructured Supplementary Service Data (USSD) message, or an IP based message). In accordance with an embodiment, the following pieces of information may be transmitted as part of the request message: (i) the enterprise address (e.g., SIP URI or E.164 number) that the enterprise user is reachable at; (ii) the non-enterprise address (e.g., E.164 number) that the enterprise UE is reachable at when it is attached to the cellular network; (iii) the E.164 number or SIP URI of the called party; and (iv) an indication of whether privacy is required. Upon receiving the request message from the enterprise UE (block 204), the service logic at the UCP node 104 uses the received information to effectuate two call legs in association with a switching node such as a SIP-capable PBX/CENTREX node, a first call leg between the switching node and the enterprise UE and a second call leg between the called party's UE and the switching node wherein the enterprise user's enterprise address is presented to the called party instead of the non-enterprise address associated with the UE (i.e., the cellular number) (block 206). Thereafter, the first and second call legs are patched together wherein the two respective Session Description Protocol (SDP) streams associated with the call legs are joined in order to establish an end-to-end bearer communications path between the enterprise user and

Ex.1002 / Page 591 of 1008
Cisco Systems, Inc.

the called party (block 208).

[0023] Set forth below is an example of how a SIP REFER request can be used to trigger the UCP node 104 to establish an outgoing call within the context of the scheme described above:

Table I

```
REFER sip: IntegrationServer@companyXXX.com; SIP/2.0
Via: SIP/2.0/UDP PIN12345678.blackberry.com
     ;branch=z9hG4bKhjhs8ass83

Max-Forwards: 70
To: <sip: IntegrationServer@companyXXX.com>
From: Mike <sip:Mike@companyXXX.com>;tag=32331
Call-ID: d432fa84b4c76e66710
Cseq: 2 REFER
Contact: <sip:PIN12345678.blackberry.com>
Refer-To: <cid:cn35t8jf02@companyXXX.com>
Require: multiple-refer
Content-Type: application/resource-lists+xml
Content-Disposition: recipient-list
Content-Length: 362
Content-ID: <cn35t8jf02@example.com>

<?xml version="1.0" encoding="UTF-8"?>
<resource-lists  xmlns+"um:ietf:params:xml:ns:resource-
lists"
     Xmins:xsi="http://www.w3.org/2001/XML.Schema-
instance">
<list>
<entry uri="tel: 098-765-4321"/>
<entry uri="tel: 123-456-7890"/>
</list>
</resource-lists>
```

[0024] Those skilled in the art will recognize that the above SIP REFER request embodiment uses the Resource List mechanism defined in draft-ietf-sip-multiple-refer and draft-ietf-simple-xcap-list-user to trigger the sending of a SIP INVITE request towards both the enterprise UE 118 and the called party equipment 120 using the list entry uri elements to deliver both the E.164 number that the enterprise UE is reachable at via the cellular network and the E.164 number of the party being called. Accordingly, when the UCP node 104 receives the SIP REFER request or other trigger message, it uses SIP Third Party Call Control to establish two SIP Call legs; one SIP leg to the enterprise UE via the PBX, SIP-PSTN Gateway and the circuit-switched cellular network; the other SIP leg to the called party. As pointed out previously, these two call legs are joined together at the UCP node 104 in order to form a single end-to-end call between the enterprise user and the called party. The SIP INVITE requests sent contain the enterprise address of the enterprise UE terminal which can be in the form of SIP URI or as an E.164 number in a TEL URI along with the appropriate privacy setting if requested in the SIP REFER request. Alternatively, the privacy setting may be required by the enterprise network based on certain service provisioning policies and profiles. The enterprise address of the enterprise UE terminal can be transported in the SIP INVITE request using the SIP From header, Referred-By header, P-Asserted-Identity header, Identity header or Remote-Party-ID header. If a SIP URI is used as the enterprise address of the enterprise UE terminal, the SIP-PBX 110 may translate this address to the corresponding E.164 number that represents the enterprise address of the device. The SIP-PSTN GW 112 includes the E.164 number that represents the enterprise address of the enterprise UE terminal in the Calling Line Identity in the circuit-switched signaling messages.

Ex.1002 / Page 592 of 1008
Cisco Systems, Inc.

[0025] With respect to the behavior of the enterprise UE for purposes of facilitating integration of an outgoing cellular call, reference may now be taken to FIG. 3 wherein a flowchart is depicted. When a request message for initiating an outgoing cellular call to a called party is transmitted to the network infrastructure, there is an expectation to receive an incoming circuit-switched call back from the network within a time window (block 302). Accordingly, a timer mechanism may be started at the application level to determine when to receive the circuit-switched call back in response to the outgoing request message. In one embodiment, if the timer expires, the enterprise UE device may try a number of times until a limit is reached, whereupon the call is considered to have failed. When the enterprise UE device receives a call establishment SETUP signaling request via the circuit-switched PSTN/PMLN signaling, the logic executing on the device is operable to identify that the circuit-switched call contains the enterprise address as the Calling Line Identity (block 304) (that is, the Calling Line Identity in the SETUP is the enterprise UE's enterprise address), and based thereon, the logic determines that this incoming call is related to the requested outgoing call (requested via the SIP REFER request or other message) (block 306). Accordingly, the logic operates to suppress generation of an alert to the enterprise user but establishes the circuit-switched call and stops the application timer (block 306). Further, the enterprise UE may provide an indication to the network that the call leg has been established (block 308). Accordingly, in one embodiment, the UCP node may wait until it receives such an acknowledgement of the establishment of the call leg with the enterprise UE device before attempting to establish the call leg to the called user by sending an SIP INVITE request in order to avoid the possibility of the called party answering before the call leg with the enterprise UE device is established (i.e., avoidance of a race condition). In the meantime, until the call legs are patched, there may be a delay experienced at the enterprise UE from the time the circuit-switched call leg with the network is established. Appropriate delay handling mechanisms(s) may therefore be provided to mitigate the delay.

[0026] When the called party's equipment receives the circuit-switched SETUP message (or SIP INVITE request if the called party is using a SIP phone within the enterprise SIP network or an external SIP network), the Calling Line Identity in the case of the circuit-switched SETUP message (or From header, Referred-By header, P-Asserted-Identity header, Identity header or Remote-Party-ID header in the case of SIP INVITE message) contains the enterprise address (e.g., E.164 number or SIP URI) of the enterprise UE device to be presented to the called party for Calling Line Identity Presentation (if provided based on the privacy setting). The called phone rings the user and returns an ALERTING message in the case of a circuit-switched call (or a SIP 180 "Ringing" response in the case of a SIP call). An ALERTING message will be translated by the SIP-PSTN gateway to a SIP 180 "Ringing" response. When the SIP 180 "Ringing" response is received at the UCP node, the service logic operable thereat may send a notification of "Ringing" back to the enterprise UE terminal via the cellular network's data network. In the case that the call establishment was triggered using a SIP REFER request, this notification may be in the form of a SIP NOTIFY request as specified in RFC 3515. In the case a message other than a SIP REFER request was used, the notification of "Ringing" may be sent using some other message. It is necessary to use the connection via the cellular network's data network to notify the "Ringing" since the call leg that is established with the enterprise UE terminal via the circuit-switched network is "in the wrong direction" to be able to indicate ALERTING using the circuit-switched signaling protocol.

[0027] Upon answering by the enterprise user, the UE terminal sends the circuit-switched CONNECT message (or SIP 200 "OK" response if the called party is using a SIP phone within the enterprise SIP network or an external SIP network). A CONNECT message will be translated by the SIP-PSTN GW to a SIP 200 "OK" response. When the SIP 200 "OK" response is received at the UCP node 104, it can send a notification of "OK" back to the enterprise UE terminal via the cellular network's data network. In the case that the call establishment was triggered using a SIP REFER request, this notification will be in the form of a SIP NOTIFY request as specified in RFC 3515. In the case a message other than a SIP REFER request was used, the notification of "OK" may be sent using some other message. At this point the call is established via the cellular network between the enterprise UE terminal and the called party, with the enterprise address of the enterprise UE terminal being displayed as the identity of the calling party.

[0028] FIG. 4 depicts an exemplary message flow diagram according to an embodiment of the process set forth above. As illustrated, a UCP node 402 and a network node 404 are exemplified to highlight the message flow between the enterprise UE 118 and the network infrastructure in particular detail. Upon blocking all incoming calls to the enterprise UE 108 (block 406), a request with respect to an outgoing call is initiated (reference numeral 408). In response, the UCP node 402 sends a message to the network node 404 (e.g., SIP-PBX) to block calls to the enterprise UE 118. A confirmation 412 is then propagated from the network node 404 to enterprise UE 118 via the UCP node 412, whereupon incoming calls from the network may be allowed (block 414). The UCP node 402 transmits a message 416 to the network node 404 to invite the enterprise user (i.e., caller) with respect to establishing a CS call 418 through the cellular network to the enterprise UE 118. Service logic at the enterprise UE 118 is operable to intercept the incoming CS call setup and identify that the enterprise address of the enterprise user is the CLI (block 420). Thereafter, a SIP 200 "OK" message 424 is generated by the network node 404 towards the UCP node 402 with respect to caller SDP. In response, an acknowledgement (ACK) 426 is generated by the UCP node 402. The UCP node 402 also generates a message 428 towards the network node 404 to invite the called party (i.e., callee) with respect to establishing a CS call 430 therewith through the PSTN/PLMN. As shown in block 422, appropriate service logic may be provided for handling the delay before

Ex.1002 / Page 593 of 1008
Cisco Systems, Inc.

patching the call legs. Pursuant to joining the audio paths (block 432), a SIP 200 "OK" message 434 is generated by the network node 404 towards the UCP node 402 with respect to callee SDP. In response, an acknowledgement (ACK) 436 is generated by the UCP node 402. A message 438 is provided thereafter by the UCP node 402 to the network node 404 in order to unblock calls to the enterprise UE 118, resulting in a confirmation 440 by the network node 404.

[0029] An embodiment of the foregoing call integration mechanism may also be implemented within an IMS-based network environment in a different application wherein the functionality of the UCP node is provided as an IMS node. Referring now to FIG. 5, an exemplary IMS-based network environment 500 is depicted wherein an embodiment of the present patent disclosure may be practiced for effectuating call integration with respect to an enterprise call originated by a UE device. As depicted, the network environment 500 is generalized to include an access space 504 comprised of a number of access technologies available to one or more enterprise UE devices 502-1 through 502-N. As generalized previously, a UE device may be any tethered or untethered communications device, and may include any personal computer (e.g., desktops, laptops, palmtops, or handheld computing devices) equipped with a suitable wireless modem or a mobile communications device (e.g., cellular phones or data-enabled handheld devices capable of receiving and sending messages, web browsing, et cetera), or any enhanced PDA device or integrated information appliance capable of email, video mail, Internet access, corporate data access, messaging, calendaring and scheduling, information management, and the like. Further, as alluded to hereinabove, the UE device may also capable of operating in multiple modes in that it can engage in both CS-based as well as PS-based communications, and can transition from one mode of communications to another mode of communications without loss of continuity.

[0030] The access space 504 may be comprised of both CS and PS networks, which may involve wireless technologies, wireline technologies, broadband access technologies, etc. For example, reference numeral 506 refers to wireless technologies such as GSM and CDMA networks, although it is envisaged that the teachings hereof may be extended to any 3rd Generation Partnership Project (3GPP)-compliant cellular network (e.g., 3GPP or 3GPP2) as well. Reference numeral 508 refers to broadband access networks including WLANs, Wi-MAX networks as well as fixed networks such as DSL, cable broadband, etc. Thus, for purposes of the present disclosure, the access technologies may comprise RATs selected from IEEE 802.11a technology, IEEE 802.11b technology, IEEE 802.11g technology, IEEE 802.11n technology, GSM/EDGE Radio Access Network (GERAN) technology (both CS and PS domains), and UMTS technology, and Evolution - Data Optimized (EVDO) technology, and so on. Additionally, also exemplified as part of the access space 504 is the conventional wireline PSTN infrastructure 510 available to the enterprise UEs as illustrated in FIG. 5.

[0031] An IMS core network 512 is coupled to the various access networks set forth above, including any CS-based networks. As is well known, the IMS standard defined by the 3GPP is designed to allow service providers manage a variety of services that can be delivered via IP over any network type, wherein IP is used to transport both bearer traffic and SIP-based signaling traffic. Broadly, IMS is a framework for managing the applications (i.e., services) and networks (i.e., access) that is capable of providing multimedia services. IMS defines an "application server" as a network element that delivers services subscribers use, e.g., voice call continuity (VCC), Push-To-Talk (PTT), etc. IMS manages applications by defining common control components that each application server (AS) is required to have, e.g., subscriber profiles, IMS mobility, network access, authentication, service authorization, charging and billing, inter-operator functions, and interoperation with the legacy phone network.

[0032] It should be understood that whereas IMS is defined by the 3GPP standards body which mainly addresses GSM networks, another group, 3GPP2, is involved in defining a closely analogous architecture referred to as Multimedia Domain (MMD). MMD is essentially an IMS for CDMA networks, and since MMD and IMS are roughly equivalent, the term "IMS" may be used in this present patent disclosure to refer collectively to both IMS and MMD where applicable. In addition, fixed network standards for NGN (Next Generation Networks) that are based on and/or reuse IMS are also being developed by bodies such as ETSI TISPAN, Cablelabs and the ITU-T. NGN and IMS are roughly equivalent, and accordingly the term "IMS" may also be used in this present patent disclosure to refer collectively to both IMS and NGN where applicable.

[0033] Continuing to refer to FIG. 5, reference numerals 514-1 to 514-N refer to a plurality of AS nodes operable to support various services, e.g., VCC, PTT, etc., as alluded to hereinabove. Further, a call integration AS node having an IMS CS Control Function (ICCF, or CCF for short) may also be disposed within the core network for controlling call integration with respect to calls originated by one or more enterprise UE devices. Accordingly, it should be appreciated that at least one of the AS nodes is operable equivalent to the functionality of UCP node 104 described in detail hereinabove. Further, an AS node, e.g., AS 514-N, may be provided as part of the enterprise users' home IMS core network which implements functionality referred to as call continuity control function (CCCF) 516 and network domain selection (NeDS) 518. In essence, the CCCF portion 516 of AS 514-N is operable as a new IMS application server element that resides in the home IMS network and tracks all call sessions and related mobile VoIP bearer traffic, including call handover/routing between CS and IMS domains. The NeDS portion 518 of AS 114-N is responsible for performing, *inter alia,* registration/de-registration management between the IMS and CS networks (e.g., GSM or CDMA). Despite being potentially separate functions, it is possible to integrate both the CCCF and NeDS functionalities into a single IMS-compatible network element 514-N as illustrated in FIG. 5. Also, a suitable session control function (SCF) 520 may be

Ex.1002 / Page 594 of 1008
Cisco Systems, Inc.

provided as part of the AS node 514-N with respect to applicable radio access technology, e.g., gsmSCF. Additional related functional entities may include the following: Domain Transfer Function (DTF) (also referred to as Functional Entity FE-A), CS Adaptation Function (CSAF) (also referred to as FE-B), CAMEL Service (also referred to as FE-C), and Domain Selection Function (DSF) (also referred to as FE-D). Accordingly, for purposes of the present disclosure, the term "network node" with reference to an IMS core network may comprise one or more of the foregoing functionalities in any combination as applicable as well as the call integration functionality described herein.

[0034] Furthermore, although not shown in FIG. 5, a master user database, referred to as a Home Subscriber Server or HSS, may also be provided as part of the home IMS network 512, for supporting the various IMS network entities that actually manage calls or sessions such as UCP/AS node 514-N. In general, the HSS database may contain user profiles (i.e., subscription-related information), including various user and device identifies such as International Mobile Subscriber Identity (IMSI), Temporal Mobile Subscriber Identity (TMSI), International Mobile Equipment Identity (IMEI), Mobile Subscriber ISDN Number (MSISDN), Universally Unique Identifier (UUID), as well as additional IMS-specific identities such as IM Multimedia Private Identity (IMPI) and IP Multimedia Public Identity (IMPU) that are implemented as Tel-URIs or SIP-URIs.

[0035] FIG. 6 depicts an exemplary message flow diagram according to another embodiment of the present patent disclosure for call integration in an IMS-based environment such as the network environment 500 described in the foregoing sections. Network functionalities such as Visited Mobile Switching Center (VMSC) 602, Media Gateway Control Function (MGCF) 604, Media Gateway (MGW) 606 are operable with respect to IMS functionalities such as Call/Session Control Function (CSCF) 608 and CCF 610 for purposes of mediating an originating call by the enterprise UE 118 towards the call party 120. As illustrated, the enterprise UE 118 is operable to generate a SIP INVITE message 612 including the enterprise user information, called party information, as well as privacy setting information, as described hereinabove, towards CSCF node 608 which propagates SIP INVITE 612 to ICCF 610 embodying the call integration functionality. For purposes of establishing a first call leg, ICCF 610 generates a SIP INVITE message 614 towards the calling party, i.e., the enterprise UE 118, which is received by MGCF 604. In response, an Initial Address Message (IAM) 616 is generated towards VMSC 602, which in turn sends a SETUP message 618 to the enterprise UE 118. Thereafter, a first call leg is 610 is established between the enterprise UE 118 and the IMS network node. Further, ICCF 610 generates another SIP INVITE message 622 towards the called party 120, which is also mediated via CSCF 608. As a result, a second call leg 624 is established, which is patched with the first call leg 620 for establishing an end-to-end path 626 between the enterprise UE 118 and called party 120. Those skilled in the art will recognize that suitable timing mechanisms and delay handling mechanisms may also be implemented at the device side and/or the network side in order to avoid the race conditions and other operational issues set forth in detail with reference to the previously described embodiments.

[0036] FIG. 7 depicts another flowchart of the present patent disclosure according to one embodiment 700 which describes the IMS node functionality for effectuating call integration. As described above, an enterprise user sends a SIP INVITE request to initiate an outgoing call to a called party (block 702). A serving IMS network node receives the request from the enterprise user (block 704), whereupon it establishes two call legs in association with a CSCF node: one call leg between the IMS network and the enterprise user and another call leg between the IMS network and the called party. Using the information provided in the SIP INVITE message, the enterprise user's enterprise address is presented as a Calling Line Identity to the called party instead of the non-enterprise address of the enterprise user (block 706). The two call legs are then patched in order to establish the communication path between the parties (block 708). It should be appreciated that the various operations set forth herein may be accomplished via a number of means, including software (e.g., program code), firmware, hardware, or in any combination, usually in association with a processing system. Where the processes are embodied in software, such software may comprise program instructions that form a computer program product, uploadable service application software, or software downloadable from a remote station, and the like.

[0037] FIG. 8 depicts a block diagram of an embodiment of a communications device 800 operable as a UE device, e.g., the enterprise UE 118, for purposes of the present patent disclosure. It will be recognized by those skilled in the art upon reference hereto that although an embodiment of UE 118 may comprise an arrangement similar to one shown in FIG. 8, there can be a number of variations and modifications, in hardware, software or firmware, with respect to the various modules depicted. Further, a UE device 800 for purposes of the present disclosure may comprise a mobile equipment (ME) device without a removable storage module and/or a mobile device coupled with such a storage module. Accordingly, the arrangement of FIG. 8 should be taken as illustrative rather than limiting with respect to the embodiments of the present patent disclosure. A microprocessor 802 providing for the overall control of an embodiment of UE 800 is operably coupled to a communication subsystem 804 that may preferably be capable of multi-mode communications (e.g., CS domain and PS domain). The communication subsystem 804 generally includes one or more receivers 808 and one or more transmitters 814 as well as associated components such as one or more local oscillator (LO) modules 810 and a processing module such as a digital signal processor (DSP) 812. As will be apparent to those skilled in the field of communications, the particular design of the communication module 804 may be dependent upon the communications networks with which the mobile device is intended to operate (e.g., a CDMA network, a GSM network, or a

Ex.1002 / Page 595 of 1008
Cisco Systems, Inc.

WLAN, et cetera). Regardless of the particular design, however, signals received by antenna 806 through appropriate access infrastructure 805 (e.g., cellular base station towers, WLAN hot spots, etc.) are provided to receiver 808, which may perform such common receiver functions as signal amplification, frequency down conversion, filtering, channel selection, analog-to-digital (A/D) conversion, and the like. Similarly, signals to be transmitted are processed, including modulation and encoding, for example, by DSP 812, and provided to transmitter 814 for digital-to-analog (D/A) conversion, frequency up conversion, filtering, amplification and transmission over the air-radio interface via antenna 816.

[0038] Microprocessor 802 may also interface with further device subsystems such as auxiliary input/output (I/O) 818, serial port 820, display 822, keyboard/keypad 824, speaker 826, microphone 828, random access memory (RAM) 830, a short-range communications subsystem 832, and any other device subsystems, e.g., timer mechanisms, generally labeled as reference numeral 833. To control access, a USIM/RUIM interface 834 may also be provided in communication with the microprocessor 802. In one implementation, USIM/RUIM interface 834 is operable with a USIM/RUIM card having a number of key configurations 844 and other information 846 such as identification and subscriber-related data.

[0039] Operating system software and applicable service logic software may be embodied in a persistent storage module (i.e., non-volatile storage) such as Flash memory 835. In one implementation, Flash memory 835 may be segregated into different areas, e.g., storage area for computer programs 836 (e.g., service processing logic), as well as data storage regions such as device state 837, address book 839, other personal information manager (PIM) data 841, and other data storage areas generally labeled as reference numeral 843. A transport stack 845 may be provided to effectuate one or more appropriate radio-packet transport protocols. In addition, enterprise call request messaging logic 848, including memory storage for storing pertinent address information, is provided for facilitating integration of outgoing calls as set forth hereinabove.

[0040] It is believed that the operation and construction of the embodiments of the present patent application will be apparent from the Detailed Description set forth above. While the exemplary embodiments shown and described may have been characterized as being preferred, it should be readily understood that various changes and modifications could be made therein without departing from the scope of the present disclosure as set forth in the following claims.

Claims

1. A method for integrating an outgoing cellular call as an enterprise call in an IP Multimedia Subsystem (IMS) environment (500), wherein said outgoing cellular call is originated by an enterprise user (118) towards a called party (120), said enterprise user (118) having an enterprise address and a non-enterprise address, comprising:

   receiving (704) a Session Initiation Protocol (SIP) INVITE request (612) from said enterprise user (118) for initiating said outgoing cellular call to said called party (120);
   establishing (706) a first call leg (620) to said enterprise user (118);
   establishing (706) a second call leg (624) to said called party (120); and
   patching (708) said first and second call legs (620, 624) to establish an end-to-end communications path (626) between said enterprise user (118) and said called party (120), wherein said enterprise address is presented instead of said non-enterprise address to said called party (120) as a calling line identity with respect to said outgoing cellular call from said enterprise user (118).

2. The method as recited in claim 1, wherein said SIP INVITE request (612) includes said enterprise address, said non-enterprise address, said called party's address, and a privacy indication.

3. The method as recited in claim 2, wherein said enterprise address comprises one of a SIP Uniform Resource Identifier (URI) and an E-164 number.

4. The method as recited in claim 2, wherein said non-enterprise address comprises a cellular telephony network number in E-164 format.

5. The method as recited in claim 2, wherein said called party's address comprises one of a SIP Uniform Resource Identifier (URI) and an E-164 number.

6. The method as recited in claim 1, wherein said establishment (706) of said first call leg (620) is facilitated by sending a SIP INVITE message (614) towards said enterprise user (118).

7. The method as recited in claim 1, wherein said establishment (706) of said second call leg (624) is facilitated sending a SIP INVITE message (622) towards said called party (120).

Ex.1002 / Page 596 of 1008
Cisco Systems, Inc.

8. An IP Multimedia Subsystem (IMS) network node (610) for integrating an outgoing cellular call as an enterprise call, wherein said outgoing cellular call is originated by an enterprise user (118) towards a called party (120), said enterprise user having an enterprise address and a non-enterprise address, comprising:

means for receiving (704) a Session Initiation Protocol (SIP) INVITE request (612) from said enterprise user (118) for initiating said outgoing cellular call to said called party (120);
means for establishing (706) a first call leg (620) to said enterprise user (118);
means for establishing (706) a second call leg (624) to said called party (120); and
means for patching (708) said first and second call legs (620, 624) to establish an end-to-end communications path (626) between said enterprise user (118) and said called party (120), wherein said enterprise address is presented instead of said non-enterprise address to said called party (120) as a calling line identity with respect to said outgoing cellular call from said enterprise user (118) .

9. The IMS network node (610) as recited in claim 8, wherein said SIP INVITE request (612) includes said enterprise address, said non-enterprise address, said called party's address, and a privacy indication.

10. The IMS network node (610) as recited in claim 9, wherein said enterprise address comprises one of a SIP Uniform Resource Identifier (URI) and an E-164 number.

11. The IMS network node (610) as recited in claim 9, wherein said called party's address comprises one of a SIP Uniform Resource Identifier (URI) and an E-164 number.

12. The IMS network node (610) as recited in claim 9, wherein said non-enterprise address comprises a cellular telephony network number in E-164 format.

13. The IMS network node (610) as recited in claim 8, further including means for sending a SIP INVITE message (614) towards said enterprise user (118) with respect to establishment of said first call leg (620).

14. The IMS network node (610) as recited in claim 8, further including means for sending a SIP INVITE message (622) towards said called party (120) with respect to establishment of said second call leg (624).

15. An IP Multimedia Subsystem (IMS)-capable user equipment (UE) device (800), comprising:

means for generating (802, 848) a Session Initiation Protocol (SIP) INVITE request (612) with respect to initiating an outgoing cellular call to a called party (120), said SIP INVITE request (612) being directed to an IMS network node (610); and
means for establishing (802, 848) a call leg (620) with said IMS network node (610) responsive to receiving a control message (618) that is provided responsive to a SIP INVITE message (614) from said IMS network node (610).

16. The IMS-capable UE device (800) as recited in claim 15, further comprising means for providing (802, 848) an indication to said IMS network node (610) that said call leg (620) is established between said UE device (800) and said network node (610).

17. The IMS-capable UE device (800) as recited in claim 15 or claim 16, wherein said request (612) includes an enterprise address and a non-enterprise address each associated with an enterprise user, said called party's address, and a privacy indication.

18. The IMS-capable UE device (800) as recited in claim 17, wherein said enterprise address comprises one of a SIP Uniform Resource Identifier (URI) and an E-164 number.

19. The IMS-capable UE device (800) as recited in claim 17, wherein said called party's address comprises one of a SIP Uniform Resource Identifier (URI) and an E-164 number.

20. The IMS-capable UE device (800) as recited in claim 18, wherein said non-enterprise address comprises a cellular telephony network number in E-164 format.

Ex.1002 / Page 597 of 1008
Cisco Systems, Inc.

Amended claims in accordance with Rule 137(2) EPC.

1. A method for integrating an outgoing cellular call as an enterprise call in an IP Multimedia Subsystem (IMS) environment (500), wherein said outgoing cellular call is originated by an enterprise user (118) towards a called party (120), said enterprise user (118) having an enterprise address and a non-enterprise address, comprising:

receiving (704) a Session Initiation Protocol (SIP) INVITE request (612) from said enterprise user (118) for initiating said outgoing cellular call to said called party (120);
establishing (706) a first call leg (620) to said enterprise user (118), wherein said enterprise address is presented to said enterprise user as a calling line identity;
establishing (706) a second call leg (624) to said called party (120); and
patching (708) said first and second call legs (620, 624) to establish an end-to-end communications path (626) between said enterprise user (118) and said called party (120), wherein said enterprise address is presented instead of said non-enterprise address to said called party (120) as a calling line identity with respect to said outgoing cellular call from said enterprise user (118).

2. The method as recited in claim 1, wherein said SIP INVITE request (612) includes said enterprise address, said non-enterprise address, said called party's address, and a privacy indication.

3. The method as recited in claim 2, wherein said enterprise address comprises one of a SIP Uniform Resource Identifier (URI) and an E-164 number.

4. The method as recited in claim 2, wherein said non-enterprise address comprises a cellular telephony network number in E-164 format.

5. The method as recited in claim 2, wherein said called party's address comprises one of a SIP Uniform Resource Identifier (URI) and an E-164 number.

6. The method as recited in claim 1, wherein said establishment (706) of said first call leg (620) is facilitated by sending a SIP INVITE message (614) towards said enterprise user (118).

7. The method as recited in claim 1, wherein said establishment (706) of said second call leg (624) is facilitated sending a SIP INVITE message (622) towards said called party (120).

8. An IP Multimedia Subsystem (IMS) network node (610) for integrating an outgoing cellular call as an enterprise call when said outgoing cellular call is originated by an enterprise user (118) towards a called party (120), said enterprise user having an enterprise address and a non-enterprise address, the network node comprising:

means for receiving (704) a Session Initiation Protocol (SIP) INVITE request (612) from said enterprise user (118) for initiating said outgoing cellular call to said called party (120);
means for establishing (706) a first call leg (620) to said enterprise user (118) and for presenting said enterprise address to said enterprise user as a calling line identity;
means for establishing (706) a second call leg (624) to said called party (120); and
means for patching (708) said first and second call legs (620, 624) to establish an end-to-end communications path (626) between said enterprise user (118) and said called party (120), wherein the network node is configured to present said enterprise address instead of said non-enterprise address to said called party (120) as a calling line identity with respect to said outgoing cellular call from said enterprise user (118).

9. The IMS network node (610) as recited in claim 8, configured to include in said SIP INVITE request (612) said enterprise address, said non-enterprise address, said called party's address, and a privacy indication.

10. The IMS network node (610) as recited in claim 9, configured to include said enterprise address as one of a SIP Uniform Resource Identifier (URI) and an E-164 number.

11. The IMS network node (610) as recited in claim 9, configured to include said called party's address as one of a SIP Uniform Resource Identifier (URI) and an E-164 number.

12. The IMS network node (610) as recited in claim 9, configured to include said non-enterprise address as a cellular

Ex.1002 / Page 598 of 1008
Cisco Systems, Inc.

telephony network number in E-164 format.

13. The IMS network node (610) as recited in claim 8, further including means for sending a SIP INVITE message (614) towards said enterprise user (118) with respect to establishment of said first call leg (620).

14. The IMS network node (610) as recited in claim 8, further including means for sending a SIP INVITE message (622) towards said called party (120) with respect to establishment of said second call leg (624).

Ex.1002 / Page 599 of 1008
Cisco Systems, Inc.

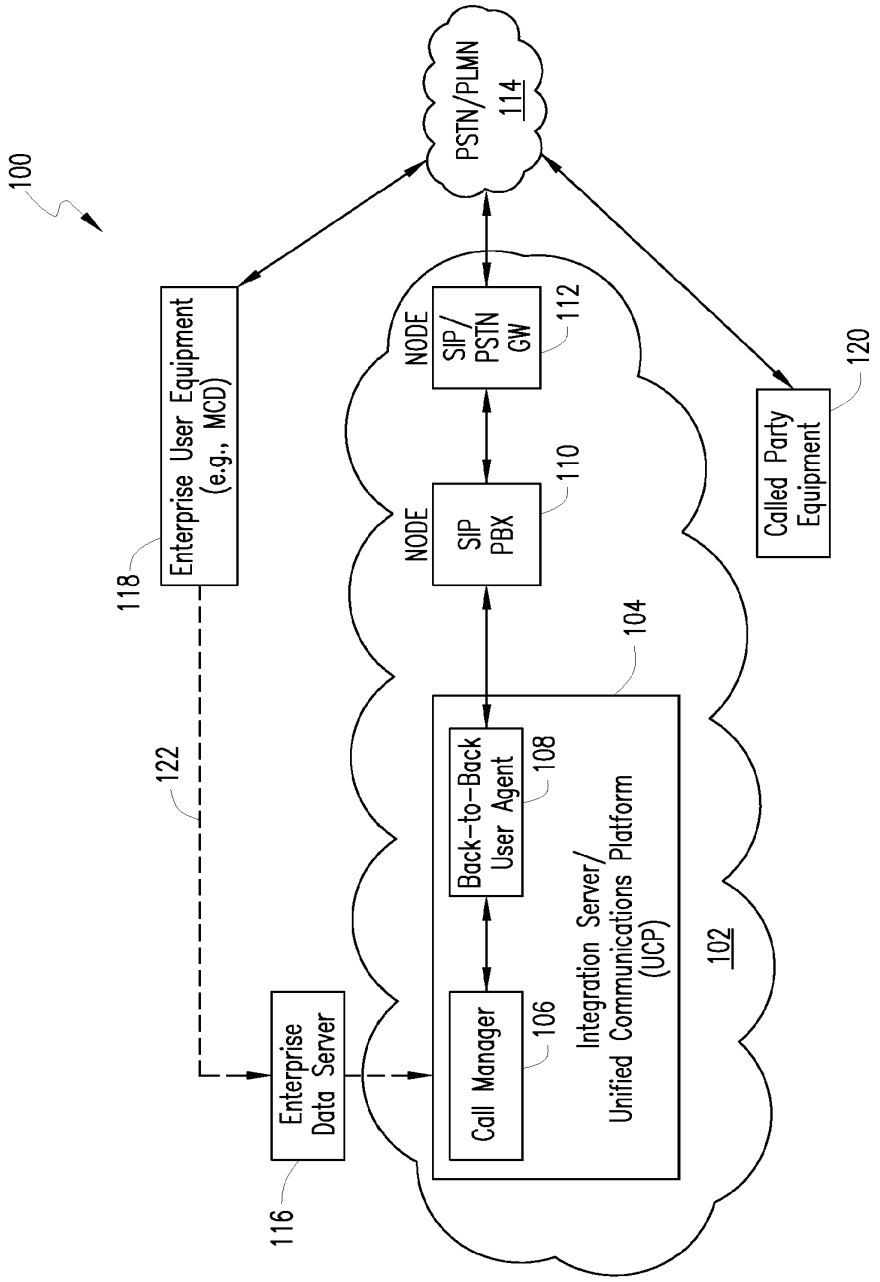

100
PSTN/PLMN
114
Enterprise User Equipment
(e.g., MCD)
118
NODE
SIP/
PSTN
GW
112
NODE
SIP
PBX
110
Called Party
Equipment
120
104
Back-to-Back
User Agent
108
Call Manager
106
Integration Server/
Unified Communications Platform
(UCP)
102
122
Enterprise
Data Server
116

FIG. 1

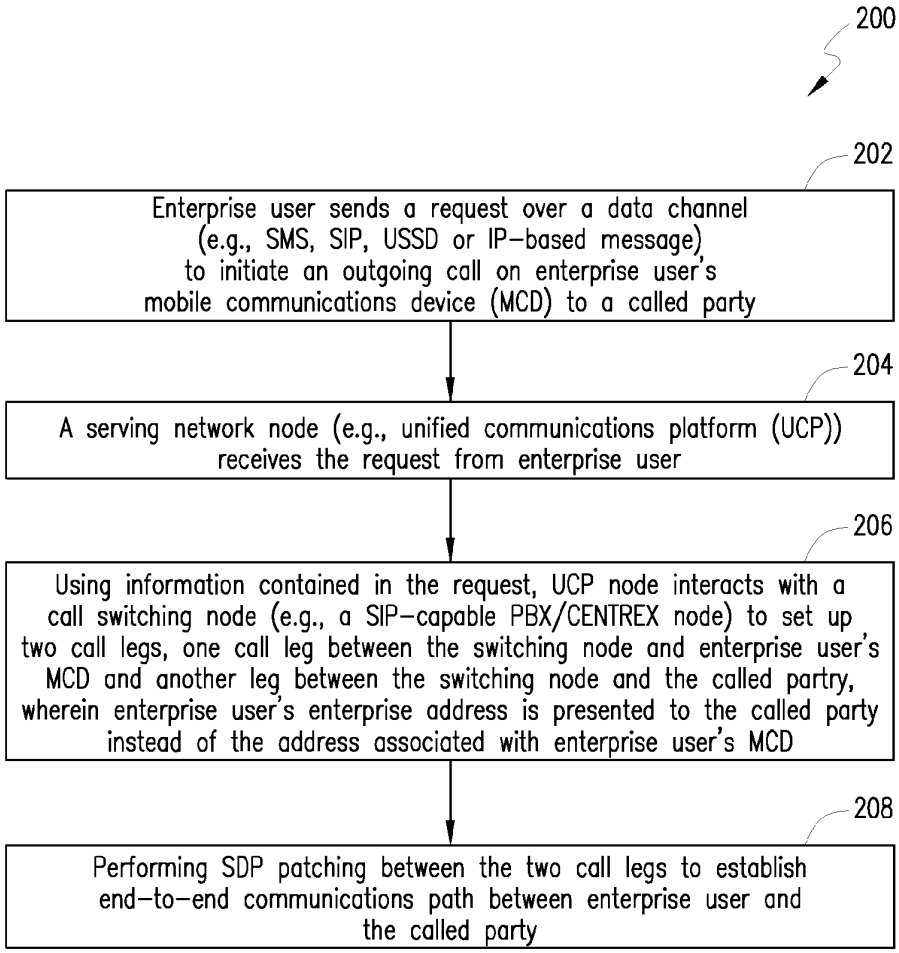


FIG. 2

Ex.1002 / Page 601 of 1008
Cisco Systems, Inc.

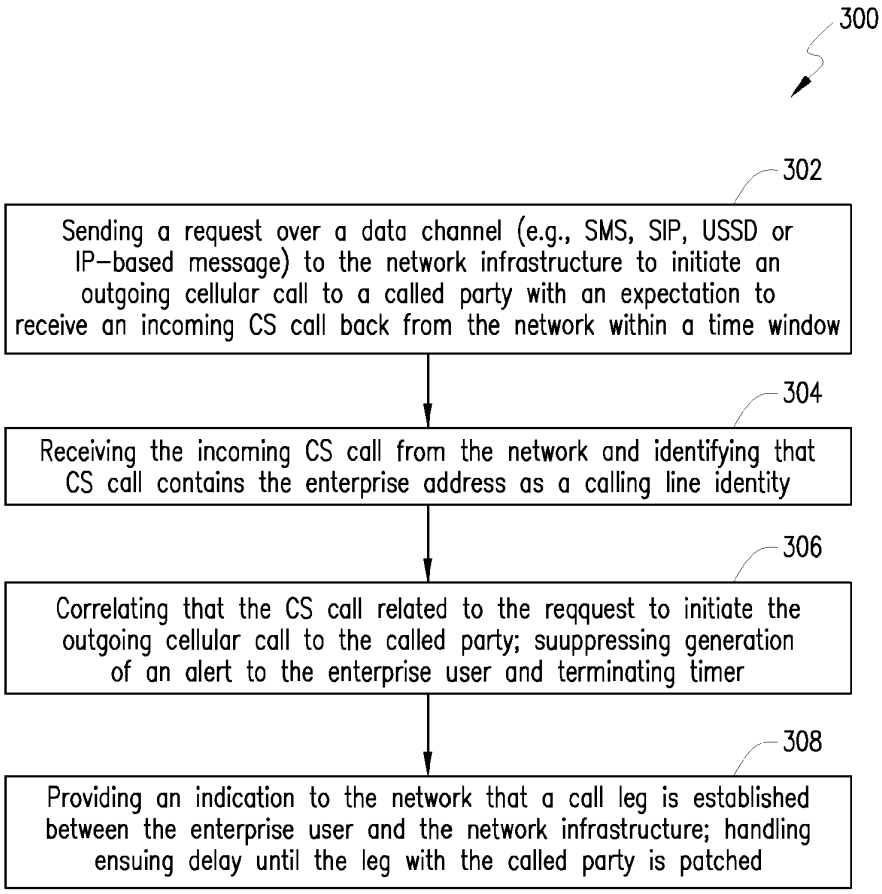


FIG. 3

Ex.1002 / Page 602 of 1008
Cisco Systems, Inc.

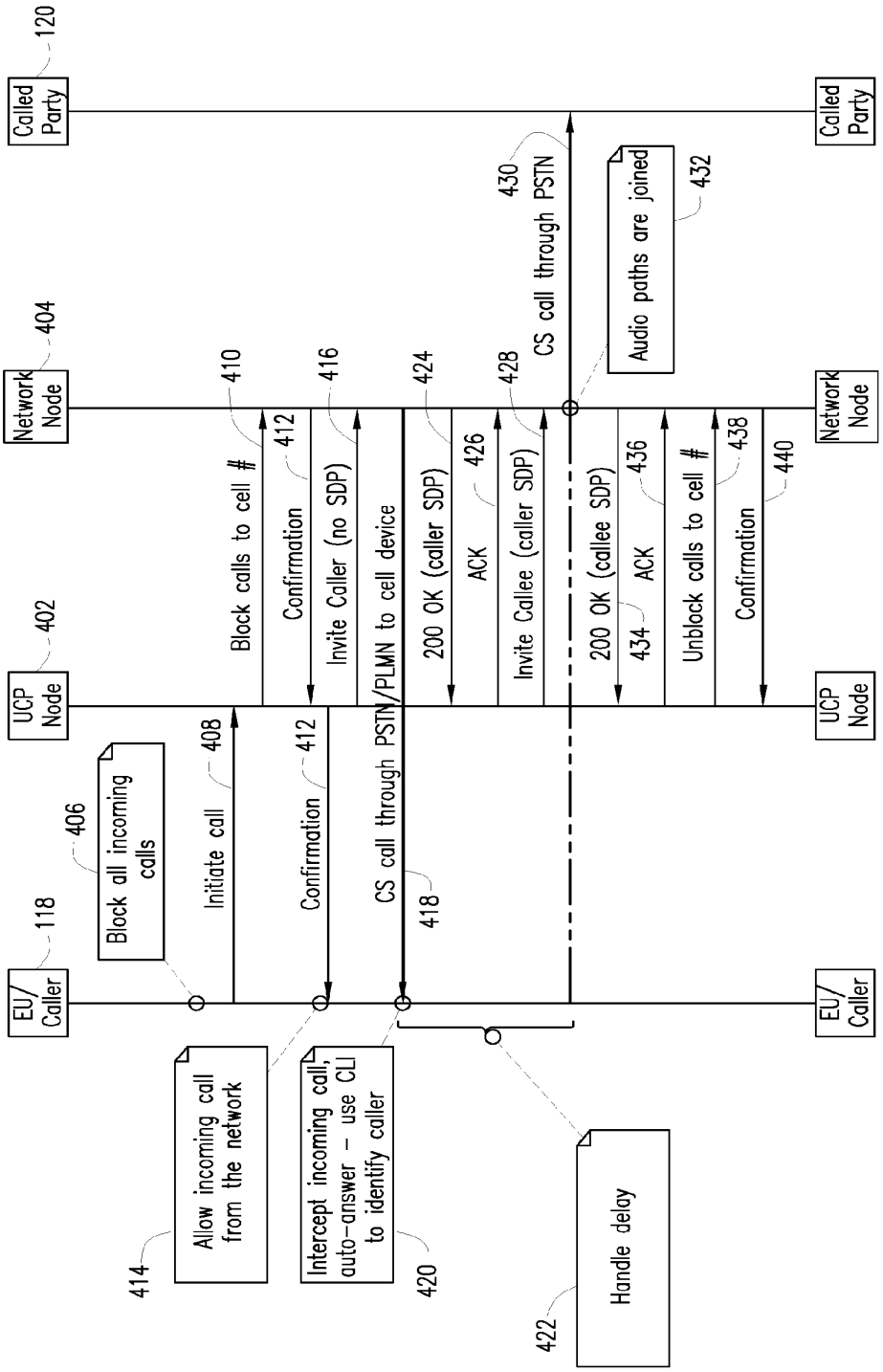


FIG. 4

Ex.1002 / Page 603 of 1008
Cisco Systems, Inc.

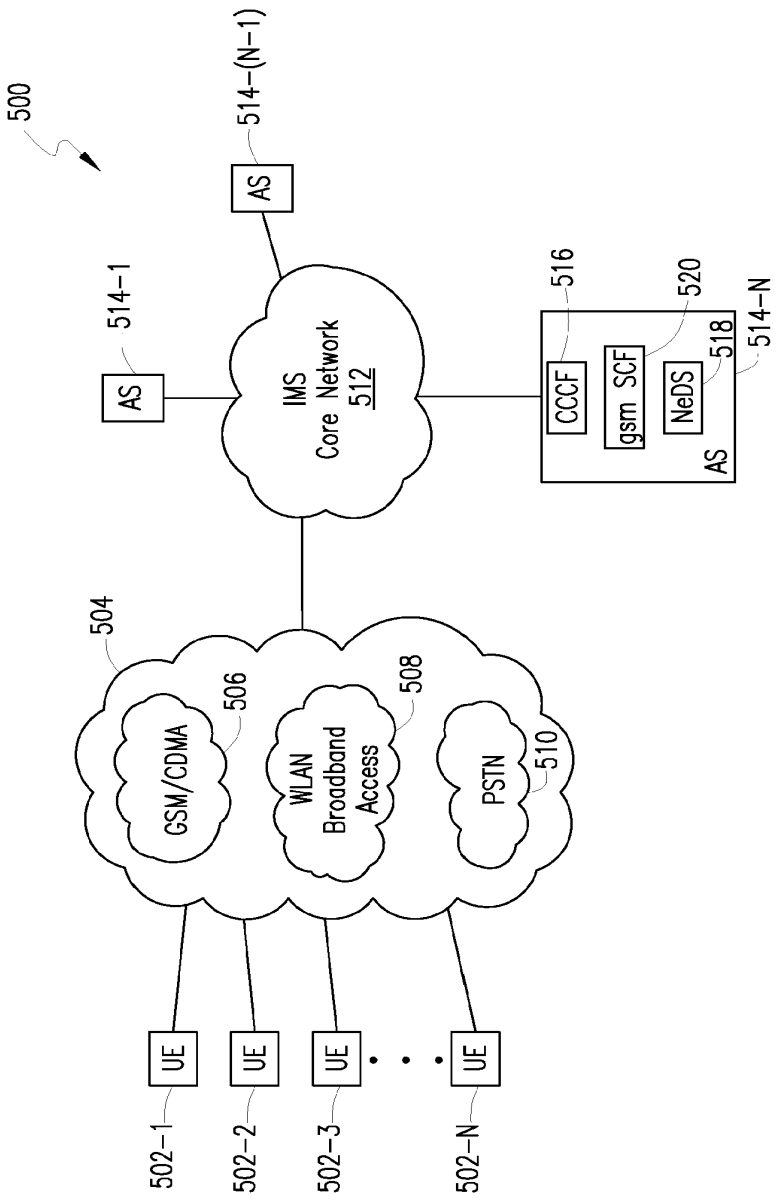

500
514-(N-1)
AS
514-1
AS
IMS
Core Network
512
516
520
514-N
518
CCCF
gsm SCF
NeDS
AS
504
GSM/CDMA
506
WLAN
Broadband
Access
508
PSTN
510
UE
UE
UE
UE
502-1
502-2
502-3
502-N

FIG. 5

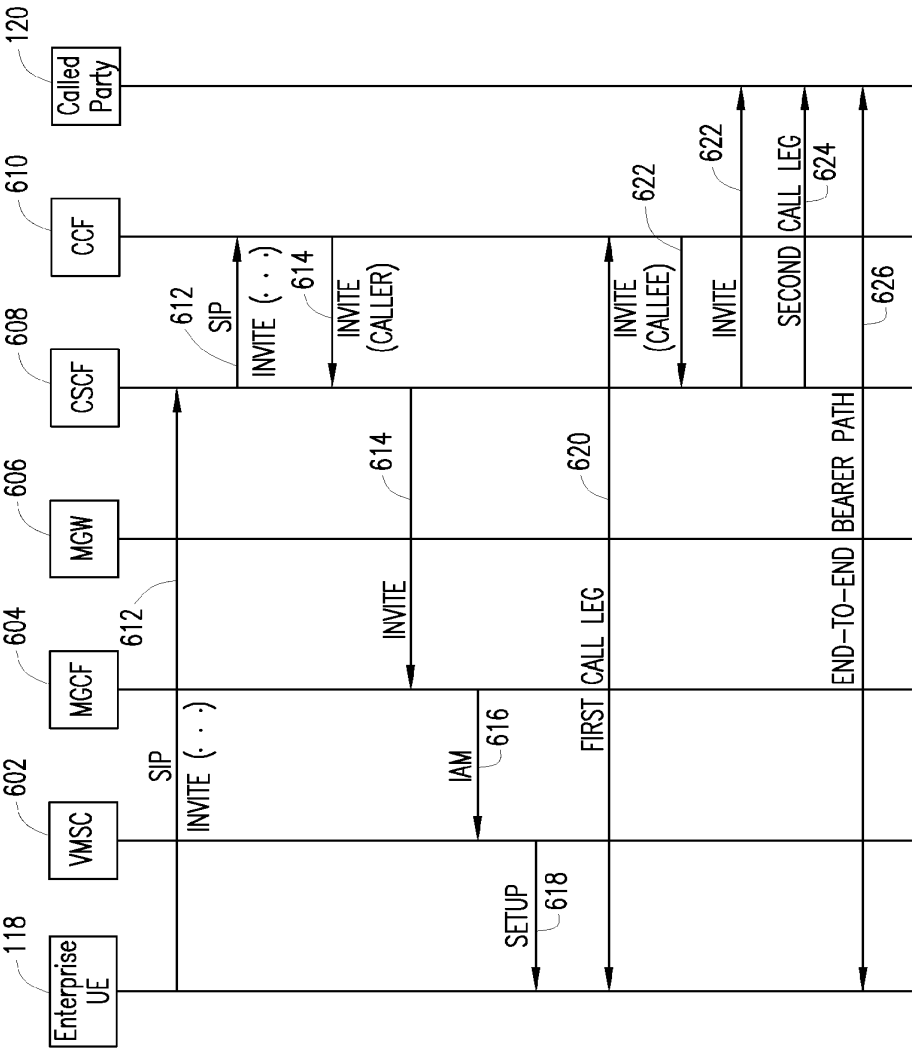

Enterprise UE
118
VMSC
602
MGCF
604
MGW
606
CSCF
608
CCF
610
Called Party
120
SIP INVITE (· · ·)
612
SETUP
618
IAM
616
INVITE
614
SIP INVITE (· · ·)
612
INVITE (CALLER)
614
FIRST CALL LEG
614
620
INVITE (CALLEE)
622
INVITE
622
SECOND CALL LEG
624
END-TO-END BEARER PATH
626

FIG. 6

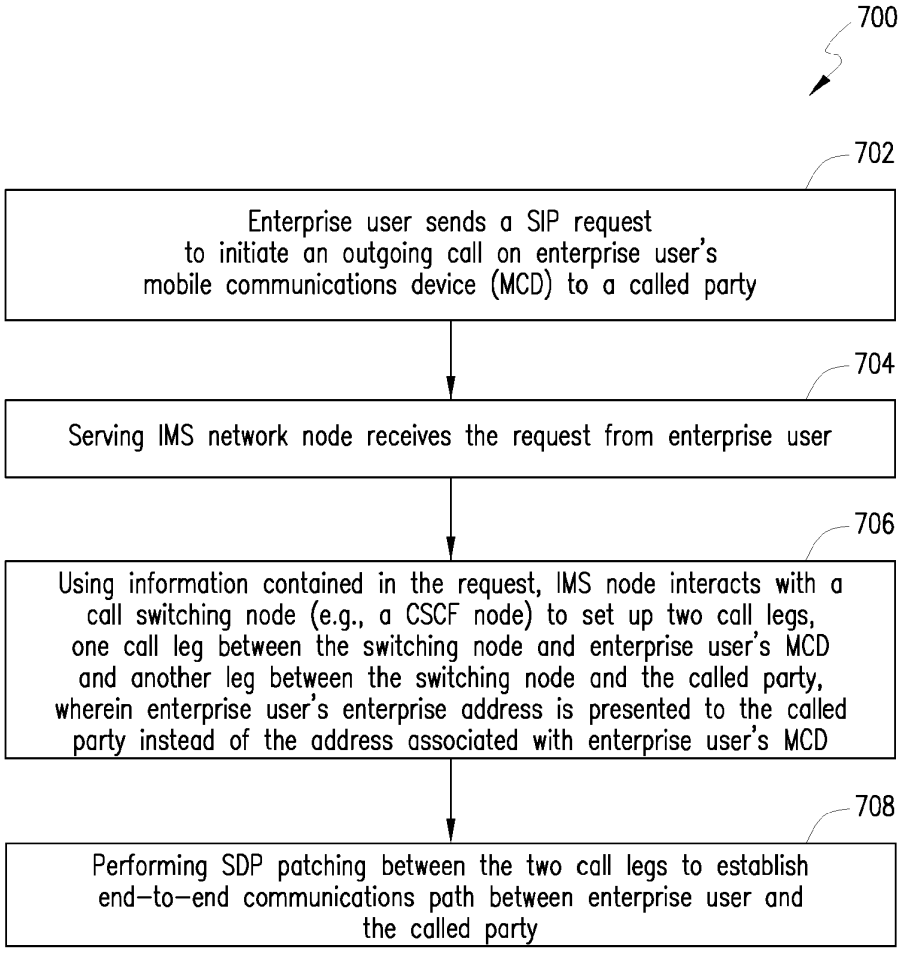


FIG. 7

Ex.1002 / Page 606 of 1008
Cisco Systems, Inc.

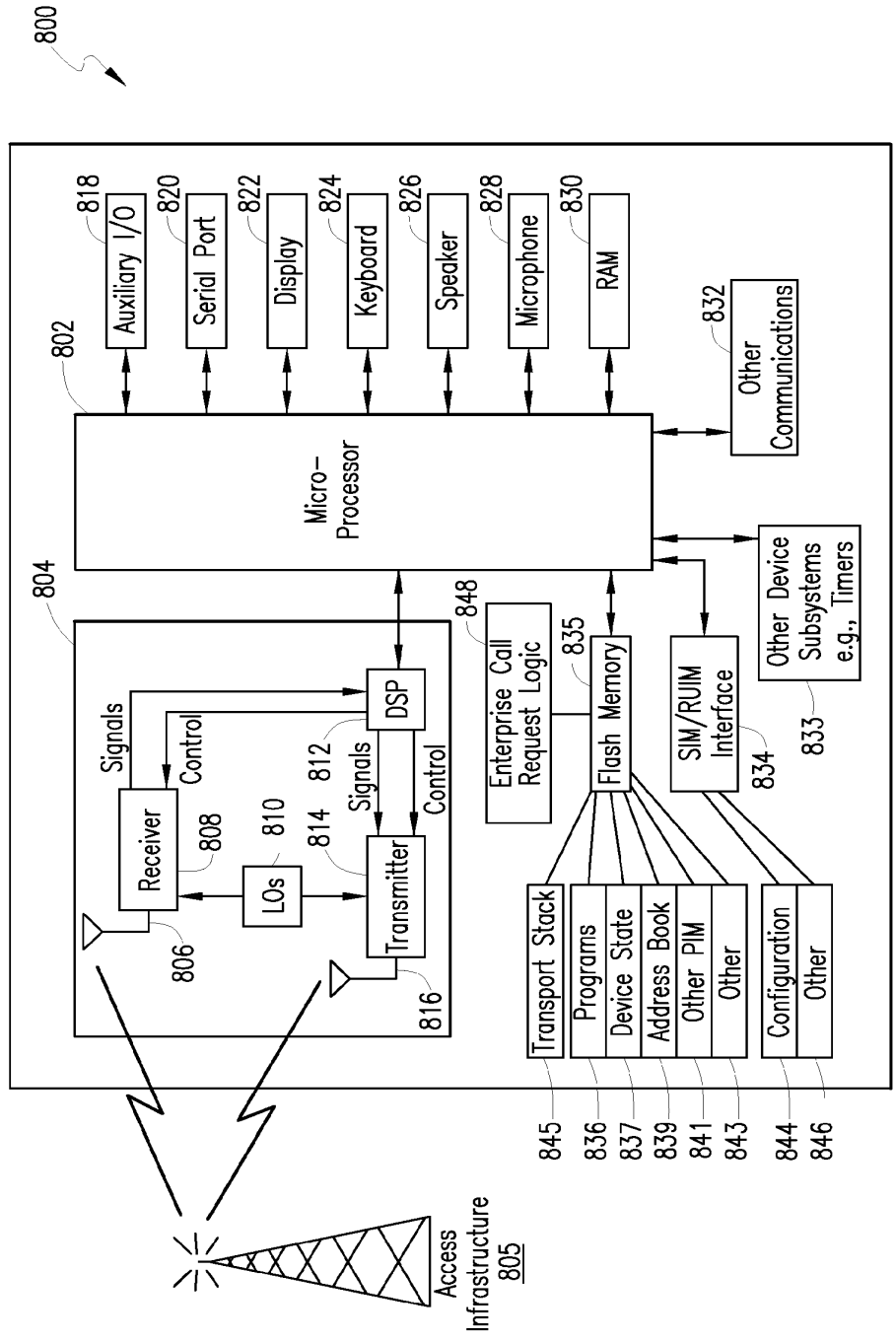


FIG. 8

Ex.1002 / Page 607 of 1008
Cisco Systems, Inc.

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 07 10 7248

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	GB 2 342 536 A (ORANGE PERSONAL COMM SERV LTD [GB]) 12 April 2000 (2000-04-12) * page 8, line 10 - page 9, line 12; figure 3 *	1-20	INV. H04M7/12 H04L29/06 H04M1/253 H04M1/725
Y	US 2007/015535 A1 (LABAUVE LANCE [US] ET AL) 18 January 2007 (2007-01-18) * paragraph [0078] *	1-20	
A	DE VRIENDT, J.; HANSON, G.; URIE, A.: "Network migration strategies towards IMS" ALCATEL TELECOMMUNICATIONS REVIEW, ALCATEL, PARIS CEDEX, FR, 2005, XP007903135 ISSN: 1267-7167 *Mobile operator migration path*	1-20	

TECHNICAL FIELDS SEARCHED (IPC)

H04M
H04Q
H04L

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	17 October 2007	Cremer, Jan

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

Ex.1002 / Page 608 of 1008
Cisco Systems, Inc.

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 07 10 7248

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

17-10-2007

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB 2342536 A	12-04-2000	AU 6214899 A	01-05-2000
		EP 1118240 A1	25-07-2001
		WO 0022863 A1	20-04-2000
US 2007015535 A1	18-01-2007	US 2007015536 A1	18-01-2007

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 988 697 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
05.11.2008 Bulletin 2008/45

(21) Application number: **07107246.6**

(22) Date of filing: **30.04.2007**

(51) Int Cl.:
H04M 7/12 *(2006.01)* ***H04L 29/06*** *(2006.01)*
H04M 1/253 *(2006.01)* ***H04M 1/725*** *(2006.01)*

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC MT NL PL PT RO SE SI SK TR
Designated Extension States:
AL BA HR MK RS

(71) Applicant: **Research In Motion Limited**
Waterloo, Ontario N2L 3W8 (CA)

(72) Inventors:
- **Allen, Andrew**
  Mundelein, IL 60060 (US)
- **Buckley, Adrian**
  Tracy, CA 95376 (US)
- **George, Richard**
  Waterloo, Ontario N2T 2S3 (CA)
- **Oliver, Brian**
  Fergus, Ontario N1M 1C8 (CA)
- **Luu, Lap**
  Markham, Ontario, L6C 2X7 (CA)
- **Lee, Dalsu**
  Thornhill, Ontario, L4J 7Y8 (CA)

(74) Representative: **Roberts, Gwilym Vaughan et al**
Kilburn & Strode
20 Red Lion Street
London WC1R 4PJ (GB)

Remarks:
Amended claims in accordance with Rule 137(2) EPC.

(54) **Hybrid VoWLAN-cellular system and method for establishing an outgoing cellular call as an enterprise call**

(57) The application relates to systems based upon Voice-over-IP and Session Initiation Protocol-based signaling systems that utilize the existing enterprise IP infrastructure. Mobile communication devices are being enhanced to provide SIP-based communications (including VoIP) over WLAN access as well as cellular networks, thereby allowing these devices to provide mobile telephony communications capability when within the enterprise as well as when away from the enterprise. However, these networks cannot currently commercially support carrier-class VoIP telephony services. This problem is solved by the invention in that instead of a VoIP call, a circuit-switched call is established. In particular, a network node (404) is operable, responsive to receiving (408) a request from an enterprise user (118) to initiate origination of an outgoing cellular call to a called party (120), for establishing (418) a first call leg to the enterprise user (118) by sending a circuit-switched call that identifies an enterprise address of the enterprise user (118) as a calling line identity. The network node (404) includes functionality for establishing (430) a second call leg to the called party (120) upon receiving an indication from the enterprise user (118) that the first call leg has been established. The first and second call legs are then patched to establish an end-to-end communications path between the enterprise user (118) and the called party (120), wherein the enterprise address instead of the non-enterprise address is presented to the called party (120) as a calling line identity with respect to the outgoing cellular call from the enterprise user (118).

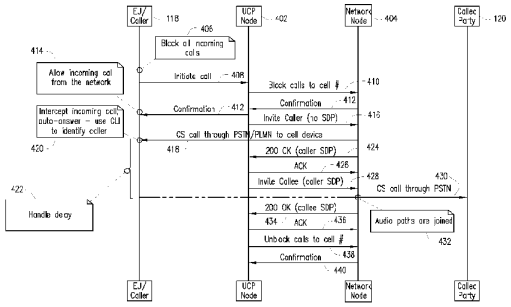


FIG. 4

EP 1 988 697 A1

Description

CROSS-REFERECE TO RELATED APPLICATION(S)

[0001] This application discloses subject matter that is related to the subject matter of the following U.S. patent application(s): (i) "SYSTEM AND METHOD FOR PRESENTING MEDIA TO MULTIPLE PARTIES IN A SIP ENVIRONMENT" (Docket No. 30761-2-US-PAT), Application No.:_, filed even date herewith, in the name(s) of Andrew Allen, Adrian Buckley, Richard George, Brian Oliver, Lap Luu and Dalsu Lee; and (ii) "SYSTEM AND METHOD FOR INTEGRATING AN OUTGOING CELLULAR CALL AS AN ENTERPRISE CALL IN AN IMS ENVIRONMENT" (Docket No. 30761-1-US-PAT), Application No.:_, filed even date herewith, in the name(s) of Andrew Allen, Adrian Buckley, Richard George, Brian Oliver, Lap Luu and Dalsu Lee, which is (are) hereby incorporated by reference.

FIELD OF THE DISCLOSURE

[0002] The present patent disclosure generally relates to communications networks. More particularly, and not by way of any limitation, the present patent disclosure is directed to a system and method for integrating an outgoing cellular call as an enterprise call in a network environment.

BACKGROUND

[0003] Many enterprise networks are replacing their existing Private Branch Exchange (PBX)- and Central Office Exchange (CENTREX)-based telephony systems with systems based upon Voice-over-IP (VoIP) and Session Initiation Protocol (SIP)-based signaling systems that utilize the existing enterprise IP infrastructure, e.g., Local Area Network (LAN) and Wireless LAN (WLAN) technologies. It is not uncommon for enterprise employees to regularly use mobile communications devices when away from the enterprise, which interoperate with cellular networks such as, e.g., the Global System for Mobile Communications (GSM) networks, Code Division Multiple Access (CDMA) networks, and Universal Mobile Telecommunications System (UMTS) networks, to keep in touch with other employees of the enterprise and to conduct business communications with other people outside the enterprise. Additionally, mobile communications devices are being enhanced to provide SIP-based communications (including VoIP) over WLAN access as well as cellular networks, thereby allowing these devices to provide mobile telephony communications capability when within the enterprise as well as when away from the enterprise. It is expected that such developments may allow replacement of the ubiquitous wired desktop phone in the enterprise with dual-mode, WLAN-capable mobile devices.

[0004] Although cellular telephony networks have deployed IP-based data communications capabilities through exploitation of well-known technologies, it is generally understood that these networks cannot currently commercially support carrier-class VoIP telephony services due to issues of delay, Quality of Service (QoS) and efficiency, which prevent cost-effective usage of such networks for purposes of providing acceptable quality voice services. Accordingly, for the foreseeable future, telephony services based upon the existing network infrastructure are likely to continue to utilize conventional circuit-switched network technology for telephony calls.

[0005] Based on the foregoing, it should appreciated that the integration of VoIP enterprise networks with carrier cellular telephony networks in order to serve an enterprise user within the enterprise as well as while away is fraught with numerous difficulties. Moreover, in such scenarios it may be desirable for enterprises to have certain control over the calls made by their employees for tracking and monitoring purposes.

SUMMARY

[0006] The present patent disclosure is broadly directed to a scheme for integrating an outgoing cellular call as an enterprise call wherein an enterprise user's enterprise address is presented to the called party instead of the enterprise user's non-enterprise address (e.g., cellular telephony number). In one aspect, disclosed herein is an embodiment of a method for facilitating integration of an outgoing cellular call as an enterprise call, wherein the outgoing cellular call is originated by an enterprise user towards a called party, the enterprise user having an enterprise address and a non-enterprise address. The claimed embodiment comprises one or more of the following: sending a request to a network node for initiating the outgoing cellular call to the called party with an expectation to receive an incoming circuit-switched call back from the network node within a time window; receiving the incoming circuit-switched call from the network node and identifying that the incoming circuit-switched call contains the enterprise address as a calling line identity; correlating that the incoming circuit-switched call is related to the request to initiate origination of the outgoing cellular call; and providing an indication to the network node (which could be optional in some embodiments) that a call leg is established between the enterprise user and the network node.

[0007] In another aspect, disclosed herein is an embodiment of a method for integrating an outgoing cellular call as

Ex.1002 / Page 611 of 1008
Cisco Systems, Inc.

an enterprise call by an enterprise user having an enterprise address and a non-enterprise address. The claimed embodiment comprises one or more of the following: receiving a request from the enterprise user for initiating the outgoing cellular call to the called party; establishing a first call leg to the enterprise user by sending a circuit-switched call that identifies the enterprise address as a calling line identity; establishing a second call leg to the called party, preferably upon receiving an indication that the first call leg has been established; and patching the first and second call legs to establish an end-to-end communications path between the enterprise user and the called party, wherein the enterprise address is presented instead of the non-enterprise address to the called party as a calling line identity with respect to the outgoing cellular call from the enterprise user.

[0008] In a further aspect, disclosed herein is an embodiment of a user equipment (UE) device operable to generate an outgoing cellular call as an enterprise call to a called party. The claimed embodiment comprises one or more of the following: means for sending a request to a network node to initiate origination of the outgoing cellular call to the called party with an expectation to receive an incoming circuit-switched call back from the network node within a time window; and means for correlating that the incoming circuit-switched call is related to the request to initiate origination of the outgoing cellular call by identifying that the incoming circuit-switched call contains an enterprise address of the enterprise user as a calling line identity.

[0009] In a still further aspect, disclosed herein is an embodiment of a network node for integrating an outgoing cellular call as an enterprise call. The claimed embodiment comprises one or more of the following: means, responsive to receiving a request from the enterprise user to initiate origination of the outgoing cellular call to the called party, for establishing a first call leg to the enterprise user by sending a circuit-switched call that identifies the enterprise address as a calling line identity; means for establishing a second call leg to the called party upon receiving an indication from the enterprise user that the first call leg has been established; and means for patching the first and second call legs to establish an end-to-end communications path between the enterprise user and the called party, wherein an enterprise address of the enterprise user instead of its non-enterprise address is presented to the called party as a calling line identity with respect to the outgoing cellular call from the enterprise user.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] A more complete understanding of the embodiments of the present patent disclosure may be had by reference to the following Detailed Description when taken in conjunction with the accompanying drawings wherein:

[0011] FIG. 1 depicts an exemplary network environment wherein one or more embodiments of the present patent disclosure may be practiced for purposes of integrating an outgoing cellular call as an enterprise call;

[0012] FIG. 2 depicts a flowchart of the present patent disclosure according to one embodiment;

[0013] FIG. 3 depicts another flowchart of the present patent disclosure according to one embodiment;

[0014] FIG. 4 depicts an exemplary message flow diagram according to one embodiment of the present patent disclosure; and

[0015] FIG. 5 depicts a block diagram of an embodiment of a communications device operable for purposes of the present patent disclosure.

DETAILED DESCRIPTION OF THE DRAWINGS

[0016] A system and method of the present patent disclosure will now be described with reference to various examples of how the embodiments can best be made and used. Like reference numerals are used throughout the description and several views of the drawings to indicate like or corresponding parts, wherein the various elements are not necessarily drawn to scale. Referring now to the drawings, and more particularly to FIG. 1, an exemplary network environment 100 is depicted wherein an embodiment of the present patent disclosure may be practiced for integrating an outgoing cellular call as an enterprise call. As depicted, the network environment 100 includes a generalized network infrastructure 102 wherein certain portions may form an enterprise network whereas the remaining portions may comprise an external network arrangement such as one or several service provider networks that serve as intermediary networks with respect to the enterprise network and the well-known PSTN/PLMN infrastructure 114. For purposes herein, an enterprise network may be any communications network internal to a company, office, or organization, and may comprise wireline and/or wireless network infrastructure. Regardless of the actual implementation, the network infrastructure 102 includes an integration server (also referred to as a Unified Communications Platform (UCP) element) 104, a switching element such as a SIP-capable Private Branch Exchange (PBX) 110 and a gateway (GW) element such as a SIP/PSTN GW 112. As alluded to previously, one or more of these elements may be incorporated within an enterprise network infrastructure in one embodiment. Alternatively, one or more of these elements or their functionalities may be hosted in a service provider network. In either arrangement, the functionalities of the elements may be integrated or redistributed into separate network entities. Accordingly, for purposes of the present patent disclosure, a "network node" may comprise a generalized network entity that effectuates or facilitates at least a portion of the functionalities set forth hereinbelow

Ex.1002 / Page 612 of 1008
Cisco Systems, Inc.

with respect to call integration.

[0017] An enterprise user is operable to effectuate communications (e.g., Voice/data/Video calls or multimedia sessions, and the like) in a number of scenarios within the context of the network environment 100 with respect to a called party 120. In general, the enterprise user is capable of initiating communications using one of two addresses: an enterprise address that may be used for calls made from within the enterprise network and a non-enterprise address for calls made from outside the enterprise network. In one application, the enterprise user may be provided with two separate pieces of user equipment (UE) 118: a wireline telephony equipment having the enterprise address that is used when the enterprise user is on the enterprise premises and a mobile communications device (MCD) having a cellular telephony number (i.e., non-enterprise address) that may be used when the enterprise user is away. Alternatively, where local wireless connectivity to the enterprise network is supported, a single wireless UE device operable in two different radio access technologies (RATs) may be provided. In this scenario, when the wireless UE device is attached to the enterprise network via any known or heretofore unknown Wireless Local Area Network (WLAN) technology, calls originated by the enterprise user may have the enterprise address as the calling party number. On the other hand, calls originated when the wireless UE device is attached to a wide area cellular network (WACN) such as the Public Land Mobile Network (PLMN) 114 may have the non-enterprise address (e.g., cellular telephony number) as the calling party number. Accordingly, it should be appreciated that the enterprise user equipment 118 may be a conventional cellular phone having data channel capability (e.g., Short Message Service or SMS capability) or a dual-mode MCD having WLAN capability (for enterprise operation) and WACN capability (for remote operation). Additionally, for purposes of further generalization, the enterprise UE device 118 may also comprise any personal computer (e.g., desktops, laptops, palmtops, personal digital assistants (PDAs) or other handheld computing devices) equipped with a suitable wireless modem, as well as a communications device operable in both circuit-switched (CS) and packet-switched (PS) communications that may even be capable of effectuating an inter-technology handoff between both CS and PS domains.

[0018] Based on the foregoing, it may be realized that the enterprise and non-enterprise addresses for an enterprise user may take on different forms, depending on the equipment and service provisioning. For instance, the enterprise address may comprise a SIP Uniform Resource Identifier (URI) or an E-164 number. Likewise, the non-enterprise address and the called party address may also comprise either SIP URIs, E.164 numbers, or other identifiers.

[0019] An enterprise data server 116 may be disposed in association with at least a portion of the network 102, preferably with the UCP node 104 when provisioned as part of an enterprise network. A data communications path 122 may be effectuated between the enterprise UE 118 and the enterprise network over the PLMN data network infrastructure via the enterprise data server 116. Regardless of whether integrated within an enterprise network or disposed in a service provider network, UCP node 104 preferably includes a Call Manager functionality 106 as well as a SIP Back-to-Back User Agent (B2BUA) 108 that is operable to perform third-party call control in order to combine multiple call legs together. In general, all enterprise SIP calls may be routed via the UCP node 104 and it is the role of the UCP node 104 to trigger the routing of the incoming SIP calls to the enterprise user regardless of whether UE 118 is attached via the enterprise WLAN or via the PLMN cellular network. Further, as will be described in detail below, the enterprise data server 116 can also receive a trigger message (i.e., a request to originate an outgoing cellular call) from UE 118 that is attached to the PLMN cellular network 114 via the cellular network's data network (such as GPRS or CDMA packet data network, for example) to request that the UCP node 104 establish a call between the enterprise UE 118 and the equipment 120 of the called party.

[0020] Taking reference to FIGS. 1 and 2 together, a generalized scheme 200 for integrating outgoing calls from the enterprise UE 118 when it is attached to the cellular network may be set forth as follows. The enterprise user using its equipment sends a request message to a serving network node (i.e., the UCP element 104 shown in FIG. 1) via the cellular network's data network (block 202). Additionally or alternatively, the request message may also be mediated via an enterprise data server. In one embodiment, the request may comprise a SIP Request such as a SIP REFER message or some other SIP Request (e.g., a SIP INVITE message) either sent directly to the enterprise data server 116 via the cellular network's data network or routed to the UCP node 104 via the cellular network's SIP based infrastructure such as the IP Multimedia Subsystem (IMS). Alternatively, the message may not be a SIP Message at all and could be any message that contains the necessary information to enable the UCP node 104 to establish a call between the enterprise UE 118 and the called party's equipment 120 that the enterprise user is attempting to call (e.g., an SMS message, an Unstructured Supplementary Service Data (USSD) message, or an IP based message). In accordance with an embodiment, the following pieces of information may be transmitted as part of the request message: (i) the enterprise address (e.g., SIP URI or E.164 number) that the enterprise user is reachable at; (ii) the non-enterprise address (e.g., E.164 number) that the enterprise UE is reachable at when it is attached to the cellular network; (iii) the E.164 number or SIP URI of the called party; and (iv) an indication of whether privacy is required. Upon receiving the request message from the enterprise UE (block 204), the service logic at the UCP node 104 uses the received information to effectuate two call legs in association with a switching node such as a SIP-capable PBX/CENTREX node, a first call leg between the switching node and the enterprise UE and a second call leg between the called party's UE and the switching node wherein the enterprise user's enterprise address is presented to the called party instead of the non-

Ex.1002 / Page 613 of 1008
Cisco Systems, Inc.

enterprise address associated with the UE (i.e., the cellular number) (block 206). Thereafter, the first and second call legs are patched together wherein the two respective Session Description Protocol (SDP) streams associated with the call legs are joined in order to establish an end-to-end bearer communications path between the enterprise user and the called party (block 208).

[0021] Set forth below is an example of how a SIP REFER request can be used to trigger the UCP node 104 to establish an outgoing call within the context of the scheme described above:

Table I

```
REFER sip: IntegrationServer@companyXXX.com; SIP/2.0
Via: SIP/2.0/UDP PIN12345678.blackberry.com
     ;branch=z9hG4bKhjhs8ass83

Max-Forwards: 70
To: <sip: IntegrationServer@companyXXX.com>
From: Mike <sip:Mike@companyXXX.com>;tag=32331
Call-ID: d432fa84b4c76e66710
Cseq: 2 REFER
Contact: <sip:PIN12345678.blackberry.com>
Refer-To: <cid:cn35t8jf02@companyXXX.com>
Require: multiple-refer
Content-Type: application/resource-lists+xml
Content-Disposition: recipient-list
Content-Length: 362
Content-ID: <cn35t8jf02@example.com>

<?xml version="1.0" encoding="UTF-8"?>
<resource-lists  xmlns+"um:ietf:params:xml:ns:resource-
lists"
     Xmins:xsi="http://www.w3.org/2001/XML.Schema-
instance">
<list>
<entry uri="tel: 098-765-4321"/>
<entry uri="tel: 123-456-7890"/>
</list>
</resource-lists>
```

[0022] Those skilled in the art will recognize that the above SIP REFER request embodiment uses the Resource List mechanism defined in draft-ietf-sip-multiple-refer and draft-ietf-simple-xcap-list-user to trigger the sending of a SIP INVITE request towards both the enterprise UE 118 and the called party equipment 120 using the list entry uri elements to deliver both the E.164 number that the enterprise UE is reachable at via the cellular network and the E.164 number of the party being called. Accordingly, when the UCP node 104 receives the SIP REFER request or other trigger message, it uses SIP Third Party Call Control to establish two SIP Call legs; one SIP leg to the enterprise UE via the PBX, SIP-PSTN Gateway and the circuit-switched cellular network; the other SIP leg to the called party. As pointed out previously, these two call legs are joined together at the UCP node 104 in order to form a single end-to-end call between the enterprise user and the called party. The SIP INVITE requests sent contain the enterprise address of the enterprise UE terminal which can be in the form of SIP URI or as an E.164 number in a TEL URI along with the appropriate privacy setting if requested in the SIP REFER request. Alternatively, the privacy setting may be required by the enterprise network based on certain service provisioning policies and profiles. The enterprise address of the enterprise UE terminal can be transported in the SIP INVITE request using the SIP From header, Referred-By header, P-Asserted-Identity header, Identity header or Remote-Party-ID header. If a SIP URI is used as the enterprise address of the enterprise UE

Ex.1002 / Page 614 of 1008
Cisco Systems, Inc.

terminal, the SIP-PBX 110 may translate this address to the corresponding E.164 number that represents the enterprise address of the device. The SIP-PSTN GW 112 includes the E.164 number that represents the enterprise address of the enterprise UE terminal in the Calling Line Identity in the circuit-switched signaling messages.

[0023] With respect to the behavior of the enterprise UE for purposes of facilitating integration of an outgoing cellular call, reference may now be taken to FIG. 3 wherein a flowchart is depicted. When a request message for initiating an outgoing cellular call to a called party is transmitted to the network infrastructure, there is an expectation to receive an incoming circuit-switched call back from the network within a time window (block 302). Accordingly, a timer mechanism may be started at the application level to determine when to receive the circuit-switched call back in response to the outgoing request message. In one embodiment, if the timer expires, the enterprise UE device may try a number of times until a limit is reached, whereupon the call is considered to have failed. When the enterprise UE device receives a call establishment SETUP signaling request via the circuit-switched PSTN/PMLN signaling, the logic executing on the device is operable to identify that the circuit-switched call contains the enterprise address as the Calling Line Identity (block 304) (that is, the Calling Line Identity in the SETUP is the enterprise UE's enterprise address), and based thereon, the logic determines that this incoming call is related to the requested outgoing call (requested via the SIP REFER request or other message) (block 306). Accordingly, the logic operates to suppress generation of an alert to the enterprise user but establishes the circuit-switched call and stops the application timer (block 306). Further, the enterprise UE may provide an indication to the network that the call leg has been established (block 308). Accordingly, in one embodiment, the UCP node may wait until it receives such an acknowledgement of the establishment of the call leg with the enterprise UE device before attempting to establish the call leg to the called user by sending an SIP INVITE request in order to avoid the possibility of the called party answering before the call leg with the enterprise UE device is established (i.e., avoidance of a race condition). In the meantime, until the call legs are patched, there may be a delay experienced at the enterprise UE from the time the circuit-switched call leg with the network is established. Appropriate delay handling mechanisms(s) may therefore be provided to mitigate the delay.

[0024] When the called party's equipment receives the circuit-switched SETUP message (or SIP INVITE request if the called party is using a SIP phone within the enterprise SIP network or an external SIP network), the Calling Line Identity in the case of the circuit-switched SETUP message (or From header, Referred-By header, P-Asserted-Identity header, Identity header or Remote-Party-ID header in the case of SIP INVITE message) contains the enterprise address (e.g., E.164 number or SIP URI) of the enterprise UE device to be presented to the called party for Calling Line Identity Presentation (if provided based on the privacy setting). The called phone rings the user and returns an ALERTING message in the case of a circuit-switched call (or a SIP 180 "Ringing" response in the case of a SIP call). An ALERTING message will be translated by the SIP-PSTN gateway to a SIP 180 "Ringing" response. When the SIP 180 "Ringing" response is received at the UCP node, the service logic operable thereat may send a notification of "Ringing" back to the enterprise UE terminal via the cellular network's data network. In the case that the call establishment was triggered using a SIP REFER request, this notification may be in the form of a SIP NOTIFY request as specified in RFC 3515. In the case a message other than a SIP REFER request was used, the notification of "Ringing" may be sent using some other message. It is necessary to use the connection via the cellular network's data network to notify the "Ringing" since the call leg that is established with the enterprise UE terminal via the circuit-switched network is "in the wrong direction" to be able to indicate ALERTING using the circuit-switched signaling protocol.

[0025] Upon answering by the enterprise user, the UE terminal sends the circuit-switched CONNECT message (or SIP 200 "OK" response if the called party is using a SIP phone within the enterprise SIP network or an external SIP network). A CONNECT message will be translated by the SIP-PSTN GW to a SIP 200 "OK" response. When the SIP 200 "OK" response is received at the UCP node 104, it can send a notification of "OK" back to the enterprise UE terminal via the cellular network's data network. In the case that the call establishment was triggered using a SIP REFER request, this notification will be in the form of a SIP NOTIFY request as specified in RFC 3515. In the case a message other than a SIP REFER request was used, the notification of "OK" may be sent using some other message. At this point the call is established via the cellular network between the enterprise UE terminal and the called party, with the enterprise address of the enterprise UE terminal being displayed as the identity of the calling party.

[0026] FIG. 4 depicts an exemplary message flow diagram according to an embodiment of the process set forth above. As illustrated, a UCP node 402 and a network node 404 are exemplified to highlight the message flow between the enterprise UE 118 and the network infrastructure in particular detail. Upon blocking all incoming calls to the enterprise UE 118 (block 406), a request with respect to an outgoing call is initiated (reference numeral 408). In response, the UCP node 402 sends a message to the network node 404 (e.g., SIP-PBX) to block calls to the enterprise UE 118. A confirmation 412 is then propagated from the network node 404 to enterprise UE 118 via the UCP node 412, whereupon incoming calls from the network may be allowed (block 414). The UCP node 402 transmits a message 416 to the network node 404 to invite the enterprise user (i.e., caller) with respect to establishing a CS call 418 through the cellular network to the enterprise UE 118. Service logic at the enterprise UE 118 is operable to intercept the incoming CS call setup and identify that the enterprise address of the enterprise user is the CLI (block 420). Thereafter, a SIP 200 "OK" message 424 is generated by the network node 404 towards the UCP node 402 with respect to caller SDP. In response, an

Ex.1002 / Page 615 of 1008
Cisco Systems, Inc.

acknowledgement (ACK) 426 is generated by the UCP node 402. The UCP node 402 also generates a message 428 towards the network node 404 to invite the called party (i.e., callee) with respect to establishing a CS call 430 therewith through the PSTN/PLMN. As shown in block 422, appropriate service logic may be provided for handling the delay before patching the call legs. Pursuant to joining the audio paths (block 432), a SIP 200 "OK" message 434 is generated by the network node 404 towards the UCP node 402 with respect to callee SDP. In response, an acknowledgement (ACK) 436 is generated by the UCP node 402. A message 438 is provided thereafter by the UCP node 402 to the network node 404 in order to unblock calls to the enterprise UE 118, resulting in a confirmation 440 by the network node 404. It should be appreciated that the various operations set forth herein may be accomplished via a number of means, including software (e.g., program code), firmware, hardware, or in any combination, usually in association with a processing system. Where the processes are embodied in software, such software may comprise program instructions that form a computer program product, uploadable service application software, or software downloadable from a remote station, and the like.

[0027] FIG. 5 depicts a block diagram of an embodiment of a communications device 500 operable as a UE device, e.g., the enterprise UE 118, for purposes of the present patent disclosure. It will be recognized by those skilled in the art upon reference hereto that although an embodiment of UE 118 may comprise an arrangement similar to one shown in FIG. 5, there can be a number of variations and modifications, in hardware, software or firmware, with respect to the various modules depicted. Further, a UE device 500 for purposes of the present disclosure may comprise a mobile equipment (ME) device without a removable storage module and/or a mobile device coupled with such a storage module. Accordingly, the arrangement of FIG. 5 should be taken as illustrative rather than limiting with respect to the embodiments of the present patent disclosure. A microprocessor 502 providing for the overall control of an embodiment of UE 500 is operably coupled to a communication subsystem 504 that may preferably be capable of multi-mode communications (e.g., CS domain and PS domain). The communication subsystem 504 generally includes one or more receivers 508 and one or more transmitters 514 as well as associated components such as one or more local oscillator (LO) modules 510 and a processing module such as a digital signal processor (DSP) 512. As will be apparent to those skilled in the field of communications, the particular design of the communication module 504 may be dependent upon the communications networks with which the mobile device is intended to operate (e.g., a CDMA network, a GSM network, WLAN, et cetera). Regardless of the particular design, however, signals received by antenna 506 through appropriate access infrastructure 505 (e.g., cellular base station towers, WLAN hot spots, etc.) are provided to receiver 508, which may perform such common receiver functions as signal amplification, frequency down conversion, filtering, channel selection, analog-to-digital (A/D) conversion, and the like. Similarly, signals to be transmitted are processed, including modulation and encoding, for example, by DSP 512, and provided to transmitter 514 for digital-to-analog (D/A) conversion, frequency up conversion, filtering, amplification and transmission over the air-radio interface via antenna 516.

[0028] Microprocessor 502 may also interface with further device subsystems such as auxiliary input/output (I/O) 518, serial port 520, display 522, keyboard/keypad 524, speaker 526, microphone 528, random access memory (RAM) 530, a short-range communications subsystem 532, and any other device subsystems, e.g., timer mechanisms, generally labeled as reference numeral 533. To control access, a USIM/RUIM interface 534 may also be provided in communication with the microprocessor 602. In one implementation, USIM/RUIM interface 534 is operable with a USIM/RUIM card having a number of key configurations 544 and other information 546 such as identification and subscriber-related data.

[0029] Operating system software and applicable service logic software may be embodied in a persistent storage module (i.e., non-volatile storage) such as Flash memory 535. In one implementation, Flash memory 535 may be segregated into different areas, e.g., storage area for computer programs 536 (e.g., service processing logic), as well as data storage regions such as device state 537, address book 539, other personal information manager (PIM) data 541, and other data storage areas generally labeled as reference numeral 543. A transport stack 545 may be provided to effectuate one or more appropriate radio-packet transport protocols. In addition, enterprise call request messaging logic 548, including memory storage for storing pertinent address information, is provided for facilitating integration of outgoing calls as set forth hereinabove.

[0030] It is believed that the operation and construction of the embodiments of the present patent application will be apparent from the Detailed Description set forth above. While the exemplary embodiments shown and described may have been characterized as being preferred, it should be readily understood that various changes and modifications could be made therein without departing from the scope of the present disclosure as set forth in the following claims.

Claims

1. A method for facilitating integration of an outgoing cellular call as an enterprise call, wherein said outgoing cellular call is originated by an enterprise user (118) towards a called party (120), said enterprise user (118) having an enterprise address and a non-enterprise address, comprising:

Ex.1002 / Page 616 of 1008
Cisco Systems, Inc.

sending (302) a request to a network node (104) for initiating said outgoing cellular call to said called party (120) with an expectation to receive an incoming circuit-switched call back from said network node (104) within a time window;
receiving (304) said incoming circuit-switched call from said network node (104) and identifying that said incoming circuit-switched call contains said enterprise address as a calling line identity;
correlating (306) that said incoming circuit-switched call is related to said request to initiate origination of said outgoing cellular call; and
providing (308) an indication to said network node (104) that a call leg is established between said enterprise user (118) and said network node (104).

2. The method as recited in claim 1, wherein said request is sent as one of a Short Message Service (SMS) message, an Unstructured Supplementary Service Data (USSD)-based message, a Session Initiation Protocol (SIP) message, and an Internet Protocol (IP)-based message.

3. The method as recited in claim 1 or claim 2, wherein said request includes said enterprise address, said non-enterprise address, said called party's address, and a privacy indication.

4. The method as recited in claim 3, wherein said enterprise address comprises one of a SIP Uniform Resource Identifier (URI) and an E-164 number.

5. The method as recited in claim 3, wherein said non-enterprise address comprises a cellular telephony network number in E-164 format.

6. The method as recited in claim 3, wherein said called party's address comprises one of a SIP Uniform Resource Identifier (URI) and an E-164 number.

7. The method as recited in claim 1, wherein said time window is effectuated based on commencing a timer with respect to sending said request.

8. The method as recited in claim 7, wherein said timer is terminated upon receipt of said incoming circuit-switched call from said network node (104).

9. The method as recited in claim 1, further comprising determining whether said time window has elapsed without receiving said incoming circuit-switched call from said network node (104), and if so, continuing to send said request a select number of times.

10. A method for integrating an outgoing cellular call as an enterprise call, wherein said outgoing cellular call is originated by an enterprise user (118) towards a called party (120), said enterprise user (118) having an enterprise address and a non-enterprise address, comprising:

receiving (204) a request from said enterprise user (118) for initiating said outgoing cellular call to said called party (120);
establishing (206) a first call leg to said enterprise user (118) by sending a circuit-switched call that identifies said enterprise address as a calling line identity;
establishing (206) a second call leg to said called party (120) upon receiving an indication that said first call leg has been established; and
patching (208) said first and second call legs to establish an end-to-end communications path between said enterprise user (118) and said called party (120), wherein said enterprise address is presented instead of said non-enterprise address to said called party (120) as a calling line identity with respect to said outgoing cellular call from said enterprise user (118).

11. The method as recited in claim 10, wherein said request is received as one of a Short Message Service (SMS) message, an Unstructured Supplementary Service Data (USSD)-based message, a Session Initiation Protocol (SIP) message, and an Internet Protocol (IP)-based message.

12. The method as recited in claim 10 or claim 11, wherein said request includes said enterprise address, said non-enterprise address, said called party's address, and a privacy indication.

Ex.1002 / Page 617 of 1008
Cisco Systems, Inc.

13. The method as recited in claim 12, wherein said enterprise address comprises one of a SIP Uniform Resource Identifier (URI) and an E-164 number.

14. The method as recited in claim 12, wherein said non-enterprise address comprises a cellular telephony network number in E-164 format.

15. The method as recited in claim 12, wherein said called party's address comprises one of a SIP Uniform Resource Identifier (URI) and an E-164 number.

16. A user equipment (UE) device (500) operable to generate an outgoing cellular call as an enterprise call, wherein said outgoing cellular call is originated towards a called party (118), comprising:

means for sending (302) a request to a network node (104) to initiate origination of said outgoing cellular call to said called party (118) with an expectation to receive an incoming circuit-switched call back from said network node (104) within a time window; and
means for correlating (306) that said incoming circuit-switched call is related to said request to initiate origination of said outgoing cellular call.

17. The UE device (500) as recited in claim 16, further comprising means for providing (308) an indication to said network node (104) that a call leg is established between said UE device (500) and said network node (104).

18. The UE device (500) as recited in claim 16 or claim 17, wherein said request comprises one of a Short Message Service (SMS) message, an Unstructured Supplementary Service Data (USSD)-based message, a Session Initiation Protocol (SIP) REFER message, a SIP INVITE message, and an Internet Protocol (IP)-based message.

19. The UE device (500) as recited in claim 18, wherein said request includes said enterprise address, said non-enterprise address, said called party's address, and a privacy indication.

20. A network node (104) for integrating an outgoing cellular call as an enterprise call, wherein said outgoing cellular call is originated by an enterprise user (118) towards a called party (120), said enterprise user (118) having an enterprise address and a non-enterprise address, comprising:

means, responsive to receiving (204) a request from said enterprise user (118) to initiate origination of said outgoing cellular call to said called party (120), for establishing (206) a first call leg to said enterprise user (118) by sending a circuit-switched call that identifies said enterprise address as a calling line identity;
means for establishing (206) a second call leg to said called party (120) upon receiving an indication from said enterprise user (118) that said first call leg has been established; and
means for patching (208) said first and second call legs to establish an end-to-end communications path between said enterprise user (118) and said called party (120), wherein said enterprise address is presented instead of said non-enterprise address to said called party (120) as a calling line identity with respect to said outgoing cellular call from said enterprise user (118).

21. The network node (104) as recited in claim 20, wherein said request comprises one of a Short Message Service (SMS) message, an Unstructured Supplementary Service Data (USSD)-based message, a Session Initiation Protocol (SIP) REFER message, a SIP INVITE message, and an Internet Protocol (IP)-based message.

22. The network node (104) as recited in claim 20 or claim 21, wherein said request includes said enterprise address, said non-enterprise address, said called party's address, and a privacy indication.

23. The network node (104) as recited in claim 22, wherein said enterprise address comprises one of a SIP Uniform Resource Identifier (URI) and an E-164 number.

24. The network node as recited in claim 22, wherein said called party's address comprises one of a SIP Uniform Resource Identifier (URI) and an E-164 number.

Ex.1002 / Page 618 of 1008
Cisco Systems, Inc.

Amended claims in accordance with Rule 137(2) EPC.

1. A method for facilitating integration of an outgoing cellular call as an enterprise call, wherein said outgoing cellular call is originated by an enterprise user (118) towards a called party (120), said enterprise user (118) having an enterprise address and a non-enterprise address, comprising:

sending (302) a request to a network node (104) for initiating said outgoing cellular call to said called party (120) with an expectation to receive an incoming circuit-switched call back from said network node (104) within a time window;
receiving (304) said incoming circuit-switched call from said network node (104) and identifying that said incoming circuit-switched call contains said enterprise address as a calling line identity;
correlating (306) that said incoming circuit-switched call is related to said request to initiate origination of said outgoing cellular call; and
providing (308) an indication to said network node (104) that a call leg is established between said enterprise user (118) and said network node (104).

2. The method as recited in claim 1, wherein said request is sent as one of a Short Message Service (SMS) message, an Unstructured Supplementary Service Data (USSD)-based message, a Session Initiation Protocol (SIP) message, and an Internet Protocol (IP)-based message.

3. The method as recited in claim 1 or claim 2, wherein said request includes said enterprise address, said non-enterprise address, said called party's address, and a privacy indication.

4. The method as recited in claim 3, wherein said enterprise address comprises one of a SIP Uniform Resource Identifier (URI) and an E-164 number.

5. The method as recited in claim 3, wherein said non-enterprise address comprises a cellular telephony network number in E-164 format.

6. The method as recited in claim 3, wherein said called party's address comprises one of a SIP Uniform Resource Identifier (URI) and an E-164 number.

7. The method as recited in claim 1, wherein said time window is effectuated based on commencing a timer with respect to sending said request.

8. The method as recited in claim 7, wherein said timer is terminated upon receipt of said incoming circuit-switched call from said network node (104).

9. The method as recited in claim 1, further comprising determining whether said time window has elapsed without receiving said incoming circuit-switched call from said network node (104), and if so, continuing to send said request a select number of times.

10. A user equipment (UE) device (500) operable to generate an outgoing cellular call as an enterprise call, wherein said outgoing cellular call is originated towards a called party (118), comprising:

means for sending (302) a request to a network node (104) to initiate origination of said outgoing cellular call to said called party (118) with an expectation to receive an incoming circuit-switched call back from said network node (104) within a time window;
means for receiving (304) said incoming circuit-switched call from said network node (104) and for identifying that said incoming circuit-switched call contains an enterprise address associated with said UE device as a calling line identity; and
means for correlating (306) that said incoming circuit-switched call is related to said request to initiate origination of said outgoing cellular call.

11. The UE device (500) as recited in claim 10, further comprising means for providing (308) an indication to said network node (104) that a call leg is established between said UE device (500) and said network node (104).

12. The UE device (500) as recited in claim 10 or claim 11, wherein said request comprises one of a Short Message

Ex.1002 / Page 619 of 1008
Cisco Systems, Inc.

Service (SMS) message, an Unstructured Supplementary Service Data (USSD)-based message, a Session Initiation Protocol (SIP) REFER message, a SIP INVITE message, and an Internet Protocol (IP)-based message.

13. The UE device (500) as recited in claim 12, wherein said request includes said enterprise address, said non-enterprise address, said called party's address, and a privacy indication.

Ex.1002 / Page 620 of 1008
Cisco Systems, Inc.

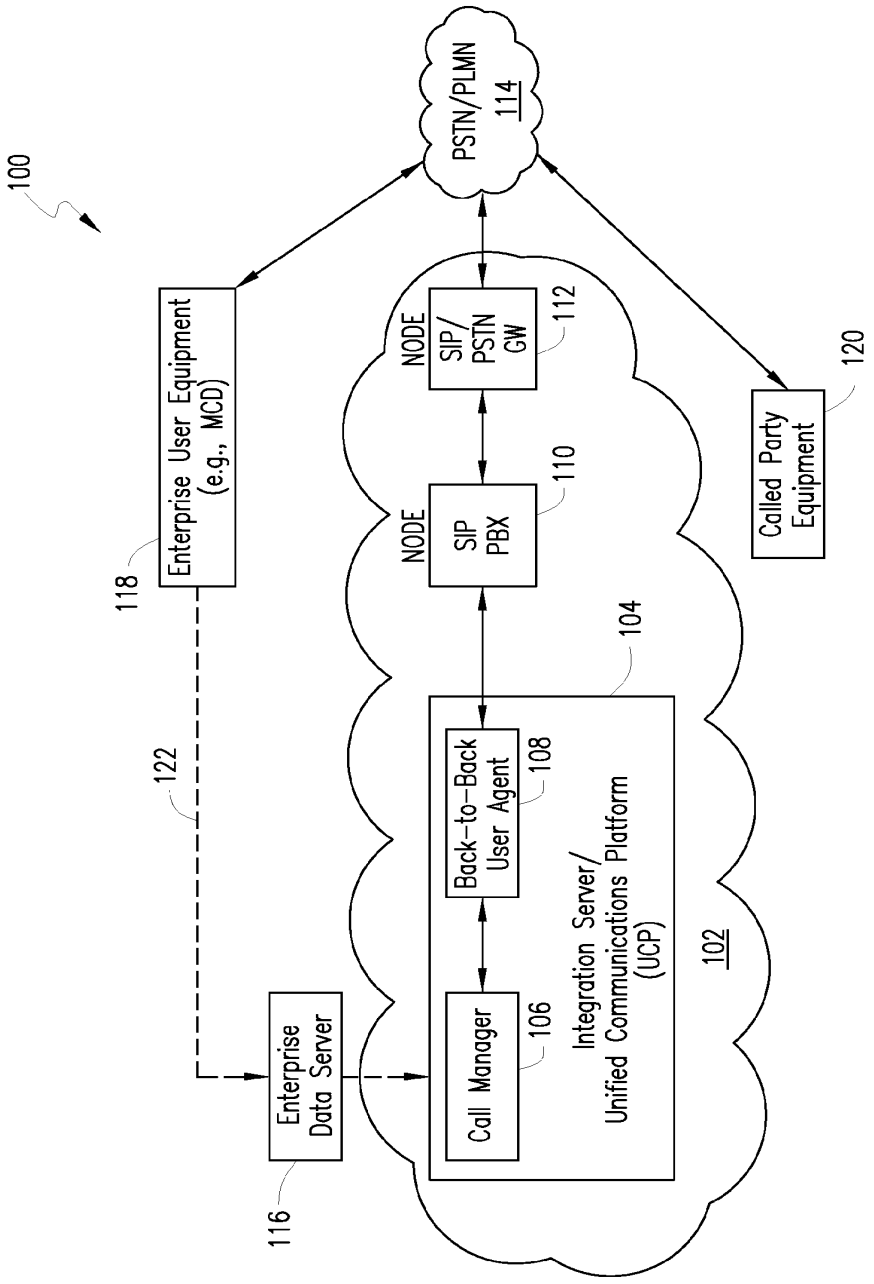


FIG. 1

Ex.1002 / Page 621 of 1008
Cisco Systems, Inc.

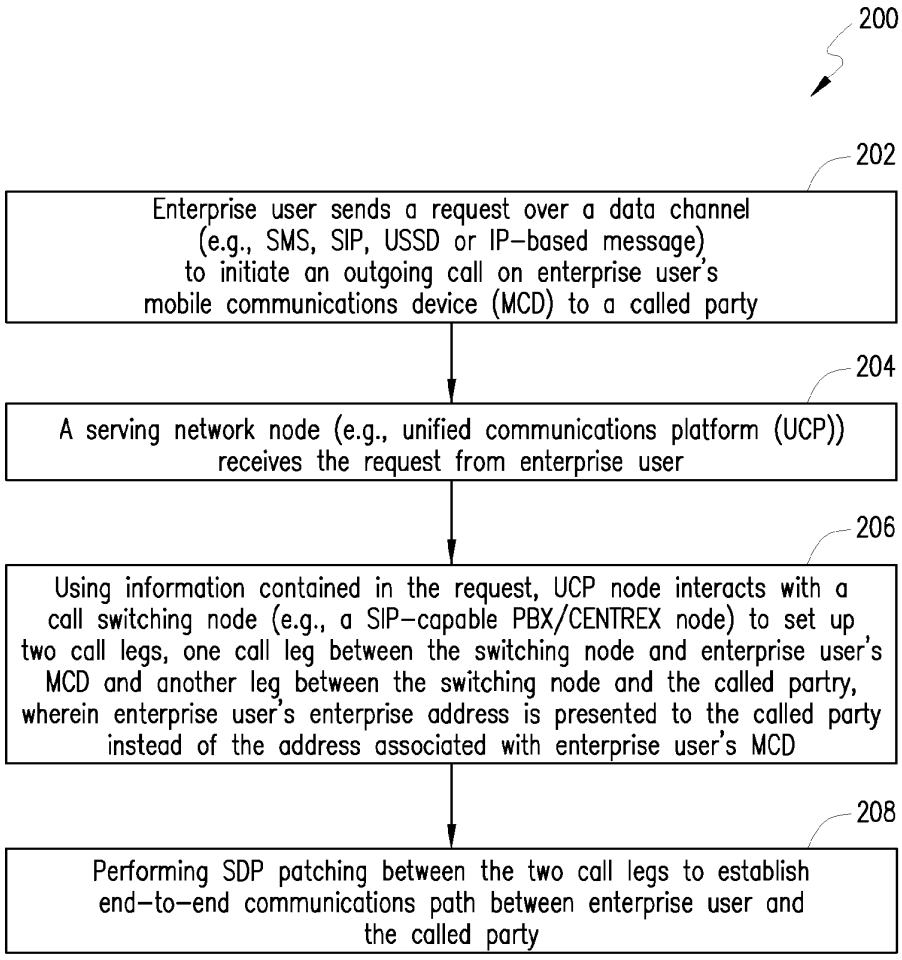


FIG. 2

Ex.1002 / Page 622 of 1008
Cisco Systems, Inc.

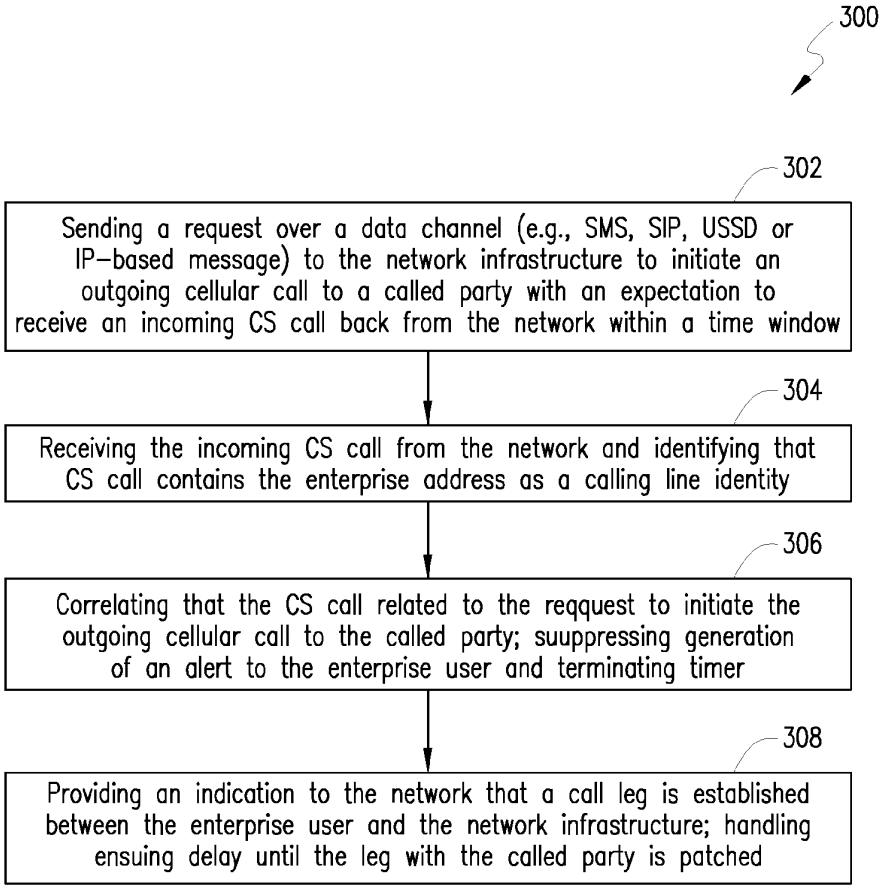


FIG. 3

Ex.1002 / Page 623 of 1008
Cisco Systems, Inc.

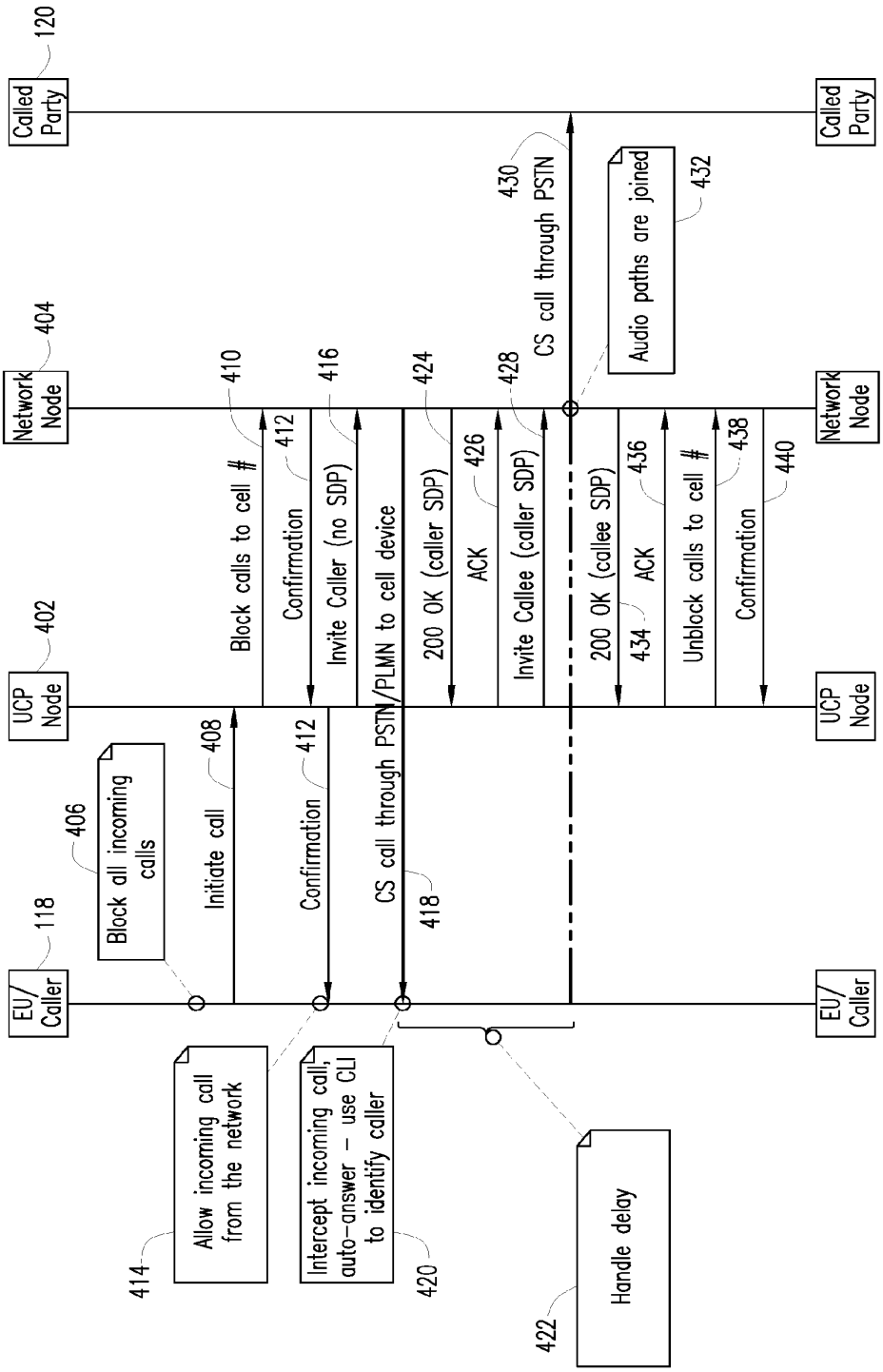


FIG. 4

Ex.1002 / Page 624 of 1008
Cisco Systems, Inc.

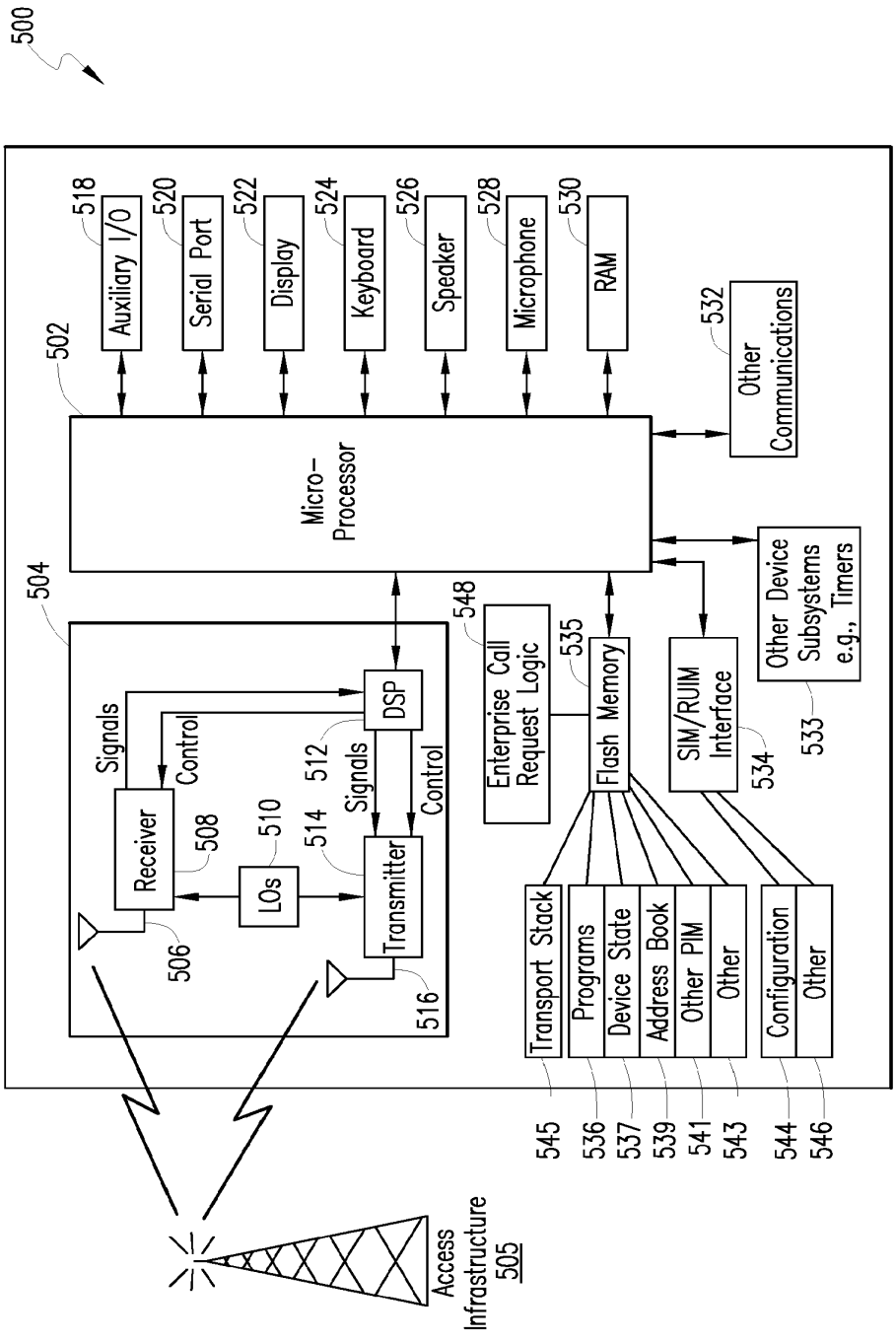

500
502
504
Micro-Processor
Auxiliary I/O
518
Serial Port
520
Display
522
Keyboard
524
Speaker
526
Microphone
528
RAM
530
Other Communications
532
Other Device Subsystems e.g., Timers
533
SIM/RUIM Interface
534
Flash Memory
535
Enterprise Call Request Logic
548
DSP
Signals
Control
512
Receiver
508
LOs
510
514
Transmitter
506
516
Transport Stack
Programs
Device State
Address Book
Other PIM
Other
Configuration
Other
545
536
537
539
541
543
544
546
Access Infrastructure 505

FIG. 5

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 07 10 7246

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	GB 2 342 536 A (ORANGE PERSONAL COMM SERV LTD [GB]) 12 April 2000 (2000-04-12)	1-9, 11-19, 21-24	INV. H04M7/12 H04L29/06
Y	* page 8, line 10 - page 9, line 12; figure 3 *	10,20	H04M1/253 H04M1/725
Y	US 2007/015535 A1 (LABAUVE LANCE [US] ET AL) 18 January 2007 (2007-01-18) * paragraph [0078] *	10,20	
A	EP 0 582 440 A2 (AMERICAN TELEPHONE & TELEGRAPH [US] AT & T CORP [US]) 9 February 1994 (1994-02-09) * figures 5,6 *	1,16	

TECHNICAL FIELDS SEARCHED (IPC)

H04M
H04Q
H04L

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	28 September 2007	Cremer, Jan

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

Ex.1002 / Page 626 of 1008
Cisco Systems, Inc.

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 07 10 7246

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

28-09-2007

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB 2342536 A	12-04-2000	AU 6214899 A	01-05-2000
		EP 1118240 A1	25-07-2001
		WO 0022863 A1	20-04-2000
US 2007015535 A1	18-01-2007	US 2007015536 A1	18-01-2007
EP 0582440 A2	09-02-1994	CA 2101395 A1	06-02-1994
		DE 69332300 D1	24-10-2002
		DE 69332300 T2	15-05-2003
		ES 2181683 T3	01-03-2003
		JP 3369263 B2	20-01-2003
		JP 6197172 A	15-07-1994
		MX 9304689 A1	31-05-1994
		US 5311583 A	10-05-1994

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

Ex.1002 / Page 627 of 1008
Cisco Systems, Inc.

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

PCT

(43) International Publication Date
22 June 2006 (22.06.2006)

(10) International Publication Number
WO 2006/064047 A1

(51) International Patent Classification:
H04L 29/06 (2006.01)

(21) International Application Number:
PCT/EP2005/056832

(22) International Filing Date:
15 December 2005 (15.12.2005)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
11/014,552 16 December 2004 (16.12.2004) US

(71) Applicant *(for all designated States except US)*: INTERNATIONAL BUSINESS MACHINES CORPORATION [US/US]; New Orchard Road, Armonk, NY 10504 (US).

(71) Applicant *(for MG only)*: IBM UNITED KINGDOM LIMITED [GB/GB]; PO Box 41 North Harbour, Portsmouth Hampshire PO6 3AU (GB).

(72) Inventors; and

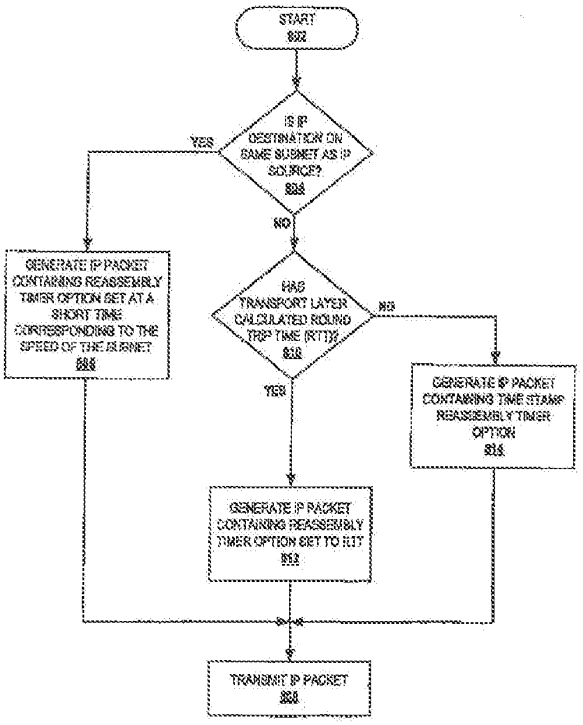
(75) Inventors/Applicants *(for US only)*: MANJUNATHA, Shankar [US/US]; 11915 Stonehollow Drive, Austin, TX 78758 (US). VALLABHANENI, Vasu [US/US]; 9103 Topridge Drive, Austin, TX 78750 (US). VENKATSUBRA, Venkat [US/US]; 8607 Bryer Creek Trail, Austin, TX 78717 (US). YOUNGMAN, Richard, Perry [US/US]; 409 Oakcrest Drive, Cedar Park, TX 78613 (US).

(74) Agent: WALDNER, Philip; IBM United Kingdom Limited, Intellectual Property Law, Hursley Park, Winchester Hampshire SO21 2JN (GB).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

[Continued on next page]

(54) Title: METHOD, SYSTEM AND ARTICLE FOR IMPROVED NETWORK PERFORMANCE BY AVOIDING DATA CORRUPTION



(57) Abstract: The reassembly timer in a TCP/IP receiver is dynamically set to avoid data corruption on fast networks caused by IP identification wrap-around. A sender generates IP packets with a special option specifying a reassembly time for fragments based on the subnet of the destination or on the calculated round-trip time of the connection. A receiver sets the reassembly timer to the reassembly time specified in the option. A sender can generate IP packets with an alternative option setting a time stamp for the generated packet. A receiver calculates a traversal time based on the difference between the arrival time of the fragment and this time stamp, and sets the reassembly timer based on this traversal time.

WO 2006/064047 A1

(84) **Designated States** *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— *with international search report*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

METHOD, SYSTEM AND ARTICLE FOR IMPROVED NETWORK PERFORMANCE BY AVOIDING DATA CORRUPTION

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates generally to data transfers in data processing network systems, and in particular to transfer of data blocks over the Internet and similar networks. Still more particularly, the present invention relates to improved Internet Protocol (IP) network communications.

Description of the Related Art

A computer network is a geographically distributed collection of interconnected communication media for transporting data between entities. An entity may consist of any device, such as a host or end station, that sources (i.e., transmits) and/or receives network messages over the communication media. Many types of computer networks are available, with the types ranging from local area networks (LANs) to wide area networks (WANs). The end stations, which may include personal computers or workstations, typically communicate by exchanging discrete messages, such as frames or packets, of data according to predefined protocols. In this context, a communications protocol stack consists of a set of rules defining how the stations interact with each.

The Internet has become an important computer network for transmission and distribution of data (text, code, image, video, audio, or mixed) and software. The primary protocols of the Internet communications architecture protocol stack are the Internet Protocol (IP) at the network layer (layer 3) and Transmission Control Protocol (TCP) at the transport layer(layer 4). The term TCP/IP is commonly used to refer to the Internet architecture, which has become a widely implemented standard communication protocol in Internet and Intranet technology, enabling broad heterogeneity between clients, servers, and the communications systems coupling them. IP provides a "datagram" delivery service at the network level. TCP builds a connection-oriented transport level service to provide reliable, sequential delivery of a data stream between two IP hosts. Reliability in

TCP/IP transmissions is generally compromised by three events: data loss, data corruption, and reordering of data.

Data loss is managed in TCP/IP by a time-out mechanism. TCP maintains a timer (retransmission timer) to measure the delay in receiving an acknowledgment (ACK) of a transmitted segment from the receiver. When an ACK does not arrive within an estimated time interval (retransmission time-out (RTO)), the corresponding segment is assumed to be lost and is retransmitted. Further, because TCP is traditionally based on the premise that packet loss is an indication of network congestion, TCP will back-off its transmission rate by entering "slow-start," thereby drastically decreasing its congestion window to one segment.

TCP manages data corruption by performing a checksum on segments as they arrive at the receiver. The checksum algorithm is a 16-bit one's complement of a one's complement sum of all 16-bit words in the TCP header and data. The TCP sender computes the checksum on the packet data and loads this 2-byte value into the TCP header. The TCP header's checksum field also includes a 12-byte pseudo header that contains information from the IP header. The receiver computes the checksum on the received data (excluding the 2-byte checksum field in the TCP header), and verifies that it matches the checksum value in the header.

TCP manages reordering of data or out-of-order arrival of segments by maintaining a reassembly queue that queues incoming packets until they are rearranged in sequence. Only when data in this queue gets in sequence is it moved to the user's receive buffer where it can be seen by the user. When the receiver observes a "hole" in the sequence numbers of packets received, it generates a duplicate acknowledgement (DACK) for every subsequent "out-of-order" packet it receives. Until the missing packet is received, each received data packet with a higher sequence number is considered to be "out-of-order" and will cause a DACK to be generated.

FIG. 10 is a schematic block diagram of an IP packet 100 comprising an IP header portion 110 and a payload/data portion 150. The IP header 110 comprises a version field 102 that indicates the format of the IP header, an Internet header length (IHL) field 104 that indicates the length of the Internet header and a type of service (TOS) field 106 that provides an indication of parameters of a desired quality of service.

An IP total length field 108 specifies the length of the IP packet including the IP header and payload/data, while an IP identification field 110 specifies an identifying value assigned by the sending entity to aid in assembling the fragments of the packet.

The IP header further includes a more fragment (MF) flag 112, an IP fragment offset field 114 that specifies the placement of the fragment within the IP packet and a time to live (TTL) field 116 that indicates a maximum time the packet is allowed to remain in the network. A protocol field 118 indicates the next level protocol used in the payload/data portion 150 of the packet, while a header checksum field 120 provides a checksum on only the IP header. The IP header further includes a source address field 122 containing the IP source address of the sending entity and a destination address field 124 containing the IP destination address of the receiving entity, along with an options field 126 and a padding field 128.

Fragmentation of an IP datagram (hereinafter referred to as a packet) is often necessary if the LAN standards associated with the source and destination entities are dissimilar (e.g., Ethernet and Token Ring). In such a case, the routers and switches of the network may need to alter the format of the packet so that it may be received by the destination entity. For example, if a packet originates in a network that allows a large packet size and traverses one or more links or local networks that limit the packet to a smaller size, the switch interconnecting the networks must fragment the IP packet. In the context of a TCP/IP networking environment, the fragmentation and reassembly procedure is well known and described in detail in the Internet Protocol, Request for Comments (RFC) 791, by Information Sciences Institute University of Southern California (1981), which disclosure is hereby incorporated by reference. According to RFC 791, IP fragmentation apportions an IP packet into an arbitrary number of fragments that can be later reassembled.

To fragment an IP packet, either a source or an intermediate system (e.g., a switch) creates two or more new IP fragments and copies the contents of a portion of the IP header fields from the original packet into each of the IP headers of the fragments. The receiving entity of the fragments uses the contents of the IP identification field 110 (i.e., the packet identifier (ID)) to ensure that fragments of different packets are

not mixed. That is, the identification field 110 is used to distinguish the fragments of one packet from those of another. The IP fragment offset field 114 informs the receiving entity about the position of a fragment in the original packet. The contents of the fragment offset field and the IP total length field 108 of each fragment determine the portion of the original packet covered by the fragment. The MF flag 112 indicates (e.g., when reset) the last fragment. The originating host of a complete IP packet sets the IP identification field 110 to a value that is unique for the source/destination address pair and protocol (e.g., TCP, UDP) for the time the packet will be active in the network. The originating host of the complete packet also sets the MF flag 112 to, e.g., zero and the IP fragment offset field 114 to zero.

The IP identification field 110 is a 2 byte field, which must wrap around (i.e., must restart numbering at 1) after reaching 65535. On a high speed network generating thousands of IP packets per second, the IP identifier (IP-ID) in field 110 can wrap around multiple times per second. For example, on gigabit Ethernet, 80,000 packets can be generated in a second, which means the wrap around of the IP-ID can occur within a second. As networks become even faster, this wrap around occurs even more frequently. For example, with 10 gigabit Ethernet, the wrap around can occur in milliseconds.

As a result, IP-ID wrap around can be a cause of data corruption in the network if fragments belonging to a wrapped around IP-ID are reassembled with fragments of a different IP packet identified by the original IP-ID. Upper layer protocols such as TCP or UDP may not be able to detect the corruption since the Internet checksum algorithm utilizing header checksum 120 to detect corruption is not very strong. This problem is addressed in IP by the use of a reassembly timer (see RFC 791). IP fragment reassembly uses the reassembly timer to discard fragments if all fragments of an identified packet have not been received within the reassembly timer period. Many implementations of IP fragment reassembly typically use 30 seconds for the reassembly timer. In very fast networks, the IP-ID will wrap around many times in this time interval, increasing the likelihood that fragments will be mismatched with the wrong fragments of a wrapped around IP-ID.

The solution to IP-ID wrap around in fast networks has been to set the reassembly timer to a very low value, thereby reducing the number of duplicate IP-IDs outstanding. However, this causes performance degradation in network environments with varied speeds of both fast and slow networks because fragments will be mistakenly discarded along a slow link when the IP packets merely have not yet arrived. Discarding IP fragments in slow network connections will result in unnecessary retransmissions being required from the upper layers. As can be seen, it would be desirable to provide a solution to data corruption problems caused by IP-ID wrap-around on variable-speed networks that provides improved performance over the known solutions.

SUMMARY OF THE INVENTION

In accordance with the present invention, improved methods, systems and articles of manufacture for communication over a data processing system network are disclosed. One preferred method of the present invention comprises the steps of determining a customized reassembly time for a particular data packet to be transmitted, generating the data packet, including inserting the customized reassembly time into a field of the data packet, and transmitting the data packet, wherein a receiver of the data packet will utilize the customized reassembly time to discard a fragment of the packet that remains fragmented longer than indicated by the customized reassembly time following receipt of the fragment.

Another preferred method of the present invention for communication over a data processing system network comprises receiving a data fragment over a network containing an option indicating a customized reassembly time for a data packet comprising the data fragment, and discarding the data fragment if it remains fragmented from the data packet longer than indicated by the customized reassembly time following receipt of the data fragment.

All objects, features, and advantages of the present invention will become apparent in the following detailed written description.

BRIEF DESCRIPTION OF THE DRAWINGS

This invention is described in a preferred embodiment in the following description with reference to the drawings, in which like numbers represent the same or similar elements, as follows:

FIG. 1 shows a data processing system network in which a preferred embodiment of the present invention may be implemented is depicted.

FIG. 2 is a depiction of a typical software architecture for a server-client system, as may be utilized in a preferred embodiment of the present invention.

FIG. 3 is a 4-layer communications architecture for the network, as may be utilized in a preferred embodiment of the present invention.

FIG. 4 depicts a block diagram of networks such as the Internet interconnected by routers, as may be utilized in a preferred embodiment of the present invention.

FIG. 5 shows the format of a data packet as it traverses the TCP/IP protocol stack, as may be utilized in a preferred embodiment of the present invention.

FIG. 6 shows the format for the Reassembly Timer Option for an IP header, in accordance with a preferred embodiment of the present invention.

FIG. 7 shows the format for the Time Stamp Reassembly Timer option for an IP header, in accordance with a preferred embodiment of the present invention.

FIG. 8 shows a flow diagram of a process for generating an IP packet containing a reassembly time, in accordance with a preferred embodiment of the present invention.

FIG. 9 shows a flow diagram of a process for setting the reassembly timer in response to receiving an IP fragment, in accordance with a preferred embodiment of the present invention.

FIG. 10 is a schematic block diagram of an IP packet data format comprising an IP header portion and a payload/data portion.

In the following detailed description of exemplary embodiments of the invention, reference is made to the accompanying drawings, which form a part hereof, and in which is shown by way of illustration specific exemplary embodiments in which the invention may be practiced.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

In the following detailed description of exemplary embodiments of the invention, specific exemplary embodiments in which the invention may be practiced are described in sufficient detail to enable those skilled in the art to practice the invention, and it is to be understood that other embodiments may be utilized and that logical, architectural, programmatic, mechanical, electrical and other changes may be made without departing from the spirit or scope of the present invention. The following detailed description is, therefore, not to be taken in a limiting sense, and the scope of the present invention is defined only by the appended claims. In particular, although the preferred embodiment is described below with respect to a TCP/IP network environment, it will be appreciated that the present invention is not limited to TCP/IP implementations.

With reference now to the figures, and in particular with reference to FIG. 1, a data processing system network in which a preferred embodiment of the present invention may be implemented is depicted. Data processing system network 101 includes at least one server system 103 coupled to at least one client system 105 via at least one network such as the Internet 107. Data transfers between the server 103 and client 105 conform to the TCP/IP specification, as well as File Transfer Protocol (FTP), HyperText Transfer Protocol (HTTP), or some similar communications protocol. As will be appreciated, while only a single server 103 and single client system 105 are shown, data processing system network 101 may include any number of server and client systems (not shown) interconnected by one or more connections and networks, including Internet 107. For illustrative purposes, server 103 and client system 105 communicate using TCP/IP, although the present invention is not limited as such, and that, in alternative embodiments, other suitable protocols may also be employed.

FIG. 2 is a depiction of a typical software architecture for a server-client system, as may be utilised in a preferred embodiment of the present invention. Server 103 and client 105 are each architected with software architecture 200. At the lowest level, an operating system 205 is utilized to provide high-level functionality to the user and to other software. Such an operating system typically includes a BIOS (Basic Input Output System). Communication software 210 provides communications through an external port to a network such as the Internet via a physical communication link by either directly invoking operating system functionality or indirectly, bypassing the operating system to access the hardware for communications over the network. The application programming interface 215 allows the user of the system, be it an individual or a software routine, to invoke system capabilities using a standard consistent interface without concern for how the particular functionality is implemented. The Internet software 220 represents any one of several standard commercial packages available for equipping a computer with Internet functionality. The application software 225 represents any number of software applications designed to react to data through the communications port to provide the desired functionality the user seeks. Applications at this level may include those necessary to handle data, video, graphics, photos or text, which can be accessed by users of the Internet.

As shown in FIG. 3, TCP/IP and similar protocols are utilized by a 4-layer communications architecture for the network comprising an application layer 310, a transport layer 312, a network layer 314, a link layer 316 and a physical layer 318. Each layer is responsible for handling various communications tasks, as follows.

Physical layer 318 generally transforms data into bits for communication between the various physical devices in the network. Examples of protocols employed in the physical layer may include, but are not limited to, protocols from the network interface card, such as an Ethernet card, token ring card, wireless network card, and the like. The Institute Of Electrical and Electronics Engineers (IEEE) has promulgated a variety of protocols that may be employed in the physical layer, protocols such as IEEE 802.3 Standard (Ethernet), IEEE 802.5 Standard (Token Ring), and IEEE 802.11 Standard (Wireless Ethernet).

Link layer 316 generally manages the data that is communicated over the network. Link layer 316 (also referred to as the data-link layer or the network interface layer) normally includes the device drivers and may include protocols such as Media Access Control (MAC), for example. Together, the physical and link layers handle all the hardware details of physically interfacing with the network media being used.

The network layer 314 (also referred to as the internet layer) handles the movement of packets of data around the network. For example, the network layer handles the routing of the various packets of data that are transferred over the network. The network layer in the TCP/IP suite is comprised of several protocols, including IP (Internet Protocol), ICMP (Internet Control Message Protocol), and IGMP (Internet Group Management Protocol).

The transport layer 312 provides an interface between the network layer 314 and the application layer 310 that facilitates the transfer of data between two host computers. The transport layer is concerned with things such as dividing the data passed to it from the application into appropriately sized chunks for the network layer below, acknowledging received packets, setting timeouts to make certain the other end acknowledges packets that are sent, etc. In the TCP/IP protocol suite there are two distinctly different transport protocols: TCP (Transmission Control Protocol) and UDP (User Datagram Protocol). TCP provides reliability services to ensure that data is properly transmitted between two hosts, including dropout detection and retransmission services. Conversely, UDP provides a much simpler service to the application layer by merely sending packets of data called datagrams from one host to the other, without providing any mechanism for guaranteeing that the data is properly transferred. When using UDP, the application layer must perform the reliability functionality.

The application layer 310 handles the details of the particular application. There are many common TCP/IP applications that almost every implementation provides, including (1) Telnet for remote login; (2) FTP, the File Transfer Protocol; (3) SMTP, the Simple Mail Transfer Protocol, for electronic mail, (4) SNMP, the Simple Network Management Protocol, and (5) Post Office Protocol, v3 (POP3).

Networks such as the Internet are interconnected by routers, which each connecting two or more networks together. Typical routers comprise a special-purpose hardware box with input and output connections and dedicated hardware and/or embedded software that allow many different types of physical networks to be connected, such as Ethernet, token ring, point-to-point links, etc. FIG. 4 shows an internet 400 comprising an Ethernet network 432 connected to a token ring network 434 by a router 436. Although FIG. 4 only shows two hosts in communication, any host on the Ethernet network can communicate with any host thereon, or with any host on the token ring network, and vice versa.

As shown in FIG. 4, the router 436 comprises a network layer module 438 (an IP module in this case), and appropriate network drivers for connecting to the host networks, namely an Ethernet driver 440 and a token ring driver 442. At the application layer, the network comprises an FTP client 420 and a FTP server 422; at the transport layer, the network comprises a TCP client 424 and a TCP server 426; and at the network layer, the network comprises an IP client 428 and a IP server 430. Most network applications are designed so that one end is the client and the other side is the server. The server provides some type of services to various clients, in this case, access to files on the server host. Each layer has one or more protocols for communicating with its peer at the same layer. These communication protocols include the FTP protocol 444 at the application layer, the TCP protocol 446 at the transport layer, the IP protocol 448 at the network layer, and the Ethernet protocol 450 and token ring protocol 454 at the link layer. It is common for the application layer to handle user processes, while the lower three layers (transport, network and link) are implemented in the kernel of the operating system, such as UNIX or Windows operating system. For example, the purpose of the network interface layer is to handle the details of the communication media (Ethernet, token ring, etc.), while the purpose of the application layer is to handle one specific user application (FTP, Telnet, etc.).

The application layer and the transport layer use end-to-end protocols (FTP protocol 444, TCP protocol 446). The network layer provides a hop-to-hop protocol that is used on the two end systems and every intermediate system in between (for clarity only one intermediate system is shown here). For instance, the IP module 438 of the router 436 is connected to the two hosts by IP protocols 448. There are also link

layer protocols that are specific to the various types of host networks that are connected to the router to handle communication between the networks and the router at the link layer. Thus, an Ethernet protocol 450 is used to handle communications between the Ethernet driver 440 in the router 436 and the Ethernet driver 452 of the hosts on the Ethernet network 432, while a token ring protocol 454 is used to handle communications between the token ring driver 442 of the router 436 and the token ring driver 456 of the hosts on the token ring network 434.

When an application sends data using TCP/IP, the data is sent down a protocol stack, through each layer, until it is sent out as a stream of bits across the network. As shown in FIG. 5, each layer in the protocol stack 500 adds information to the data by prepending headers (and sometimes adding trailer information) to the data that it receives. For instance, at the application layer an application header 580 is prepended to user data 582 to form application data 584. At the transport layer a transport protocol header is prepended to the application data. In the case of FIG. 5 the transport layer is TCP, and therefore a TCP header 586 is prepended to the application data 584, thereby forming a TCP frame 588 that is sent to the network layer IP. The TCP header 586 comprises twenty bytes. Similarly, at the network layer, a network layer header is prepended to the transport layer data. In the case of TCP/IP, an IP header 590 is prepended to the TCP frame 588 to form an IP datagram 592. The IP header 590 also comprises twenty bytes. Finally, at the link layer a media header such as Ethernet header 594 is added to the data received from the network layer to form a frame of data. In some instances, such as when the media is Ethernet, a media trailer is also appended to the end of the data. For instance, in FIG. 5 an Ethernet trailer 96 is appended to the Ethernet Header 594 and the IP datagram 592 to form an Ethernet frame 598. The Ethernet frame comprises the stream of bits that flow across the network that correspond to the original application message data. The numbers (14, 20, 20, 4) at the bottom of the headers are typical sizes of the headers in bytes, e.g., the Ethernet header 94 comprises 14 bytes, etc. The size of the frame will be limited by the maximum transmission unit (MTU) of the type of network being used to transfer the data packet. For example, the MTU of an Ethernet network is 1500 bytes. The network layer automatically performs fragmentation (breaking the datagram up into smaller pieces), so that each fragment is smaller than the MTU of the network.

With reference now back to Figures 1 and 4, the operation of a dynamic IP packet reassembly timer as provided in a preferred embodiment of the present invention for use in a heterogeneous network environment is now described. In various embodiments of the present invention, the reassembly timer for discarding IP fragments is dynamically computed individually for each IP packet. These embodiments provide substantial improvements in avoiding data corruption due to IP-ID wraparound in IP network systems.

In a first embodiment, the IP packet sender (either server 103 or client 105) specifies a new IP option 126 in the IP packet header 100 that specifies the reassembly timer value for the generated IP packet. In accordance with a preferred embodiment of the present invention, this new option is called the Reassembly Timer Option. The format for the Reassembly Timer Option for an IP header, in accordance with a preferred embodiment of the present invention, is shown in Figure 6.

As seen in Figure 6, Reassembly Timer Option 602 contains a one-byte field 604 specifying the option number of option 126 recognized in IP for the Reassembly Timer Option. Field 604 is a one-byte field specifying the payload length in bytes. In this example, the payload to the Reassembly Timer Option 602 is a numeric value of reassembly time, which is specified as a four-byte field. Field 608 indicates the reassembly time that should be assigned to the receiver's reassembly timer for this IP packet. The sender will determine the value for the Reassembly Time 608 based on a variety of factors related to the network, sender and receiver, and IP packet being sent.

In a preferred embodiment for setting the Reassembly Time 606, the sender has two considerations for setting the reassembly time. As a first consideration, the sender determines whether the destination address for the IP packet is on the same subnet as the sender. If the sender and receiver are on the same subnet, the sender can base the Reassembly Time 608 on the speed of the subnet connecting the sender and receiver. For example, on a gigabit Ethernet network that can generate 80,000 packets per second, the reassembly timer can be sent to half a second (0.5 sec), and for a 10 gigabit Ethernet network, the reassembly timer can be set to a tenth of this time (i.e. 50 milliseconds).

As a second consideration, the sender can review the round trip time (RTT) value computed by TCP for use as the re-transmission timer computation. By using this value, the sender can provide the receiver an estimate of an expected roundtrip time under normal network conditions, thereby suggesting that a fragment taking longer than the RTT should appropriately be re-transmitted. Using this algorithm, the sender will set the Reassembly Time 608 equal to the RTT or RTT plus some delta (for example, RTT * 1.5). It should be understood that the sender may consider any number of factors and algorithms when setting the Reassembly Time 608, and that any one consideration alone or a combination of these or other considerations can be used.

In an alternative preferred embodiment of the present invention, the sender and receiver coordinate a synchronized timing algorithm to determine the appropriate reassembly timer. This preferred embodiment can be used in environments where the network protocol doesn't have an estimate of the round trip time or if the destination is not on the same subnet.

Figure 7 shows the data format for a new IP option 126 called "Time Stamp Reassembly Timer," in accordance with a preferred embodiment of the present invention. Time stamp reassembly timer option 702 is an option 126 within IP header 100 of an IP packet. Field 704 indicates the option number recognized in IP for the Time Stamp Reassembly Timer option. Field 706 is a 1-byte field indicating the length of the option's payload. In this case, the option indicates a 4-byte payload. Field 708 specifies a numeric value of current time, which is specified as a four-byte field. The time stamp 708 is set by the sending server at the time the IP header 100 is generated.

The sender first synchronizes its time using Network Time Protocol and sends the current time as time stamp 708. Upon receiving a Time Stamp Reassembly Timer option 702 contained within options 126 of an IP header 100, the receiver computes the traversal time of that fragment by calculating the difference between the current time and the time stamp 708. The receiver then adds a "delta" time period to the calculated traversal time to determine a reassembly timer for the fragments of the IP packet. For example, after computing a traversal time of the fragment, the receiver could add an amount of time equal to half of the traversal

time to set the reassembly timer to one and a half times the calculated traversal time of the IP packet. This calculated reassembly timer would normally be used by the receiver if the received packet was the first fragment of an IP packet or if the calculated reassembly timer is determined to be larger than the currently used timer in the receiving system. This algorithm for setting the reassembly time could be used only on the first fragment of an IP packet or on every fragment, depending on the granularity desired. In a network environment where either the Reassembly Timer and the Time Stamp Reassembly Timer options are not available or received, the receiver can use a preprogrammed value for the reassembly timer.

With reference now to Figure 8, there is shown a flow diagram of a process for generating an IP packet containing a reassembly time, in accordance with a preferred embodiment of the present invention. The process starts at step 802 when a sending server is instructed to generate an IP packet. At decision block 804, a determination by the sending server is made whether the IP destination is on the same subnet as the IP source address. If so, the subnet has a known, fast throughput, suggesting a very short retransmission timer should be set for the IP fragment. The process proceeds to step 806, where the sending server will generate an IP packet containing a Reassembly Timer option 602 in options 126 having a Reassembly Time 608 set at a very short time corresponding to the speed of the known subnet between the server and client. Thereafter, the server transmits the IP packet (or fragment) as shown at step 808 (the process ends).

Returning to decision block 804, if the IP destination is not on the same subnet as the sender, the process proceeds to decision block 810, where the sending server determines if the transport layer has calculated a round-trip time for data communication. For example, TCP calculates a RTT and includes this calculation in the TCP header. If so, the process proceeds to step 812, where the sending server generates the IP packet containing a Reassembly Timer option 602 set to the roundtrip time calculated for the transport layer. In TCP, is set to the RTT. Thereafter, the process ends at step 808, when the sending server transmits the IP packet.

Returning to decision block 810, if the transport layer has not calculated the round-trip time or if such a calculation is not supported by the transport layer, the process proceeds to step 814, where the sending server generates the IP packet containing the Time Stamp Reassembly Timer option 702. The sender sets the Time Stamp 708 with a numeric value representing the current time when the IP packet is generated. Thereafter, the process ends following the sending server transmitting the IP packet to the client, as seen at step 808. As will now be appreciated, each of these header options can be used individually or in combination.

With reference now to Figure 9, there is shown a flow diagram of a process for setting the reassembly timer in response to receiving an IP fragment, in accordance with a preferred embodiment of the present invention. The process begins at step 902 when an IP fragment is received by a client on the network. The process proceeds to decision block 904, where the receiving client determines if the IP fragment contains a Reassembly Timer option 602. If so, the receiving client sets the reassembly time for the received IP fragment to a value set in the option's payload field 708, as seen at step 906. If the IP fragment does not contain a Reassembly Timer option 602, the process proceeds to decision block 908, where the receiving client determines if the IP fragment contains a Time Stamp Reassembly Timer option 702. If so, the receiver calculates the traversal time of the IP fragment by subtracting the time stamp 708 contained in the payload from the current time at the receiver, as seen at step 910. The receiver then sets the reassembly timer based on the calculated traversal time, as seen at step 912. Returning the decision block 908, if the time stamp reassembly option is not set, the process ends at block 914, where the receiving client sets the reassembly timer to a stored value predetermined by the user or calculated by the system as an optimal time for discarding IP fragments and requiring retransmission.

It will be appreciated by one of ordinary skill in the art that the method described above will typically be carried out in software running on one or more processors (not shown), and that the software may be provided as a computer program element carried on any suitable data carrier (also not shown) such as a magnetic or optical computer disc. The channels for the transmission of data likewise may include storage media

of all descriptions as well as signal carrying media, such as wired or wireless signal media.

Accordingly, the present invention may suitably be embodied as a computer program product for use with a computer system. Such an implementation may comprise a series of computer readable instructions either fixed on a tangible medium, such as a computer readable medium, for example, diskette, CD-ROM, ROM, or hard disk, or transmittable to a computer system, via a modem or other interface device, over either a tangible medium, including but not limited to optical or analogue communications lines, or intangibly using wireless techniques, including but not limited to microwave, infrared or other transmission techniques. The series of computer readable instructions embodies all or part of the functionality previously described herein.

Those skilled in the art will appreciate that such computer readable instructions can be written in a number of programming languages for use with many computer architectures or operating systems. Further, such instructions may be stored using any memory technology, present or future, including but not limited to, semiconductor, magnetic, or optical, or transmitted using any communications technology, present or future, including but not limited to optical, infrared, or microwave. It is contemplated that such a computer program product may be distributed as a removable medium with accompanying printed or electronic documentation, for example, shrink-wrapped software, pre-loaded with a computer system, for example, on a system ROM or fixed disk, or distributed from a server or electronic bulletin board over a network, for example, the Internet or World Wide Web.

While the invention has been particularly shown and described with reference to a preferred embodiment, it will be understood by those skilled in the art that various changes in form and detail may be made therein without departing from the spirit and scope of the invention. For example, the present invention may be implemented using any combination of computer programming software, firmware or hardware. As a preparatory step to practicing the invention or constructing an apparatus according to the invention, the computer programming code (whether software or firmware) according to the invention will typically be stored in one or more machine readable storage mediums such as fixed (hard) drives,

diskettes, optical disks, magnetic tape, semiconductor memories such as ROMs, PROMs, etc., thereby making an article of manufacture in accordance with the invention. The article of manufacture containing the computer programming code is used by either executing the code directly from the storage device, by copying the code from the storage device into another storage device such as a hard disk, RAM, etc., or by transmitting the code for remote execution. The method form of the invention may be practiced by combining one or more machine-readable storage devices containing the code according to the present invention with appropriate standard computer hardware to execute the code contained therein. An apparatus for practicing the invention could be one or more computers and storage systems containing or having network access to computer program(s) coded in accordance with the invention.

CLAIMS

1. A method in a data processing system network comprising:

receiving a data fragment over a network containing an option indicating a customized reassembly time for a data packet comprising the data fragment; and

discarding the data fragment if it remains fragmented from the data packet longer than indicated by the customized reassembly time following receipt of the data fragment.

2. The method according to claim 1, wherein the option specifies the customized reassembly time in a field of the data fragment or wherein the option specifies a time stamp of when the data packet was generated by a sender, and further comprising computing a traversal time for the data fragment as a function of the time stamp and a time that the data fragment arrives at the receiver, and further specifying a reassembly time for the data fragment based on the traversal time.

3. The method according to claim 1 or 2, wherein the customized reassembly timer is used to indicate the reassembly time for all data fragments of the data packet or wherein the customised reassembly timer is used to set a reassembly time in the receiver if the customized reassembly timer indicates a reassembly time longer than a currently-used reassembly time in the receiving system.

4. A data processing system comprising:

means for receiving a data fragment over a network containing an option indicating a customized reassembly time for a data packet comprising the data fragment; and

means for discarding the data fragment if it remains fragmented from the data packet longer than indicated by the customized reassembly time following receipt of the data fragment.

5. A method for communication over a data processing system network comprising:

determining a customized reassembly time for a particular data packet to be transmitted;

generating the data packet, including inserting the customized reassembly time into a field of the data packet; and

transmitting the data packet, wherein a receiver of the data packet will utilize the customized reassembly time to discard a fragment of the packet that remains fragmented longer than indicated by the customized reassembly time following receipt of the fragment.

6. The method according to claim 5, wherein the step of determining a customized reassembly time includes setting the customized reassembly time to a first time if a sender of the data packet is connected to the receiver over a known fast link of the network and to a second time if the sender of the data packet is not connected to the receiver over a known fast link of the network.

7. The method according to claim 6, wherein the sender of the data packet is connected to the receiver over a known fast link of the network when the sender is within a same subnet of the network as the receiver of the data packet.

8. The method according to any one of claims 5 to 7, wherein the step of determining a customized reassembly time includes setting the customized reassembly time to a computed round-trip time for a data packet transmitted from a sender to the receiver.

9. The method according to claim 8, wherein the round-trip time is the RTT computed by a TCP layer.

10. The method according to any one of claims 5 to 9, wherein the data packet is an IP packet generated by an IP layer.

11. The method according to any one of claims 5 to 10, wherein the customized reassembly time is a time stamp specifying a time when the data packet is generated, and wherein the receiver of the data packet will utilize the customized reassembly time to compute a traversal time of the data fragment based on the arrival time of the data fragment, and further wherein the receiver sets a reassembly time for the data fragment based on the traversal time.

12. The method according to any one of claims 5 to 11, wherein the step of generating the data packet comprises setting an option in a header of the data packet specifying a reassembly time.

13. A data processing system comprising:

means for determining a customized reassembly time for a particular data packet to be transmitted;

means for generating the data packet, including inserting the customized reassembly time into a field of the data packet; and

means for transmitting the data packet, wherein a receiver of the data packet will utilize the customized reassembly time to discard a fragment of the packet that remains fragmented longer than indicated by the customized reassembly time following receipt of the fragment.

14. The system according to claim 13, further comprising means for setting the customized reassembly time to a first time if a sender of the data packet is connected to the receiver over a known fast link of the network and to a second time if the sender of the data packet is not connected to the receiver over a known fast link of the network.

15. The system according to claims 13 or 14, further comprising means for setting the customized reassembly time to a computed round-trip time for a data packet transmitted from a sender to the receiver.

16. The system according to claim 10, further comprising means for setting an option in a header of the data packet specifying a reassembly time or means for setting an option in a header of the data packet with a time stamp specifying a time of generating the data packet.

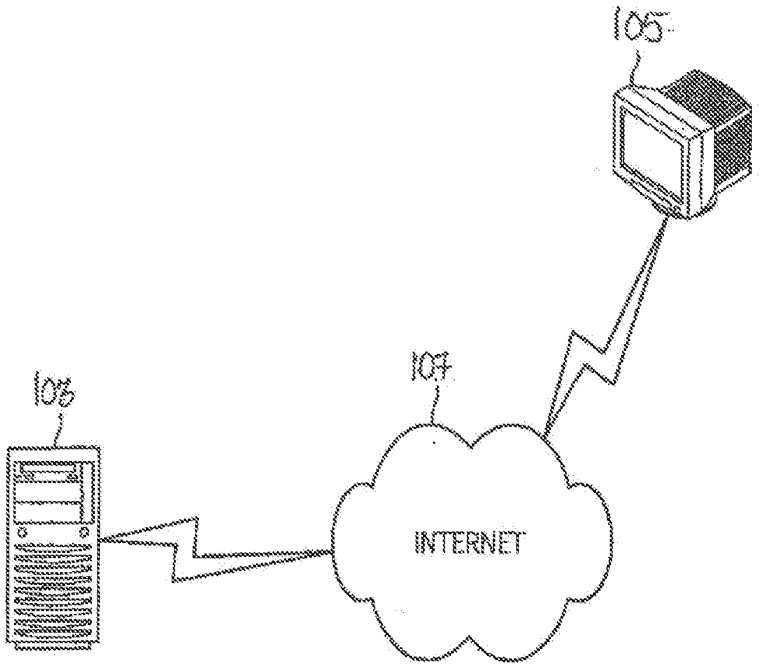


Fig. 1 101

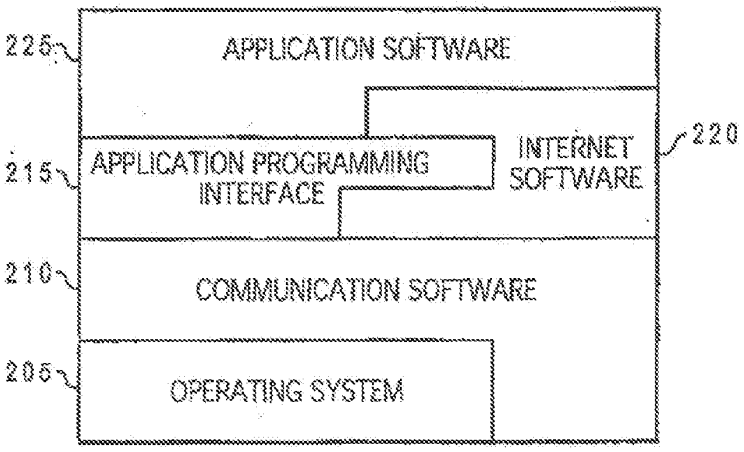


Fig. 2 200

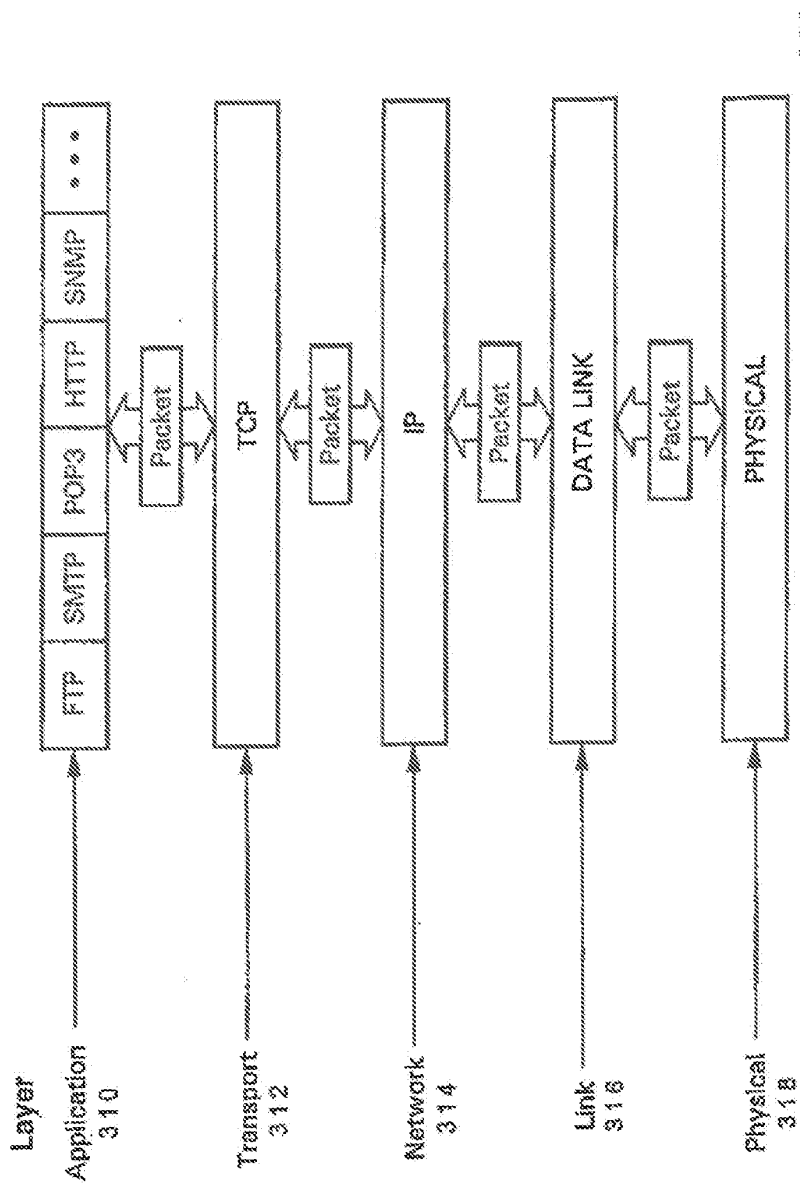

300
Layer
Application
310
Transport
312
Network
314
Link
316
Physical
318
FTP
SMTP
POP3
HTTP
SNMP
• • •
Packet
TCP
Packet
IP
Packet
DATA LINK
Packet
PHYSICAL

Fig. 3

FTP CLIENT
420
TCP
424
IP
428
ETHERNET DRIVER
452
ETHERNET PROTOCOL
450
IP PROTOCOL
448
FTP PROTOCOL
444
TCP PROTOCOL
446
ROUTER
436
IP
438
ETHERNET DRIVER
440
TOKEN RING DRIVER
442
ETHERNET
432
FTP SERVER
422
TCP
426
IP
430
IP PROTOCOL
448
TOKEN RING DRIVER
456
TOKEN RING PROTOCOL
454
TOKEN RING
434
410

Fig. 4

USER DATA
582
USER DATA
APPL HEADER
580
APPLICATION DATA
584
TCP HEADER
586
TCP SEGMENT
600
APPLICATION DATA
TCP HEADER
IP HEADER
580
IP DATAGRAM
602
APPLICATION DATA
TCP HEADER
20
IP HEADER
20
ETHERNET HEADER
14
584
ETHERNET FRAME
598
4
ETHERNET TRAILER
596
46 TO 1600 BYTES
500

Fig. 5

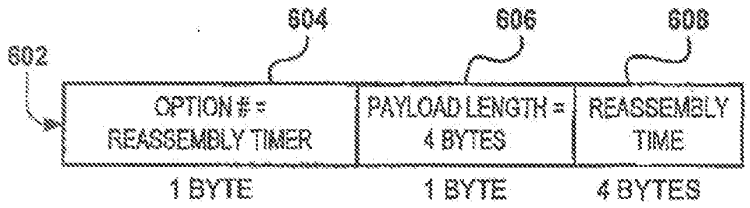


FIGURE 6

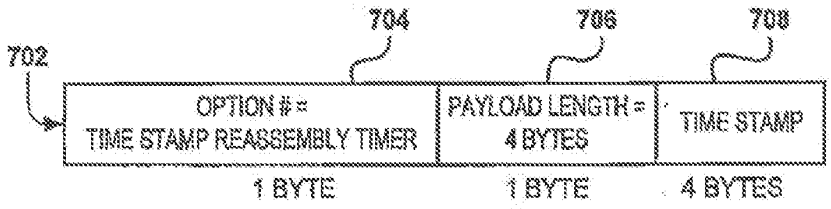


FIGURE 7

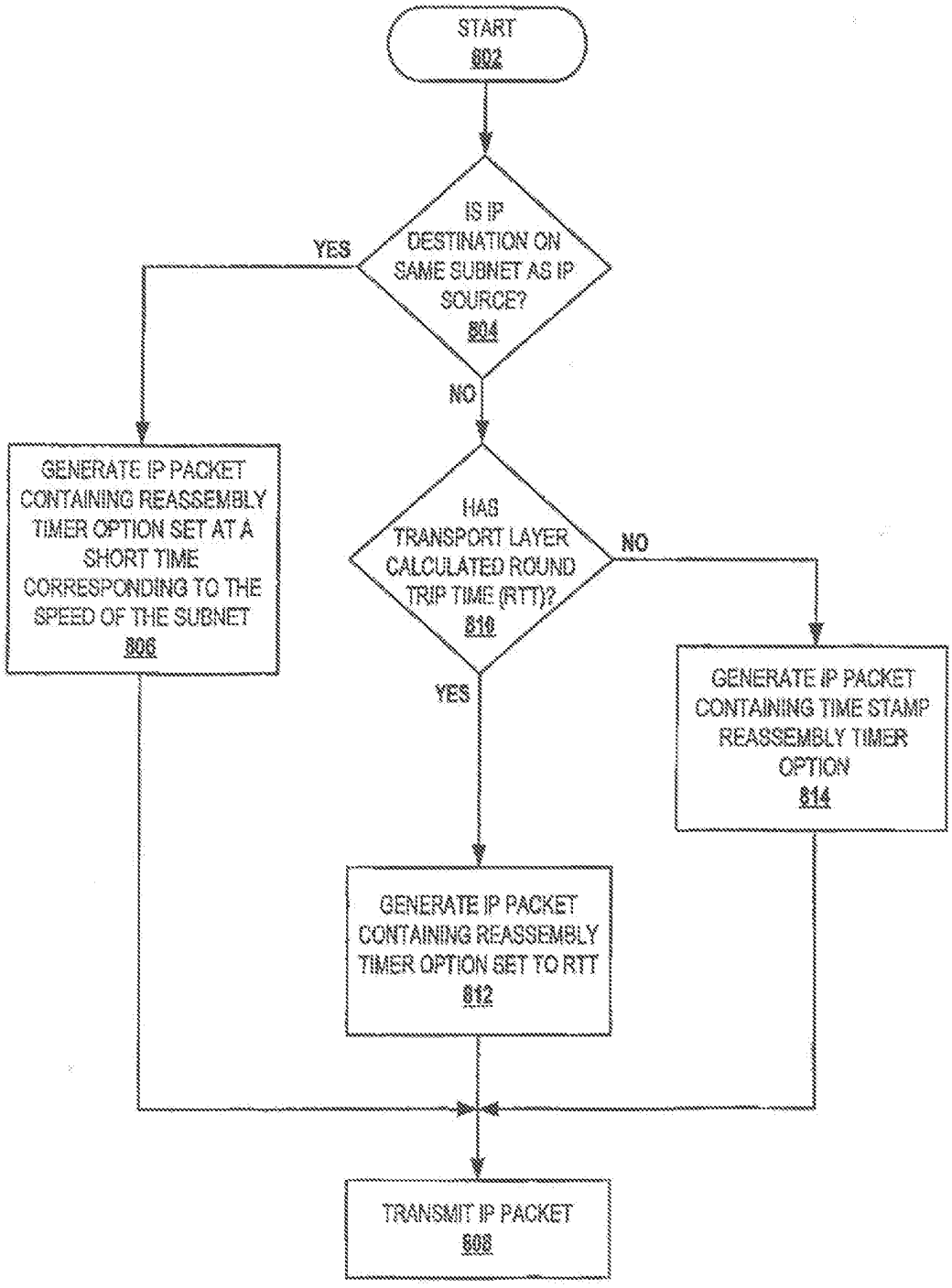

START
802
IS IP DESTINATION ON SAME SUBNET AS IP SOURCE?
804
YES
NO
GENERATE IP PACKET CONTAINING REASSEMBLY TIMER OPTION SET AT A SHORT TIME CORRESPONDING TO THE SPEED OF THE SUBNET
806
HAS TRANSPORT LAYER CALCULATED ROUND TRIP TIME (RTT)?
810
NO
YES
GENERATE IP PACKET CONTAINING TIME STAMP REASSEMBLY TIMER OPTION
814
GENERATE IP PACKET CONTAINING REASSEMBLY TIMER OPTION SET TO RTT
812
TRANSMIT IP PACKET
808

FIGURE 8

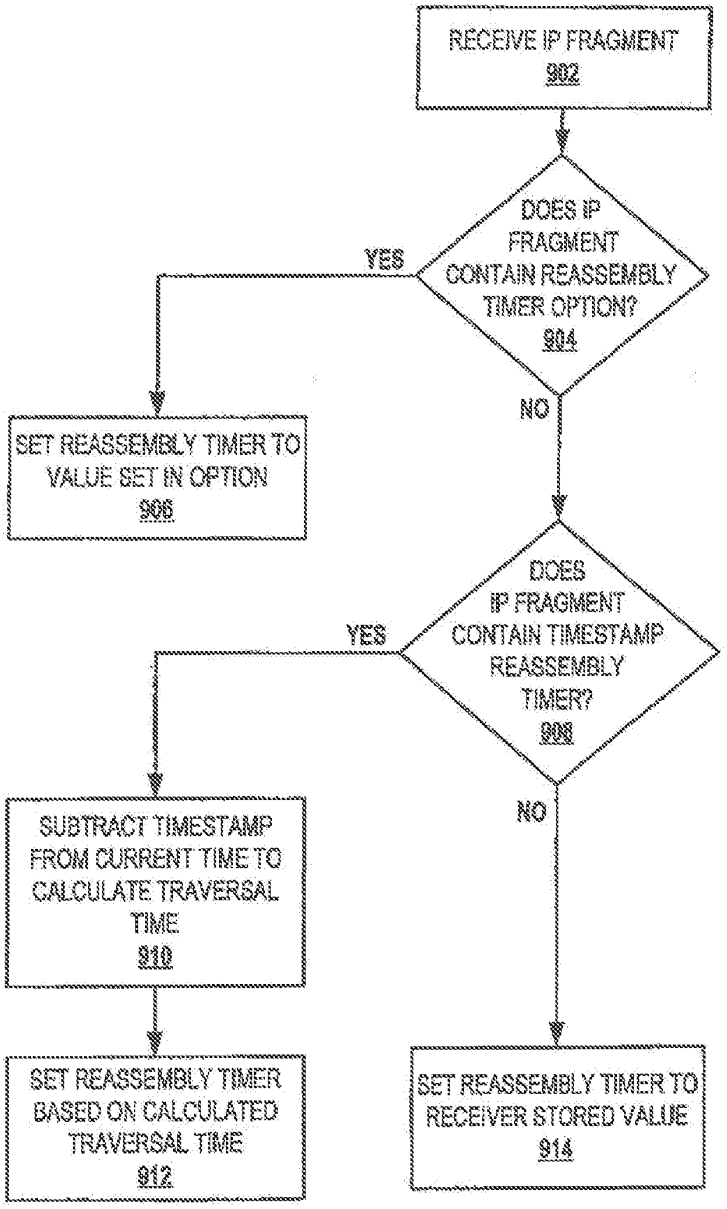

RECEIVE IP FRAGMENT
902
DOES IP FRAGMENT CONTAIN REASSEMBLY TIMER OPTION?
904
YES
NO
SET REASSEMBLY TIMER TO VALUE SET IN OPTION
906
DOES IP FRAGMENT CONTAIN TIMESTAMP REASSEMBLY TIMER?
908
YES
NO
SUBTRACT TIMESTAMP FROM CURRENT TIME TO CALCULATE TRAVERSAL TIME
910
SET REASSEMBLY TIMER BASED ON CALCULATED TRAVERSAL TIME
912
SET REASSEMBLY TIMER TO RECEIVER STORED VALUE
914

FIGURE 9

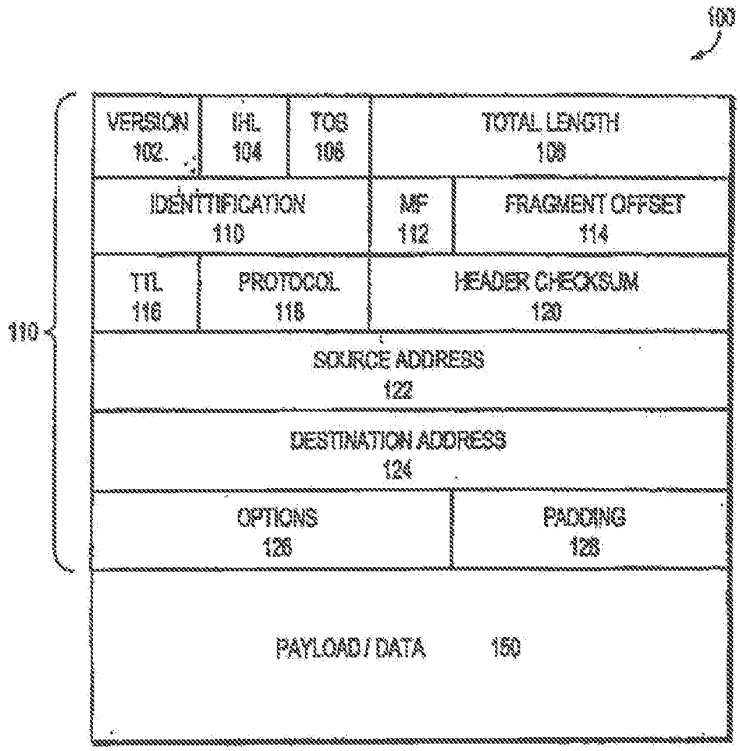

100
VERSION 102
IHL 104
TOS 106
TOTAL LENGTH 108
IDENTTIFICATION 110
MF 112
FRAGMENT OFFSET 114
TTL 116
PROTOCOL 118
HEADER CHECKSUM 120
SOURCE ADDRESS 122
DESTINATION ADDRESS 124
OPTIONS 126
PADDING 128
PAYLOAD / DATA 150
110

FIG. 10

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2005/056832

A. CLASSIFICATION OF SUBJECT MATTER
H04L29/06

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
H04L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	US 2002/095512 A1 (RANA ASWINKUMAR VISHANJI ET AL) 18 July 2002 (2002-07-18) paragraphs '0010!, '0027!, '0031!; claim 6	1,4,5, 10,12,13 2,3,6-9, 11,14-16
Y	ZHANG L: "WHY TCP TIMERS DON'T WORK WELL" COMPUTER COMMUNICATION REVIEW, ACM, NEW YORK, NY, US, vol. 16, no. 3, 5 August 1986 (1986-08-05), pages 397-405, XP000743153 ISSN: 0146-4833 page 398, column 2, paragraph 3 page 398, column 2, paragraph 3.1 page 399, column 1, paragraph 2 page 403, column 2, paragraphs 2,3	2,3,6-9, 11,14-16

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
10 February 2005	20/02/2006
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax (+31-70) 340-3016	Authorized officer Manea, A

Form PCT/ISA/210 (second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2005/056832

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2002095512 A1	18-07-2002	AU 3413602 A	11-06-2002
		WO 0245328 A1	06-06-2002

Form PCT/ISA/210 (patent family annex) (April 2005)

(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 638 275 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
22.03.2006 Bulletin 2006/12

(51) Int Cl.:
H04L 12/56 (2006.01)

(21) Application number: 05255066.2

(22) Date of filing: 17.08.2005

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC NL PL PT RO SE SI SK TR
Designated Extension States:
AL BA HR MK YU

(30) Priority: 18.08.2004 GB 0418379

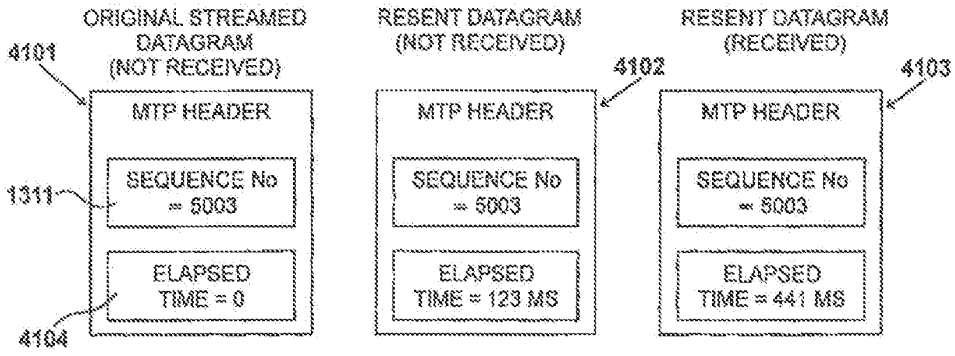
(71) Applicant: Wecomm Limited
Austin Friars,
London EC2N 2HA (GB)

(72) Inventors:
- Sturrock, Oliver
London W12 8NT (GB)
- Wentford, Timothy John
Pinner HA5 1NB (GB)

(74) Representative: Chapman, Paul Nicholas et al
Atkinson Burrington Limited
29 President Buildings
President Way
Sheffield S4 7UR (GB)

(54) Transmitting packets of data

(57) Data packet transmission involves transmitting a first data packet from a first station over a network to create a first transmission with the intention of the first transmission being received at a second station. Said first data packet is retransmitted from the first station to the second station to create a second transmission, wherein said second transmission of said first data packet includes latency information indicating the time between said first transmission and said second transmission. The second station processes said latency information to determine a resend latency measurement.



RESEND LATENCY = ELAPSED TIME IN RECEIVED DATAGRAM

RECEIVE EMPTY DATAGRAM Y REDUCE RESEND LATENCY
NO DATAGRAMS RECEIVED Y INCREASE RESEND LATENCY

APPLICATION LATENCY = CONNECTION LATENCY + PROTOCOL LATENCY

Figure 41

EP 1 638 275 A2

Printed by Jouve, 75001 PARIS (FR)

Description

Field of the Invention

[0001] The invention relates to measuring latency when transmitting packets of data over a network.

Description of the Related Art

[0002] Protocols are known for transmitting data over a network, for example an intranet or the internet. However, the transmission of real time data (data that must be transmitted between stations very quickly, possibly within milliseconds of its production) presents problems not addressed by such protocols. In particular, it is necessary to be able to provide a measurement of how old real time data is, since data that is more than, for example, a few seconds old may not be useful.

Brief Summary of the Invention

[0003] According to a first aspect of the invention, there is provided a network data transmission method, comprising the steps of transmitting a first data packet from a first station over a network to create a first transmission with the intention of said first transmission being received at a second station, re-transmitting said first data packet from said first station to said second station to create a second transmission, wherein said second transmission of said first data packet includes latency information indicating the time between said first transmission and said second transmission, and at said second station processing said latency information to determine a resend latency measurement.

Brief Description of the Several Views of the Drawings

[0004]

Figure 1 illustrates a networked environment;
Figure 2 illustrates a prior art method of supplying data from a server to a terminal over a telephony network;
Figure 3 shows a prior art graph of data against time;
Figure 4 illustrates a typical performance of TCP over a mobile telephony network;
Figure 5 shows a real time data provider shown in *Figure 1*;
Figure 6 details a real time data server shown in *Figure 5*;
Figure 7 details steps carried out by the real time data server shown in *Figure 6*;
Figure 8 details the contents of the memory shown in *Figure 6*;
Figure 9 details a session item shown in *Figure 8*;
Figure 10 details steps carried out during *Figure 7* to execute real time data server instructions;
Figure 11 illustrates the structure of a typical datagram;
Figure 12 details an MTP header shown in *Figure 11*;
Figure 13 details steps carried out during *Figure 10* to transmit datagrams;
Figure 14 illustrates the process of transmitting data;
Figure 15 details steps carried out during *Figure 13* to prepare a transactional datagram;
Figure 16 details steps carried out during *Figure 13* to prepare a streamed datagram;
Figure 17 details steps carried out during *Figure 10* to perform output buffer processing;
Figure 18 details steps carried out during *Figure 17* to set an MTP header;
Figure 19 details steps carried out during *Figure 10* to receive datagrams;
Figure 20 illustrates the use of an MTP header field to measure connection latency;
Figure 21 details steps carried out during *Figure 19* to process acknowledgements and state changes;
Figure 22 details steps carried out during *Figure 21* to process an extended acknowledgement;
Figure 23 illustrates the reception of a datagram;
Figure 24 details steps carried out during *Figure 19* to extract the data contained in a received datagram;
Figure 25 details steps carried out during *Figure 10* to process datagrams placed in the transactional segment buffer;
Figure 26 details steps carried out during *Figure 10* to process incoming streamed datagrams;
Figure 27 details steps carried out during *Figure 10* to perform background processing;
Figure 28 illustrates an extended acknowledgement;
Figure 29 details steps carried out during *Figure 27* to update the datagram transmission rate;
Figure 30 details steps carried out during *Figure 10* to perform session maintenance;
Figure 31 details an application server shown in *Figure 5*;
Figure 32 details steps carried out by the application server shown in *Figure 31*;
Figure 33 details the contents of the memory shown in *Figure 32*.
Figure 34 details instructions executed by a process shown in *Figure 32*;
Figure 35 details steps carried out during *Figure 34* to send a selective update;
Figure 36 illustrates examples of providing varying levels of service dependent upon network conditions;
Figure 37 details a PDA shown in *Figure 5*;
Figure 38 shows steps carried out by the PDA shown in *Figure 37*;
Figure 39 details the contents of memory shown in *Figure 38*;
Figure 40 details steps carried out during *Figure 38* to execute real time application instructions;
Figure 41 illustrates the calculation of resend laten-

Ex.1002 / Page 661 of 1008
Cisco Systems, Inc.

cy; and *Figure 42* details steps carried out during *Figure 40* to negotiate a heartbeat rate.

Written Description of the Best Mode for Carrying Out the Invention

Figure 1

[0005] *Figure 1* illustrates a networked environment in which the invention may be used. A Real Time Data Provider **101** provides data to a number of terminals **102, 103, 104, 105, 106, 107, 108** and **109** via the Internet **110**. The data can be separated into at least two types. The first type is streamed data, which comprises updates of certain information that a user of a terminal has indicated that he is interested in. This could be, for example, financial data such as stock prices or exchange rates, sports data such as the latest football scores, news items and so on. A second type of data is transactional data. This comprises any data forming a transaction, which could be a financial transaction such as placing a bid to trade stocks or placing a bet on a sports fixture. Transactional data can also include logging-on or user profile activities.

[0006] The data is provided over a variety of networks, including radio networks such as mobile telephony networks or wireless networks. A Third Generation (3G) mobile telephony network, connected to the Internet **110**, includes a gateway **111** which provides connectivity to a network of base stations. Terminals **102** and **103** are each connected to one of these base stations. A General Packet Radio Service (GPRS) gateway **112** is connected to the Internet **110** and provides connection to a network of GPRS base stations. Terminals **104** to **106** are each connected to one of these stations. A GMS gateway **113** is connected to the Internet **110**, providing connectivity for terminal **107**. A terminal could, when possible, switch between connections as shown by dotted line **114**.

[0007] Internet Service Provider (ISP) **115** is connected to the Internet **110** and provides internet access for server **116**, server **117** and a Wireless Network or Wireless Fidelity (WiFi) gateway **118**. Terminal **108** has a link to gateway **118**. ISP **119** is connected to the Internet **110** and provides internet access for computer systems **120, 121, 122** and **123** via wire links. Terminal **109** is connected by an ethernet wire link, possibly using a docking cradle, to computer system **122**. Alternatively, server **124** is connected directly to the Internet **110**.

[0008] Thus there is a number of ways in which a terminal may link to the Internet **110** in order to receive data from RTDP **101**. There are, of course, other methods of connection and the rate of technological advance means that in the future there will be further methods. This description should not be construed as limiting connection methods to those described here. However, the number of methods makes the task of providing real time data difficult. While it is, for example, relatively easy to provide data quickly to terminals **108** and **109**, terminals **102** to **107** use relatively low bandwidth, high latency and high variability connections over which it is very difficult to provide real time data.

[0009] Mobile telephony systems such as those provided by gateways **111** to **113** are used to provide data. For example, mobile telephone users are able to browse the Internet **110**. However, the rate of data supply can be extremely slow. This is merely inconvenient when browsing. However, if data on the basis of which decisions are to be made is required, for example financial data, it must be provided in a timely fashion. This means that the data should arrive at the terminal quickly, and preferably it should be possible to indicate to a user how up-to-date the information is.

Figure 2

[0010] *Figure 2* illustrates a prior art method of supplying data from a server to a terminal over a telephony network. A server **201** on an ethernet network **202** supplies data packets to a first gateway **203**, where the data packets are placed on a high capacity data interconnect **204**. A router **205** receives these packets and supplies them to another network **206**. Eventually the packets arrive at a telecoms gateway **207**, where a telecoms provider can select which of several wireless networks to supply the packets to. A GPRS gateway **208** then supplies the packets to a GPRS router **209**, which routes the packets to the base station **210** to which the terminal **211** is currently connected.

[0011] This journey across several networks is facilitated by the Internet Protocol (IP) which provides a header at the start of every packet defining the destination IP address. Other information is also provided in the IP header, such as the size of the packet, but its primary function is to define an address that gateways and routers can read, and decide where the packet should be sent next. Packets are sent separately, and may end up taking different routes. It is therefore possible for packets to arrive out of order.

[0012] In order to maintain a dialogue between server **201** and terminal **211**, an additional protocol must be used. Most commonly, this protocol is the Transport Control Protocol (TCP). This enables a two-way link to be set up between two systems on the Internet **110**. Messages are sent, and TCP provides functionality such as acknowledging and resending data, if necessary, and reordering packets if they arrive in the wrong order. TCP was designed to be used on networks that have a high data capacity and low latency, but can suffer from congestion. However mobile telephony networks have different characteristics and TCP handles certain of these characteristics in an ineffective way.

[0013] In the communication chain shown in *Figure 2*, TCP (and other protocols) achieve effective communication across high-capacity parts of the Internet **110**. However, the final link to terminal **211**, over a low-capacity wireless connection, is extremely vulnerable. TCP falls

Ex.1002 / Page 662 of 1008
Cisco Systems, Inc.

to address these vulnerabilities effectively, since it was not designed for that purpose.

Figure 3

[0014] *Figure 3* shows a prior art graph of data against time for packets that are sent over the Internet 110. Graph 301 illustrates the headers of a packet sent using a transport protocol such as TCP. The Internet 110 comprises many interconnected networks. As a packet is sent over each individual network, a local network protocol header 302 is attached to it, generally to transfer it from one part of the network to another. At the point of exit from the network, the network gateway will strip the local network protocol header 302, leaving the IP header 303. From this the next destination on a neighbouring network is determined (the router uses various algorithms to work out the next intermediate destination). The local network protocol header is transient, and changes as the packet traverses the Internet 110.

[0015] The IP header 303 defines the destination IP address for the packet. After this, there is the transport protocol header 304, which is typically used by the communication client and server to form a connection over which communications can take place. Finally the remainder of the data packet 305 is the data payload. Some packets do not have data, and simply consist of signalling in the transport header 304, for example an acknowledgement packet that tells the recipient that some data has been successfully received. Typically, though, acknowledgements are combined with data to reduce traffic.

[0016] An example of a transport protocol is TCP, as described with reference to *Figure 2*. TCP forms reliable connections and is often combined with higher protocols such as the File Transfer Protocol (FTP) or Hypertext Transport Protocol (HTTP).

Figure 4

[0017] *Figure 4* (prior art) illustrates a typical performance of TCP over a mobile telephony network. Graph 401 plots bandwidth 402 against time 403. The upper line 404 shows theoretically available bandwidth over the network, while the lower line 405 shows the use made of the bandwidth using TCP.

[0018] TCP's performance is always less than 100%. When there are significant changes in network availability, TCP compensates inefficiently, because its underlying mechanisms make assumptions about the network that are invalid for a mobile connection. When bandwidth falls off, for example at point 406, the amount of data sent using TCP falls much faster, because data packets that have been lost need to be resent, resulting in a downward spiral of lost bandwidth. TCP cannot anticipate or compensate fast enough to avoid such inefficiencies.

[0019] When a disconnection occurs, such as at point 407, TCP takes a long time to re-establish data flow when the link is reconnected. When using a terminal on a mobile telephony network, such disconnections are frequent, for example when the user goes through a tunnel.

[0020] TCP presents another problem to real time data provision. When a disconnection takes place (as at point 407), a wireless service provider will often perform a service known as "IP spoofing". This involves a proxy server being used to maintain the TCP connection with a server, even though the wireless connection is broken. When the connection is re-established data can be sent from where it is cached on the proxy server to the terminal. The telecoms provider does this so that a data transfer can continue, rather than being restarted every time the connection is lost.

[0021] This operation is helpful for internet browsing and downloading of large files to mobile telephones. However, it presents two problems to RTDP 101. The first is that if the telecoms provider caches a large amount of streamed data and sends it all to a terminal upon reconnection this can overload the connection. This is especially inappropriate given that much of it may be out of date. The second problem is that the RTDP 101 might send transactional data to, for example, terminal 102 while it is disconnected from 3G gateway 110. The 3G network, spoofing terminal 102, will acknowledge this data. However, if terminal 102 does not reconnect, which might happen for one of many reasons, then the cached transactional data will never be forwarded. This results in RTDP 101 wrongly concluding that terminal 102 has received the data.

[0022] A further problem with TCP is that it is a connection-oriented protocol. When a client moves between wireless base stations its IP address can change, resulting in a requirement to set up a new TCP connection. This can interfere with communications. In particular, a secure transaction could be terminated. This also prevents a terminal from using a higher-bandwidth, lower latency network that may become available without terminating a connection, for example when a terminal connected to GPRS gateway 112 comes within range of 3G gateway 111, or moves into the radius of a WiFi gateway 118.

Figure 5

[0023] *Figure 5* shows RTDP 101 which comprises an application server 501 and a real time data server 502. The real time data server communicates with a large number (potentially thousands) of terminals. It facilitates communications between the application server 501 and the terminals. Terminals can have a variety of types of connection, including high speed WiFi or wire. The real time data server 502 manages communications with all these types of connections. A terminal need not be mobile to take advantage of the system.

[0024] The application server 501 receives data from a number of data feeds. These are illustrated by two-way arrows, as data is provided to application server 501 but

Ex.1002 / Page 663 of 1008
Cisco Systems, Inc.

the server may also send information back, for example details of a financial transaction or an information request. Financial transaction services data feed 503 provides communications for making stock-market-based transactions. Sports transaction services data feed 504 provides communications for making sports-based transactions. Financial data feed 505 provides real time updates of, for example, share prices and exchange rates, while sports data feed 506 provides real time updates of sports scores. News data feed 507 provides news headlines and stories. It will be appreciated that the data feeds illustrated in *Figure 5* are representative of the type of data that a Real Time Data Server might provide to clients. Other data types and feeds are contemplated and included in this description.

[0025] The application server 501 communicates with the real time data server 502 over an outbound-initiated TCP-based link 508. The connection between the two systems is made via a high-speed Gigabit Ethernet connection. In other embodiments, the two servers could use the same processing system. However, this provides less security.

[0026] The application server 501 is protected by a first firewall 509, so as to resist any security vulnerabilities that may exist in the real time data server 502, which has its own firewall 510. The real time data server 502 takes data from the application server 501 and supplies it to terminals via the Internet 110 using a custom protocol called the Mobile Transport Protocol (MTP). This protocol addresses the needs of real time data services for mobile client terminals.

[0027] In the embodiment described herein the terminals are Personal Digital Assistants (PDAs) such as PDA 511. These are small portable devices including a display screen 512, control buttons 513, a speaker 514 and a microphone 515. The display 512 may be touch-sensitive, allowing the PDA 511 to be controlled using a stylus on the screen instead of buttons 513. A typical PDA is supplied with software providing the functionality of, inter alia, a mobile telephone, word processing and other office-related capabilities, a calendar and address book, email and internet access, games, and so on. The skilled reader will appreciate that the PDAs illustrated in this document are not the only terminals that can be used. For example, a mobile telephone with enough storage and memory could be used, or other devices which can communicate over mobile telephony networks.

[0028] PDA 511 may communicate with the real time data server 502 to obtain access to data provided by any of data feeds 503 to 507, or to obtain software downloads for installation. The application server 501 facilitates several different types of service. In particular, the efficient provision of multiple types of data having different characteristics is enabled using the custom protocol MTP.

[0029] The two main types of data are transactional data and streamed data. For transactional data, a two-way communication between the PDA 511 and the real time data server 502 facilitates the making of a secure transaction. Data delivery must be guaranteed even if a connection is broken. Such data may be several kilobytes for each message, requiring multiple datagrams to be transmitted before a message is complete. These packets, or datagrams, must be reassembled in the right order before use.

[0030] Streamed data comprises updates, for example of financial or sporting data. These may be provided at a fixed regular rate, or may be provided at an irregular rate as the data becomes available. Each update or message is contained in a single datagram (although a datagram may contain more than one message). For this reason it is not necessary for streamed datagrams to be ordered at the terminal.

[0031] Because of these different data types, each of which has its own issues to be addressed, MTP provides two types of data communication, transactional communication and streamed communication. It facilitates communication of both types over the same communication link. The data types are differentiated, such that the bandwidth utilisation is maximised without compromising transactional communications. It specifically addresses the need for bandwidth efficiency, latency measurement, multiple data types and continuous updates over a low bandwidth, high latency, high variability wireless mobile link. Also, because by its nature a mobile terminal such as a PDA has low storage and memory capabilities, it minimises the computational requirements of the terminal.

Figure 6

[0032] *Figure 6* details real time data server 502. It comprises a central processing unit (CPU) 601 having a clock frequency of three gigahertz (GHz), a main memory 602 comprising two gigabytes (GB) of dynamic RAM and local storage 603 provided by a 80Gb-disk array. A CD-ROM disk drive 604 allows instructions to be loaded onto local storage 603 from a CD-ROM 605. A first Gigabit Ethernet card 606 facilitates intranet connection to the application server 501. The intranet can also be used for installation of instructions. A second Gigabit Ethernet card 607 provides a connection to Internet 110 using MTP.

Figure 7

[0033] *Figure 7* details steps carried out by real time data server 502. At step 701 the real time data server 502 is switched on and at step 702 a question is asked as to whether the necessary instructions are already installed. If this question is answered in the negative then at step 703 a further question is asked as to whether the instructions should be loaded from the intranet. If this question is answered in the affirmative then at step 704 the instructions are downloaded from a network 705. If it is answered in the negative then at step 706 the instructions are loaded from a CD-ROM 707.

[0034] Following either of steps 704 or 706 the instructions are installed at step 708. At this point, or if the question asked at step 702 is answered in the negative, the instructions are executed at step 709. At step 710 the real time data server is switched off. In practice this will happen very infrequently, for example for maintenance.

Figure 8

[0035] *Figure 8* details the contents of memory 602 during the running of real time data server 502. An operating system 801 provides operating system instructions for common system tasks and device abstraction. The Windows™ XP™ operating system is used. Alternatively, a Macintosh™, Unix™ or Linux™ operating system provides similar functionality. Real time data server instructions 802 include MTP instructions and instructions for providing MTP status information to the application server 501. Session data 803 comprises the details of every session, such as session item 804, currently maintained by the server 502. Each client terminal that is currently logged on has a session, and when a session starts an area of memory is allocated to it in which variables, specific to each user, are stored. Other data includes data used by the operating system and real time data server instructions.

Figure 9

[0036] *Figure 9* details an individual session item 804 shown in *Figure 8*. Each session item includes a session ID 901 and session state variables 902, indicating whether the session is starting, ongoing, stalled, reconnecting or disconnecting. Each item also includes transmitter data 903 and receiver data 904, since MTP provides two-way communication. Transmitter data 903 includes a transactional segment buffer 905, a streamed segment buffer 906 and prioritised message queues 907. Receiver data 904 includes a transactional segment buffer 908 and prioritised message queues 909.

Figure 10

[0037] *Figure 10* illustrates step 709 at which the real time data server instructions are executed. This step comprises a number of separate processes that effectively occur in parallel. The concurrency of these processes is achieved by a mixture of concurrent threads and sequential processing, details of which will be known to those skilled in the art. In particular, although the processes may be described in terms of communications with a single client, PDA 511, they should be understood to be relevant to all the clients that the real time data server 502 is communicating with.

[0038] Process 1001 transmits datagrams from the real time data server 502 to a client 511. Each packet includes an IP header, a UDP header and an MTP header. For convenience each packet is referred to as a datagram. Process 1001 comprises two separate processes: datagram preparation 1002 and output buffer processing 1003. Process 1002 prepares data for transmission. Data received from application server 501 can be from several applications having different data characteristics and priorities and it must be processed before it can be sent to terminals such as PDA 511.

[0039] Process 1004 receives datagrams from client terminals such as PDA 511 and comprises three separate processes: datagram reception 1005, transactional datagram processing 1006 and streamed datagram processing 1007.

[0040] Process 1008, which will be described further with reference to *Figure 27*, performs background processing, which includes various processes required to be performed while transmitting and receiving data, such as identifying timeout conditions.

[0041] Process 1009 provides session maintenance, which includes operations performed when PDA 511 is temporarily disconnected. This process, which will be described further with reference to *Figure 30*, is the first to start, with processes 1001, 1004 and 1008 being performed once the user session is established.

Figure 11

[0042] *Figure 11* illustrates the structure of a typical datagram 1101 sent between the real time data server 502 and PDA 511. A local network protocol header 1102 changes as the datagram passes from network to network across the Internet 110. An IP header 1103 defines the destination of the packet, as well as other characteristics. A UDP header 1104 precedes an MTP header 1105, which implements several features for efficiently supplying real time data to clients over mobile wireless links, as well as other data links of varying degrees of quality. The MTP header 1105 is followed by data 1106 that has a maximum length, in this embodiment, of approximately 500 bytes. This limit is chosen to avoid packet fragmentation and to avoid overloading the terminals, and could be varied.

[0043] The IP header 1103 includes several fields. Version field 1108 indicates the version of IP being used, for example IPv4 or IPv6. Internet Header Length field 1109 indicates the length, in 32-bit words, of the IP header. Its minimum value is 5. Length field 1110 gives the total length, in bytes, of the datagram, including the IP header (but not including the local network protocol header 1102). Protocol field 1111 is set to a value indicating that UDP is being used. Source IP address field 1112 gives the return address of the datagram, while destination IP address field 1113 gives its destination.

[0044] The UDP header 1104 has the following fields. Source port field 1114 gives the port on the computer sending the datagram, while destination port field 1115 gives the port number on the computer receiving the datagram. Length field 1116 gives the length of the datagram in bytes, including the UDP header but not including

the previous headers 1102 and 1103. Checksum field 1117 contains a value computed from the IP header 1103, UDP header 1104 and the remainder of the datagram, enabling data integrity to be confirmed.

Figure 12

[0045] *Figure 12* details MTP header 1105. It contains a number of fields. Firstly, version number field 1201 gives the version of MTP being used.

[0046] Fields 1202 to 1209 are single-bit fields that are considered to be "set" if their value is one, and not set if it is zero. SYN field 1202 and KAL field 1213 are used for signalling. At the start and end of a session, SYN field 1202 is used for handshaking, but it is also used to perform various connection timing procedures. KAL field 1213 is used to send "keep alive" datagrams that indicate that a connection is open. ACK field 1203 indicates that the datagram is being used to acknowledge a received datagram, while EACK field 1204 indicates an extended acknowledgement. STREAM field 1205 is used to differentiate between streamed and transactional data. When set, it indicates that the datagram contains streamed data.

[0047] START field 1206 and END field 1207 are used to indicate that a datagram contains data and that it is the first or last of a set. If a datagram is too large to be sent as a single datagram then it may be split, and so START field 1206 indicates the first datagram and END field 1207 indicates the last. A datagram that has not been split has both fields set. An empty datagram does not have these fields set.

[0048] RESET field 1208 is used for session handshaking when restarting a session, and FINISH field 1209 is used to close an MTP session.

[0049] Session ID field 1210 is a number indicating which session the MTP datagram relates to. Sequence number field 1211 is a number indicating the datagram sequence. Each datagram that is sent out and that requires acknowledgement is given its own effectively unique number, which is then used in an acknowledgement by the client. (Since streamed and transactional datagrams are numbered using a different sequence, and since the sequence numbering loops at a number that is greater than the number of acknowledgements that will be outstanding at any time, the sequence number is not strictly unique but is effectively unique.) An acknowledgement is itself a datagram, which may contain data, and so acknowledgement number field 1212 is the sequence number of the datagram being acknowledged in a datagram that has the ACK field 1203 set. This datagram is probably otherwise unconnected with the datagram being acknowledged.

Figure 13

[0050] *Figure 13* details process 1002 at which datagrams are transmitted. Process 1001 comprises two, effectively concurrent processes 1002 and 1003. Process 1002 fills up the transactional and streamed segment buffers 905 and 906, while process 1003 looks in the buffers and marks the datagrams for sending.

[0051] Process 1002 commences with step 1301 at which a question is asked as to whether there is any data for transmission. If this question is answered in the affirmative then a further question is asked at step 1302 as to whether the data is transactional data. If this question is answered in the affirmative then at step 1303 a datagram is prepared and at step 1304 it is placed in the transactional segment buffer 905. Alternatively, if the question asked at step 1302 is answered in the negative, a datagram of streamed data is prepared at step 1305. The elapsed time value in the datagram is set to zero, indicating fresh data, at step 1306 and at step 1307 the datagram is placed in the streamed segment buffer 906.

[0052] Following steps 1303 or 1307, or if the question asked at step 1301 is answered in the affirmative, control is returned to step 1301 and the question is asked again as to whether there is any data for transmission.

Figure 14

[0053] *Figure 14* illustrates the process performed during steps 1303 to 1307, in which data is prepared for transmission. A datagram 1401 can comprise transactional data or streamed data, which is determined by whether or not STREAM field 1205 is set in the MTP header 1105. Each of the two types of data has its own buffer, transactional segment buffer 905 and streamed segment buffer 906, from which datagrams are sent. Once acknowledged, a datagram can be deleted from its location in segment buffer 905 or 906. Each segment buffer stores a number of datagrams.

[0054] Transmission is facilitated by supplying a datagram to the operating system 801, which facilitates its electronic transmission using the Internet Protocol.

[0055] Transactional and streamed datagrams are generated from data stored in prioritised message queues 907. This data is supplied to message queues 907 by applications running on application server 501. An application may supply all its outgoing messages to a particular message queue, or may pass messages to different queues depending upon the nature of the data.

[0056] Transactional data is supplied to prioritised message queues 1402, 1403 and 1404. Streamed data is supplied to prioritised message queues 1405, 1406 and 1407. Each message queue may contain a number of messages supplied from applications on application server 501. These messages are delineated by level one message headers, such as header 1408, that specify the length of the data and the application from which it was supplied.

[0057] The amount of data taken from each message queue and combined into a single datagram depends upon proportions defined for each message queue. For example, default proportions of fifty percent, thirty per-

Ex.1002 / Page 666 of 1008
Cisco Systems, Inc.

cent and twenty percent may be assigned to prioritised message queues 1405 to 1407 respectively. If message queue 1407 has no data then its allocation will be equally reallocated between queues 1406 and 1407, giving queue 1408 thirty-five percent and queue 1407 sixty-five percent. If only one queue contains data then it will have one hundred percent of the allocation.

[0058] The way the data is allocated also depends upon the type of message queue. Transactional messages may be broken up over a number of datagrams, and so the process only considers the amount of data in the queue. However, streamed messages must be wholly contained within one datagram, and so only entire messages are taken from these message queues, even if this means that the message queue's priority allocation is not used up.

[0059] Datagrams are created from the message queues and placed in segment buffers 905 and 906. These are then sent, with the first message being taken from each segment buffer in turn.

[0060] The example in *Figure 14* shows datagram 1401, which is made up from transactional data. The amount of data that can be included in the datagram is calculated, and data is taken from each of queues 1402 to 1404 according to their priority levels. Data from different prioritised message queues is delineated within a datagram by level two message headers, such as headers 1409, 1410 and 1411. These headers include a length field 1412 and a message queue field 1413.

[0061] Thus the example datagram 1401 does not contain a single message but in fact contains portions of five messages, since the data from each of queues 1402 to 1404 includes a message header and thus includes the end of one message and the beginning of another.

[0062] The number of prioritised message queues shown here and their proportions are provided as an example only. There could be fewer queues, for example only one transactional queue and two streamed queues, or any other number. The proportions will vary according to the kinds of real time data provided and the realities of each individual system. Additionally, it is not necessary that unused allocation be equally divided between the remaining queues. It could be divided according to their own allocations, or in some other way.

Figure 15

[0063] *Figure 15* details step 1303, at which a transactional datagram is prepared. At step 1501 an MTP header is created in a temporary buffer. This is a default headerthat as yet does not contain any information specific to the datagram being considered. This information is added by buffer processing process 1003, which will be described with reference to *Figure 17*. At step 1502 a variable N is set to be the number of transactional prioritised message queues 1402 to 1404 that contain data, and a variable Y is initialised to zero. At step 1503 the number of bytes available for data, indicated by variable S, is calculated by subtracting the product of N and the level two header size from the maximum data size. For example, the maximum data size may be 500 bytes.

[0064] At step 1504 the variable N is decremented by one and at step 1505 the highest message queue is selected. A variable P is set to be the sum of the proportion of the datagram that the data in that queue may use, for example 0.3 for queue P1, and variable Y (zero on the first iteration), and a variable X is set to be the amount of data, in bytes, in the queue. At step 1506 a question is asked as to whether the variable N is equal to zero. If this question is answered in the affirmative then the queue under consideration is the last one containing data and so the following steps need not be carried out, control being directed to step 1513.

[0065] However, if it is answered in the negative then at step 1507 a further question is asked as to whether the variable X is less than the product of the variables S and P; that is, whether the amount of data in the queue is less than the amount of data that may be used. If this question is answered in the affirmative then at step 1508 the variable Y is calculated as the variable X subtracted from the product of P and S, all divided by the product of S and N, all added to the previous value of Y. Thus Y is a proportion that is to be added to the proportions of the remaining queues in order to allocate to them the unused space allocated to the queue under consideration. For example, if the available space is 400 bytes and all three queues contained data, then P1 is allocated 120 bytes. If it only contained 100 bytes then a further 10 bytes would be allocated to each of the remaining queues. Y would thus be 0.05. Alternatively, if the question asked at step 1507 is answered in the negative, to the effect that the variable X is not less than the product of X and S, then at step 1509 the variable X is set to be the product of the variables P and S.

[0066] Following either step 1508 or step 1509, or if the question asked at step 1506 is answered in the affirmative, at step 1510 a level two header is created in the temporary buffer and the first X bytes are moved from the queue into the temporary buffer. The question is then asked at step 1511 as to whether the variable N is equal to zero. If this question is answered in the negative then control is then returned to step 1504 where N is decremented again before the next queue is selected. If it is answered in the affirmative then step 1303 is over and a datagram has been prepared. The step at 1304 of placing this datagram in the transactional segment buffer 905 consists of moving the data from the temporary buffer to the transactional segment buffer 905.

Figure 16

[0067] *Figure 16* details step 1305, at which a streamed datagram is prepared from the data in streamed prioritised message queues 1405 to 1407. At step 1601 an MTP header is created in a temporary buffer, and at step 1602 a variable N is set to be the number

Ex.1002 / Page 667 of 1008
Cisco Systems, Inc.

of streamed message queues that contain data, while variables X and Y are set to be zero.

[0068] At step 1603 the available space S is calculated in the same way as at step 1503, except that a further two bytes are subtracted, which will be used to store the elapsed time. At step 1604 the variable N is decremented by one.

[0069] At step 1605 a level two header is created in the temporary buffer, and at step 1606 the first message queue is selected, and a variable P set to be the sum of the queue's priority proportion and the variable Y. At step 1607 the first message in the queue is selected, and the variable X is set to be the sum of the message's length in bytes and the previous value of X. At step 1608 a question is asked as to whether the variable X is less than the product of the variables P and S.

[0070] If this question is answered in the affirmative then at step 1609 the message is moved to the temporary buffer and a further question is asked as to whether there is more data in the queue. If the question is answered in the negative then control is returned to step 1607 and the next message is selected.

[0071] If the question asked at step 1608 is answered in the affirmative, or the question asked at step 1610 is answered in the negative, then at step 1611 the variable X is reset to zero, and the variable Y is updated to be the previous value of the variable X subtracted from the product of P and S, all divided by the product of S and N, all added to the previous value of Y. A question is then asked at step 1612 as to whether N is equal to zero. If this question is answered in the negative then control is returned to step 1604. If it is answered in the affirmative then step 1605 is concluded.

[0072] Thus only entire messages are included in a streamed datagram, although more than one message may be contained in a single datagram. A streamed datagram may contain more than one message from a single queue, as long as it does not exceed its priority allocation, but may not contain a fragment of a datagram.

[0073] As discussed above, the algorithm presented in *Figure 15* and *Figure 16* is only one possibility for prioritising data.

[0074] Additionally, in another embodiment (not shown) this prioritisation and mixing of data does not take place. In that embodiment datagrams only contain data from a single application, and the START field 1206 and END field 1207 are used to indicate the beginning and end of messages, instead of the level one headers described with reference to *Figure 14*.

Figure 17

[0075] Output buffer processing 1003 is detailed in *Figure 17*. At step 1701 a question is asked as to whether both the transactional segment buffer 905 and the streamed segment buffer 906 are empty, and if this question is answered in the negative then the next datagram to be sent in either buffer 905 or 906 is marked for transmission (the process alternates between the two buffers) at step 1702. This may be the next newest datagram, or it may be an unacknowledged datagram that has been marked to be resent.

[0076] If the question asked at step 1701 is answered in the negative then at step 1703 a further question is asked as to whether an acknowledgement is required. If this question is answered in the affirmative then at step 1704 an empty acknowledgement datagram is created. If the question asked at step 1703 is answered in the negative then at step 1705 a further question is asked as to whether a heartbeat datagram is required, and if this question is answered in the affirmative then a latency-measuring datagram is produced at step 1706 (this will be described more fully with reference to *Figure 20*). If the question asked at step 1705 is also answered in the negative then control is returned to step 1701 and the question is asked again as to whether the buffers are empty.

[0077] Following any of steps 1702, 1704 or 1706, the MTP header as described in *Figure 12* is set at step 1707. At step 1708 the process waits for a transmission time, since the rate of datagram transmission is controlled, as will be described with reference to *Figure 29*. When this transmission time is reached, the time of sending is internally recorded for the purposes of delaying the next transmission. It is recorded with the datagram stored in the segment buffer, along with an indication of how many times the datagram has already been sent. At step 1710 a question is asked as to whether this datagram is being resent and is also a datagram containing streamed data, as indicated by the setting of both STREAM field 1205 and START field 1206; if so the elapsed time is changed at step 1711 to reflect the amount of time since the first attempt at sending the datagram, as can be calculated from the time of the last sending and any previous value of the elapsed time. This is to facilitate the calculation of resend latency, as will be described with reference to *Figure 41*. Finally, at step 1712, the datagram is sent.

Figure 18

[0078] *Figure 18* details step 1705, at which the MTP header is set. At step 1801 a question is asked as to whether there is a datagram received from the client that needs to be acknowledged. The answer to this question depends not only on whether a datagram has been received from PDA 511 but also what kind of datagram it is. A datagram containing transactional data is acknowledged immediately, as is any datagram being used for timing purposes, and so if either of these have been received but not acknowledged the question is answered in the affirmative. Streamed data, being less critical, is acknowledged using an extended acknowledge, in which multiple packets are acknowledged in order to lower network traffic. Thus if only streamed datagrams have been received then the question will be answered in the affirmative only if a suitable period of time has elapsed. Oth-

Ex.1002 / Page 668 of 1008
Cisco Systems, Inc.

erwise, or if no datagrams have been received at all, the question is answered in the negative.

[0079] If the question asked at step 1801 is answered in the affirmative then at step 1802 ACK field 1203 is set and the sequence number of the datagram being acknowledged is entered in acknowledgement number field 1212. At step 1803 a question is asked as to whether this acknowledgement is an extended acknowledgement. If this question is answered in the affirmative then at step 1804 the EACK field 1204 is also set, and any datagrams that have not been received but have lower sequence numbers than the sequence number contained in field 1212 are listed as data in part 1106 of the datagram. Thus these datagrams are negatively acknowledged. Since the IP header 1103 and UDP header 1104 both contain length fields indicating the total length of the datagram the recipient of an extended acknowledgement knows implicitly how many datagrams are being negatively acknowledged. At this point, and if the question asked at step 1803 is answered in the negative, step 1705 is completed. (Note that because transactional datagrams have a separate sequence number from streamed datagrams, the extended acknowledgement process does not interfere with the acknowledgement of transactional datagrams.)

[0080] However, if the question asked at step 1801 is answered in the negative, to the effect that an acknowledgement is not due, at step 1805 a further question is asked as to whether a latency measurement or heartbeat should be initiated. If this question is answered in the affirmative then at step 1806 SYN field 1202 is set to one. A datagram having this field set initiates a latency measurement. When an acknowledging datagram is received from PDA 511 it is used to measure round-trip latency (further described with reference to *Figure 17*). (Thus the SYN field cannot be set in an acknowledging datagram. For this reason step 1805 is only initiated if the question asked at step 1801 is answered in the negative.) Alternatively, if no data is being sent, a datagram having this field set, in addition to being used to measure latency, provides a heartbeat that confirms that the connection is still open.

[0081] Following step 1806, or if the question asked at step 1805 is answered in the negative, step 1705 is completed.

[0082] This figure highlights one of the few ways in which the server and the client are not symmetrical. While a session is stalled, the server will not send heartbeat datagrams, but the client will. This is because the receipt of a datagram from the client by the server ends the stall. This is provided by the suspension of background processing process 1008, which makes the decision as to whether to send a heartbeat datagram, during a stalled session. However, process 1003 sends the datagram, if instructed to, in exactly the same way on both the server and the client.

Figure 19

[0083] *Figure 19* details process 1005 that receives datagrams sent by PDA 511. At step 1901 an incoming datagram is received and the receive time logged. A question is then asked at step 1902 as to whether the datagram has a sequence number identical to a recently received datagram of the same type (ie streamed or transactional). This can happen when acknowledgements and resends "cross" and when acknowledgements are lost over the network. Thus if this question is answered in the affirmative then control is directed to step 1912 and the datagram is acknowledged without being processed. Alternatively, if it is answered in the affirmative, then at step 1903 a question is asked as to whether the SYN field 1202 is set, indicating that the datagram is a latency-measurement datagram. Thus if this question is answered in the affirmative then at step 1904 a further question is asked as to whether ACK field 1203 is also set. If this question is also answered in the affirmative then the datagram is a returned latency-measurement datagram and so the latency is calculated at step 1905.

[0084] Alternatively, if it is answered in the negative, then at step 1906 a question is asked as to whether the acknowledgement number field 1212 is zero. If this question is answered in the affirmative then the ACK field is not set but an acknowledgement number is given. This indicates that the acknowledgement field does not contain a sequence number but indicates a new heartbeat rate, measured in milliseconds, and thus the heartbeat timing rate contained in the session data 804 is updated at step 1907. This process will be described further with reference to *Figure 42*.

[0085] Following either of steps 1907 or 1905, or if either the question asked at step 1903 is answered in the negative or that asked at step 1906 is answered in the affirmative, then control is directed to step 1908, at which a question is asked as to whether the datagram contains streamed data, as indicated by the setting of STREAM field 1205. If this question is answered in the affirmative then the resend latency is recalculated at step 1909. Resend latency, in combination with connection latency, is used to estimate the age of data received, and is described further with reference to *Figure 41*.

[0086] Following this, or if the question asked at step 1908 is answered in the negative, acknowledgements and state changes are processed at step 1910, as will be further described with reference to *Figure 21*.

[0087] Finally the data 1106 is extracted at step 1911, as will be further described with reference to *Figure 23* and *Figure 24* and the datagram acknowledged at step 1912. The processing steps 1901 to 1910 relate only to the information contained within the MTP header 1105, much of which is not connected with the data in any way.

Ex.1002 / Page 669 of 1008
Cisco Systems, Inc.

Figure 20

[0088] *Figure 20* illustrates the use of the SYN field **1202** to measure connection latency. It is necessary that at all times the client terminals are aware of exactly how old the data is. This is not possible using traditional methods such as, for example, clock synchronisation, because there may be thousands of terminals. Thus the system described herein provides a method of measuring the connection latency between the RTDP **101** and each of its terminals.

[0089] A latency-measurement datagram is sent at regular intervals by setting the SYN field **1202** in an outgoing datagram in either transactional segment buffer **905** or streamed segment buffer **906** and noting the time at which it was sent. As an example, transactional segment buffer **905** is shown, containing several packets **2001, 2002** and **2003**. The question asked at step **1605** is answered in the affirmative, to the effect that a latency measurement should be initiated, and so the SYN field **1202** of the next datagram to be sent, which is datagram **2001**, is set.

[0090] Datagram **2001** takes a number of milliseconds, shown by arrow **2004** and identified by the variable A, to be transmitted to PDA **511**, whose receive buffer **2005** is shown. A process running on PDA **511**, which is substantially identical to process **1005**, sets the SYN field **1202** and the ACK field **1203** in its next outgoing datagram **2006**. This process takes a time indicated by arrow **2007** and identified by the variable B. Finally, transmission of datagram **2006** back to real time data server **502** takes a time indicated by arrow **2008** and identified by the variable C. When datagram **2002** is received at real time data server **502** the fact that both the SYN and ACK fields are set triggers latency calculation at step **1905**.

[0091] The round trip time, which is obtained by comparing the receive time of datagram **2002** with the transmission time of datagram **2001**, is equal to the sum of the variables A, B and C. Since network conditions are, on average, symmetric, A is assumed to be approximately equal to C. B is very small because it is possible to directly acknowledge packet **2001** without waiting for any out-of-order datagrams that would have to be received if the latency was measured using a cumulative acknowledgement, as with TCP. Thus, as shown by equation **2006**, the two-way latency is approximately equal to the round trip time, and the one-way latency, or connection latency, is half the round trip time.

[0092] Having obtained a value for the round trip time, it is filtered using equations **2007**. K is an adaptive filter coefficient that is varied in order to optimise the ability of the filtered latency to follow quick changes when these are consistently observed. Thus the filtered latency is equal to the sum of the following factors: K subtracted from one all multiplied by the measured latency; and K multiplied by the previous filtered latency calculation. Other filtering or weighting methods may be used in order to smooth the variability of the latency calculation.

[0093] The round trip time is used by both the server and the client to determine the length of time that should be waited for an acknowledgement before a transactional datagram is resent (timeout). Since streamed datagrams may be acknowledged using an extended acknowledgement, the time that a process waits before sending an extended acknowledgement is added to the latency value to produce the timeout for streamed datagrams. The constant measurement of the latency described above ensures that the timeout settings are as accurate as possible. A fixed timeout setting can be set too high, in which case the wait before resend would be too long, thus degrading the timeliness of the data, or it can be too low, resulting in too many resends. This dynamic timeout creates a compromise.

[0094] The round trip time may be halved to give a connection latency, which indicates the approximate time taken by a datagram to be sent from the server to the client. This value is used by the client to indicate the timeliness of received data, and will therefore be described further with reference to *Figure 41*. Resend latency measurement, which will be described with reference to *Figure 41*, is also calculated at both the client and the server end but in this embodiment is only used by the client. It will therefore not be discussed at this stage.

Figure 21

[0095] *Figure 21* details step **1910** at which acknowledgements and state changes are processed. At step **2101** a question is asked as to whether the RESET field **1206** or FINISH field **1209** (as contained in the MTP header **1105** of the datagram received at step **1901**) is set, indicating that the session should be reset or ended. If this question is answered in the affirmative then a disconnect takes place at step **2102**. This concludes step **1910** if this route is taken.

[0096] If the question asked at step **2101** is answered in the negative then at step **2103** a question is asked as to whether EACK field **1204** is set, indicating that the datagram contains an extended acknowledge. If this question is answered in the affirmative then at step **2104** the extended acknowledgement is processed. If it is answered in the negative then at step **2105** a further question is asked as to whether ACK field **1203** is set, indicating that the datagram contains an acknowledgement. If this question is answered in the affirmative then at step **2106** the acknowledgement is processed by removing the datagram that has the sequence number contained in SEQUENCE NUMBER field **1211** from the relevant segment buffer **905** or **906**. If it is answered in the negative, or following step **2104**, the session state variables **902** for POA **511** are modified if necessary.

Figure 22

[0097] *Figure 22* details step **2104**, at which an extended acknowledgement is processed. As described previ-

Ex.1002 / Page 670 of 1008
Cisco Systems, Inc.

ously with reference to step 1604, an extended acknowledgement is in the form of a datagram with EACK field 1204 set, a streamed datagram sequence number contained in acknowledgement number field 1212, and possibly a list of streamed datagram sequence numbers that have not been received by PDA 511 as data 1108. Thus the process has a range of datagram sequence numbers to consider. This range starts at the number following the sequence number contained in the last extended acknowledgement and finishes at the number contained in the extended acknowledgement currently being considered.

[0098] Thus at step 2201 the first sequence number in this range is selected. At step 2202 the streamed datagram corresponding to this sequence number is identified and at step 2203 a question is asked as to whether the sequence number identified at step 2201 is in the list of negatively acknowledged datagrams contained in data 1108 of the datagram. If the question is answered in the negative then the sequence number is being acknowledged and this is processed at step 2205. If the question is answered in the affirmative then, since the identified datagram is still stored in its relevant segment buffer 908 or 906, it is marked to be resent at step 2204.

[0099] At step 2206 a question is asked as to whether the sequence number being considered is the same as the number contained in the acknowledgement number field 1212 of the datagram. If this question is answered in the negative then control is returned to step 2201 and the next sequence number is selected. If, however, it is answered in the affirmative, then the extended acknowledgement has been fully processed and step 2104 is completed.

Figure 23

[0100] *Figure 23* illustrates the reception of a datagram from PDA 511. A receive buffer is provided by the operating system 801, which supplies a datagram to receiving transactional segment buffer 908 or to process 1007, via process 1005. Once datagrams are ordered within transactional segment buffer 908, process 1006 decodes the level two message headers in the datagrams to split the data up and place it in the correct one of prioritised message queues 910. There are three transactional queues 2301, 2302, and 2303, corresponding to the message queues 1402 to 1404. Process 1007 performs the same function for streamed datagrams. There is no streamed segment buffer for incoming datagrams because there is no ordering necessary. There are three streamed queues 2304, 2305 and 2306. These correspond to the prioritised message queues 1405 to 1407. Once the data is placed in the queues, level one headers indicate to the applications that a message is complete and can be used.

[0101] In the alternative embodiment described with reference to *Figure 16*, wherein mixing of the data is not used, only the transactional data need be ordered in the segment buffer 908. In this embodiment every streamed message is contained in a single datagram and so need not be ordered. If an old update arrives after a new one then the old one is simply discarded by the relevant application. However transactional data, which usually stretches over more than one datagram, must be ordered. The START and END fields 1206 and 1207 are used to indicate when a message is finished and can be transferred to the relevant message queue.

Figure 24

[0102] *Figure 24* details step 1911, at which the data contained in a received datagram is extracted and acknowledged. At step 2401 a question is asked as to whether the received datagram contains data in portion 1106. If this question is answered in the negative then a further question is asked at step 2402 as to whether STREAM field 1205 is set, indicating that the datagram contains streamed data. If this question is answered in the negative then at step 2403 the data is placed in transactional segment buffer 908, while if it is answered in the affirmative then the data is passed to process 1007 at step 2404.

[0103] Following step 2404, or if the question asked at step 2401 is answered in the negative, to the effect that the datagram contains no data, then a question is asked at step 2405 as to whether SYN field 1202 is set, indicating that the datagram is a latency measurement or heartbeat datagram. If this question is answered in the affirmative, or following step 2403, the datagram is immediately acknowledged at step 2406. This step involves flagging the sequence number in order that process 1003 acknowledges it in the next available outgoing datagram at step 1707 as described with reference to *Figure 18*. (If there is no outgoing datagram, then an empty streamed datagram is created.) At this point, or if the question is answered in the negative, step 1911 is concluded. Thus transactional and latency-measurement datagrams are acknowledged immediately. Streamed datagrams are acknowledged using an extended acknowledgement, and empty datagrams that are not tagged, for example an acknowledgement containing no data, are not themselves acknowledged.

Figure 25

[0104] *Figure 25* details process 1006 which processes the datagrams placed in the transactional segment buffer 908. At step 2501 a question is asked as to whether there is data in the transactional segment buffer, and if this is answered in the negative then the question is asked again until it is answered in the affirmative, when at step 2502 a question is asked as to whether the first datagram in the segment buffer has the next expected sequence number and is complete (as described with reference to *Figure 12*, a datagram can be split over more than one datagram, and if this happens then the full set of datagrams must be received before they can be proc-

Ex.1002 / Page 671 of 1008
Cisco Systems, Inc.

essed). If this question is answered in the affirmative then the datagram can be processed, and at step **2504** the first level two message header in the datagram is read to obtain the length of the data following it and the message queue into which it is to be placed. The indicated amount of data is then removed from the segment buffer and placed in the correct queue at step **2505**, with the level two header and MTP header being discarded. At step **2506** a question is asked as to whether there is another level two header, and if this question is answered in the affirmative then control is returned to step **2504**. If it is answered in the negative, or if the question asked at step **2503** is answered in the negative, to the effect that the next datagram in segment buffer **908** is not the next expected one, control is returned to step **2501** and the process waits for more data.

Figure 26

[0105] *Figure 26* details process **1007**, which processes incoming streamed datagrams. Since streamed datagrams do not have to be ordered, there is no necessity for an incoming streamed segment buffer. Thus at step **2601** a streamed datagram is received from process **1006**, and at step **2602** the first level two message header in the datagram is read to obtain the length of the data following it and the message queue into which it is to be placed. The indicated amount of data is then removed from the datagram and placed in the correct queue at step **2603**, with the level two header and MTP header being discarded. At step **2604** a question is asked as to whether there is another level two header, and if this question is answered in the affirmative then control is returned to step **2602**. If it is answered in the negative, control is returned to step **2601** and the process waits for more data.

Figure 27

[0106] *Figure 27* details background processing process **1008**. (This process is suspended on the server if the session is stalled. It is never suspended on the client.) At step **2701** the process considers whether or not a latency-measurement datagram needs to be sent. If so, a flag is set which triggers the question asked at step **1805**, as to whether such a datagram should be sent, to be answered in the affirmative. It also triggers the question asked at step **1702** as to whether a heartbeat datagram is needed, which is asked only if both segment buffers are empty, to be answered in the affirmative. Thus if there is an outgoing datagram at the point where a latency-measurement datagram is required, then that datagram has its SYN field **1202** set. However, if there is no outgoing datagram then process **1003** creates one at step **1703**. This is referred to as a heartbeat, but it is also a latency-measurement datagram. (It is also possible to use the KAL field **1213** as a heartbeat. A datagram with this field set is not acknowledged and not used as a latency-measuring datagram, but merely indicates that the connection is open.)

[0107] At step **2702** the process negotiates a new heartbeat rate, if required. This is the maximum interval that should pass without data being sent on either the server or client side. If no data is sent, then a heartbeat datagram, which is an empty streamed datagram with the SYN field **1202** set, is sent. The server does not send heartbeats during stalling of a session. This is achieved by the suspension of process **1008** when a session is stalled. The negotiation of a heartbeat rate, although available to both client and server, is in this embodiment predominantly initiated by the client and will therefore be described with reference to *Figure 42*.

[0108] At step **2703** the process flags the necessity for an extended acknowledgement, if one is due, which leads to the question asked by process **1003** at step **1803** being answered in the affirmative. At step **2704** the process marks for resending any datagrams that have not been acknowledged within a timeout, and are thus still within their respective segment buffer **905** or **906**. This is done by flagging the datagram for resending, and it also increments the value in resend field **1119** by one, to indicate the number of times the datagram has been resent.

[0109] At step **2705** the process updates the timeouts based on connection characteristics. The timeout for a transactional datagram is equal to (or slightly larger than) the round trip time calculated at step **1905**. The timeout for a streamed datagram is equal to (or slightly larger than) the round trip time calculated at step **1905** plus the time that the process will wait before sending an extended acknowledgement.

[0110] At step **2706** the process recalculates the data transmission rate, if necessary. This recalculation is done at specified intervals, and thus may not be carried out on every cycle.

[0111] At step **2707** the process sends an update of network characteristics to the application server, for use by the applications. In this embodiment this update includes the amount of data currently being sent per second (in datagrams or in bytes), the amount of data in the segment buffer that has the most data, or alternatively in both segment buffers, and the round trip time; in other embodiments the update could include more or less information.

[0112] Control is then returned to step **2701** and the process cycles until terminated.

Figure 28

[0113] *Figure 28* illustrates an extended acknowledgement. The MTP header **1105** and data **1106** of a datagram are shown. In the header **1105** the EACK field **1204** is set. The acknowledgement number field **1212** contains the sequence number of the most recent streamed datagram received. The data portion **1106** contains a list of sequence numbers **2801**, **2802** and **2803**

Ex.1002 / Page 672 of 1008
Cisco Systems, Inc.

that are lower than the number contained in field 1212 but which have not been received. The datagrams corresponding to these numbers are therefore negatively acknowledged.

[0114] Thus data packets or datagrams are transmitted from a first station such as RTDP 101 for reception at a second station such as PDA 511. The PDA 511 receives at least one of the transmitted packets in an input buffer, identifies at least one transmitted packet that has not been received as an identified non-received packet, and transmits an indication back to the server station indicating the identified non-received packet.

Figure 28A

[0115] *Figure* 28A illustrates two of the different ways in which transactional and streamed data is treated. The word data is herein applied to all kinds of data, including the information received from feeds 503 to 507, the messages containing the information produced by application server 501 and the datagrams that contain a part or whole of these messages produced by real time data server 502, the messages received by a terminal and the information displayed by that terminal to the user.

[0116] Application server 501, part of real time data provider 101, produces transactional messages 2811, 2812, 2813 and 2814 and streamed messages 2815, 2816, 2817 and 2818. Process 1102 on real time data server 502 sends these messages to a terminal such as PDA 511 in the form of datagrams. Transactional messages 2811 to 2814 are split and sent as part of datagram 2819, 2820 and 2821. For example, datagram 2819 may consist of a part of message 2811, a part of message 2812 and a part of message 2814. Streamed messages 2815 to 2818 are not split. Thus datagram 2825 consists of the whole of messages 2815 and 2816. Datagram 2826 consists of message 2817. The whole of message 2818 cannot also fit into the datagram, and so it is sent even though it is not at the maximum size. Datagram 2827 contains message 2818. Thus transactional messages may be split over at least two datagrams, while streamed messages must be contained within a datagram.

[0117] Another difference in the treatment of transactional and streamed data is the method of acknowledgement. Thus each of transactional datagrams 2819 to 2821 is individually acknowledged using acknowledgements 2822, 2823 and 2824. However, streamed datagrams 2825 to 2827 may be acknowledged by PDA 511 using a single extended acknowledgement 2828, unless they are control datagrams that have a field such as SYN 1202, RESET 1208 or FINISH 1209 set, in which case they are individually acknowledged.

Figure 29

[0118] *Figure 29* details step 2706, at which the data transmission rate is calculated by updating the transmission interval (the time that process 1003 waits after sending a datagram before sending another datagram). Although each of the streamed and transactional data being sent from the RTDP 101 to each of its clients is relatively small in data terms, it must be provided in a timely fashion. Congestion should therefore be avoided. Existing protocols such as TCP merely react to congestion rather than preventing it, and as shown in *Figure 4* have a very slow restart when a connection is cut off.

[0119] This problem is solved by having a separate transmission rate for each terminal, and constantly monitoring each of these rates to keep it optimum. Thus at step 2901 a question is asked as to whether the interval since the last update is less than the product of 1.25 and the round trip time calculated at step 1905. If this question is answered in the negative then it is not yet time to perform the calculation and step 2706 is concluded. This is because the effect of a previous update to the transmission rate is not felt until at least one round trip time later, and thus the calculation interval is a small amount more than the round trip time - a quarter of the round trip time in this embodiment.

[0120] However, if the question is answered in the affirmative then at step 2902 the total number of resends in the streamed segment buffer 906 is determined and set as the value of a variable R. The number of resends is a sum of the number of datagrams in the buffer that are tagged to be resent, with an indication that a datagram is on its second resend adding two to the total, an indication that a datagram is on its third resent adding three to the total, and so on.

[0121] At step 2903 a question is asked as to whether the value of R is zero, meaning that there are no datagrams in the buffer that are being resent. This indicates that the rate of transmission can be increased. Thus if this question is answered in the affirmative then a further question is asked at step 2904 as to whether the current interval between transmissions is significantly larger than a value saved as the "current best interval". If this question is answered in the affirmative then the transmission interval is decreased by a first, larger amount at step 2905, while if it is answered in the negative then the transmission interval is decreased by a second, smaller amount at step 2906. This means that when the transmission interval is much larger than the last known achievable interval, the transmission interval is decreased much faster than when it is close to it.

[0122] If the question asked at step 2903 is answered in the negative, to the effect that R is not zero, then at step 2907 a question is asked as to whether R is less than a certain threshold. If this question is answered in the affirmative then the transmission rate is not changed. If, however, it is answered in the negative then a further question is asked at step 2908 as to whether R is significantly smaller than the previous value of R. If this question is answered in the affirmative then the rate is not altered, even though R is above the threshold, because this value of R may be an anomaly.

Ex.1002 / Page 673 of 1008
Cisco Systems, Inc.

[0123] If R is above the threshold and not significantly smaller than the previous R, then this indicates that there are too many resends and the interval between datagram transmissions needs to be increased. However, first a question is asked at step **2909** as to whether the last change in the interval was a decrease. If this question is answered in the affirmative then the current transmission interval is the lowest known achievable interval at the current time, and so it is saved as the current best at step **2910**. The transmission interval is then increased at step **2911** (the step size used in this embodiment is larger than both of the step sizes used for decreasing the transmission interval).

[0124] The algorithm described herein is a robust method of attempting to increase the rate of datagram transmissions while minimising the number of resends, using continual and rapid adjustment. It provides a quick response to decreases in the available network bandwidth and a fast restart when transmission is temporarily cut off or after a congestion spike. Clearly the implementation details of the algorithm, such as the number of step sizes and what is meant by "significantly large" could be changed.

[0125] In this embodiment, due to the small receive buffer of PDA **511**, it is only possible to send one datagram at a time. However, in other embodiments, the method could be altered by sending more than one datagram at once when the transmission interval reaches a certain low threshold. It can be more efficient to send two packets at once at a larger interval than to continue decreasing the transmission interval.

[0126] Additionally, in another embodiment it could be the transactional segment buffer or both segment buffers that are considered when summing the resends.

Figure 30

[0127] *Figure 30* details process **1009**, which performs session maintenance. This process notes certain information available in the headers of datagrams as they arrive and maintains the client sessions accordingly, but does not interfere with the processing of the datagrams. Thus at step **3001** a datagram is received, and at step **3002** a question is asked as to whether the datagram header contains valid session details, for example session number, encryption and so on.

[0128] If this question is answered in the negative, meaning either that the datagram has no session number or that it contains invalid session details, then at step **3003** a further question is asked as to whether the datagram is requesting a new session, indicated by the lack of a session number and the setting of SYN field **1202**. If this question is answered in the affirmative then at step **3004** a new session is created for the client that sent the datagram. This includes creating session data **803** and validating the new session, ie checking whether a valid account number for an active account, valid name and correct password have been supplied, and is in practice performed by calling a subroutine on application server **501**, on which the user details are stored.

[0129] An answer in the negative to the question asked at step **3003** means that there is a problem of some kind with the datagram, for example it relates to a terminated session or the session details do not match, and so the session is ended at step **3012** by sending a reset datagram (a datagram in which the RESET field **1108** is set) to the originating IP address and removing the session data, if there is any.

[0130] If the question asked at step **3002** is answered in the affirmative, to the effect that the session details are valid, then a further question is asked at step **3005** as to whether the IP address from which the datagram was sent matches the IP address held in the session variables. If this question is answered in the negative then at step **3006** the IP address is updated in the session variables. The client could change IP addresses for a number of reasons. The main ones are that a client that has moved between networks or cells, thus changing its mobile IP address, or that a client deliberately terminated its IP connection in order to fully use bandwidth for another function, for example to make a telephone call. In this case the client would probably be assigned a different IP address on reconnection, even if it is in the same cell of the same network. However, this functionality of MTP allows the client to immediately restore the session without visible delay to the user.

[0131] At step **3007** a question is asked as to whether the datagram is terminating the session, indicated by a setting of FINISH field **1209**. If this question is answered in the affirmative then the session is ended at step **3012**, but if it is answered in the negative then at step **3008** a question is asked as to whether another datagram has been received for this session within two timeouts and if is answered in the affirmative then control is returned to step **3001**. This timeout is different from the resend timeouts discussed with reference to *Figure 27*, and is set by the heartbeat rate. The heartbeat rate is the maximum interval which should pass without receiving data from a client.

[0132] Thus, if the question is answered in the affirmative, indicating that since the receipt of the last datagram a period of time equal to two timeouts has passed with no further communication from the client, then at step **3009** the session is placed in a stalled state. This involves noting in the session variables that the session is stalled, which prevents any more datagrams from being sent to the client. In this embodiment, this involves suspending datagram reception process **1104** and background processing process **1109**. A stalled session can occur because the network connection to the client has been broken, because the PDA **511** does not currently require the real time data and has therefore stopped communicating, because the PDA **511** has been switched off without ending the session, and so on.

[0133] At step **3010** a question is asked as to whether a datagram has been received for this session within ten

Ex.1002 / Page 674 of 1008
Cisco Systems, Inc.

minutes of the session being placed in a stalled state, and if this question is answered in the affirmative then the stall is ended and control is returned to step 3001. Ending a stall involves changing the session state and restarting any suspended processes. This will then have the effect of resending any datagrams that have not been acknowledged. However, in an alternative embodiment the streamed data buffer 906, and possibly the streamed message queues 1405 to 1407, could be flushed on the ending of a stall.

[0134] If, however, the question asked at step 3010 is answered in the negative then at step 3012 the session is ended. The session is closed after a long stall firstly for security measures, because the user may have left his terminal unattended, and secondly to prevent memory space being used for an unwanted session, for example if the terminal has been switched off.

[0135] Stalling as described above solves the problem with spoofing - that on reconnection the telecoms gateway sends a large amount of data all at once to the terminal, thus negating any value obtained by managing data transmission rate as described with reference to *Figure 29*. Instead, when the connection is broken and the real time data server 502 stops receiving datagrams from PDA 511 the session is stalled and the real time data server 502 sends no more datagrams. Thus the telecoms gateway builds up a very small amount of data, if any, to send on when the connection is re-established.

[0136] The second problem solved here is the maintenance of a session when the PDA 511 moves between cells in a telecoms network or indeed between networks. As soon as an incoming datagram that has the correct session ID and encryption but a different IP address is received, the IP address in the session data 804 is immediately updated so that datagrams intended for PDA 511 are sent to that IP address. The user therefore perceives very little, if any, delay when moving between IP addresses.

Figure 30A

[0137] The updating of IP addresses described with respect to step 3006 is illustrated in *Figure 30A*. A session is described by its session data 804 stored on application server 501. It includes a session ID field 901 containing a session ID 3020 and an IP address field 3021 containing an IP address 3022. The session may be in an active state or may move to a stalled state, as shown by arrow 3023, when no communication is received from the client within two timeouts as set by the heartbeat rate.

[0138] A datagram 3024 is received by real time data server 502. It includes a source IP address field 1112 in its IP header 1103 and a session ID field 1210 in its MTP header 1210. The session ID 3020 matches the session ID in field 901. However, the IP address 3025 does not match the IP address 3021 in the IP header 3022. The session data 804 is therefore updated immediately by replacing the IP address in field 3021 with IP address 3025. All datagrams produced are now sent to this new address. Receipt of datagram 3024 also ends any stall, if one existed, and so the session is shown as active.

Figure 31

[0139] *Figure 31* details application server 501. It comprises a central processing unit (CPU) 3101 having a clock frequency of 3GHz, a main memory 3102 comprising 2GB of dynamic RAM and local storage 3103 provided by a 130GB disk array. A CD-ROM disk drive 3104 allows instructions to be loaded onto local storage 3103 from a CD-ROM 3105. A Gigabit Ethernet card 3106 facilitates intranet connection to the real time data server 502 and the feeds 503 to 507.

Figure 32

[0140] *Figure 32* details steps carried out by application server 501. At step 3201 the application server 501 is switched on and at step 3202 a question is asked as to whether the necessary instructions are already installed. If this question is answered in the negative then at step 3203 a further question is asked as to whether the instructions should be loaded from the intranet. If this question is answered in the affirmative then at step 3204 the instructions are downloaded from a network 3205. If it is answered in the negative then at step 3206 the instructions are loaded from a CD-ROM 3207.

[0141] Following either of steps 3204 or 3206 the instructions are installed at step 3208. At this point, or if the question asked at step 3202 is answered in the negative, the instructions are executed at step 3209. At step 3210 the application server is switched off. In practice this will happen very infrequently, for example for maintenance.

Figure 33

[0142] *Figure 33* details the contents of memory 3002 during the running of application server 501. An operating system 3301 provides operating system instructions for common system tasks and device abstraction. The Windows™ XP™ operating system is used. Alternatively, a Macintosh™, Unix™ or Linux™ operating system provides similar functionality. Application server instructions 3302 include an application manager 3303 and applications 3304, 3305, 3306, 3307, 3308 and 3309, including an application for each of data feeds 503 to 507. Application data 3310 is data used by the applications 3304 to 3309 and user account data 3311 comprises details of users' accounts, including the validation data information required when starting a session. Live data feed buffers 3312 are buffers for feeds 503 to 507. Other data includes data used by the operating system and application server instructions.

Ex.1002 / Page 675 of 1008
Cisco Systems, Inc.

Figure 34

[0143] *Figure 34* details the instructions executed by application manager 3303 at step 3208. At step 3401 a client logs on successfully to start a session, and at step 3402 the user's application requirements, as stored in his account, are noted. These include the exact data in which the user is interested, for example stocks updates and news stories. At step 3403 a default level of service is selected, which is also retrieved from the user account. Levels of service will be discussed further with reference to *Figure 36*.

[0144] At step 3404 the application server 501 communicates with the client via real time data server 502 by sending messages. The content of these messages is determined by the user's application requirements and the current level of service.

[0145] At step 3405 a question is asked as to whether the session is stalled, which will be indicated to the application server 501 by real time data server 502, and if this question is answered in the affirmative then at step 3406 a question is asked as to whether the stall has ended. If this question is answered in the affirmative then at step 3407 a selective update of data is performed and control is returned to step 3404. While the session is stalled, the application server 501 does not send any messages to real time data server 502.

[0146] If either of the questions asked at steps 3405 or 3406 is answered in the negative, to the effect that the session is not stalled or that the stall has not ended, then at step 3408 a further question is asked as to whether the session has ended. If this question is answered in the affirmative then the session ends at step 3411. If, however, it is answered in the negative then at step 3409 any change in application requirements received from the client via real time data server 502 is processed, and at step 3410 any received network conditions update is processed to change the level of service, if necessary. Control is then returned to step 3404.

[0147] Although this process is described here in terms of a single client and session, the skilled user will appreciate that step 3208 involves application server 501 performing these steps for every session.

Figure 35

[0148] *Figure 35* details the selective update performed at step 3407. At step 3501 all waiting transactional messages are sent. At step 3502 the waiting streamed messages are examined to identify messages that relate to the same data. If any are found, then the older ones are deleted. This means that if during a stall two or more updates have been produced for the same data, as is particularly likely with stock prices, then only the newest update is sent. At step 3503 concatenation of messages is performed if possible. This means that updates for data that have the same priority level could be amalgamated into one message, instead of being sent as individual messages. Finally, at step 3504, the streamed messages are sent.

[0149] Thus, on a selective update, transactional messages are all sent, whereas only the newest streamed data is sent in order to avoid overloading the network and the client.

Figure 36

[0150] As described with respect to *Figure 27*, the real time data server 502 periodically supplies to application server 501 updates of certain network condition indicators, which in this example comprise the current effective bandwidth, given by the amount of data being sent per second, the amount of data in one or more buffers, and the current round trip time. (In this sense, network includes the real time data server and the client, as well as the internet, mobile telephony network or LAN, or any other networks in between.) The values of these indicators provide to the application server 502 information regarding the amount of data that can be sent to this client. The applications 3304 to 3309 then use this information to determine how much information of what type should be sent and at what speed.

[0151] *Figure 36* thus illustrates different ways in which the level of service can be changed. Graph 3601 shows how a news application supplies different information dependent upon the effective bandwidth measurement supplied. When the effective bandwidth is low, then only news headlines are supplied. More effective bandwidth allows news summaries to be supplied, while even more allows limited graphics. When the effective bandwidth is very high, the full stories are sent. This is an example of how the level of service sets the type of data sent.

[0152] Graph 3602 shows how a stock prices application could increase the interval between sending messages as the amount of data in the buffers increases. The application can then supersede data that is waiting to be sent with a newer update to the same data, and amalgamate messages if necessary. This is an example of how the level of service sets the amount of data sent.

[0153] Graph 3603 shows how an exchange rate application could stop sending updates altogether if the connection latency is too high, send only some exchange rates if the connection latency is about normal, and send all the rates that the user is interested in if the latency gets very low. This could be valuable if the user has indicated that he does not want to trade on, and is therefore not interested in, certain exchange rates if the latency is known to be above a certain threshold. This is an example of how the amount and type of data sent could be set by the level of service.

[0154] These graphs are only examples of ways in which network condition indicators could be used to vary the level of service. The exact way in which the level of service varies depends upon the application requirements of the user, the particular type of application, the data that the application supplies, and so on. Also, al-

Ex.1002 / Page 676 of 1008
Cisco Systems, Inc.

though these graphs indicate thresholds and linear correlations, the network conditions could be used so that an increase or decrease in a value triggers an increase or decrease in level of service, such that a particular value does not necessarily indicate a particular level of service. The values of two or more network condition indicators could be combined to indicate whether the level of service should increase or decrease. Additionally, the application manager **3303** could make the necessity to consider network conditions more binding on some applications than others.

[0155] Thus MTP provides an additional advantage over other protocols. Because of its management of transmission rate, as described with reference to *Figure 29*, networks with high bandwidth and low latency are used just as effectively as those with low bandwidth and high latency, but if network conditions are better then more information is sent. Thus if, for example, the user of PDA **511** moves into transmission range of WiFi gateway **118** and the PDA detects this and starts using WiFi instead of a telecoms network, not only does the session maintenance described with reference to *Figure 30* enable the session to be continued seamlessly over the higher capacity network, but the user may immediately perceive a higher level of service, depending upon the application being used. Thus the protocol makes the best possible use of low bandwidth and high latency connections, but also provides high bandwidth, low latency users with a high level of service and perceived functionality.

Figure 37

[0156] *Figure 37* details PDA **511**. As described above, this is an example of a terminal that could be used in a system embodying the invention. It includes a CPU **3701** with a clock speed of 370 megahertz (MHz) with memory **3702** being provided by 64 megabytes (MB) of RAM. 256MB of nonvolatile FLASH memory **3703** is provided for program and data storage. Liquid crystal display **3704** is used to display information to the user. Input/output **3705** processes the input of the keys and buttons **513** while audio input/output **3706** provides a microphone and speaker interface for use with the telephone facility. Universal Serial Bus (USB) input/output **3707** is used to connect PDA **511** to another computer, or to the Internet **110** via a wired connection. GPRS/WiFi connection **3708** and GSM connection **3709** enable PDA **511** to connect to wireless networks, while Ethernet card **3710** enables PDA **511** to connect to a wired network, for example via a docking station on a computer.

Figure 38

[0157] *Figure 38* details steps carried out by PDA **511**. At step **3801** PDA **511** is switched on and at step **3802** a question is asked as to whether the real time application instructions are already installed. If this question is answered in the negative then at step **3803** the instructions are downloaded from a network **3804**. The instructions are then installed at step **3805**.

[0158] At this point, or if the question asked at step **3802** is answered in the negative, the instructions are executed at step **3806**. Instructions for other applications on PDA **511** are executed at step **3807**. At step **3808** the PDA is switched off.

Figure 39

[0159] *Figure 39* details the contents of memory **3702** during step **3806**. An operating system **3901** provides operating system instructions for common system tasks and device abstraction. The Windows™ CE™ operating system is used, but a different PDA-suitable operating system could be used. Data transport instructions **3902**, substantially like those described for the real time data server **502** except that there is only a single session, include MTP instructions. Real time application instructions **3903** include individual real time applications such as financial data application **3904**. Application **3904** takes information provided via datagrams into a message queue and displays it on display **3704** according to its interface and user setups. For example, it may provide stocks prices in a grid with news headlines scrolling along the bottom.

[0160] Web browser instructions **3905** and email client instructions **3905** are provided. These applications could also use MTP to communicate via the real time application provider **101**. RTDP **101** can forward information from and to a third party using TCP and from and to a terminal using MTP. This emphasises that the protocol described herein for providing real time data could be used for communication of many types.

[0161] Session data includes segment buffers, priority buffer and state variables as shown for session data **804** in *Figure 9*. Real time application data **3908** is data used by the application instructions **3903** and user account data **3909** comprises the user's password, name, billing details and so on. Other data includes data used by the operating system and other applications.

Figure 40

[0162] Since MTP is a substantially symmetrical protocol there is no need to describe in detail much of the real time application instructions executed at step **3806**. Datagrams are produced, transmitted and received in substantially the same way as the processes described with reference to *Figure 10*. Thus, as shown in *Figure 40*, step **3806** where the client runs the application instructions comprises the following processes running substantially in parallel. Process **4001** transmits datagrams from the client **511** to the real time data server **502**. It comprises two separate processes: datagram preparation **4002** and output buffer processing **4003**. Processes **4002** and **4003** are substantially identical to processes **1002** and **1003** respectively.

Ex.1002 / Page 677 of 1008
Cisco Systems, Inc.

[0163] Process 4004 receives datagrams from the real time data server 502 and comprises three separate processes: datagram reception 4005, transactional datagram processing 4006 and streamed datagram processing 4007. These processes are substantially identical to processes 1005, 1006 and 1007 respectively.

[0164] Process 4008 performs background processing. This is similar to process 1008, except that process 4008 has no step corresponding to step 2707, at which the real time data server 502 informs the application server 501 of the network conditions. The only substantial difference between the client and the server is that the client does not perform a process corresponding to session maintenance 1009.

[0165] An additional difference is that, in general, a session will be requested and terminated by the user of PDA 511.

[0166] Datagram reception process 4005 includes step 4009, at which a resend latency value is calculated, and background processing 4008 includes step 4010, at which a heartbeat rate is negotiated. These steps correspond to steps 1909 and 2702 respectively. Although the facility for these steps exists on both the real time data server 502 and PDA 511, in practice, in this embodiment, it is only PDA 511 that uses them. They are thus described in *Figure 41* and *Figure 42* respectively.

Figure 41

[0167] *Figure 41* illustrates resend latency measurement. This is the delay caused by having to resend a datagram, as opposed to the connection latency which is the delay caused by the network. Packets sent across the Internet 110 are not guaranteed to arrive, which is why an additional protocol like MTP must be used to ensure eventual delivery. When an MTP datagram gets "lost", meaning that it is not acknowledged, it will be resent. The data it contains, therefore, is more out-of-date than it would have been had it arrived first time. This resend latency is calculated at step 4009.

[0168] In *Figure 41* the original datagram 4101 is transmitted and fails to be delivered. After a time, either through a lack of acknowledgement or a negative acknowledge, the real time data server 502 will resend the datagram. The resent datagram 4102 is also lost. A third attempt 4103 is successful.

[0169] Each datagram contains an elapsed time field 4104. In datagram 4101 this is set to zero. In datagram 4102 it is the difference between the transmission time of datagram 4102 and the transmission time of datagram 4101; similarly for datagram 4103. Thus, for example, the elapsed time field for datagram 4103 is 421 milliseconds.

[0170] Thus a first data packet or datagram is transmitted from a first station, such as server 502, over a network to create a first transmission with the intention of said first transmission being received at a second station, such as PDA 511. The server 502 re-transmits the first data packet to PDA 511 to create a second transmission. The second transmission of the first data packet includes latency information, such as the elapsed time field, indicating the time between the first transmission and the second transmission, and PDA 511 processes the latency information to determine a resend latency measurement.

[0171] When a resent datagram is received the resend latency is recalculated using a smoothing filter on the elapsed time. If no datagrams are received at all then the resend latency is gradually increased. This occurs in this embodiment once a heartbeat period has passed with no receipt of datagrams. However, receipt of any datagram, including transactional datagrams and empty streamed datagrams, will at this point decrease the latency, since it implies that the reason for non-receipt of streamed data may be that there is no data to send, and thus the last received updates may still be current.

[0172] The resend latency is added to the connection latency to give the application latency. This is the actual time delay of the data displayed to the user on PDA 511. Thus the timeliness of the data, according to a function of the length of time taken to reach the client and the possible number of resends it required, is displayed to the user to allow him to make a decision regarding whether or not to use the data. Optionally, when the application latency falls below a certain threshold the screen may "grey out" and transactions may be suspended.

Figure 42

[0173] *Figure 42* details step 4010, at which the PDA 511 negotiates a new heartbeat rate with real time data server 502. The heartbeat rate is the maximum interval that is allowed to pass without sending data, both by the server and by the client: if no data has been sent at the end of this interval then an empty streamed datagram is sent. In this embodiment, this is combined with the connection latency measurement by sending the latency measurement datagram at intervals which are the same as the heartbeat rate. If the server does not receive any data from the client for an interval substantially equal to twice the heartbeat interval, then the session will stall. The client, however, does not stall a session on non-receipt of data, but continues to send data, or heartbeats if there is no data. A heartbeat is in this embodiment usually a latency-measurement datagram, but could be an empty datagram with the KAL field 1213 set.

[0174] Since latency measurements are sent at the heartbeat rate, the latency is more accurate when the heartbeat is faster. This means that when the user is, for example, trading, the heartbeat should be fast, whereas when he is browsing news stories the heartbeat should be slow. Thus the heartbeat negotiation is triggered by events that occur when the PDA 511 switches applications, minimises or maximises applications or enters a particular state in an application.

[0175] At step 4201 a new heartbeat rate is requested

Ex.1002 / Page 678 of 1008
Cisco Systems, Inc.

by sending a datagram that has SYN field 1202 set and a number in acknowledgement number field 1212, but does not have ACK field 1203 set. At step 4202 a question is asked as to whether the heartbeat rate has been agreed by receiving an acknowledgement of this datagram. If this question is answered in the negative then the heartbeat rate is not changed. Alternatively, if the heartbeat rate is agreed, the rate is changed at step 4203.

[0176] Associated with this is the possibility that the client may at any time change its application requirements. For example, on minimising of the display of stock prices the client may, using a transactional datagram, change its application requirements to stop the transmission of stock prices. On using the telephone, which requires as much bandwidth as possible, the client may change its application requirements to cease all transmission of streamed data. When the user returns to the display of stocks then the application requirements can be changed again to indicate that the default requirements apply. However, even when no streamed data is being sent, the client and server continue to send latency measurements at the agreed heartbeat rate. This indicates not only that the connection is still active but allows an immediate display of latency when the user returns to the display of streamed data.

Claims

1. A network data transmission method, comprising the steps of:

   transmitting a first data packet from a first station over a network to create a first transmission with the intention of said first transmission being received at a second station;
   re-transmitting said first data packet from said first station to said second station to create a second transmission, wherein
   said second transmission of said first data packet includes latency information indicating the time between said first transmission and said second transmission; and, at said second station
   processing said latency information to determine a resend latency measurement.

2. A method according to claim 1, wherein said first station retransmits said first data packet if an acknowledgement of said first data packet has not been received from said second station within a specified period of time.

3. A method according to claim 1, wherein said first station retransmits said first data packet if said second station has transmitted an indication that said first data packet has not been received.

4. A method according to claim 1, further including the steps of, at said second station:

   identifying a condition to the effect that an anticipated transmission has not been received from said first station, and
   increasing the measurement of said resend latency.

5. A method according to claim 1, further including the steps of, at said second station:

   receiving a data packet from said first station that does not contain any data; and
   decreasing the measurement of said resend latency.

6. A method according to claim 1, wherein said network includes a radio network.

7. A method according to claim 1, wherein said first station is a server.

8. A method according to claim 1, wherein said second station is one of a plurality of terminals.

9. A method according to claim 8, wherein said terminal is a mobile terminal or a radio device.

10. A radio network data transmission method, comprising the steps of:

    transmitting a first data packet from a server over a radio network to create a first transmission with the intention of said first transmission being received by a mobile terminal;
    re-transmitting said first data packet from said server to said terminal to create a second transmission if an acknowledgement of said first transmission has not been received by said server, wherein
    said second transmission includes latency information indicating the time between said first transmission and said second transmission; and, at said terminal
    processing said latency information to determine a resend latency measurement.

11. A server configured to communicate with at least one terminal over a network, said server configured to:

    transmit a first data packet to a terminal to create a first transmission with the intention of said first transmission being received by said terminal;
    identifying a condition to the effect that said first transmission has not been received as intended;
    calculating latency information indicating a measurement of time between said first trans-

Ex.1002 / Page 679 of 1008
Cisco Systems, Inc.

mission and a proposed re-transmission;
re-transmitting said first data packet to said terminal to create a second transmission, wherein said latency information is included in said second transmission, such that said latency information may be processed by said terminal to determine a measurement of re-send latency.

12. A server according to claim 11, configured to communicate with a plurality of terminals.

13. A server configured to receive data over a network from at least one terminal, said server configured to:

receive a first data packet that includes latency information indicating the time between a first transmission of said first data packet and the received transmission of said first data packet, and
processing said latency information to determine a resend latency measurement.

14. A server according to claim 13 configured to communicate with a plurality of terminals.

15. A terminal configured to communicate with a server over a network, said terminal configured to:

transmit a first data packet to said server to create a first transmission with the intention of said first transmission being received by said server;
identify a condition to the effect that said first transmission has not been received as intended;
calculate latency information indicating a measurement of time between said first transmission and a proposed re-transmission;
re-transmitting said first data packet to said server to create a second transmission, wherein
said latency information is included in said second transmission, such that said latency information may be processed by said server to determine a measurement of re-send latency.

16. A terminal according to claim 15, configured as a mobile terminal or a radio device.

17. A terminal configured to receive data over a network from a server, said terminal configured to:

receive a first data packet that includes latency information indicating the time between a first transmission of said first data packet and the received transmission of said first data packet, and
processing said latency information to determine a resend latency measurement.

18. A terminal according to claim 17, embodied as a mobile terminal or a radio device.

19. Instructions executable by a network of computers or programmable data processing devices such that when executing said instruction stations connection to said network will perform the steps of:

transmitting a first data packet from a first station over said network to create a first transmission with the intention of said first transmission being received at a second station; and
re-transmitting said first data packet from said first station to said second station over said network to create a second transmission, wherein said second transmission of said first data packet includes latency information indicating the time between said first transmission and said second transmission; and, at said second station
processing said latency information to determine a resend latency measurement.

20. Instructions executable by stations connected over a network such that, when executing said instructions, said stations will perform the steps of:

transmitting a first data packet from a first station over said network to create a first transmission with the intention of said first transmission being received by a second station;
re-transmitting said first data packet from said first station to said second station to create a second transmission if an acknowledgement of said first transmission has not been received by said first station, wherein
said second transmission includes latency information indicating the time between said first transmission and said second transmission; and, at said second station
processing said latency information to determine a resend latency measurement.

21. A computer readable medium having machine readable instructions executable by a computer such that when executing said instructions a computer will perform the steps of

transmitting a first data packet to a networked device to create a first transmission with the intention of said first transmission being received by said networked device;
receiving an indication to the effect that said first transmission has not been received as intended;
calculating latency information indicating a measurement of latency between said first transmission and a proposed re-transmission;
re-transmitting said first data packet to said networked device to create a second transmission,

Ex.1002 / Page 680 of 1008
Cisco Systems, Inc.

wherein
said latency information is included in said second transmission, such that said latency information may be processed by said networked device to determine a measurement of re-send latency.

22. A computer readable medium having machine-readable instructions executable by a computer such that when executing said instructions a computer will perform the steps of

receiving a first data packet that includes latency information indicating the time between a first transmission of said first data packet and the received transmission of said first data packet, and
processing said latency information to determine a resend latency measurement.

Ex.1002 / Page 681 of 1008
Cisco Systems, Inc.

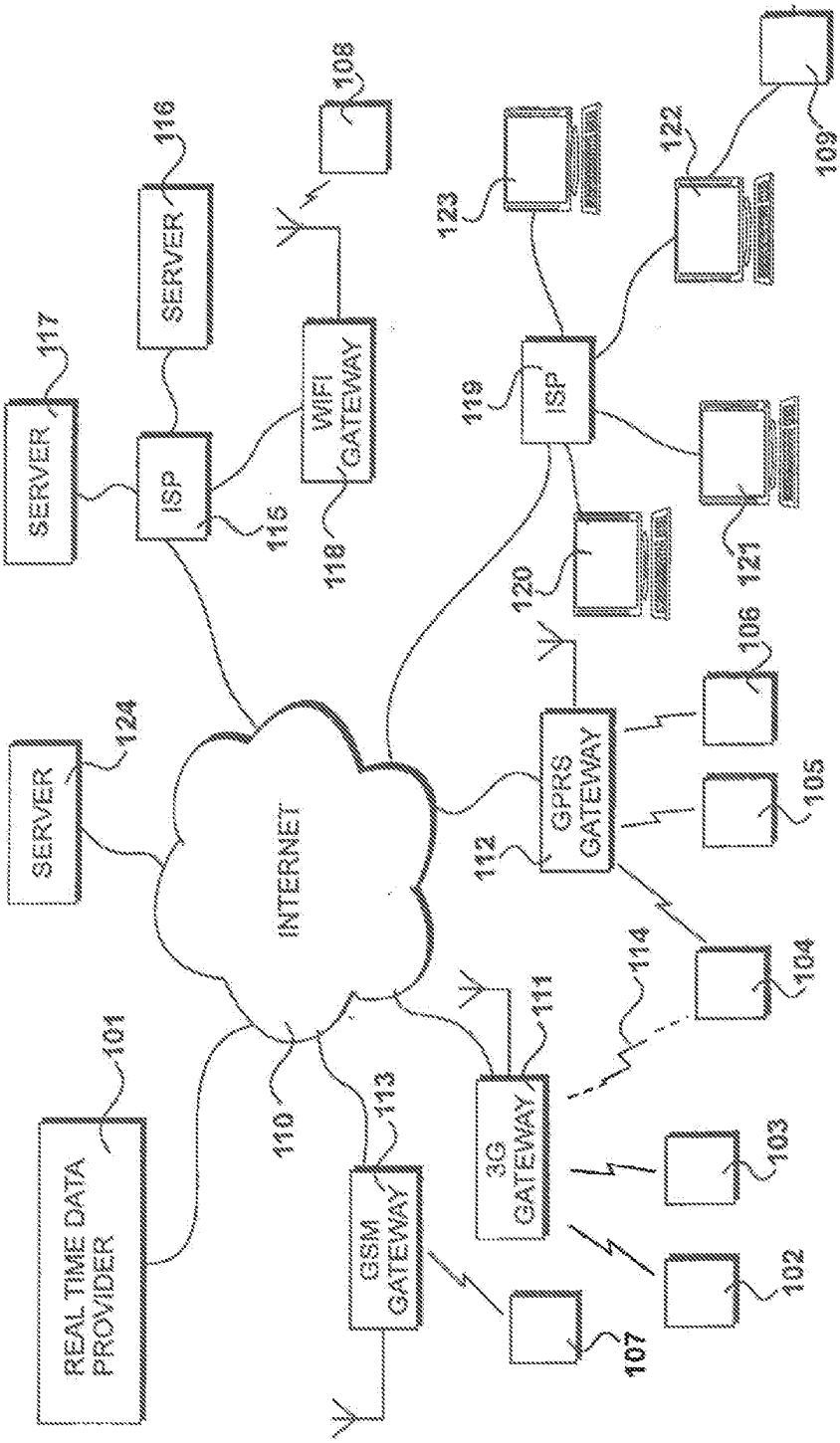

REAL TIME DATA PROVIDER
101
INTERNET
SERVER
124
SERVER
117
SERVER
116
ISP
116
WIFI GATEWAY
118
108
GSM GATEWAY
113
110
3G GATEWAY
111
GPRS GATEWAY
112
ISP
119
123
122
109
120
106
121
105
104
114
103
102
107

Figure 1

GPRS BASE STATION
210
211
GPRS ROUTER
209
[PRIOR ART]
HIGH CAPACITY DATA INTERCONNECT
204
ROUTER
205
206
TELECOMS GATEWAY
207
GPRS GATEWAY
208
GATEWAY
203
202
201
SERVER
ETHERNET

Figure 2

Figure 3

[PRIOR ART]

Figure 4 [PRIOR ART]

514
512
511
513
MTP
515
109
101
APPLICATION SERVER
501
503
504
505
506
507
FIREWALL
509
TCP
508
502
REAL TIME
DATA SERVER
FIREWALL
510
MTP
INTERNET

Figure 5

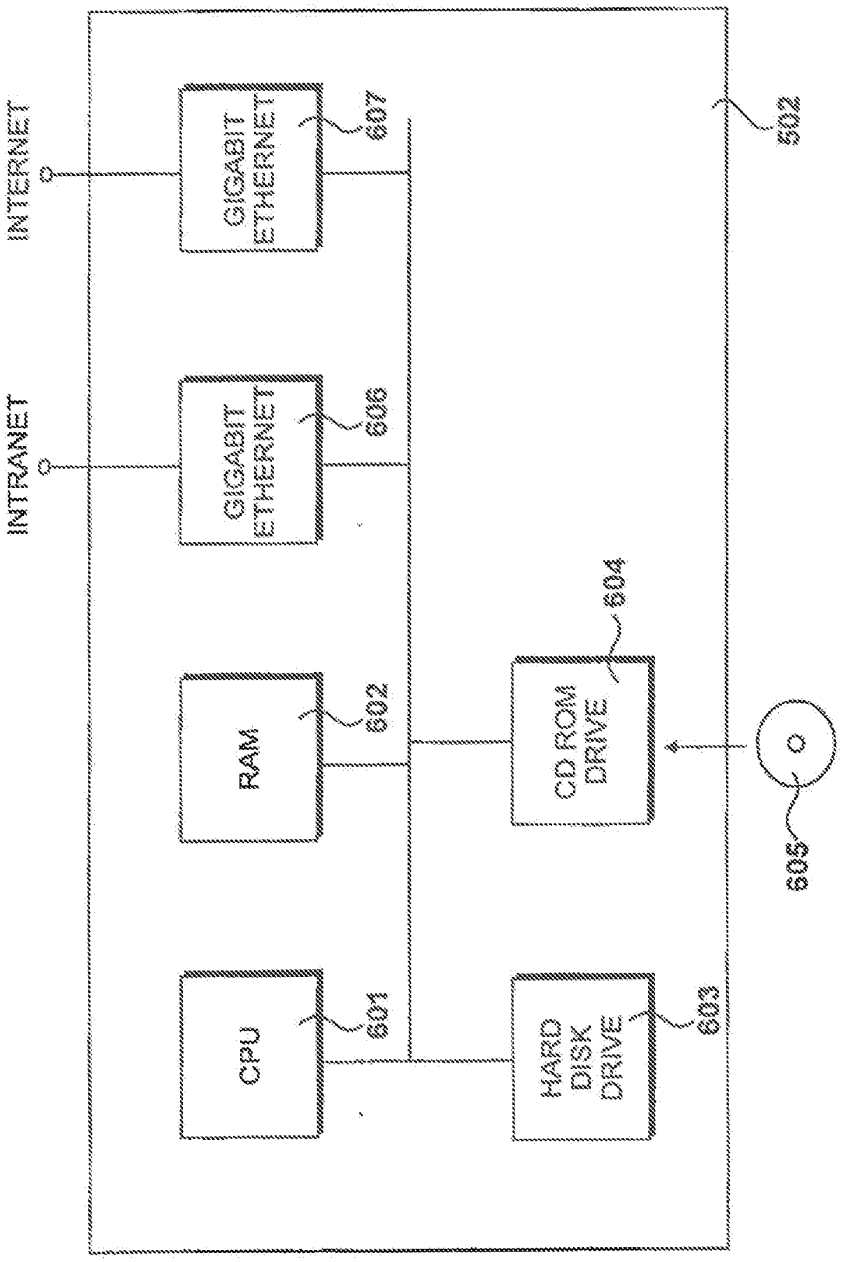

INTERNET
INTRANET
GIGABIT ETHERNET
607
GIGABIT ETHERNET
606
RAM
602
CD ROM DRIVE
604
CPU
601
HARD DISK DRIVE
603
605
502

Figure 6

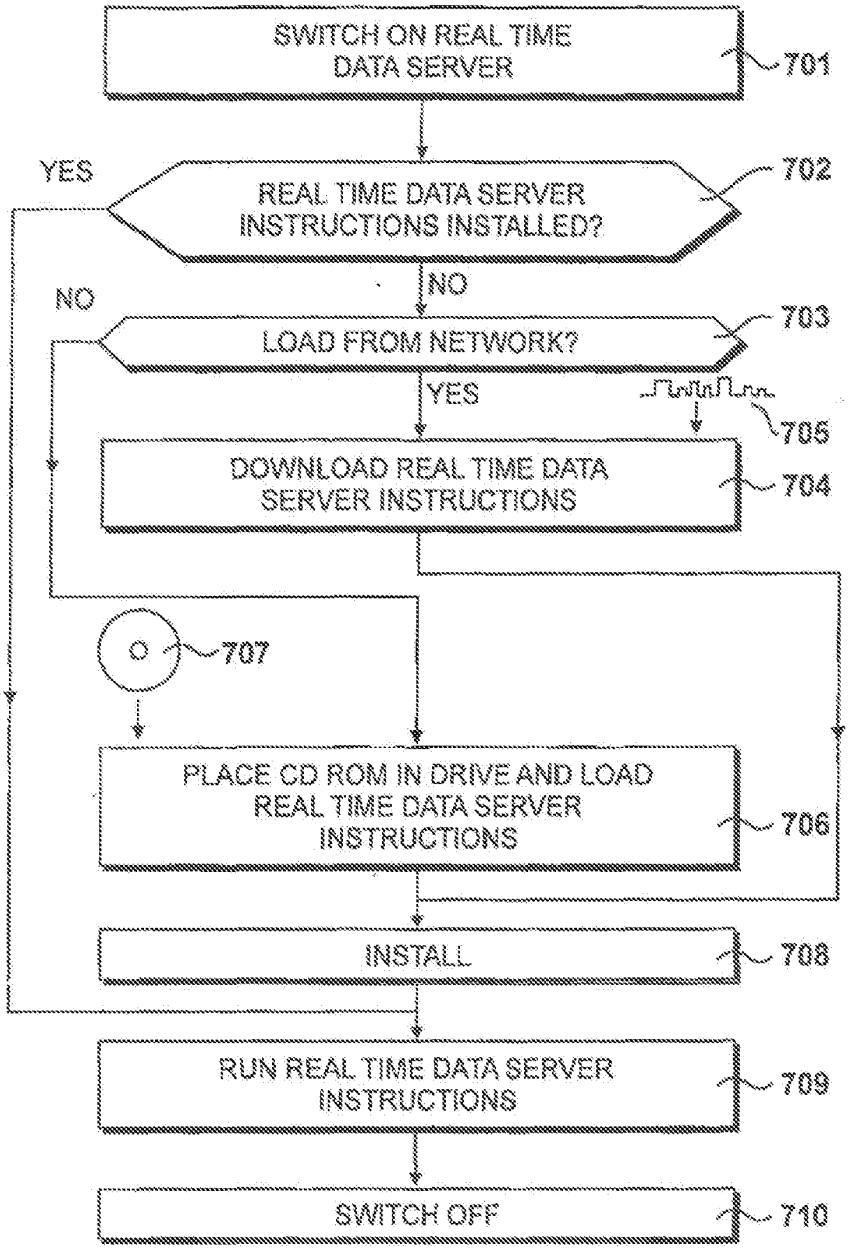

SWITCH ON REAL TIME DATA SERVER
701
YES
REAL TIME DATA SERVER INSTRUCTIONS INSTALLED?
702
NO
NO
LOAD FROM NETWORK?
703
YES
705
DOWNLOAD REAL TIME DATA SERVER INSTRUCTIONS
704
707
PLACE CD ROM IN DRIVE AND LOAD REAL TIME DATA SERVER INSTRUCTIONS
706
INSTALL
708
RUN REAL TIME DATA SERVER INSTRUCTIONS
709
SWITCH OFF
710

Figure 7

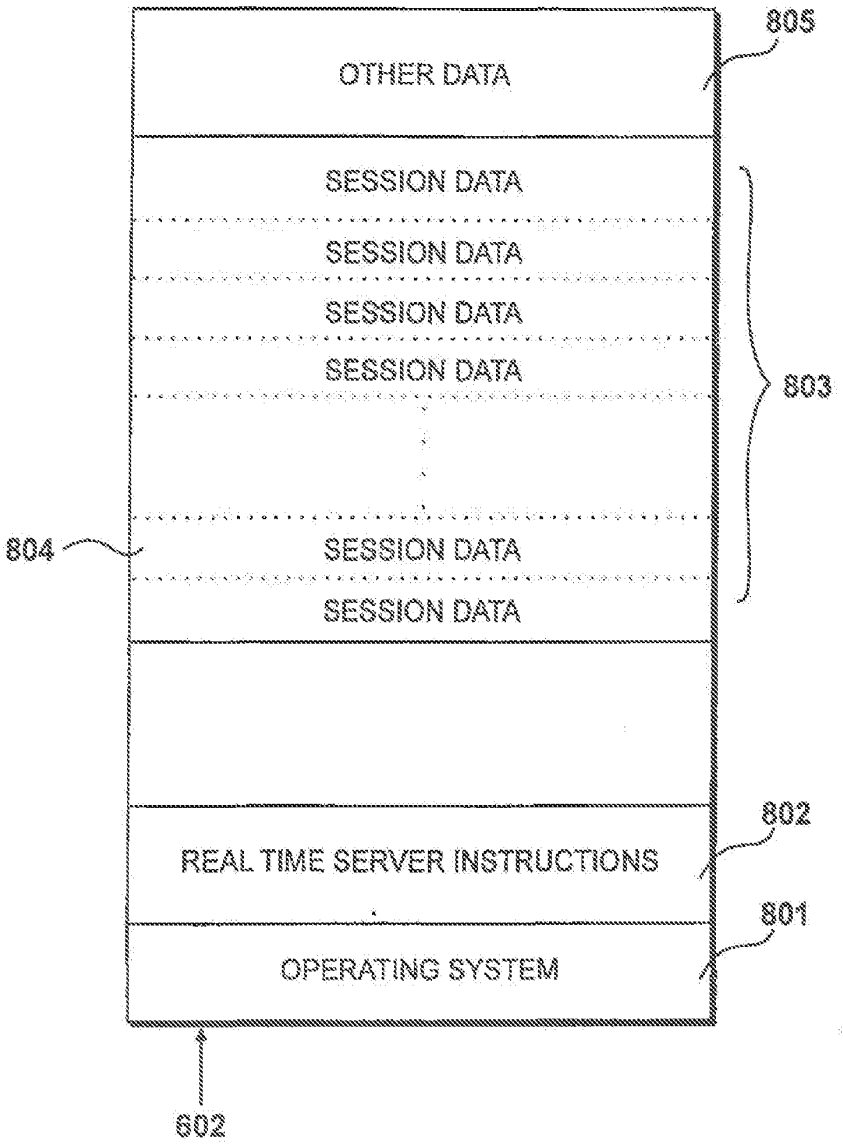

OTHER DATA
805
SESSION DATA
SESSION DATA
SESSION DATA
SESSION DATA
803
804
SESSION DATA
SESSION DATA
REAL TIME SERVER INSTRUCTIONS
802
OPERATING SYSTEM
801
602

Figure 8

901
SESSION ID
902
SESSION STATE VARIABLES
TRANSMITTER
903
905
TRANSACTIONAL SEGMENT BUFFER
906
STREAMED SEGMENT BUFFER
907
MESSAGE QUEUES
RECEIVER
904
908
TRANSACTIONAL SEGMENT BUFFER
909
MESSAGE QUEUES
804

Figure 9

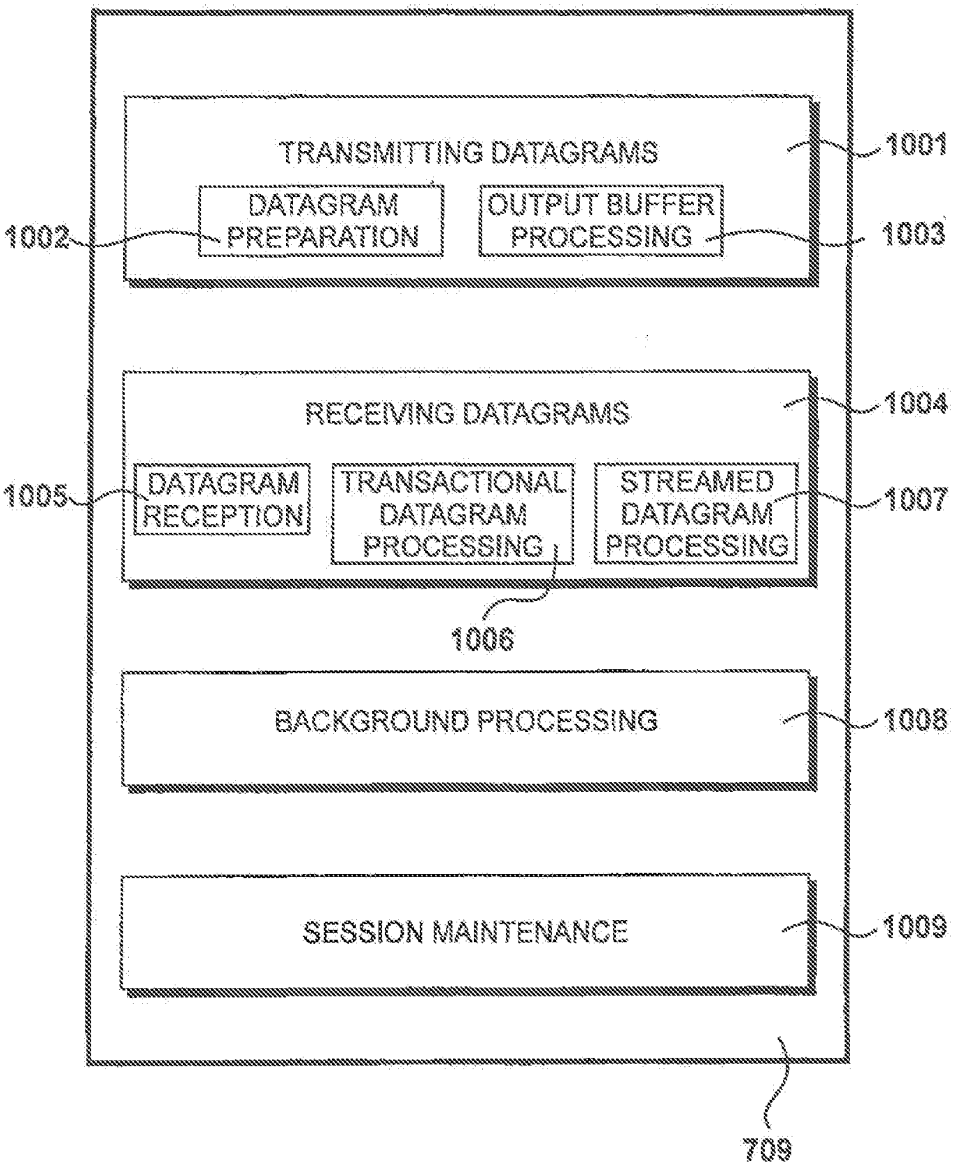

TRANSMITTING DATAGRAMS
1001
DATAGRAM PREPARATION
1002
OUTPUT BUFFER PROCESSING
1003
RECEIVING DATAGRAMS
1004
DATAGRAM RECEPTION
1005
TRANSACTIONAL DATAGRAM PROCESSING
1006
STREAMED DATAGRAM PROCESSING
1007
BACKGROUND PROCESSING
1008
SESSION MAINTENANCE
1009
709

Figure 10

Figure 11

Ex.1002 / Page 692 of 1008
Cisco Systems, Inc.

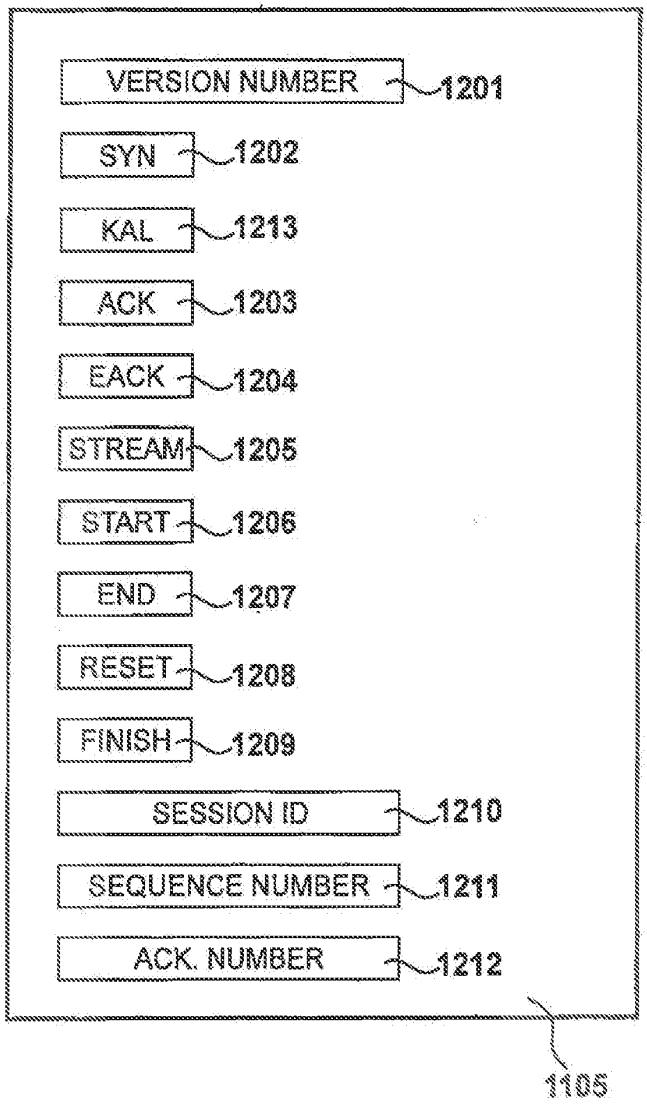

VERSION NUMBER
1201
SYN
1202
KAL
1213
ACK
1203
EACK
1204
STREAM
1205
START
1206
END
1207
RESET
1208
FINISH
1209
SESSION ID
1210
SEQUENCE NUMBER
1211
ACK. NUMBER
1212
1105

Figure 12

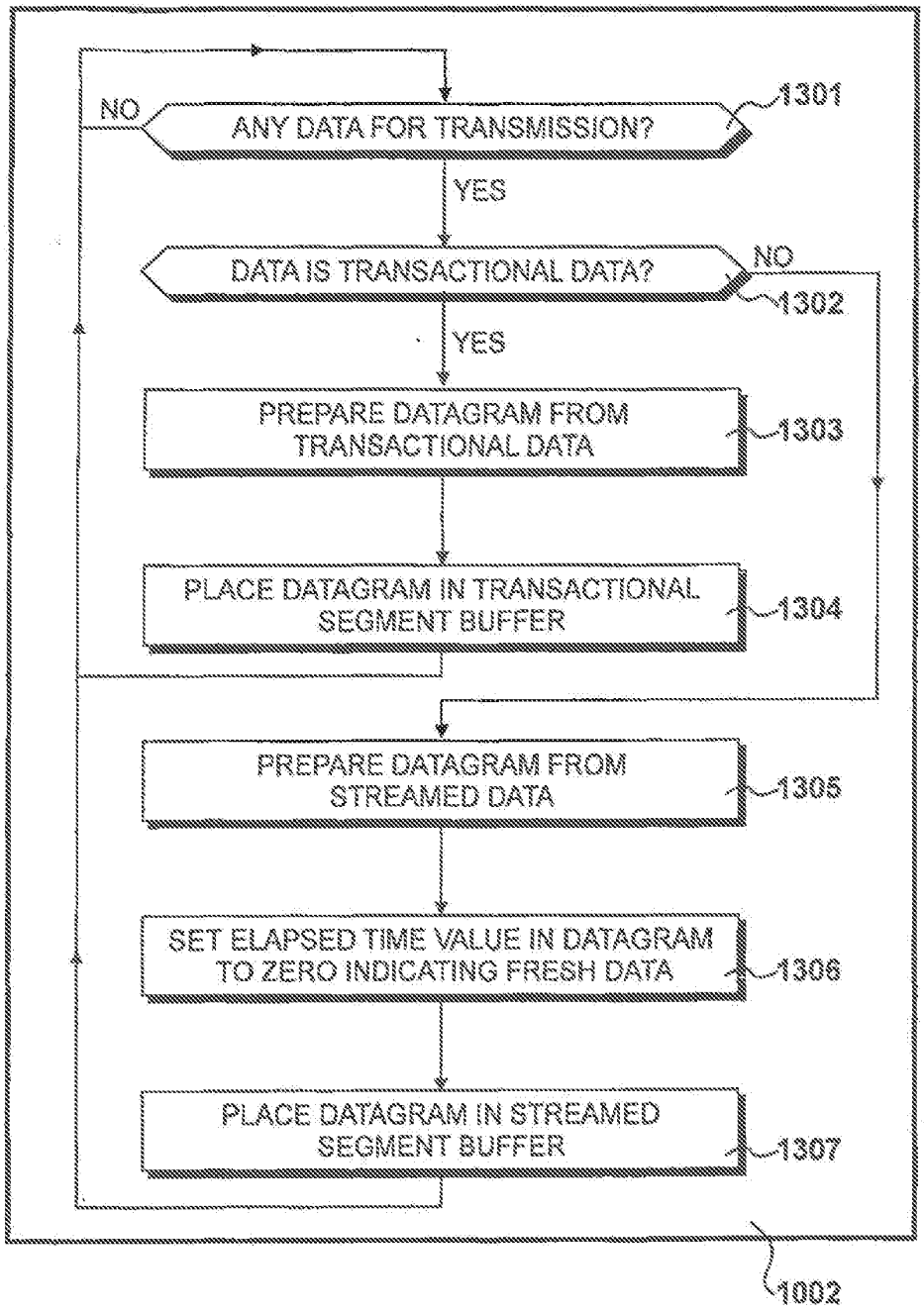

ANY DATA FOR TRANSMISSION?
1301
NO
YES
DATA IS TRANSACTIONAL DATA?
NO
1302
YES
PREPARE DATAGRAM FROM TRANSACTIONAL DATA
1303
PLACE DATAGRAM IN TRANSACTIONAL SEGMENT BUFFER
1304
PREPARE DATAGRAM FROM STREAMED DATA
1305
SET ELAPSED TIME VALUE IN DATAGRAM TO ZERO INDICATING FRESH DATA
1306
PLACE DATAGRAM IN STREAMED SEGMENT BUFFER
1307
1002

Figure 13

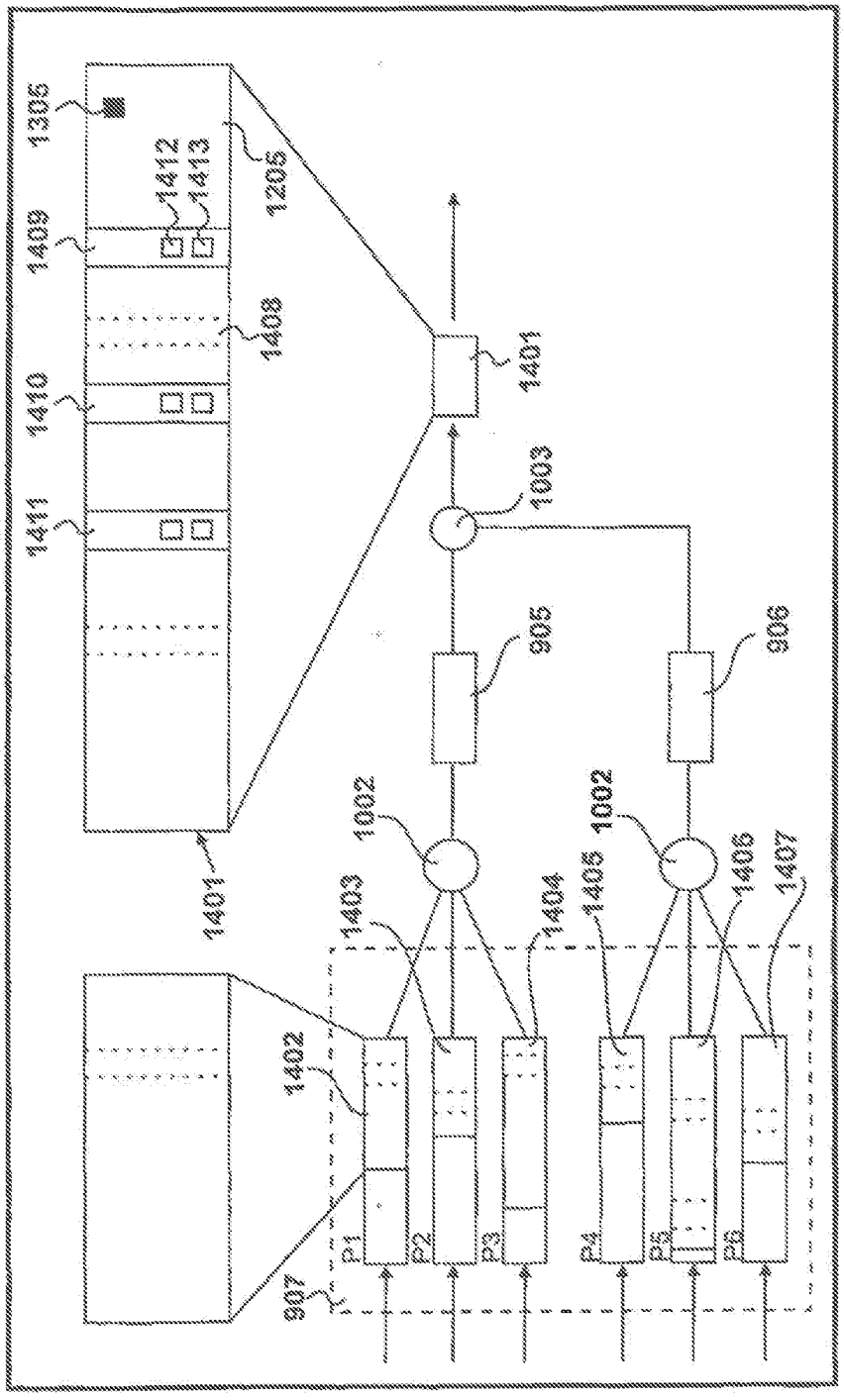

1305
1412
1413
1205
1409
1408
1410
1411
1401
1003
905
906
1002
1002
1403
1404
1405
1406
1407
1402
907
P1
P2
P3
P4
P5
P6

Figure 14

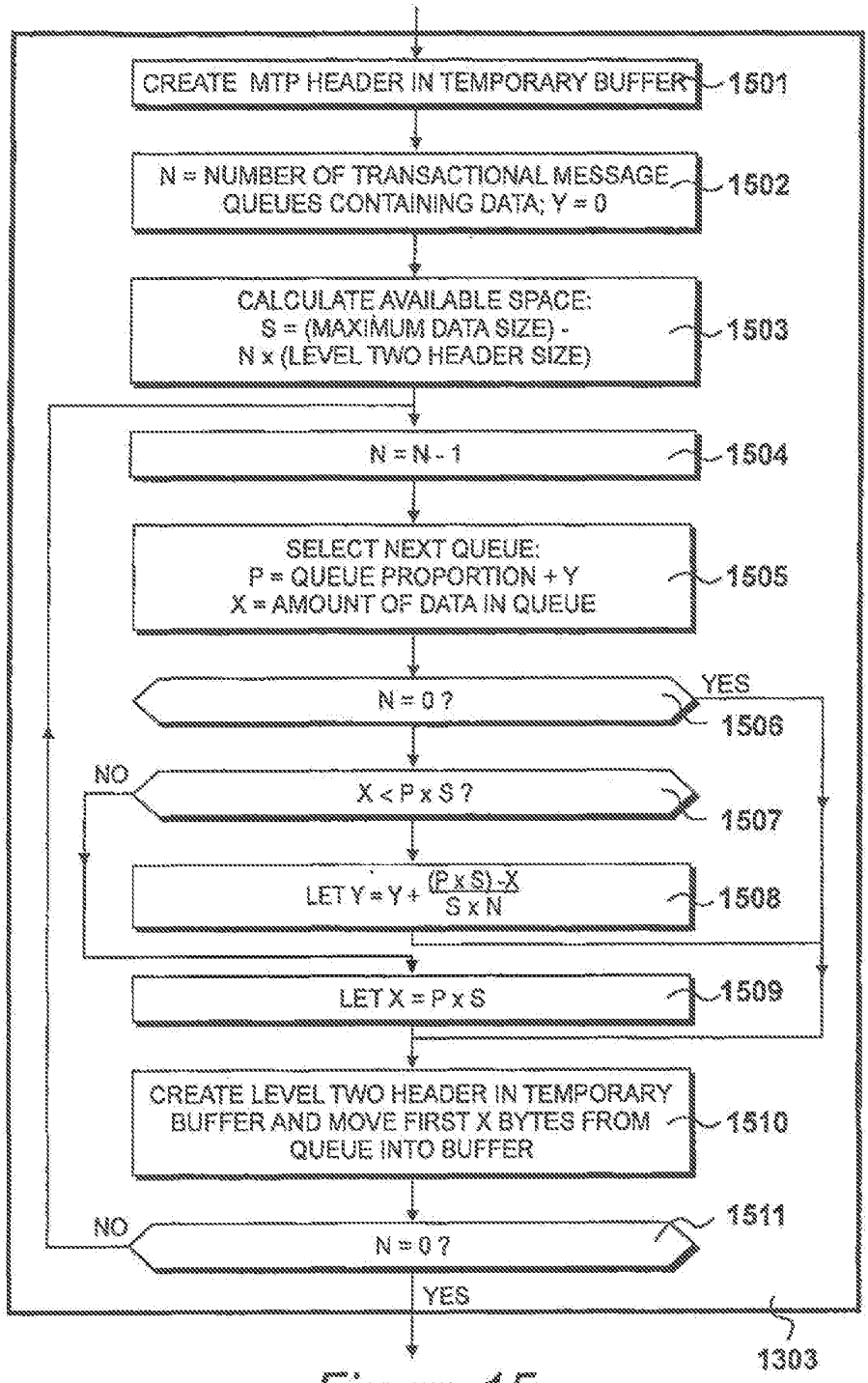


Figure 15

Ex.1002 / Page 696 of 1008
Cisco Systems, Inc.

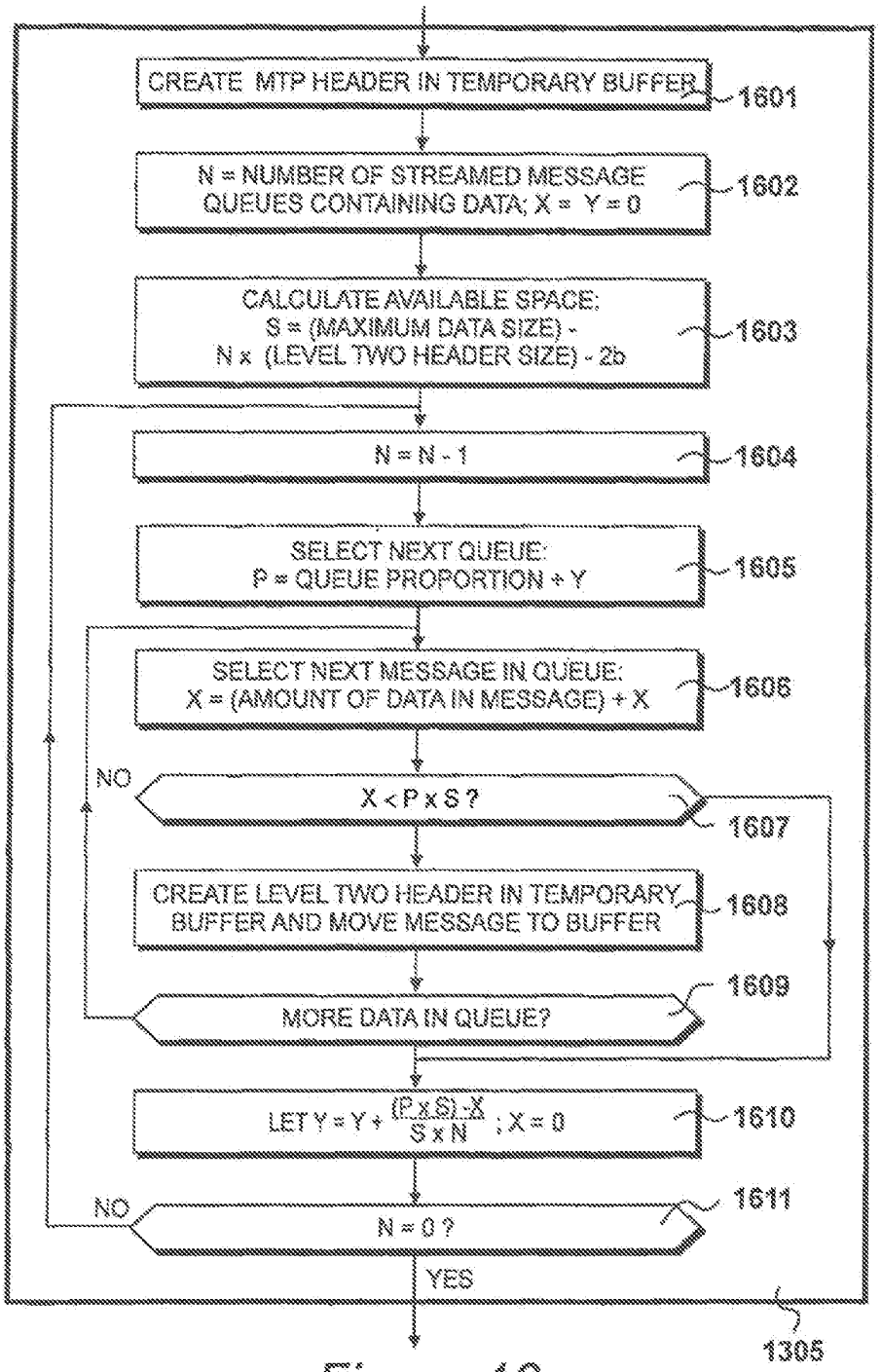

CREATE MTP HEADER IN TEMPORARY BUFFER
1601
N = NUMBER OF STREAMED MESSAGE QUEUES CONTAINING DATA; X = Y = 0
1602
CALCULATE AVAILABLE SPACE: S = (MAXIMUM DATA SIZE) - N x (LEVEL TWO HEADER SIZE) - 2b
1603
N = N - 1
1604
SELECT NEXT QUEUE: P = QUEUE PROPORTION ÷ Y
1605
SELECT NEXT MESSAGE IN QUEUE: X = (AMOUNT OF DATA IN MESSAGE) + X
1606
NO
X < P x S ?
1607
CREATE LEVEL TWO HEADER IN TEMPORARY BUFFER AND MOVE MESSAGE TO BUFFER
1608
1609
MORE DATA IN QUEUE?
LET Y = Y + (P x S) - X / S x N ; X = 0
1610
NO
1611
N = 0 ?
YES
1305

Figure 16

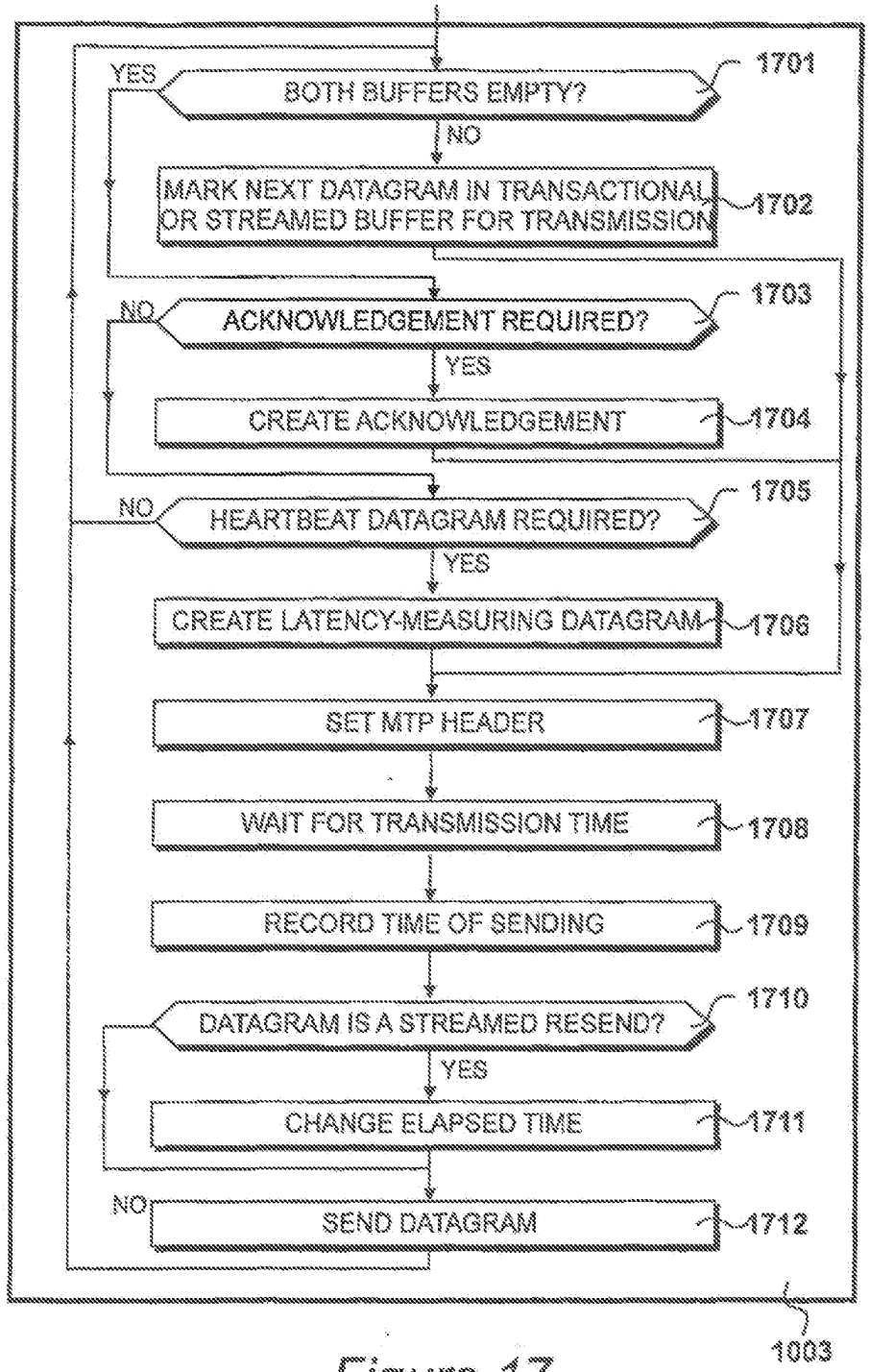

BOTH BUFFERS EMPTY?
1701
YES
NO
MARK NEXT DATAGRAM IN TRANSACTIONAL OR STREAMED BUFFER FOR TRANSMISSION
1702
ACKNOWLEDGEMENT REQUIRED?
1703
NO
YES
CREATE ACKNOWLEDGEMENT
1704
HEARTBEAT DATAGRAM REQUIRED?
1705
NO
YES
CREATE LATENCY-MEASURING DATAGRAM
1706
SET MTP HEADER
1707
WAIT FOR TRANSMISSION TIME
1708
RECORD TIME OF SENDING
1709
DATAGRAM IS A STREAMED RESEND?
1710
YES
CHANGE ELAPSED TIME
1711
NO
SEND DATAGRAM
1712
1003

Figure 17

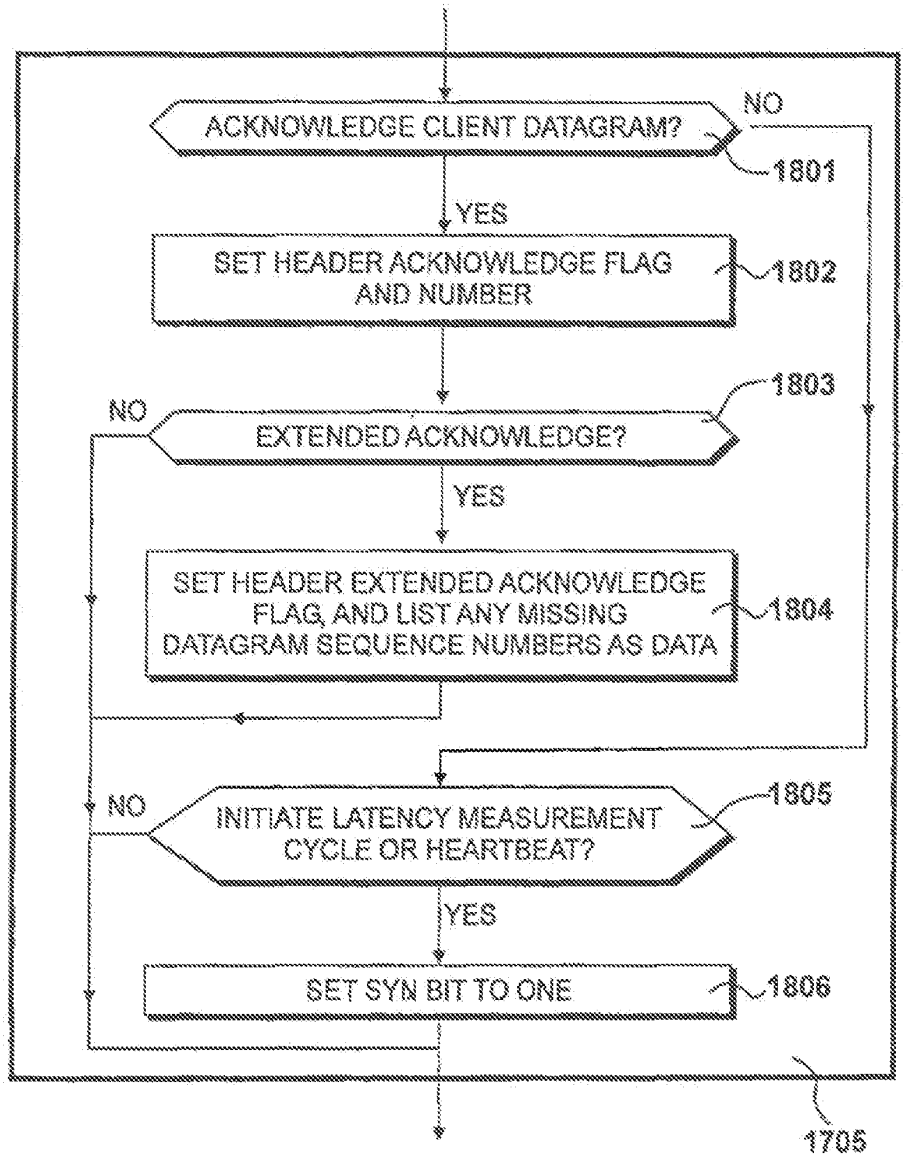

ACKNOWLEDGE CLIENT DATAGRAM?
NO
1801
YES
SET HEADER ACKNOWLEDGE FLAG AND NUMBER
1802
1803
NO
EXTENDED ACKNOWLEDGE?
YES
SET HEADER EXTENDED ACKNOWLEDGE FLAG, AND LIST ANY MISSING DATAGRAM SEQUENCE NUMBERS AS DATA
1804
NO
INITIATE LATENCY MEASUREMENT CYCLE OR HEARTBEAT?
1805
YES
SET SYN BIT TO ONE
1806
1705

Figure 18

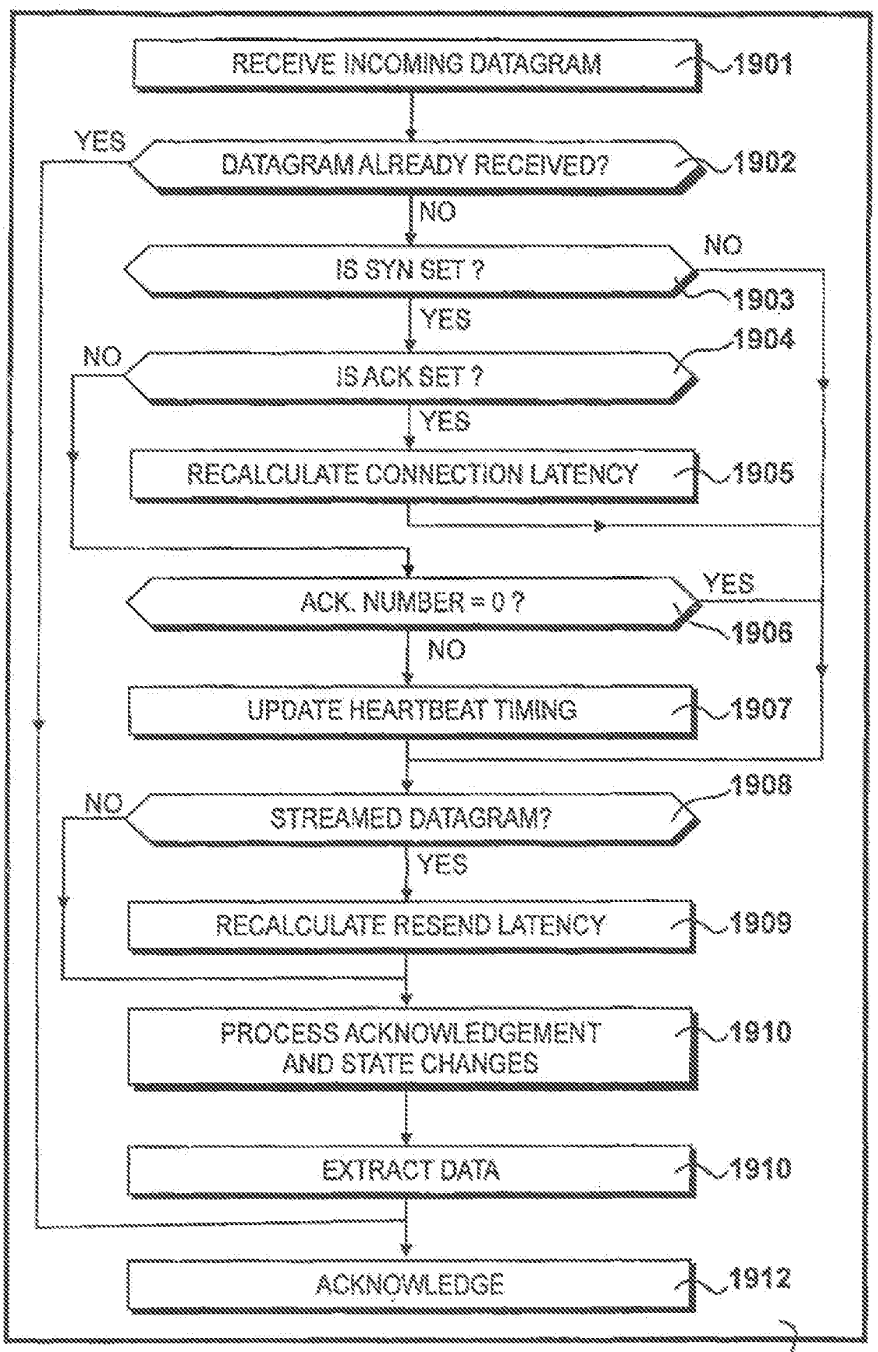

RECEIVE INCOMING DATAGRAM
1901
YES
DATAGRAM ALREADY RECEIVED?
1902
NO
NO
IS SYN SET ?
1903
YES
1904
NO
IS ACK SET ?
YES
RECALCULATE CONNECTION LATENCY
1905
YES
ACK. NUMBER = 0 ?
1906
NO
UPDATE HEARTBEAT TIMING
1907
1908
NO
STREAMED DATAGRAM?
YES
RECALCULATE RESEND LATENCY
1909
PROCESS ACKNOWLEDGEMENT AND STATE CHANGES
1910
EXTRACT DATA
1910
ACKNOWLEDGE
1912
1005

Figure 19

REAL TIME DATA SERVER 502
CLIENT 511
TAG SET
1202
905
TRANSMIT
TRANSMIT DATAGRAM
2004
A
2005
RECEIVE
2003
2002
2001
B
COPY TAG
2006
2007
TRANSMIT
RECEIVE
1202
TRANSMIT DATAGRAM
C
2008
1203
1203
TWO-WAY LATENCY = A + B + C
2006
ONE-WAY LATENCY = A + B + C / 2
FILTERED LATENCY = (1-K) LATENCY + K. FILTERED LATENCY
2008
WHERE K = ADAPTIVE FILTER COEFFICIENT

Figure 20

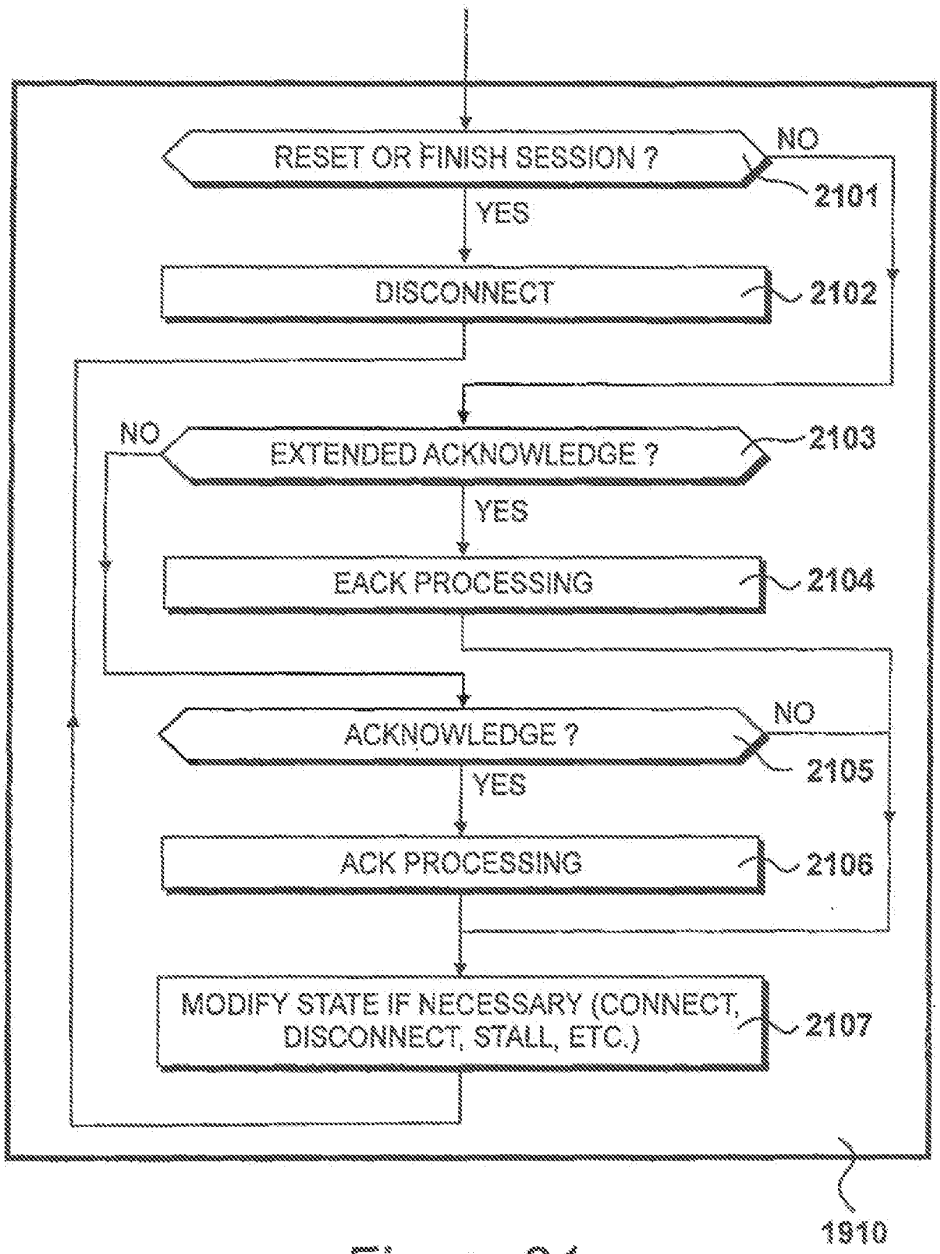

RESET OR FINISH SESSION ?
NO
2101
YES
DISCONNECT
2102
NO
EXTENDED ACKNOWLEDGE ?
2103
YES
EACK PROCESSING
2104
ACKNOWLEDGE ?
NO
2105
YES
ACK PROCESSING
2106
MODIFY STATE IF NECESSARY (CONNECT, DISCONNECT, STALL, ETC.)
2107
1910

Figure 21

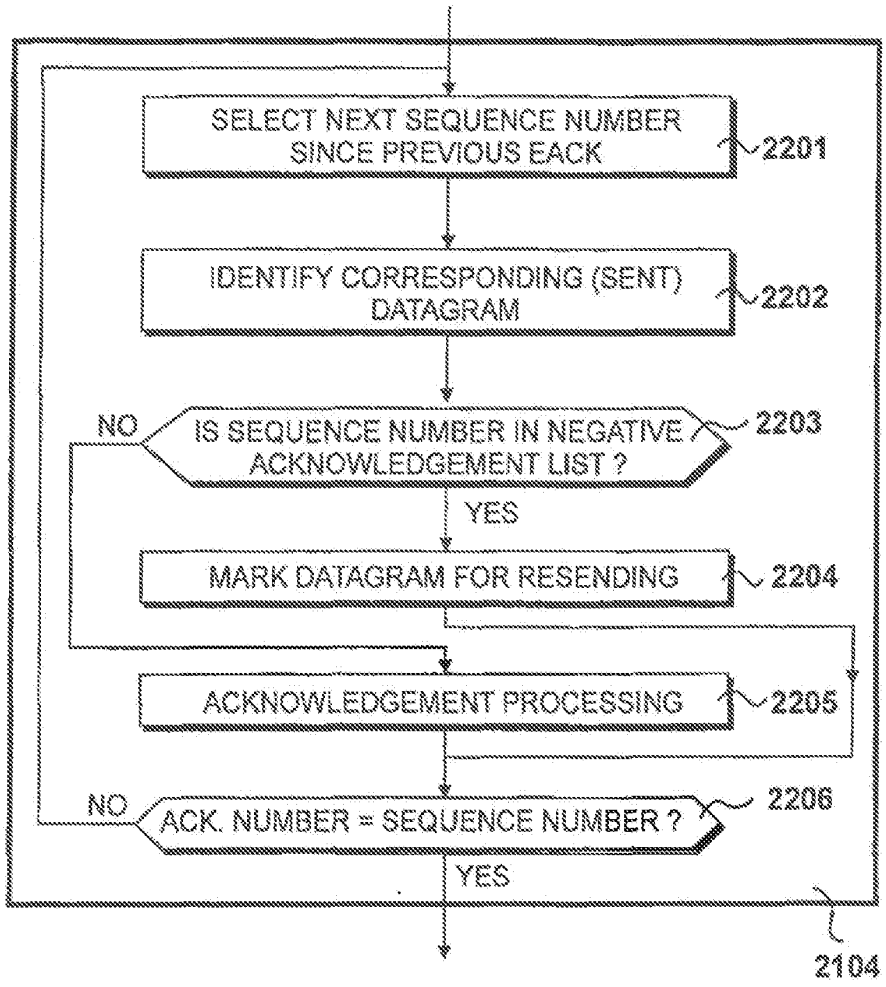


Figure 22

Ex.1002 / Page 703 of 1008
Cisco Systems, Inc.

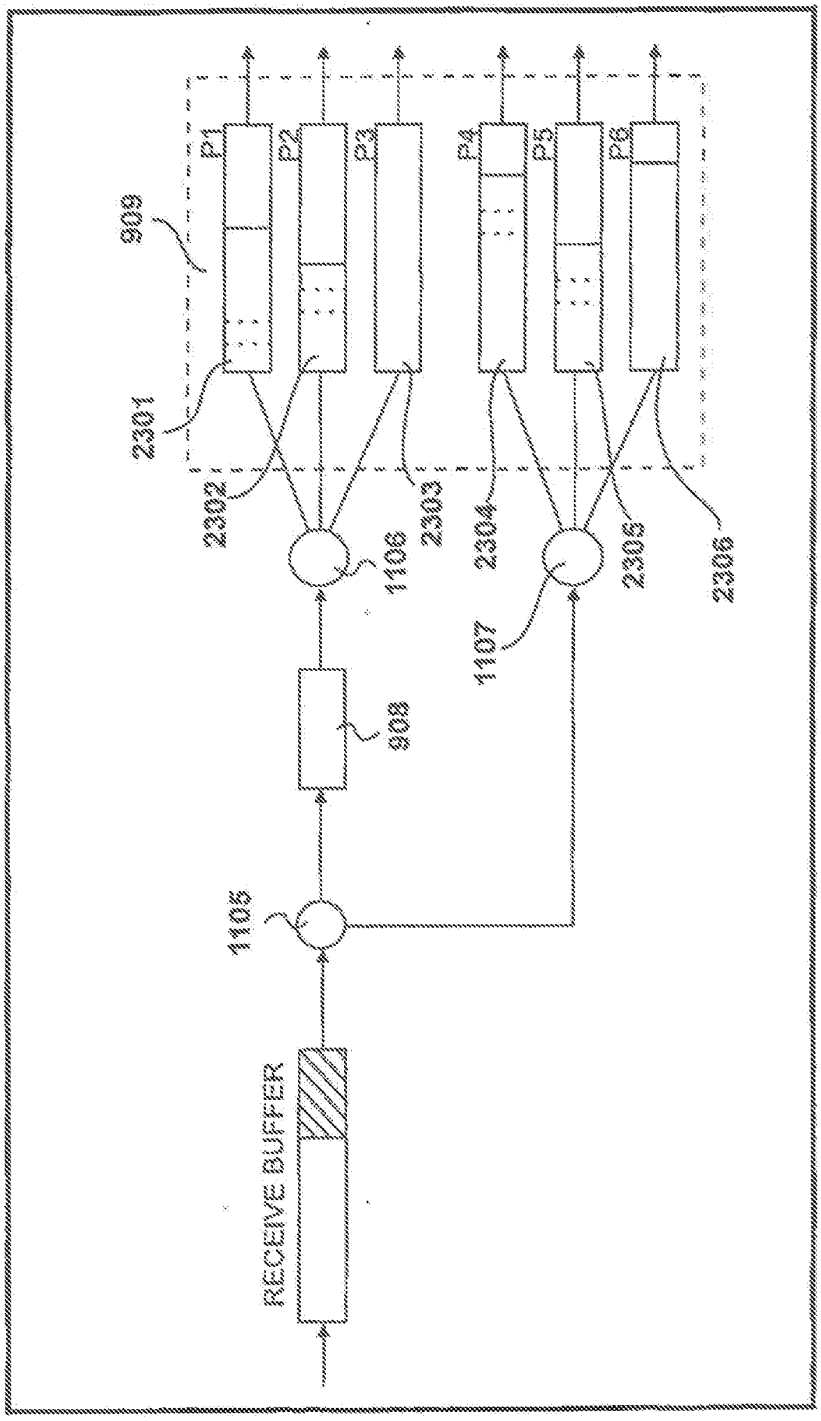

RECEIVE BUFFER
1105
903
1106
1107
909
2301
2302
2303
2304
2305
2306
P1
P2
P3
P4
P5
P6

Figure 23

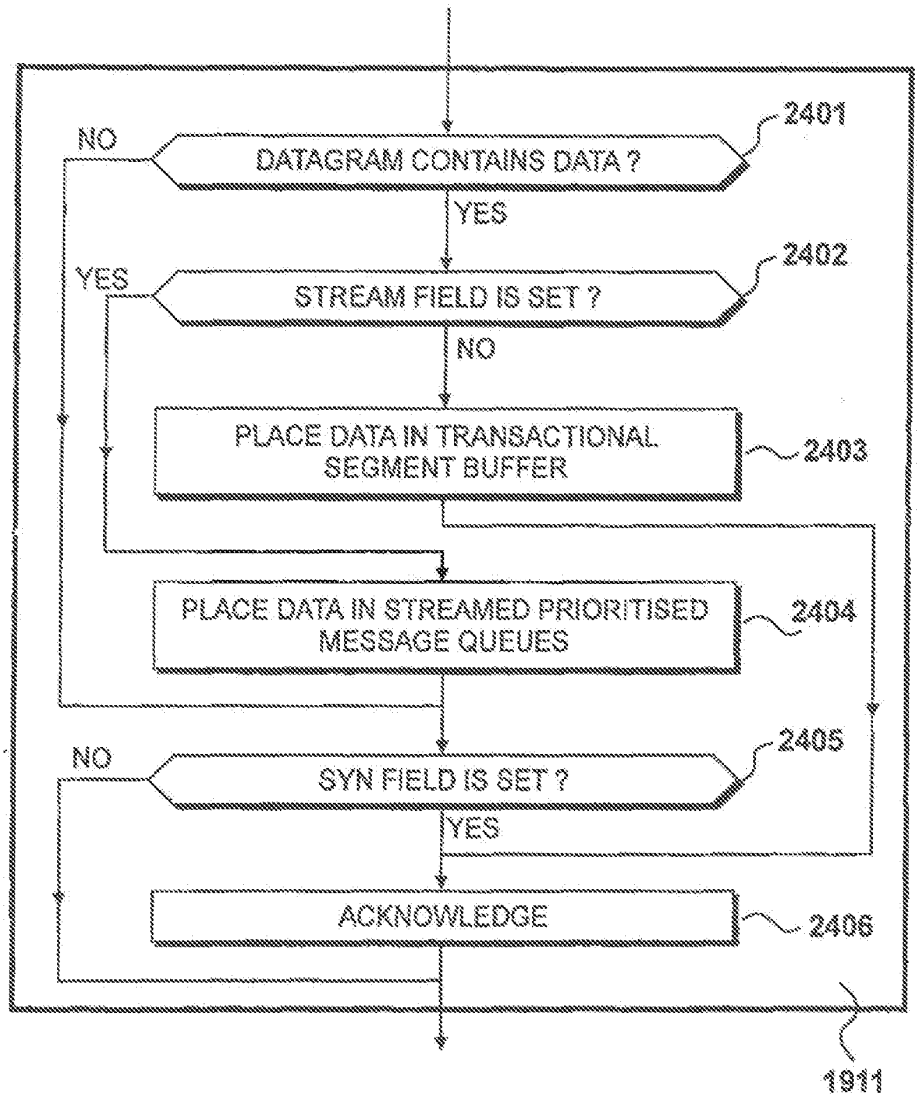

2401
NO
DATAGRAM CONTAINS DATA ?
YES
2402
YES
STREAM FIELD IS SET ?
NO
PLACE DATA IN TRANSACTIONAL SEGMENT BUFFER
2403
PLACE DATA IN STREAMED PRIORITISED MESSAGE QUEUES
2404
2405
NO
SYN FIELD IS SET ?
YES
ACKNOWLEDGE
2406
1911

Figure 24

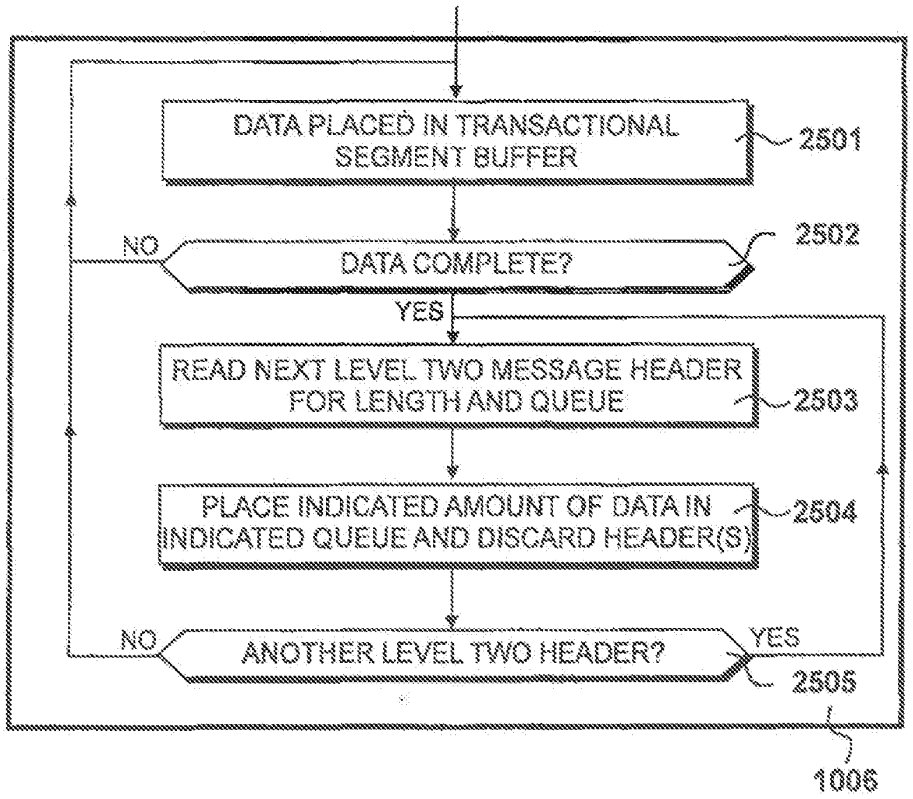

DATA PLACED IN TRANSACTIONAL SEGMENT BUFFER
2501
NO
DATA COMPLETE?
2502
YES
READ NEXT LEVEL TWO MESSAGE HEADER FOR LENGTH AND QUEUE
2503
PLACE INDICATED AMOUNT OF DATA IN INDICATED QUEUE AND DISCARD HEADER(S)
2504
NO
ANOTHER LEVEL TWO HEADER?
YES
2505
1006

Figure 25

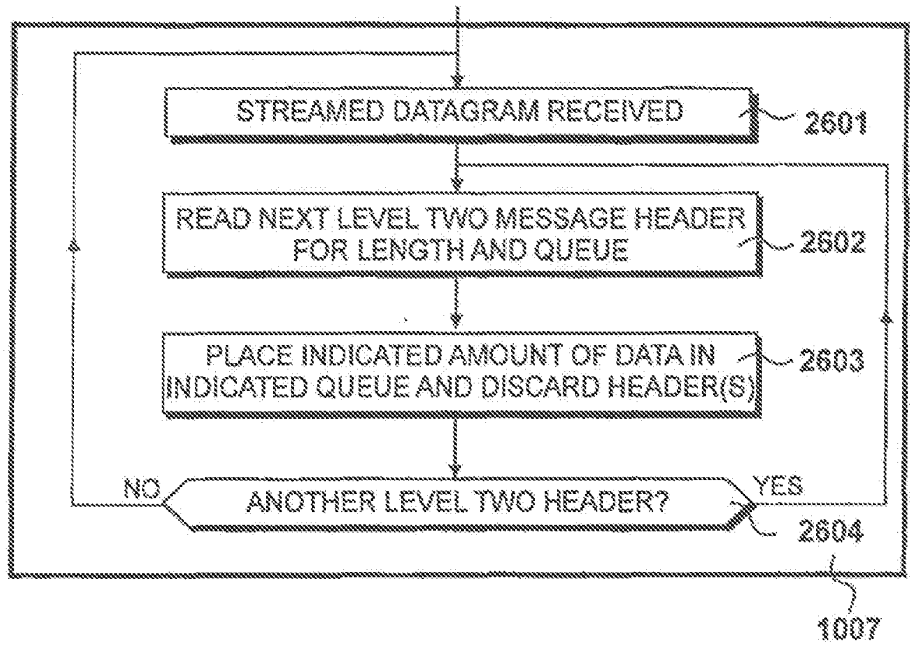

STREAMED DATAGRAM RECEIVED
2601
READ NEXT LEVEL TWO MESSAGE HEADER FOR LENGTH AND QUEUE
2602
PLACE INDICATED AMOUNT OF DATA IN INDICATED QUEUE AND DISCARD HEADER(S)
2603
NO
ANOTHER LEVEL TWO HEADER?
YES
2604
1007

Figure 26

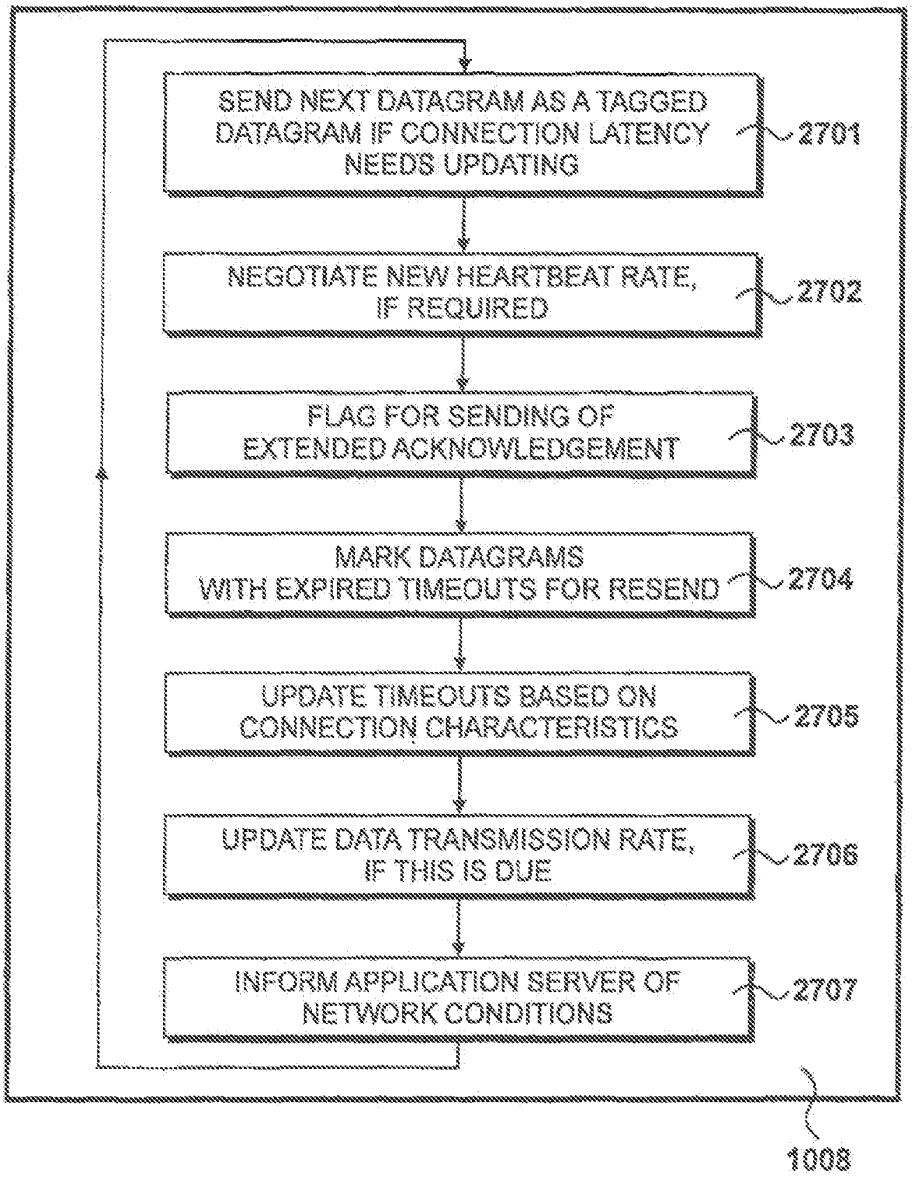

SEND NEXT DATAGRAM AS A TAGGED DATAGRAM IF CONNECTION LATENCY NEEDS UPDATING
2701
NEGOTIATE NEW HEARTBEAT RATE, IF REQUIRED
2702
FLAG FOR SENDING OF EXTENDED ACKNOWLEDGEMENT
2703
MARK DATAGRAMS WITH EXPIRED TIMEOUTS FOR RESEND
2704
UPDATE TIMEOUTS BASED ON CONNECTION CHARACTERISTICS
2705
UPDATE DATA TRANSMISSION RATE, IF THIS IS DUE
2706
INFORM APPLICATION SERVER OF NETWORK CONDITIONS
2707
1008

Figure 27

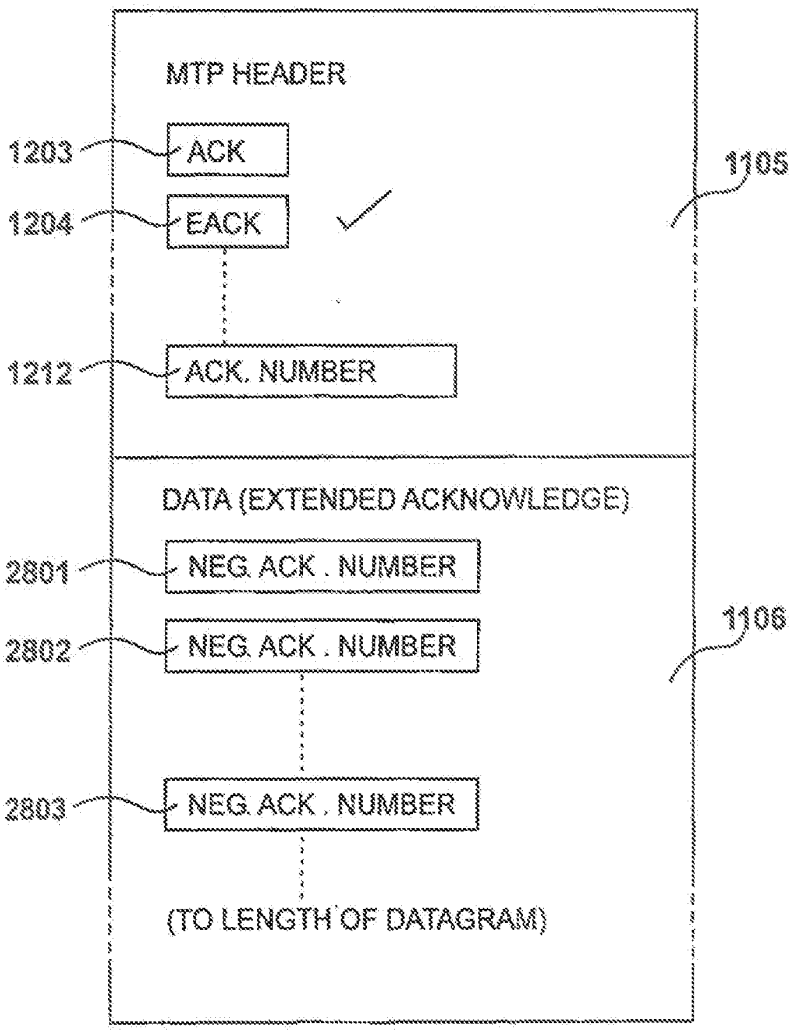

MTP HEADER
1203
ACK
1204
EACK
1105
1212
ACK. NUMBER
DATA (EXTENDED ACKNOWLEDGE)
2801
NEG. ACK . NUMBER
2802
NEG. ACK . NUMBER
1106
2803
NEG. ACK . NUMBER
(TO LENGTH OF DATAGRAM)

Figure 28

PDA
311
REAL TIME
DATA PROVIDER
101
1102
1102
2811
2812
2813
2814
2815
2816
2817
2818
2819
2820
2821
2822
2823
2824
2825
2826
2827
2828
ACK
ACK
ACK
EACK

Figure 28A

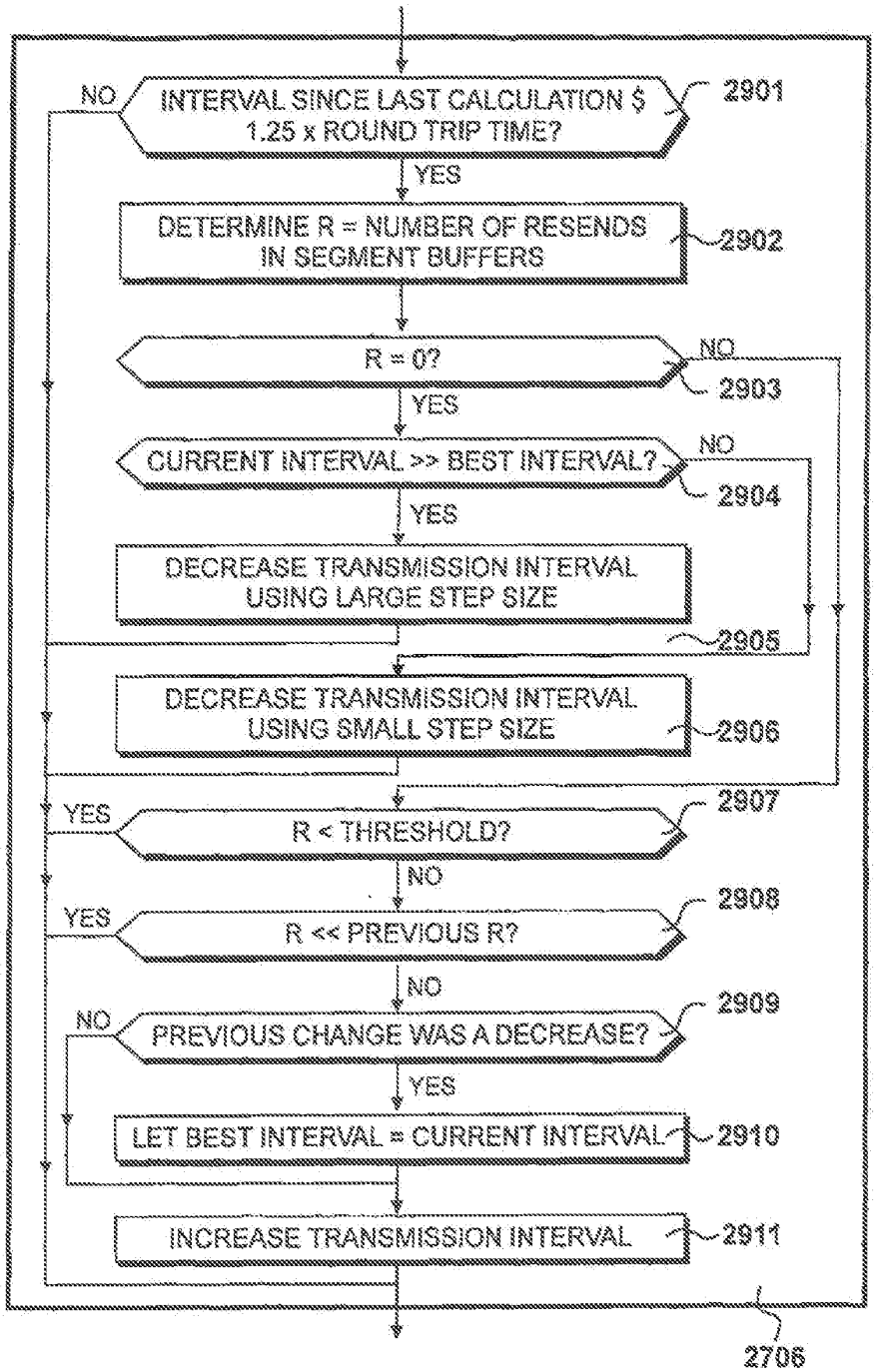

INTERVAL SINCE LAST CALCULATION $ 1.25 x ROUND TRIP TIME?
2901
NO
YES
DETERMINE R = NUMBER OF RESENDS IN SEGMENT BUFFERS
2902
R = 0?
NO
2903
YES
CURRENT INTERVAL >> BEST INTERVAL?
NO
2904
YES
DECREASE TRANSMISSION INTERVAL USING LARGE STEP SIZE
2905
DECREASE TRANSMISSION INTERVAL USING SMALL STEP SIZE
2906
R < THRESHOLD?
2907
YES
NO
R << PREVIOUS R?
2908
YES
NO
PREVIOUS CHANGE WAS A DECREASE?
2909
NO
YES
LET BEST INTERVAL = CURRENT INTERVAL
2910
INCREASE TRANSMISSION INTERVAL
2911
2706

Figure 29

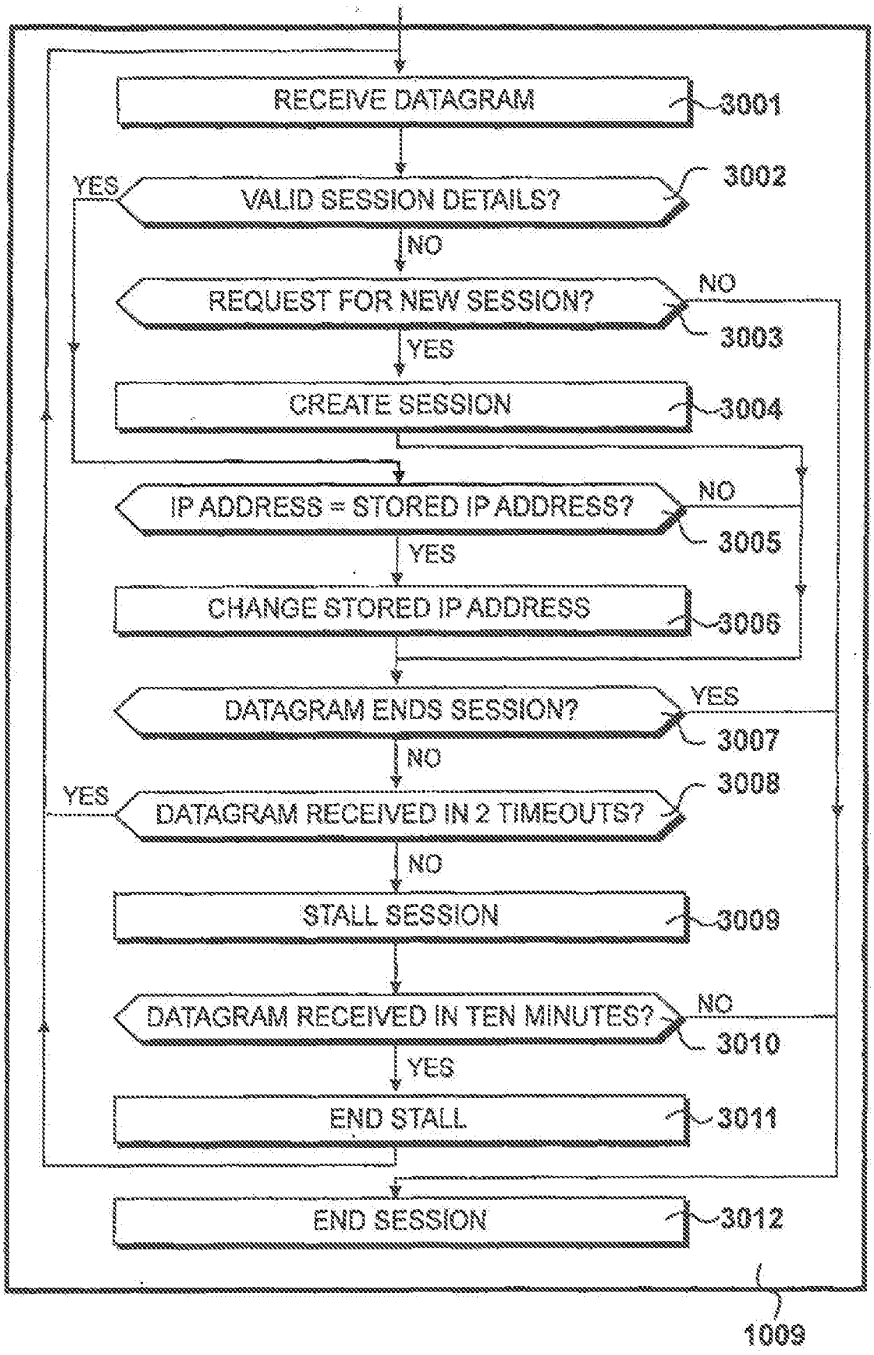

RECEIVE DATAGRAM
3001
VALID SESSION DETAILS?
3002
YES
NO
REQUEST FOR NEW SESSION?
NO
3003
YES
CREATE SESSION
3004
IP ADDRESS = STORED IP ADDRESS?
NO
3005
YES
CHANGE STORED IP ADDRESS
3006
DATAGRAM ENDS SESSION?
YES
3007
NO
DATAGRAM RECEIVED IN 2 TIMEOUTS?
3008
YES
NO
STALL SESSION
3009
DATAGRAM RECEIVED IN TEN MINUTES?
NO
3010
YES
END STALL
3011
END SESSION
3012
1009

Figure 30

804
SESSION DATA (ACTIVE)
3021
SESSION ID
IP ADDRESS
3028
1103
IP HEADER
1112
IP ADDRESS
3024
1105
MTP HEADER
1210
SESSION ID
3025
3020
3020
3023
SESSION DATA (ACTIVE)
SESSION ID
IP ADDRESS
3022
SESSION DATA (STALLED)
SESSION ID
IP ADDRESS
3022
804
901
3021
804
901
3021

Figure 30A

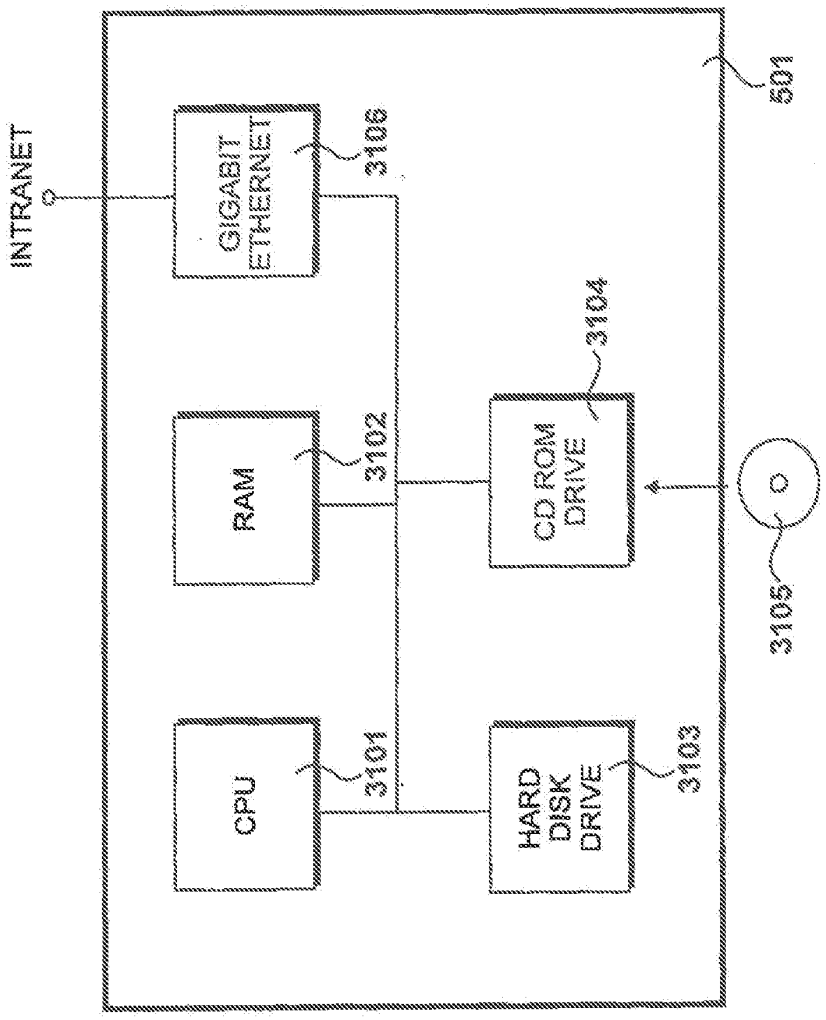

INTRANET
GIGABIT ETHERNET
3106
501
3104
RAM
3102
CD ROM DRIVE
3105
CPU
3101
HARD DISK DRIVE
3103

Figure 31

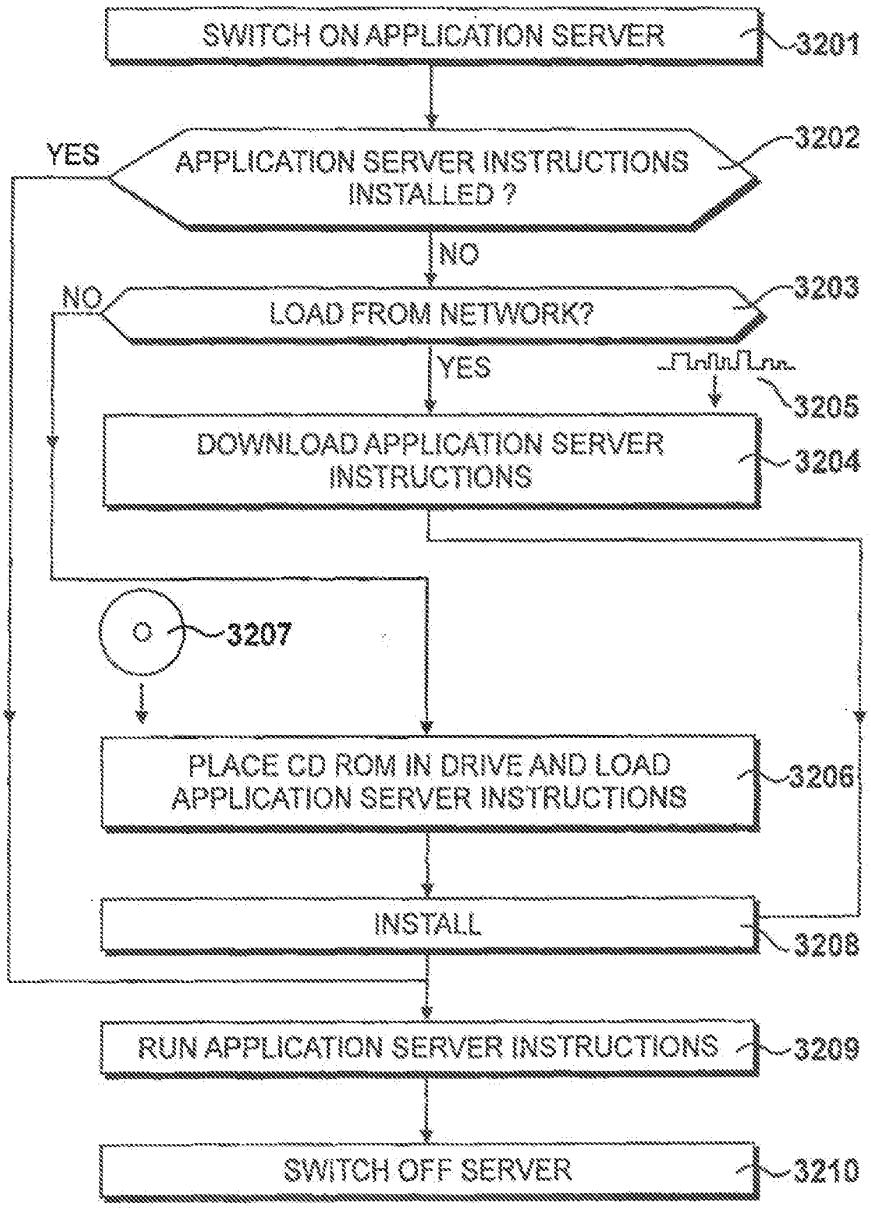

SWITCH ON APPLICATION SERVER
3201
APPLICATION SERVER INSTRUCTIONS INSTALLED ?
3202
YES
NO
LOAD FROM NETWORK?
3203
NO
YES
3205
DOWNLOAD APPLICATION SERVER INSTRUCTIONS
3204
3207
PLACE CD ROM IN DRIVE AND LOAD APPLICATION SERVER INSTRUCTIONS
3206
INSTALL
3208
RUN APPLICATION SERVER INSTRUCTIONS
3209
SWITCH OFF SERVER
3210

Figure 32

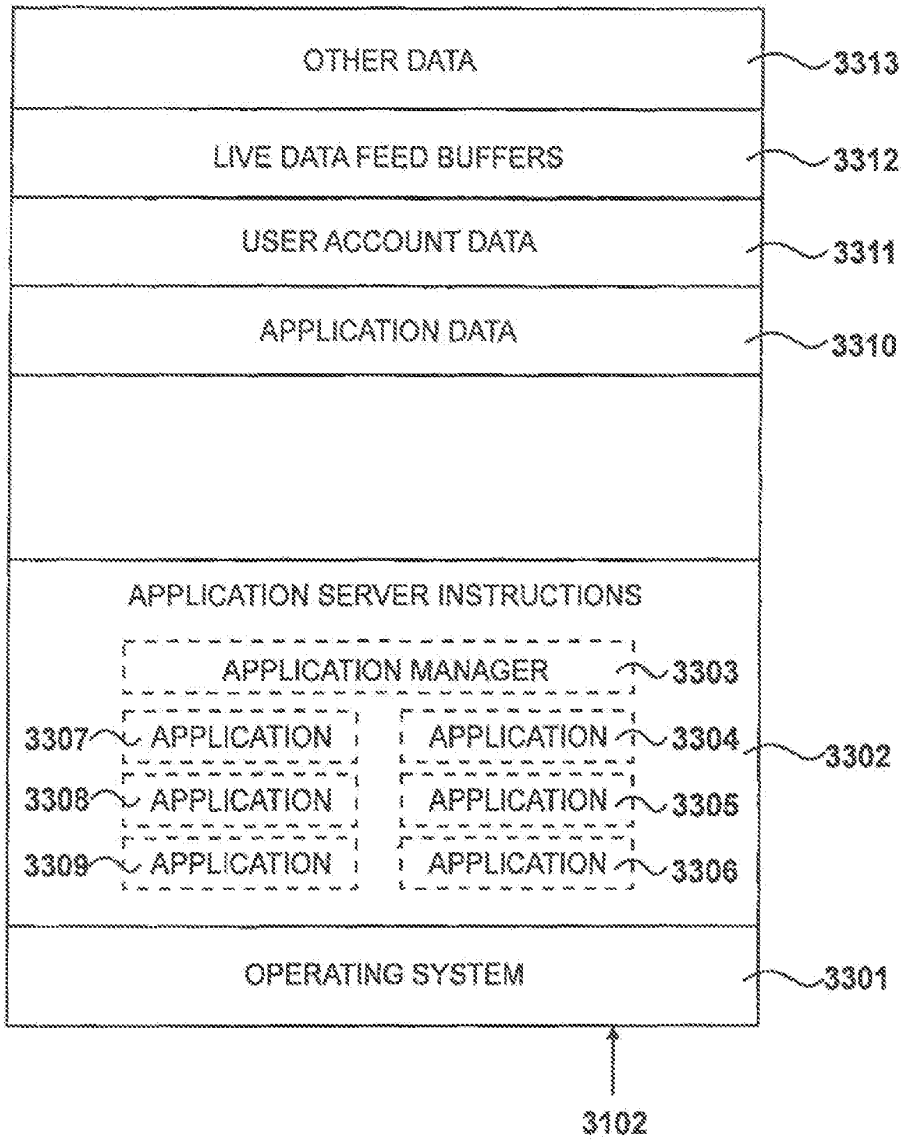

OTHER DATA
3313
LIVE DATA FEED BUFFERS
3312
USER ACCOUNT DATA
3311
APPLICATION DATA
3310
APPLICATION SERVER INSTRUCTIONS
APPLICATION MANAGER
3303
3307
APPLICATION
APPLICATION
3304
3302
3308
APPLICATION
APPLICATION
3305
3309
APPLICATION
APPLICATION
3306
OPERATING SYSTEM
3301
3102

Figure 33

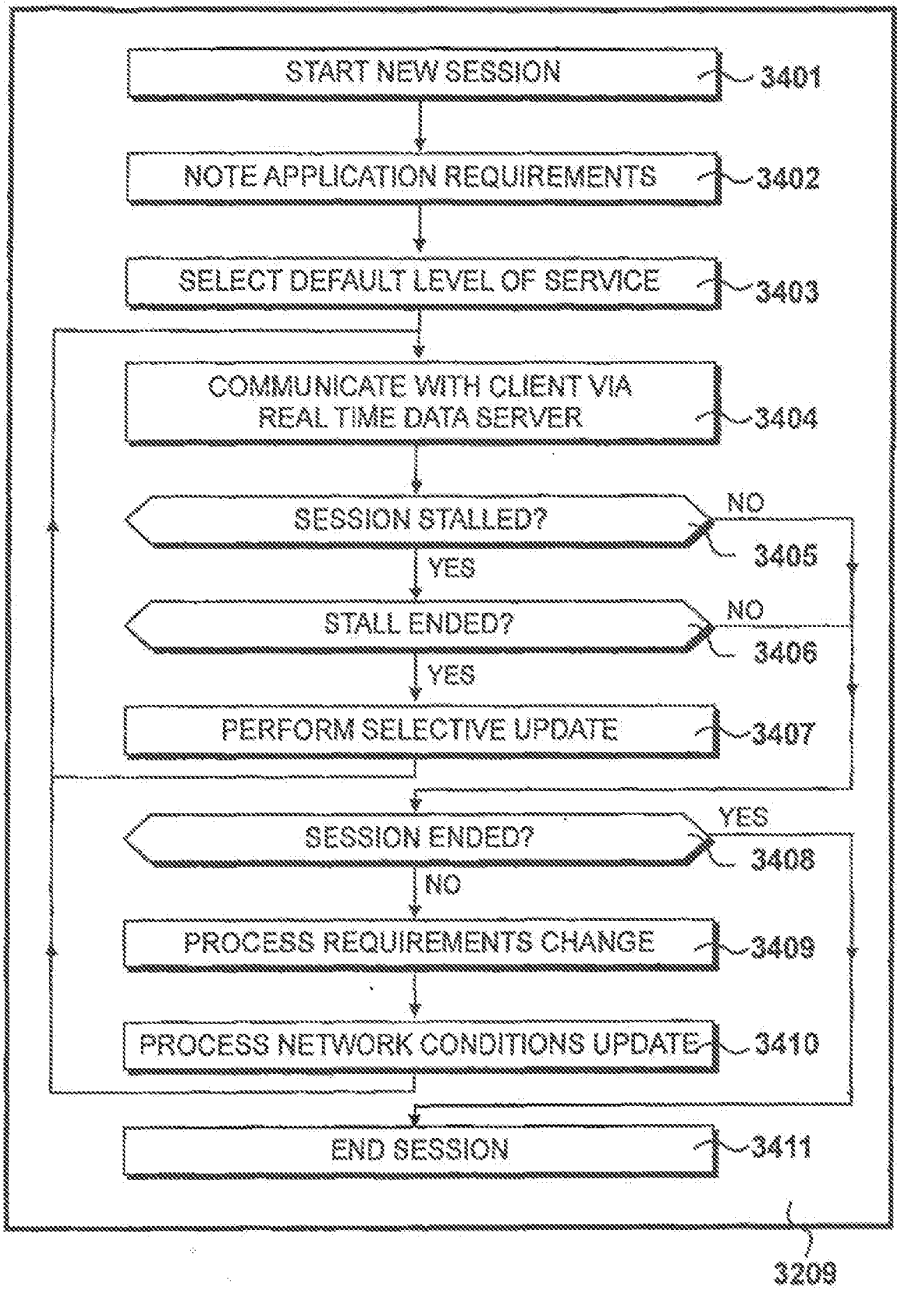

START NEW SESSION
3401
NOTE APPLICATION REQUIREMENTS
3402
SELECT DEFAULT LEVEL OF SERVICE
3403
COMMUNICATE WITH CLIENT VIA REAL TIME DATA SERVER
3404
SESSION STALLED?
NO
3405
YES
STALL ENDED?
NO
3406
YES
PERFORM SELECTIVE UPDATE
3407
SESSION ENDED?
YES
3408
NO
PROCESS REQUIREMENTS CHANGE
3409
PROCESS NETWORK CONDITIONS UPDATE
3410
END SESSION
3411
3209

Figure 34

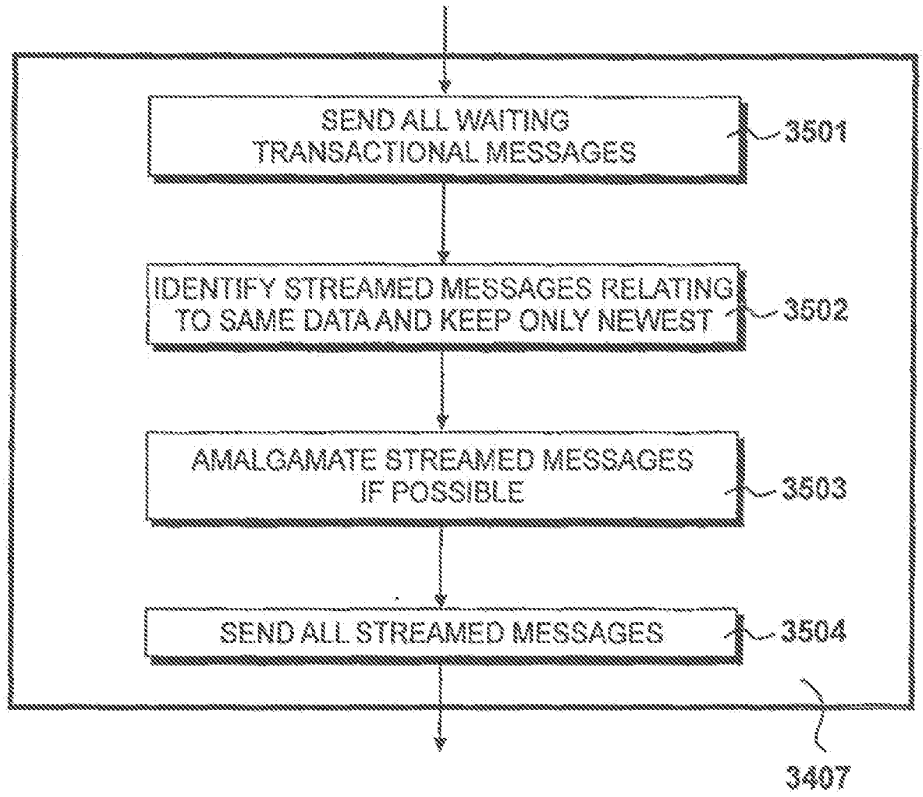

SEND ALL WAITING TRANSACTIONAL MESSAGES
3501
IDENTIFY STREAMED MESSAGES RELATING TO SAME DATA AND KEEP ONLY NEWEST
3502
AMALGAMATE STREAMED MESSAGES IF POSSIBLE
3503
SEND ALL STREAMED MESSAGES
3504
3407

Figure 35

3601
AMOUNT OF DATA IN BUFFER
PERIOD BETWEEN UPDATES
3601
EFFECTIVE BANDWIDTH
FULL NEWS
NEWS SUMMARIES WITH LIMITED GRAPHICS
NEWS SUMMARIES
NEWS HEADLINES ONLY
3603
CONNECTION LATENCY
NO EXCHANGE RATES
SELECTED EXCHANGE RATES ONLY
ALL EXCHANGE RATES

Figure 36

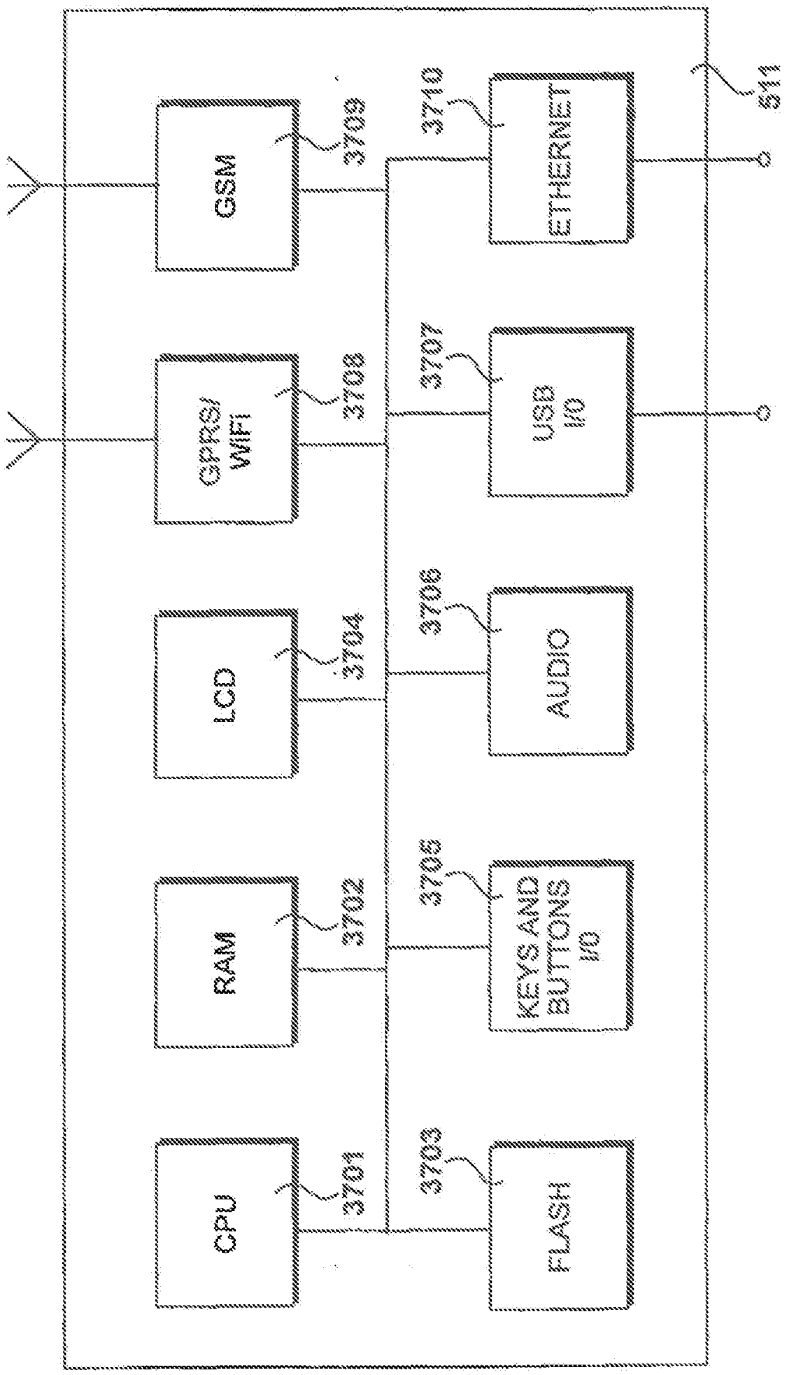

CPU
3701
RAM
3702
FLASH
3703
LCD
3704
KEYS AND BUTTONS I/O
3705
AUDIO
3706
USB I/O
3707
GPRS/ WiFi
3708
GSM
3709
ETHERNET
3710
511

Figure 37

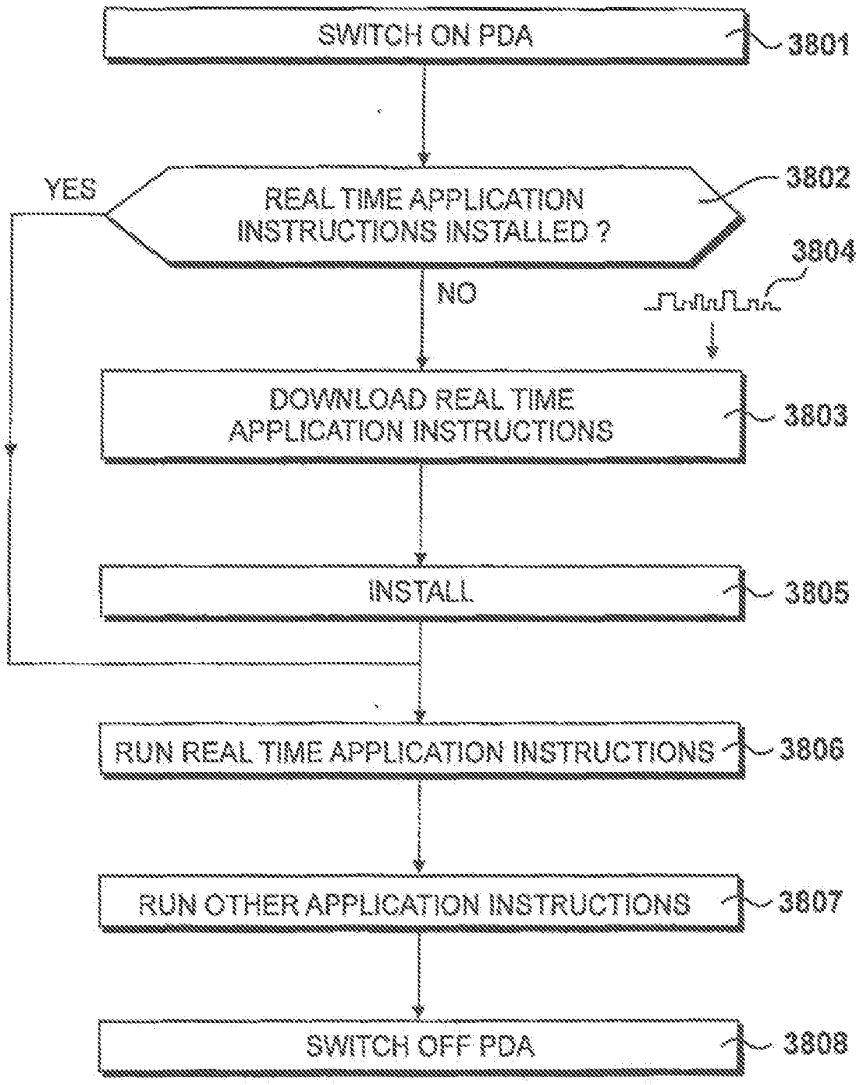

SWITCH ON PDA
3801
YES
REAL TIME APPLICATION INSTRUCTIONS INSTALLED ?
3802
3804
NO
DOWNLOAD REAL TIME APPLICATION INSTRUCTIONS
3803
INSTALL
3805
RUN REAL TIME APPLICATION INSTRUCTIONS
3806
RUN OTHER APPLICATION INSTRUCTIONS
3807
SWITCH OFF PDA
3808

Figure 38

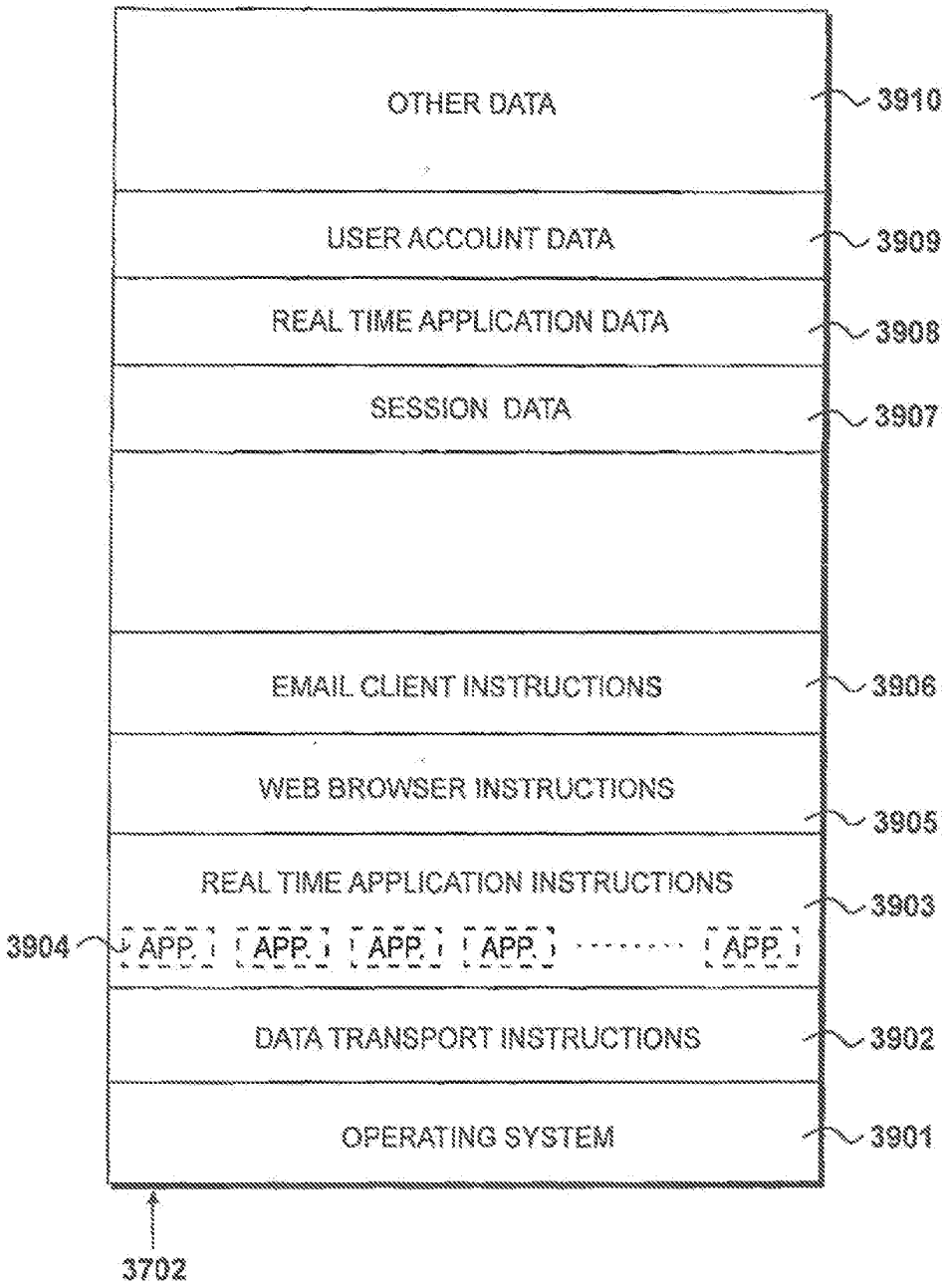

OTHER DATA
3910
USER ACCOUNT DATA
3909
REAL TIME APPLICATION DATA
3908
SESSION DATA
3907
EMAIL CLIENT INSTRUCTIONS
3906
WEB BROWSER INSTRUCTIONS
3905
REAL TIME APPLICATION INSTRUCTIONS
3903
3904
APP.
APP.
APP.
APP.
APP.
DATA TRANSPORT INSTRUCTIONS
3902
OPERATING SYSTEM
3901
3702

Figure 39

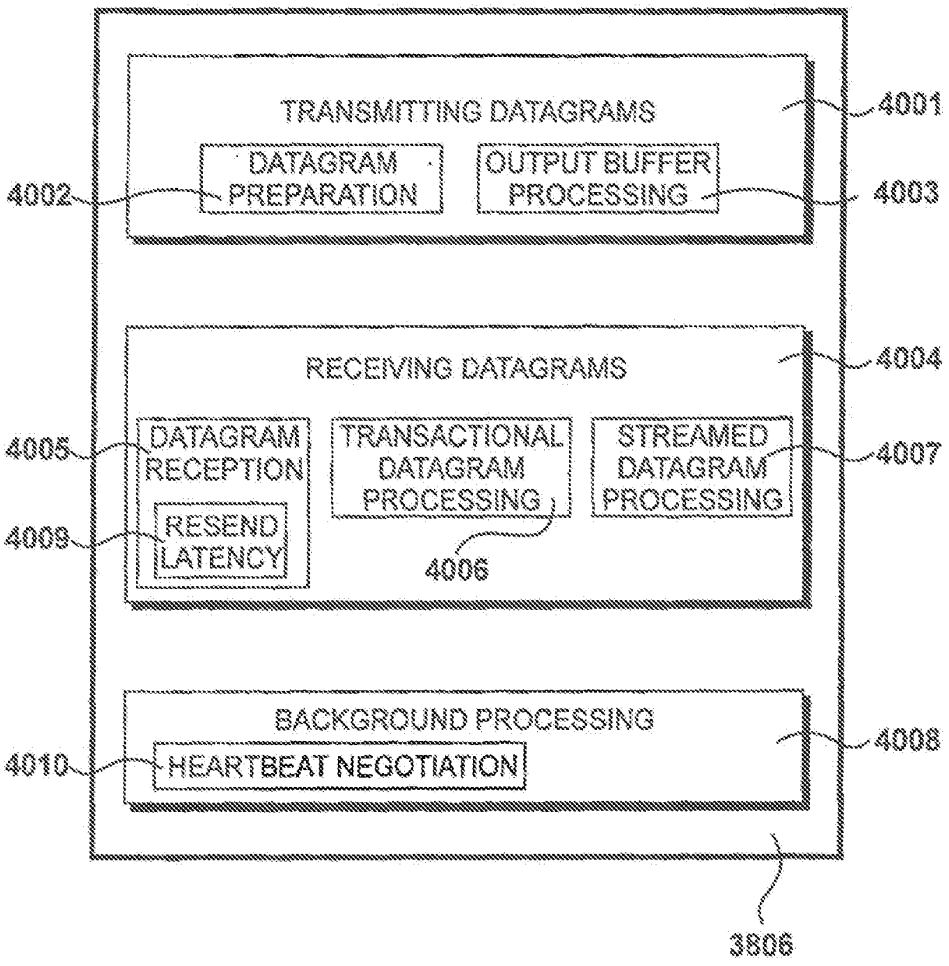

TRANSMITTING DATAGRAMS
4001
DATAGRAM PREPARATION
4002
OUTPUT BUFFER PROCESSING
4003
RECEIVING DATAGRAMS
4004
DATAGRAM RECEPTION
4005
TRANSACTIONAL DATAGRAM PROCESSING
4006
STREAMED DATAGRAM PROCESSING
4007
RESEND LATENCY
4009
BACKGROUND PROCESSING
4008
HEARTBEAT NEGOTIATION
4010
3806

Figure 40

ORIGINAL STREAMED DATAGRAM (NOT RECEIVED)
4101
MTP HEADER
SEQUENCE No = 5003
1311
ELAPSED TIME = 0
4104
RESENT DATAGRAM (NOT RECEIVED)
4102
MTP HEADER
SEQUENCE No = 5003
ELAPSED TIME = 123 MS
RESENT DATAGRAM (RECEIVED)
4103
MTP HEADER
SEQUENCE No = 5003
ELAPSED TIME = 441 MS
RESEND LATENCY = ELAPSED TIME IN RECEIVED DATAGRAM
RECEIVE EMPTY DATAGRAM Y REDUCE RESEND LATENCY
NO DATAGRAMS RECEIVED Y INCREASE RESEND LATENCY
APPLICATION LATENCY = CONNECTION LATENCY + PROTOCOL LATENCY

Figure 41

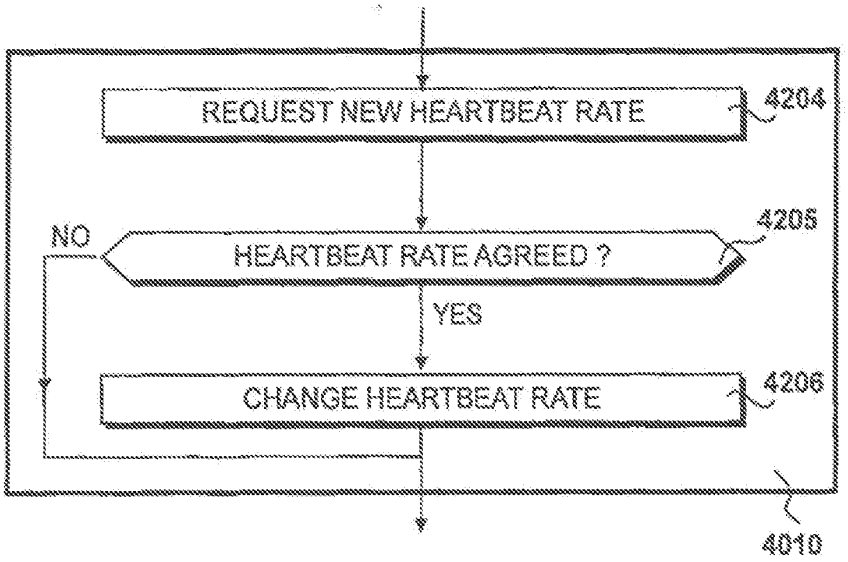

REQUEST NEW HEARTBEAT RATE
4204
NO
HEARTBEAT RATE AGREED ?
4205
YES
CHANGE HEARTBEAT RATE
4206
4010

Figure 42

(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 603 339 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
07.12.2005 Bulletin 2005/49

(21) Application number: 04012878.7

(22) Date of filing: 01.06.2004

(51) Int Cl.7: H04N 7/24, H04L 1/00, H04N 7/26, H04N 7/36, H04N 7/64

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IT LI LU MC NL PL PT RO SE SI SK TR
Designated Extension States:
AL HR LT LV MK

(71) Applicant: STMicroelectronics S.r.l.
20041 Agrate Brianza (Milano) (IT)

(72) Inventors:
- Melpignano, Diego
  20052 Monza (Milano) (IT)
- Olivieri, Stefano
  20131 Milano (IT)

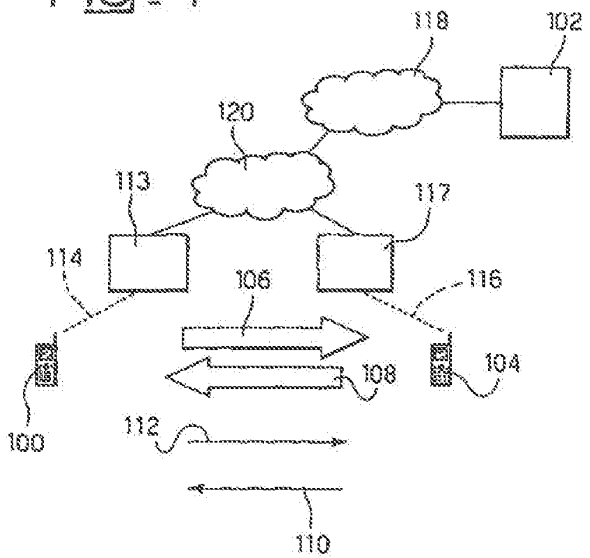
(74) Representative: Bosotti, Luciano
c/o Buzzi, Notaro & Antonielli d'Oulx
Via Maria Vittoria 18
10123 Torino (IT)

(54) Method and system for communicating video data in a packet-switched network, related network and computer program product therefor

(57) A method for communicating video data on a wireless channel in a packet-switched network, that includes the steps of operating at a wireless terminal (100) a compression (10; 204) in packets (106, 108) on the video data during a video coding operation, detecting wireless channel conditions and adapting control parameters of the video coding operation to the detected wireless channel conditions. The compression operation is a robust header compression operation (204) and the step of adapting control parameters of said video coding operation is performed in dependence of information (200, 210, 110) about the wireless channel conditions detected on a feedback channel made available in a decompression step (202) associated to the compression operation (204).

Preferred application in mobile phones and video over IP applications.

Fig. 4



EP 1 603 339 A1

Printed by Jouve, 75001 PARIS (FR)

Description

Field of the invention

[0001] The present invention relates to communication systems, and was developed by paying specific attention to mobile and wireless video communication systems.

[0002] In particular, this invention proposes a new technique for adapting the behavior of a video coder to the channel conditions, especially in the case of a wireless channel.

Description of the related art

[0003] Nowadays, mobile bi-directional video communication applications use circuit-switched channels and the H.324M protocol stack defined by the International Telecommunication Union (ITU). Static encoding schemes like H.263 with fixed output stream bitrate and coding parameters are used.

[0004] This solution is not very flexible.

[0005] Packet-switched networks, on the contrary, offer a higher degree of flexibility especially when connecting heterogeneous systems (like on the Internet network) at the cost of larger protocol overhead and implementation complexity. The increased overhead is due to packet headers, such a circumstance being particularly undesirable in cellular systems characterized by limited (and costly) bandwidth availability.

[0006] The use of packet switched channels and adaptive encoders can provide greater service flexibility, since a mobile terminal can communicate with any host through the Internet network. With suitable arrangements it is also possible to increase channel utilization, efficiency, and video quality.

[0007] However, current mobile videoconferencing systems do not exploit information available at different layers of the protocol stack to optimize the quality of the video-call: in this way, if the wireless channel conditions change, video frames may be dropped and errors may corrupt images for quite a long time.

[0008] From the end user point of view, UMTS (Universal Mobile Telecommunication System) is a network for services. The end-to-end services are carried over the Universal Mobile Telecommunication System network with bearers, where a bearer is a service providing a given Quality of Service class between two end points.

[0009] Universal Mobile Telecommunication System Quality of Service classes, also known as "traffic classes", are defined keeping in mind that the classification must be simple. In particular, from the end user point of view, the impression of the connection quality is very often related to the delay experienced on the connection. For this reason, the connection delay is the main separating attribute between the Universal Mobile Telecommunication System Quality of Service classes, whereas the other factors are guaranteed bit-rate (i.e. bandwidth) and nature of traffic (i.e. symmetric/asymmetric).

[0010] Four Quality of Service classes have been defined for Universal Mobile Telecommunication System services:

- Conversational class: minimum fixed delay, no buffering, symmetric traffic, guaranteed bit-rate.
- Streaming class: minimum variable delay, buffering allowed, asymmetric traffic, guaranteed bit-rate.
- Interactive class: moderate variable delay, buffering allowed, asymmetric traffic, no guaranteed bit-rate.
- Background class: big variable delay, buffering allowed, asymmetric traffic, no guaranteed bit-rate.

[0011] The conversational class is the most demanding Quality of Service class meant for Real Time traffic as, for instance, bi-directional video communication.

[0012] In conversational services the end-to-end delay has to be minimized to avoid any perceptual perturbations and to maintain synchronization of audio and video. Therefore, encoding, transmission and decoding of audio and video is performed simultaneously in real time and in both directions.

[0013] The mobile environment is characterized by harsh transmission conditions in terms of attenuation, fading, and shadowing, which may result in time-varying channel conditions.

[0014] The UMTS network provides many highly sophisticated techniques, such as space-time coding, diversity techniques, interleaving, and Turbo codes, in order to combat errors on the wireless link. However, these advanced tools can provide a negligible radio block error rate only for a relatively large value of tolerated maximum delay, whereas some amount of residual errors has to be tolerated for low-delay applications.

[0015] Therefore, a video coding standard has to be error-resilient in order to be applicable for conversational services in the wireless environment.

[0016] Another critical aspect concerning wireless video communication is that in general, the available bandwidth (and thus the bit-rate) over the radio link is limited and the costs for the user are expected to be proportional to the number of transmitted bits over the radio link. Thus, low bit-rates are likely to be typical, and compression efficiency is thus an important requirement for a video-coding standard to be successful in a mobile environment.

Ex.1002 / Page 727 of 1008
Cisco Systems, Inc.

[0017] Third Generation Partnership Project (3GPP) has chosen the RTP/UDP/IP stack, (Realtime Transport Protocol / Unreliable Datagram Protocol / Internet Protocol), for sending real-time or streaming data over Universal Mobile Telecommunication System IP-based Packet-Switched networks.

[0018] In this case, the encoded media is encapsulated in the Realtime Transport Protocol / Unreliable Datagram Protocol / Internet Protocol packet with media specific Realtime Transport Protocol payload formats defined by the International Engineering Task Force.

[0019] This packet in turn, after header compression, is encapsulated into one Packet Data Convergence Protocol Point-to-Point Protocol (PDCP/PPP) packet, thus becoming a Radio Link Control (RLC) Service Data Unit (SDU).

[0020] The Radio Link Control protocol provides segmentation and retransmission services for both users and control data.

[0021] It can operate in three modes, namely Transparent Mode (TM), Acknowledged Mode (AM) or Unacknowledged Mode (UM).

[0022] In Transparent Mode no protocol overhead is added to higher layer data. Erroneous Packet Data Units (EPDU) can be discarded or marked erroneous.

[0023] In the Acknowledged Mode an automatic repeat request mechanism is used for error correction.

[0024] Contrarily, Unacknowledged Mode does not use any retransmission protocol, which implies that data delivery is not guaranteed.

[0025] Due to time-delay constraints, for bi-directional video communication Third Generation Partnership Project indicates bearers using Unacknowledged Mode Radio Link Control.

[0026] The Request For Comments 3550 (Realtime Transport Protocol), described in IETF RFC 3550, "RTP: A Transport Protocol for Real-Time Applications", does not impose a maximum size on Realtime Transport Protocol packets. However, when Realtime Transport Protocol packets are sent over the radio link of a Third Generation Partnership Project Packet Switched system there is an advantage in limiting the maximum size of Realtime Transport Protocol packets both for Acknowledged Mode and Unacknowledged Mode modes of operation.

[0027] In Unacknowledged Mode large Realtime Transport Protocol packets are more susceptible to losses over the radio link compared to small Realtime Transport Protocol packets since the loss of a segment may result in the loss of the whole packet.

[0028] On the other hand in Acknowledge Mode large Realtime Transport Protocol packets will result in larger delay jitter compared to small packets, as there is a larger chance that more segments have to be retransmitted.

[0029] For these reasons, Third Generation Partnership Project recommends that the maximum size of Realtime Transport Protocol packets should be limited in size taking into account the wireless link. This will decrease the Realtime Transport Protocol packet loss rate particularly for Realtime Transport Protocol in Unacknowledged Mode.

[0030] For Realtime Transport Protocol in Acknowledged Mode the delay jitter will be reduced permitting the client to use a smaller receiving buffer. It should also be noted that too small Realtime Transport Protocol packets could result in too much overhead, if IP/UDP/RTP (Internet Protocol / Unreliable Datagram Protocol / Realtime Transport Protocol) header compression is not applied, or in unnecessary load at the streaming server.

[0031] In the case of transporting video in the payload of Realtime Transport Protocol packets it may happen that a video frame is split into more than one Realtime Transport Protocol packet in order not to produce too large Realtime Transport Protocol packets.

[0032] Then, to be able to decode packets following a lost packet in the same video frame, Third Generation Partnership Protocol recommends that synchronization information should be inserted at the start of such Realtime Transport Protocol packets.

[0033] For example, for H.263 this implies the use of Group of Blocks (GOBs) with non-empty Group of Blocks headers and in the case of MPEG-4 video the use of video packets (resynchronization markers).

[0034] Besides transfer of user data, Packet Data Convergence Protocol performs also the header compression and decompression of IP data streams, e.g. Transport Control Protocol / Internet Protocol (TCP/IP) and Realtime Transport Protocol / Unreliable Datagram Protocol / Internet Protocol headers for Ipv4 and Ipv6, at the transmitting and receiving entity, respectively.

[0035] According to the specifications of Third Generation Partnership Protocol TS 25.323 (Rel. 4), "Packet Data Convergence Protocol (PDCP) Specification", two header compression protocol types, i.e. "RFC 2507" and "RFC 3095 (ROHC)" are supported on Universal Mobile Telecommunications System networks.

[0036] By utilizing the Packet Identifier (PID) field in the Packet Data Convergence Protocol Packet Data Unit (PDCP/PDU), the Packet Data Convergence Protocol sublayer is then able to identify the specific header compression protocol and, as far as Robust Header Compression is concerned, to also distinguish different contexts.

[0037] Robust Header Compression (ROHC) as standardized by the International Engineering Task Force (IETF) and adopted by the Third Generation Partnership Project (3GPP) starting from Release 4, provides an extensible framework for robust header compression that is designed for IP data flows over wireless channels.

[0038] In US20020146000 the basic algorithms for Robust Header Compression are presented together with their

Ex.1002 / Page 728 of 1008
Cisco Systems, Inc.

application to voice-over-IP services.

[0039] So far, the Robust Header Compression recommendation has defined four profiles:

- Uncompressed IP packets;
- Realtime Transport Protocol / Unreliable Datagram Protocol / Internet Protocol (RTP/UDP/IP);
- Unreliable Datagram Protocol / Internet Protocol (UDP/IP);
- Encapsulating Security Payload (ESP/IP).

[0040] Figure 1 shows a compressor chain where reference 10 indicates a compressor, operating a Robust Header Compression operation, and 20 indicates a correspondent decompressor, that are comprised in video coders/encoders, not shown as a whole in Figure 1, separated by a wireless transmission channel.

[0041] The Robust Header Compression compressor 10 and decompressor 20 need to maintain context information 30 so that static header fields 11, i.e. those headers that remain unchanged within a given context, are not transmitted at all. Only dynamic fields 12 of the real-time flow are transmitted after suitable encoding in compressed fields 13.

[0042] For a Realtime Transport Protocol / Unreliable Datagram Protocol / Internet Protocol flow the dynamic header fields are listed below:

- IPv4 Identification (IP-ID) (16 bits),
- Unreliable Datagram Protocol Checksum (16 bits),
- Realtime Transport Protocol Marker (M-bit) (1 bit), ,
- Realtime Transport Protocol Sequence Number (SN) (16 bits),
- Realtime Transport Protocol Timestamp (TS) (32 bits) .

All the other header fields are either static or inferred, i.e. never change or can be calculated by link layer information, respectively.

[0043] Figure 2 shows the compressor states. Initially the compressor 10 is in a Initialization and Refresh (IR) state 40, where the headers are sent non-compressed so that the decompressor 20 can create a context for the Internet Protocol flow.

[0044] In a First Order (FO) state 50 the compressor 10 only sends updates of the static fields to the decompressor 20 to compensate for irregularities in the stream that may corrupt the context. Therefore, in this state, the compressor 10 sends only context updates.

[0045] In a Second Order (SO) state 60, the compressor 10 sends compressed headers 12 since it is confident that the decompressor 20 has correctly received a valid context. This is the state in which the compressor 10 should normally operate. Only when stream irregularities are found the compressor 10 goes to the First Order state 50 or even to the Initialization and Refresh state 40.

[0046] Figure 3 shows the decompressor states. The decompressor 20 starts in a "no-context" (NC) state 70. Upon successful decompression of a header, it passes to a "full context" (FC) state 90, which is the normal operating state. Only after repeated failures in decompressing headers, the decompressor 20 passes to a "static context" (SC) state 80, waiting for context update packets (sent by the compressor 10 in the First Order state 40). If a valid context cannot be recovered, the decompressor returns to the "no context" state.

[0047] Transitions among states are governed by operating modes. Robust Header Compression defines three operating modes: Unidirectional (U-mode), bi-directional Optimistic (O-mode) and bi-directional Reliable (R-mode).

[0048] In the U-mode a feedback channel from the decompressor to the compressor does not exist (or cannot be used) so that transitions between compressor states are only based on periodic timeouts and irregularities in the incoming packet headers, periodic refreshes of the context are needed. In the O-mode, a feedback channel is used for error recovery requests and (optionally) acknowledgements of context updates; the rationale behind this operating mode is to minimize the use of the feedback channel.

[0049] Finally, the R-mode makes intensive use of the feedback channel in order to maximize robustness against loss propagation and damage propagation.

[0050] Given a header field value v to be compressed, in ROHC a Window-based Least Significant Bit (W-LSB) algorithm is applied that transmits only its least significant bits, provided a suitable reference value v_ref is maintained both at the compressor 10 and at the decompressor 20. In order to avoid mismatches between reference values v_ref, a robust algorithm is defined which selects the reference value v_ref within a Variable Sliding Window (VSW). The number of least significant bits k to transmit for the header field value v to be compressed is selected according to the following relation:

Ex.1002 / Page 729 of 1008
Cisco Systems, Inc.

$$f(v\_ref,k)=[v\_ref-p, v\_ref+(2^k-1)-p] \quad (1)$$

f(v_ref, k) represents an interval in which the header field value v is expected to vary. The offset parameter p can be chosen according to the behavior of the specific field to compress.

[0051] Now, at the compressor 10 the number of least significant bits k can be chosen in such a way that:

$$k=g(v\_ref,v)\stackrel{\Delta}{=}\min\{k : v\in f(v\_ref,k)\} \quad (2)$$

So k would be the minimum value such that the header field value v falls in the interval f(v_ref, k).

[0052] However, this scheme would not be robust against errors because the compressor has no knowledge that the decompressor is using the same reference value (which could actually be different because of transmission errors). Instead, a variable sliding window is introduced:

$$VSW = [v_{i-w}, v_i] \quad (3)$$

where w indicates a window size, i.e. the last w values that have been transmitted. Whenever a new value enters the compressor, it is appended to Variable Sliding Window. When the compressor is sufficiently confident that some of the older values in Variable Sliding Window have been correctly received, those values are removed from Variable Sliding Window.

$$v_{min} = \min(VSW),\ v_{max} = \max(VSW) \quad (4)$$

are the minimum and maximum values in Variable Sliding Window.

[0053] In the Window-based Least Significant Bit coding scheme, the selection of the number of least significant bits k is made according to the following formula:

$$k\stackrel{\Delta}{=}\max(g(v,v_{min}),g(v,v_{max})) \quad (5)$$

where function g() has been defined in equation (2) .

[0054] In this way, a higher number of bits is used to encode the field due to the uncertainty that the decompressor has a good reference interval for decoding the transmitted m bits.

[0055] In fact, the decoding technique at the decompressor is based on the following algorithm.

$$I_d = f(v\_ref\_d,m) \quad (6)$$

v_ref_d is the last correctly decompressed value, m is the number of bits received and I_d is the interpretation interval.

[0056] The decompressed field is simply derived by picking the value in the above interpretation interval whose m least significant bits match the received m bits.

[0057] The size w of the Variable Sliding Window depends on the confidence that the compressor has on the decompressor state, which in turn depends on the selected Robust Header Compression mode. For U and O modes, w is implementation dependent. In R-mode explicit feedback from the decompressor can be used to minimize the sliding window dimension and therefore maximizing the compression ratio.

[0058] The Window-based Least Significant Bit algorithm will be now explained by way of a example.

[0059] Assuming that the compressor 10 has transmitted the values 151, 152, 153, 154 and 155 and that the last three ones have not been received because of transmission errors on the wireless link, then, at the compressor 10 will be Variable Sliding Window = [151,152,153,154,155], v_{min}=151 and v_{max}=155.

[0060] If, now, the value 156 enters the compressor 10, the number of least significant bits k to transmit is given by relation (5), which yields k = max (3,1) = 3.

[0061] So the last three Least Significant Bits of the value 156 = '10011100' are transmitted, i.e. '100'.

Ex.1002 / Page 730 of 1008
Cisco Systems, Inc.

[0062] At the decompressor 20, since the values 153, 154 and 155 have been lost, the last good reference value is 152.

[0063] According to relation (6), the decompressor 20 has thus an interpretation interval $I_d = [152, 159]$, which is expanded below in Table 1, where the first column contains the decimal value and the second column contains the corresponding binary value.

Table 1

Dec	Bin
152	10011000
153	10011001
154	10011010
155	10011011
156	10011100 <<<
157	10011101
158	10011110
159	10011111

[0064] Within this interval the only value whose three Least Significant Bits match the pattern '100' is the number 156.

[0065] The correctness of the decompression can be checked by applying a small Cyclic Redundancy Check (CRC) to the original header, from 3 to 8 bits depending on mode, in order to avoid that an undetected transmission error leads to a wrong decompressed value, which, in turn, would be used later as a reference value, leading to damage propagation.

[0066] Failure of the Cyclic Redundancy Check to detect a damaged value is also compensated for in the Robust Header Compression framework (see IEFT RFC 3095, "Robust Header Compression (ROHC): Framework and four profiles: RTP, UDP, ESP, and uncompressed", section 5.3.2.2.3).

[0067] The Window-based Least Significant Bit coding algorithm is not the only one that is used in the Robust Header Compression framework.

[0068] Other schemes exist that take advantage of specific characteristics of some header fields such as, for example, the Realtime Transport Protocol timestamp, which usually increases in regular steps over time (multiple of a TS_STRIDE value).

[0069] This characteristic is exploited by "scaled Realtime Transport Protocol timestamp" encoding.

[0070] Realtime Transport Protocol timestamp can also be approximated with a linear function of the time of day for traffic generated at constant rate, fixed sampling frequency and when packet generation is locked to the sampling frequency. In this case "timer-based compression of Realtime Transport Protocol timestamp" applies.

[0071] The Internet Protocol identification field (IP-ID) is encoded by considering only offsets between the IP-ID and the Realtime Transport Protocol sequence number (the latter increases by one for each new packet) and applying Window-based Least Significant Bit encoding to such offsets.

[0072] Constant header fields of the Realtime Transport Protocol / Unreliable Datagram Protocol / Internet Protocol stream to be compressed can be structured as ordered lists. The Robust Header Compression framework provides means to handle such lists in such a way that list items (that form the context) in the decompressor can be flexibly inserted, removed or changed by the compressor.

[0073] The dynamic fields of the Realtime Transport Protocol header are encoded according to Table 2.

Table 2

Field	Coding	Comments
RTP-SN Sequence Number	Window-based Least Significant Bit	$p=2^{k-3}-1$, k>4, p=1 otherwise
IP-ID	Offset IP-ID	Unless IP-ID varies randomly (RND flag <> 0)
RTP-TS Timestamp	- Timer-based - Scaled RTP TS - No compression	Depending on flag values in the header (TS-STRIDE, Tsc) $p=2^{k-2}-1$

Ex.1002 / Page 731 of 1008
Cisco Systems, Inc.

Table 2 (continued)

Field	Coding	Comments
Cyclic Redundancy Check	3, 7 or 8 bits	Calculated over the original uncompressed header
Marker bit	Only updated when it changes	Context initially set to 0

[0074] The Realtime Transport Protocol Timestamp and IP-ID fields can often be derived from the Realtime Transport Protocol Sequence Number, since IP-ID usually increases by the same difference or delta as the sequence number and the timestamp by the same delta times a fixed value. Therefore, when these conditions apply, only the Realtime Transport Protocol Sequence Number is included in the compressed header and the functions to derive the other fields are included in the context.

[0075] A Robust Header Compression packet has the format shown in Table 3:

Padding
Feedback
Header
Payload

Table 3

[0076] The first field in the packet of Table 3 is the Padding field and is an optional field with variable length. The second field is the Feedback field that comprises zero or more feedback elements. The third field is the Header field that is Variable, with Context ID information (CID).

[0077] Each element of the packet in Table 3, with the exception of the payload, starts with a unique bit pattern.

[0078] Headers carry Context ID information: they may include one byte add-Context ID octet (starting with the pattern '1110') for small Context IDs between 1 and 15 or carry embedded Context ID information when the Context ID space is large (up to 2 bytes). Context ID = 0 is not transmitted: in that case the packet starts with the packet type, which is a unique bit pattern different from '1110' and a null Context ID is implied.

[0079] Feedback information can be piggybacked to any Robust Header Compression packet and carries negative and positive acknowledgements for context updates and header decompression. Feedback packets can also be used by the decompressor, to request transitions between modes (e.g. from U-mode to O-mode).

[0080] Several packets types are defined by Robust Header Compression depending on their function, the used mode and which field is carried. The notation for Robust Header Compression packets is:

<Mode>-<Type>-<Optional Fields>.

[0081] For example, an UOR-2 packet can be used in U-mode, O-mode or R-mode and is of type 2.

[0082] In the Realtime Transport Protocol profile three packet types are used to identify compressed headers and two for initialization and refresh as shown below:

i) (R-0, R-0-CRC,UO-0) this is the minimal packet type where only the W- Window-based Least Significant Bit encoded Realtime Transport Protocol - Sequence Number is transmitted, since all the functions to derive the other fields are known at the decompressor.

ii) (R-1, R-1-ID, R-1-TS, UO-1, UO-1-ID, UO-1-TS) this packet is used when the number of bits needed to encode the Realtime Transport Protocol - Sequence Number exceeds those available in packet type i) or when the functions to derive Realtime Transport Protocol Timestamp and IP-ID from Realtime Transport Protocol Sequence Number change.

iii) (UOR-2, UOR-2-ID, UOR-2-TS) used to change parameters of any Sequence Number - function.

iv) IR: this packet is used to communicate the static part of the context, i.e. the constant Sequence Number functions

v) IR-DYN: this packet type is used to communicate the dynamic part of the context, i.e. the non-constant Sequence Number - functions.

Ex.1002 / Page 732 of 1008
Cisco Systems, Inc.

[0083] The bit patterns that form unique prefixes for each of the packet type are shown in Table 4.

[0084] Upon receiving a packet, the decompressor parses the first byte and consequently drives its state machine.

[0085] The Initialization and Refresh packet allows the decompressor to create a context for the Realtime Transport Protocol / Unreliable Datagram Protocol / Internet Protocol flow. Its structure is shown below in Table 5.

Table 4

Packet type	Pattern
Add-CID	1110
Padding	11100000
Feedback	11110
IR	1111110
IR-DYN	11111000
Segment	1111111
R-0	00
R-0-CRC	01
UO-0	0
R-1, R-1-ID, R-1-TS	10
UO-1, UO-1-ID, UO-1-TS	10
UOR-2, UOR-2-ID, UOR-2-TS	110

0 7	
Add-CID octet	1
1111110 D	1
CID info (opt.)	0-2, large CIDs
profile	
CRC	
Static chain	variable
Dynamic chain	variable Present if D=1
Payload	

Table 5

[0086] The Add - Context ID octet allows associating a context identifier to the static header information that is carried in the rest of the packet.

[0087] The D bit is profile specific and, in the case of the Realtime Transport Protocol profile, it indicates the presence of a dynamic sub-header information right after the static chain.

[0088] The Context ID info field is present only if big context identifiers need to be used. The profile field is an identifier

Ex.1002 / Page 733 of 1008
Cisco Systems, Inc.

for the Robust Header Compression profile. An 8-bit Cyclic Redundancy Check follows (see IEFT RFC 3095, "Robust Header Compression (ROHC): Framework and four profiles: RTP, UDP, ESP, and uncompressed", section 5.9.1 for the generator polynomial and on which fields the value is computed).

[0089] The static chain contains the ordered list of static header fields.

[0090] For example, an IPv4 header should be initialized with a static part that includes: version, protocol, source address and destination address. The dynamic part of the IPv4 header includes type of service time to live, identification, Data Field, Random (RND), Network Byte Order (NBO), extension header list.

[0091] The IR-DYN packet is used to update the dynamic part of the context.

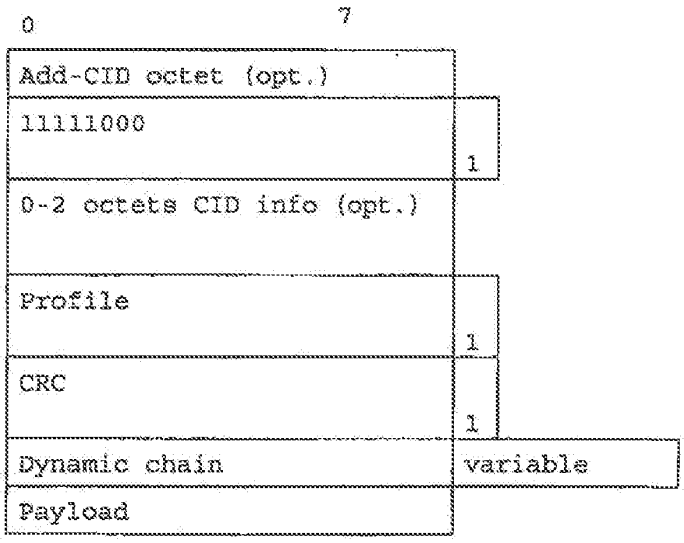


Table 6

[0092] Only the dynamic chain is carried in this case.

[0093] The compressed packet format is shown in Table 7. It can be noticed that its structure depends on many conditions (Cx) so that its processing may not be obvious.

Ex.1002 / Page 734 of 1008
Cisco Systems, Inc.

0 7	
Add-CID octet (opt.)	
Base header	1 byte, Type indication
0-2 octets CID info (opt.)	
Remainder of base header	1
Extension	variable, CU
IP-ID outer IPv4 header	2 bytes, C1
AH data for outer list	Variable
GRE checksum	2 bytes, C2
IP-ID of inner IPv4 header	2 bytes, C3
AH data for inner list	Variable
GRE checksum	2 bytes, C4
UDP checksum	2 bytes, C5

Table 7

[0094] Conditions depend on values of previously decoded flag fields.

[0095] Header extensions may be optionally present to carry additional Robust Header Compression information (four different extension types are defined). An IP-ID field may be present if the context indicates that this field varies randomly.

[0096] AH data refers to Authentication Headers, which contain values for security associations. The Generic Routing Encapsulation (GRE) checksum refers to Generic Routing Encapsulation tunnels (RFC2784, RFC2890).

[0097] The Unreliable Datagram Protocol checksum is present only when explicitly indicated in the context.

[0098] For what concerns the video encoding, the H.264 hybrid video coding standard is known, whose primary goals are improved coding efficiency and improved network adaptation. The syntax of H.264 permits a significant reduction in bit-rate compared to all previous standards such as H.263 and MPEG-4 at the same quality level.

[0099] H.264 has been designed for technical solutions including broadcasting services, interactive or serial storage, conversational services, Video on Demand and Multimedia Messaging Services. Moreover, new applications may be deployed over existing and future networks.

[0100] To address this need for flexibility and customizability, the H.264 design covers both Video Coding Layer (VCL), which is designed to efficiently represent the video content, and a Network Abstraction Layer (NAL), which formats the Video Coding Layer representation and provides header information in a manner appropriate for conveyance by a variety of transport layers or storage media.

[0101] H.264 introduces three new features that impact the motion estimation process.

[0102] First, Multiframe Prediction allows using more than one previously decoded frame for forward motion estima-

Ex.1002 / Page 735 of 1008
Cisco Systems, Inc.

tion. Second, a precision of one fourth of pixel for motion vectors can be achieved through sub-pixel interpolation.

[0103] Moreover, a 16x16 macroblock can be partitioned in seven different ways, and each partition can have its own independent motion vector. This means that up to 16 different motion vectors can be used for a single macroblock, and each of them can be unrestricted, i.e. it can point to a predictor partially lying outside the reference frame.

[0104] The bi-directional prediction can also be used, but no more than one single reference frame is allowed to the backward motion estimation, in order to reduce the size of the reorder buffer. Instead, there is no limitation on the number of B frames that can be placed between two anchor frames (even none).

[0105] During the motion estimation process, two different cost functions can be used to evaluate the goodness of a predictor.

[0106] The first one is named SAD, Sum of Absolute Differences, the second one is SATD, Sum of Absolute Transformed Differences. It is well known that the Sum of Absolute Differences minimization cannot produce a bitstream of minimum size, because the prediction error will be encoded in the frequency domain. This is why H.264 allows to compute the matching error through the Hadamard transform, which is a very simple frequency transform having square waves base functions. In such a way, the transform matrix contains only +1 and -1 values and it can be computed without multiplications.

[0107] Furthermore, two different modalities can be applied to choose the best encoding mode for each macroblock: in "low-complexity" mode, the cost function is simply either the above-mentioned Sum of Absolute Differences or Sum of Absolute Transformed Differences, whereas in "high-complexity" mode a rate-distortion optimization is performed by evaluating a Lagrangian functional.

[0108] The frequency transform is computed by means of a 16x16 or 4x4 integer transform, having the same statistical properties of the Discrete Cosine Transform (DCT) used by MPEG standards. A 2x2 dedicated transform is applied only to the chrominance components.

[0109] Transformed coefficients information is reduced to fit the desired rate through a quantization step, which is also used to vary the strength of a de-blocking loop filter that operates at macroblock level during the coding process.

[0110] H.264 allows two ways to perform the variable length coding: CAVLC (Context-Adaptive Variable Length Coding) and CABAC (Context-Adaptive Binary Arithmetic Coding) .

[0111] The Context-Adaptive Variable Length Coding comprises a combination of adaptive Huffman coding, used to encode residual 4x4 block data, and Exp-Golomb coding, dedicated to the translation of headers in regular code-words. It can be proved that the Huffman method provides an optimal code only if the probability of the symbols are exact powers of 0.5. The Context-Adaptive Binary Arithmetic Coding overcomes this disadvantage by assigning a code to a sequence of symbols, so each symbol can be coded with a fractional number of bits. Adapting the variable length codes to the instantaneous statistical frequency of the symbols further raises the performance.

[0112] The coded video data is organized into Network Adaptation Layer (NAL) units, each of which is actually a packet that contains an integer number of bytes. The first byte of each Network Adaptation Layer unit is a header byte that contains an indication of the type of data in the Network Adaptation Layer unit (NALU), and the remaining bytes contain payload data of the type indicated by the header. The Network Adaptation Layer unit structure definition specifies a generic format for use in both packet-oriented and bitstream-oriented transport systems, and a series of Network Adaptation Layer units generated by an encoder is referred to as a Network Adaptation Layer unit stream.

[0113] Network Adaptation Layer units are classified into Video Coding Layer and non- Video Coding Layer Network Adaptation Layer units. The Video Coding Layer Network Adaptation Layer units contain the data that represent the values of the samples in the video pictures, and the non- Video Coding Layer Network Adaptation Layer units contain any associated additional information such as parameter sets (important header data that can apply to a large number of Video Coding Layer Network Adaptation Layer units) and supplemental enhancement information (timing information and other supplemental data that may enhance usability of the decoded video signal but are not necessary for decoding the values of the samples in the video pictures).

[0114] Sequence and Picture Parameter Sets are necessary (must be correctly delivered by the underlying network) for a correct decoding of the video stream since they contain information that is referenced by every other Video Coding Layer and non - Video Coding Layer NALU.

[0115] A slice can be considered as a standalone decoding unit and consists into a set of macroblocks of a given picture. Unlike the rigid slice structure found in MPEG-2 (which reduces coding efficiency by increasing the quantity of header data and decreasing the effectiveness of prediction), slice sizes in H.264/AVC are highly flexible, as was the case earlier in MPEG-1.

[0116] Since it is always contained into a Network Adaptation Layer unit, a slice is typically transmitted separately from other ones of the same picture. Then, slicing allows the encoder to arrange information in different independent network units in order to limit the consequence of a transmission failure to a portion instead to the whole picture. Other important features included into the H.264/AVC standard that can be useful for error resilience/concealment purposes are Flexible Macroblock Ordering (FMO) and Data Partitioning.

[0117] A new ability to partition the picture into regions called slice groups has been developed, with each slice

Ex.1002 / Page 736 of 1008
Cisco Systems, Inc.

becoming an independently-decodable subset of a slice group. When used effectively, flexible macroblock ordering can significantly enhance robustness to data losses by managing the spatial relationship between the regions that are coded in each slice.

[0118] Since some coded information for representation of each region (e.g., motion vectors and other prediction information) is more important or more valuable than other information for purposes of representing the video content, H.264 allows the syntax of each slice to be separated into up to three different partitions for transmission, depending on a categorization of syntax elements. It is important to point out that H.264 Data Partitioning makes a categorization on different syntax elements within the same picture region, based on the damage that a loss of the slice would produce.

[0119] US-B-6611674 describes a method for adjusting video coding parameters, in particular the intra refresh rate, depending on wireless link conditions. However, the link conditions are estimated based only on signal to interference ratio or signal to noise ratio, which represent only link local quality measures. This method has two main drawbacks: i) it may be difficult for an application (video encoder) to retrieve such statistics since these are kept in the modem and ii) there is no way to detect adverse conditions in the remote wireless link.

[0120] In US-A-20020054578 a cross-layer approach for adapting multimedia streaming resource allocation to varying channel conditions in a 3G Wideband Code Division Multiple Access (W-CDMA) system is described. Such an approach can either minimize distortion or power and specifically targets hybrid delay-constrained Automatic Repeat Request and Forward Error Correction mechanisms that are applied to base layers and enhancements layers of a scalable video stream. In particular, the adaptation of the system consists of a dynamic allocation of bits to source coding and channel coding depending on measured channel conditions. Source coding bitrate is varied using Fine Grained Scalability.

Object and summary of the invention

[0121] The object of the present invention is thus to provide a method for adapting the parameters of a video coder to the wireless channel conditions that allows for easy and fast retrieval of channel condition information. By using information available in the header compressor, the video coder can estimate which video packets have been lost in the wireless link and avoid error propagation. Different video packetization strategies are suggested depending on the header compression mode being used.

[0122] According to the present invention, the above object is achieved by means of a method having the features set forth in the claims that follow. The invention also relates to a corresponding system, a related network as well as a related computer program product, loadable in the memory of at least one computer and including software code portions for performing the steps of the method of the invention when the product is run on a computer . As used herein, reference to such a computer program product is intended to be equivalent to reference to a computer-readable medium containing instructions for controlling a computer system to coordinate the performance of the method of the invention. Reference to "at least one computer" is evidently intended to highlight the possibility for the present invention to be implemented in a distributed/modular fashion.

[0123] The arrangement described herein proposes a method to exploit information on the link quality derived for example from the header compressor and consequently change video coding parameters in order to optimize video quality at the receiver.

[0124] A new method for adapting the parameters of a video coder to the wireless channel conditions, based on feedback coming from a Robust Header Compression compressor, is here proposed. In fact, Robust Header Compression uses acknowledgement messages, in particular Negative Acknowledgement messages, in case of unsuccessful header reconstruction, which indicates the loss of a packet carrying video payload. Such information can be used by the video coder to trigger proper error recovery techniques.

[0125] When applied to a mobile terminal, this technique improves the quality of IP-based video communications even when the peer device does not run an equivalent algorithm.

[0126] As far as video coding is concerned, reference is made to emerging H.264 standard ("Draft ITU-T Recommendation and Final Draft International Standard of Joint Video Specification (ITU-T Rec. H.264 ISO/IEC 14496-10 AVC)"), which has been designed for delivery of packet-based networks. However, the same concept can be applied to other standards as well, like for example MPEG-4.

[0127] The method of the invention thus propose to estimate link quality based only on layer-2 (header compressor) and layer-4 Realtime Transport Protocol information, which are more easily accessible and provide end-to-end quality estimation.

Brief description of the annexed drawings

[0128] The invention will now be described, by way of example only, by referring to the enclosed figures of drawing, wherein:

Ex.1002 / Page 737 of 1008
Cisco Systems, Inc.

- Figure 1 shows a block diagram of the compression operations,
- Figure 2 shows a block diagram of the compressor states,
- Figure 3 shows a block diagram of the decompressor states,
- Figure 4 shows the proposed system architecture,
- Figure 5 shows the sequence diagram of optimistic mode packet loss detection,
- Figure 6 shows the sequence diagram of reliable mode packet loss detection,
- Figure 7 shows a block diagram of a mobile phone suitable for implementing the proposed method.

Detailed description of preferred embodiments of the invention

[0129] The goal of the present arrangement is the optimization of an IP-based video-call application between two terminals, in which at least one of them is a mobile one.

[0130] A system architecture is depicted in Figure 4 for further reference, where a mobile terminal 100, corresponding to the User Equipment cited in the standard, is shown. Such a mobile terminal 100 communicates through a local link 114 with a base station 113, that in its turn is communication with a controller network 120, according to a typical mobile telecommunication architecture. A further remote mobile terminal 104 is shown, communicating with a remote base station 113 through a remote link 116, and thereby connected to the controller network 120. Also a fixed terminal 102 is shown, that can communicate with the controller network 120 through a Internet network 118.

[0131] The video-call application can either run between the mobile terminal 100 and the fixed terminal 102 or between the mobile terminals 100 and 104. The present invention applies to both cases.

[0132] Although a Universal Mobile Telecommunications System cellular architecture has been used as a reference, the method described is applicable also to other wireless communication systems, like, for example, General Packet Radio Service - Enhanced Data rates for Global Evolution (GPRS - EDGE) or Wireless LAN (Local Area Network).

[0133] If the mobile terminal 100 and the remote mobile terminal 104 are having a bi-directional video-call, they are generating Realtime Transport Protocol flows RTP_1 106 and RTP_2 108 respectively and they receive corresponding Real-time Transport Control Protocol $RTCP\text{-}RR_1$ Receiver Reports (RR) message, indicated with the arrow 110 in Figure 4, and $RTCP\text{-}RR_2$ Receiver Reports message, indicated with the arrow 112, in the reverse direction. Each Real-time Transport Control Protocol Receiver Reports message carries statistical information such as lost packets and jitter. Mobile terminals 100 and 104 compress Realtime Transport Protocol packet headers on the wireless link according to the Realtime Transport Protocol / Unreliable Datagram Protocol / Internet Protocol profile.

[0134] From the point of view of the local mobile terminal 100, the goal is optimizing the RTP_1 flow 106 to the remote mobile terminal 104, on the basis of the conditions of the links, composing a wireless channel, that such RTP_1 flow 106 must cross, i.e. the local link 114 and the remote link 116 and possibly the Internet 118.

[0135] There may be critical conditions (Radio Frequency nulls, high Bit Error Rate, interference...) in the local link 114, remote link 116 or both. Furthermore, there may be congestion in the core Internet 120.

[0136] Consequently, different ways of detecting such conditions at the mobile terminal 100, are defined as shown in Table 8.

Table 8

Error link	Detection technique	Responsiveness
Local link 114	ROHC feedback (NACKs)	Immediate
Remote link 116	$RTCP\text{-}RR_1$ messages	Slow
Local and remote link (all)	Combinations of the above	

[0137] The terminal that is transmitting video, i.e. the local mobile terminal 100, can detect a critical condition in the local wireless link 114 with the base station 113, by the reception of Negative Acknowledgement generated by the Robust Header Compression decompressor in the Universal Terrestrial Radio Access radio network controller.

[0138] The Robust Header Compression decompressor (using the optimistic or reliable mode) generates a Negative Acknowledgement (NACK) message when a number of the Cyclic Redundancy Check of the received compressed headers fail and the Realtime Transport Protocol headers cannot be correctly reconstructed.

[0139] The rate of reception of Robust Header Compression Negative Acknowledgement messages can be used by the local mobile terminal 100 to: i) detect a generic critical condition in the local wireless link and ii) keep track of which video packets have been lost.

[0140] The second case is especially important because such information can be fed back to the video encoder to prevent error propagation at the receiver.

[0141] In order to detect that the link of the receiver, i.e. the remote mobile terminal 104, is experiencing packet

Ex.1002 / Page 738 of 1008
Cisco Systems, Inc.

losses, Real-time Transport Control Protocol Receiver Reports messages may be used, which explicitly include a packet loss rate indication. The responsiveness depends on the total bandwidth allocated to the Realtime Transport Protocol flow. Indeed, it is specified (RFC 3550) that the fraction of the session bandwidth for Real-time Transport Control Protocol is 5%.

[0142] The Robust Header Compression framework, as previously mentioned, supports multiple operating modes, based on the presence and utilization of a feedback channel from the header decompressor back to the header compressor.

[0143] Although the methods described hereafter refer to Robust Header Compression profile 1 (Realtime Transport Protocol / Unreliable Datagram Protocol / Internet Protocol), the same concepts can also be applied to other Robust Header Compression profiles, for example Transport Control Protocol / Internet Protocol.

[0144] When operating in optimistic mode, the Robust Header Compression framework minimizes the feedback channel usage. The decompressor in full context state (which should be the normal operating mode after an initial set-up phase) sends a Negative Acknowledgement packet back to the compressor when all the following conditions are verified:

- a Cyclic Redundancy Check fails,
- Sequence Number Least Significant Bit wraparound correction fails, and
- Local context repair fails.

[0145] In case of many consecutive packets being lost there is a high probability of a context damage and consequent Negative Acknowledgement generation. In O-mode the window size w is 16 for the coded Realtime Tansport Protocol - Sequence Number values (when UO-0 packets are used); therefore any link outage that causes the loss of at least 16 packets is likely to trigger a Negative Acknowledgement.

[0146] This observation suggests that application data should be segmented into a higher number of packets in order to improve loss detection capability, at the cost of slightly reduced compression efficiency. Such a penalty is limited when using small Context ID space and UO-0 packets, leading to a minimum header dimension of only one or two bytes.

[0147] Figure 5 shows an example of the operation of a compressor 204 and a decompressor 202 according to the invention.

[0148] The compressor 204 sends a sequence of P (prediction) frames and I (intra) frames. Once the compressor 204 receives a Negative Acknowledgement 200 it transits to a lower state and sends suitable packets to update the context (UOR-2, IR-DYN or IR). As can be seen from figure 5, this corresponds to sending I frames. Such packets further reduce compression efficiency, but they are necessary to re-establish a valid context at the decompressor 202 after a prolonged link outage.

[0149] If the Robust Header Compression decompressor 202 informs the video encoder about the packet loss event, suitable techniques can be used to mitigate video quality degradation at the receiver.

[0150] It should be noted, however, that the decompressor 202 may be able to recover damaged context information without sending a Negative Acknowledgement 200, so the optimistic mode does not guarantee 100% packet loss detection.

[0151] The video coder is operating at 10 frames per second and generates 10 packets per frame (with a variable dimension depending on frame type I or P).

[0152] In these conditions a burst of errors affecting at least 16 packets (~160ms on average) will cause the decompressor 202 to transmit a Negative Acknowledgement packet 200 (Robust Header Compression feedback-2 packet, 2 bytes minimum). Upon receiving such Negative Acknowledgement indication 200, the Robust Header Compression compressor 204 informs the video encoder, which triggers an Intra-refresh 212 operation.

[0153] In Reliable mode, the Robust Header Compression framework uses the feedback channel more frequently: acknowledgement packets are transmitted whenever the context is successfully updated.

[0154] In particular, in Figure 6 the Robust Header Compression decompressor 202 generates an Acknowledge (ACK) message 210 (Robust Header Compression feedback-1 packet, one byte minimum) in the following cases:

- the first of a sequence of R-0-CRC packets is correctly decompressed;
- the first N packets out of a sequence of UOR-2, IR or IR-DYN packets are successfully decompressed, where the default value for N is 2.

[0155] The decompressor 202 should ensure that at least one Acknowledge packet 210 per round trip time is generated, whereas the "sparse Acknowledge" mechanism tries to reduce the number of Acknowledges that are generated.

[0156] The Acknowledge packet 210 carries the Sequence Number of the packet that triggered the Acknowledge event.

[0157] In this case, preferably larger packets (that update the Robust Header Compression context) should be used

Ex.1002 / Page 739 of 1008
Cisco Systems, Inc.

in order to force the decompressor 202 to generated Acknowledge packets 210, at the cost of a higher radio bandwidth used for this purpose.

[0158] The transmitting side can therefore use two strategies to detect packet loss and consequently take countermeasures in the video encoder.

[0159] First, it can track the Robust Header Compression Acknowledge inter-arrival rate and, based on the measured average and variance, set a timeout T. This timeout T is set each time a Robust Header Compression Acknowledge is received. Upon timeout expiration, the transmitter assumes that the Acknowledge has not been generated due to a packet loss.

[0160] Second, the transmitter side keeps track of Sequence Numbers of Acknowledge packets (these sequence numbers are carried in the Robust Header Compression Acknowledge packet) and can easily detect gaps.

[0161] Whenever packet loss is detected by using the RoHC framework, the video encoder can react to mitigate video quality degradation, as discussed below.

[0162] Conversational services are mainly characterized by the fact that the end-to-end delay should be less than 150 ms, which leads to unavoidable transmission errors. Thus, an error-resilient video coding standard suitable for conversational communication has to minimize the visual effect of errors within one frame, whereas at the same time the well-known problem of spatial-temporal error propagation has to be limited.

[0163] H.264 video encoding is based on sequential encoding of N frames. Moreover, within each frame video encoding is based on sequential encoding of M macroblocks, where M is the total number of macroblocks in one frame and depends on the spatial resolution of the video sequence.

[0164] The encoding process then creates slices by grouping a certain number of macroblocks, the picture and macroblock indexes being binary coded in the slice header. The coded representation of a slice is the payload of a Network Adaptation Layer unit, which in turn is encapsulated in a Realtime Transport Protocol packet.

[0165] Sliced-structured coding is an error resiliency tool that helps in reducing packet loss probability and the corresponding visual degradation.

[0166] Packet loss probability can be reduced if slices are relatively small, since the probability of bit errors is generally lower than for large packets.

[0167] Moreover, short packets reduce the amount of lost information, so that error concealment techniques can be applied more efficiently, although it has to be considered that the increased overhead associated with decreasing slice size might affect coding performance. Thus, careful selection of the packet size is necessary.

[0168] At the receiving side, the decoder is in charge of temporal and spatial localization of lost packets i.e., error detection. In particular, the decoder has to detect if an entire picture or one or more slices of a picture were lost. This can be done by checking frame and macroblock indexes in slice headers.

[0169] Once errors have been detected, error concealment tools may be applied by means of pixel-level processing techniques. For example, supposing that a macroblock has not been received, it can be concealed from the pixel values of spatially adjacent macroblocks.

[0170] The need also exists of taking into account that error resiliency, error detection and error concealment techniques may help in reducing the impact of errors on the video quality. However, since errors cannot be completely eliminated, the effects of spatial-temporal propagation may still become severe.

[0171] Considering a given macroblock MB_A of frame (n-1), and supposing that the set of macroblocks belonging to frame n and predicted from pixels of such given macroblock MB_A is given by a set $\{MB_j\}$, $j = 1, ..., k$, and further supposing that the given macroblock MB_A has not been received because of packet loss during transmission of frame (n-1), the decoder cannot then decode this macroblock, and error concealment is applied to estimate the given macroblock MB_A. However, such reconstruction leads to mismatches of the reference frame (n-1) between encoder and decoder. Thus, decoding of frame n causes the set $\{MB_j\}$ to suffer from error propagation.

[0172] If no information on missing macroblocks is available at the encoder, the only effective way to recover from error propagation is refreshing by coding intra frames, although it must be taken into account that the instantaneous bit-rate and the resulting delay would increase significantly.

[0173] On the other hand, if the encoder knows which macroblocks of frame (n-1) have been lost during transmission, error propagation can be avoided by forcing those macroblocks not to be used for prediction of macroblocks of frame n.

[0174] For each macroblock belonging to frame n, the encoder may then decide to use inter or intra coding according to efficiency considerations (H.264 allows intra encoding of single macroblock). The only difference compared to usual frame coding is that here frame (n-1), which is used as the reference frame to encode frame n, contains "forbidden macroblock" meaning that they cannot be used for prediction.

[0175] Information about missing macroblocks is usually available at the decoder side. Indeed, as explained above, error detection allows knowing which slices are missing. This implies that:

- a feedback channel is necessary in order to let the decoder sending the encoder a not-acknowledge message (Acknowledge) for missing slices,

Ex.1002 / Page 740 of 1008
Cisco Systems, Inc.

- the encoder receives Acknowledges on parts of frame n-d, where d is a delay which depends on the bandwidth available for the feedback channel.

[0176] As far as the second item is concerned, error tracking techniques have to be adopted by the encoder. The encoder attempts to track the error to obtain an estimate of the quality of frame n-1 at the decoder side, which serves as reference for frame n, so that proper error recovery to stop error propagation may be applied.

[0177] The Negative Acknowledgement sent by the Robust Header Compression decompressor located in the Universal Terrestrial Radio Access Radio Network Controller can be beneficially used to get information about macroblocks that have been lost with Realtime Transport Protocol packets transmitted in the local link. To do that, it is sufficient to create a map of macroblocks contained in each Realtime Transport Protocol packet.

[0178] Such a procedure involving support of the feedback channel is - not - known from H.264 standard. Moreover, its full support would not be possible with current transport and control protocols.

[0179] The proposal is thus made of exploiting Third Generation Partnership Project from Rel. 4 supports Robust Header Compression on Universal Mobile Telecommunications System networks so that the proposed technique is fully standard compliant and no modifications are required.

[0180] Another important aspect is that the Negative Acknowledgement from the Robust Header Compression decompressor may be much faster than the Negative Acknowledgement sent by the decoder through a possible differently built feedback channel. When this application-level feedback is available, it is obviously possible to combine it with RoHC feedback.

[0181] In particular, supposing that after the encoder has encoded frame (n-1), the corresponding Realtime Transport Protocol packets are transmitted from the mobile terminal 100 to the base station 113, when the last Realtime Transport Protocol packet has been sent, the video encoder starts encoding frame n.

[0182] It is observed that, if Negative Acknowledgements related to Realtime Transport Protocol packets of frame (n-1) are received before the encoder starts encoding frame n, no error tracking is needed to estimate frame (n-1) at the decoder side. The encoder has just to set forbidden macroblocks as described above in order to avoid error propagation.

[0183] In absence of a feedback channel, the encoder has no information about lost packets on the remote link. Thus, it is not possible to apply macroblock-based error recovery techniques, unless a feedback channel is available providing information on lost macroblocks. However, as explained previously, it is to be taken into account that this would not be a standard-compliant solution.

[0184] Therefore, intra frame refreshing should be applied to recover from error propagation when bad quality occurs in the remote link.

[0185] The reverse video flow that is being generated by the peer mobile terminal may be used to estimate the quality of the remote link. To do that, Realtime Transport Control Protocol Receiver Report messages of the reverse video flow, which explicitly include an Realtime Transport Protocol packet loss rate indication may be used, although the rate of generation of such reports is low.

[0186] In particular, the link quality estimation strategy summarized in Table 9 can be adopted.

	RTP packet loss (remote)	No RTP packet loss (remote)
ROHC NACK occurrence (local)	Bad local link, and bad remote link depending on RTP packet loss rate	Bad local link
No ROHC NACK occurrence (local)	Bad remote link	Good local and remote link

Table 9

[0187] A preferred embodiment of the present invention may be implemented in future mobile phones according to the schematics shown in Figure 7, for example on next-generation Nomadik platforms.

Ex.1002 / Page 741 of 1008
Cisco Systems, Inc.

[0188] Such a preferred embodiment basically provides for a procedure that runs in a main Central Process Unit 300 of the mobile phone and interacts with a video coder 310, which is usually implemented as a hardware accelerator. Such Central Process Unit 300 interacts with the video codec 310 by means of I/O registers 312, shared memory 314 and interrupts.

[0189] All the networking tasks (protocol stacks) run on the Central Process Unit 300 including the Robust Header Compression engine. Based on the detected link conditions, the video coder 310 parameters are dynamically written in its control registers.

[0190] A method for dynamically adapting video encoding characteristics in an IP-based mobile video call system has thus been presented that improves the received video quality in presence of varying wireless link conditions.

[0191] By exploiting information from the Realtime Transport Protocol / Unreliable Datagram Protocol / Internet Protocol header compressor and by analyzing the reverse video stream, the terminal is able to adapt the video encoder parameters to the estimated channel conditions and therefore limit error propagation which degrades video quality.

[0192] The arrangement described herein can be used also in other contexts where IP-based video services are provided and RoHC is applicable. For instance, it can be used in EDGE (Enhanced Data Rates for GSM Evolution (EDGE)) or other CDMA mobile standards.

[0193] Consequently, without prejudice to the underlying principles of the invention, the details and the embodiments may vary, also appreciably, with reference to what has been described by way of example only, without departing from the scope of the invention as defined by the annexed claims.

Claims

1. A method for communicating video data on a channel in a packet-switched network, the method including the steps of performing at a terminal (100) compression (10; 204) of said video data in packets (106, 108) during a video coding operation, detecting wireless channel conditions and adapting control parameters of said video coding operation to said detected channel conditions, **characterized in that** said compression operation is a robust header compression operation (204) and said step of adapting control parameters of said video coding operation is performed as a function of information (200, 210, 110) about said wireless channel conditions detected on a feedback channel made available in a decompression step (202) associated to said compression operation (204).

2. The method of claim 1, **characterized in that** said channel is a wireless channel.

3. The method of claim 1, **characterized in that** said step of adapting the control parameters of the video coding operation includes triggering error recovery techniques.

4. The method of claim 3, **characterized in that** said error recovery techniques include transmitting in response to said information (200, 210, 110) about said channel conditions video data related to context (30).

5. The method of any of the preceding claims, **characterized in that** said information (200, 210, 110) detected on a feedback channel is sent in said robust header compression operation from a header decompressor (202) to a header compressor (204).

6. The method of claim 5, **characterized in that** said information (200, 210, 110) sent on a feedback channel includes received packet acknowledgment messages (200, 210).

7. The method of claim 6, **characterized in that** said information (200, 210) sent on a feedback channel pertains a local link (114) of said channel between said terminal (100) and the network (120).

8. The method of claim 7, **characterized in that** said feedback channel further include a reverse video data flow (108) from a remote terminal (104) said information sent on a feedback channel includes a part wireless channel between said remote terminal (104) and said network (120).

9. The method of claim 8, **characterized in that** said part (110) pertaining a remote link (118) comprises messages including packet loss rate indication, in particular Real-time Transport Control Protocol Receiver Reports messages sent by said remote terminal (104) in said reverse video flow (108).

10. The method of one of claims 7 to 9,
characterized in that said information (110) sent on a feedback channel includes a rate of reception of robust

Ex.1002 / Page 742 of 1008
Cisco Systems, Inc.

header compression negative acknowledgement messages (200) used to keep track of which video packets (106) are lost.

11. The method of any of the preceding claims, **characterized in that** said compression operation (204) includes a first mode of operation suitable for minimizing said feedback channel usage that provides for sending a negative acknowledgement message (200) to the compressor (204) when one or more the following conditions are verified:

- a Cyclic Redundancy Check fails,
- Sequence Number Least Significant Bit wraparound correction fails, and
- Local context repair fails.

12. The method of claim 11, **characterized in that** when the compressor (204) receives a negative acknowledgement message (200) transits to a lower state and triggers an intra-refresh operation (212).

13. The method of any of the preceding claims, **characterized in that** said compression operation includes a second mode of operation in which an acknowledge message (210) is generated in the following cases:

- the first of a sequence of R-0-CRC packets is correctly decompressed;
- the first N packets in a sequence of UOR-2, IR

or IR-DYN packets are successfully decompressed; such an acknowledge message (210) also carrying a sequence number of the packet (106) that caused its generation.

14. The method of claim 13, **characterized in that** said step of adapting the control parameters of the video coding operation includes detecting packet loss by tracking a robust header compression acknowledge message (210) inter-arrival rate and setting a timeout (T) depending from said inter-arrival rate parameters, said timeout (T) being set each time a robust header compression acknowledge message (21) is received and assuming upon timeout expiration that said acknowledge message (210) does not indicate a packet loss.

15. The method of either claim 13 or 14, **characterized in that** said step of adapting the control parameters of the video encoding operation includes detecting packet loss by keeping track of sequence numbers of acknowledge message (210) packets.

16. The method of any of the preceding claims, **characterized in that** further includes an error recovery procedure on the local link (114) including the steps of mapping macroblocks contained in each real time packet and using said information (200, 210, 110) sent on the feedback channel in said compression operation for obtaining information about macroblocks that have been lost in real time packets (106) transmitted on said local link (114).

17. The method of claim 15 or 16, **characterized in that** said error recovery procedure includes setting forbidden macroblocks at the compressor (204) in order to avoid error propagation.

18. The method of claim 16 or 17, **characterized in that** said information sent on the feedback channel comprises a negative acknowledgement message (200) sent by the robust header compression decompressor (202) located in a Universal Terrestrial Radio Access Radio Network Controller (120) connected to said local link (114)

19. The method of any of the previous claims, **characterized in that** further includes evaluating a combination of said part (110) pertaining a remote link including messages including packet loss rate indication and of said acknowledgment messages (200, 210) sent from the header decompressor to the header compressor for estimating the wirsless channel conditions.

20. The method of any of the preceding claims, **characterized in that** said robust header compression operation is a Robust Header Compression profile 1 according to Realtime Transport Protocol / Unreliable Datagram Protocol / Internet Protocol.

21. The method of any of the preceding claims, **characterized in that** said robust header compression operation follows Transport Control Protocol / Internet Protocol.

Ex.1002 / Page 743 of 1008
Cisco Systems, Inc.

22. The method of any of the preceding claims, **characterized in that** said video coding operation operates according the H.264 standard.

23. System for communicating video data on a channel of a packet-switched network, that includes a video coder (310) associated to a compressor module (10; 204) configured for compressing in packets (106, 108) said video data, said video coder (310) being suitable for adapting control parameters to wireless channel conditions, **characterized in that** said video coder (310) is suitable for operating according to said step of adapting control parameters of the method of claims 1 to 22.

24. The system of claim 23, **characterized in that** said channel is a wireless channel.

25. The system of claim 23, **characterized in that** said compressor module (204) operates according the robust header compression operation of claims 1 to 22.

26. The system of claim 25, **characterized in that** includes a decompressor module (202) that operates according the robust header compression of claims 1 to 21.

27. The system of claim 25 or 26, **characterized in that** said video coder (310) is implemented as a hardware accelerator.

28. The system of any of claims 25 to 27, **characterized in that** is associated to a wireless mobile terminal (100, 104).

29. The system of claim 28, **characterized in that** said video coder (310) interacts with a main Central Process Unit (300) of said mobile terminal (100).

30. The system of claim 29, **characterized in that** said robust header compression engine run on a Central Process Unit (300) and said video coder (310) control parameters are dynamically written in control registers of said video coder (310).

31. Network for communicating video data on wireless channel, **characterized in that** includes at least one compressor (204) and/or a decompressor operating according the method of claims 1 to 22.

32. The network of claim 31, **characterized in that** is associated to a Internet-type network (118).

33. A computer program product, directly loadable in the memory of at least one computer and including software code portions for performing the steps of the method of claims 1 to 22 when the product is run on a computer.

Ex.1002 / Page 744 of 1008
Cisco Systems, Inc.

Fig. 1

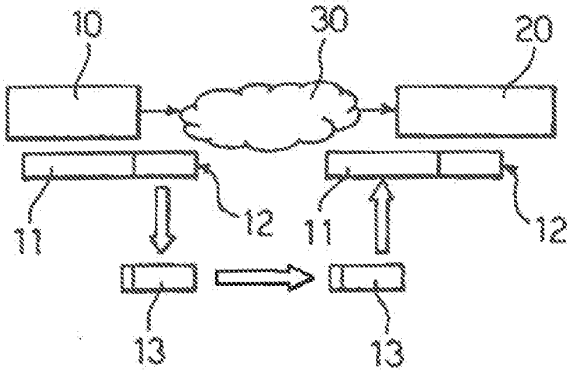


Fig. 2

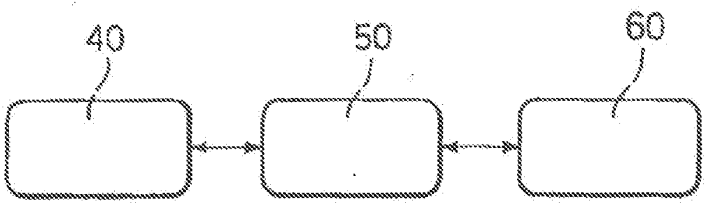


Fig. 3

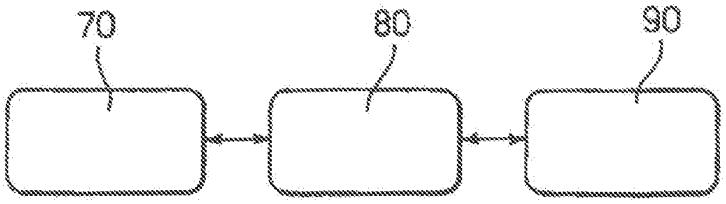


Fig. 4

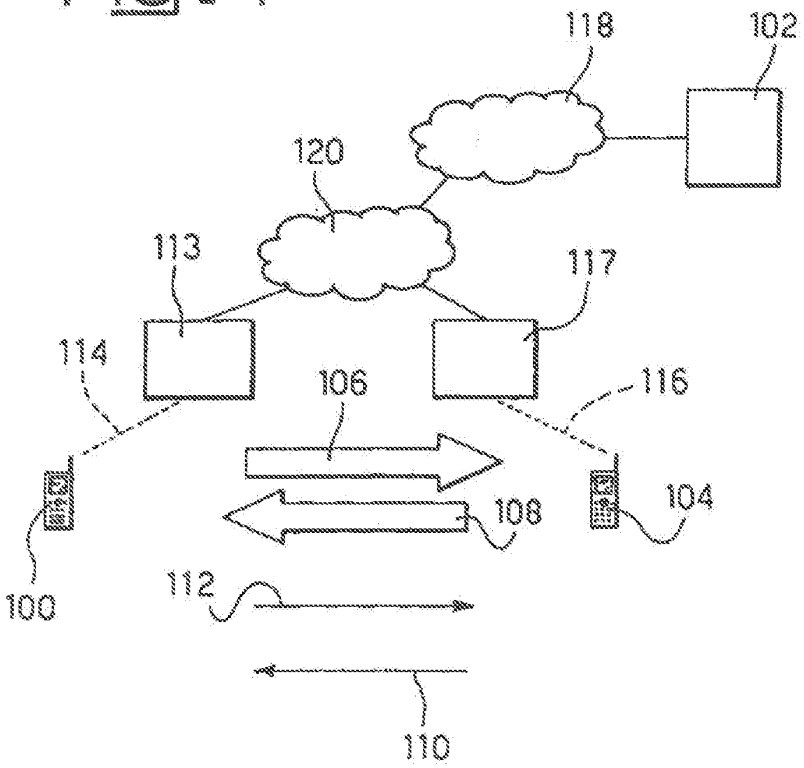

118
102
120
113
117
114
106
116
104
108
100
112
110

Fig. 5

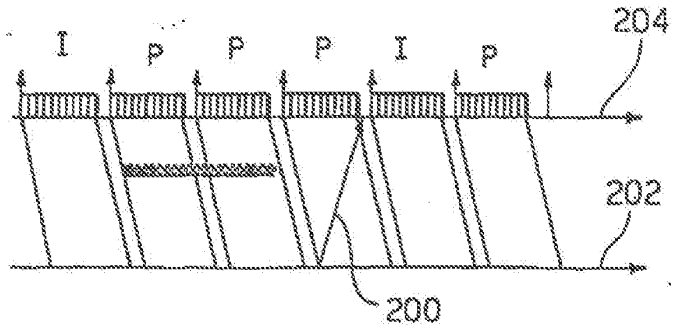

I
P
P
P
I
P
204
202
200

Fig. 6

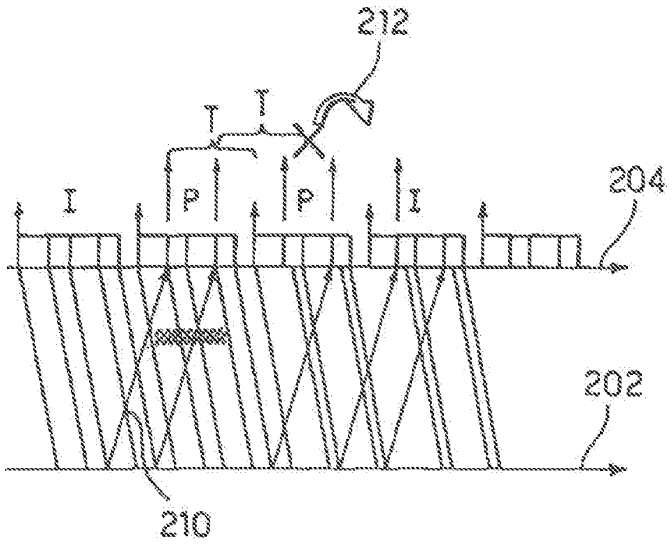
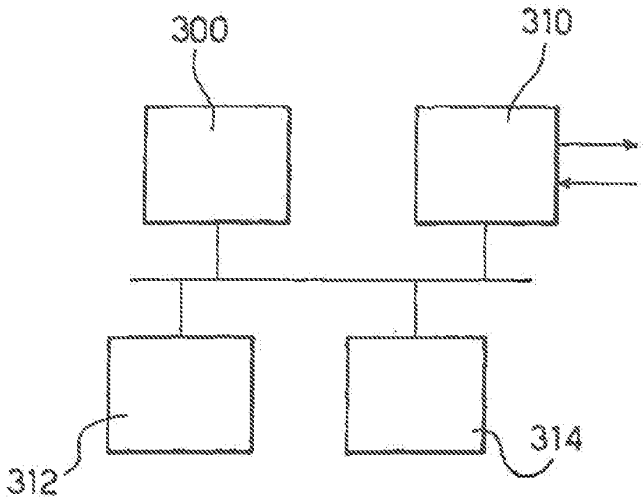


Fig. 7



European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 04 01 2878

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	YU H-B ET AL: "A highly efficient, low delay architecture for transporting H.264 video over wireless channel" SIGNAL PROCESSING. IMAGE COMMUNICATION, ELSEVIER SCIENCE PUBLISHERS, AMSTERDAM, NL, vol. 19, no. 4, April 2004 (2004-04), pages 369-385, XP004495311 ISSN: 0923-5965	1-8, 19-33	H04N7/24 H04L1/00 H04N7/26 H04N7/36 H04N7/64
Y	* abstract * * Section 1.1 H.264 NAL structure for wireless communications * * Section 1.2 Related work on multiframe * * Chapter 2. Proposed architecture * * figures 1,2,5,6,8,9 *	9-18	
Y	US 6 275 471 B1 (MUKHERJEE SARIT ET AL) 14 August 2001 (2001-08-14) * column 7, line 40 - column 7, line 56 * * figures 8,9 *	9	
D,Y	BORMANN C ET AL: "RObust Header Compression (ROHC)" DRAFT-IETF-ROHC-RTP-06.TXT, 24 November 2000 (2000-11-24), XP002211014 * page 38, line 3 - page 68, line 3 *	10-15	TECHNICAL FIELDS SEARCHED (Int.Cl.7) H04N H04L
Y	MASAHIRO WADA: "SELECTIVE RECOVERY OF VIDEO PACKET LOSS USING ERROR CONCEALMENT" IEEE JOURNAL ON SELECTED AREAS IN COMMUNICATIONS, IEEE INC. NEW YORK, US, vol. 7, no. 5, 1 June 1989 (1989-06-01), pages 807-814, XP000036749 ISSN: 0733-8716 * abstract * * page 808, left-hand column, line 8 - page 808, left-hand column, line 44 *	16-18	

-/--

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	2 November 2004	Hampson, F

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

Ex.1002 / Page 748 of 1008
Cisco Systems, Inc.

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 04 01 2678

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
A	STOCKHAMMER T ET AL: "H.264/AVC IN WIRELESS ENVIRONMENTS" IEEE TRANSACTIONS ON CIRCUITS AND SYSTEMS FOR VIDEO TECHNOLOGY, IEEE INC. NEW YORK, US, vol. 13, no. 7, July 2003 (2003-07), pages 657-673, XP001051194 ISSN: 1051-8215 * page 657, right-hand column, line 44 - page 668, left-hand column, line 38 * * figure 6 *	1-33	
A	GIROD B ET AL: "FEEDBACK-BASED ERROR CONTROL FOR MOBILE VIDEO TRANSMISSION" PROCEEDINGS OF THE IEEE, IEEE. NEW YORK, US, vol. 87, no. 10, October 1999 (1999-10), pages 1707-1723, XP000927243 ISSN: 0018-9219 * abstract * * page 1713, left-hand column, line 48 - page 1713, right-hand column, line 27 *	1,23,31, 33	TECHNICAL FIELDS SEARCHED (Int.Cl.7)
A	EP 1 126 716 A (ERICSSON TELEFON AB L M) 22 August 2001 (2001-08-22) * abstract * * paragraph [0027] - paragraph [0042] * * figures 1,2A,2B *	1,23,31, 33	
A	EP 1 180 871 A (MATSUSHITA ELECTRIC IND CO LTD) 20 February 2002 (2002-02-20)		
A	S. WENGER ET AL.: "RTP payload Format for H.264 Video" DRAFT-IETF-AVT-RTP-H264-06.TXT, May 2004 (2004-05), XP002303378		

-/--

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	2 November 2004	Hampson, F

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

Ex.1002 / Page 749 of 1008
Cisco Systems, Inc.

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 04 01 2878

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
A	MATOBA N ET AL: "A STUDY ON REDUCING TRANSMISSION DELAY IN MOBILE VIDEO COMMUNICATION SYSTEMS" IEICE TRANSACTIONS ON FUNDAMENTALS OF ELECTRONICS, COMMUNICATIONS AND COMPUTER SCIENCES, INSTITUTE OF ELECTRONICS INFORMATION AND COMM. ENG. TOKYO, JP, vol. E80-A, no. 7, 1 July 1997 (1997-07-01), pages 1281-1287, XP000748958 ISSN: 0916-8508		
A	US 6 154 489 A (ABOUSLEMAN GLEN PATRICK ET AL) 28 November 2000 (2000-11-28)		
A	EP 1 202 487 A (TOKYO SHIBAURA ELECTRIC CO) 2 May 2002 (2002-05-02)		
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	2 November 2004	Hampson, P

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

Ex.1002 / Page 750 of 1008
Cisco Systems, Inc.

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 04 01 2878

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

02-11-2004

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 6275471 B1	14-08-2001	NONE	
EP 1126716 A	22-08-2001	EP 1126716 A1	22-08-2001
		AT 243907 T	15-07-2003
		AU 3376801 A	27-08-2001
		DE 60100403 D1	31-07-2003
		DE 60100403 T2	19-05-2004
		WO 0162007 A1	23-08-2001
		EP 1256235 A1	13-11-2002
		ES 2199207 T3	16-02-2004
		US 2001022000 A1	13-09-2001
EP 1180871 A	20-02-2002	JP 2002135362 A	10-05-2002
		CA 2355016 A1	17-02-2002
		CN 1339877 A	13-03-2002
		EP 1180871 A2	20-02-2002
		US 2002059464 A1	16-05-2002
US 6154489 A	28-11-2000	NONE	
EP 1202487 A	02-05-2002	JP 2002204278 A	19-07-2002
		EP 1202487 A2	02-05-2002
		US 2002053053 A1	02-05-2002

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

Ex.1002 / Page 751 of 1008
Cisco Systems, Inc.

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

To:

BLISS TIMOTHY F.

HOWISON & ARNOTT, L.L.P. P.O. BOX 741715 DALLAS TX 75374-1715 USA

PCT

REC'D NOV 03 2011

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT AND THE WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

Applicant's or agent's file reference DAMA-30,559	Date of mailing *(day/month/year)* 26 OCTOBER 2011 (26.10.2011) **FOR FURTHER ACTION** See paragraphs 1 and 4 below
International application No. **PCT/US2011/024870**	International filing date *(day/month/year)* **15 FEBRUARY 2011 (15.02.2011)**
Applicant **DAMAKA, INC. et al**	

1. ☒ The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

Filing of amendments and statement under Article 19:

The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):

When? The time limit for filing such amendments is normally two months from the date of transmittal of the international search report.

Where? Directly to the International Bureau of WIPO, 34 chemin des Colombettes 1211 Geneva 20, Switzerland, Facsimile No.: +41 22 338 82 70

For more detailed instructions, see *PCT Applicant's Guide*, International Phase, paragraphs 9.004 . 9.011.

2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3. ☐ **With regard to any protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

☐ the protest together with the decision thereon has been transmitted to the International Bureau together with any request to forward the texts of both the protest and the decision thereon to the designated Offices.

☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Reminders**

The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. Following the expiration of 30 months from the priority date, these comments will also be made available to the public.

Shortly after the expiration of **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau before the completion of the technical preparations for international publication (Rules 90bis.1 and 90bis.3).

Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19months.

For details about the applicable time limits, Office by Office, see www.wipo.int/pct/en/texts/time_limits.html and the PCT Applicant's Guide, National Chapters.

Name and mailing address of the ISA/KR Korean Intellectual Property Office Government Complex-Daejeon, 189 Cheongsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	Authorized officer COMMISSIONER Telephone No. 82-42-481-8755

Form PCT/ISA/220 (July 2010)

* Attention

Copies of the documents cited in the international search report can be searched in the following Korean Intellectual Property Office English website for three months from the date of mailing of the international search report.

http://www.kipo.go.kr/en/ => PCT Services => PCT Services

ID : PCT international application number
PW : **MUFNHRSS**

Inquiries related to PCT International Search Report or Written Opinion prepared by KIPO as an International Searching Authority can be answered not only by KIPO but also through IPKC (Intellectual Property Korea Center), located in Vienna, VA, which functions as a PCT Help Desk for PCT applicants.

Homepage: http://www.ipkcenter.com
Email: ipkc@ipkcenter.com
Phone: +1 703 388 1066
Fax: +1 703 388 1084

Notes to Form PCT/ISA/220 (July 2010)

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	FOR FURTHER ACTION	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
DAMA-30,559		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/US2011/024870	**15 FEBRUARY 2011 (15.02.2011)**	15 FEBRUARY 2010 (15.02.2010)
Applicant		
DAMAKA, INC. et al		

This International search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 5 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**
   a. With regard to the **language**, the international search was carried out on the basis of:
      ☒ the international application in the language in which it was filed
      ☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))
   b. ☐ This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6*bis*(a)).
   c. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.
2. ☐ **Certain claims were found unsearchable** (See Box No. II)
3. ☐ **Unity of invention is lacking** (See Box No. III)
4. With regard to the **title,**
   ☒ the text is approved as submitted by the applicant.
   ☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract,**
   ☒ the text is approved as submitted by the applicant.
   ☐ the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.
6. With regard to the drawings,
   a. the figure of the **drawings** to be published with the abstract is Figure No. 1
      ☒ as suggested by the applicant.
      ☐ as selected by this Authority, because the applicant failed to suggest a figure.
      ☐ as selected by this Authority, because this figure better characterizes the invention.
   b. ☐ none of the figure is to be published with the abstract.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2011/024870

A. CLASSIFICATION OF SUBJECT MATTER

H04L 12/28(2006.01)i, G06F 15/173(2006.01)i, H04L 29/06(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

H04L 12/28; G06F 15/16; H04L 11/00; H04L 12/56

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models
Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) & Keywords: private, public, and relay routes , public address ,reflector, NAT device

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	J. ROSENBERG et al. "Session Traversal Utilities for NAT (STUN)", draft-ietf-behave-rfc3489bis-06, March 5, 2007. See Abstract, sections 5, 12.2, 13.2.3.	1-20
A	US 7623516 B2 (CHATURVEDI, SIVAKUMAR R. et al.) 24 November 2009 See whole document.	1-20
A	US 7623476 B2 (RAVIKUMAR, SIVAKUMAR et al.) 24 November 2009 See whole document.	1-20
A	US 7590758 B2 (TAKEDA, YUTAKA et al.) 15 September 2009 See whole document.	1-20
A	US 2006-0182100 A1 (LI, JIN et al.) 17 August 2006 See whole document.	1-20

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents,such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
26 OCTOBER 2011 (26.10.2011)	**26 OCTOBER 2011 (26.10.2011)**

Name and mailing address of the ISA/KR	Authorized officer
Korean Intellectual Property Office Government Complex-Daejeon, 189 Cheongsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	KWON, Ho Young Telephone No. 82-42-481-8478

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/US2011/024870

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 7623516 B2	24.11.2009	AU 2005-264013 A1	26.01.2006
		AU 2005-264013 B2	27.05.2010
		CA 2571754 A1	26.01.2006
		CA 2676770 A1	09.08.2007
		CN 101044735 A0	26.09.2007
		EP 1766919 A1	28.03.2007
		JP 04-681697 B2	10.02.2011
		JP 2008-505580 A	21.02.2008
		JP 2011-103121 A	26.05.2011
		US 2005-0286519 A1	29.12.2005
		US 2006-0039365 A1	23.02.2006
		US 2006-0050700 A1	09.03.2006
		US 2006-0095365 A1	04.05.2006
		US 2006-0120375 A1	08.06.2006
		US 2006-0203750 A1	14.09.2006
		US 2006-0206310 A1	14.09.2006
		US 2006-0218624 A1	28.09.2006
		US 2007-0165597 A1	19.07.2007
		US 2007-0165629 A1	19.07.2007
		US 2009-0262742 A1	22.10.2009
		US 2009-0296606 A1	03.12.2009
		US 2010-0318678 A1	16.12.2010
		US 7570636 B2	04.08.2009
		US 7623476 B2	24.11.2009
		US 7656870 B2	02.02.2010
		US 7778187 B2	17.08.2010
		US 7933260 B2	26.04.2011
		US 8000325 B2	16.08.2011
		US 8009586 B2	30.08.2011
		WO 2006-008589 A1	26.01.2006
		WO 2007-027478 A1	08.03.2007
		WO 2007-047554 A2	26.04.2007
		WO 2007-047554 A3	26.04.2007
		WO 2007-070670 A2	21.06.2007
		WO 2007-070670 A3	21.06.2007
		WO 2007-089717 A2	09.08.2007
		WO 2007-089717 A3	09.08.2007
		WO 2007-134260 A2	22.11.2007
		WO 2007-134260 A3	22.11.2007
		WO 2007-134261 A2	22.11.2007
		WO 2007-134261 A3	22.11.2007
		WO 2007-134263 A2	22.11.2007
		WO 2007-134263 A3	22.11.2007
US 7623476 B2	24.11.2009	AU 2005-264013 A1	26.01.2006
		AU 2005-264013 B2	27.05.2010
		CA 2571754 A1	26.01.2006
		CA 2676770 A1	09.08.2007
		CN 101044735 A0	26.09.2007

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/US2011/024870

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
		EP 1766919 A1	28.03.2007
		JP 04-681697 B2	10.02.2011
		JP 2008-505580 A	21.02.2008
		JP 2011-103121 A	26.05.2011
		US 2005-0286519 A1	29.12.2005
		US 2006-0039365 A1	23.02.2006
		US 2006-0050700 A1	09.03.2006
		US 2006-0095365 A1	04.05.2006
		US 2006-0120375 A1	08.06.2006
		US 2006-0203750 A1	14.09.2006
		US 2006-0206310 A1	14.09.2006
		US 2006-0218624 A1	28.09.2006
		US 2007-0165597 A1	19.07.2007
		US 2007-0165629 A1	19.07.2007
		US 2009-0262742 A1	22.10.2009
		US 2009-0296606 A1	03.12.2009
		US 2010-0318678 A1	16.12.2010
		US 7570636 B2	04.08.2009
		US 7623516 B2	24.11.2009
		US 7656870 B2	02.02.2010
		US 7778187 B2	17.08.2010
		US 7933260 B2	26.04.2011
		US 8000325 B2	16.08.2011
		US 8009586 B2	30.08.2011
		WO 2006-008589 A1	26.01.2006
		WO 2007-027478 A1	08.03.2007
		WO 2007-047554 A2	26.04.2007
		WO 2007-047554 A3	26.04.2007
		WO 2007-070670 A2	21.06.2007
		WO 2007-070670 A3	21.06.2007
		WO 2007-089717 A2	09.08.2007
		WO 2007-089717 A3	09.08.2007
		WO 2007-134260 A2	22.11.2007
		WO 2007-134260 A3	22.11.2007
		WO 2007-134261 A2	22.11.2007
		WO 2007-134261 A3	22.11.2007
		WO 2007-134263 A2	22.11.2007
		WO 2007-134263 A3	22.11.2007
US 7590758 B2	15.09.2009	US 2004-0139227 A1	15.07.2004
		US 2004-0139228 A1	15.07.2004
		US 2008-0126528 A1	29.05.2008
		US 7328280 B2	05.02.2008
		US 7899932 B2	01.03.2011
		WO 2004-063843 A2	29.07.2004
		WO 2004-063843 A3	29.07.2004
		WO 2004-063843 A3	31.03.2005
		WO 2004-064356 A2	29.07.2004
		WO 2004-064356 A3	29.07.2004

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/US2011/024870

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2006-0182100 A1	17.08.2006	US 7912046 B2	22.03.2011

Form PCT/ISA/210 (patent family annex) (July 2009)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
BLISS TIMOTHY F.

HOWISON & ARNOTT, L.L.P. P.O. BOX 741715 DALLAS
TX 75374-1715 USA

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing *(day/month/year)*	**26 OCTOBER 2011 (26.10.2011)**
Applicant's or agent's file reference DAMA-30,559	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2011/024870	**15 FEBRUARY 2011 (15.02.2011)**	15 FEBRUARY 2010 (15.02.2010)

International Patent Classification (IPC) or both national classification and IPC

H04L 12/28(2006.01)i, G06F 15/173(2006.01)i, H04L 29/06(2006.01)i

Applicant

DAMAKA, INC. et al

1. This opinion contains indications relating to the following items:

- [x] Box No. I Basis of the opinion
- [ ] Box No. II Priority
- [ ] Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- [ ] Box No. IV Lack of unity of invention
- [x] Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- [ ] Box No. VI Certain documents cited
- [x] Box No. VII Certain defects in the international application
- [ ] Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.
For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/KR	Date of completion of this opinion	Authorized officer
Korean Intellectual Property Office Government Complex-Daejeon, 189 Cheongsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	26 OCTOBER 2011 (26.10.2011)	KWON, Ho Young Telephone No.82-42-481-8478

Form PCT/ISA/237 (cover sheet) (July 2011)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/024870

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of:

   a. a sequence listing filed or furnished
      ☐ on paper
      ☐ in electronic form

   b. time of filing or furnishing
      ☐ contained in the international application as filed.
      ☐ filed together with the international application in electronic form.
      ☐ furnished subsequently to this Authority for the purposes of search.

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additioanl copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/024870

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-20	YES
	Claims	NONE	NO
Inventive step (IS)	Claims	1-20	YES
	Claims	NONE	NO
Industrial applicability (IA)	Claims	1-20	YES
	Claims	NONE	NO

2. Citations and explanations :

Reference is made to the following documents:

D1: J. ROSENBERG et al. "Session Traversal Utilities for NAT (STUN)", draft-ietf-behave-rfc3489bis-06, March 5, 2007
D2: US 7623516 B2 (CHATURVEDI, SIVAKUMAR R. et al.) 24 November 2009
D3: US 7623476 B2 (RAVIKUMAR, SIVAKUMAR et al.) 24 November 2009
D4: US 7590758 B2 (TAKEDA, YUTAKA et al.) 15 September 2009
D5: US 2006-0182100 A1 (LI, JIN et al.) 17 August 2006

1. Novelty (PCT Article 33(2)) and Inventive Step (PCT Article 33(3))

1.1 Claims 1-5

D1 is regarded as the closest prior art to the subject matter of claim 1. The subject matter of claim 1 differs from that of D1 in that the method in claim 1 comprises "receiving, by the first endpoint, a first private presence message, a first public presence message, and a first relay presence message from the second endpoint via private, public, and relay routes, respectively, wherein the private route corresponds to a local address assigned to the first endpoint by a network address translation (NAT) device in a local network, the public route corresponds to a public address of the NAT device, and the relay route uses a reflector", "sending to the second endpoint by the first endpoint", "sending a second private presence message", "receiving a second response from the second endpoint to one of the second private, public, or relay message by the first endpoint", "selecting the private, public, or relay route by the first endpoint", and "identifying the private, public, or relay route". These features of claim 1 are not shown in any other prior art documents (D2-D5) cited in the ISR. Hence, claim 1 is considered novel under PCT Article 33(2).

Regarding inventive step, the subject matter of claim 1 is not obvious to a person skilled in the art over the documents individually or in combination. Therefore, claim 1 is considered to involve an inventive step under PCT Article 33(3).

Claims 2-5 are dependent on claim 1 and as such also meet the requirements of PCT Article 33(2) and 33(3).

1.2 Claims 6-18

D1 is regarded as the closest prior art to the subject matter of claim 6. The subject matter of claim 6 differs from that of D1 in that the method in claim 6 comprises "sending, by the first endpoint, a first presence message to the second endpoint via a first route", "sending, by the first endpoint, a second presence message to the second endpoint via a second route", and "receiving a response from the second endpoint to one of the first and second presence messages, wherein the response identifies which of the first and second presence messages is being answered by the response". These features of claim 6 are not shown in any other prior art documents (D2-D5) cited in the ISR. Hence, claim 6 is considered novel under PCT Article 33(2).

Regarding inventive step, the subject matter of claim 6 is not obvious to a person skilled in the art over the documents individually or in combination. Therefore, claim 6 is considered to involve an inventive step under PCT Article 33(3).

Claims 7-18 are dependent on claim 6 and as such also meet the requirements of PCT Article 33(2) and 33(3).

Continued on Supplemental Box

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/024870

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

According to the requirements of PCT Rule 11.13(k), the different figures shall be numbered in Arabic numerals consecutively and independently of the numbering of the sheet. This requirement is not met in view of the use of FIG. 2a, FIG. 2b, FIG. 2c, FIG. 2d, FIG. 2e, FIG. 2f, FIG. 2g, FIG. 3a, FIG. 3b, FIG. 19A, FIG. 19B, FIG. 23A, FIG. 23B.

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of:

Box V

1.3 Claims 19-20

D1 is regarded as the closest prior art to the subject matter of claim 19. The subject matter of claim 19 differs from that of D1 in that the endpoint in claim 19 comprises "sending first and second presence messages via first and second routes", "receiving a first response from the other endpoint to one of the first and second presence messages", "selecting the first or second route that corresponds to the first or second presence message, respectively", "receiving a third presence message via one of the first and second routes", "sending a second response to the third presence message to the other endpoint via the first or second route". These features of claim 19 are not shown in any other prior art documents (D2-D5) cited in the ISR. Hence, claim 19 is considered novel under PCT Article 33(2).

Regarding inventive step, the subject matter of claim 19 is not obvious to a person skilled in the art over the documents individually or in combination. Therefore, claim 19 is considered to involve an inventive step under PCT Article 33(3).

Claims 20 is dependent on claim 19 and as such also meets the requirements of PCT Article 33(2) and 33(3).

2. Industrial Applicability (PCT Article 33(4))

The subject matter of claims 1-20 has industrial applicability and meets the requirement of PCT Article 33(4).

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

To:

BLISS TIMOTHY F.

HOWISON & ARNOTT, L.L.P. P.O.BOX 741715 DALLAS
TX 75374-1715 USA

PCT REC'D NOV 21 2011

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT AND THE WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

Applicant's or agent's file reference DAMA-30,563	Date of mailing *(day/month/year)* 09 NOVEMBER 2011 (09.11.2011) **FOR FURTHER ACTION** See paragraphs 1 and 4 below
International application No. **PCT/US2011/028685**	International filing date *(day/month/year)* **16 MARCH 2011 (16.03.2011)**
Applicant **DAMAKA, INC. et al**	

1. ☒ The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

Filing of amendments and statement under Article 19:

The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):

When? The time limit for filing such amendments is normally two months from the date of transmittal of the international search report.

Where? Directly to the International Bureau of WIPO, 34 chemin des Colombettes 1211 Geneva 20, Switzerland, Facsimile No.: +41 22 338 82 70

For more detailed instructions, see *PCT Applicant's Guide*, International Phase, paragraphs 9.004 . 9.011.

2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3. ☐ **With regard to any protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

☐ the protest together with the decision thereon has been transmitted to the International Bureau together with any request to forward the texts of both the protest and the decision thereon to the designated Offices.

☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Reminders**

The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. Following the expiration of 30 months from the priority date, these comments will also be made available to the public.

Shortly after the expiration of **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau before the completion of the technical preparations for international publication (Rules 90bis.1 and 90bis.3).

Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19months.

For details about the applicable time limits, Office by Office, see www.wipo.int/pct/en/texts/time_limits.html and the PCT Applicant's Guide, National Chapters.

Name and mailing address of the ISA/KR Korean Intellectual Property Office Government Complex-Daejeon, 189 Cheongsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	Authorized officer COMMISSIONER Telephone No. 82-42-481-8752

Form PCT/ISA/220 (July 2010)

* Attention

Copies of the documents cited in the international search report can be searched in the following Korean Intellectual Property Office English website for three months from the date of mailing of the international search report.

http://www.kipo.go.kr/en/ => PCT Services => PCT Services

ID : PCT international application number
PW : **DHQFHXJR**

Inquiries related to PCT International Search Report or Written Opinion prepared by KIPO as an International Searching Authority can be answered not only by KIPO but also through IPKC (Intellectual Property Korea Center), located in Vienna, VA, which functions as a PCT Help Desk for PCT applicants.

Homepage: http://www.ipkcenter.com
Email: ipkc@ipkcenter.com
Phone: +1 703 388 1066
Fax: +1 703 388 1084

Notes to Form PCT/ISA/220 (July 2010)

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	FOR FURTHER ACTION	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
DAMA-30,563		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/US2011/028685	**16 MARCH 2011 (16.03.2011)**	19 MARCH 2010 (19.03.2010)

Applicant

DAMAKA, INC. et al

This International search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of **4** sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**
   a. With regard to the **language**, the international search was carried out on the basis of:
      ☒ the international application in the language in which it was filed
      ☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))
   b. ☐ This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6*bis*(a)).
   c. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.
2. ☐ **Certain claims were found unsearchable** (See Box No. II)
3. ☐ **Unity of invention is lacking** (See Box No. III)
4. With regard to the **title,**
   ☒ the text is approved as submitted by the applicant.
   ☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract,**
   ☒ the text is approved as submitted by the applicant.
   ☐ the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.
6. With regard to the drawings,
   a. the figure of the **drawings** to be published with the abstract is Figure No. **1**
      ☒ as suggested by the applicant.
      ☐ as selected by this Authority, because the applicant failed to suggest a figure.
      ☐ as selected by this Authority, because this figure better characterizes the invention.
   b. ☐ none of the figure is to be published with the abstract.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2011/028685

A. CLASSIFICATION OF SUBJECT MATTER

H04L 9/32(2006.01)i, H04L 29/06(2006.01)i, H04L 12/28(2006.01)i, H04L 12/56(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

H04L 9/32; H04N 7/173; H04N 7/167; H04L 12/28; H04L 12/56

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models
Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) & Keywords: virtual endpoint, peer to peer, login and authentication.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2008-0080392 A1 (WALSH, RICHARD J et al.) 03 April 2008 See abstract, figures 1-3A,3D,4,7,9, paragraphs [0027]-[0030],[0032],[0034]-[0036],[0039],[0042]-[0044],[0061]-[0063],[0067],[0108]-[0111] and claims 1, 14,15,23.	1-20
A	US 2006-0218624 A1 (RAVIKUMAR, SIVAKUMAR et al.) 28 September 2006 See abstract, figures 12,13,31a, paragraphs [0099],[0102]-[0104],[0195]-[0197] and claims 1-7.	1-20
A	US 2009-0300673 A1 (BACHET, FRANCK et al.) 03 December 2009 See abstract, figures 2,6,7,9,17,25 and paragraphs [0059],[0062],[0355],[0363],[0376],[0449],[0450],[0498]-[0505].	1-20

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents,such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
08 NOVEMBER 2011 (08.11.2011)	**09 NOVEMBER 2011 (09.11.2011)**

Name and mailing address of the ISA/KR
Korean Intellectual Property Office
Government Complex-Daejeon, 189 Cheongsa-ro,
Seo-gu, Daejeon 302-701, Republic of Korea
Facsimile No. 82-42-472-7140

Authorized officer
Yang, Jong Phil
Telephone No. 82-42-481-8595

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/US2011/028685

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2008-0080392 A1	03.04.2008	CN 101542461 A	23.09.2009
		EP 2069952 A2	17.06.2009
		KR 10-2009-0080051 A	23.07.2009
		WO 2008-042534 A2	10.04.2008
		WO 2008-042534 A3	06.11.2008
US 2006-0218624 A1	28.09.2006	AU 2005-264013 A1	26.01.2006
		AU 2005-264013 B2	27.05.2010
		CA 2571754 A1	26.01.2006
		CA 2676770 A1	09.08.2007
		CN 101044735 A0	26.09.2007
		EP 1766919 A1	28.03.2007
		JP 04-681697 B2	10.02.2011
		JP 2008-505580 A	21.02.2008
		JP 2011-103121 A	26.05.2011
		US 2005-0286519 A1	29.12.2005
		US 2006-0039365 A1	23.02.2006
		US 2006-0050700 A1	09.03.2006
		US 2006-0095365 A1	04.05.2006
		US 2006-0120375 A1	08.06.2006
		US 2006-0203750 A1	14.09.2006
		US 2006-0206310 A1	14.09.2006
		US 2007-0165597 A1	19.07.2007
		US 2007-0165629 A1	19.07.2007
		US 2009-0262742 A1	22.10.2009
		US 2009-0296606 A1	03.12.2009
		US 2010-0318678 A1	16.12.2010
		US 7570636 B2	04.08.2009
		US 7623476 B2	24.11.2009
		US 7623516 B2	24.11.2009
		US 7656870 B2	02.02.2010
		US 7778187 B2	17.08.2010
		US 7933260 B2	26.04.2011
		US 8000325 B2	16.08.2011
		US 8009586 B2	30.08.2011
		WO 2006-008589 A1	26.01.2006
		WO 2007-027478 A1	08.03.2007
		WO 2007-047554 A2	26.04.2007
		WO 2007-047554 A3	26.04.2007
		WO 2007-070670 A2	21.06.2007
		WO 2007-070670 A3	21.06.2007
		WO 2007-089717 A2	09.08.2007
		WO 2007-089717 A3	09.08.2007
		WO 2007-134260 A2	22.11.2007
		WO 2007-134260 A3	22.11.2007
		WO 2007-134261 A2	22.11.2007
		WO 2007-134261 A3	22.11.2007
		WO 2007-134263 A2	22.11.2007
		WO 2007-134263 A3	22.11.2007

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/US2011/028685

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
		WO 2007-134263 A3	23.10.2008
US 2009-0300673 A1	03.12.2009	EP 2044771 A2	08.04.2009
		WO 2008-012488 A2	31.01.2008
		WO 2008-012488 A3	31.01.2008

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
BLISS TIMOTHY F.

HOWISON & ARNOTT, L.L.P. P.O.BOX 741715 DALLAS
TX 75374-1715 USA

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing *(day/month/year)*	**09 NOVEMBER 2011 (09.11.2011)**
Applicant's or agent's file reference: DAMA-30,563	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2011/028685	**16 MARCH 2011 (16.03.2011)**	19 MARCH 2010 (19.03.2010)

International Patent Classification (IPC) or both national classification and IPC

H04L 9/32(2006.01)i, H04L 29/06(2006.01)i, H04L 12/28(2006.01)i, H04L 12/56(2006.01)i

Applicant

DAMAKA, INC. et al

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☒ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.
For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/KR	Date of completion of this opinion	Authorized officer
Korean Intellectual Property Office Government Complex-Daejeon, 189 Cheongsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	08 NOVEMBER 2011 (08.11.2011)	Yang, Jong Phil Telephone No.82-42-481-8595

Form PCT/ISA/237 (cover sheet) (July 2011)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/028685

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of :

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of:

   a. a sequence listing filed or furnished
      ☐ on paper
      ☐ in electronic form

   b. time of filing or furnishing
      ☐ contained in the international application as filed.
      ☐ filed together with the international application in electronic form.
      ☐ furnished subsequently to this Authority for the purposes of search.

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additioanl copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/028685

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-20	YES
	Claims	NONE	NO
Inventive step (IS)	Claims	1-20	YES
	Claims	NONE	NO
Industrial applicability (IA)	Claims	1-20	YES
	Claims	NONE	NO

2. Citations and explanations :

Reference is made to the following documents:

D1: US 2008-0080392 A1 (WALSH, RICHARD J et al.) 03 April 2008
D2: US 2006-0218624 A1 (RAVIKUMAR, SIVAKUMAR et al.) 28 September 2006
D3: US 2009-0300673 A1 (BACHET, FRANCK et al.) 03 December 2009

1. Novelty and Inventive Step

The subject matter of claims 1, 12 and 18 differs from the documents D1-D3 in that a mapped endpoint lacks the functionality needed to communicate directly with a peer-to-peer network (or the mapped endpoint is incompatible with the peer-to-peer network). Accordingly, claims 1, 12 and 18 are not anticipated by any of the documents, nor are they obvious to a person skilled in the art over the documents individually or in combination.

Thus, **claims 1, 12 and 18 meet the requirements of PCT Article 33(2) and 33(3) with respect to novelty and inventive step, and claims 2-11, 13-17 and 19-20 comply with PCT Article 33(2) and 33(3) as they are dependent on claims 1, 12 and 18, respectively.**

2. Industrial Applicability

Claims 1-20 are industrially applicable under PCT Article 33(4).

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/028685

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

Claim 11, dependent on claim 1, is worded in reference to a method step of claim 1, "sending a message by the virtual endpoint to the mapped endpoint". However, said method step has not been worded in claim 1. Therefore, claim 11 does not meet the requirements of PCT Article 6.

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

To:

BLISS TIMOTHY F.

HOWISON & ARNOTT, L.L.P. P.O. BOX 741715 DALLAS TX 75374-1715 USA

PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT AND THE WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

	Date of mailing *(day/month/year)* 24 NOVEMBER 2011 (24.11.2011)
Applicant's or agent's file reference DAMA-30,568	**FOR FURTHER ACTION** See paragraphs 1 and 4 below
International application No. **PCT/US2011/029954**	International filing date *(day/month/year)* **25 MARCH 2011 (25.03.2011)**
Applicant **DAMAKA, INC. et al**	

1. ☒ The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

Filing of amendments and statement under Article 19:

The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):

When? The time limit for filing such amendments is normally two months from the date of transmittal of the international search report.

Where? Directly to the International Bureau of WIPO, 34 chemin des Colombettes 1211 Geneva 20, Switzerland, Facsimile No.: +41 22 338 82 70

For more detailed instructions, see *PCT Applicant's Guide*, International Phase, paragraphs 9.004 . 9.011.

2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3. ☐ **With regard to any protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

☐ the protest together with the decision thereon has been transmitted to the International Bureau together with any request to forward the texts of both the protest and the decision thereon to the designated Offices.

☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Reminders**

The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. Following the expiration of 30 months from the priority date, these comments will also be made available to the public.

Shortly after the expiration of **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau before the completion of the technical preparations for international publication (Rules 90bis.1 and 90bis.3).

Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19months.

For details about the applicable time limits, Office by Office, see www.wipo.int/pct/en/texts/time_limits.html and the PCT Applicant's Guide, National Chapters.

Name and mailing address of the ISA/KR Korean Intellectual Property Office Government Complex-Daejeon, 189 Cheongsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea	Authorized officer COMMISSIONER
Facsimile No. 82-42-472-7140	Telephone No. 82-42-481-8755

Form PCT/ISA/220 (July 2010)

* Attention

Copies of the documents cited in the international search report can be searched in the following Korean Intellectual Property Office English website for three months from the date of mailing of the international search report.

http://www.kipo.go.kr/en/ => PCT Services => PCT Services

ID : PCT international application number
PW : **MNNR8WCP**

Inquiries related to PCT International Search Report or Written Opinion prepared by KIPO as an International Searching Authority can be answered not only by KIPO but also through IPKC (Intellectual Property Korea Center), located in Vienna, VA, which functions as a PCT Help Desk for PCT applicants.

Homepage: http://www.ipkcenter.com
Email: ipkc@ipkcenter.com
Phone: +1 703 388 1066
Fax: +1 703 388 1084

Notes to Form PCT/ISA/220 (July 2010)

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	FOR FURTHER ACTION	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
DAMA-30,568		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/US2011/029954	**25 MARCH 2011 (25.03.2011)**	29 MARCH 2010 (29.03.2010)
Applicant		
DAMAKA, INC. et al		

This International search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 3 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**
   a. With regard to the **language**, the international search was carried out on the basis of:
      ☒ the international application in the language in which it was filed
      ☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))
   b. ☐ This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6*bis*(a)).
   c. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.
2. ☐ **Certain claims were found unsearchable** (See Box No. II)
3. ☐ **Unity of invention is lacking** (See Box No. III)
4. With regard to the **title,**
   ☒ the text is approved as submitted by the applicant.
   ☐ the text has been established by this Authority to read as follows:
5. With regard to the **abstract,**
   ☒ the text is approved as submitted by the applicant.
   ☐ the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.
6. With regard to the drawings,
   a. the figure of the **drawings** to be published with the abstract is Figure No. 1
      ☒ as suggested by the applicant.
      ☐ as selected by this Authority, because the applicant failed to suggest a figure.
      ☐ as selected by this Authority, because this figure better characterizes the invention.
   b. ☐ none of the figure is to be published with the abstract.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2011/029954

A. CLASSIFICATION OF SUBJECT MATTER

H04L 29/06(2006.01)i, H04L 12/28(2006.01)i, H04L 12/56(2006.01)i, H04L 9/32(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

H04L 29/06; G06F 15/173; H04L 12/66; H04L 12/56

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models
Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) & Keywords: session, transition, switch, hand-over, SIP.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2009-0003322 A1 (ISUMI, SHINYA) 01 January 2009 See abstract; figures 6, 9, 10; paragraphs [0011]-[0015]; claims 1-6.	1-20
A	US 2009-0327516 A1 (AMISHIMA, MAKI et al.) 31 December 2009 See abstract; figures 1, 4-19; claim 1.	1-20
A	EP 1848163 A1 (SHARP KABUSHIKI KAISHA) 24 October 2007 See abstract; figures 3-5; claims 1-14.	1-20
A	US 2006-0187926 A1 (IMAI, NAOKI) 24 August 2006 See abstract; figures 1, 4-6; claims 1-7.	1-20

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents,such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
24 NOVEMBER 2011 (24.11.2011)	**24 NOVEMBER 2011 (24.11.2011)**

Name and mailing address of the ISA/KR	Authorized officer
Korean Intellectual Property Office Government Complex-Daejeon, 189 Cheongsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	Kim Sun Jong Telephone No. 82-42-481-8260

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/US2011/029954

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2009-0003322 A1	01.01.2009	JP 04-434238 B2	08.01.2010
		JP 2009-005205 A	08.01.2009
		JP 4434238 B2	17.03.2010
US 2009-0327516 A1	31.12.2009	CN 101199230 A0	11.06.2008
		JP 04-664127 B2	14.01.2011
		JP 2006-352517 A	28.12.2006
		JP 4664127 B2	06.04.2011
		WO 2006-134803 A1	21.12.2006
EP 1848163 A1	24.10.2007	JP W020-060756 77A1	20.07.2006
		WO 2006-075677 A1	20.07.2006
US 2006-0187926 A1	24.08.2006	JP 2006-237815 A	07.09.2006

Form PCT/ISA/210 (patent family annex) (July 2009)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
BLISS TIMOTHY F.

HOWISON & ARNOTT, L.L.P. P.O. BOX 741715 DALLAS
TX 75374-1715 USA

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing *(day/month/year)*	**24 NOVEMBER 2011 (24.11.2011)**
Applicant's or agent's file reference: DAMA-30,568	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2011/029954	**25 MARCH 2011 (25.03.2011)**	29 MARCH 2010 (29.03.2010)

International Patent Classification (IPC) or both national classification and IPC

H04L 29/06(2006.01)i, H04L 12/28(2006.01)i, H04L 12/56(2006.01)i, H04L 9/32(2006.01)i

Applicant

DAMAKA, INC. et al

1. This opinion contains indications relating to the following items:

- [x] Box No. I Basis of the opinion
- [ ] Box No. II Priority
- [ ] Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- [ ] Box No. IV Lack of unity of invention
- [x] Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- [ ] Box No. VI Certain documents cited
- [ ] Box No. VII Certain defects in the international application
- [ ] Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.
For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/KR	Date of completion of this opinion	Authorized officer
Korean Intellectual Property Office Government Complex-Daejeon, 189 Cheongsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	24 NOVEMBER 2011 (24.11.2011)	Kim Sun Jong Telephone No.82-42-481-8260

Form PCT/ISA/237 (cover sheet) (July 2011)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/029954

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of :

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into _____ , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of:

   a. a sequence listing filed or furnished
      ☐ on paper
      ☐ in electronic form

   b. time of filing or furnishing
      ☐ contained in the international application as filed.
      ☐ filed together with the international application in electronic form.
      ☐ furnished subsequently to this Authority for the purposes of search.

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additioanl copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/029954

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-20	YES
	Claims	NONE	NO
Inventive step (IS)	Claims	1-20	YES
	Claims	NONE	NO
Industrial applicability (IA)	Claims	1-20	YES
	Claims	NONE	NO

2. Citations and explanations :

Reference is made to the following documents:

D1: US 2009-0003322 A1 (ISUMI, SHINYA) 01 January 2009
D2: US 2009-0327516 A1 (AMISHIMA, MAKI et al.) 31 December 2009
D3: EP 1848163 A1 (SHARP KABUSHIKI KAISHA) 24 October 2007
D4: US 2006-0187926 A1 (IMAI, NAOKI) 24 August 2006

1. Novelty (PCT Article 33(2)) and Inventive Step (PCT Article 33(3))

1.1. In regard to claim 10, document D1, which is considered to represent the most relevant state of the art, discloses (the references in parentheses applying to this document):

A method for sweeping an active session exiting between a first endpoint and a second endpoint from the first endpoint to a third endpoint (see 'change the first communication to the second communication' in claim 1), the method comprising:
receiving, by the first end point, a go away message directly from the third end point (see 'receiving a call instruction' in claim 2); and
transferring, by the first endpoint, session information to the third endpoint, wherein the session information includes information needed by the third endpoint to enter the active session with the second endpoint (see 'employing the coding scheme stormed in the memory to perform ... call setting between the second and third IP phones' in claim 2).

However, D1 does not explicitly disclose the features of checking, by the first endpoint, a policy associated with the first endpoint to determine an action to be taken upon receipt of the go away message; and identifying, by the first endpoint, that the first endpoint is engaged in an active session with the second endpoint. In addition, these features of claim 10 are not disclosed in any other documents cited in the ISR, nor would they be obvious to a person skilled in the art. Therefore, claim 10 meets the requirements of PCT Article 33(2) and 33(3) with respect to novelty and inventive step.

1.2. Claims 1 and 18 include the essential features of claim 10, and the features of claims 1 and 18 essentially correspond to those defined in claim 10. Therefore, claims 1 and 18 meet the requirements of PCT Article 33(2) and 33(3) with respect to novelty and inventive step.

1.3. Claims 2-9, 11-17, and 19-20 are dependent on claims 1, 10, and 18, respectively, and therefore meet the requirements of PCT Article 33(2) and 33(3).

2. Industrial Applicability (PCT Article 33(4))

Claims 1-20 have industrial applicability and meet the requirement of PCT Article 33(4).

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

REC'D DEC 12 2011

To:

BLISS TIMOTHY F.

HOWISON & ARNOTT, L.L.P. P.O. BOX 741715 DALLAS TX 75374-1715 USA

PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT AND THE WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

Date of mailing *(day/month/year)*	25 NOVEMBER 2011 (25.11.2011)
Applicant's or agent's file reference: DAMA-30,562	**FOR FURTHER ACTION** See paragraphs 1 and 4 below
International application No.: **PCT/US2011/024891**	International filing date *(day/month/year)*: **15 FEBRUARY 2011 (15.02.2011)**

Applicant

DAMAKA,INC et al

1. ☒ The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

   Filing of amendments and statement under Article 19:

   The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):

   When? The time limit for filing such amendments is normally two months from the date of transmittal of the international search report.

   Where? Directly to the International Bureau of WIPO, 34 chemin des Colombettes 1211 Geneva 20, Switzerland, Facsimile No.: +41 22 338 82 70

   For more detailed instructions, see *PCT Applicant's Guide*, International Phase, paragraphs 9.004 . 9.011.

2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3. ☐ **With regard to any protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

   ☐ the protest together with the decision thereon has been transmitted to the International Bureau together with any request to forward the texts of both the protest and the decision thereon to the designated Offices.

   ☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Reminders**

The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. Following the expiration of 30 months from the priority date, these comments will also be made available to the public.

Shortly after the expiration of **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau before the completion of the technical preparations for international publication (Rules 90bis.1 and 90bis.3).

Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19months.

For details about the applicable time limits, Office by Office, see www.wipo.int/pct/en/texts/time_limits.html and the PCT Applicant's Guide, National Chapters.

Name and mailing address of the ISA/KR: Korean Intellectual Property Office, Government Complex-Daejeon, 189 Cheongsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea	Authorized officer: COMMISSIONER
Facsimile No. 82-42-472-7140	Telephone No. 82-42-481-8752

Form PCT/ISA/220 (July 2010)

* Attention

Copies of the documents cited in the international search report can be searched in the following Korean Intellectual Property Office English website for three months from the date of mailing of the international search report.

http://www.kipo.go.kr/en/ => PCT Services => PCT Services

ID : PCT international application number
PW : **U5NVMQP7**

Inquiries related to PCT International Search Report or Written Opinion prepared by KIPO as an International Searching Authority can be answered not only by KIPO but also through IPKC (Intellectual Property Korea Center), located in Vienna, VA, which functions as a PCT Help Desk for PCT applicants.

Homepage: http://www.ipkcenter.com
Email: ipkc@ipkcenter.com
Phone: +1 703 388 1066
Fax: +1 703 388 1084

Notes to Form PCT/ISA/220 (July 2010)

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	**FOR FURTHER ACTION**	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
DAMA-30,562		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/US2011/024891	**15 FEBRUARY 2011 (15.02.2011)**	15 FEBRUARY 2010 (15.02.2010)
Applicant		
DAMAKA,INC et al		

This International search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 3 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**
   a. With regard to the **language**, the international search was carried out on the basis of:
      ☒ the international application in the language in which it was filed
      ☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))
   b. ☐ This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6*bis*(a)).
   c. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.
2. ☐ **Certain claims were found unsearchable** (See Box No. II)
3. ☐ **Unity of invention is lacking** (See Box No. III)
4. With regard to the **title,**
   ☒ the text is approved as submitted by the applicant.
   ☐ the text has been established by this Authority to read as follows:
5. With regard to the **abstract,**
   ☒ the text is approved as submitted by the applicant.
   ☐ the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.
6. With regard to the drawings,
   a. the figure of the **drawings** to be published with the abstract is Figure No. 1
      ☒ as suggested by the applicant.
      ☐ as selected by this Authority, because the applicant failed to suggest a figure.
      ☐ as selected by this Authority, because this figure better characterizes the invention.
   b. ☐ none of the figure is to be published with the abstract.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2011/024891

A. CLASSIFICATION OF SUBJECT MATTER

H04L 29/06(2006.01)i, H04L 12/28(2006.01)i, H04L 12/56(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
H04L 29/06; H04B 7/00; H04L 12/26; H04L 12/28; H04J 3/24; H04L 12/56

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Korean utility models and applications for utility models
Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
eKOMPASS(KIPO internal) & Keywords: session, NAT, peer-to-peer, endpoint, tunneling.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2007-0019545 A1 (WADE R. ALT et al.) 25 January 2007 See abstract; figures 2, 4-15; paragraphs [0007]-[0011]; claims 1-8.	1-20
A	US 2005-0208947 A1 (PRADEEP BAHL) 22 September 2005 See abstract; figures 1, 4, 6; claims 1-11.	1-20
A	US 2007-0297430 A1 (PETRI NYKANEN et al.) 27 December 2007 See abstract; figures 1-5; claims 1-4.	1-20
A	US 2003-0214955 A1 (JUN-HYEONG KIM) 20 November 2003 See abstract; figures 3, 4; claims 1-10.	1-20
A	US 2005-0270992 A1 (AJIT SANZGIRI et al.) 08 December 2005 See abstract; figures 2, 3; claims 1-10.	1-20

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents,such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
24 NOVEMBER 2011 (24.11.2011)	**25 NOVEMBER 2011 (25.11.2011)**
Name and mailing address of the ISA/KR Korean Intellectual Property Office Government Complex-Daejeon, 189 Cheongsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	Authorized officer Kim Sun Jong Telephone No. 82-42-481-8260

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/US2011/024891

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2007-0019545 A1	25.01.2007	None	
US 2005-0208947 A1	22.09.2005	AT 412301 T	15.11.2008
		CN 1677976 A	05.10.2005
		CN 1677976 B	08.06.2011
		CN 1677976 C0	05.10.2005
		DE 602005010494 D1	04.12.2008
		EP 1578083 A1	21.09.2005
		EP 1578083 B1	22.10.2008
		JP 04-762581 B2	17.06.2011
		JP 2005-269661 A	29.09.2005
		KR 10-0953805 B1	21.04.2010
		KR 20060044435A	16.05.2006
		US 7457626 B2	25.11.2008
US 2007-0297430 A1	27.12.2007	US 2007-0271453 A1	22.11.2007
		US 2008-0005290 A1	03.01.2008
US 2003-0214955 A1	20.11.2003	JP 03-749720 B2	01.03.2006
		JP 2004-007671 A	08.01.2004
		KR 10-0485769 B1	28.04.2005
		KR 20030088723A	20.11.2003
		US 7796616 B2	14.09.2010
US 2005-0270992 A1	08.12.2005	US 7616613 B2	10.11.2009

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
BLISS TIMOTHY F.

HOWISON & ARNOTT, L.L.P. P.O. BOX 741715 DALLAS
TX 75374-1715 USA

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing *(day/month/year)*	**25 NOVEMBER 2011 (25.11.2011)**
Applicant's or agent's file reference: DAMA-30,562	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2011/024891	**15 FEBRUARY 2011 (15.02.2011)**	15 FEBRUARY 2010 (15.02.2010)

International Patent Classification (IPC) or both national classification and IPC

H04L 29/06(2006.01)i, H04L 12/28(2006.01)i, H04L 12/56(2006.01)i

Applicant

DAMAKA,INC et al

1. This opinion contains indications relating to the following items:

- [x] Box No. I Basis of the opinion
- [ ] Box No. II Priority
- [ ] Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- [ ] Box No. IV Lack of unity of invention
- [x] Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- [ ] Box No. VI Certain documents cited
- [ ] Box No. VII Certain defects in the international application
- [ ] Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.
For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/KR	Date of completion of this opinion	Authorized officer
Korean Intellectual Property Office Government Complex-Daejeon, 189 Cheongsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	24 NOVEMBER 2011 (24.11.2011)	Kim Sun Jong Telephone No.82-42-481-8260

Form PCT/ISA/237 (cover sheet) (July 2011)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/024891

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of :

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into _____ , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of:

   a. a sequence listing filed or furnished
      ☐ on paper
      ☐ in electronic form

   b. time of filing or furnishing
      ☐ contained in the international application as filed.
      ☐ filed together with the international application in electronic form.
      ☐ furnished subsequently to this Authority for the purposes of search.

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additioanl copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/024891

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-20	YES
	Claims	NONE	NO
Inventive step (IS)	Claims	1-20	YES
	Claims	NONE	NO
Industrial applicability (IA)	Claims	1-20	YES
	Claims	NONE	NO

2. Citations and explanations :

Reference is made to the following documents:

D1: US 2007-0019545 A1 (WADE R. ALT et al.) 25 January 2007
D2: US 2005-0208947 A1 (PRADEEP BAHL) 22 September 2005
D3: US 2007-0297430 A1 (PETRI NYKANEN et al.) 27 December 2007
D4: US 2003-0214955 A1 (JUN-HYEONG KIM) 20 November 2003
D5: US 2005-0270992 A1 (AJIT SANZGIRI et al.) 08 December 2005

1. Novelty (PCT Article 33(2)) and Inventive Step (PCT Article 33(3))

D1 discloses a method for providing packetized communication services, the method comprising: receiving a request from a first endpoint of a first domain for establishing a communication session with a second endpoint of a second domain; and establishing a tunnel by a network address translation server to support the communication session, the network address translation server being controlled by a service provider as part of a managed communication service, the tunnel traversing a first firewall and a first network address translator of the first domain and a second firewall and a second network address translator of the second domain to reach the second endpoint; and encrypting the communication session for transport via the tunnel.

D2 discloses a method and mobile node that facilitate persisting virtual private network structures across multiple network addresses assigned to the mobile node. The method includes initially setting up a virtual private network tunnel between a mobile node and a virtual private network tunnel server.

D3 discloses a communication network for providing seamless peer-to-peer connectivity between nodes of different communication network environments, the communication network comprising at least one tunneling server comprising an access unit for providing access to the communication network and an addressing unit for assigning a dynamic address of a first addressing scheme routable in the communication network to a node connecting itself to the tunneling server, the node having a fixed address of a second addressing scheme, and storing at runtime an association between the fixed address of the second addressing scheme and the dynamic address of the first addressing scheme.

D4 discloses a network connection apparatus for communicating between a network device located in a first private network and a second private network located outside the first private network. The apparatus includes an address acquisition module capable of acquiring a public IP address of a network management device from a DNS based on a domain name of the network management device of the second private network.

D5 discloses a method for transferring information in a digital network, wherein the network includes a router, an access point, a user device, and a plurality of other devices all coupled to the network, the method comprising creating a multipoint tunnel communication mode to transfer information from the user device to at least one of the other devices; using a routing configuration to route communications over the multipoint tunnel; and modifying the routing configuration in response to a discovered host.

Continued on Supplemental Box

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/024891

Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**
Continuation of:

Box V

1.1 In regard to claim 1, none of the documents D1 to D5 nor any combination thereof teaches or fairly suggests the features wherein "determining identifies that none of a private interface, a public interface, and a relay interface are available when using the first message protocol" and wherein "the private interface corresponds to a local address assigned to the first endpoint by a NAT device in a local network, the public interface corresponds to a public address of the NAT device that represents the first endpoint in networks outside of the local network, and the relay interface corresponds to a reflector located outside of the local network". Accordingly, it would not have been obvious to a person skilled in the art to apply the knowledge of D1 to D5 in order to create the method for establishing a peer-to-peer communication session between first and second endpoints according to claim 1. Therefore, claim 1 meets the requirements of PCT Article 33(2) and 33(3).

1.2 The features of claim 9 essentially correspond to those of claim 1 in that the former are described from the viewpoint of a tunneling server and the latter from that of a first endpoint. Therefore, claim 9 meets the requirements of PCT Article 33(2) and 33(3) for the same reasoning as given for claim 1.

1.3 The features of claim 15 essentially correspond to those of claim 1 except that their invention categories are different. Therefore, claim 15 meets the requirements of PCT Article 33(2) and 33(3) for the same reasoning as given for claim 1.

1.4 Claims 2-8, 10-14, and 16-20 are dependent on claims 1, 9, and 15, respectively, and therefore meet the requirements of PCT Article 33(2) and 33(3).

2. Industrial Applicability (PCT Article 33(4))

Claims 1-20 have industrial applicability and meet the requirement of PCT Article 33(4).

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

To:

BLISS TIMOTHY F.

HOWISON & ARNOTT, L.L.P. P.O.BOX 741715 DALLAS TX 75374-1715 USA

PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT AND THE WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

Date of mailing *(day/month/year)* 26 DECEMBER 2011 (26.12.2011)	
Applicant's or agent's file reference DAMA-30,572	**FOR FURTHER ACTION** See paragraphs 1 and 4 below
International application No. **PCT/US2011/031245**	International filing date *(day/month/year)* **05 APRIL 2011 (05.04.2011)**
Applicant **DAMAKA, INC. et al**	

1. ☒ The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

   Filing of amendments and statement under Article 19:

   The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):

   When? The time limit for filing such amendments is normally two months from the date of transmittal of the international search report.

   Where? Directly to the International Bureau of WIPO, 34 chemin des Colombettes 1211 Geneva 20, Switzerland, Facsimile No.: +41 22 338 82 70

   For more detailed instructions, see *PCT Applicant's Guide*, International Phase, paragraphs 9.004 . 9.011.

2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3. ☐ **With regard to any protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

   ☐ the protest together with the decision thereon has been transmitted to the International Bureau together with any request to forward the texts of both the protest and the decision thereon to the designated Offices.

   ☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Reminders**

The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. Following the expiration of 30 months from the priority date, these comments will also be made available to the public.

Shortly after the expiration of **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau before the completion of the technical preparations for international publication (Rules 90bis.1 and 90bis.3).

Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19months.

For details about the applicable time limits, Office by Office, see www.wipo.int/pct/en/texts/time_limits.html and the PCT Applicant's Guide, National Chapters.

Name and mailing address of the ISA/KR Korean Intellectual Property Office Government Complex-Daejeon, 189 Cheongsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	Authorized officer COMMISSIONER Telephone No. 82-42-481-8753

Form PCT/ISA/220 (July 2010)

* Attention

Copies of the documents cited in the international search report can be searched in the following Korean Intellectual Property Office English website for three months from the date of mailing of the international search report.

http://www.kipo.go.kr/en/ => PCT Services => PCT Services

ID : PCT international application number
PW : **5U32JJEB**

Inquiries related to PCT International Search Report or Written Opinion prepared by KIPO as an International Searching Authority can be answered not only by KIPO but also through IPKC (Intellectual Property Korea Center), located in Vienna, VA, which functions as a PCT Help Desk for PCT applicants.

Homepage: http://www.ipkcenter.com
Email: ipkc@ipkcenter.com
Phone: +1 703 388 1066
Fax: +1 703 388 1084

Notes to Form PCT/ISA/220 (July 2010)

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	FOR FURTHER ACTION	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
DAMA-30,572		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/US2011/031245	**05 APRIL 2011 (05.04.2011)**	16 APRIL 2010 (16.04.2010)

Applicant

DAMAKA, INC. et al

This International search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 4 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**
   a. With regard to the **language**, the international search was carried out on the basis of:
      ☒ the international application in the language in which it was filed
      ☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))
   b. ☐ This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6*bis*(a)).
   c. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.
2. ☒ **Certain claims were found unsearchable** (See Box No. II)
3. ☐ **Unity of invention is lacking** (See Box No. III)
4. With regard to the **title,**
   ☒ the text is approved as submitted by the applicant.
   ☐ the text has been established by this Authority to read as follows:
5. With regard to the **abstract,**
   ☒ the text is approved as submitted by the applicant.
   ☐ the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.
6. With regard to the drawings,
   a. the figure of the **drawings** to be published with the abstract is Figure No. 1
      ☒ as suggested by the applicant.
      ☐ as selected by this Authority, because the applicant failed to suggest a figure.
      ☐ as selected by this Authority, because this figure better characterizes the invention.
   b. ☐ none of the figure is to be published with the abstract.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2011/031245

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☒ Claims Nos.: 7
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

Claim 7, dependent on claim 1, relates to a method that an enterprise network performs, but claim 1 relates to an enterprise network. Accordingly, there is an inconsistency in the matter for which protection is sought. Therefore, claim 7 does not clearly define the matter for which protection is sought.

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required addtional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2011/031245

A. CLASSIFICATION OF SUBJECT MATTER

H04L 29/06(2006.01)i, H04L 12/66(2006.01)i, H04L 12/46(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
H04L 29/06; H04M 1/253; H04Q 7/00; H04M 7/12; H04L 12/28

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Korean utility models and applications for utility models
Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
eKOMPASS(KIPO internal) & Keywords: PBX, voice call continuity, handover, celluar, network, SIP, gateway.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 1988698 A1 (RESEARCH IN MOTION LIMITED) 05 November 2008 See abstract; figure 6; paragraphs [0006]-[0008],[0018]-[0021].	1-6,8-21
A	US 2009-0052399 A1 (A. SILVER et al.) 26 February 2009 See abstract; figures 1,8,9; paragraphs [0003],[0004],[0021]-[0028].	1-6,8-21
A	US 2007-0206563 A1 (A. SILVER et al.) 06 September 2007 See abstract; figures 4,5,9,10,11; paragraphs [0006]-[0008],[0034]-[0049].	1-6,8-21
A	EP 1988697 A1 (RESEARCH IN MOTION LIMITED) 05 November 2008 See abstract; figures 1-5; claims 1-9.	1-6,8-21

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents,such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
26 DECEMBER 2011 (26.12.2011)	**26 DECEMBER 2011 (26.12.2011)**

Name and mailing address of the ISA/KR
Korean Intellectual Property Office
Government Complex-Daejeon, 189 Cheongsa-ro,
Seo-gu, Daejeon 302-701, Republic of Korea
Facsimile No. 82-42-472-7140

Authorized officer
Kim Sun Jong
Telephone No. 82-42-481-8260

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/US2011/031245

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 1988698 A1	05.11.2008	CA 2630130 A1	30.10.2008
		CN 101547415 A	30.09.2009
US 2009-0052399 A1	26.02.2009	WO 2009-026447 A1	26.02.2009
US 2007-0206563 A1	06.09.2007	EP 1989893 A2	12.11.2008
		EP 1994772 A2	26.11.2008
		US 2007-0206568 A1	06.09.2007
		US 2007-0206571 A1	06.09.2007
		US 2007-0206572 A1	06.09.2007
		US 2007-0206573 A1	06.09.2007
		US 2007-0206580 A1	06.09.2007
		US 2007-0206735 A1	06.09.2007
		US 2011-0051707 A1	03.03.2011
		US 2011-0075609 A1	31.03.2011
		US 2011-0081911 A1	07.04.2011
		US 2011-0090823 A1	21.04.2011
		US 2011-0116498 A1	19.05.2011
		US 7843901 B2	30.11.2010
		US 7873001 B2	18.01.2011
		US 7873032 B2	18.01.2011
		US 7890096 B2	15.02.2011
		US 7903635 B2	08.03.2011
		US 7974618 B2	05.07.2011
		US 8023479 B2	20.09.2011
		WO 2007-103121 A2	13.09.2007
		WO 2007-103121 A3	13.09.2007
		WO 2007-103125 A2	13.09.2007
		WO 2007-103125 A3	13.09.2007
		WO 2007-103127 A2	13.09.2007
		WO 2007-103127 A3	13.09.2007
		WO 2007-103127 A3	15.11.2007
		WO 2007-103129 A2	13.09.2007
		WO 2007-103129 A3	13.09.2007
		WO 2007-103140 A2	13.09.2007
		WO 2007-103140 A3	13.09.2007
		WO 2007-103217 A1	13.09.2007
		WO 2007-103218 A2	13.09.2007
		WO 2007-103218 A3	13.09.2007
		WO 2007-103238 A2	13.09.2007
		WO 2007-103238 A3	13.09.2007
		WO 2007-103238 A3	22.11.2007
		WO 2007-103269 A2	13.09.2007
		WO 2007-103269 A3	13.09.2007
EP 1988697 A1	05.11.2008	CA 2630101 A1	30.10.2008
		CN 101330763 A	24.12.2008

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
BLISS TIMOTHY F.

HOWISON & ARNOTT, L.L.P. P.O.BOX 741715 DALLAS
TX 75374-1715 USA

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing *(day/month/year)*	**26 DECEMBER 2011 (26.12.2011)**
Applicant's or agent's file reference DAMA-30,572	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2011/031245	**05 APRIL 2011 (05.04.2011)**	16 APRIL 2010 (16.04.2010)

International Patent Classification (IPC) or both national classification and IPC

H04L 29/06(2006.01)i, H04L 12/66(2006.01)i, H04L 12/46(2006.01)i

Applicant

DAMAKA, INC. et al

I. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☒ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☒ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.
For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/KR	Date of completion of this opinion	Authorized officer
Korean Intellectual Property Office Government Complex-Daejeon, 189 Cheongsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	26 DECEMBER 2011 (26.12.2011)	Kim Sun Jong Telephone No.82-42-481-8260

Form PCT/ISA/237 (cover sheet) (July 2011)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/031245

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of:

   a. a sequence listing filed or furnished
      ☐ on paper
      ☐ in electronic form

   b. time of filing or furnishing
      ☐ contained in the international application as filed.
      ☐ filed together with the international application in electronic form.
      ☐ furnished subsequently to this Authority for the purposes of search.

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additioanl copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/031245

Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non obvious), or to be industrially applicable have not been examined in respect of:

☐ the entire international application

☒ claims Nos. 7

because:

☐ the said international application, or the said claims Nos. _____ relate to the following subject matter which does not require an international search *(specify)*:

☒ the description, claims or drawings *(indicate particular elements below)* or said claims Nos. 7 are so unclear that no meaningful opinion could be formed *(specify)*:

Claim 7, dependent on claim 1, relates to a method that an enterprise network performs, but claim 1 relates to an enterprise network. As there is an inconsistency in the matter for which protection is sought, claim 7 does not meet the requirements of PCT Article 6.

☐ the claims, or said claims Nos. _____ are so inadequately supported by the description that no meaningful opinion could be formed *(specify)*:

☒ no international search report has been established for said claims Nos. 7

☐ a meaningful opinion could not be formed without the sequence listing; the applicant did not, within the prescribed time limit:

☐ furnish a sequence listing on paper complying with the standard provided for in Annex C of the Administrative Istructions, and such listing was not available to the International Searching Authority in a form and manner acceptable to it.

☐ furnish a sequence listing in electronic form complying with the standard provided for in Annex C of the Administrative Istructions, and such listing was not available to the International Searching Authority in a form and manner acceptable to it.

☐ pay the required late furnishing fee for the furnishing of a sequence listing in response to an invitation under Rule 13ter.1(a) or (b).

☐ See Supplemental Box for further details.

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/031245

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-6,8-21	YES
	Claims	NONE	NO
Inventive step (IS)	Claims	1-6,8-21	YES
	Claims	NONE	NO
Industrial applicability (IA)	Claims	1-6,8-21	YES
	Claims	NONE	NO

2. Citations and explanations :

Reference is made to the following documents:

D1: EP 1988698 A1 (RESEARCH IN MOTION LIMITED) 05 November 2008
D2: US 2009-0052399 A1 (A. SILVER et al.) 26 February 2009
D3: US 2007-0206563 A1 (A. SILVER et al.) 06 September 2007
D4: EP 1988697 A1 (RESEARCH IN MOTION LIMITED) 05 November 2008

1. Novelty and Inventive step

1.1 Claim 1 relates to an enterprise network comprising:
- an enterprise private branch exchange (PBX) having a pilot number associated therewith, wherein the enterprise PBX is configured to communicate signaling information with a client of the enterprise network when the client is positioned in a cellular network that is separate from the enterprise network and is outside of the enterprise network's control, and wherein the enterprise PBX is further configured to communicate signaling information with an external device coupled to a PSTN that is external to the enterprise network;
- an enterprise IP-Public Switched Telephone Network (PSTN) media gateway configured to provide a first media path between the client and the enterprise IP-PSTN media gateway when the client is positioned in the cellular network, and further configured to provide a second media path between the enterprise IP-PSTN media gateway and the external device;
- a voice call continuity (VCC) Session Initiation Protocol (SIP) server configured to communicate with the enterprise PBX in order to perform signaling functions for the client via the enterprise PBX when the client is positioned in the cellular network, and further configured to communicate signaling information directly with the client when the client is positioned in an IP network that is separate from the enterprise network and is outside of the enterprise network's control; and
- a VCC media gateway configured to communicate with the enterprise IP-PSTN media gateway and the VCC SIP server and to receive digits corresponding to a destination number associated with the external device from the client after the client places a call to the pilot number, further configured to anchor the first and second media paths, and further configured to provide a third media path directly to the client when the client is positioned in the IP network and to anchor the third media path.

None of the prior art documents D1 to D4 teach or fairly suggest the features of said enterprise network of claim 1, and the features of claim 1 cannot be easily derived from each prior art document or any combination thereof by one skilled in the art. Hence, the subject matter of claim 1 is considered to be novel and to involve an inventive step in the sense of PCT Article 33(2) and 33(3).

1.2 Claims 2-5 are dependent on claim 1 and therefore meet the requirements of PCT Article 33(2) and 33(3).

Continued on Supplemental Box

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/031245

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

Claim 7, dependent on claim 1, relates to a method that an enterprise network performs, but claim 1 relates to an enterprise network. As there is an inconsistency in the matter for which protection is sought, claim 7 does not meet the requirements of PCT Article 6.

Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**
Continuation of:

Box V

1.3 Claim 6 relates to a method for use within an enterprise network comprising:
- receiving, by the enterprise network, a call request at a pilot number of the enterprise network from a first device that is a client of the enterprise network, wherein the enterprise network designates a call received at the pilot number as a request for a voice call continuity (VCC) communication session, and wherein the first device is located in a first communication network that is external to the enterprise network and not controlled by the enterprise network;
- receiving, by the enterprise network, a plurality of digits from the first device, wherein the plurality of digits provide contact information corresponding to a second device that is located in a second communication network that is external to the enterprise network and not controlled by the enterprise network;
- performing, by the enterprise network, signaling with the first device and the second device to establish the communication session between the first and second devices, wherein the establishment of the communication session is controlled by the enterprise network;
- establishing, by the enterprise network, a first media path between the enterprise network and the first device, wherein the first media path is anchored on a media gateway within the enterprise network; and
- establishing, by the enterprise network, a second media path between the enterprise network and the second device, wherein the second media path is anchored on the media gateway, and wherein the first and second media paths connect the first and second devices for the communication session.

None of the prior art documents D1 to D4 teach or fairly suggest the features of said method of claim 6, and the features of claim 6 cannot be easily derived from each prior art document or any combination thereof by one skilled in the art. Hence, the subject matter of claim 6 is considered to be novel and to involve an inventive step in the sense of PCT Article 33(2) and 33(3).

1.4 Claims 8-15 are dependent on claim 6 and therefore meet the requirements of PCT Article 33(2) and 33(3).

1.5 Claim 16 relates to a method for use within an enterprise network comprising:
- receiving, by the enterprise network, a call at a pilot number of the enterprise network from a second device that is not a client of the enterprise network, wherein the enterprise network designates a call received at the pilot number as a request for a voice call continuity (VCC) communication session, wherein the call identifies a first device that is a client of the enterprise network as a destination, and wherein the first and second devices are both located in communication networks that are external to the enterprise network and are not controlled by the enterprise network;
- identifying, by the enterprise network, whether the first device is registered with the enterprise network as available to the enterprise network via an Internet Protocol (IP) network;
- performing, by the enterprise network, signaling with the first device and the second device to establish the communication session between the first and second devices, wherein the establishment of the communication session is controlled by the enterprise network;
- establishing, by the enterprise network, a first media path between the enterprise network and the first device, wherein the first media path is anchored on a media gateway within the enterprise network, and wherein the first media path is a cellular bearer path if the first device is not registered as available via the IP network and is an IP bearer path if the first device is registered as available via the IP network; and
- establishing, by the enterprise network, a second media path between the enterprise network and the second device, wherein the second media path is anchored on the media gateway, wherein the first and second media paths connect the first and second devices for the communication session.

None of the prior art documents D1 to D4 teach or fairly suggest the features of said method of claim 16, and the features of claim 16 cannot be easily derived from each prior art document or any combination thereof by one skilled in the art. Hence, the subject matter of claim 16 is considered to be novel and to involve an inventive step in the sense of PCT Article 33(2) and 33(3).

Continued on Supplemental Box

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/031245

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of:

Box V

1.6 Claims 17-21 are dependent on claim 16 and therefore meet the requirements of PCT Article 33(2) and 33(3).

2. Industrial Applicability

Claims 1-6 and 8-21 have industrial applicability and meet the requirement of PCT Article 33(4).

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	FOR FURTHER ACTION	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
DAMA-30,814		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/US2011/040864	**17 JUNE 2011 (17.06.2011)**	18 JUNE 2010 (18.06.2010)

Applicant

DAMAKA, INC. et al

This International search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 4 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**
   a. With regard to the **language**, the international search was carried out on the basis of:
      ☒ the international application in the language in which it was filed
      ☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))
   b. ☐ This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6*bis*(a)).
   c. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.
2. ☐ **Certain claims were found unsearchable** (See Box No. II)
3. ☐ **Unity of invention is lacking** (See Box No. III)
4. With regard to the **title,**
   ☒ the text is approved as submitted by the applicant.
   ☐ the text has been established by this Authority to read as follows:
5. With regard to the **abstract,**
   ☒ the text is approved as submitted by the applicant.
   ☐ the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.
6. With regard to the drawings,
   a. the figure of the **drawings** to be published with the abstract is Figure No. 1
      ☐ as suggested by the applicant.
      ☒ as selected by this Authority, because the applicant failed to suggest a figure.
      ☐ as selected by this Authority, because this figure better characterizes the invention.
   b. ☐ none of the figure is to be published with the abstract.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2011/040864

A. CLASSIFICATION OF SUBJECT MATTER

H04L 29/02(2006.01)i, H04L 12/56(2006.01)i, H04L 12/28(2006.01)i, G06F 15/16(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

H04L 29/02; G06F 3/048; G06F 15/173; H04L 12/66; H04Q 11/00; G06F 9/46; H04M 3/42; G06F 15/177; H04L 12/56

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models
Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) & Keywords: buddy, transfer, forward, call, P2P, wireless, network, endpoint, and similar terms.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2008-0250408 A1 (C. Y. TSUI et al.) 09 October 2008 See abstract; figures 4,5; paragraphs [51]-[54],[56].	1-20
A	US 2009-0136016 A1 (M. GORNOI et al.) 28 May 2009 See abstract; figure 4; paragraphs [60]-[70]; claims 1,7,22.	1-20
A	US 2006-0203750 A1 (S. RAVIKUMAR et al.) 14 September 2006 See abstract; figures 1,21; paragraphs [44],[124].	1-20
A	US 2008-0235362 A1 (S. KJESBU et al.) 25 September 2008 See abstract; figures 1A,1B; paragraphs [36],[37],[39]-[42],[64]-[67].	1-20

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents,such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
10 FEBRUARY 2012 (10.02.2012)	**17 FEBRUARY 2012 (17.02.2012)**

Name and mailing address of the ISA/KR	Authorized officer
Korean Intellectual Property Office Government Complex-Daejeon, 189 Cheongsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	Kim Sun Jong Telephone No. 82-42-481-8260

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/US2011/040864

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2008-0250408 A1	09.10.2008	CN 101711387 A	19.05.2010
		CN 101766015 A	30.06.2010
		KR 10-2009-0125264 A	04.12.2009
		KR 10-2010-0015362 A	12.02.2010
		US 2008-0248750 A1	09.10.2008
		US 2008-246439 A1	09.10.2008
		US 2008-246629 A1	09.10.2008
		US 2008-246734 A1	09.10.2008
		US 2008-248779 A1	09.10.2008
		US 2008-249969 A1	09.10.2008
		US 2008-261572 A1	23.10.2008
		WO 2008-124394 A1	16.10.2008
		WO 2008-124399 A1	16.10.2008
US 2009-0136016 A1	28.05.2009	None	
US 2006-0203750 A1	14.09.2006	AU 2005-264013 A1	26.01.2006
		AU 2005-264013 B2	27.05.2010
		CA 2571754 A1	26.01.2006
		CA 2676770 A1	09.08.2007
		CN 101044735 A0	26.09.2007
		EP 1766919 A1	28.03.2007
		JP 04-681697 B2	10.02.2011
		JP 2008-505580 A	21.02.2008
		JP 2011-103121 A	26.05.2011
		US 2005-0286519 A1	29.12.2005
		US 2006-0039365 A1	23.02.2006
		US 2006-0050700 A1	09.03.2006
		US 2006-0095365 A1	04.05.2006
		US 2006-0120375 A1	08.06.2006
		US 2006-0206310 A1	14.09.2006
		US 2006-0218624 A1	28.09.2006
		US 2007-0165597 A1	19.07.2007
		US 2007-0165629 A1	19.07.2007
		US 2009-0262742 A1	22.10.2009
		US 2009-0296606 A1	03.12.2009
		US 2010-0318678 A1	16.12.2010
		US 7570636 B2	04.08.2009
		US 7623476 B2	24.11.2009
		US 7623516 B2	24.11.2009
		US 7656870 B2	02.02.2010
		US 7778187 B2	17.08.2010
		US 7933260 B2	26.04.2011
		US 8000325 B2	16.08.2011
		US 8009586 B2	30.08.2011
		US 8050272 B2	01.11.2011
		WO 2006-008589 A1	26.01.2006
		WO 2007-027478 A1	08.03.2007
		WO 2007-047554 A2	26.04.2007

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/US2011/040864

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
		WO 2007-047554 A3	26.04.2007
		WO 2007-070670 A2	21.06.2007
		WO 2007-070670 A3	21.06.2007
		WO 2007-089717 A2	09.08.2007
		WO 2007-089717 A3	09.08.2007
		WO 2007-134260 A2	22.11.2007
		WO 2007-134260 A3	22.11.2007
		WO 2007-134260 A3	15.01.2009
		WO 2007-134261 A2	22.11.2007
		WO 2007-134261 A3	22.11.2007
		WO 2007-134263 A2	22.11.2007
		WO 2007-134263 A3	22.11.2007
US 2008-0235362 A1	25.09.2008	EP 2137926 A1	30.12.2009
		NO 2007145 1A	22.09.2008
		WO 2008-115077 A1	25.09.2008

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
BLISS TIMOTHY F.

HOWISON & ARNOTT, L.L.P. P.O. BOX 741715 DALLAS
TX 75374-1715 USA

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing *(day/month/year)*	**17 FEBRUARY 2012 (17.02.2012)**
Applicant's or agent's file reference: DAMA-30,814	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2011/040864	**17 JUNE 2011 (17.06.2011)**	18 JUNE 2010 (18.06.2010)

International Patent Classification (IPC) or both national classification and IPC

H04L 29/02(2006.01)i, H04L 12/56(2006.01)i, H04L 12/28(2006.01)i, G06F 15/16(2006.01)i

Applicant

DAMAKA, INC. et al

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.
For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/KR	Date of completion of this opinion	Authorized officer
Korean Intellectual Property Office Government Complex-Daejeon, 189 Cheongsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	10 FEBRUARY 2012 (10.02.2012)	Kim Sun Jong Telephone No.82-42-481-8260

Form PCT/ISA/237 (cover sheet) (July 2011)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/040864

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of :

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of:

   a. a sequence listing filed or furnished
      ☐ on paper
      ☐ in electronic form

   b. time of filing or furnishing
      ☐ contained in the international application as filed.
      ☐ filed together with the international application in electronic form.
      ☐ furnished subsequently to this Authority for the purposes of search.

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additioanl copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/040864

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-20	YES
	Claims	NONE	NO
Inventive step (IS)	Claims	1-20	YES
	Claims	NONE	NO
Industrial applicability (IA)	Claims	1-20	YES
	Claims	NONE	NO

2. Citations and explanations :

Reference is made to the following documents:

D1: US 2008-0250408 A1 (C. Y. TSUI et al.) 09 October 2008
D2: US 2009-0136016 A1 (M. GORNOI et al.) 28 May 2009
D3: US 2006-0203750 A1 (S. RAVIKUMAR et al.) 14 September 2006
D4: US 2008-0235362 A1 (S. KJESBU et al.) 25 September 2008

1. Novelty and Inventive step

Regarding independent claim 1, document D1 which is considered to represent the most relevant state of the art discloses (the references in parentheses applying to this document):

a method for transferring a call in a hybrid peer-to-peer network comprising:
- receiving, by a first endpoint, an instruction to transfer a call to a second endpoint, wherein the first endpoint is engaged in the call with a third endpoint when the instruction is received (lines 10-17 in paragraph [51]);
- determining, by the first endpoint, whether the first endpoint has a buddy relationship with the second endpoint, wherein the first endpoint cannot transfer the call to the second endpoint unless the first and second endpoints have a buddy relationship because the buddy relationship is needed to provide permission by the second endpoint for the first endpoint to communicate with the second endpoint (paragraph [52]);
- sending, by the first endpoint, at least one transfer message to the second endpoint to transfer the call, wherein the at least one transfer message indicates that the first endpoint wants to transfer the call to the second endpoint and identifies the third endpoint as being involved in the call (paragraphs [52],[53]); and
- ending, by the first endpoint, the first endpoint's involvement in the call after the call is transferred (paragraphs [52],[56]).

The subject matter of claim 1 differs from that of D1 in that D1 does not disclose the features ofestablishing, by the first endpoint, a buddy relationship with the second endpoint if the first and second endpoints are not in a buddy relationship. In addition, this difference would not be obvious to a person skilled in the art over D1. Therefore, claim 1 meets the requirements of PCT Article 33(2) and 33(3) with respect to novelty and inventive step.

1.2 The features of independent claim 10 essentially correspond to those of claim 1 in that the former are described from a second endpoint receiving a call transfer and the latter from that of a first endpoint performing a call transfer. Therefore, claim 10 meets the requirements of PCT Article

Continued on Supplemental Box

Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**
Continuation of:

Box V

33(2) and 33(3) with respect to novelty and inventive step for the same reasoning as given for claim 1.

1.3 The features of independent claim 18 essentially correspond to those of claim 1 except that claimed categories are different to each other. Therefore, claim 18 meets the requirements of PCT Article 33(2) and 33(3) with respect to novelty and inventive step for the same reasoning as given for claim 1.

1.4 Claims 2-9 are dependent on claim 1, and therefore meet the requirements of PCT Article 33(2) and 33(3).

1.5 Claims 11-17 are dependent on claim 10, and therefore meet the requirements of PCT Article 33(2) and 33(3).

1.6 Claims 19 and 20 are dependent on claim 18, and therefore meet the requirements of PCT Article 33(2) and 33(3).

2. Industrial Applicability

Claims 1-20 have industrial applicability and meet the requirement of PCT Article 33(4).

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	FOR FURTHER ACTION	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
DAMA-30,815		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/US2011/041565	**23 JUNE 2011 (23.06.2011)**	23 JUNE 2010 (23.06.2010)

Applicant

DAMAKA, INC. et al

This International search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 3 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**
   a. With regard to the **language**, the international search was carried out on the basis of :
      ☒ the international application in the language in which it was filed
      ☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))
   b. ☐ This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6*bis*(a)).
   c. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.
2. ☐ **Certain claims were found unsearchable** (See Box No. II)
3. ☐ **Unity of invention is lacking** (See Box No. III)
4. With regard to the **title,**
   ☒ the text is approved as submitted by the applicant.
   ☐ the text has been established by this Authority to read as follows:
5. With regard to the **abstract,**
   ☒ the text is approved as submitted by the applicant.
   ☐ the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.
6. With regard to the drawings,
   a. the figure of the **drawings** to be published with the abstract is Figure No. 4
      ☐ as suggested by the applicant.
      ☒ as selected by this Authority, because the applicant failed to suggest a figure.
      ☐ as selected by this Authority, because this figure better characterizes the invention.
   b. ☐ none of the figure is to be published with the abstract.

Form PCT/ISA/210 (first sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2011/041565

A. CLASSIFICATION OF SUBJECT MATTER

H04L 9/14(2006.01)i, H04L 29/06(2006.01)i, H04L 12/56(2006.01)i, G06F 21/20(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

H04L 9/14; H04L 12/66; H04L 9/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models
Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) & Keywords: key, refresh, iteration, update, SIP and peer.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	Wireless Application Protocol - Wireless Transport Layer Security Specification, Version 18-Feb-2000, Wireless Application Forum, Ltd. 2000. See the whole document.	1,5-10,12
Y	US 2008-0235511 A1 (O`BRIEN WILLIAM G. et al.) 25 September 2008	1,5-10,12
A	See abstract, figures 2,4a-6b and claims 1-13.	2-4,11,13-19
A	US 2010-0049980 A1 (BARRIGA LUIS et al.) 25 February 2010 See abstract and figures 5-6,8-10.	1-19

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents,such combination being obvious to a person skilled in the art
"&", document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
05 JANUARY 2012 (05.01.2012)	**05 JANUARY 2012 (05.01.2012)**

Name and mailing address of the ISA/KR

Korean Intellectual Property Office
Government Complex-Daejeon, 189 Cheongsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea

Facsimile No. 82-42-472-7140

Authorized officer

Yang, Jong Phil

Telephone No. 82-42-481-8595

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/US2011/041565

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2008-0235511 A1	25.09.2008	CA 2571891 A1	21.06.2008
US 2010-0049980 A1	25.02.2010	None	

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
BLISS TIMOTHY F.

HOWISON & ARNOTT, L.L.P. P.O. BOX 741715 DALLAS
TX 75374-1715 USA

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing *(day/month/year)* **05 JANUARY 2012 (05.01.2012)**

Applicant's or agent's file reference
DAMA-30,815

FOR FURTHER ACTION
See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2011/041565	**23 JUNE 2011 (23.06.2011)**	23 JUNE 2010 (23.06.2010)

International Patent Classification (IPC) or both national classification and IPC

H04L 9/14(2006.01)i, H04L 29/06(2006.01)i, H04L 12/56(2006.01)i, G06F 21/20(2006.01)i

Applicant

DAMAKA, INC. et al

1. This opinion contains indications relating to the following items:

- [x] Box No. I Basis of the opinion
- [ ] Box No. II Priority
- [ ] Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- [ ] Box No. IV Lack of unity of invention
- [x] Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- [ ] Box No. VI Certain documents cited
- [ ] Box No. VII Certain defects in the international application
- [ ] Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.
For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/KR	Date of completion of this opinion	Authorized officer
Korean Intellectual Property Office Government Complex-Daejeon, 189 Cheongsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	05 JANUARY 2012 (05.01.2012)	Yang, Jong Phil Telephone No.82-42-481-8595

Form PCT/ISA/237 (cover sheet) (July 2011)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/041565

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of :

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of:

   a. a sequence listing filed or furnished
      ☐ on paper
      ☐ in electronic form

   b. time of filing or furnishing
      ☐ contained in the international application as filed.
      ☐ filed together with the international application in electronic form.
      ☐ furnished subsequently to this Authority for the purposes of search.

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additioanl copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/041565

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-19	YES
	Claims	NONE	NO
Inventive step (IS)	Claims	2-4,11,13-19	YES
	Claims	1,5-10,12	NO
Industrial applicability (IA)	Claims	1-19	YES
	Claims	NONE	NO

2. Citations and explanations :

Reference is made to the following documents:

D1: Wireless Application Protocol - Wireless Transport Layer Security Specification, Version 18-Feb-2000, Wireless Application Forum, Ltd. 2000.
D2: US 2008-0235511 A1 (O`BRIEN WILLIAM G. et al.) 25 September 2008
D3: US 2010-0049980 A1 (BARRIGA LUIS et al.) 25 February 2010

1. Novelty and Inventive Step

1.1 Claims 1-12

D1, which is considered to represent the most relevant state of the art to the subject matter of independent claim 1, discloses a method for changing an encryption key, the method comprising: receiving, by a first endpoint, an instruction to change from a first encryption key to a second encryption key; sending, by the first endpoint, a first message to a second endpoint that the first endpoint is going to change to the second encryption key, wherein the first message includes information representing the second encryption key; receiving, by the first endpoint, in response to the first message, a second message from the second endpoint indicating that the second endpoint received the first message; sending, by the first endpoint, a third message to the second endpoint acknowledging receipt of the second message; and changing, by the first endpoint, from the first encryption key to the second encryption key, wherein all incoming messages for the first endpoint are to be encrypted using the second encryption key (the technical features related to "Key refresh" and 'Finished' in the whole document of D1).

D1 does not disclose the feature, "the messages are defined for use with a transactional state model in a peer-to-peer network". However, it would be readily derived from the features in figures 2,4a-6b and claims 1-13 of D2 by a person skilled in the art. Accordingly, claim 1 is obvious over D1 in view of D2. Therefore, **claim 1 lacks an inventive step under PCT Article 33(3).**

The additional feature of claim 5, dependent on claim 1, would be readily derived from figures 2,4a-6b and claims 1-13 of D2 by a person skilled in the art.

The additional features of claims 6-7 and 10, dependent on claim 1, would be readily derived from the features related to "Key refresh" and 'Finished' of D1 and figures 2,4a-6b and claims 1-13 of D2 by a person skilled in the art.

<Continued on Supplemental Box>

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of :

<Box No.V>

The additional features of claims 8-9, dependent on claim 7, are not explicitly disclosed in any of the documents D1-D3. However, they would be regarded as normal design options by a person skilled in the art.

The additional feature of claim 12, dependent on claim 1, are not explicitly disclosed in any of the documents D1-D3. However, it would be regarded as a normal design option by a person skilled in the art.

Therefore, **claims 5-10 and 12 lack an inventive step under PCT Article 33(3).**

The additional features of claims 2-4 and 11, dependent on claim 1, are not disclosed in any of the documents D1-D3, nor are they obvious to a person skilled in the art over the documents individually or in combination. Accordingly, **claims 2-4 and 11 are novel and involve an inventive step under PCT Article 33(2) and (3).**

1.2 Claims 13-19

The subject matter of claims 13 and 17 differs from the documents D1-D3 in the following features: receiving, by a first endpoint, an encrypted message from a second endpoint; applying a first key iteration of a second base encryption key to the encrypted message to determine if the first key iteration will decrypt the encrypted message; if the first key iteration will not decrypt the message, rotating the encryption key to form a next key iteration from the second based encryption key; and applying the next key iteration to the encrypted message to determine if the next key iteration will decrypt the encrypted message as long as untried key iterations are available, continuing the steps of rotating and applying for each key iteration until the message is decrypted.

Accordingly, claims 13 and 17 are not anticipated from any of the documents, nor are they obvious to a person skilled in the art over the documents individually or in combination.

Thus, **claims 13 and 17 meet the requirements of PCT Article 33(2) and 33(3) with respect to novelty and inventive step, and claims 14-16 and 18-19 comply with PCT Article 33(2) and 33(3) as they are dependent on claims 13 and 17, respectively.**

2. Industrial Applicability

Claims 1-19 are industrially applicable under PCT Article 33(4).

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	FOR FURTHER ACTION	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
DAMA-30,746		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/US2011/031246	**05 APRIL 2011 (05.04.2011)**	29 APRIL 2010 (29.04.2010)

Applicant

DAMAKA, INC. et al

This International search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of **5** sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**
   a. With regard to the **language**, the international search was carried out on the basis of:
      ☒ the international application in the language in which it was filed
      ☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))
   b. ☐ This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6*bis*(a)).
   c. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.
2. ☐ **Certain claims were found unsearchable** (See Box No. II)
3. ☐ **Unity of invention is lacking** (See Box No. III)
4. With regard to the **title,**
   ☒ the text is approved as submitted by the applicant.
   ☐ the text has been established by this Authority to read as follows:
5. With regard to the **abstract,**
   ☒ the text is approved as submitted by the applicant.
   ☐ the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.
6. With regard to the drawings,
   a. the figure of the **drawings** to be published with the abstract is Figure No. **1**
      ☐ as suggested by the applicant.
      ☒ as selected by this Authority, because the applicant failed to suggest a figure.
      ☐ as selected by this Authority, because this figure better characterizes the invention.
   b. ☐ none of the figure is to be published with the abstract.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2011/031246

A. CLASSIFICATION OF SUBJECT MATTER

H04L 29/06(2006.01)i, H04L 12/56(2006.01)i, H04L 12/28(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

H04L 29/06; H04L 12/66; H04Q 11/00; H04L 12/28; H04L 12/56

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models
Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) & Keywords: call, instant message, signaling information, routing.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2005-0286519 A1 (SIVAKUMAR RAVIKUMAR et al.) 29 December 2005 See abstract; claims 1-3,5,8,9,14-17	1-24
A	US 2006-0203750 A1 (SIVAKUMAR RAVIKUMAR et al.) 14 September 2006 See claims 1,2,4-9	1-24
A	US 2006-0120375 A1 (SIVAKUMAR RAVIKUMAR et al.) 08 June 2006 See claims 1,2,5,16	1-24
A	US 2007-0165629 A1 (SIVAKUMAR CHATURVEDI et al.) 19 July 2007 See claims 1,2,14	1-24

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents,such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
27 DECEMBER 2011 (27.12.2011)	**28 DECEMBER 2011 (28.12.2011)**
Name and mailing address of the ISA/KR Korean Intellectual Property Office Government Complex-Daejeon, 189 Cheongsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	Authorized officer YANG, CHAN HO Telephone No. 82-42-481-5689

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/US2011/031246

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2005-0286519 A1	29.12.2005	AU 2005-264013 B2	27.05.2010
		CA 2571754 A1	26.01.2006
		CA 2676770 A1	09.08.2007
		CN 101044735 A0	26.09.2007
		EP 1766919 A1	28.03.2007
		JP 04-681697 B2	10.02.2011
		JP 2008-505580 T	21.02.2008
		JP 2011-103121 A	26.05.2011
		MX 2007000141 A	15.04.2009
		US 2006-0039365 A1	23.02.2006
		US 2006-0050700 A1	09.03.2006
		US 2006-0120375 A1	08.06.2006
		US 2006-0203750 A1	14.09.2006
		US 2006-0206310 A1	14.09.2006
		US 2006-0218624 A1	28.09.2006
		US 2007-0165597 A1	19.07.2007
		US 2007-0165629 A1	19.07.2007
		US 2009-0262742 A1	22.10.2009
		US 2009-0296606 A1	03.12.2009
		US 2010-0318678 A1	16.12.2010
		US 7570636 B2	04.08.2009
		US 7623476 B2	24.11.2009
		US 7623516 B2	24.11.2009
		US 7656870 B2	02.02.2010
		US 7778187 B2	17.08.2010
		US 7933260 B2	26.04.2011
		US 8000325 B2	16.08.2011
		US 8009586 B2	30.08.2011
		US 8050272 B2	01.11.2011
		WO 2006-008589 A1	26.01.2006
		WO 2007-027478 A1	08.03.2007
		WO 2007-047554 A2	26.04.2007
		WO 2007-070670 A3	21.06.2007
		WO 2007-089717 A2	09.08.2007
		WO 2007-134260 A3	22.11.2007
		WO 2007-134261 A2	22.11.2007
		WO 2007-134263 A3	22.11.2007
US 2006-0203750 A1	14.09.2006	AU 2005-264013 B2	27.05.2010
		CA 2571754 A1	26.01.2006
		CA 2676770 A1	09.08.2007
		CN 101044735 A0	26.09.2007
		EP 1766919 A1	28.03.2007
		JP 04-681697 B2	10.02.2011
		JP 2008-505580 A	21.02.2008
		JP 2011-103121 A	26.05.2011
		US 2005-0286519 A1	29.12.2005
		US 2006-0039365 A1	23.02.2006
		US 2006-0050700 A1	09.03.2006

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/US2011/031246

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
		US 2006-0120375 A1	08.06.2006
		US 2006-0206310 A1	14.09.2006
		US 2006-0218624 A1	28.09.2006
		US 2007-0165597 A1	19.07.2007
		US 2007-0165629 A1	19.07.2007
		US 2009-0262742 A1	22.10.2009
		US 2009-0296606 A1	03.12.2009
		US 2010-0318678 A1	16.12.2010
		US 7570636 B2	04.08.2009
		US 7623476 B2	24.11.2009
		US 7623516 B2	24.11.2009
		US 7656870 B2	02.02.2010
		US 7778187 B2	17.08.2010
		US 7933260 B2	26.04.2011
		US 8000325 B2	16.08.2011
		US 8009586 B2	30.08.2011
		US 8050272 B2	01.11.2011
		WO 2006-008589 A1	26.01.2006
		WO 2007-027478 A1	08.03.2007
		WO 2007-047554 A2	26.04.2007
		WO 2007-070670 A3	21.06.2007
		WO 2007-089717 A2	09.08.2007
		WO 2007-134260 A3	22.11.2007
		WO 2007-134261 A2	22.11.2007
		WO 2007-134263 A2	22.11.2007
US 2006-0120375 A1	08.06.2006	AU 2005-264013 B2	27.05.2010
		CA 2571754 A1	26.01.2006
		CA 2676770 A1	09.08.2007
		CN 101044735 A0	26.09.2007
		EP 1766919 A1	28.03.2007
		JP 04-681697 B2	10.02.2011
		JP 2008-505580 A	21.02.2008
		JP 2011-103121 A	26.05.2011
		US 2005-0286519 A1	29.12.2005
		US 2006-0039365 A1	23.02.2006
		US 2006-0050700 A1	09.03.2006
		US 2006-0203750 A1	14.09.2006
		US 2006-0206310 A1	14.09.2006
		US 2006-0218624 A1	28.09.2006
		US 2007-0165597 A1	19.07.2007
		US 2007-0165629 A1	19.07.2007
		US 2009-0262742 A1	22.10.2009
		US 2009-0296606 A1	03.12.2009
		US 2010-0318678 A1	16.12.2010
		US 7570636 B2	04.08.2009
		US 7623476 B2	24.11.2009
		US 7623516 B2	24.11.2009
		US 7656870 B2	02.02.2010
		US 7778187 B2	17.08.2010

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/US2011/031246

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
		US 7933260 B2	26.04.2011
		US 8000325 B2	16.08.2011
		US 8009586 B2	30.08.2011
		US 8050272 B2	01.11.2011
		WO 2006-008589 A1	26.01.2006
		WO 2007-027478 A1	08.03.2007
		WO 2007-047554 A2	26.04.2007
		WO 2007-070670 A3	21.06.2007
		WO 2007-089717 A3	09.08.2007
		WO 2007-134260 A2	22.11.2007
		WO 2007-134261 A3	22.11.2007
		WO 2007-134263 A2	22.11.2007
US 2007-0165629 A1	19.07.2007	AU 2005-264013 B2	27.05.2010
		CA 2571754 A1	26.01.2006
		CA 2676770 A1	09.08.2007
		CN 101044735 A0	26.09.2007
		EP 1766919 A1	28.03.2007
		JP 04-681697 B2	10.02.2011
		JP 2008-505580 A	21.02.2008
		JP 2011-103121 A	26.05.2011
		US 2005-0286519 A1	29.12.2005
		US 2006-0039365 A1	23.02.2006
		US 2006-0050700 A1	09.03.2006
		US 2006-0095365 A1	04.05.2006
		US 2006-0120375 A1	08.06.2006
		US 2006-0203750 A1	14.09.2006
		US 2006-0206310 A1	14.09.2006
		US 2006-0218624 A1	28.09.2006
		US 2007-0165597 A1	19.07.2007
		US 2009-0262742 A1	22.10.2009
		US 2009-0296606 A1	03.12.2009
		US 2010-0318678 A1	16.12.2010
		US 7570636 B2	04.08.2009
		US 7623476 B2	24.11.2009
		US 7623516 B2	24.11.2009
		US 7656870 B2	02.02.2010
		US 7778187 B2	17.08.2010
		US 7933260 B2	26.04.2011
		US 8000325 B2	16.08.2011
		US 8009586 B2	30.08.2011
		US 8050272 B2	01.11.2011
		WO 2006-008589 A1	26.01.2006
		WO 2007-027478 A1	08.03.2007
		WO 2007-047554 A2	26.04.2007
		WO 2007-070670 A3	21.06.2007
		WO 2007-089717 A3	09.08.2007
		WO 2007-134260 A2	22.11.2007
		WO 2007-134261 A3	22.11.2007
		WO 2007-134263 A3	22.11.2007

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
BLISS TIMOTHY F.

HOWISON & ARNOTT, L.L.P. P.O.BOX 741715 DALLAS
TX 75374-1715 USA

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing *(day/month/year)*	**28 DECEMBER 2011 (28.12.2011)**
Applicant's or agent's file reference DAMA-30,746	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2011/031246	**05 APRIL 2011 (05.04.2011)**	29 APRIL 2010 (29.04.2010)

International Patent Classification (IPC) or both national classification and IPC

H04L 29/06(2006.01)i, H04L 12/56(2006.01)i, H04L 12/28(2006.01)i

Applicant

DAMAKA, INC. et al

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.
For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/KR	Date of completion of this opinion	Authorized officer
Korean Intellectual Property Office Government Complex-Daejeon, 189 Cheongsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	27 DECEMBER 2011 (27.12.2011)	YANG, CHAN HO Telephone No.82-42-481-5689

Form PCT/ISA/237 (cover sheet) (July 2011)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/031246

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of:

   a. a sequence listing filed or furnished
      ☐ on paper
      ☐ in electronic form

   b. time of filing or furnishing
      ☐ contained in the international application as filed.
      ☐ filed together with the international application in electronic form.
      ☐ furnished subsequently to this Authority for the purposes of search.

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additioanl copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/031246

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-24	YES
	Claims	NONE	NO
Inventive step (IS)	Claims	1-24	YES
	Claims	NONE	NO
Industrial applicability (IA)	Claims	1-24	YES
	Claims	NONE	NO

2. Citations and explanations :

Reference is made to the following documents:

D1: US 2005-0286519 A1 (SIVAKUMAR RAVIKUMAR et al.) 29 December 2005
D2: US 2006-0203750 A1 (SIVAKUMAR RAVIKUMAR et al.) 14 September 2006
D3: US 2006-0120375 A1 (SIVAKUMAR RAVIKUMAR et al.) 08 June 2006
D4: US 2007-0165629 A1 (SIVAKUMAR CHATURVEDI et al.) 19 July 2007

(1) Novelty (N) and Inventive Step (IS)

The subject matter of claim 1, 10, and 18 differs from these prior art documents in establishing, by the first endpoint, at least one media route with the second endpoint to carry media for the call, wherein the at least one media route is established using the peer-to-peer hybrid network and not the third party instant message system. And it is not obvious to a person skilled in the art by the documents, taken alone or in combination. Therefore, claim 1, 10, and 18 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

Claims 2-9 are dependant on claim 1 and therefore meet the requirements of PCT Article 33(2) and (3).

Claims 11-17 are dependant on claim 10 and therefore meet the requirements of PCT Article 33(2) and (3).

Claims 19-24 are dependant on claim 18 and therefore meet the requirements of PCT Article 33(2) and (3).

(2) Industrial Applicability (IA)

Claims 1-24 are industrially applicable under PCT Article 33(4).

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	FOR FURTHER ACTION	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
DAMA-30,900		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/US2011/049000	**24 AUGUST 2011 (24.08.2011)**	25 AUGUST 2010 (25.08.2010)

Applicant

DAMAKA, INC. et al

This International search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 5 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**
   a. With regard to the **language**, the international search was carried out on the basis of:
      ☒ the international application in the language in which it was filed
      ☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))
   b. ☐ This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6*bis*(a)).
   c. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.
2. ☐ **Certain claims were found unsearchable** (See Box No. II)
3. ☒ **Unity of invention is lacking** (See Box No. III)
4. With regard to the **title,**
   ☒ the text is approved as submitted by the applicant.
   ☐ the text has been established by this Authority to read as follows:
5. With regard to the **abstract,**
   ☒ the text is approved as submitted by the applicant.
   ☐ the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.
6. With regard to the drawings,
   a. the figure of the **drawings** to be published with the abstract is Figure No. 3
      ☐ as suggested by the applicant.
      ☒ as selected by this Authority, because the applicant failed to suggest a figure.
      ☐ as selected by this Authority, because this figure better characterizes the invention.
   b. ☐ none of the figure is to be published with the abstract.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2011/049000

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

I. Claims 1-17 are directed to a method for receiving, by a first endpoint, a communication peer-to-peer communication session between a second endpoint and a third end point in a hybrid peer-to-peer network.

II. Claims 18-22 are directed to a method for joining, by a first endpoint, an ongoing peer-to-peer communication session between a second endpoint and a third end point in a hybrid peer-to-peer network.

1. ☐ As all required addtional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☒ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2011/049000

A. CLASSIFICATION OF SUBJECT MATTER

H04L 29/02(2006.01)i, H04L 12/56(2006.01)i, G06F 15/16(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

H04L 29/02; G06F 15/16; H04L 9/28; H04L 12/56

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models
Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) & Keywords: hybrid, p2p, peer, join, access server, media server, sharing, and similar terms.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2004-0148434 A1 (D. MATSUBARA et al.) 29 July 2004 See abstract; figures 1,2,4,5; paragraphs [0055]-[0058],[0071],[0072]; claims 1-15.	1-22
A	US 2009-0182815 A1 (J. CZECHOWSKI, III et al.) 16 July 2009 See abstract; figures 1,3,4,7,8; paragraphs [0023]-[0030],[0038],[0045], [0127]-[0129],[0134].	1-22
A	US 2007-0165629 A1 (S. R. CHATURVEDI et al.) 19 July 2007 See abstract; figures 1,2A; paragraphs [0043],[0044].	1-22
A	US 2008-0273541 A1 (A. PHARN) 06 November 2008 See abstract; figures 2-5; paragraphs [0023]-[0026].	1-22

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents,such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
26 MARCH 2012 (26.03.2012)	**27 MARCH 2012 (27.03.2012)**

Name and mailing address of the ISA/KR
Korean Intellectual Property Office
Government Complex-Daejeon, 189 Cheongsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea
Facsimile No. 82-42-472-7140

Authorized officer
Kim Sun Jong
Telephone No. 82-42-481-8260

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/US2011/049000

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2004-0148434 A1	29.07.2004	CN 1517900 A	04.08.2004
		CN 1517900 C0	04.08.2004
		JP 2004-227562 A	12.08.2004
		JP 4545419 B2	09.07.2010
		JP 4545419 B2	15.09.2010
		US 7769881 B2	03.08.2010
US 2009-0182815 A1	16.07.2009	WO 2009-076251 A2	18.06.2009
		WO 2009-076251 A3	18.06.2009
US 2007-0165629 A1	19.07.2007	AU 2005-264013 A1	26.01.2006
		AU 2005-264013 B2	27.05.2010
		CA 2571754 A1	26.01.2006
		CA 2676770 A1	09.08.2007
		CN 101044735 A0	26.09.2007
		EP 1766919 A1	28.03.2007
		JP 04-681697 B2	10.02.2011
		JP 2008-505580 A	21.02.2008
		JP 2011-103121 A	26.05.2011
		US 2005-0286519 A1	29.12.2005
		US 2006-0039365 A1	23.02.2006
		US 2006-0050700 A1	09.03.2006
		US 2006-0095365 A1	04.05.2006
		US 2006-0120375 A1	08.06.2006
		US 2006-0203750 A1	14.09.2006
		US 2006-0206310 A1	14.09.2006
		US 2006-0218624 A1	28.09.2006
		US 2007-0165597 A1	19.07.2007
		US 2009-0262742 A1	22.10.2009
		US 2009-0296606 A1	03.12.2009
		US 2010-0318678 A1	16.12.2010
		US 7570636 B2	04.08.2009
		US 7623476 B2	24.11.2009
		US 7623516 B2	24.11.2009
		US 7656870 B2	02.02.2010
		US 7778187 B2	17.08.2010
		US 7933260 B2	26.04.2011
		US 8000325 B2	16.08.2011
		US 8009586 B2	30.08.2011
		US 8050272 B2	01.11.2011
		WO 2006-008589 A1	26.01.2006
		WO 2007-027478 A1	08.03.2007
		WO 2007-047554 A2	26.04.2007
		WO 2007-047554 A3	26.04.2007
		WO 2007-070670 A2	21.06.2007
		WO 2007-070670 A3	21.06.2007
		WO 2007-089717 A2	09.08.2007
		WO 2007-089717 A3	09.08.2007
		WO 2007-134260 A2	22.11.2007

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/US2011/049000

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
		WO 2007-134260 A3	22.11.2007
		WO 2007-134261 A2	22.11.2007
		WO 2007-134261 A3	22.11.2007
		WO 2007-134263 A2	22.11.2007
		WO 2007-134263 A3	22.11.2007
US 2008-0273541 A1	06.11.2008	None	

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
TIMOTHY F. BLISS

HOWISON & ARNOTT, L.L.P. P.O. BOX 741715 DALLAS TX 75374-1715 USA

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing *(day/month/year)*	**27 MARCH 2012 (27.03.2012)**
Applicant's or agent's file reference: DAMA-30,900	**FOR FURTHER ACTION**: See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2011/049000	**24 AUGUST 2011 (24.08.2011)**	25 AUGUST 2010 (25.08.2010)

International Patent Classification (IPC) or both national classification and IPC

H04L 29/02(2006.01)i, H04L 12/56(2006.01)i, G06F 15/16(2006.01)i

Applicant

DAMAKA, INC. et al

1. This opinion contains indications relating to the following items:

- [X] Box No. I Basis of the opinion
- [ ] Box No. II Priority
- [ ] Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- [X] Box No. IV Lack of unity of invention
- [X] Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- [ ] Box No. VI Certain documents cited
- [ ] Box No. VII Certain defects in the international application
- [ ] Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.
For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/KR	Date of completion of this opinion	Authorized officer
Korean Intellectual Property Office Government Complex-Daejeon, 189 Cheongsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	26 MARCH 2012 (26.03.2012)	Kim Sun Jong Telephone No.82-42-481-8260

Form PCT/ISA/237 (cover sheet) (July 2011)

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/049000

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of:

   a. a sequence listing filed or furnished
      ☐ on paper
      ☐ in electronic form

   b. time of filing or furnishing
      ☐ contained in the international application as filed.
      ☐ filed together with the international application in electronic form.
      ☐ furnished subsequently to this Authority for the purposes of search.

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additioanl copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/049000

Box No. IV Lack of unity of invention

1. ☐ In response to the invitation (Form PCT/ISA/206) to pay additional fees the applicant has, within the applicable time limit:
   - ☐ paid additional fees
   - ☐ paid additional fees under protest and, where applicable, the protest fee
   - ☐ paid additional fees under protest but the applicable protest fee was not paid
   - ☐ not paid additional fees
2. ☒ This Authority found that the requirement of unity of invention is not complied with and chose not to invite the applicant to pay additional fees.
3. This Authority considers that the requirement of unity of invention in accordance with Rule 13.1, 13.2 and 13.3 is
   - ☐ complied with
   - ☒ not complied with for the following reasons:

I. Claims 1-17 are directed to a method for receiving, by a first endpoint, a communication peer-to-peer communication session between a second endpoint and a third end point in a hybrid peer-to-peer network.

II. Claims 18-22 are directed to a method for joining, by a first endpoint, an ongoing peer-to-peer communication session between a second endpoint and a third end point in a hybrid peer-to-peer network.

Since the above mentioned groups of claims do not share any of the technical features identified, a technically special relationship between the inventions does not exist.

Accordingly, the claims do not relate to one invention or to a single inventive concept, a priori.

4. Consequently, this opinion has been established in respect of the following parts of the international application :
   - ☒ all parts.
   - ☐ the parts relating to claims Nos. _____

Form PCT/ISA/237 (Box No. IV) (July 2011)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/049000

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-22	YES
	Claims	NONE	NO
Inventive step (IS)	Claims	1-22	YES
	Claims	NONE	NO
Industrial applicability (IA)	Claims	1-22	YES
	Claims	NONE	NO

2. Citations and explanations :

Reference is made to the following documents:

D1: US 2004-0148434 A1 (D. MATSUBARA et al.) 29 July 2004
D2: US 2009-0182815 A1 (J. CZECHOWSKI, III et al.) 16 July 2009
D3: US 2007-0165629 A1 (S. R. CHATURVEDI et al.) 19 July 2007
D4: US 2008-0273541 A1 (A. PHARN) 06 November 2008

1. Novelty and Inventive Step

1.1 Regarding independent claim 1, document D1, which is considered to represent the most relevant state of the art, discloses (see the underlined):

a method for receiving, by a first endpoint, a *communication peer-to-peer communication session* between a second endpoint and a third end point in a hybrid peer-to-peer network comprising (fig. 5):
- sending, by the first endpoint, a first request to an access sever in the hybrid peer-to-peer network, wherein the first request includes information that enables the access server to identify a session entry corresponding to the ongoing communication session from a plurality of session entries corresponding to a plurality of communication sessions (lines 1-6 in para. [0055]);
- receiving, by the first endpoint, a response to the first request from the access server, wherein the response includes a network address for a media server (lines 9-10 in para. [0057]);
- sending, by the first endpoint, a second request to the media server, wherein the second request includes information that enables the media server to identify a recording session corresponding to the ongoing communication session from a plurality of recording sessions corresponding to a plurality of communication sessions, wherein each recording session includes communications sent to the media server for recording by at least one endpoint in each of the plurality of communications sessions; and
- receiving, by the first endpoint via the media server, peer-to-peer communications from the ongoing communication session between the second and third endpoints, wherein the first endpoint does not communicate with either of the second and third endpoints to receiver the peer-to-peer communications.

None of the prior art documents D1 to D4 teach or fairly suggest the feature of 'sending, by the first endpoint, a second request to the media server and receiving, via the media server, peer-to-peer communications from the ongoing communication session between the second and third endpoints'. Accordingly, this feature is not obvious, nor can it be easily derived from each prior art document or any combination of said prior art documents by one skilled in the art. Hence, the subject matter of claim 1 is considered to be novel and to involve an inventive step in the sense of PCT Article 33(2) and 33(3).

Continued on Supplemental Box

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of:

Box No. V

1.2 Regarding independent claim 18, document D1, which is considered to represent the most relevant state of the art, discloses (see the underlined):

a method for joining, by a first endpoint, an ongoing peer-to-peer communication session between a second endpoint and a third end point in a hybrid peer-to-peer network comprising (fig. 4):
- identifying, by the first endpoint, the ongoing communication session from a plurality of communication sessions (lines 1-6 in para. [0049]);
- obtaining from a server, by the first endpoint, first communications occurring between the second and third endpoints that correspond to the ongoing communication session, wherein the server is configured to receive the first communications from the first and second endpoints for recording (lines 1-12 in para. [0050]);
- establishing, by the first endpoint, a communication leg directly with the second endpoint, wherein the communication leg is capable of carrying second communications from the first endpoint to the second endpoint; and
- sending, by the first endpoint, the second communications to the second endpoint.

None of the prior art documents D1 to D4 teach or fairly suggest the feature of 'establishing, by the first endpoint, a communication leg directly with the second endpoint and sending the second communications to the second endpoint'. Accordingly, this feature is not obvious, nor can it be easily derived from each prior art document or any combination of said prior art documents by one skilled in the art. Hence, the subject matter of claim 18 is considered to be novel and to involve an inventive step in the sense of PCT Article 33(2) and 33(3).

1.3 Claim 2-17 are dependent on claim 1 and therefore meet the requirements of PCT Article 33(2) and 33(3).

1.4 Claim 19-22 are dependent on claim 18 and therefore meet the requirements of PCT Article 33(2) and 33(3).

2. Industrial Applicability

Claims 1-22 have industrial applicability and meet the requirement of PCT Article 33(4).

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	FOR FURTHER ACTION	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
DAMA-30,937		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/US2011/051877	**15 SEPTEMBER 2011 (15.09.2011)**	24 SEPTEMBER 2010 (24.09.2010)

Applicant

DAMAKA, INC. et al

This International search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 3 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**
   a. With regard to the **language**, the international search was carried out on the basis of:
      ☒ the international application in the language in which it was filed
      ☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))
   b. ☐ This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6*bis*(a)).
   c. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.
2. ☐ **Certain claims were found unsearchable** (See Box No. II)
3. ☐ **Unity of invention is lacking** (See Box No. III)
4. With regard to the **title,**
   ☒ the text is approved as submitted by the applicant.
   ☐ the text has been established by this Authority to read as follows:
5. With regard to the **abstract,**
   ☒ the text is approved as submitted by the applicant.
   ☐ the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.
6. With regard to the drawings,
   a. the figure of the **drawings** to be published with the abstract is Figure No. 8
      ☐ as suggested by the applicant.
      ☒ as selected by this Authority, because the applicant failed to suggest a figure.
      ☐ as selected by this Authority, because this figure better characterizes the invention.
   b. ☐ none of the figure is to be published with the abstract.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2011/051877

A. CLASSIFICATION OF SUBJECT MATTER

H04L 12/18(2006.01)i, G06F 15/16(2006.01)i, G06F 17/28(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

H04L 12/18; G06F 17/21; G06F 17/28; G10L 21/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models
Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) & Keywords:convert,language,translation

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2009-0006076 A1 (JINDAL DINESH K.) 01 January 2009 See abstract; paragraphs [0017],[0023],[0030]; claims 1,2	1-20
A	US 06161082A A (GOLDBERG; RANDY G. et al.) 12 December 2000 See abstract; column 3 lines 1-6,20-25, column 5 lines 25-34; claims1,5	1-20
A	US 2010-0223047 A1 (CHRIST OLIVER) 02 September 2010 See paragraphs [0057],[0095]; claims 1,11,18,19	1-20
A	US 2010-0299150 A1 (FEIN GENE S. et al.) 25 November 2010 See abstract; paragraphs [0034],[0036]-[0039],[0071]; claims 1,11	1-20

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents,such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
13 APRIL 2012 (13.04.2012)	**13 APRIL 2012 (13.04.2012)**

Name and mailing address of the ISA/KR

Korean Intellectual Property Office
Government Complex-Daejeon, 189 Cheongsa-ro,
Seo-gu, Daejeon 302-701, Republic of Korea

Facsimile No. 82-42-472-7140

Authorized officer

YANG, CHAN HO

Telephone No. 82-42-481-5689

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/US2011/051877

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2009-0006076 A1	01.01.2009	None	
US 06161082A A	12.12.2000	None	
US 2010-0223047 A1	02.09.2010	CN 101826072 A	08.09.2010
		EP 2226733 A1	08.09.2010
		GB 0903418 D0	08.04.2009
		GB 2468278 A	08.09.2010
		JP 2010-205268 A	16.09.2010
		US 2011-0184719 A1	28.07.2011
US 2010-0299150 A1	25.11.2010	None	

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
TIMOTHY F. BLISS

HOWISON & ARNOTT, L.L.P. P.O. BOX 741715 DALLAS
TX 75374-1715 USA

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing *(day/month/year)*	**13 APRIL 2012 (13.04.2012)**
Applicant's or agent's file reference DAMA-30,937	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2011/051877	**15 SEPTEMBER 2011 (15.09.2011)**	24 SEPTEMBER 2010 (24.09.2010)

International Patent Classification (IPC) or both national classification and IPC

H04L 12/18(2006.01)i, G06F 15/16(2006.01)i, G06F 17/28(2006.01)i

Applicant

DAMAKA, INC. et al

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.
For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/KR	Date of completion of this opinion	Authorized officer
Korean Intellectual Property Office Government Complex-Daejeon, 189 Cheongsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	13 APRIL 2012 (13.04.2012)	YANG, CHAN HO Telephone No.82-42-481-5689

Form PCT/ISA/237 (cover sheet) (July 2011)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/051877

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of :

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of:

   a. a sequence listing filed or furnished
      ☐ on paper
      ☐ in electronic form

   b. time of filing or furnishing
      ☐ contained in the international application as filed.
      ☐ filed together with the international application in electronic form.
      ☐ furnished subsequently to this Authority for the purposes of search.

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additioanl copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/051877

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-20	YES
	Claims	NONE	NO
Inventive step (IS)	Claims	1-20	YES
	Claims	NONE	NO
Industrial applicability (IA)	Claims	1-20	YES
	Claims	NONE	NO

2. Citations and explanations :

Reference is made to the following documents:

D1: US 2009-0006076 A1 (JINDAL DINESH K.) 01 January 2009
D2: US 06161082A A (GOLDBERG; RANDY G. et al.) 12 December 2000
D3: US 2010-0223047 A1 (CHRIST OLIVER) 02 September 2010
D4: US 2010-0299150 A1 (FEIN GENE S. et al.) 25 November 2010

1. Novelty and Inventive Step

D1 and D2, which is considered to be close prior art to the subject matter of claim 1 of the present invention, discloses a method for communicating, by a first endpoint, in an ongoing peer-to-peer communication session between the first endpoint and a second endpoint in a hybrid peer-to-peer network comprising:
establishing, by the first endpoint, a communications route directly between the first endpoint and the second endpoint, wherein signaling communications are sent directly from the first endpoint to the second endpoint via a signaling path provided by the communications route (see column 3 lines 1-6, 20-25 in D2);
receiving, by the first endpoint, audio speech input in a first spoken language from a user of the first endpoint (see paragraph [0023]; claim 1 in D1);
determining, by the first endpoint, whether the audio speech input is to be translated from the first spoken language to a second spoken language (see column 5 lines 25-34 in D2); and
sending, by the first endpoint, the audio speech input to a language translation component accessible to the first endpoint via the hybrid peer-to-peer network if the audio speech input is to be translated from the first spoken language to the second spoken language, wherein the first endpoint does not send the audio speech input directly to the second endpoint if the audio speech input is to be translated from the spoken language to the second spoken language (see paragraph [0023]; claim 1 in D1).

However, the subject matter of claim 1 differs from these prior art documents in sending, by the first endpoint, the audio speech input directly to the second endpoint via the communications route if the audio speech input is not to be translated from the first spoken language to the second language. And it is not obvious to a person skilled in the art by the documents, taken alone or in combination. Therefore, claim 1 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

Continued on Supplemental Box

Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**
Continuation of :

Box V

Claims 2-9 are dependant on claim 1 and therefore meet the requirements of PCT Article 33(2) and (3).

The subject matter of claim 10 differs from these prior art documents in notifying, by the first endpoint, a language translation component in the hybrid peer-to-peer network of the inbound port, wherein the language translation component is accessible to the first endpoint via the hybrid peer-to-peer network, and wherein the notifying instructs the language translation component to send audio received from the endpoint to the inbound port. And it is not obvious to a person skilled in the art by the documents, taken alone or in combination. Therefore, claim 10 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

Claims 11-17 are dependant on claim 10 and therefore meet the requirements of PCT Article 33(2) and (3).

The subject matter of claim 18 differs from these prior art documents in performing an authentication process with an access server in a hybrid peer-to-peer network, wherein the authentication process authorizes the first endpoint to access the hybrid peer-to-peer network. And it is not obvious to a person skilled in the art by the documents, taken alone or in combination. Therefore, claim 18 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

Claims 19 and 20 are dependant on claim 18 and therefore meet the requirements of PCT Article 33(2) and (3).

2. Industrial Applicability

Claims 1-20 are industrially applicable under PCT Article 33(4).

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	FOR FURTHER ACTION	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
DAMA-30.960		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/US2011/055101	**06 OCTOBER 2011 (06.10.2011)**	11 OCTOBER 2010 (11.10.2010)
Applicant		
DAMAKA, INC. et al		

This International search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 4 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**
   a. With regard to the **language**, the international search was carried out on the basis of:
      ☒ the international application in the language in which it was filed
      ☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))
   b. ☐ This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6*bis*(a)).
   c. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.
2. ☐ **Certain claims were found unsearchable** (See Box No. II)
3. ☐ **Unity of invention is lacking** (See Box No. III)
4. With regard to the **title**,
   ☒ the text is approved as submitted by the applicant.
   ☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,
   ☒ the text is approved as submitted by the applicant.
   ☐ the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.
6. With regard to the drawings,
   a. the figure of the **drawings** to be published with the abstract is Figure No. 1
      ☐ as suggested by the applicant.
      ☒ as selected by this Authority, because the applicant failed to suggest a figure.
      ☐ as selected by this Authority, because this figure better characterizes the invention.
   b. ☐ none of the figure is to be published with the abstract.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2011/055101

A. CLASSIFICATION OF SUBJECT MATTER

H04L 29/06(2006.01)i, H04L 12/56(2006.01)i, H04L 12/58(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

H04L 29/06; H04B 7/00; G06F 15/16; H04L 12/66; H04W 4/00; H04L 12/28

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models
Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) & Keywords: call, forwarding, deliver*, switchover, redirect, rerout*, peer-to-peer, P2P, SIP, session initiation protocol, invitation

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2005-0130650 A1 (THOMAS CREAMER et al.) 16 June 2005 See claims 1-3 and 6; paragraphs [34]-[40]; figures 1 and 2	1-26
A	US 2009-0088150 A1 (CHATURVEDI SIVAKUMAR et al.) 02 April 2009 See claims 1-6; paragraphs [19]-[24],[34]-[36]; figures 1,2,4 and 5	1-26
A	US 2005-0286519 A1 (SIVAKUMAR RAVIKUMAR et al.) 29 December 2005 See paragraphs [57]-[60],[89]-[92],[101]; figures 4 and 13	1-26
A	US 2010-0011111 A1 (VIZAEI MOHAMMAD) 14 January 2010 See claims 8,13 and 14; paragraphs [12],[28]-[36]; figure 1	1-26

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents,such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
21 MAY 2012 (21.05.2012)	**22 MAY 2012 (22.05.2012)**

Name and mailing address of the ISA/KR	Authorized officer
Korean Intellectual Property Office 189 Cheongsa-ro, Seo-gu, Daejeon Metropolitan City, 302-701, Republic of Korea Facsimile No. 82-42-472-7140	Lee Hyoung Il Telephone No. 82-42-481-8199

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/US2011/055101

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2005-0130650 A1	16.06.2005	CN 1630266 A	22.06.2005
		CN 1630266 C	14.05.2008
		JP 04-160951 B2	08.10.2008
		JP 2005-184820 A	07.07.2005
		US 7215959 B2	08.05.2007
US 2009-0088150 A1	02.04.2009	WO 2009-043016 A2	02.04.2009
		WO 2009-043016 A3	14.05.2009
US 2005-0286519 A1	29.12.2005	AU 2005-264013 A1	26.01.2006
		AU 2005-264013 B2	27.05.2010
		CA 2571754 A1	26.01.2006
		CA 2676770 A1	09.08.2007
		CN 101044735 A	26.09.2007
		EP 1766919 A1	28.03.2007
		JP 04-681697 B2	10.02.2011
		JP 2008-505580 A	21.02.2008
		JP 2011-103121 A	26.05.2011
		JP 4681697 B2	11.05.2011
		MX 2007000141 A	15.04.2009
		US 2006-0039365 A1	23.02.2006
		US 2006-0050700 A1	09.03.2006
		US 2006-0095365 A1	04.05.2006
		US 2006-0120375 A1	08.06.2006
		US 2006-0203750 A1	14.09.2006
		US 2006-0206310 A1	14.09.2006
		US 2006-0218624 A1	28.09.2006
		US 2007-0165597 A1	19.07.2007
		US 2007-0165629 A1	19.07.2007
		US 2009-0262742 A1	22.10.2009
		US 2009-0296606 A1	03.12.2009
		US 2010-0318678 A1	16.12.2010
		US 7570636 B2	04.08.2009
		US 7623476 B2	24.11.2009
		US 7623516 B2	24.11.2009
		US 7656870 B2	02.02.2010
		US 7778187 B2	17.08.2010
		US 7933260 B2	26.04.2011
		US 8000325 B2	16.08.2011
		US 8009586 B2	30.08.2011
		US 8050272 B2	01.11.2011
		US 8139578 B2	20.03.2012
		WO 2006-008589 A1	26.01.2006
		WO 2007-027478 A1	08.03.2007
		WO 2007-047554 A2	26.04.2007
		WO 2007-070670 A2	21.06.2007
		WO 2007-089717 A2	09.08.2007
		WO 2007-134260 A2	22.11.2007
		WO 2007-134261 A2	22.11.2007

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/US2011/055101

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
		WO 2007-134263 A2	22.11.2007
US 2010-0011111 A1	14.01.2010	CN 101536481 A	16.09.2009
		EP 2057832 A1	13.05.2009
		KR 10-2009-0053924 A	28.05.2009
		WO 2008-022855 A1	28.02.2008

Form PCT/ISA/210 (patent family annex) (July 2009)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
TIMOTHY F.BLISS

HOWISON & ARNOTT, L.L.P. P.O. BOX 741715 DALLAS
TX 75374-1715 USA

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing *(day/month/year)*	**22 MAY 2012 (22.05.2012)**
Applicant's or agent's file reference DAMA-30.960	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2011/055101	**06 OCTOBER 2011 (06.10.2011)**	11 OCTOBER 2010 (11.10.2010)

International Patent Classification (IPC) or both national classification and IPC

H04L 29/06(2006.01)i, H04L 12/56(2006.01)i, H04L 12/58(2006.01)i

Applicant

DAMAKA, INC. et al

1. This opinion contains indications relating to the following items:

- [X] Box No. I Basis of the opinion
- [ ] Box No. II Priority
- [ ] Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- [ ] Box No. IV Lack of unity of invention
- [X] Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- [ ] Box No. VI Certain documents cited
- [X] Box No. VII Certain defects in the international application
- [ ] Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.
For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/KR	Date of completion of this opinion	Authorized officer
Korean Intellectual Property Office 189 Cheongsa-ro, Seo-gu, Daejeon Metropolitan City, 302-701, Republic of Korea Facsimile No. 82-42-472-7140	21 MAY 2012 (21.05.2012)	Lee Hyoung Il Telephone No.82-42-481-8199

Form PCT/ISA/237 (cover sheet) (July 2011)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/055101

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of:

   a. a sequence listing filed or furnished
      ☐ on paper
      ☐ in electronic form

   b. time of filing or furnishing
      ☐ contained in the international application as filed.
      ☐ filed together with the international application in electronic form.
      ☐ furnished subsequently to this Authority for the purposes of search.

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additioanl copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/055101

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-26	YES
	Claims	NONE	NO
Inventive step (IS)	Claims	1-26	YES
	Claims	NONE	NO
Industrial applicability (IA)	Claims	1-26	YES
	Claims	NONE	NO

2. Citations and explanations :

Reference is made to the following documents:

D1: US 2005-0130650 A1 (THOMAS CREAMER et al.) 16 June 2005
D2: US 2009-0088150 A1 (CHATURVEDI SIVAKUMAR et al.) 02 April 2009
D3: US 2005-0286519 A1 (SIVAKUMAR RAVIKUMAR et al.) 29 December 2005
D4: US 2010-0011111 A1 (VIZAEI MOHAMMAD) 14 January 2010

1. Novelty and Inventive Step

1.1 Claims 1-13

The subject matter of claim 1 differs from these prior art documents in receiving an inbound call, wherein the inbound call is received via one of a cellular network and a public switched telephone network and continuing the inbound call on the one of the cellular network and the public switched telephone network on which the inbound call was received if the acknowledgement message has not been received. And it is not obvious to a person skilled in the art by the documents, taken alone or in combination. Therefore, claim 1 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

Claims 2-13 are dependent on claim 1 and therefore meet the requirements of PCT Article 33(2) and (3).

1.2 Claims 14-20

The subject matter of claim 14 differs from these prior art documents in receiving a first plurality of digits identifying a first destination device and initiating an outbound call to the first destination device based on the first plurality of digits, wherein the outbound call is initiated vis one of a cellular network and a public switched telephone network. And it is not obvious to a person skilled in the art by the documents, taken alone or in combination. Therefore, claim 14 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

Claims 15-20 are dependent on claim 14 and therefore meet the requirements of PCT Article 33(2) and (3).

[Continued on Supplemental Box]

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/055101

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

Figures 2a-2c, 10A-10B and 11A-11B do not comply with PCT Rule 11.13(k) because the different figures shall not be numbered in Arabic numerals consecutively and independently of the numbering of the sheets.

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of:

[Box V]

1.2 Claims 21-26

Claim 21 relates to an endpoint to perform the method according to claim 14. Claim 21 is considered to be novel and to involve an inventive step under PCT Article 33(2) and (3), because the subject matter of claim 14 is considered to be novel and to involve an inventive step under PCT Article 33(2) and (3).

Claims 22-26 depend on claim 21 and consequently they are also considered to be novel and to involve an inventive step under PCT Article 33(2) and (3).

2. Industrial Applicability

Claims 1-26 are industrially applicable under PCT Article 33(4).

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION CONCERNING TRANSMITTAL OF COPY OF INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY (CHAPTER I OF THE PATENT COOPERATION TREATY)
(PCT Rule 44bis.1(c))

To:

BLISS, Timothy, F.
Howison & Arnott, L.L.P.
P.O. Box 741715
Dallas, TX 75374-1715
ETATS-UNIS D'AMERIQUE

Date of mailing *(day/month/year)* 30 August 2012 (30.08.2012)	
Applicant's or agent's file reference DAMA-30,559	**IMPORTANT NOTICE**

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2011/024870	15 February 2011 (15.02.2011)	15 February 2010 (15.02.2010)

Applicant
DAMAKA, INC. et al

The International Bureau transmits herewith a copy of the international preliminary report on patentability (Chapter I of the Patent Cooperation Treaty)

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No. +41 22 338 82 70

Authorized officer
Simin Baharlou

e-mail: pt09.pct@wipo.int

Form PCT/IB/326 (January 2004)

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44*bis*)

Applicant's or agent's file reference DAMA-30,559	**FOR FURTHER ACTION**	See item 4 below
International application No. PCT/US2011/024870	International filing date *(day/month/year)* 15 February 2011 (15.02.2011)	Priority date *(day/month/year)* 15 February 2010 (15.02.2010)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant DAMAKA, INC.		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 *bis*.1(a).

2. This REPORT consists of a total of 6 sheets, including this cover sheet.

   In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

☒	Box No. I	Basis of the report
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☒	Box No. VII	Certain defects in the international application
☐	Box No. VIII	Certain observations on the international application

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44*bis*.3(c) and 93*bis*.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44*bis* .2).

	Date of issuance of this report 21 August 2012 (21.08.2012)
The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. +41 22 338 82 70	Authorized officer Simin Baharlou e-mail: pt09.pct@wipo.int

Form PCT/IB/373 (January 2004)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
BLISS TIMOTHY F.

HOWISON & ARNOTT, L.L.P. P.O. BOX 741715 DALLAS
TX 75374-1715 USA

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing *(day/month/year)*	**26 OCTOBER 2011 (26.10.2011)**
Applicant's or agent's file reference DAMA-30,559	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2011/024870	**15 FEBRUARY 2011 (15.02.2011)**	15 FEBRUARY 2010 (15.02.2010)

International Patent Classification (IPC) or both national classification and IPC

H04L 12/28(2006.01)i, G06F 15/173(2006.01)i, H04L 29/06(2006.01)i

Applicant

DAMAKA, INC. et al

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☒ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.
For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/KR	Date of completion of this opinion	Authorized officer
Korean Intellectual Property Office Government Complex-Daejeon, 189 Cheongsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	26 OCTOBER 2011 (26.10.2011)	KWON, Ho Young Telephone No.82-42-481-8478

Form PCT/ISA/237 (cover sheet) (July 2011)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/024870

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of :

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into _____ , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of:

   a. a sequence listing filed or furnished
      ☐ on paper
      ☐ in electronic form

   b. time of filing or furnishing
      ☐ contained in the international application as filed.
      ☐ filed together with the international application in electronic form.
      ☐ furnished subsequently to this Authority for the purposes of search.

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additioanl copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/024870

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-20	YES
	Claims	NONE	NO
Inventive step (IS)	Claims	1-20	YES
	Claims	NONE	NO
Industrial applicability (IA)	Claims	1-20	YES
	Claims	NONE	NO

2. Citations and explanations :

Reference is made to the following documents:

D1: J. ROSENBERG et al. "Session Traversal Utilities for NAT (STUN)", draft-ietf-behave-rfc3489bis-06, March 5, 2007
D2: US 7623516 B2 (CHATURVEDI, SIVAKUMAR R. et al.) 24 November 2009
D3: US 7623476 B2 (RAVIKUMAR, SIVAKUMAR et al.) 24 November 2009
D4: US 7590758 B2 (TAKEDA, YUTAKA et al.) 15 September 2009
D5: US 2006-0182100 A1 (LI, JIN et al.) 17 August 2006

1. Novelty (PCT Article 33(2)) and Inventive Step (PCT Article 33(3))

1.1 Claims 1-5

D1 is regarded as the closest prior art to the subject matter of claim 1. The subject matter of claim 1 differs from that of D1 in that the method in claim 1 comprises "receiving, by the first endpoint, a first private presence message, a first public presence message, and a first relay presence message from the second endpoint via private, public, and relay routes, respectively, wherein the private route corresponds to a local address assigned to the first endpoint by a network address translation (NAT) device in a local network, the public route corresponds to a public address of the NAT device, and the relay route uses a reflector", "sending to the second endpoint by the first endpoint", "sending a second private presence message", "receiving a second response from the second endpoint to one of the second private, public, or relay message by the first endpoint", "selecting the private, public, or relay route by the first endpoint", and "identifying the private, public, or relay route". These features of claim 1 are not shown in any other prior art documents (D2-D5) cited in the ISR. Hence, claim 1 is considered novel under PCT Article 33(2).

Regarding inventive step, the subject matter of claim 1 is not obvious to a person skilled in the art over the documents individually or in combination. Therefore, claim 1 is considered to involve an inventive step under PCT Article 33(3).

Claims 2-5 are dependent on claim 1 and as such also meet the requirements of PCT Article 33(2) and 33(3).

1.2 Claims 6-18

D1 is regarded as the closest prior art to the subject matter of claim 6. The subject matter of claim 6 differs from that of D1 in that the method in claim 6 comprises "sending, by the first endpoint, a first presence message to the second endpoint via a first route", "sending, by the first endpoint, a second presence message to the second endpoint via a second route", and "receiving a response from the second endpoint to one of the first and second presence messages, wherein the response identifies which of the first and second presence messages is being answered by the response". These features of claim 6 are not shown in any other prior art documents (D2-D5) cited in the ISR. Hence, claim 6 is considered novel under PCT Article 33(2).

Regarding inventive step, the subject matter of claim 6 is not obvious to a person skilled in the art over the documents individually or in combination. Therefore, claim 6 is considered to involve an inventive step under PCT Article 33(3).

Claims 7-18 are dependent on claim 6 and as such also meet the requirements of PCT Article 33(2) and 33(3).

Continued on Supplemental Box

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/US2011/024870

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

According to the requirements of PCT Rule 11.13(k), the different figures shall be numbered in Arabic numerals consecutively and independently of the numbering of the sheet. This requirement is not met in view of the use of FIG. 2a, FIG. 2b, FIG. 2c, FIG. 2d, FIG. 2e, FIG. 2f, FIG. 2g, FIG. 3a, FIG. 3b, FIG. 19A, FIG. 19B, FIG. 23A, FIG. 23B.

Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**
Continuation of :

Box V

1.3 Claims 19-20

D1 is regarded as the closest prior art to the subject matter of claim 19. The subject matter of claim 19 differs from that of D1 in that the endpoint in claim 19 comprises "sending first and second presence messages via first and second routes", "receiving a first response from the other endpoint to one of the first and second presence messages", "selecting the first or second route that corresponds to the first or second presence message, respectively", "receiving a third presence message via one of the first and second routes", "sending a second response to the third presence message to the other endpoint via the first or second route". These features of claim 19 are not shown in any other prior art documents (D2-D5) cited in the ISR. Hence, claim 19 is considered novel under PCT Article 33(2).

Regarding inventive step, the subject matter of claim 19 is not obvious to a person skilled in the art over the documents individually or in combination. Therefore, claim 19 is considered to involve an inventive step under PCT Article 33(3).

Claims 20 is dependent on claim 19 and as such also meets the requirements of PCT Article 33(2) and 33(3).

2. Industrial Applicability (PCT Article 33(4))

The subject matter of claims 1-20 has industrial applicability and meets the requirement of PCT Article 33(4).

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION CONCERNING TRANSMITTAL OF COPY OF INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY (CHAPTER I OF THE PATENT COOPERATION TREATY)
(PCT Rule 44bis.1(c))

To:

BLISS, Timothy, F.
Howison & Arnott, L.L.P.
P.O. Box 741715
Dallas, TX 75374-1715
ETATS-UNIS D'AMERIQUE

Date of mailing *(day/month/year)*
30 August 2012 (30.08.2012)

Applicant's or agent's file reference
DAMA-30,562

IMPORTANT NOTICE

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2011/024891	15 February 2011 (15.02.2011)	15 February 2010 (15.02.2010)

Applicant
DAMAKA,INC et al

The International Bureau transmits herewith a copy of the international preliminary report on patentability (Chapter I of the Patent Cooperation Treaty)

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No. +41 22 338 82 70

Authorized officer
Philippe Bécamel

e-mail: pt01.pct@wipo.int

Form PCT/IB/326 (January 2004)

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44*bis*)

Applicant's or agent's file reference DAMA-30,562	**FOR FURTHER ACTION**	See item 4 below
International application No. PCT/US2011/024891	International filing date *(day/month/year)* 15 February 2011 (15.02.2011)	Priority date *(day/month/year)* 15 February 2010 (15.02.2010)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant DAMAKA,INC		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 *bis*.1(a).

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

   In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

☒	Box No. I	Basis of the report
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☐	Box No. VII	Certain defects in the international application
☐	Box No. VIII	Certain observations on the international application

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44*bis*.3(c) and 93*bis*.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44*bis* .2).

	Date of issuance of this report 21 August 2012 (21.08.2012)
The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. +41 22 338 82 70	Authorized officer Philippe Bécamel e-mail: pt01.pct@wipo.int

Form PCT/IB/373 (January 2004)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
BLISS TIMOTHY F.

HOWISON & ARNOTT, L.L.P. P.O. BOX 741715 DALLAS
TX 75374-1715 USA

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing *(day/month/year)*	**25 NOVEMBER 2011 (25.11.2011)**
Applicant's or agent's file reference DAMA-30,562	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2011/024891	**15 FEBRUARY 2011 (15.02.2011)**	15 FEBRUARY 2010 (15.02.2010)

International Patent Classification (IPC) or both national classification and IPC

H04L 29/06(2006.01)i, H04L 12/28(2006.01)i, H04L 12/56(2006.01)i

Applicant

DAMAKA,INC et al

1. This opinion contains indications relating to the following items:

- [x] Box No. I Basis of the opinion
- [ ] Box No. II Priority
- [ ] Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- [ ] Box No. IV Lack of unity of invention
- [x] Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- [ ] Box No. VI Certain documents cited
- [ ] Box No. VII Certain defects in the international application
- [ ] Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.
For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/KR	Date of completion of this opinion	Authorized officer
Korean Intellectual Property Office Government Complex-Daejeon, 189 Cheongsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	24 NOVEMBER 2011 (24.11.2011)	Kim Sun Jong Telephone No.82-42-481-8260

Form PCT/ISA/237 (cover sheet) (July 2011)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/024891

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of :

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into _____ , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of:

   a. a sequence listing filed or furnished
      ☐ on paper
      ☐ in electronic form

   b. time of filing or furnishing
      ☐ contained in the international application as filed.
      ☐ filed together with the international application in electronic form.
      ☐ furnished subsequently to this Authority for the purposes of search.

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additioanl copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/024891

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-20	YES
	Claims	NONE	NO
Inventive step (IS)	Claims	1-20	YES
	Claims	NONE	NO
Industrial applicability (IA)	Claims	1-20	YES
	Claims	NONE	NO

2. Citations and explanations :

Reference is made to the following documents:

D1: US 2007-0019545 A1 (WADE R. ALT et al.) 25 January 2007
D2: US 2005-0208947 A1 (PRADEEP BAHL) 22 September 2005
D3: US 2007-0297430 A1 (PETRI NYKANEN et al.) 27 December 2007
D4: US 2003-0214955 A1 (JUN-HYEONG KIM) 20 November 2003
D5: US 2005-0270992 A1 (AJIT SANZGIRI et al.) 08 December 2005

1. Novelty (PCT Article 33(2)) and Inventive Step (PCT Article 33(3))

D1 discloses a method for providing packetized communication services, the method comprising: receiving a request from a first endpoint of a first domain for establishing a communication session with a second endpoint of a second domain; and establishing a tunnel by a network address translation server to support the communication session, the network address translation server being controlled by a service provider as part of a managed communication service, the tunnel traversing a first firewall and a first network address translator of the first domain and a second firewall and a second network address translator of the second domain to reach the second endpoint; and encrypting the communication session for transport via the tunnel.

D2 discloses a method and mobile node that facilitate persisting virtual private network structures across multiple network addresses assigned to the mobile node. The method includes initially setting up a virtual private network tunnel between a mobile node and a virtual private network tunnel server.

D3 discloses a communication network for providing seamless peer-to-peer connectivity between nodes of different communication network environments, the communication network comprising at least one tunneling server comprising an access unit for providing access to the communication network and an addressing unit for assigning a dynamic address of a first addressing scheme routable in the communication network to a node connecting itself to the tunneling server, the node having a fixed address of a second addressing scheme, and storing at runtime an association between the fixed address of the second addressing scheme and the dynamic address of the first addressing scheme.

D4 discloses a network connection apparatus for communicating between a network device located in a first private network and a second private network located outside the first private network. The apparatus includes an address acquisition module capable of acquiring a public IP address of a network management device from a DNS based on a domain name of the network management device of the second private network.

D5 discloses a method for transferring information in a digital network, wherein the network includes a router, an access point, a user device, and a plurality of other devices all coupled to the network, the method comprising creating a multipoint tunnel communication mode to transfer information from the user device to at least one of the other devices; using a routing configuration to route communications over the multipoint tunnel; and modifying the routing configuration in response to a discovered host.

Continued on Supplemental Box

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/US2011/024891

Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**
Continuation of :

Box V

1.1 In regard to claim 1, none of the documents D1 to D5 nor any combination thereof teaches or fairly suggests the features wherein "determining identifies that none of a private interface, a public interface, and a relay interface are available when using the first message protocol" and wherein "the private interface corresponds to a local address assigned to the first endpoint by a NAT device in a local network, the public interface corresponds to a public address of the NAT device that represents the first endpoint in networks outside of the local network, and the relay interface corresponds to a reflector located outside of the local network". Accordingly, it would not have been obvious to a person skilled in the art to apply the knowledge of D1 to D5 in order to create the method for establishing a peer-to-peer communication session between first and second endpoints according to claim 1. Therefore, claim 1 meets the requirements of PCT Article 33(2) and 33(3).

1.2 The features of claim 9 essentially correspond to those of claim 1 in that the former are described from the viewpoint of a tunneling server and the latter from that of a first endpoint. Therefore, claim 9 meets the requirements of PCT Article 33(2) and 33(3) for the same reasoning as given for claim 1.

1.3 The features of claim 15 essentially correspond to those of claim 1 except that their invention categories are different. Therefore, claim 15 meets the requirements of PCT Article 33(2) and 33(3) for the same reasoning as given for claim 1.

1.4 Claims 2-8, 10-14, and 16-20 are dependent on claims 1, 9, and 15, respectively, and therefore meet the requirements of PCT Article 33(2) and 33(3).

2. Industrial Applicability (PCT Article 33(4))

Claims 1-20 have industrial applicability and meet the requirement of PCT Article 33(4).

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION CONCERNING TRANSMITTAL OF COPY OF INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY (CHAPTER I OF THE PATENT COOPERATION TREATY)
(PCT Rule 44bis.1(c))

To:

BLISS, Timothy, F.
Howison & Arnott, L.L.P.
P.O.Box 741715
Dallas, TX 75374-1715
ETATS-UNIS D'AMERIQUE

Date of mailing *(day/month/year)* 04 October 2012 (04.10.2012)	
Applicant's or agent's file reference DAMA-30,563	**IMPORTANT NOTICE**

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2011/028685	16 March 2011 (16.03.2011)	19 March 2010 (19.03.2010)

Applicant
DAMAKA, INC. et al

The International Bureau transmits herewith a copy of the international preliminary report on patentability (Chapter I of the Patent Cooperation Treaty)

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No. +41 22 338 82 70

Authorized officer
Nora Lindner

e-mail: pt03.pct@wipo.int

Form PCT/IB/326 (January 2004)

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44*bis*)

Applicant's or agent's file reference DAMA-30,563	**FOR FURTHER ACTION**	See item 4 below
International application No. PCT/US2011/028685	International filing date *(day/month/year)* 16 March 2011 (16.03.2011)	Priority date *(day/month/year)* 19 March 2010 (19.03.2010)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant DAMAKA, INC.		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 *bis*.1(a).

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

   In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

☒	Box No. I	Basis of the report
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☐	Box No. VII	Certain defects in the international application
☒	Box No. VIII	Certain observations on the international application

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44*bis*.3(c) and 93*bis*.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44*bis* .2).

	Date of issuance of this report 25 September 2012 (25.09.2012)
The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. +41 22 338 82 70	Authorized officer Nora Lindner e-mail: pt03.pct@wipo.int

Form PCT/IB/373 (January 2004)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
BLISS TIMOTHY F.

HOWISON & ARNOTT, L.L.P. P.O.BOX 741715 DALLAS
TX 75374-1715 USA

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing *(day/month/year)*	**09 NOVEMBER 2011 (09.11.2011)**
Applicant's or agent's file reference DAMA-30,563	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2011/028685	**16 MARCH 2011 (16.03.2011)**	19 MARCH 2010 (19.03.2010)

International Patent Classification (IPC) or both national classification and IPC

H04L 9/32(2006.01)i, H04L 29/06(2006.01)i, H04L 12/28(2006.01)i, H04L 12/56(2006.01)i

Applicant

DAMAKA, INC. et al

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☒ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.
For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/KR	Date of completion of this opinion	Authorized officer
Korean Intellectual Property Office Government Complex-Daejeon, 189 Cheongsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	08 NOVEMBER 2011 (08.11.2011)	Yang, Jong Phil Telephone No.82-42-481-8595

Form PCT/ISA/237 (cover sheet) (July 2011)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/028685

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of :

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into _____ , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of:

   a. a sequence listing filed or furnished
      ☐ on paper
      ☐ in electronic form

   b. time of filing or furnishing
      ☐ contained in the international application as filed.
      ☐ filed together with the international application in electronic form.
      ☐ furnished subsequently to this Authority for the purposes of search.

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additioanl copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/028685

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-20	YES
	Claims	NONE	NO
Inventive step (IS)	Claims	1-20	YES
	Claims	NONE	NO
Industrial applicability (IA)	Claims	1-20	YES
	Claims	NONE	NO

2. Citations and explanations :

Reference is made to the following documents:

D1: US 2008-0080392 A1 (WALSH, RICHARD J et al.) 03 April 2008
D2: US 2006-0218624 A1 (RAVIKUMAR, SIVAKUMAR et al.) 28 September 2006
D3: US 2009-0300673 A1 (BACHET, FRANCK et al.) 03 December 2009

1. Novelty and Inventive Step

The subject matter of claims 1, 12 and 18 differs from the documents D1-D3 in that a mapped endpoint lacks the functionality needed to communicate directly with a peer-to-peer network (or the mapped endpoint is incompatible with the peer-to-peer network). Accordingly, claims 1, 12 and 18 are not anticipated by any of the documents, nor are they obvious to a person skilled in the art over the documents individually or in combination.

Thus, **claims 1, 12 and 18 meet the requirements of PCT Article 33(2) and 33(3) with respect to novelty and inventive step, and claims 2-11, 13-17 and 19-20 comply with PCT Article 33(2) and 33(3) as they are dependent on claims 1, 12 and 18, respectively.**

2. Industrial Applicability

Claims 1-20 are industrially applicable under PCT Article 33(4).

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/US2011/028685

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

Claim 11, dependent on claim 1, is worded in reference to a method step of claim 1, "sending a message by the virtual endpoint to the mapped endpoint". However, said method step has not been worded in claim 1. Therefore, claim 11 does not meet the requirements of PCT Article 6.

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION CONCERNING TRANSMITTAL OF COPY OF INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY (CHAPTER I OF THE PATENT COOPERATION TREATY)
(PCT Rule 44bis.1(c))

To:

BLISS, Timothy, F.
Howison & Arnott, L.L.P.
P.O.Box 741715
Dallas, TX 75374-1715
ETATS-UNIS D'AMERIQUE

Date of mailing *(day/month/year)* 26 October 2012 (26.10.2012)	
Applicant's or agent's file reference DAMA-30,572	**IMPORTANT NOTICE**

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2011/031245	05 April 2011 (05.04.2011)	16 April 2010 (16.04.2010)

Applicant
DAMAKA, INC. et al

The International Bureau transmits herewith a copy of the international preliminary report on patentability (Chapter I of the Patent Cooperation Treaty)

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No. +41 22 338 82 70

Authorized officer
Athina Nickitas-Etienne

e-mail: pt04.pct@wipo.int

Form PCT/IB/326 (January 2004)

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44*bis*)

Applicant's or agent's file reference DAMA-30,572	**FOR FURTHER ACTION**	See item 4 below
International application No. PCT/US2011/031245	International filing date *(day/month/year)* 05 April 2011 (05.04.2011)	Priority date *(day/month/year)* 16 April 2010 (16.04.2010)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant DAMAKA, INC.		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 *bis*.1(a).

2. This REPORT consists of a total of 8 sheets, including this cover sheet.

   In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

☒	Box No. I	Basis of the report
☐	Box No. II	Priority
☒	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☐	Box No. VII	Certain defects in the international application
☒	Box No. VIII	Certain observations on the international application

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44*bis*.3(c) and 93*bis*.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44*bis* .2).

	Date of issuance of this report 16 October 2012 (16.10.2012)
The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. +41 22 338 82 70	Authorized officer Athina Nickitas-Etienne e-mail: pt04.pct@wipo.int

Form PCT/IB/373 (January 2004)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
BLISS TIMOTHY F.

HOWISON & ARNOTT, L.L.P. P.O.BOX 741715 DALLAS
TX 75374-1715 USA

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing *(day/month/year)*	**26 DECEMBER 2011 (26.12.2011)**
Applicant's or agent's file reference DAMA-30,572	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2011/031245	**05 APRIL 2011 (05.04.2011)**	16 APRIL 2010 (16.04.2010)

International Patent Classification (IPC) or both national classification and IPC

H04L 29/06(2006.01)i, H04L 12/66(2006.01)i, H04L 12/46(2006.01)i

Applicant

DAMAKA, INC. et al

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☒ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☒ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.
For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/KR	Date of completion of this opinion	Authorized officer
Korean Intellectual Property Office Government Complex-Daejeon, 189 Cheongsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	26 DECEMBER 2011 (26.12.2011)	Kim Sun Jong Telephone No.82-42-481-8260

Form PCT/ISA/237 (cover sheet) (July 2011)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/031245

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of :

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into _____ , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of:

   a. a sequence listing filed or furnished
      ☐ on paper
      ☐ in electronic form

   b. time of filing or furnishing
      ☐ contained in the international application as filed.
      ☐ filed together with the international application in electronic form.
      ☐ furnished subsequently to this Authority for the purposes of search.

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additioanl copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/031245

Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non obvious), or to be industrially applicable have not been examined in respect of:

☐ the entire international application

☒ claims Nos. 7

because:

☐ the said international application, or the said claims Nos. _____ relate to the following subject matter which does not require an international search *(specify)*:

☒ the description, claims or drawings *(indicate particular elements below)* or said claims Nos. 7 are so unclear that no meaningful opinion could be formed *(specify)*:

Claim 7, dependent on claim 1, relates to a method that an enterprise network performs, but claim 1 relates to an enterprise network. As there is an inconsistency in the matter for which protection is sought, claim 7 does not meet the requirements of PCT Article 6.

☐ the claims, or said claims Nos. _____ are so inadequately supported by the description that no meaningful opinion could be formed *(specify)*:

☒ no international search report has been established for said claims Nos. 7

☐ a meaningful opinion could not be formed without the sequence listing; the applicant did not, within the prescribed time limit:

☐ furnish a sequence listing on paper complying with the standard provided for in Annex C of the Administrative Istructions, and such listing was not available to the International Searching Authority in a form and manner acceptable to it.

☐ furnish a sequence listing in electronic form complying with the standard provided for in Annex C of the Administrative Istructions, and such listing was not available to the International Searching Authority in a form and manner acceptable to it.

☐ pay the required late furnishing fee for the furnishing of a sequence listing in response to an invitation under Rule 13ter.1(a) or (b).

☐ See Supplemental Box for further details.

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/031245

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-6,8-21	YES
	Claims	NONE	NO
Inventive step (IS)	Claims	1-6,8-21	YES
	Claims	NONE	NO
Industrial applicability (IA)	Claims	1-6,8-21	YES
	Claims	NONE	NO

2. Citations and explanations :

Reference is made to the following documents:

D1: EP 1988698 A1 (RESEARCH IN MOTION LIMITED) 05 November 2008
D2: US 2009-0052399 A1 (A. SILVER et al.) 26 February 2009
D3: US 2007-0206563 A1 (A. SILVER et al.) 06 September 2007
D4: EP 1988697 A1 (RESEARCH IN MOTION LIMITED) 05 November 2008

1. Novelty and Inventive step

1.1 Claim 1 relates to an enterprise network comprising:
- an enterprise private branch exchange (PBX) having a pilot number associated therewith, wherein the enterprise PBX is configured to communicate signaling information with a client of the enterprise network when the client is positioned in a cellular network that is separate from the enterprise network and is outside of the enterprise network's control, and wherein the enterprise PBX is further configured to communicate signaling information with an external device coupled to a PSTN that is external to the enterprise network;
- an enterprise IP-Public Switched Telephone Network (PSTN) media gateway configured to provide a first media path between the client and the enterprise IP-PSTN media gateway when the client is positioned in the cellular network, and further configured to provide a second media path between the enterprise IP-PSTN media gateway and the external device;
- a voice call continuity (VCC) Session Initiation Protocol (SIP) server configured to communicate with the enterprise PBX in order to perform signaling functions for the client via the enterprise PBX when the client is positioned in the cellular network, and further configured to communicate signaling information directly with the client when the client is positioned in an IP network that is separate from the enterprise network and is outside of the enterprise network's control; and
- a VCC media gateway configured to communicate with the enterprise IP-PSTN media gateway and the VCC SIP server and to receive digits corresponding to a destination number associated with the external device from the client after the client places a call to the pilot number, further configured to anchor the first and second media paths, and further configured to provide a third media path directly to the client when the client is positioned in the IP network and to anchor the third media path.

None of the prior art documents D1 to D4 teach or fairly suggest the features of said enterprise network of claim 1, and the features of claim 1 cannot be easily derived from each prior art document or any combination thereof by one skilled in the art. Hence, the subject matter of claim 1 is considered to be novel and to involve an inventive step in the sense of PCT Article 33(2) and 33(3).

1.2 Claims 2-5 are dependent on claim 1 and therefore meet the requirements of PCT Article 33(2) and 33(3).

Continued on Supplemental Box

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/US2011/031245

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

Claim 7, dependent on claim 1, relates to a method that an enterprise network performs, but claim 1 relates to an enterprise network. As there is an inconsistency in the matter for which protection is sought, claim 7 does not meet the requirements of PCT Article 6.

Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**
Continuation of :

Box V

1.3 Claim 6 relates to a method for use within an enterprise network comprising:
- receiving, by the enterprise network, a call request at a pilot number of the enterprise network from a first device that is a client of the enterprise network, wherein the enterprise network designates a call received at the pilot number as a request for a voice call continuity (VCC) communication session, and wherein the first device is located in a first communication network that is external to the enterprise network and not controlled by the enterprise network;
- receiving, by the enterprise network, a plurality of digits from the first device, wherein the plurality of digits provide contact information corresponding to a second device that is located in a second communication network that is external to the enterprise network and not controlled by the enterprise network;
- performing, by the enterprise network, signaling with the first device and the second device to establish the communication session between the first and second devices, wherein the establishment of the communication session is controlled by the enterprise network;
- establishing, by the enterprise network, a first media path between the enterprise network and the first device, wherein the first media path is anchored on a media gateway within the enterprise network; and
- establishing, by the enterprise network, a second media path between the enterprise network and the second device, wherein the second media path is anchored on the media gateway, and wherein the first and second media paths connect the first and second devices for the communication session.

None of the prior art documents D1 to D4 teach or fairly suggest the features of said method of claim 6, and the features of claim 6 cannot be easily derived from each prior art document or any combination thereof by one skilled in the art. Hence, the subject matter of claim 6 is considered to be novel and to involve an inventive step in the sense of PCT Article 33(2) and 33(3).

1.4 Claims 8-15 are dependent on claim 6 and therefore meet the requirements of PCT Article 33(2) and 33(3).

1.5 Claim 16 relates to a method for use within an enterprise network comprising:
- receiving, by the enterprise network, a call at a pilot number of the enterprise network from a second device that is not a client of the enterprise network, wherein the enterprise network designates a call received at the pilot number as a request for a voice call continuity (VCC) communication session, wherein the call identifies a first device that is a client of the enterprise network as a destination, and wherein the first and second devices are both located in communication networks that are external to the enterprise network and are not controlled by the enterprise network;
- identifying, by the enterprise network, whether the first device is registered with the enterprise network as available to the enterprise network via an Internet Protocol (IP) network;
- performing, by the enterprise network, signaling with the first device and the second device to establish the communication session between the first and second devices, wherein the establishment of the communication session is controlled by the enterprise network;
- establishing, by the enterprise network, a first media path between the enterprise network and the first device, wherein the first media path is anchored on a media gateway within the enterprise network, and wherein the first media path is a cellular bearer path if the first device is not registered as available via the IP network and is an IP bearer path if the first device is registered as available via the IP network; and
- establishing, by the enterprise network, a second media path between the enterprise network and the second device, wherein the second media path is anchored on the media gateway, wherein the first and second media paths connect the first and second devices for the communication session.

None of the prior art documents D1 to D4 teach or fairly suggest the features of said method of claim 16, and the features of claim 16 cannot be easily derived from each prior art document or any combination thereof by one skilled in the art. Hence, the subject matter of claim 16 is considered to be novel and to involve an inventive step in the sense of PCT Article 33(2) and 33(3).

Continued on Supplemental Box

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/US2011/031245

Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**
Continuation of :

Box V

1.6 Claims 17-21 are dependent on claim 16 and therefore meet the requirements of PCT Article 33(2) and 33(3).

2. Industrial Applicability

Claims 1-6 and 8-21 have industrial applicability and meet the requirement of PCT Article 33(4).

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION CONCERNING TRANSMITTAL OF COPY OF INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY (CHAPTER I OF THE PATENT COOPERATION TREATY)
(PCT Rule 44bis.1(c))

To:

BLISS, Timothy, F.
Howison & Arnott, LLP
P.O. Box 741715
Dallas, TX 75374-1715
ETATS-UNIS D'AMERIQUE

Date of mailing *(day/month/year)* 11 October 2012 (11.10.2012)	
Applicant's or agent's file reference DAMA-30,568	**IMPORTANT NOTICE**

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2011/029954	25 March 2011 (25.03.2011)	29 March 2010 (29.03.2010)

Applicant
DAMAKA, INC. et al

The International Bureau transmits herewith a copy of the international preliminary report on patentability (Chapter I of the Patent Cooperation Treaty)

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No. +41 22 338 82 70

Authorized officer
Yukari Nakamura

e-mail: pt07.pct@wipo.int

Form PCT/IB/326 (January 2004)

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44*bis*)

Applicant's or agent's file reference DAMA-30,568	**FOR FURTHER ACTION**	See item 4 below
International application No. PCT/US2011/029954	International filing date *(day/month/year)* 25 March 2011 (25.03.2011)	Priority date *(day/month/year)* 29 March 2010 (29.03.2010)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant DAMAKA, INC.		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 *bis*.1(a).

2. This REPORT consists of a total of 4 sheets, including this cover sheet.

   In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

☒	Box No. I	Basis of the report
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☐	Box No. VII	Certain defects in the international application
☐	Box No. VIII	Certain observations on the international application

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44*bis*.3(c) and 93*bis*.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44*bis* .2).

	Date of issuance of this report 02 October 2012 (02.10.2012)
The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. +41 22 338 82 70	Authorized officer Yukari Nakamura e-mail: pt07.pct@wipo.int

Form PCT/IB/373 (January 2004)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
BLISS TIMOTHY F.

HOWISON & ARNOTT, L.L.P. P.O. BOX 741715 DALLAS
TX 75374-1715 USA

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing *(day/month/year)*	**24 NOVEMBER 2011 (24.11.2011)**
Applicant's or agent's file reference DAMA-30,568	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2011/029954	**25 MARCH 2011 (25.03.2011)**	29 MARCH 2010 (29.03.2010)

International Patent Classification (IPC) or both national classification and IPC

H04L 29/06(2006.01)i, H04L 12/28(2006.01)i, H04L 12/56(2006.01)i, H04L 9/32(2006.01)i

Applicant

DAMAKA, INC. et al

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.
For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/KR	Date of completion of this opinion	Authorized officer
Korean Intellectual Property Office Government Complex-Daejeon, 189 Cheongsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	24 NOVEMBER 2011 (24.11.2011)	Kim Sun Jong Telephone No.82-42-481-8260

Form PCT/ISA/237 (cover sheet) (July 2011)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/029954

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of :

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into _____ , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of:

   a. a sequence listing filed or furnished
      ☐ on paper
      ☐ in electronic form

   b. time of filing or furnishing
      ☐ contained in the international application as filed.
      ☐ filed together with the international application in electronic form.
      ☐ furnished subsequently to this Authority for the purposes of search.

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additioanl copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/029954

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-20	YES
	Claims	NONE	NO
Inventive step (IS)	Claims	1-20	YES
	Claims	NONE	NO
Industrial applicability (IA)	Claims	1-20	YES
	Claims	NONE	NO

2. Citations and explanations :

Reference is made to the following documents:

D1: US 2009-0003322 A1 (ISUMI, SHINYA) 01 January 2009
D2: US 2009-0327516 A1 (AMISHIMA, MAKI et al.) 31 December 2009
D3: EP 1848163 A1 (SHARP KABUSHIKI KAISHA) 24 October 2007
D4: US 2006-0187926 A1 (IMAI, NAOKI) 24 August 2006

1. Novelty (PCT Article 33(2)) and Inventive Step (PCT Article 33(3))

1.1. In regard to claim 10, document D1, which is considered to represent the most relevant state of the art, discloses (the references in parentheses applying to this document):

A method for sweeping an active session exiting between a first endpoint and a second endpoint from the first endpoint to a third endpoint (see 'change the first communication to the second communication' in claim 1), the method comprising:
receiving, by the first end point, a go away message directly from the third end point (see 'receiving a call instruction' in claim 2); and
transferring, by the first endpoint, session information to the third endpoint, wherein the session information includes information needed by the third endpoint to enter the active session with the second endpoint (see 'employing the coding scheme stormed in the memory to perform ... call setting between the second and third IP phones' in claim 2).

However, D1 does not explicitly disclose the features of checking, by the first endpoint, a policy associated with the first endpoint to determine an action to be taken upon receipt of the go away message; and identifying, by the first endpoint, that the first endpoint is engaged in an active session with the second endpoint. In addition, these features of claim 10 are not disclosed in any other documents cited in the ISR, nor would they be obvious to a person skilled in the art. Therefore, claim 10 meets the requirements of PCT Article 33(2) and 33(3) with respect to novelty and inventive step.

1.2. Claims 1 and 18 include the essential features of claim 10, and the features of claims 1 and 18 essentially correspond to those defined in claim 10. Therefore, claims 1 and 18 meet the requirements of PCT Article 33(2) and 33(3) with respect to novelty and inventive step.

1.3. Claims 2-9, 11-17, and 19-20 are dependent on claims 1, 10, and 18, respectively, and therefore meet the requirements of PCT Article 33(2) and 33(3).

2. Industrial Applicability (PCT Article 33(4))

Claims 1-20 have industrial applicability and meet the requirement of PCT Article 33(4).

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION CONCERNING TRANSMITTAL OF COPY OF INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY (CHAPTER I OF THE PATENT COOPERATION TREATY)
(PCT Rule 44bis.1(c))

To:

BLISS, Timothy, F.
Howison & Arnott, L.L.P.
P.O.Box 741715
Dallas, TX 75374-1715
ETATS-UNIS D'AMERIQUE

Date of mailing *(day/month/year)* 08 November 2012 (08.11.2012)	
Applicant's or agent's file reference DAMA-30,746	**IMPORTANT NOTICE**

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2011/031246	05 April 2011 (05.04.2011)	29 April 2010 (29.04.2010)

Applicant
DAMAKA, INC. et al

The International Bureau transmits herewith a copy of the international preliminary report on patentability (Chapter I of the Patent Cooperation Treaty)

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No. +41 22 338 82 70

Authorized officer
Athina Nickitas-Etienne

e-mail: pt04.pct@wipo.int

Form PCT/IB/326 (January 2004)

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44*bis*)

Applicant's or agent's file reference DAMA-30,746	**FOR FURTHER ACTION**	See item 4 below
International application No. PCT/US2011/031246	International filing date *(day/month/year)* 05 April 2011 (05.04.2011)	Priority date *(day/month/year)* 29 April 2010 (29.04.2010)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant DAMAKA, INC.		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 *bis*.1(a).

2. This REPORT consists of a total of 4 sheets, including this cover sheet.

   In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

☒	Box No. I	Basis of the report
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☐	Box No. VII	Certain defects in the international application
☐	Box No. VIII	Certain observations on the international application

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44*bis*.3(c) and 93*bis*.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44*bis* .2).

	Date of issuance of this report 30 October 2012 (30.10.2012)
The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. +41 22 338 82 70	Authorized officer Athina Nickitas-Etienne e-mail: pt04.pct@wipo.int

Form PCT/IB/373 (January 2004)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
BLISS TIMOTHY F.

HOWISON & ARNOTT, L.L.P. P.O.BOX 741715 DALLAS
TX 75374-1715 USA

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing *(day/month/year)*	**28 DECEMBER 2011 (28.12.2011)**
Applicant's or agent's file reference DAMA-30,746	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2011/031246	**05 APRIL 2011 (05.04.2011)**	29 APRIL 2010 (29.04.2010)

International Patent Classification (IPC) or both national classification and IPC

H04L 29/06(2006.01)i, H04L 12/56(2006.01)i, H04L 12/28(2006.01)i

Applicant

DAMAKA, INC. et al

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.
For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/KR	Date of completion of this opinion	Authorized officer
Korean Intellectual Property Office Government Complex-Daejeon, 189 Cheongsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	27 DECEMBER 2011 (27.12.2011)	YANG, CHAN HO Telephone No.82-42-481-5689

Form PCT/ISA/237 (cover sheet) (July 2011)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/031246

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of :

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into _____ , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of:

   a. a sequence listing filed or furnished
      ☐ on paper
      ☐ in electronic form

   b. time of filing or furnishing
      ☐ contained in the international application as filed.
      ☐ filed together with the international application in electronic form.
      ☐ furnished subsequently to this Authority for the purposes of search.

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additioanl copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/031246

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-24	YES
	Claims	NONE	NO
Inventive step (IS)	Claims	1-24	YES
	Claims	NONE	NO
Industrial applicability (IA)	Claims	1-24	YES
	Claims	NONE	NO

2. Citations and explanations :

Reference is made to the following documents:

D1: US 2005-0286519 A1 (SIVAKUMAR RAVIKUMAR et al.) 29 December 2005
D2: US 2006-0203750 A1 (SIVAKUMAR RAVIKUMAR et al.) 14 September 2006
D3: US 2006-0120375 A1 (SIVAKUMAR RAVIKUMAR et al.) 08 June 2006
D4: US 2007-0165629 A1 (SIVAKUMAR CHATURVEDI et al.) 19 July 2007

(1) Novelty (N) and Inventive Step (IS)

The subject matter of claim 1, 10, and 18 differs from these prior art documents in establishing, by the first endpoint, at least one media route with the second endpoint to carry media for the call, wherein the at least one media route is established using the peer-to-peer hybrid network and not the third party instant message system. And it is not obvious to a person skilled in the art by the documents, taken alone or in combination. Therefore, claim 1, 10, and 18 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

Claims 2-9 are dependant on claim 1 and therefore meet the requirements of PCT Article 33(2) and (3).

Claims 11-17 are dependant on claim 10 and therefore meet the requirements of PCT Article 33(2) and (3).

Claims 19-24 are dependant on claim 18 and therefore meet the requirements of PCT Article 33(2) and (3).

(2) Industrial Applicability (IA)

Claims 1-24 are industrially applicable under PCT Article 33(4).

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT AND THE WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

To:
Timothy F.Bliss
Howison & Arnott, L.L.P.
P.O. Box 741715
Dallas, Texas 75374-1715
United States of America

Date of mailing *(day/month/year)* 18 October 2012 (18.10.2012)	
Applicant's or agent's file reference DAMA-31343	**FOR FURTHER ACTION** See paragraphs 1 and 4 below
International application No. PCT/US 2012/046026	International filing date *(day/month/year)* 10 July 2012 (10.07.2012)
Applicant DAMAKA, INC. et al.	

1. [X] The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

   Filing of amendments and statement under Article 19:

   The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):

   When? The time limit for filing such amendments is normally two months from the date of transmittal of the international search report.

   Where? Directly to the International Bureau of WIPO, 34 chemin des Colombettes 1211 Geneva 20, Switzerland, Facsimile No.: +41 22 338 82 70

   For more detailed instructions, see *PCT Applicant's Guide*, International Phase, paragraphs 9.004 – 9.011.

2. [ ] The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3. [ ] **With regard to any protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

   [ ] the protest together with the decision thereon has been transmitted to the International Bureau together with any request to forward the texts of both the protest and the decision thereon to the designated Offices.

   [ ] no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Reminders**

   The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. Following the expiration of 30 months from the priority date, these comments will also be made available to the public.

   Shortly after the expiration of **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau before the completion of the technical preparations for international publication (Rules 90*bis*.1 and 90*bis*.3).

   Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

   In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19 months.

   For details about the applicable time limits, Office by Office, see www.wipo.int/pct/en/texts/time_limits.html and the *PCT Applicant's Guide*, National Chapters.

Name and mailing address of the ISA/ FIPS Russia, 123995, Moscow, G-59, GSP-5, Berezhkovskaya nab., 30-1 Facsimile No. +7 (499) 243-33-37	Authorized officer L. Tsoban Telephone No. 495-531-64-81

Form PCT/ISA/220 (July 2010)

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference DAMA-31343	FOR FURTHER ACTION	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
International application No. PCT/US 2012/046026	International filing date *(day/month/year)* 10 July 2012 (10.07.2012)	(Earliest) Priority Date *(day/month/year)* 15 July 2011 (15.07.2011)
Applicant DAMAKA, INC. et al.		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 2 sheets.

[ ] It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

a. With regard to the **language**, the international search was carried out on the basis of:

[X] the international application in the language in which it was filed.

[ ] a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

b. [ ] This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6*bis*(a)).

c. [ ] With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. [ ] **Certain claims were found unsearchable** (see Box No. II).

3. [ ] **Unity of invention is lacking** (see Box No. III).

4. With regard to the **title**,

[X] the text is approved as submitted by the applicant.

[ ] the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

[X] the text is approved as submitted by the applicant.

[ ] the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regard to the **drawings**,

a. the figure of the drawings to be published with the abstract is Figure No. _____

[ ] as suggested by the applicant.

[ ] as selected by this Authority, because the applicant failed to suggest a figure.

[ ] as selected by this Authority, because this figure better characterizes the invention.

b. [X] none of the figures is to be published with the abstract.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 2012/046026

A. CLASSIFICATION OF SUBJECT MATTER

H04L 12/56 *(2006.01)*

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

H04L 12/56, 12/24, 12/26, H04W 24/00, 28/00, 28/02, H04L 1/00, 1/16, 29/06

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WIPO, Esp@cenet, USPTO, PatSearch

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2006/064047 A1 (INTERNATIONAL BUSINESS MACHINES CORPORATION et al.) 22.06.2006	1-16
A	EP 1638275 A2 (WECOMM LIMITED) 22.03.2006	1-16
A	EP 1603339 A1 (STMICROELECTRONICS S.R.L.) 07.12.2005	1-16

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
24 September 2012 (24.09.2012)	18 October 2012 (18.10.2012)
Name and mailing address of the ISA/ FIPS Russia, 123995, Moscow, G-59, GSP-5, Berezhkovskaya nab., 30-1 Facsimile No. +7 (499) 243-33-37	Authorized officer K. Raskovalov Telephone No. (495)531-64-81

Form PCT/ISA/210 (second sheet) (July 2009)

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

To:
Timothy P.Bliss
Howison & Arnott, L.L.P.
P.O. Box 741715
Dallas, Texas 75374-1715
United States of America

Date of mailing *(day/month/year)* 18 October 2012 (18.10.2012)	
Applicant's or agent's file reference DAMA-31343	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US 2012/046026	10 July 2012 (10.07.2012)	15 July 2011 (15.07.2011)

International Patent Classification (IPC) or both national classification and IPC
H04L 12/56 (2006.01)

Applicant
DAMAKA, INC. et al.

1. This opinion contains indications relating to the following items:

- [X] Box No. I Basis of the opinion
- [ ] Box No. II Priority
- [ ] Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- [ ] Box No. IV Lack of unity of invention
- [X] Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
- [ ] Box No. VI Certain documents cited
- [ ] Box No. VII Certain defects in the international application
- [ ] Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/ FIPS Russia, 123995, Moscow, G-59, GSP-5, Berezhkovskaya nab., 30-1 Facsimile No. +7 (499) 243-33-37	Date of completion of this opinion 24 September 2012 (24.09.2012)	Authorized officer K. Raskovalov Telephone No. (495)531-64-81

Form PCT/ISA/237 (cover sheet) (July 2011)

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US 2012/046026

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:

   [X] the international application in the language in which it was filed.

   [ ] a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

2. [ ] This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing filed or furnished:

   a. (means)

      [ ] on paper

      [ ] in electronic form

   b. (time)

      [ ] in the international application as filed

      [ ] together with the international application in electronic form

      [ ] subsequently to this Authority for the purposes of search

4. [ ] In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US 2012/046026

Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-16	YES
	Claims		NO
Inventive step (IS)	Claims	1-16	YES
	Claims		NO
Industrial applicability (IA)	Claims	1-16	YES
	Claims		NO

2. Citations and explanations:

D1: WO 2006064047 A1, D2: EP 1638275 A2 D3: EP 1603339 A1.

D1 discloses a method for streaming data using a virtual bi-directional data stream between a first communication device and a second communication device (page 1, lines 37-39), including the following stages:

creating, by the first device, a streaming data packet (DP) (D1, fig. 10);

inserting, by the first device, the data segment and DP into a payload section of a connection-less transport layer packet (D1, fig. 10), wherein at least one of DP and the transport layer packet includes a send field identifying a starting location in the data stream of a data segment to be sent with DP (D1, page 4, lines 2-4), an acknowledgement (ACK) field identifying a location in the data stream up to which all data has been received by the first device (D1, page 2, lines 6-9), a unique identifier (UID) identifying a connection used by the first device for the data stream (D1, page 3, lines 37-38), a packet type field (D1, page 2, lines 34-39), a pad field identifying an amount of padding used to ensure DP has a predefined length (D1, page 3, lines 15-16), a network address of the first device, a network address of the second device (D1, page 3, lines 12-15), and a length of the transport layer packet (D1, page 4, lines 4-5);

sending, by the first device, the transport layer packet to the second device (D1, fig. 4);

obtaining, by the first device, a current round trip time (RTT) that is based on first and second RTTs of packets previously sent from the first device to the second device and a configurable RTT variation factor (D1, page 13, paragraph 1);

calculating, by the first device, a timeout for DP based on the current RTT (D1, page 13, paragraph 1) and

resending, by the first device, D1 if the timeout does not exceed a predefined timeout limit and if an ACK for D1 has not been received from the second device (D1, fig. 7; page 2, paragraph 2).

The invention of claim 1 differs from the invention of D1 in that DP contains "a window field identifying an amount of space available in a receive buffer of the first device", which is obvious for a person skilled in the art, as well as in that the first device receives the current round trip time variance, which is based on the previous RTT variance, the first and second RTTs, and a configurable RTT variance variation factor, and the first device is calculating a timeout for DP based, among other values, on the current RTT variance, which does not obviously follow from the state of the art, and contributes to defining the timeout time more precisely, and, as a result, increasing the connection reliability.

Therefore, the invention of independent claim 1 and dependent claims 2-16 meets the criteria of novelty and inventive step.

The invention of claims 1-16 meets the criterion of industrial applicability.

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION CONCERNING TRANSMITTAL OF COPY OF INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY (CHAPTER I OF THE PATENT COOPERATION TREATY)
(PCT Rule 44bis.1(c))

To:

BLISS, Timothy, F.
Howison & Arnott, L.L.P.
P.O. Box 741715
Dallas, TX 75374-1715
ETATS-UNIS D'AMERIQUE

Date of mailing *(day/month/year)*	
03 January 2013 (03.01.2013)	
Applicant's or agent's file reference	IMPORTANT NOTICE
DAMA-30,814	

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2011/040864	17 June 2011 (17.06.2011)	18 June 2010 (18.06.2010)

Applicant

DAMAKA, INC. et al

The International Bureau transmits herewith a copy of the international preliminary report on patentability (Chapter I of the Patent Cooperation Treaty).

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No. +41 22 338 82 70

Authorized officer:

Simin Baharlou

e-mail: pt09.pct@wipo.int

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44*bis*)

Applicant's or agent's file reference DAMA-30.814	**FOR FURTHER ACTION**	See item 4 below
International application No. PCT/US2011/040964	International filing date *(day/month/year)* 17 June 2011 (17.06.2011)	Priority date *(day/month/year)* 18 June 2010 (18.06.2010)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant DAMAKA, INC.		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 *bis*.1(a).

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

   In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

☒	Box No. I	Basis of the report
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☐	Box No. VII	Certain defects in the international application
☐	Box No. VIII	Certain observations on the international application

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44*bis*.3(c) and 93*bis*.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44*bis* .2).

	Date of issuance of this report 19 December 2012 (19.12.2012)
The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer Simin Baharlou
Facsimile No. +41 22 338 82 70	e-mail: pct@wipo.int

Form PCT/IB/373 (January 2004)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
BLISS TIMOTHY F.

HOWISON & ARNOTT, L.L.P. P.O. BOX 741715 DALLAS TX 75374-1715 USA

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

	Date of mailing *(day/month/year)* **17 FEBRUARY 2012 (17.02.2012)**
Applicant's or agent's file reference DAMA-30,814	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2011/040864	**17 JUNE 2011 (17.06.2011)**	18 JUNE 2010 (18.06.2010)

International Patent Classification (IPC) or both national classification and IPC

H04L 29/02(2006.01)i, H04L 12/56(2006.01)i, H04L 12/28(2006.01)i, G06F 15/16(2006.01)i

Applicant

DAMAKA, INC. et al

1. This opinion contains indications relating to the following items:

- [x] Box No. I Basis of the opinion
- [ ] Box No. II Priority
- [ ] Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- [ ] Box No. IV Lack of unity of invention
- [x] Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- [ ] Box No. VI Certain documents cited
- [ ] Box No. VII Certain defects in the international application
- [ ] Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.
For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/KR	Date of completion of this opinion	Authorized officer
Korean Intellectual Property Office Government Complex-Daejeon, 189 Cheongsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	10 FEBRUARY 2012 (10.02.2012)	Kim Sun Jong Telephone No.82-42-481-8260

Form PCT/ISA/237 (cover sheet) (July 2011)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/040864

Box No. 1 Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of :

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into _____ , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of:

   a. a sequence listing filed or furnished
      ☐ on paper
      ☐ in electronic form

   b. time of filing or furnishing
      ☐ contained in the international application as filed.
      ☐ filed together with the international application in electronic form.
      ☐ furnished subsequently to this Authority for the purposes of search.

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/040864

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-20	YES
	Claims	NONE	NO
Inventive step (IS)	Claims	1-20	YES
	Claims	NONE	NO
Industrial applicability (IA)	Claims	1-20	YES
	Claims	NONE	NO

2. Citations and explanations:

Reference is made to the following documents:

D1: US 2008-0250408 A1 (C. Y. TSUI et al.) 09 October 2008
D2: US 2009-0150016 A1 (M. GOENOI et al.) 28 May 2009
D3: US 2006-0200750 A1 (S. RAVIKUMAR et al.) 14 September 2006
D4: US 2008-0235362 A1 (S. KJESBU et al.) 25 September 2008

1. Novelty and inventive step

Regarding independent claim 1, document D1 which is considered to represent the most relevant state of the art discloses (the references in parentheses applying to this document):

a method for transferring a call in a hybrid peer-to-peer network comprising:
- receiving, by a first endpoint, an instruction to transfer a call to a second endpoint, wherein the first endpoint is engaged in the call with a third endpoint when the instruction is received (lines 10-17 in paragraph [51]);
- determining, by the first endpoint, whether the first endpoint has a buddy relationship with the second endpoint, wherein the first endpoint cannot transfer the call to the second endpoint unless the first and second endpoints have a buddy relationship because the buddy relationship is needed to provide permission by the second endpoint for the first endpoint to communicate with the second endpoint (paragraph [52]);
- sending, by the first endpoint, at least one transfer message to the second endpoint to transfer the call, wherein the at least one transfer message indicates that the first endpoint wants to transfer the call to the second endpoint and identifies the third endpoint as being involved in the call (paragraphs [52],[53]); and
- ending, by the first endpoint, the first endpoint's involvement in the call after the call is transferred (paragraphs [52],[56]).

The subject matter of claim 1 differs from that of D1 in that D1 does not disclose the features ofestablishing, by the first endpoint, a buddy relationship with the second endpoint if the first and second endpoints are not in a buddy relationship. In addition, this difference would not be obvious to a person skilled in the art over D1. Therefore, claim 1 meets the requirements of PCT Article 33(2) and 33(3) with respect to novelty and inventive step.

1.2 The features of independent claim 10 essentially correspond to those of claim 1 in that the former are described from a second endpoint receiving a call transfer and the latter from that of a first endpoint performing a call transfer. Therefore, claim 10 meets the requirements of PCT Article
Continued on Supplemental Box

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of :

Box V

33(2) and 33(3) with respect to novelty and inventive step for the same reasoning as given for claim 1.

1.3 The features of independent claim 18 essentially correspond to those of claim 1 except that claimed categories are different to each other. Therefore, claim 18 meets the requirements of PCT Article 33(2) and 33(3) with respect to novelty and inventive step for the same reasoning as given for claim 1.

1.4 Claims 2-9 are dependent on claim 1, and therefore meet the requirements of PCT Article 33(2) and 33(3).

1.5 Claims 11-17 are dependent on claim 10, and therefore meet the requirements of PCT Article 33(2) and 33(3).

1.6 Claims 19 and 20 are dependent on claim 18, and therefore meet the requirements of PCT Article 33(2) and 33(3).

2. Industrial Applicability

Claims 1-20 have industrial applicability and meet the requirement of PCT Article 33(4).

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION CONCERNING
TRANSMITTAL OF COPY OF INTERNATIONAL
PRELIMINARY REPORT ON PATENTABILITY
(CHAPTER I OF THE PATENT COOPERATION
TREATY)
(PCT Rule 44bis.1(c))

To:

BLISS, Timothy, F.
Howison & Arnott, L.L.P.
P.O. Box 741715
Dallas, TX 75374-1715
ETATS-UNIS D'AMERIQUE

Date of mailing *(day/month/year)* 10 January 2013 (10.01.2013)	
Applicant's or agent's file reference DAMA-30,815	**IMPORTANT NOTICE**

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2011/041565	23 June 2011 (23.06.2011)	23 June 2010 (23.06.2010)

Applicant
DAMAKA, INC. et al

The International Bureau transmits herewith a copy of the international preliminary report on patentability (Chapter I of the Patent Cooperation Treaty)

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No. +41 22 338 82 70

Authorized officer
Simin Baharlou

e-mail: pt09.pct@wipo.int

Form PCT/IB/326 (January 2004)

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44*bis*)

Applicant's or agent's file reference DAMA-30,815	**FOR FURTHER ACTION**	See item 4 below
International application No. PCT/US2011/041565	International filing date *(day/month/year)* 23 June 2011 (23.06.2011)	Priority date *(day/month/year)* 23 June 2010 (23.06.2010)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant DAMAKA, INC.		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 *bis*.1(a).

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

   In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

☒	Box No. I	Basis of the report
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☐	Box No. VII	Certain defects in the international application
☐	Box No. VIII	Certain observations on the international application

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44*bis*.3(c) and 93*bis*.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44*bis* .2).

	Date of issuance of this report 28 December 2012 (28.12.2012)
The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. +41 22 338 82 70	Authorized officer Simin Baharlou e-mail: pt09.pct@wipo.int

Form PCT/IB/373 (January 2004)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
BLISS TIMOTHY F.

HOWISON & ARNOTT, L.L.P. P.O. BOX 741715 DALLAS
TX 75374-1715 USA

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing *(day/month/year)*	**05 JANUARY 2012 (05.01.2012)**
Applicant's or agent's file reference DAMA-30,815	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2011/041565	**23 JUNE 2011 (23.06.2011)**	23 JUNE 2010 (23.06.2010)

International Patent Classification (IPC) or both national classification and IPC

H04L 9/14(2006.01)i, H04L 29/06(2006.01)i, H04L 12/56(2006.01)i, G06F 21/20(2006.01)i

Applicant

DAMAKA, INC. et al

1. This opinion contains indications relating to the following items:

- [x] Box No. I Basis of the opinion
- [ ] Box No. II Priority
- [ ] Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- [ ] Box No. IV Lack of unity of invention
- [x] Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- [ ] Box No. VI Certain documents cited
- [ ] Box No. VII Certain defects in the international application
- [ ] Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.
For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/KR	Date of completion of this opinion	Authorized officer
Korean Intellectual Property Office Government Complex-Daejeon, 189 Cheongsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	05 JANUARY 2012 (05.01.2012)	Yang, Jong Phil Telephone No.82-42-481-8595

Form PCT/ISA/237 (cover sheet) (July 2011)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/041565

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of :

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into _____ , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of:

   a. a sequence listing filed or furnished
      ☐ on paper
      ☐ in electronic form

   b. time of filing or furnishing
      ☐ contained in the international application as filed.
      ☐ filed together with the international application in electronic form.
      ☐ furnished subsequently to this Authority for the purposes of search.

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additioanl copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/041565

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-19	YES
	Claims	NONE	NO
Inventive step (IS)	Claims	2-4,11,13-19	YES
	Claims	1,5-10,12	NO
Industrial applicability (IA)	Claims	1-19	YES
	Claims	NONE	NO

2. Citations and explanations :

Reference is made to the following documents:

D1: Wireless Application Protocol - Wireless Transport Layer Security Specification, Version 18-Feb-2000, Wireless Application Forum, Ltd. 2000.
D2: US 2008-0235511 A1 (O`BRIEN WILLIAM G. et al.) 25 September 2008
D3: US 2010-0049980 A1 (BARRIGA LUIS et al.) 25 February 2010

1. Novelty and Inventive Step

1.1 Claims 1-12

D1, which is considered to represent the most relevant state of the art to the subject matter of independent claim 1, discloses a method for changing an encryption key, the method comprising: receiving, by a first endpoint, an instruction to change from a first encryption key to a second encryption key; sending, by the first endpoint, a first message to a second endpoint that the first endpoint is going to change to the second encryption key, wherein the first message includes information representing the second encryption key; receiving, by the first endpoint, in response to the first message, a second message from the second endpoint indicating that the second endpoint received the first message; sending, by the first endpoint, a third message to the second endpoint acknowledging receipt of the second message; and changing, by the first endpoint, from the first encryption key to the second encryption key, wherein all incoming messages for the first endpoint are to be encrypted using the second encryption key (the technical features related to "Key refresh" and 'Finished' in the whole document of D1).

D1 does not disclose the feature, "the messages are defined for use with a transactional state model in a peer-to-peer network". However, it would be readily derived from the features in figures 2,4a-6b and claims 1-13 of D2 by a person skilled in the art. Accordingly, claim 1 is obvious over D1 in view of D2. Therefore, **claim 1 lacks an inventive step under PCT Article 33(3).**

The additional feature of claim 5, dependent on claim 1, would be readily derived from figures 2,4a-6b and claims 1-13 of D2 by a person skilled in the art.

The additional features of claims 6-7 and 10, dependent on claim 1, would be readily derived from the features related to "Key refresh" and 'Finished' of D1 and figures 2,4a-6b and claims 1-13 of D2 by a person skilled in the art.

<Continued on Supplemental Box>

Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**
Continuation of :

<Box No.V>

The additional features of claims 8-9, dependent on claim 7, are not explicitly disclosed in any of the documents D1-D3. However, they would be regarded as normal design options by a person skilled in the art.

The additional feature of claim 12, dependent on claim 1, are not explicitly disclosed in any of the documents D1-D3. However, it would be regarded as a normal design option by a person skilled in the art.

Therefore, **claims 5-10 and 12 lack an inventive step under PCT Article 33(3).**

The additional features of claims 2-4 and 11, dependent on claim 1, are not disclosed in any of the documents D1-D3, nor are they obvious to a person skilled in the art over the documents individually or in combination. Accordingly, **claims 2-4 and 11 are novel and involve an inventive step under PCT Article 33(2) and (3).**

1.2 Claims 13-19

The subject matter of claims 13 and 17 differs from the documents D1-D3 in the following features: receiving, by a first endpoint, an encrypted message from a second endpoint; applying a first key iteration of a second base encryption key to the encrypted message to determine if the first key iteration will decrypt the encrypted message; if the first key iteration will not decrypt the message, rotating the encryption key to form a next key iteration from the second based encryption key; and applying the next key iteration to the encrypted message to determine if the next key iteration will decrypt the encrypted message as long as untried key iterations are available, continuing the steps of rotating and applying for each key iteration until the message is decrypted.

Accordingly, claims 13 and 17 are not anticipated from any of the documents, nor are they obvious to a person skilled in the art over the documents individually or in combination.

Thus, **claims 13 and 17 meet the requirements of PCT Article 33(2) and 33(3) with respect to novelty and inventive step, and claims 14-16 and 18-19 comply with PCT Article 33(2) and 33(3) as they are dependent on claims 13 and 17, respectively.**

2. Industrial Applicability

Claims 1-19 are industrially applicable under PCT Article 33(4).

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44*bis*)

Applicant's or agent's file reference DAMA-30,500	**FOR FURTHER ACTION**	See item 4 below
International application No. PCT/US2011/049000	International filing date *(day/month/year)* 24 August 2011 (24.08.2011)	Priority date *(day/month/year)* 25 August 2010 (25.08.2010)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant DAMAKA, INC.		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 *bis*.1(a).

2. This REPORT consists of a total of 6 sheets, including this cover sheet.

   In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

☒	Box No. I	Basis of the report
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☒	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☐	Box No. VII	Certain defects in the international application
☐	Box No. VIII	Certain observations on the international application

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44*bis*.3(c) and 93*bis*.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44*bis*.2).

	Date of issuance of this report 26 February 2013 (26.02.2013)
The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. +41 22 338 82 70	Authorized officer Philippe Bécamel e-mail: pt01.pct@wipo.int

Form PCT/IB/373 (January 2004)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
TIMOTHY F. BLISS

HOWISON & ARNOTT, L.L.P. P.O. BOX 741715 DALLAS
TX 75374-1715 USA

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing *(day/month/year)*	**27 MARCH 2012 (27.03.2012)**
Applicant's or agent's file reference DAMA-30,900	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2011/049000	**24 AUGUST 2011 (24.08.2011)**	25 AUGUST 2010 (25.08.2010)

International Patent Classification (IPC) or both national classification and IPC

H04L 29/02(2006.01)i, H04L 12/56(2006.01)i, G06F 15/16(2006.01)i

Applicant

DAMAKA, INC. et al

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☒ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.
For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/KR	Date of completion of this opinion	Authorized officer
Korean Intellectual Property Office Government Complex-Daejeon, 189 Cheongsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	26 MARCH 2012 (26.03.2012)	Kim Sun Jong Telephone No.82-42-481-8260

Form PCT/ISA/237 (cover sheet) (July 2011)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/049000

Box No. 1 Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of :

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into _____ , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of:

   a. a sequence listing filed or furnished
      ☐ on paper
      ☐ in electronic form

   b. time of filing or furnishing
      ☐ contained in the international application as filed.
      ☐ filed together with the international application in electronic form.
      ☐ furnished subsequently to this Authority for the purposes of search.

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/049000

Box No. IV Lack of unity of invention

1. ☐ In response to the invitation (Form PCT/ISA/206) to pay additional fees the applicant has, within the applicable time limit:
   - ☐ paid additional fees
   - ☐ paid additional fees under protest and, where applicable, the protest fee
   - ☐ paid additional fees under protest but the applicable protest fee was not paid
   - ☐ not paid additional fees
2. ☒ This Authority found that the requirement of unity of invention is not complied with and chose not to invite the applicant to pay additional fees.
3. This Authority considers that the requirement of unity of invention in accordance with Rule 13.1, 13.2 and 13.3 is:
   - ☐ complied with
   - ☒ not complied with for the following reasons:

I. Claims 1-17 are directed to a method for receiving, by a first endpoint, a communication peer-to-peer communication session between a second endpoint and a third end point in a hybrid peer-to-peer network.

II. Claims 18-22 are directed to a method for joining, by a first endpoint, an ongoing peer-to-peer communication session between a second endpoint and a third end point in a hybrid peer-to-peer network.

Since the above mentioned groups of claims do not share any of the technical features identified, a technically special relationship between the inventions does not exist.

Accordingly, the claims do not relate to one invention or to a single inventive concept, a priori.

4. Consequently, this opinion has been established in respect of the following parts of the international application:
   - ☒ all parts.
   - ☐ the parts relating to claims Nos. _____

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/049000

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-22	YES
	Claims	NONE	NO
Inventive step (IS)	Claims	1-22	YES
	Claims	NONE	NO
Industrial applicability (IA)	Claims	1-22	YES
	Claims	NONE	NO

2. Citations and explanations:

Reference is made to the following documents:

D1: US 2004-0148434 A1 (D. MATSUBARA et al.) 29 July 2004
D2: US 2006-0182215 A1 (J. CZECK[illegible], III et al.) 16 July 2009
D3: US 2007-0165629 A1 (S. R. CHATURVEDI et al.) 19 July 2007
D4: US 2008-0273541 A1 (A. PHAPO) 06 November 2008

1. Novelty and Inventive Step

1.1 Regarding independent claim 1, document D1, which is considered to represent the most relevant state of the art, discloses (see the underlined):

a method for receiving, by a first endpoint, a communication peer-to-peer communication session between a second endpoint and a third end point in a hybrid peer-to-peer network comprising (fig. 5):
" sending, by the first endpoint, a first request to an access server in the hybrid peer-to-peer network, wherein the first request includes information that enables the access server to identify a session entry corresponding to the ongoing communication session from a plurality of session entries corresponding to a plurality of communication sessions (lines 1-6 in para. [0055]);
" receiving, by the first endpoint, a response to the first request from the access server, wherein the response includes a network address for a media server (lines 9-10 in para. [0057]);
" sending, by the first endpoint, a second request to the media server, wherein the second request includes information that enables the media server to identify a recording session corresponding to the ongoing communication session from a plurality of recording sessions corresponding to a plurality of communication sessions, wherein each recording session includes communications sent to the media server for recording by at least one endpoint in each of the plurality of communications sessions; and
" receiving, by the first endpoint via the media server, peer-to-peer communications from the ongoing communication session between the second and third endpoints, wherein the first endpoint does not communicate with either of the second and third endpoints to receiver the peer-to-peer communications.

None of the prior art documents D1 to D4 teach or fairly suggest the feature of 'sending, by the first endpoint, a second request to the media server and receiving, via the media server, peer-to-peer communications from the ongoing communication session between the second and third endpoints'. Accordingly, this feature is not obvious, nor can it be easily derived from each prior art document or any combination of said prior art documents by one skilled in the art. Hence, the subject matter of claim 1 is considered to be novel and to involve an inventive step in the sense of PCT Article 33(2) and 33(3).

Continued on Supplemental Box

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/049000

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of :

Box No. V

1.2 Regarding independent claim 18, document D1, which is considered to represent the most relevant state of the art, discloses (see the underlined):

a method for joining, by a first endpoint, an ongoing peer-to-peer communication session between a second endpoint and a third endpoint in a hybrid peer-to-peer network comprising (fig. 4):
- identifying, by the first endpoint, the ongoing communication session from a plurality of communication sessions (lines 1-6 in para. [0049]);
- obtaining from a server, by the first endpoint, first communications occurring between the second and third endpoints that correspond to the ongoing communication session, wherein the server is configured to receive the first communications from the first and second endpoints for recording (lines 1-12 in para. [0050]);
- establishing, by the first endpoint, a communication leg directly with the second endpoint, wherein the communication leg is capable of carrying second communications from the first endpoint to the second endpoint; and
- sending, by the first endpoint, the second communications to the second endpoint.

None of the prior art documents D1 to D4 teach or fairly suggest the feature of 'establishing, by the first endpoint, a communication leg directly with the second endpoint and sending the second communications to the second endpoint'. Accordingly, this feature is not obvious, nor can it be easily derived from each prior art document or any combination of said prior art documents by one skilled in the art. Hence, the subject matter of claim 18 is considered to be novel and to involve an inventive step in the sense of PCT Article 33(2) and 33(3).

1.3 Claim 2-17 are dependent on claim 1 and therefore meet the requirements of PCT Article 33(2) and 33(3).

1.4 Claim 19-22 are dependent on claim 18 and therefore meet the requirements of PCT Article 33(2) and 33(3).

2. Industrial Applicability

Claims 1-22 have industrial applicability and meet the requirement of PCT Article 33(4).

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44*bis*)

Applicant's or agent's file reference DAMA-30,937	**FOR FURTHER ACTION**	See item 4 below
International application No. PCT/US2011/051877	International filing date *(day/month/year)* 16 September 2011 (16.09.2011)	Priority date *(day/month/year)* 24 September 2010 (24.09.2010)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant DAMAKA, INC.		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 *bis*.1(a).

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

   In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

☒	Box No. I	Basis of the report
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☐	Box No. VII	Certain defects in the international application
☐	Box No. VIII	Certain observations on the international application

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44*bis*.3(c) and 93*bis*.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44*bis* .2).

	Date of issuance of this report 26 March 2013 (26.03.2013)
The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. +41 22 338 82 70	Authorized officer Nora Lindner e-mail: pt03.pct@wipo.int

Form PCT/IB/373 (January 2004)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
TIMOTHY F. BLISS

HOWISON & ARNOTT, L.L.P. P.O. BOX 741715 DALLAS
TX 75374-1715 USA

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing *(day/month/year)*	**13 APRIL 2012 (13.04.2012)**
Applicant's or agent's file reference DAMA-30,937	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2011/051877	**15 SEPTEMBER 2011 (15.09.2011)**	24 SEPTEMBER 2010 (24.09.2010)

International Patent Classification (IPC) or both national classification and IPC

H04L 12/18(2006.01)i, G06F 15/16(2006.01)i, G06F 17/28(2006.01)i

Applicant

DAMAKA, INC. et al

1. This opinion contains indications relating to the following items:

- [x] Box No. I Basis of the opinion
- [ ] Box No. II Priority
- [ ] Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- [ ] Box No. IV Lack of unity of invention
- [x] Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- [ ] Box No. VI Certain documents cited
- [ ] Box No. VII Certain defects in the international application
- [ ] Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.
For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/KR	Date of completion of this opinion	Authorized officer
Korean Intellectual Property Office Government Complex-Daejeon, 189 Cheongsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	13 APRIL 2012 (13.04.2012)	YANG, CHAN HO Telephone No.82-42-481-5689

Form PCT/ISA/237 (cover sheet) (July 2011)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/051877

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of :

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into _____ , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of:

   a. a sequence listing filed or furnished
      ☐ on paper
      ☐ in electronic form

   b. time of filing or furnishing
      ☐ contained in the international application as filed.
      ☐ filed together with the international application in electronic form.
      ☐ furnished subsequently to this Authority for the purposes of search.

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additioanl copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/051877

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-20	YES
	Claims	NONE	NO
Inventive step (IS)	Claims	1-20	YES
	Claims	NONE	NO
Industrial applicability (IA)	Claims	1-20	YES
	Claims	NONE	NO

2. Citations and explanations :

Reference is made to the following documents:

D1: US 2009-0006076 A1 (JINDAL DINESH K.) 01 January 2009
D2: US 06161082A A (GOLDBERG; RANDY G. et al.) 12 December 2000
D3: US 2010-0223047 A1 (CHRIST OLIVER) 02 September 2010
D4: US 2010-0299150 A1 (FEIN GENE S. et al.) 25 November 2010

1. Novelty and Inventive Step

D1 and D2, which is considered to be close prior art to the subject matter of claim 1 of the present invention, discloses a method for communicating, by a first endpoint, in an ongoing peer-to-peer communication session between the first endpoint and a second endpoint in a hybrid peer-to-peer network comprising:
establishing, by the first endpoint, a communications route directly between the first endpoint and the second endpoint, wherein signaling communications are sent directly from the first endpoint to the second endpoint via a signaling path provided by the communications route (see column 3 lines 1-6, 20-25 in D2);
receiving, by the first endpoint, audio speech input in a first spoken language from a user of the first endpoint (see paragraph [0023]; claim 1 in D1);
determining, by the first endpoint, whether the audio speech input is to be translated from the first spoken language to a second spoken language (see column 5 lines 25-34 in D2); and
sending, by the first endpoint, the audio speech input to a language translation component accessible to the first endpoint via the hybrid peer-to-peer network if the audio speech input is to be translated from the first spoken language to the second spoken language, wherein the first endpoint does not send the audio speech input directly to the second endpoint if the audio speech input is to be translated from the spoken language to the second spoken language (see paragraph [0023]; claim 1 in D1).

However, the subject matter of claim 1 differs from these prior art documents in sending, by the first endpoint, the audio speech input directly to the second endpoint via the communications route if the audio speech input is not to be translated from the first spoken language to the second language. And it is not obvious to a person skilled in the art by the documents, taken alone or in combination. Therefore, claim 1 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

Continued on Supplemental Box

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/051877

Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**
Continuation of :

Box V

Claims 2-9 are dependant on claim 1 and therefore meet the requirements of PCT Article 33(2) and (3).

The subject matter of claim 10 differs from these prior art documents in notifying, by the first endpoint, a language translation component in the hybrid peer-to-peer network of the inbound port, wherein the language translation component is accessible to the first endpoint via the hybrid peer-to-peer network, and wherein the notifying instructs the language translation component to send audio received from the endpoint to the inbound port. And it is not obvious to a person skilled in the art by the documents, taken alone or in combination. Therefore, claim 10 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

Claims 11-17 are dependant on claim 10 and therefore meet the requirements of PCT Article 33(2) and (3).

The subject matter of claim 18 differs from these prior art documents in performing an authentication process with an access server in a hybrid peer-to-peer network, wherein the authentication process authorizes the first endpoint to access the hybrid peer-to-peer network. And it is not obvious to a person skilled in the art by the documents, taken alone or in combination. Therefore, claim 18 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

Claims 19 and 20 are dependant on claim 18 and therefore meet the requirements of PCT Article 33(2) and (3).

2. Industrial Applicability

Claims 1-20 are industrially applicable under PCT Article 33(4).

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44*bis*)

Applicant's or agent's file reference DAMA-30.960	**FOR FURTHER ACTION**	See item 4 below
International application No. PCT/US2011/055101	International filing date *(day/month/year)* 06 October 2011 (06.10.2011)	Priority date *(day/month/year)* 11 October 2010 (11.10.2010)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant DAMAKA, INC.		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 *bis*.1(a).

2. This REPORT consists of a total of 6 sheets, including this cover sheet.

   In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

☒	Box No. I	Basis of the report
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☒	Box No. VII	Certain defects in the international application
☐	Box No. VIII	Certain observations on the international application

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44*bis*.3(c) and 93*bis*.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44*bis* .2).

	Date of issuance of this report 16 April 2013 (16.04.2013)
The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. +41 22 338 82 70	Authorized officer Philippe Bécamel e-mail: pt01.pct@wipo.int

Form PCT/IB/373 (January 2004)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
TIMOTHY F.BLISS

HOWISON & ARNOTT, L.L.P. P.O. BOX 741715 DALLAS
TX 75374-1715 USA

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing *(day/month/year)*	**22 MAY 2012 (22.05.2012)**
Applicant's or agent's file reference DAMA-30.960	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2011/055101	**06 OCTOBER 2011 (06.10.2011)**	11 OCTOBER 2010 (11.10.2010)

International Patent Classification (IPC) or both national classification and IPC

H04L 29/06(2006.01)i, H04L 12/56(2006.01)i, H04L 12/58(2006.01)i

Applicant

DAMAKA, INC. et al

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☒ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.
For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/KR	Date of completion of this opinion	Authorized officer
Korean Intellectual Property Office 189 Cheongsa-ro, Seo-gu, Daejeon Metropolitan City, 302-701, Republic of Korea Facsimile No. 82-42-472-7140	21 MAY 2012 (21.05.2012)	Lee Hyoung Il Telephone No.82-42-481-8199

Form PCT/ISA/237 (cover sheet) (July 2011)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/055101

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of :

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into _____ , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of:

   a. a sequence listing filed or furnished
      ☐ on paper
      ☐ in electronic form

   b. time of filing or furnishing
      ☐ contained in the international application as filed.
      ☐ filed together with the international application in electronic form.
      ☐ furnished subsequently to this Authority for the purposes of search.

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additioanl copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2011/055101

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-26	YES
	Claims	NONE	NO
Inventive step (IS)	Claims	1-26	YES
	Claims	NONE	NO
Industrial applicability (IA)	Claims	1-26	YES
	Claims	NONE	NO

2. Citations and explanations :

Reference is made to the following documents:

D1: US 2005-0130650 A1 (THOMAS CREAMER et al.) 16 June 2005
D2: US 2009-0088150 A1 (CHATURVEDI SIVAKUMAR et al.) 02 April 2009
D3: US 2005-0286519 A1 (SIVAKUMAR RAVIKUMAR et al.) 29 December 2005
D4: US 2010-0011111 A1 (VIZAEI MOHAMMAD) 14 January 2010

1. Novelty and Inventive Step

1.1 Claims 1-13

The subject matter of claim 1 differs from these prior art documents in receiving an inbound call, wherein the inbound call is received via one of a cellular network and a public switched telephone network and continuing the inbound call on the one of the cellular network and the public switched telephone network on which the inbound call was received if the acknowledgement message has not been received. And it is not obvious to a person skilled in the art by the documents, taken alone or in combination. Therefore, claim 1 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

Claims 2-13 are dependent on claim 1 and therefore meet the requirements of PCT Article 33(2) and (3).

1.2 Claims 14-20

The subject matter of claim 14 differs from these prior art documents in receiving a first plurality of digits identifying a first destination device and initiating an outbound call to the first destination device based on the first plurality of digits, wherein the outbound call is initiated vis one of a cellular network and a public switched telephone network. And it is not obvious to a person skilled in the art by the documents, taken alone or in combination. Therefore, claim 14 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

Claims 15-20 are dependent on claim 14 and therefore meet the requirements of PCT Article 33(2) and (3).

[Continued on Supplemental Box]

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/US2011/055101

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

Figures 2a-2c, 10A-10B and 11A-11B do not comply with PCT Rule 11.13(k) because the different figures shall not be numbered in Arabic numerals consecutively and independently of the numbering of the sheets.

Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**
Continuation of :

[Box V]

1.2 Claims 21-26

Claim 21 relates to an endpoint to perform the method according to claim 14. Claim 21 is considered to be novel and to involve an inventive step under PCT Article 33(2) and (3), because the subject matter of claim 14 is considered to be novel and to involve an inventive step under PCT Article 33(2) and (3).

Claims 22-26 depend on claim 21 and consequently they are also considered to be novel and to involve an inventive step under PCT Article 33(2) and (3).

2. Industrial Applicability

Claims 1-26 are industrially applicable under PCT Article 33(4).

Electronic Acknowledgement Receipt

EFS ID:	17629895
Application Number:	14024027
International Application Number:	
Confirmation Number:	8381
Title of Invention:	SYSTEM AND METHOD FOR PROVIDING ADDITIONAL FUNCTIONALITY TO EXISTING SOFTWARE IN AN INTEGRATED MANNER
First Named Inventor/Applicant Name:	SIVAKUMAR CHATURVEDI
Customer Number:	25883
Filer:	Timothy Frank Bliss
Filer Authorized By:	
Attorney Docket Number:	DAMA-31813
Receipt Date:	13-DEC-2013
Filing Date:	11-SEP-2013
Time Stamp:	15:58:20
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	DAM31813IDS3.pdf	620804 c58ea33b2f8db0eb6a2dc9dbfa6f64ff2e03834f	no	21

Warnings:	
Information:	

2	Foreign Reference	9-DAMA-EP1848163A1.pdf	1543156 ad04d733d8d6a89ab98b0e9943ba07495fd00320	no	26
Warnings:					
Information:					
3	Foreign Reference	10-DAMA-EP1988698A1.pdf	1137334 5c5a926ae8b887e3bb395b34f279c07c7d3f8f49	no	22
Warnings:					
Information:					
4	Foreign Reference	11-DAMA-EP1988697A1.pdf	959154 4b7ee67e886f754b851be2754b892daa9aab2760	no	18
Warnings:					
Information:					
5	Foreign Reference	13-DAMA-WO2006064047.pdf	7867387 5f999e34b49f64f5a44d6d7f6489cf04079e6891	no	32
Warnings:					
Information:					
6	Foreign Reference	12-DAMA-EP1638275.pdf	17068890 60b9df5bbc0e9896c229f8e48f109633392ffc8d	no	66
Warnings:					
Information:					
7	Foreign Reference	14-DAMA-EP1603339.pdf	8817581 979fab7510f3846c1d3c9676affe0df7e27d7243	no	26
Warnings:					
Information:					
8	Non Patent Literature	32-ISR-024870.pdf	532273 82927f31e6bd17d0865257f6025a63c865eafed1	no	12
Warnings:					
Information:					
9	Non Patent Literature	33-ROSENBERG.pdf	21933728 ad24e2c0234de4d5c4d13c3ca42a50a112799508	no	62
Warnings:					
Information:					
10	Non Patent Literature	34-ISR-028685.pdf	431648 fe037982d9e3bf15bfcbd8afac1e2db7f5e99de5	no	10
Warnings:					
Information:					

11	Non Patent Literature	35-ISR-029954.pdf	393095 70959c43d32d5f6c751695fa8095ce376da3fafa	no	8
Warnings:					
Information:					
12	Non Patent Literature	36-ISR-024891.pdf	467209 f0e9a4dab1e69c75019453cb3336b68a135e14db	no	9
Warnings:					
Information:					
13	Non Patent Literature	37-ISR-031245.pdf	614941 55851148 9b9557863dd36b468d35fae54ebd83a6	no	13
Warnings:					
Information:					
14	Non Patent Literature	40-WAP-WTLS.pdf	1346451 5f97b617de2db5c6610875154beffd20dc9f9e6b	no	99
Warnings:					
Information:					
15	Non Patent Literature	41-ISR-040864.pdf	358952 b1ebc8a193e00decd69721d9ef98780a8e8cb7bb	no	8
Warnings:					
Information:					
16	Non Patent Literature	39-ISR-41565.pdf	338194 9c220a50111a5bd8af1f5c4bd9b98fe0056d6518	no	7
Warnings:					
Information:					
17	Non Patent Literature	38-ISR-031246.pdf	377880 b27fc115348439ba38602e6459cfe6f1ff0dd9b3	no	8
Warnings:					
Information:					
18	Non Patent Literature	42-ISR-049000.pdf	1126180 e9d2a3471f1f33f4caf26aaf18351de5788a7daf	no	10
Warnings:					
Information:					
19	Non Patent Literature	43-ISR-051877.pdf	324862 bac6555c87b6b67bab630896e0a1f5149ff20a7d	no	7
Warnings:					
Information:					

20	Non Patent Literature	44-ISR-055101.pdf	899083 8c2ad4d8462d4ec4354f44ab816fb71e9b046bd5	no	9
Warnings:					
Information:					
21	Non Patent Literature	48-KARPAGAVINAYAGAM.pdf	766613 aef942f05c5925e1d97ce9e9ac576616caaa9da1	no	6
Warnings:					
Information:					
22	Non Patent Literature	46-NiceLog.pdf	2595594 9903017e3ef7f65c0ee3f67e3de1573094d03b46	no	194
Warnings:					
Information:					
23	Non Patent Literature	45-WISPA.pdf	425572 abb94584aed752d79dfacc4f878d920b5cae20ed	no	46
Warnings:					
Information:					
24	Non Patent Literature	47-IPRP-024870.pdf	256056 1f232dbf599e79097151ab5394a3db138fa8a4bc	no	7
Warnings:					
Information:					
25	Non Patent Literature	49-RFC5694.pdf	1543459 994ca4525a50d8aab22134752774c0b875b68083	no	27
Warnings:					
Information:					
26	Non Patent Literature	50-MAHY.pdf	559578 f12ae1c25c0d8ed94b65e0af26139accfa70e409	no	16
Warnings:					
Information:					
27	Non Patent Literature	51-IPRP-024891.pdf	249588 8016dff47d4fa7805ba09439a4defcf220601bb2	no	6
Warnings:					
Information:					
28	Non Patent Literature	54-Dierks-TLS.pdf	1814932 a521b5609958c41e583ad58a934a216045ebe47c6	no	40
Warnings:					
Information:					

29	Non Patent Literature	53-Rosenberg-SIP.pdf	511767 83016167cf51f342d35277dcb175ac6ed587586e	no	7
Warnings:					
Information:					
30	Non Patent Literature	52-Bazot-SIP.pdf	491271 8e73fc05541c7f4b87daa29e520f7dbc58a9470e	no	6
Warnings:					
Information:					
31	Non Patent Literature	55-IPRP-028685.pdf	190267 2b26b455a6d8c29b254548f207615e7cd99881fc	no	6
Warnings:					
Information:					
32	Non Patent Literature	56-IPRP-031245.pdf	340929 fbbc25112d50c4a8749b541f200cefaaf236d556	no	9
Warnings:					
Information:					
33	Non Patent Literature	57-IPRP-029954.pdf	198238 9a3d30cf8ba2a3d08fd11cd544b6d08dd730a18d	no	5
Warnings:					
Information:					
34	Non Patent Literature	58-IPRP-031246.pdf	183152 9dcea1281eb21acf02bfdb34d8902e40ba616f94	no	5
Warnings:					
Information:					
35	Non Patent Literature	63-Rosenberg-ICE.pdf	4650996 2552c81774547158721c4171ed2e067483a2d6ca	no	120
Warnings:					
Information:					
36	Non Patent Literature	60-Blanchet.pdf	959154 ed93e7de110e281905ffc5a7facfddc0f7a6b972	no	33
Warnings:					
Information:					
37	Non Patent Literature	61-Cooper.pdf	794809 e0421edc3ac8f573f9fc02604cc02679713bceda	no	23
Warnings:					
Information:					

38	Non Patent Literature	62-Cooper-EffectofNATs.pdf	683254 5a94faadba282fb65173ebef890e2bb2e438b98e	no	20
Warnings:					
Information:					
39	Non Patent Literature	64-Srisuresh.pdf	1288579 ee510272066f9038718bc5d67aac7aea8aad6b34	no	33
Warnings:					
Information:					
40	Non Patent Literature	59-ISR-046026.pdf	4352503 0f9c5fcba5735a3551e383a83577dabcce6b499e	no	6
Warnings:					
Information:					
41	Non Patent Literature	0-DUNIGAN.pdf	3165572 188c7ce9f83bde808477e3c92fcf2cf19c254060	no	18
Warnings:					
Information:					
42	Non Patent Literature	65-IPRP-040864.pdf	827916 bf8bd854f8991ec02c1a9b8628632d024e484568	no	6
Warnings:					
Information:					
43	Non Patent Literature	66-IPRP-041565.pdf	245082 7ab4c3d8f39ca83af36032a2c4f1d37f5b0aaa2a	no	6
Warnings:					
Information:					
44	Non Patent Literature	67-IPRP-049000.pdf	910900 6bce2523822e0ce31b2beb1b06c13975ba39124c	no	6
Warnings:					
Information:					
45	Non Patent Literature	68-IPRP-051877.pdf	219565 36cd1ef391840f48aed81cb15fb9a8b52f91342e	no	5
Warnings:					
Information:					
46	Non Patent Literature	69-IPRP-055101.pdf	197803 f82e64fcf19fe663609af4428cafe314cc16119c	no	6
Warnings:					
Information:					

Total Files Size (in bytes):	95581951

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
14/024,027	09/11/2013	2819	730	DAMA-31813	22	3

CONFIRMATION NO. 8381

25883
HOWISON & ARNOTT, L.L.P
P.O. BOX 741715
DALLAS, TX 75374-1715

FILING RECEIPT

OC000000064028679

Date Mailed: 10/02/2013

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

SIVAKUMAR CHATURVEDI, ALLEN, TX;
SATISH GUNDABATHULA, IRVING, TX;
RASHMI HIREMATH, ALLEN, TX;

Applicant(s)

DAMAKA, INC., Richardson, TX

Assignment For Published Patent Application

DAMAKA, INC., Richardson, TX

Power of Attorney: The patent practitioners associated with Customer Number 25883

Domestic Priority data as claimed by applicant

This appln claims benefit of 61/846,958 07/16/2013

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

If Required, Foreign Filing License Granted: 09/25/2013
The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 14/024,027**
Projected Publication Date: 01/22/2015
Non-Publication Request: No
Early Publication Request: No
**** SMALL ENTITY ****

Title

SYSTEM AND METHOD FOR PROVIDING ADDITIONAL FUNCTIONALITY TO EXISTING SOFTWARE IN AN INTEGRATED MANNER

Preliminary Class

326

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

SelectUSA

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop technology, manufacture products, deliver services, and grow your business, visit http://www.SelectUSA.gov or call +1-202-482-6800.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
14/024,027	09/11/2013	SIVAKUMAR CHATURVEDI	DAMA-31813

CONFIRMATION NO. 8381

25883
HOWISON & ARNOTT, L.L.P
P.O. BOX 741715
DALLAS, TX 75374-1715

FORMALITIES LETTER

OC000000064028680

Date Mailed: 10/02/2013

NOTICE TO FILE MISSING PARTS OF NONPROVISIONAL APPLICATION

FILED UNDER 37 CFR 1.53(b)

Filing Date Granted

Items Required To Avoid Abandonment:

An application number and filing date have been accorded to this application. The item(s) indicated below, however, are missing.

Applicant is given **TWO MONTHS** from the date of this Notice within which to file all required items below to avoid abandonment. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

- Additional claim fees of $ **80** as a small entity, including any required multiple dependent claim fee, are required. Applicant must submit the additional claim fees or cancel the additional claims for which fees are due.

SUMMARY OF FEES DUE:

Total fee(s) required within **TWO MONTHS** from the date of this Notice is $ **80** for a small entity
- Total additional claim fee(s) for this application is $ **80**
  - $ **80** for **2** total claims over 20.

Replies must be received in the USPTO within the set time period or must include a proper Certificate of Mailing or Transmission under 37 CFR 1.8 with a mailing or transmission date within the set time period. For more information and a suggested format, see Form PTO/SB/92 and MPEP 512.

Replies should be mailed to:

Mail Stop Missing Parts
Commissioner for Patents
P.O. Box 1450
Alexandria VA 22313-1450

Registered users of EFS-Web may alternatively submit their reply to this notice via EFS-Web.
https://sportal.uspto.gov/authenticate/AuthenticateUserLocalEPF.html

For more information about EFS-Web please call the USPTO Electronic Business Center at **1-866-217-9197** or visit our website at http://www.uspto.gov/ebc.

If you are not using EFS-Web to submit your reply, you must include a copy of this notice.

/ygizaw/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 14/024,027

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	70		N/A	
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	300		N/A	
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	360		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	22 minus 20 =	* 2	x 40 =	80	OR		
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3 minus 3 =	*	x 210 =	0.00			
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			0.00			
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				0.00			
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	810		TOTAL	

APPLICATION AS AMENDED - PART II

AMENDMENT A

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
Application Size Fee (37 CFR 1.16(s))									
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
					TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

AMENDMENT B

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE($)	ADDITIONAL FEE($)		RATE($)	ADDITIONAL FEE($)
Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
Application Size Fee (37 CFR 1.16(s))									
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
					TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
14/024,027	09/11/2013	SIVAKUMAR CHATURVEDI	DAMA-31813

CONFIRMATION NO. 8381

POA ACCEPTANCE LETTER

25883
HOWISON & ARNOTT, L.L.P
P.O. BOX 741715
DALLAS, TX 75374-1715

OC000000064028751

Date Mailed: 10/02/2013

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 09/11/2013.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

/atesfaye/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:	CHATURVEDI, Sivakumar
Serial No.:	14/024,027
Confirmation No.:	8381
Filed:	September 11, 2013
Group:	2819
Examiner:	to be assigned
For:	SYSTEM AND METHOD FOR PROVIDING ADDITIONAL FUNCTIONALITY TO EXISTING SOFTWARE IN AN INTEGRATED MANNER

Mail Stop: Missing Parts
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

RESPONSE TO MISSING PARTS NOTICE

Enclosed are the following items for filing in the above-referenced U.S. Patent Application:

1. Fees in the amount of $80 to cover the required fees. Please charge any additional fees or deficiencies in fees or credit any overpayment to Deposit Account No. 20-0780/DAMA-31813 of HOWISON & ARNOTT, L.L.P.

Respectfully submitted,
HOWISON & ARNOTT, L.L.P.
Attorneys for Applicant(s)

/Timothy F. Bliss Reg. #50925/
Timothy F. Bliss
Registration No. 50925

TFB/kh
P.O. Box 741715
Dallas, Texas 75374-1715
Tel: 972-479-0462
Fax: 972-479-0464
October 2, 2013

Electronic Patent Application Fee Transmittal

Application Number:	14024027
Filing Date:	11-Sep-2013
Title of Invention:	SYSTEM AND METHOD FOR PROVIDING ADDITIONAL FUNCTIONALITY TO EXISTING SOFTWARE IN AN INTEGRATED MANNER
First Named Inventor/Applicant Name:	SIVAKUMAR CHATURVEDI
Filer:	Timothy Frank Bliss/Keith Harden
Attorney Docket Number:	DAMA-31813

Filed as Small Entity

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Claims in excess of 20	2202	2	40	80
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
		Total in USD ($)		**80**

Electronic Acknowledgement Receipt

EFS ID:	17020605
Application Number:	14024027
International Application Number:	
Confirmation Number:	8381
Title of Invention:	SYSTEM AND METHOD FOR PROVIDING ADDITIONAL FUNCTIONALITY TO EXISTING SOFTWARE IN AN INTEGRATED MANNER
First Named Inventor/Applicant Name:	SIVAKUMAR CHATURVEDI
Customer Number:	25883
Filer:	Timothy Frank Bliss
Filer Authorized By:	
Attorney Docket Number:	DAMA-31813
Receipt Date:	02-OCT-2013
Filing Date:	11-SEP-2013
Time Stamp:	15:24:15
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	$80
RAM confirmation Number	1917
Deposit Account	200780
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)

1	Miscellaneous Incoming Letter	dam31813MISSINGPARTSSubmission.pdf	63619 26ec45b43cef7be9e695fe4c26d5ab5e8c08d3eb	no	1
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	30352 cbd6868c1ed42cdfe1f535661d54156a54dda2de	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	93971		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/AIA/82A (07-12)
Approved for use through 11/30/2014. OMB 0651-0035
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

TRANSMITTAL FOR POWER OF ATTORNEY TO ONE OR MORE REGISTERED PRACTITIONERS

NOTE: This form is to be submitted with the Power of Attorney by Applicant form (PTO/AIA/82B or equivalent) to identify the application to which the Power of Attorney is directed, in accordance with 37 CFR 1.5. If the Power of Attorney by Applicant form is not accompanied by this transmittal form or an equivalent, the Power of Attorney will not be recognized in the application.

Application Number	
Filing Date	
First Named Inventor	CHATURVEDI, Sivakumar
Title	SYSTEM AND METHOD FOR PROVIDING ADDITIONAL FUNCTIONALITY TO EXISTING SOFTWARE IN AN INTEGRATED MANNER
Art Unit	
Examiner Name	
Attorney Docket Number	DAMA-31813

SIGNATURE of Applicant or Patent Practitioner

Signature	/Timothy F. Bliss Reg. #50925/	Date	09/11/2013
Name	Timothy F. Bliss	Telephone	972-479-0462
Registration Number	50925		

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications.

☒ *Total of 1 forms are submitted.

This collection of information is required by 37 CFR 1.31, 1.32 and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

PTO/AIA/82B(07-12)
Approved for use through 11/30/2014. OMB 0651-0035
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

POWER OF ATTORNEY BY APPLICANT

I hereby revoke all previous powers of attorney given in the application identified in the attached transmittal letter.

☒ I hereby appoint Practitioner(s) associated with the following Customer Number as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the application referenced in the attached transmittal letter (form PTO/AIA/82A or equivalent):

25883

OR

☐ I hereby appoint Practitioner(s) named below as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the application referenced in the attached transmittal letter (form PTO/AIA/82A or equivalent):

Name	Registration Number	Name	Registration Number

Please recognize or change the correspondence address for the application identified in the attached transmittal letter to:

☒ The address associated with the above-mentioned Customer Number.

OR

☐ The address associated with Customer Number:

OR

☐ Firm or Individual Name					
Address					
City		State		Zip	
Country					
Telephone		Email			

I am the Applicant:

☐ Inventor or Joint Inventor

☐ Legal Representative of a Deceased or Legally Incapacitated Inventor

☒ Assignee or Person to Whom the Inventor is Under an Obligation to Assign

☐ Person Who Otherwise Shows Sufficient Proprietary Interest (*e.g.*, a petition under 37 CFR 1.46(b)(2) was granted in the application or is concurrently being filed with this document)

SIGNATURE of Applicant for Patent

Signature		Date	8/10/2013
Name	(SIVA CHATTERJEE)	Telephone	973-467-6464
Title and Company	CEO NAMAKA INC.		

NOTE: Signature - This form must be signed by the applicant in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. Submit multiple forms for more than one signature, see below *.

☒ *Total of 1 forms are submitted.

This collection of information is required by 37 CFR 1.31, 1.32 and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Attorney Docket No. DAMA-31813 Worldwide Rights

ASSIGNMENT AND DECLARATION UNDER 37 C.F.R. § 1.63

(For Use with Signed Application Data Sheet)

Title of Invention: SYSTEM AND METHOD FOR PROVIDING ADDITIONAL FUNCTIONALITY TO EXISTING SOFTWARE IN AN INTEGRATED MANNER

This assignment and declaration are directed to (check one):

- ☐ the attached application;
- ☒ the application identified by the attorney docket no. and title of invention given above;
- ☐ United States Application or PCT International Application No. _____, filed _____.

ASSIGNMENT

For good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, as a below-named inventor I have sold and assigned, and by these presents hereby sell and assign, unto:

Name of Assignee: **DAMAKA, INC.**

Address of Assignee: **2460 N. CENTRAL EXPRESSWAY, #202, RICHARDSON, TX 75080**

(hereinafter ASSIGNEE) all my right, title and interest in and to the above-identified invention in any form or embodiment thereof, in the United States and all foreign countries, including applications for patents in the United States and all countries of the world and through the Patent Cooperation Treaty and/or the European Patent Convention, including any and all applications claiming priority thereto such as divisions or continuations thereof, and in and to any and all patents granted in the United States and all countries of the world that may issue on any such applications or for said invention, including any and all reissues or extensions thereof, to be held and enjoyed by said ASSIGNEE, its successors, or assigns to the full end of the term or terms for which any and all such patents may be granted as fully and entirely as would have been held and enjoyed by me had this Assignment not been made.

I hereby authorize and request the Director of the U.S. Patent and Trademark Office to issue any and all Letters Patent of the United States to said ASSIGNEE, its successors, or assigns in accordance herewith.

I warrant and covenant that I have the full and unencumbered right to sell and assign the interests herein sold and assigned and that I have not executed and will not execute any document or instrument in conflict herewith.

I further covenant and agree that I will communicate to said ASSIGNEE, its successors, legal representatives, or assigns all information known to me relating to said invention or patent application and that I will execute and deliver any papers, make all rightful oaths, testify in any legal proceedings, and perform all other lawful acts deemed necessary or desirable by said ASSIGNEE, its successors, legal representatives, or assigns to perfect title to said invention, to said application including divisions and continuations thereof and to any and all patents that may be granted therefor or thereon, including reissues or extensions, in said ASSIGNEE, its successors, or assigns, or to assist said ASSIGNEE, its successors, legal representatives, or assigns in obtaining, reissuing, or enforcing patents for said invention.

DECLARATION

As a below-named inventor, I hereby declare that:

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. § 1001 by fine or imprisonment of not more than five (5) years, or both.

Signature: _____ 9/10/2013

Sivakumar CHATURVEDI

Inventor: DATE

Attorney Docket No. DAMA-31813 Worldwide Rights

ASSIGNMENT AND DECLARATION UNDER 37 C.F.R. § 1.63

(For Use with Signed Application Data Sheet)

Title of Invention: SYSTEM AND METHOD FOR PROVIDING ADDITIONAL FUNCTIONALITY TO EXISTING SOFTWARE IN AN INTEGRATED MANNER

This assignment and declaration are directed to (check one):

- ☐ the attached application;
- ☒ the application identified by the attorney docket no. and title of invention given above;
- ☐ United States Application or PCT International Application No. _____, filed _____.

ASSIGNMENT

For good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, as a below-named inventor I have sold and assigned, and by these presents hereby sell and assign, unto:

Name of Assignee: **DAMAKA, INC.**

Address of Assignee: **2460 N. CENTRAL EXPRESSWAY, #202, RICHARDSON, TX 75080**

(hereinafter ASSIGNEE) all my right, title and interest in and to the above-identified invention in any form or embodiment thereof, in the United States and all foreign countries, including applications for patents in the United States and all countries of the world and through the Patent Cooperation Treaty and/or the European Patent Convention, including any and all applications claiming priority thereto such as divisions or continuations thereof, and in and to any and all patents granted in the United States and all countries of the world that may issue on any such applications or for said invention, including any and all reissues or extensions thereof, to be held and enjoyed by said ASSIGNEE, its successors, or assigns to the full end of the term or terms for which any and all such patents may be granted as fully and entirely as would have been held and enjoyed by me had this Assignment not been made.

I hereby authorize and request the Director of the U.S. Patent and Trademark Office to issue any and all Letters Patent of the United States to said ASSIGNEE, its successors, or assigns in accordance herewith.

I warrant and covenant that I have the full and unencumbered right to sell and assign the interests herein sold and assigned and that I have not executed and will not execute any document or instrument in conflict herewith.

I further covenant and agree that I will communicate to said ASSIGNEE, its successors, legal representatives, or assigns all information known to me relating to said invention or patent application and that I will execute and deliver any papers, make all rightful oaths, testify in any legal proceedings, and perform all other lawful acts deemed necessary or desirable by said ASSIGNEE, its successors, legal representatives, or assigns to perfect title to said invention, to said application including divisions and continuations thereof and to any and all patents that may be granted therefor or thereon, including reissues or extensions, in said ASSIGNEE, its successors, or assigns, or to assist said ASSIGNEE, its successors, legal representatives, or assigns in obtaining, reissuing, or enforcing patents for said invention.

DECLARATION

As a below-named inventor, I hereby declare that:

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. § 1001 by fine or imprisonment of not more than five (5) years, or both.

Signature: _____ 9/10/2013

Satish GUNDABATHULA

Inventor: DATE

Attorney Docket No. DAMA-31813 Worldwide Rights

ASSIGNMENT AND DECLARATION UNDER 37 C.F.R. § 1.63

(For Use with Signed Application Data Sheet)

Title of Invention: SYSTEM AND METHOD FOR PROVIDING ADDITIONAL FUNCTIONALITY TO EXISTING SOFTWARE IN AN INTEGRATED MANNER

This assignment and declaration are directed to (check one):

- ☐ the attached application;
- ☒ the application identified by the attorney docket no. and title of invention given above;
- ☐ United States Application or PCT International Application No. _____, filed _____.

ASSIGNMENT

For good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, as a below-named inventor I have sold and assigned, and by these presents hereby sell and assign, unto:

Name of Assignee: **DAMAKA, INC.**

Address of Assignee: **2460 N. CENTRAL EXPRESSWAY, #202, RICHARDSON, TX 75080**

(hereinafter ASSIGNEE) all my right, title and interest in and to the above-identified invention in any form or embodiment thereof, in the United States and all foreign countries, including applications for patents in the United States and all countries of the world and through the Patent Cooperation Treaty and/or the European Patent Convention, including any and all applications claiming priority thereto such as divisions or continuations thereof, and in and to any and all patents granted in the United States and all countries of the world that may issue on any such applications or for said invention, including any and all reissues or extensions thereof, to be held and enjoyed by said ASSIGNEE, its successors, or assigns to the full end of the term or terms for which any and all such patents may be granted as fully and entirely as would have been held and enjoyed by me had this Assignment not been made.

I hereby authorize and request the Director of the U.S. Patent and Trademark Office to issue any and all Letters Patent of the United States to said ASSIGNEE, its successors, or assigns in accordance herewith.

I warrant and covenant that I have the full and unencumbered right to sell and assign the interests herein sold and assigned and that I have not executed and will not execute any document or instrument in conflict herewith.

I further covenant and agree that I will communicate to said ASSIGNEE, its successors, legal representatives, or assigns all information known to me relating to said invention or patent application and that I will execute and deliver any papers, make all rightful oaths, testify in any legal proceedings, and perform all other lawful acts deemed necessary or desirable by said ASSIGNEE, its successors, legal representatives, or assigns to perfect title to said invention, to said application including divisions and continuations thereof and to any and all patents that may be granted therefor or thereon, including reissues or extensions, in said ASSIGNEE, its successors, or assigns, or to assist said ASSIGNEE, its successors, legal representatives, or assigns in obtaining, reissuing, or enforcing patents for said invention.

DECLARATION

As a below-named inventor, I hereby declare that:

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. § 1001 by fine or imprisonment of not more than five (5) years, or both.

Signature: _____ 04/10/2013

Rashmi HIREMATH

Inventor: DATE

Electronic Patent Application Fee Transmittal

Application Number:	
Filing Date:	
Title of Invention:	SYSTEM AND METHOD FOR PROVIDING ADDITIONAL FUNCTIONALITY TO EXISTING SOFTWARE IN AN INTEGRATED MANNER
First Named Inventor/Applicant Name:	Sivakumar Chaturvedi
Filer:	Timothy Frank Bliss/Keith Harden
Attorney Docket Number:	DAMA-31813

Filed as Small Entity

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Utility filing Fee (Electronic filing)	4011	1	70	70
Utility Search Fee	2111	1	300	300
Utility Examination Fee	2311	1	360	360
Pages:				
Claims:				
Claims in excess of 20	2202	2	40	80
Miscellaneous-Filing:				
Petition:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**810**

Electronic Acknowledgement Receipt

EFS ID:	16825182
Application Number:	14024027
International Application Number:	
Confirmation Number:	8381
Title of Invention:	SYSTEM AND METHOD FOR PROVIDING ADDITIONAL FUNCTIONALITY TO EXISTING SOFTWARE IN AN INTEGRATED MANNER
First Named Inventor/Applicant Name:	Sivakumar Chaturvedi
Customer Number:	25883
Filer:	Timothy Frank Bliss
Filer Authorized By:	
Attorney Docket Number:	DAMA-31813
Receipt Date:	11-SEP-2013
Filing Date:	
Time Stamp:	15:47:28
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	$730
RAM confirmation Number	2616
Deposit Account	200780
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)

1	Application Data Sheet	dam31813ADS.pdf	1255786 5d3529c4038bb03fe3d5ac5ecbdeb4e25f525dc0	no	7
Warnings:					
Information:					
2		dam31813PATApp.pdf	157182 15b1d13d4615d7038594133a0193746803c31f11	yes	34
	Multipart Description/PDF files in .zip description				
	Document Description		**Start**	**End**	
	Specification		1	29	
	Claims		30	33	
	Abstract		34	34	
Warnings:					
Information:					
3	Drawings-only black and white line drawings	dam31813drawings.pdf	51328 836f8ebcab073cd9b263298d201a7435e3594b41	no	12
Warnings:					
Information:					
4	Power of Attorney	DAM31813POA.pdf	164677 143598d4fadb87d03ff65fd1e05ab1a4a64c5991	no	3
Warnings:					
Information:					
5	Oath or Declaration filed	DAM31813DECASSMTChaturvedi.pdf	76099 0a31a90ea546aa3f2b8ce5e6329e0ba4ae2f4c55	no	1
Warnings:					
Information:					
6	Oath or Declaration filed	DAM31813DECASSMTGundabathula.pdf	76080 ab6a6db2fb938cf9cc79e7ed6a46a042fb528489	no	1
Warnings:					
Information:					
7	Oath or Declaration filed	DAM31813DECASSMTHiremath.pdf	74953 c6179644496af295300901a2020cd50b7faf84f5	no	1
Warnings:					
Information:					

8	Fee Worksheet (SB06)	fee-info.pdf	33346 c5ae665e61697af237bd437cf15d4117b1e89eed	no	2
Warnings:					
Information:					
			Total Files Size (in bytes):	1889451	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/AIA/14 (03-13)
Approved for use through 01/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	DAMA-31813
	Application Number	
Title of Invention	SYSTEM AND METHOD FOR PROVIDING ADDITIONAL FUNCTIONALITY TO EXISTING SOFTWARE IN AN INTEGRATED MANNER	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Inventor Information:

Inventor 1 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	SIVAKUMAR		CHATURVEDI	

Residence Information (Select One) ◉ US Residency ○ Non US Residency ○ Active US Military Service

City	ALLEN	State/Province	TX	Country of Residence i	US

Mailing Address of Inventor:

Address 1	1210 Cordova Drive		
Address 2			
City	Allen	State/Province	TX
Postal Code	75013	Country i	US

Inventor 2 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	SATISH		GUNDABATHULA	

Residence Information (Select One) ◉ US Residency ○ Non US Residency ○ Active US Military Service

City	IRVING	State/Province	TX	Country of Residence i	US

Mailing Address of Inventor:

Address 1	1235 Nocona Drive		
Address 2			
City	Irving	State/Province	TX
Postal Code	75063	Country i	US

Inventor 3 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	RASHMI		HIREMATH	

Residence Information (Select One) ◉ US Residency ○ Non US Residency ○ Active US Military Service

PTO/AIA/14 (03-13)
Approved for use through 01/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	DAMA-31813
	Application Number	
Title of Invention	SYSTEM AND METHOD FOR PROVIDING ADDITIONAL FUNCTIONALITY TO EXISTING SOFTWARE IN AN INTEGRATED MANNER	

City	ALLEN	State/Province	TX	Country of Residence i	US

Mailing Address of Inventor:

Address 1	700 Longwood Drive		
Address 2			
City	Allen	**State/Province**	TX
Postal Code	75013	**Country** i	US

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below.
For further information see 37 CFR 1.33(a).

☐ **An Address is being provided for the correspondence Information of this application.**

Customer Number	25883		
Email Address	ADMIN@DALPAT.COM	Add Email	Remove Email

Application Information:

Title of the Invention	SYSTEM AND METHOD FOR PROVIDING ADDITIONAL FUNCTIONALITY TO EXISTING SOFTWARE IN AN INTEGRATED MANNER		
Attorney Docket Number	DAMA-31813	**Small Entity Status Claimed**	☒
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)		**Suggested Figure for Publication (if any)**	

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).
Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	◉ Customer Number	○ US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)

PTO/AIA/14 (03-13)
Approved for use through 01/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	DAMA-31813
	Application Number	
Title of Invention	SYSTEM AND METHOD FOR PROVIDING ADDITIONAL FUNCTIONALITY TO EXISTING SOFTWARE IN AN INTEGRATED MANNER	

Customer Number	25883

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) or indicate National Stage entry from a PCT application. Providing this information in the application data sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.

Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
	non provisional of	61846958	2013-07-16

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button. Add

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55(d). When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX) [i]the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(h)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Remove

Application Number	Country [i]	Filing Date (YYYY-MM-DD)	Access Code[i] (if applicable)

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button. Add

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.
NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

Authorization to Permit Access:

PTO/AIA/14 (03-13)
Approved for use through 01/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	DAMA-31813
	Application Number	
Title of Invention	SYSTEM AND METHOD FOR PROVIDING ADDITIONAL FUNCTIONALITY TO EXISTING SOFTWARE IN AN INTEGRATED MANNER	

☐ Authorization to Permit Access to the Instant Application by the Participating Offices

If checked, the undersigned hereby grants the USPTO authority to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the World Intellectual Property Office (WIPO), and any other intellectual property offices in which a foreign application claiming priority to the instant patent application is filed access to the instant patent application. See 37 CFR 1.14(c) and (h). This box should not be checked if the applicant does not wish the EPO, JPO, KIPO, WIPO, or other intellectual property office in which a foreign application claiming priority to the instant patent application is filed to have access to the instant patent application.

In accordance with 37 CFR 1.14(h)(3), access will be provided to a copy of the instant patent application with respect to: 1) the instant patent application-as-filed; 2) any foreign application to which the instant patent application claims priority under 35 U.S.C. 119(a)-(d) if a copy of the foreign application that satisfies the certified copy requirement of 37 CFR 1.55 has been filed in the instant patent application; and 3) any U.S. application-as-filed from which benefit is sought in the instant patent application.

In accordance with 37 CFR 1.14(c), access may be provided to information concerning the date of filing this Authorization.

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Applicant 1 Remove

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

◉ Assignee	○ Legal Representative under 35 U.S.C. 117	○ Joint Inventor
○ Person to whom the inventor is obligated to assign.	○ Person who shows sufficient proprietary interest	

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor :

If the Applicant is an Organization check here. ☒

Organization Name	DAMAKA, INC.

PTO/AIA/14 (03-13)
Approved for use through 01/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	DAMA-31813
	Application Number	
Title of Invention	SYSTEM AND METHOD FOR PROVIDING ADDITIONAL FUNCTIONALITY TO EXISTING SOFTWARE IN AN INTEGRATED MANNER	

Mailing Address Information:			
Address 1	2460 N. CENTRAL EXPRESSWAY, #202		
Address 2			
City	RICHARDSON	**State/Province**	TX
Country i	US	Postal Code	75080
Phone Number		Fax Number	
Email Address			

Additional Applicant Data may be generated within this form by selecting the Add button. Add

Non-Applicant Assignee Information:

Providing assignment information in this section does not subsitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Assignee 1

Complete this section only if non-applicant assignee information is desired to be included on the patent application publication in accordance with 37 CFR 1.215(b). Do not include in this section an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest), as the patent application publication will include the name of the applicant(s).

Remove

If the Assignee is an Organization check here. ☐

Prefix	**Given Name**	Middle Name	**Family Name**	Suffix

Mailing Address Information:			
Address 1			
Address 2			
City		**State/Province**	
Country i		Postal Code	
Phone Number		Fax Number	
Email Address			

Additional Assignee Data may be generated within this form by selecting the Add button. Add

PTO/AIA/14 (03-13)
Approved for use through 01/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	DAMA-31813
	Application Number	
Title of Invention	SYSTEM AND METHOD FOR PROVIDING ADDITIONAL FUNCTIONALITY TO EXISTING SOFTWARE IN AN INTEGRATED MANNER	

Signature:

Remove

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications					
Signature	/Timothy F. Bliss Reg. #50925/			Date (YYYY-MM-DD)	2013-09-11
First Name	Timothy	Last Name	Bliss	Registration Number	50925
Additional Signature may be generated within this form by selecting the Add button. Add					

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
APPLICATION FOR UNITED STATES PATENT

SYSTEM AND METHOD FOR PROVIDING ADDITIONAL FUNCTIONALITY TO EXISTING SOFTWARE IN AN INTEGRATED MANNER

Inventor(s):

Sivakumar CHATURVEDI – Allen, Texas

Satish GUNDABATHULA – Irving, Texas

Rashmi HIREMATH – Allen, Texas

Attorneys:

Howison & Arnott, L.L.P.
P.O. Box 741715
Dallas, Texas 75374-1715
(972) 479-0462

Ex.1002 / Page 963 of 1008
Cisco Systems, Inc.

SYSTEM AND METHOD FOR PROVIDING ADDITIONAL FUNCTIONALITY TO EXISTING SOFTWARE IN AN INTEGRATED MANNER

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of U.S. Provisional Patent No. 61/846,958, filed on July 16, 2013, which is hereby incorporated by reference in its entirety.

BACKGROUND

[0002] The manner in which functionality is accessed in certain environments, such as mobile device environments, may impact performance and/or battery life. Accordingly, what is needed are a system and method that addresses these issues.

BRIEF DESCRIPTION OF THE DRAWINGS

[0003] For a more complete understanding, reference is now made to the following description taken in conjunction with the accompanying Drawings in which:

[0004] FIG. 1 illustrates one embodiment of a device having a memory and a superblock stored within the memory;

[0005] FIG. 2A illustrates one embodiment of the device of FIG. 1 with the addition of a function block;

[0006] FIG. 2B illustrates one embodiment of the device of FIG. 2A with a superblock application displayed simultaneously with the additional functionality provided by a function block;

[0007] FIG. 3A illustrates one embodiment of the function block of FIG. 2 incorporated into the superblock;

[0008] FIG. 3B illustrates one embodiment of the superblock of FIG. 3A nested within another superblock;

[0009] FIG. 3C illustrates one embodiment of the function block of FIG. 2 incorporated into the superblock in multiple parts;

[0010] FIG. 4 illustrates one embodiment of a timeline showing the execution of superblock and function block instructions;

[0011] FIG. 5 illustrates a sequence diagram of one embodiment of a process that may be executed to access the functionality provided by the function block of FIG. 2;

[0012] FIG. 6A illustrates a flow chart of one embodiment of a process by which the function block may determine the services that can be provided to the superblock during the process of FIG. 5;

[0013] FIG. 6B illustrates one embodiment of a diagram showing a source and a sink coupled by the function block of FIG. 2;

[0014] FIG. 6C illustrates a more detailed embodiment of the diagram of FIG. 6B;

[0015] FIG. 7 illustrates a sequence diagram of one embodiment of a process that may be executed by the function block of FIG. 2 to respond to a service request from the superblock;

[0016] FIG. 8 illustrates a flow chart of one embodiment of a process by which the function block may determine whether to provide external services in responding to the service request of FIG. 7;

[0017] FIG. 9 illustrates a sequence diagram of one embodiment of a process that may be executed by the function block of FIG. 2 to respond to a notification from an external service;

[0018] FIG. 10 illustrates a flow chart of one embodiment of a process by which the function block may determine how to handle the notification of FIG. 9;

[0019] FIG. 11 illustrates one embodiment of a system that may be used for the device of FIG. 1; and

[0020] FIG. 12 illustrates one embodiment of the function block of FIG. 2.

DETAILED DESCRIPTION

[0021] It is understood that the following disclosure provides many different embodiments or examples. Specific examples of components and arrangements are described below to simplify the present disclosure. These are, of course, merely examples and are not intended to be limiting. In addition, the present disclosure may repeat reference numerals and/or letters in the various examples. This repetition is for the purpose of simplicity and clarity and does not in itself dictate a relationship between the various embodiments and/or configurations discussed.

[0022] Referring to FIG. 1, in one embodiment, a device 100 includes a memory 102. The memory 102 stores a superblock 104, which may be a set of executable instructions used to perform one or more functions via the device 100. For example, the device 100 may be a mobile device and the superblock 104 may be an application (the "superblock application") on the mobile device. The instructions of the superblock 104 enable a user of the mobile device to perform one or more actions, such as communications, data manipulation, and/or data management. However, the functionality of the superblock application is constrained to some degree by the device 100 and by the instructions of the superblock itself.

[0023] With respect to the device 100, the amount of available memory, how the memory 102 is structured (e.g., segment sizes), and how the memory is managed (e.g., how much memory is allocated to the superblock 104, how swapping occurs when another application needs physical memory, and how multiple applications are handled) are generally outside of the control of the superblock 104. However, mobile devices frequently provide a separate memory space for each application that is being run and so must keep track of the memory boundaries for each application. This tracking requires resources, such as processing time and power.

[0024] Furthermore, as a user switches between applications (e.g., switches contexts), the device 100 may have to swap instructions into and out of physical memory, which impacts performance and battery life. While context switching occurs in other devices, such as desktop and laptop computers, the resource impact used for those context switches is generally lower due to the greater amount of resources available for such devices compared to mobile devices. For example, as mobile devices generally have a smaller memory footprint compared to larger devices such as desktop and laptop computers, not only will a mobile device likely need to swap

files in and out of memory when a context switch occurs, but the processor load and battery life will likely be negatively impacted on the mobile device more than would occur on larger devices having more resources. In addition, while a single application may use multi-threading and therefore require the allocation of processor time for different threads, swapping between applications is generally a more resource intensive task for a mobile device.

[0025] With respect to the instructions of the superblock 104, additional functionality may be desired for the superblock application that is not provided by the instructions. For example, the superblock application may not currently support a particular type of data and/or operation (e.g., audio, video, email, and/or file transfer) and it may be desirable for the superblock application to do so. To provide such additional functionality, instructions would have to be added to the superblock 102 to give the superblock application the ability to support the data type and/or operation. This process typically entails reworking the superblock application to include the desired functionality and then releasing the updated version of the superblock application for use. Depending on the complexity and nature of the superblock application and the desired functionality, this process may take a substantial amount of time, effort, and/or expense.

[0026] One alternative is to use another application to provide the desired functionality, but this may not be a satisfactory solution. For example, assume the superblock 102 provides a superblock application that needs email functionality. On current mobile devices, a user would typically select a link in the superblock application, such as an email address. Selection of the link would launch an email application (or switch context to an email application if one is already running), which removes the user from the superblock application and places the user in the email application. The user would then compose and send the email before switching back to the superblock application. This process of leaving the superblock application, performing some other function, and then returning to the superblock application is currently a common occurrence for mobile device users.

[0027] However, this process is disruptive, difficult to manage, and pulls the user away from the superblock application while the provider of the superblock application may want the user to continue to stay in their application. Furthermore, the functions of the superblock application are not available while in the other application, and so the user may have to switch back and forth between the superblock application and the other application in order to interact with both

applications. This is inefficient and frustrating for the user, and may also increase the number of errors in the text of the email since both applications are not simultaneously available for reference.

[0028] Another example is a video window for a phone call. Assume a user is in the superblock application and has a question about data that the superblock application is displaying. In order to call and visually interact with someone about the question and still have access to the data, the user has to conduct the call while switching back and forth between the video window of the call and the superblock application. This is extremely disruptive to the user and limits the benefits of the video call, which include the ability to interact with someone on a visual basis rather than just an audio basis.

[0029] Yet another example is a user walking around a shop floor, engaged in his or her duties. In order to join a virtual meeting, the user will have to exit the superblock application, find and/or enter the meeting information using another application, and join the meeting using the other application. As with the preceding example, this is extremely disruptive to the user, wastes time, and lowers productivity.

[0030] Referring to FIGS. 2A and 2B, in another embodiment, the superblock 104 of FIG. 1 is illustrated with a function block 200 attached via a glue point 202 (FIG. 2A). It is understood that FIG. 2A is for purposes of illustration and may not represent an actual arrangement of the superblock 104 and function block 200 in the memory 102.

[0031] The function block 200 includes instructions for providing the superblock 104 with one or more functions (e.g., capabilities) that are not otherwise possessed by the superblock 104. Such functions are illustrated in part with respect to FIG. 12, and may include instant messaging, presence (e.g., online, offline, and away), audio, video, collaboration (e.g., sharing of applications, documents, and/or files), whiteboard, file transfer, email, backgrounding, push notifications, conferencing, meetings, and/or other functions. Continuing the previous examples, the function block 200 may provide email or video capabilities for the superblock 104 and does so by providing those capabilities within the superblock application. Although the functions need not be provided visually as shown in FIG. 2B (e.g., in the case of playing an audio file), visual functions may also be presented without leaving the superblock application display. In

other words, there is no need to switch context to an email application or to any other application in order to access the additional functionality provided by the function block 200.

[0032] To accomplish this, the function block 200 may be provided as a set of instructions that are included in the superblock 104. For example, the function block 200 may be provided as a software developer's kit (SDK) or as an otherwise independent module by a developer unrelated to the superblock 104. The developer of the superblock 104 may then compile or otherwise include the function block instructions in the superblock 104. This ensures that the function block 200 will occupy the same memory space as the superblock 104 unless otherwise placed elsewhere by the mobile device 100. For example, as the superblock 104 likely has little or no control over how the mobile device 100 handles memory management, the mobile device may actually separate some or all of the instructions making up the superblock 104 and the function block 200. However, by including the instructions for the function block 200 within the instructions for the superblock 104, the likelihood that the instructions will be separated may be minimized. The independent nature of the function block 200 means that the developer of the superblock 104 needs little information about the operation of the function block 100 other than how to access the services.

[0033] Furthermore, the function block 200 may be handled by developers as a single block of instructions or as multiple blocks depending on the operating system environment. For example, the function block 200 may be handled as a single block in an environment such as iOS (a mobile operating system developed and distributed by Apple Inc. of Cupertino, California), while the function block 200 may be handled as multiple blocks in an environment such as Android (a mobile operating system released as open source by Google Inc. of Mountain View, California).

[0034] The function block 200 may be configurable after being distributed as part of the superblock application. For example, the function block 200 may provide access to certain parameters, such as network address information of a server for the external services 204. Other parameters, such as call parameters (e.g., payload size) may also be configurable.

[0035] The function block 200 may provide services in a self-contained manner (e.g., internal services that may be provided without needing support outside of the device 100) or may

use one or more external services 204. The external services 204 may be provided via a server, a peer-to-peer endpoint, and/or by any other source with which the function block 200 is able to communicate. For example, the function block 200 may be able to provide audio/video playback services for a file stored in the memory 102 without needing anything outside of the device 100, assuming the device 100 includes a screen for displaying the video and speakers and/or a headset for sound output.

[0036] However, for an audio/video call session, the function block 200 needs to connect to another device in order to establish the session, even though it can play audio/video locally. In order to connect to the other device, the function block 200 may use the services 204. Accordingly, how the function block 200 handles a particular service request from the superblock 104 may depend on the specific service and the resource needs of that service. From the point of view of the superblock 104, whether the function block 200 uses local and/or external services does not matter as the superblock 104 is simply requesting the service from the function block 200. In embodiments that use an external service 204, the function block 200 is the entity between the superblock 104 and the external service 204, but does not control either the superblock 104 or the external service 204.

[0037] In the case of a request from the external services 204 (e.g., an incoming file transfer or phone call), the handling performed by the function block 200 may also depend on the specific service and the resource needs of that service. For example, the function block 200 may send a notification to the superblock 104 and wait for a response, or may handle the externally initiated request according to defined parameters.

[0038] Returning to the previous examples, the function block 200 may provide the superblock application with email functionality that enables a user to receive notifications, check email, and compose/edit/send/manage email without leaving the superblock application. For the audio/video phone call, the function block 200 may provide a video window for the phone call within the display of the superblock application, enabling a user to simultaneously see the video window and the superblock application. The video window may be resizable and/or movable. For the user walking around on the shop floor, the function block 200 may enable the user to receive a meeting notification, accept the meeting, and enter the meeting, all within the superblock application. To accomplish this, the function block 200 may hook into the meeting information (e.g., on a server) and render this in the superblock application.

[0039] Referring to FIG. 3A, one embodiment of the superblock 104 illustrates the role of the glue point 202 in enabling the superblock 104 to interact with the function block 200. For example, the glue point 202 may be an application programming interface (API) and the superblock 104 may make API calls to the function block 200 to access the function block's capabilities. The function block 200 then provides services to the superblock 104 in response to the API calls. In some embodiments, the function block 200 may also provide notifications to the superblock 104 in response to events triggered by the external services 204.

[0040] In the present example, the set of instructions that make up the function block 200 may be used with many different applications and on many different platforms and accessed via the API 202, although some customization may be performed if needed or desired. The function block 200 may be viewed as a set of instructions providing intelligence needed to perform the tasks described herein, and that set of instructions may be compiled or otherwise incorporated into the instructions of the superblock 104. As the instructions can be incorporated into many different applications to satisfy many different needs, some of the capabilities provided by the function block 200 may not be used by a particular application, but may still be present. In other embodiments, functionality that is not desired may be removed to minimize the footprint of the function block 200.

[0041] One embodiment of a header for the function block 200 (referred to in the header text as the Amadeo block) may be as follows:

```
#ifndef AMADEOBLOCK_H
#define AMADEOBLOCK_H
#include <string>
#include <list>
#include "AmadeoBlockConfig.h"
#include "AmadeoBlockCB.h"
class AmadeoBlock
    {
    public:
        static AmadeoBlock& instance();
        static bool UnlockSDK( const std::string& key );
```

```
virtual bool Initialize( const AmadeoBlockConfig& config, AmadeoBlockCB* callback ) = 0;
virtual bool Finalize() = 0;
virtual bool Activate() = 0;
virtual bool Deactivate() = 0;
virtual bool SetPresence( const std::string& presence, const std::string& text ) = 0;
virtual bool AddContact( const std::string& contact, const std::string& displayname, const std::string& group ) = 0;
virtual bool DeleteContact( const std::string& contact, const std::string& group ) = 0;
virtual bool MoveContact( const std::string& contact, const std::string& fromgroup, const std::string& togroup, const std::string& nickname ) = 0;
virtual bool CopyContact( const std::string& contact, const std::string& newgroup, const std::string& nickname ) = 0;
virtual bool AuthorizeContact( const std::string& contact, const std::sring& group ) = 0;
virtual bool RejectContact( const std::string& contact ) = 0;
virtual bool BlockContact( const std::string& contact ) = 0;
virtual bool UnblockContact( const std::string& contact ) = 0;
virtual bool AddGroup( const std::string &group ) = 0;
virtual bool DeleteGroup( const std::string& group ) = 0;
virtual bool RenameGroup( const std::string& oldgroup, const std::string& newgroup ) = 0;
virtual bool Search( const std::string& searchstring ) = 0;
virtual bool SendIM( const std::string& who, const std::string& msg ) = 0;
virtual bool StartIMConf( std::string& roomid, const std::list<std::string>& contacts, const std::string& subject ) = 0;
virtual bool EndIMConf( const std::string& roomid ) = 0;
virtual bool AcceptIMConf( const std::string& roomid ) = 0;
virtual bool SendConfIM( const std::string& roomid, const std::string& msg ) = 0;
```

```
virtual bool AddPartyIMConf( const std::string& roomid, const std::string& invitee ) = 0;
virtual bool StartFT( std::string& sessionid, const std::string& to, const std::string& filename ) = 0;
virtual bool AcceptFT( const std::string& sessionid, const std::string& pathtosave ) = 0;
virtual bool CancelFT( const std::string& sessionid ) = 0;
virtual bool DeclineFT( const std::string& sessionid ) = 0;
virtual bool CallStart( const std::string& calledparty, std::string& callid, bool startvideo ) = 0;
virtual bool CallAccept( const std::string& callid, bool startvideo ) = 0;
virtual bool CallEnd( const std::string& callid ) = 0;
virtual bool CallHold( const std::string& callid ) = 0;
virtual bool CallUnhold( const std::string& callid ) = 0;
virtual bool CallMute( const std::string& callid ) = 0;
virtual bool CallUnmute( const std::string& callid ) = 0;
virtual bool AddVideo( const std::string& callid ) = 0;
virtual bool RemoveVideo( const std::string& callid ) = 0;
virtual bool CallTransfer( const std::string& callid, const std::string& transferparty ) = 0;
virtual bool CallForward( const std::string& callid, const std::string& forwardparty ) = 0;
virtual bool CallPark( const std::string& callid ) = 0;
virtual bool CallPickup( const std::string& slotid ) = 0;
virtual bool CallVoicemail( const std::string& callid ) = 0;
virtual bool CallMerge( const std::string& callid, const std::string& othercallid ) = 0;
virtual bool CallUnmerge( const std::string& callid ) = 0;
virtual bool SendDTMF( const std::string& callid, char digit ) = 0;
virtual bool Escalate( const std::string& callid, const std::list<std::string>& targets ) = 0;
```

```
                virtual bool Deescalate( const std::string& callid, const
std::list<std::string>& targets ) = 0;
                virtual bool VMRefresh() = 0;
                virtual bool VMFetch( const std::string& itemid ) = 0;
                virtual bool VMDelete( const std::string& itemid ) = 0;
                virtual bool VMPlay( const std::string& itemid ) = 0;
                virtual bool SharingStart( const std::string& callid ) = 0;
                virtual bool SharingStop( const std::string& callid ) = 0;
                virtual bool WBStart( const std::string& target, const std::string& wbid ) =
0;
                virtual bool WBEnd( const std::string& wbid ) = 0;
                virtual bool WBSend( const std::string& wbid, const std::string& wbdata )
= 0;
                virtual bool Logging(bool enable) = 0;
                virtual bool GoToBackground() = 0;
                virtual bool MonitorNetwork( bool checknetwork ) = 0;
        protected:
                AmadeoBlock();
        private:
                AmadeoBlock(const AmadeoBlock&);
                const AmadeoBlock& operator=(const AmadeoBlock&);
    };
    #endif // AMADEOBLOCK_H
```

[0042] Referring to FIG. 3B, another embodiment illustrates the superblock 104 as being part of another superblock 206. It is understood that any number of nested superblocks may be present. The function block 200 may be accessible to only the superblock 104, or may be accessible to one or more of the other superblocks (e.g., the superblock 206), either directly or via the superblock 104. For example, the superblock 206 may be able to make an API call directly to the function block 200 in some embodiments, or may only be able to make a call through the superblock 104 in other embodiments (e.g., the superblock 206 may call the superblock 104 for a service, and the superblock 104 may in turn make an API call to the function block 200 for that service).

[0043] Referring to FIG. 3C, as previously stated, it is understood that the function block 200 need not be a single block in memory. As illustrated by blocks 200a and 200b, the function block 200 may be separated into different parts automatically (e.g., due to the operation of the operating system and how it handles memory allocation) or may be handled as separate parts during integration into the superblock application (e.g., by the developer of the superblock application).

[0044] Referring to FIG. 4, one embodiment of a timeline 400 illustrates the simultaneous operation of the superblock 104 and function block 200 when the instructions of the function block 200 are being executed to provide one or more services to the superblock application. The timeline 400 moves from left to right and includes five specific times t_1-t_5. At time t_1, the superblock instructions (as indicated by line 402) are being executed, but the function block 200 instructions are not. In other words, the superblock application is in use and has not called the function block API to provide any services. It is understood that the function block 200 may be in a waiting state at time t_1 and instructions of the function block 200 may be executed to maintain the waiting state, but the function block 200 is not actively providing services.

[0045] At time t_2, the superblock application calls the function block API or an external service contacts the function block 200, and the function block 200 instructions (as indicated by line 404) are executed to provide the service requested by the API call or handle the contact from the external service 204. The instructions for the superblock 104 and function block 200 are executed from time t_2 until time t_3, at which time the function block 200 is no longer needed and is shut down (although this may include going into the waiting state for purposes of example). The superblock instructions are executed from time t_3 until time t_4, at which time the function block 200 is again called (as indicated by line 406). The instructions for the superblock 104 and function block 200 are executed from time t_4 until time t_5, at which time the function block 200 is no longer needed and is shut down (although this may include going into the waiting state for purposes of example) while the superblock instructions continue being executed.

[0046] Accordingly, while two different applications on a mobile device would not typically execute concurrently, the execution of the instructions for the superblock 104 and function block 200 as shown in FIG. 4 allows the function block 200 to provide additional capabilities to the superblock 104 through the use of API calls. By providing an interface for the function block

200 such as an API, the instructions of the superblock 104 may require minimal modification to access the capabilities provided by the function block 200.

[0047] Referring to FIG. 5, a sequence diagram 500 illustrates one embodiment of a process that may be executed to access the functionality provided by the function block 200. The superblock 104 may use the function block 200 under a static model or a dynamic model. In the static model, the superblock 104 calls for a specific function (e.g., video), the function block 200 provides the requested function (if available), the superblock 104 consumes the services provided, and the function block 200 is shut down. In the dynamic model, the function block 200 may enter a waiting state and wait for a request from the superblock 104 and/or a request or another event trigger from the external services 204 (e.g., an incoming call, email, or file transfer), handle the request, and then resume the waiting state.

[0048] In step 502, the superblock 104 unlocks the function block 200. For example, the unlock process may indicate that the superblock 104 is authorized to unlock some or all of the functionality provided by the function block 200 by providing a key or other authorization indicator. This step may not only limit the superblock 104 to authorized functionality, but may also insure that other applications cannot access the function block's capabilities. In step 504, the function block 200 is initialized. It is noted that these steps may occur during initialization of the superblock 104 or may occur later, such as when the superblock 104 calls the function block 200 for a particular function. For example, steps 502 and 504 may occur when the superblock application is launched and may not be repeated while the superblock application remains open, may occur each time the superblock application calls the function block API for a service, may occur only for particular services, may occur for defined periods of time (e.g., the function block 200 may lock every half hour), and/or using other parameters. It is understood that steps 502 and 504 may be reversed in some embodiments.

[0049] During initialization or at another time, policies may be applied. For example, a cost policy may require that any available Wi-Fi network is used before a 3G network. A security policy may require that a virtual private network (VPN) be used whenever available. Backgrounding may be selected as an option when available to allow the superblock application to run in the background. Accordingly, the function block 200 may be configured to provide for specific behavior if desired and this behavior may in turn limit or enhance the capabilities of the superblock 104.

[0050] In steps 506 and 508, the superblock 104 may provide login information to the function block 200, and the function block 200 may use this information to access the external services 204. For example, if the function block 200 needs authentication credentials to access the external services 204, steps 506 and 508 may be used to gain access to those external services. In some embodiments, steps 506 and/or 508 may be combined with step 502 and the unlocking of the function block 200 may include logging into whatever external services are authorized and/or available.

[0051] In step 510, the function block 200 and the superblock 104 may perform a capability exchange. More specifically, the function block 200 may determine whether (1) the function block 200 has a particular capability, (2) whether the function block 200 can render that capability, and (3) whether the superblock 104 can render that capability. For example, the function block 200 may determine that the function block 200 has the capability to capture audio and play that captured audio through a speaker.

[0052] Next, the function block 200 may determine whether it can render that capability by checking, for example, to see whether there is an available microphone (mic) input and an available speaker output. If one or both of the mic and speaker are not present, then the function block 200 has the capability to handle the audio, but not the capability to render the audio. The superblock 104 is not involved in this process as it is not needed to render the audio, so the third determination may not be made. Although the superblock 104 is not involved in rendering the audio, it is understood that the superblock 104 may visually represent the audio, such as by means of an icon, one or more control buttons (e.g., play and stop), and/or other visual representations.

[0053] In another example, the superblock 104 may desire to display video. Again, the function block 200 may determine that the function block 200 has the capability to handle the video. Next, the function block 200 may determine whether it can render that capability by checking, for example, to see whether there is an available screen. If a screen is not present, then the function block 200 has the capability to handle the video, but not the capability to render the video. In this example, the superblock 104 is involved in this process as it is needed to provide a video window to render the video (e.g., the function block 200 may provide the video data to be rendered and the superblock 104 may place that video data in a video window), so the third determination is made.

[0054] By making such determinations, the function block 200 is able to notify the superblock 104 of the available functions. If a function needs the external services 204, lack of a connection may prevent the function block 200 from delivering external services to the superblock 104, but local services may still be provided. It is understood that while a screen, speaker, or other destination (e.g., a sink) may not be available, the function block 200 may handle some services using a secondary sink, such as a memory to which the video or audio is stored for later use.

[0055] With additional reference to FIG. 6A, a flow chart 600 illustrates one embodiment of a process for the capability exchange of step 510 of FIG. 5. In step 602, the function block 200 may be initialized (in embodiments where the capability exchange is performed on initialization) or the function block 200 may receive a request for service (in embodiments wherein the capability exchange occurs when a service is requested).

[0056] In step 604, a determination is made as to whether the function block 200 has the particular capability. For example, whether the function block 200 has the capability to support an audio/video call. If the determination of step 604 is that the function block 200 does not have the particular capability, the method 600 moves to step 606 and the capability is indicated as not being available. It is noted that if a particular capability has not been unlocked, the function block 200 may indicate the capability is not available even if the function block 200 can actually provide the capability. If the determination of step 604 is that the function block 200 does have the particular capability, the method 600 moves to step 608.

[0057] In step 608, a determination is made as to whether the function block 200 can render the capability as described previously. This step may determine whether the device 100 supports the needed functionality (e.g., has a microphone if audio input is needed or a speaker if audio output is needed). If the determination of step 608 is that the function block 200 cannot render the capability, the method 600 moves to step 606 and the capability is indicated as not being available. If the determination of step 608 is that the function block 200 does have the capability, the method 600 moves to step 610.

[0058] In step 610, a determination is made as to whether an external service 204 is needed to provide the capability. If the determination of step 610 is that an external service 204 is not

needed, the method 600 moves to step 614. If the determination of step 610 is that an external service 204 is needed, the method 600 moves to step 612.

[0059] In step 612, a determination is made as to whether a needed external service 204 is available. For example, the external service 204 may be offline (e.g., a server used to provide the service may be non-responsive or the device 100 may have minimal or no network connectivity). This step may also determine whether the superblock application is authorized to access the external service 204 (e.g., whether the external service will allow access by the superblock application). If the determination of step 612 is that the needed external service 204 is not available, the method 600 moves to step 606 and the capability is indicated as not being available. If the determination of step 612 is that the needed external service 204 is available, the method 600 moves to step 614.

[0060] In step 614, a determination is made as to whether the superblock 104 is needed to render the capability as described previously. If the determination of step 614 is that the superblock 104 is not needed to render the capability, the method 600 moves to step 618 and the service is indicated as available (e.g., a capability list is updated and/or the service is provided). If the determination of step 614 is that the superblock 104 is needed to render the capability, the method 600 moves to step 616.

[0061] In step 616, a determination is made as to whether the superblock 104 can render the capability as described previously. If the determination of step 616 is that the superblock 104 cannot render the capability, the method 600 moves to step 606 and the capability is indicated as not being available. If the determination of step 616 is that the superblock 104 does have the capability, the method 600 moves to step 618.

[0062] The superblock 104 and/or function block 200 may use a table or other structure for listing available capabilities. For example, a table may identify a particular service, whether the superblock 104 is authorized to access the service, whether the function block 200 can support the service, whether the function block 200 can render the service, whether the superblock 104 is needed to render the service, and whether the superblock 104 can render the service if needed. It is understood that this information may not be provided in detail in all embodiments, but may be condensed to a simple indication of whether the service is available or not. However, by providing additional levels of detail, more useful indicators may be provided. For example, the

superblock application may be able to indicate that a particular service is not authorized or that speakers are not available, rather than simply indicating that audio service is not available.

[0063] Table 1 illustrates one embodiment of a mapping table that may be used to track the capabilities that the function block 200 can provide to the superblock 104 on the device 100. It is understand that the mapping table may vary for the same function block 200, superblock 104, and device 100 in different scenarios, such as whether the device 100 has network access or not when needed for a particular service. For purposes of illustration, the first column lists services supported by the function block 200, the second column identifies whether that service is supported by the device (e.g., whether the function block 200 can render the service), the third column identifies whether the superblock application can render the service (if needed), the fourth column identifies whether the external services 204 support the service (if needed), and the fifth column identifies where the superblock application has authorization rights to that service.

[0064] In some embodiments, the service column may be limited to services that the superblock application is authorized to access. For example, if function block 200 supports instant messaging but the superblock application 104 is not authorized to use this feature, the service may or may not show up in the mapping table depending on the particular implementation. An additional column may be used to identify whether a needed external service is currently available or the fourth column may be used to show this information.

SERVICE	DEVICE	SUPERBLOCK	EXTERNAL SERVICE	AUTH?
In app video from file	Yes	Yes	N/A	Y
Audio – local file	Yes	N/A	N/A	Y
Audio - streaming	Yes	N/A	Yes	Y
Sharing	Yes	Yes	No	Y
Instant messaging	Yes	No	Yes	Y
Whiteboard	N/A	N/A	N/A	N

Table 1

[0065] For purposes of example, the first service involves playing a video from a file and is supported by both the device 100 and the superblock 104. The external services 204 are not

needed and are marked as not applicable. The second service involves playing a local audio file and is supported by the device 100. The superblock 104 and external services 204 are not needed and are marked as not applicable. The third service involves playing a streaming audio file and is supported by the device 100 and the external services 204. The superblock 104 is not needed and is marked as not applicable. The fourth service involves content sharing and is supported by the device 100 and the superblock 104, but not the external services 204. As the external services 204 are needed for sharing in this example, this service is not available to the superblock application. The fifth service involves instant messaging and is supported by the device 100 and the external services 204, but not the superblock 104.

[0066] The sixth service involves a whiteboard, but the superblock 104 is not authorized to access this service, and so the capabilities are not checked. In other embodiments, capabilities for unauthorized services may be checked and, if supported, the superblock application may notify the user that the service is not authorized. In such embodiments, a dialog or other option may appear to allow the user to subscribe or otherwise gain access to the service if allowed.

[0067] With additional reference to FIG. 6B, a diagram 630 provides a visual illustration of the process of FIG. 6A from a source/sink perspective. For the function block 200 to successfully bridge a source 632 and a sink 634 to provide a service, both the source 632 and the sink 634 must be present and available to the function block 200 as indicated by lines 636 and 638, respectively. The source 632 may be the superblock 104, the external services 204, and/or a component of the device 100 such as a wireless interface, a microphone, a camera, and/or any other component capable of providing input to the function block 200. The sink 632 may be the superblock 104, the external services 204, and/or a component of the device 100 such as a wireless interface, a speaker, a display screen, and/or any other component capable of receiving output from the function block 200. In some cases, the lack of availability of a sink may result in the use of a dummy sink (e.g., writing audio to memory when there is no available speaker).

[0068] It is understood that the source/sink model provided by the source 632 and sink 634 may be viewed as generic. For example, at the device level, the source 632 and sink 634 operate to read/send data. At the network interface level, each side acts as both source/sink because network interfaces allow for read/write simultaneously in most modern devices. In contrast, a microphone is a source and a speaker is a sink. A speaker may serve as a sink for multiple data in some cases, such as if multiple audio sources are mixed into the single speaker. In this

scenario, the source for rendering audio data may be a microphone, network audio encoded data, a music file on the device, and/or other sources. The source/sink model can also be considered for service level consumer/producer models. For example, the function block 200 may be viewed as a source for presenting client side capabilities to a server and at the same time may be viewed as a sink for rendering capabilities presented by the server.

[0069] With additional reference to FIG. 6C, a diagram 640 provides a more detailed illustration of FIG. 6B. Source 642 is a microphone and the function block 200 is to send the audio captured from the microphone to sink 644 representing an external service 204 (e.g., as outbound audio for a telephone call). For the function block 200 to successfully bridge the source 642 and the sink 644, both the source 642 and the sink 644 must be present and available to the function block 200 as indicated by lines 646 and 648, respectively, and the source 642, sink 644, and function block 200 must be capable of handling the service. If the function block 200 is thought of as providing services via a series of switches, lines 646 and 648 must both be closed to connect the source 642 and sink 644. Accordingly, the process of FIG. 6A may be executed to ensure that the function block 200 can render the audio input and that the connection to the external service is valid (e.g., that the switches can be closed).

[0070] In the present example, one or more additional flow layers represented by line 650 may also present. For example, line 650 may represent whether an audio hold exists. If the audio has been placed on hold, the function block 200 will notify the audio pipeline to stop (e.g., the switch will be opened). The audio capture may continue, but it will not be rendered (e.g., sent to the external services represented by sink 644) as the circuit formed by the function block 200 will no longer be complete.

[0071] Referring again to FIG. 5, in step 512, the function block 200 may shut down if operating under the static model or may enter a wait mode if operating under the dynamic model. In step 514, the function block 200 may provide one or more services to the superblock 104 if requested by the superblock 104 or an external service 204. It is understood that steps 512 and 514 may repeat any number of times while the superblock application is running. If no services are requested, step 514 would not be executed.

[0072] In steps 516 and 518, the superblock 104 may finalize any service requests and shutdown the function block 200. For example, if the superblock application is closing, the

superblock 104 may use one or more API calls to the function block 200 to notify the function block 200 that the function block 200 should close any open ports (e.g., with an external service 204) and close down any running processes.

[0073] Referring to FIG. 7, a sequence diagram 700 illustrates one embodiment of a process that may be executed in order to provide a service by the function block 200 in response to a service request by the superblock 104. This present example may operate under either the static model or the dynamic model. The process begins with step 512 of FIG. 5, which is not described in detail in the present example.

[0074] In step 702, the superblock 104 issues a request for a service to the function block 200 using an API call or another suitable method. In step 704, the function block 200 obtains any needed support from the external services 204. In step 706, the function block 200 provides the service to the superblock 104. In step 708, the function block 200 may repeat step 512 and either shut down or enter the wait mode depending on whether the function block 200 is operating under the static model or the dynamic model.

[0075] Referring to FIG. 8, a flow chart 800 illustrates one embodiment of a process for accessing an external service 204, such as may occur with respect to step 704 of FIG. 7. In step 802, the function block 200 receives a request from the superblock 104 (as occurs in step 702 of FIG. 7). In step 804, a determination is made as to whether the function block 200 needs to use an external service to handle the request. If the determination of step 804 indicates that no external service is needed, the method 800 moves to step 806. In step 806, the service is provided by the function block 200. If the determination of step 804 indicates that an external service is needed, the method 800 moves to step 808.

[0076] In step 808, a determination is made as to whether the external service is available. If the determination of step 808 indicates that the external service is available, the method 800 moves to step 810, where any parameters needed for communications and/or service provision may be negotiated between the function block 200 and external service 204. Such parameters may include both signaling and media parameters such as bandwidth, codecs, and/or similar information, and would typically depend on the particular service.

[0077] The method 800 then moves to step 806 where the service is provided by the function block 200. If the determination of step 808 indicates that the external service is not available, the method 800 moves to step 812. In step 812, the function block 200 may indicate that the service is not available. For example, the function block 200 may indicate that the server is not responding or that there is no network connectivity for the device 100.

[0078] Referring to FIG. 9, a sequence diagram 900 illustrates one embodiment of a process that may be executed in order to provide a service by the function block 200 in response to a notification from an external service 204. This present example may operate under the dynamic model as the function block 200 is in listening mode to receive notifications from the external services 204. The process begins with step 512 of FIG. 5, which is not described in detail in the present example.

[0079] In step 902, an external service 204 issues a notification to the function block 200 that the external service 204 has something for the superblock 104. In step 904, the function block 200 may pass the notification to the superblock 104. It is understood that step 904 may not actually pass on the notification, but that the notification of step 902 may trigger functionality within the function block 200 that serves to notify the superblock 104. For example, if the notification of step 902 is about an incoming phone call, the function block 200 may receive the notification, initiate a phone response display (e.g., a display with options for accepting or rejecting the call), and provide the information to the superblock 104 in that manner. In another example, the notification of step 902 may be a presence change (e.g., a user changes status from offline to online), and the function block 200 may update a presence indicator within the superblock application's display. In still another example, the function block 200 may use an event system and send event notifications to the superblock 104. Accordingly, some notifications may require action on the part of a user of the superblock application, while other notifications may not.

[0080] In the present example, the notification requires a response and the superblock 104 responds in step 906 by requesting and/or accepting the service (e.g., a phone call). In step 908, the function block 200 handles services between the superblock 104 and the external service 204. In other words, the function block 200 serves as an interface between the external service 204 and the superblock 104. For example, the function block 200 may bridge the phone call, handle

call waiting and other call features, and otherwise provide support for the superblock application. In step 910, the function block 200 may enter wait mode after the services have been provided.

[0081] Referring to FIG. 10, a flow chart 1000 illustrates one embodiment of a process for execution by the function block 200 with respect to an external service 204, such as may occur with respect to FIG. 9. In step 1002, the function block 200 receives a notification from the external service 204. In step 1004, a determination is made as to whether the function block 200 needs instructions from the superblock 104. If the determination of step 1004 indicates that instructions are needed, the method 1000 moves to step 1006. In step 1006, the function block 200 indicates to the superblock 104 that service is requested. The method 1000 then moves to step 1008.

[0082] In step 1008, a determination is made as to whether the service request has been approved by the superblock 104. If the determination of step 1008 indicates that the request has not been approved, the method 1000 moves to step 1010, where the notification may be rejected, ignored, or otherwise handled. It is understood that the actual response of the function block 200 in step 1010 may vary depending on the notification type. For example, the function block 200 may indicate to the external service 204 that the call is rejected. If the determination of step 1008 indicates that the request has been approved, the method 1000 moves to step 1012, where the function block 200 may handle the service provision.

[0083] Returning to step 1004, if the determination of step 1004 indicates that instructions are not needed, the method 1000 moves to step 1014. In step 1014, a determination is made as to whether the superblock 104 is to be updated based on the notification. If the determination of step 1014 indicates that the superblock 104 is not to be updated, the method 1000 moves to step 1010, where the notification may be rejected, ignored, or otherwise handled. If the determination of step 1014 indicates that the superblock 104 is to be updated, the method 1000 moves to step 1016, where the update may be performed. For example, another user's presence status may be updated from online to offline or vice versa.

[0084] Referring again to FIG. 1, embodiments of the device 100 include cellular telephones (including smart phones), personal digital assistants (PDAs), netbooks, tablets, laptops, desktops, workstations, telepresence consoles, and any other computing device that can communicate with another computing device using a wireless and/or wireline communication link. Such

communications may be direct (e.g., via a peer-to-peer network, an ad hoc network, or using a direct connection), indirect, such as through a server or other proxy (e.g., in a client-server model), or may use a combination of direct and indirect communications. Although not shown, in other embodiments, the device 100 may be an application specific integrated circuit (ASIC), a processor, or another device within which the function block 200 may be embedded. In some embodiments, external access may not be needed. Accordingly, the function block 200 may be implemented in many different ways and in many different types of systems, and may be customized as needed to operate within a particular environment.

[0085] Referring to FIG. 11, one embodiment of a system 1100 is illustrated. The system 1100 is one possible example of a device such as the device 100 of FIG. 1. The system 1100 may include a controller (e.g., a central processing unit ("CPU")) 1102, a memory unit 1104, an input/output ("I/O") device 1106, and a network interface 1108. The components 1102, 1104, 1106, and 1108 are interconnected by a transport system (e.g., a bus) 1110. A power supply (PS) 1112 may provide power to components of the computer system 1100, such as the CPU 1102 and memory unit 1104, via a power system 1114 (which is illustrated with the transport system 1110 but may be different). It is understood that the system 1100 may be differently configured and that each of the listed components may actually represent several different components. For example, the CPU 1102 may actually represent a multi-processor or a distributed processing system; the memory unit 1104 may include different levels of cache memory, main memory, hard disks, and remote storage locations; the I/O device 1106 may include monitors, keyboards, and the like; and the network interface 1108 may include one or more network cards providing one or more wired and/or wireless connections to a network 1116. Therefore, a wide range of flexibility is anticipated in the configuration of the computer system 1100.

[0086] The system 1100 may use any operating system (or multiple operating systems), including various versions of operating systems provided by Microsoft (such as WINDOWS), Apple (such as Mac OS X), UNIX, and LINUX, and may include operating systems specifically developed for handheld devices, personal computers, servers, and embedded devices depending on the use of the system 1100. The operating system, as well as other instructions (e.g., for the superblock 104 and function block 1100), may be stored in the memory unit 1104 and executed by the processor 1102. For example, if the system 1100 is the device 100, the memory unit 1104

may include instructions for performing some or all of the message sequences and methods described herein.

[0087] Referring to FIG. 12, in one embodiment, the function block 200 may contain functionality similar to that of an endpoint as described in detail in U.S. Patent No. 7,656,870, filed on March 15, 2005, and entitled SYSTEM AND METHOD FOR PEER-TO-PEER HYBRID COMMUNICATIONS and hereby incorporated by reference in its entirety. In such an embodiment, the graphical user interface (GUI) of the endpoint may be replaced with the API 202 of FIG. 2, and some functionality may be removed if not needed for a particular implementation of the function block 200. Other functionality that is not necessarily in the described endpoint, such as mobile device management (MDM) functionality, may be included in the function block 200. Accordingly, the basic functionality of the described endpoint may exist as logic embodied in the instruction set of the function block 200.

[0088] For purposes of example, the function block 200 may be accessed by the API 202 and may communicate with an operating system 1204 of the device 100 of FIG. 1. The API 202 provides access to the capabilities of the function block 200 for the superblock 104, while the operating system 1204 provides underlying functionality, as is known to those of skill in the art. Although shown as separate from the function block 200 for purposes of illustration, it is understood that the API 202 may be part of the function block 200 in some embodiments.

[0089] The function block 200 may include multiple components and layers that support the functionality required to perform the operations requested by the superblock 104. For example, the function block 200 may include a softswitch 1206, a management layer 1208, an encryption/decryption module 1210, a feature layer 1212, a protocol layer 1214, a speech-to-text engine 1216, a text-to-speech engine 1218, a language conversion engine 1220, an out-of-network connectivity module 1222, a connection from other networks module 1224, a p-commerce (e.g., peer commerce) engine 1226 that includes a p-commerce agent and a p-commerce broker, and a cellular network interface module 1228.

[0090] Each of these components/layers may be further divided into multiple modules. For example, the softswitch 1206 may include a call control module, an instant messaging (IM) control module, a resource control module, a CALEA (Communications Assistance to Law

Enforcement Act) agent, a media control module, a peer control module, a signaling agent, a fax control module, and a routing module.

[0091] The management layer 1208 may include modules for presence (i.e., network presence), peer management (detecting peers and notifying peers of being online), firewall management (navigation and management), media management, resource management, profile management, authentication, roaming, fax management, and media playback/recording management.

[0092] The encryption/decryption module 1210 may provide encryption for outgoing packets and decryption for incoming packets. In the present example, the encryption/decryption module 1210 provides application level encryption at the source, rather than at the network. However, it is understood that the encryption/decryption module 1210 may provide encryption at the network in some embodiments.

[0093] The feature layer 1212 may provide support for various features such as voice, video, IM, data, voicemail, file transfer, file sharing, class 5 features, short message service (SMS), interactive voice response (IVR), faxes, and other resources. The protocol layer 1214 may include protocols supported by the function block 200, including SIP, HTTP, HTTPS, STUN, RTP, SRTP, and ICMP. It is understood that these are examples only, and that fewer or more protocols may be supported.

[0094] The speech-to-text engine 1216 converts speech received by the function block 200 (e.g., via a microphone or network) into text, the text-to-speech engine 1218 converts text received by the function block 200 into speech (e.g., for output via a speaker), and the language conversion engine 1220 may be configured to convert inbound or outbound information (text or speech) from one language to another language. The out-of-network connectivity module 1222 may be used to handle connections between the function block 200 and the external services 204, and the connection from other networks module 1224 handles incoming connection attempts from the external services 204. The cellular network interface module 1228 may be used to interact with a wireless network.

[0095] While the preceding description shows and describes one or more embodiments, it will be understood by those skilled in the art that various changes in form and detail may be

made therein without departing from the spirit and scope of the present disclosure. For example, various steps illustrated within a particular flow chart or sequence diagram may be combined or further divided. In addition, steps described in one flow chart or diagram may be incorporated into another flow chart or diagram. Furthermore, the described functionality may be provided by hardware and/or software, and may be distributed or combined into a single platform. Additionally, functionality described in a particular example may be achieved in a manner different than that illustrated, but is still encompassed within the present disclosure. Therefore, the claims should be interpreted in a broad manner, consistent with the present disclosure.

WHAT IS CLAIMED IS:

1. A mobile device comprising:

a network interface;

a processor coupled to the network interface; and

a memory coupled to the processor and configured to store a plurality of instructions executable by the processor, the instructions including instructions for:

receiving, by a function block stored in the memory of the mobile device, a request for an audio/video (A/V) call from a superblock application stored in the memory of the mobile device;

determining, by the function block, that the superblock application is authorized to access A/V call functionality provided by the function block;

determining, by the function block, that the A/V service requires access to a resource that is external to the mobile device;

establishing, by the function block, the A/V call between the superblock application and the resource via the network interface, wherein the establishing is not supported by the superblock application;

providing, by the function block, video output for the A/V call to a video window within a display window of the superblock application on the mobile device, wherein the video window is displayed simultaneously with the display window of the superblock application on a screen of the mobile device; and

providing, by the function block, audio for the A/V call via the mobile device.

2. The device of claim 1 wherein the instructions further include determining, by the function block, whether the function block has the capability to provide the A/V call.

3. The device of claim 2 wherein the instructions further include determining, by the function block, whether the function block has the capability to render the A/V call.

4. The device of claim 3 wherein the instructions further include determining, by the function block, whether the superblock has the capability to render the A/V call.

5. The device of claim 1 wherein the instructions further include determining, by the function block, that the resource is currently available prior to establishing the A/V call.

6. The device of claim 1 wherein the instructions further include initializing the function block, by the superblock application, when the superblock application is loaded into the memory and executed.

7. The device of claim 1 wherein the request is an application programming interface (API) call from the superblock application to the function block.

8. The device of claim 1 wherein the instructions further include enabling, by the function block, a user of the device to collaborate on at least one of a document, a file, or an application with a user on another device.

9. A mobile device comprising:

a network interface;

a processor coupled to the network interface; and

a memory coupled to the processor and configured to store a plurality of instructions executable by the processor, the instructions including instructions for a superblock application having instructions for a function block included therein, wherein the function block is configured to provide a plurality of functions that are accessible to the superblock application via an application programming interface (API) of the function block, wherein the functions are provided within the superblock application itself and are accessible within the superblock application without switching context to another application on the mobile device, and wherein the superblock application cannot access at least one of the functions of the function block without providing the function block with an authorization code.

10. The mobile device of claim 9 wherein the plurality of functions includes access to an external service not present on the mobile device.

11. The mobile device of claim 10 wherein the instructions further include providing an event notification by the function block to the superblock application when the function block receives a message from the external service.

12. The mobile device of claim 11 wherein the instructions further include receiving, by the function block, a response to the event notification from the superblock application.

13. The mobile device of claim 10 wherein the instructions further include providing, by the function block, video data to the superblock application for rendering by the superblock application, wherein the superblock application renders the video data in a video window that is superimposed on a display of the superblock application, and wherein both the video window and at least a portion of the display of the superblock application are simultaneously viewable.

14. The mobile device of claim 13 wherein the video window is associated with an audio/video (A/V) call session, and wherein the function block communicates with an external service to support the A/V call session.

15. The mobile device of claim 9 wherein the superblock application is not authorized to use at least one of the functions of the function block.

16. A method comprising:

receiving, by a function block stored in a memory of a mobile device, a request for an audio/video (A/V) call from a superblock application stored in the memory of the mobile device;

determining, by the function block, that the superblock application is authorized to access A/V call functionality provided by the function block;

determining, by the function block, that the A/V service requires access to a resource that is external to the mobile device;

establishing, by the function block, the A/V call between the superblock application and the resource via the network interface, wherein the establishing is not supported by the superblock application;

providing, by the function block, video output for the A/V call to a video window within a display window of the superblock application on the mobile device, wherein the video window is displayed simultaneously with the display window of the superblock application on a screen of the mobile device; and

providing, by the function block, audio for the A/V call via the mobile device.

17. The method of claim 16 further comprising determining, by the function block, whether the function block has the capability to provide the A/V call.

18. The method of claim 17 further comprising determining, by the function block, whether the function block has the capability to render the A/V call.

19. The method of claim 18 further comprising determining, by the function block, whether the superblock has the capability to render the A/V call.

20. The method of claim 16 further comprising initializing the function block, by the superblock application, when the superblock application is loaded into the memory and executed.

21. The method of claim 16 wherein the request is an application programming interface (API) call from the superblock application to the function block.

22. The method of claim 16 further comprising enabling, by the function block, a user of the device to collaborate on at least one of a document, a file, or an application with a user on another device.

ABSTRACT

An improved system and method are disclosed for improving functionality in software applications. In one example, the method includes a mobile device having a network interface, a processor, and a memory configured to store a plurality of instructions. The instructions include instructions for a superblock application having instructions for a function block included therein. The function block is configured to provide functions that are accessible to the superblock application via an application programming interface (API). The functions are provided within the superblock application itself and are accessible within the superblock application without switching context to another application on the mobile device.

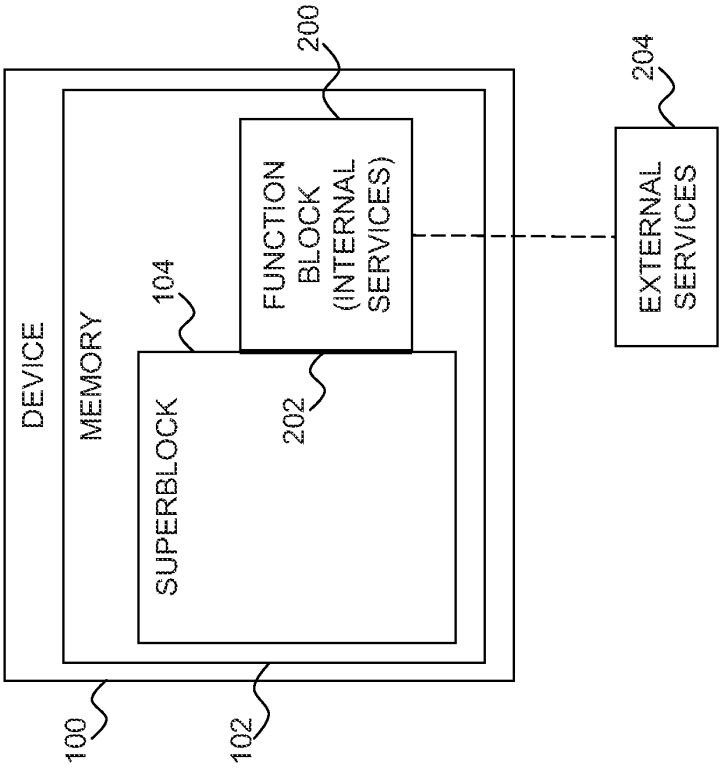

200
204
DEVICE
MEMORY
104
FUNCTION BLOCK (INTERNAL SERVICES)
EXTERNAL SERVICES
SUPERBLOCK
202
100
102

FIG. 2A

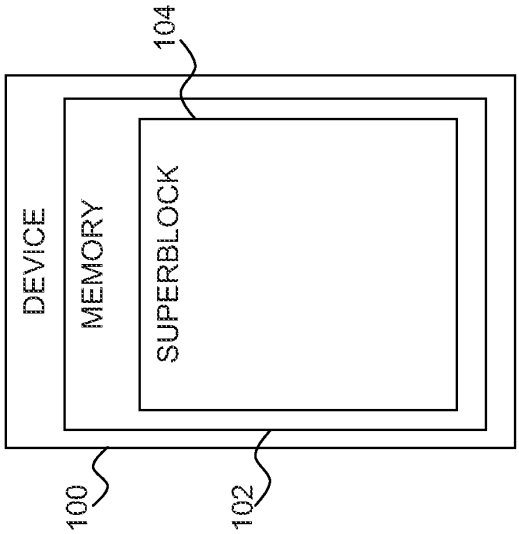

104
DEVICE
MEMORY
SUPERBLOCK
100
102

FIG. 1

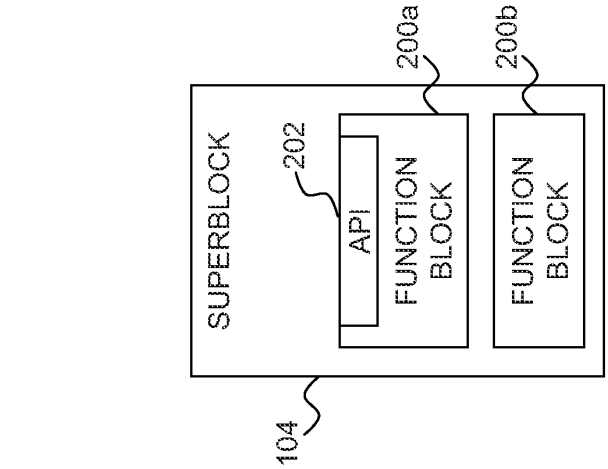


FIG. 3C

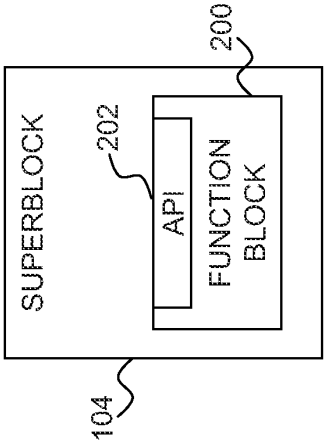


FIG. 3A

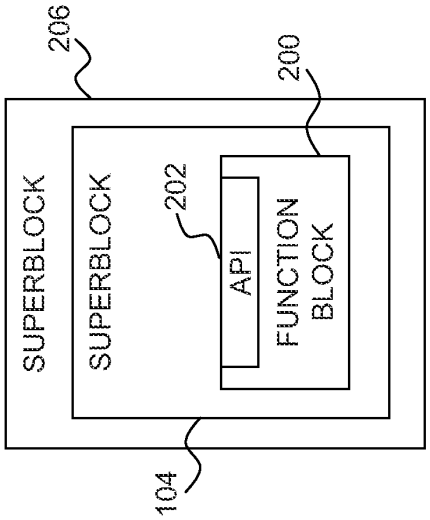


FIG. 3B

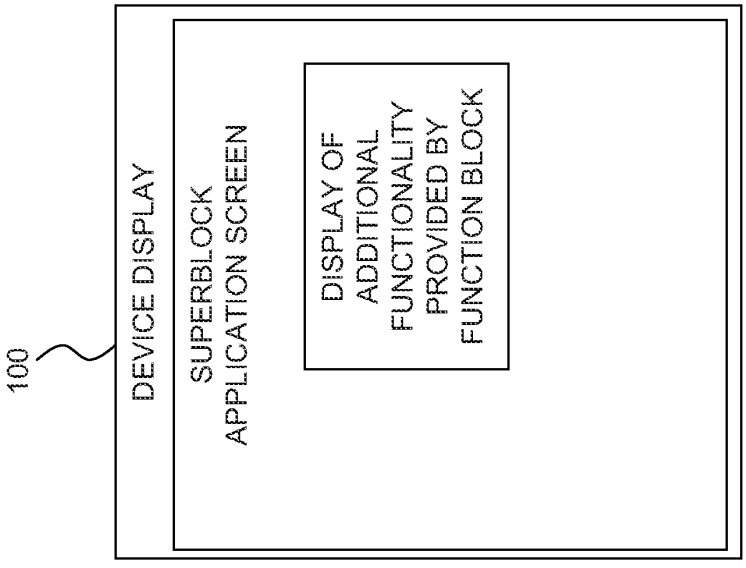


FIG. 2B

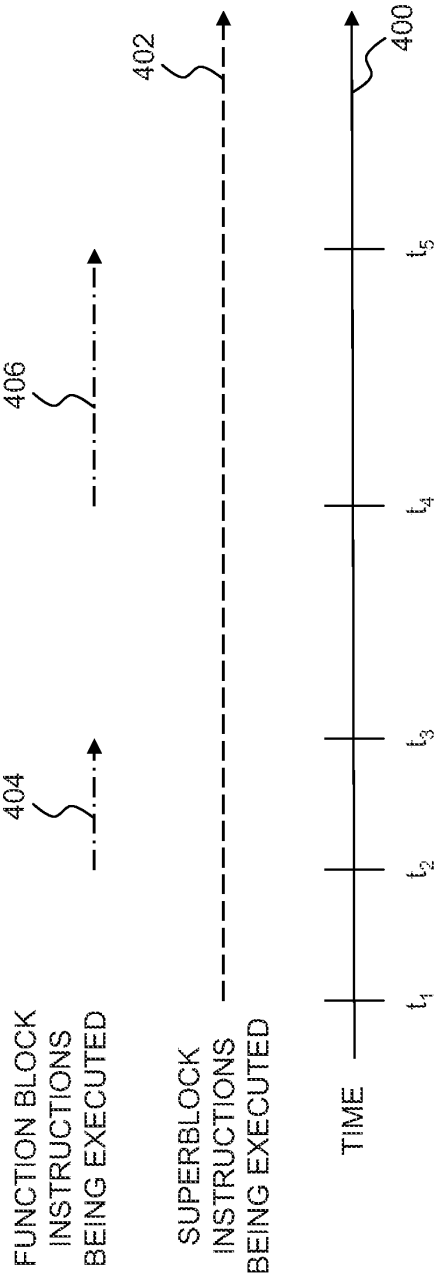

400
402
404
406
FUNCTION BLOCK INSTRUCTIONS BEING EXECUTED
SUPERBLOCK INSTRUCTIONS BEING EXECUTED
TIME
t_1
t_2
t_3
t_4
t_5

FIG. 4

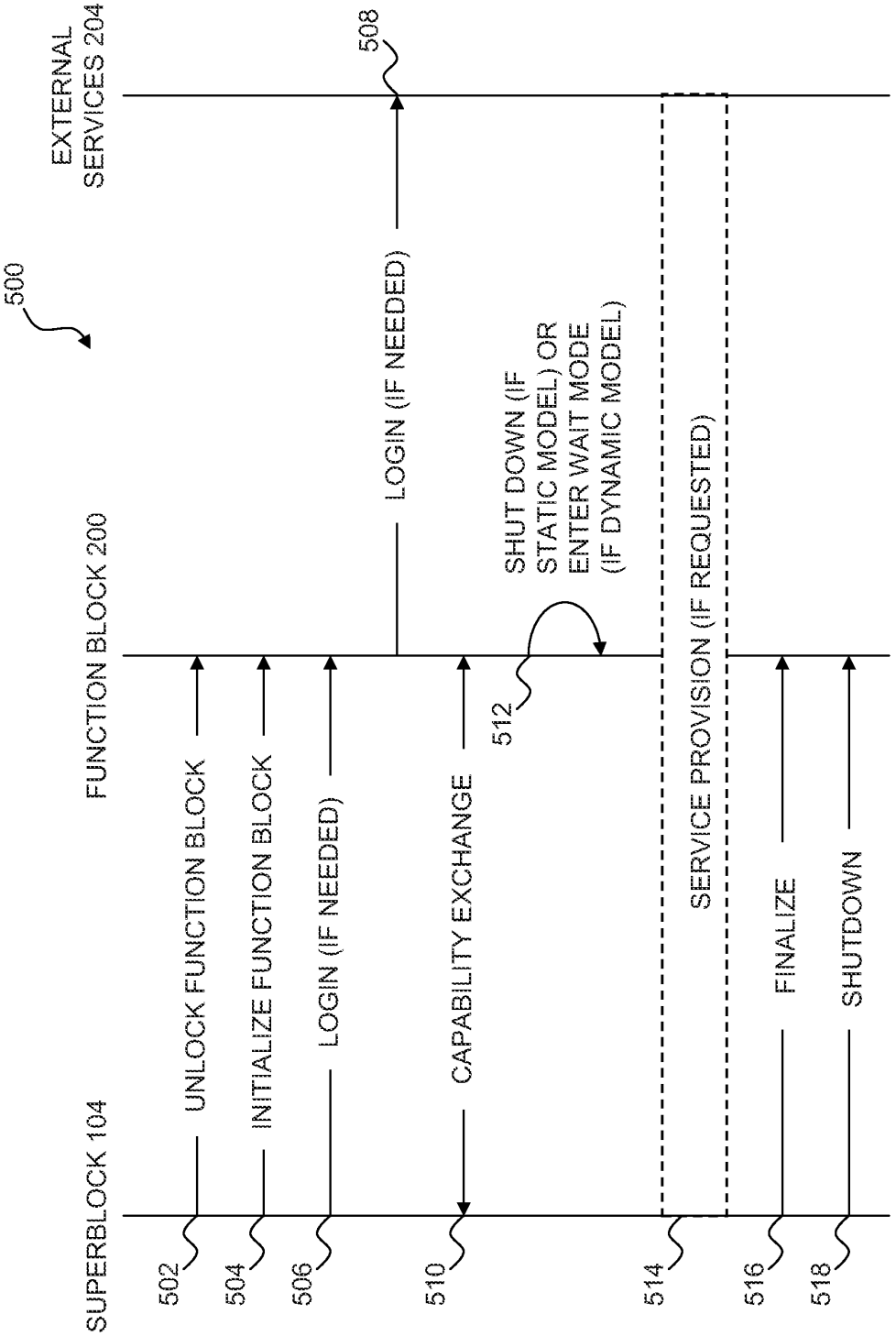

500
EXTERNAL SERVICES 204
508
FUNCTION BLOCK 200
LOGIN (IF NEEDED)
SHUT DOWN (IF STATIC MODEL) OR ENTER WAIT MODE (IF DYNAMIC MODEL)
512
SERVICE PROVISION (IF REQUESTED)
SUPERBLOCK 104
UNLOCK FUNCTION BLOCK
INITIALIZE FUNCTION BLOCK
LOGIN (IF NEEDED)
CAPABILITY EXCHANGE
FINALIZE
SHUTDOWN
502
504
506
510
514
516
518

FIG. 5

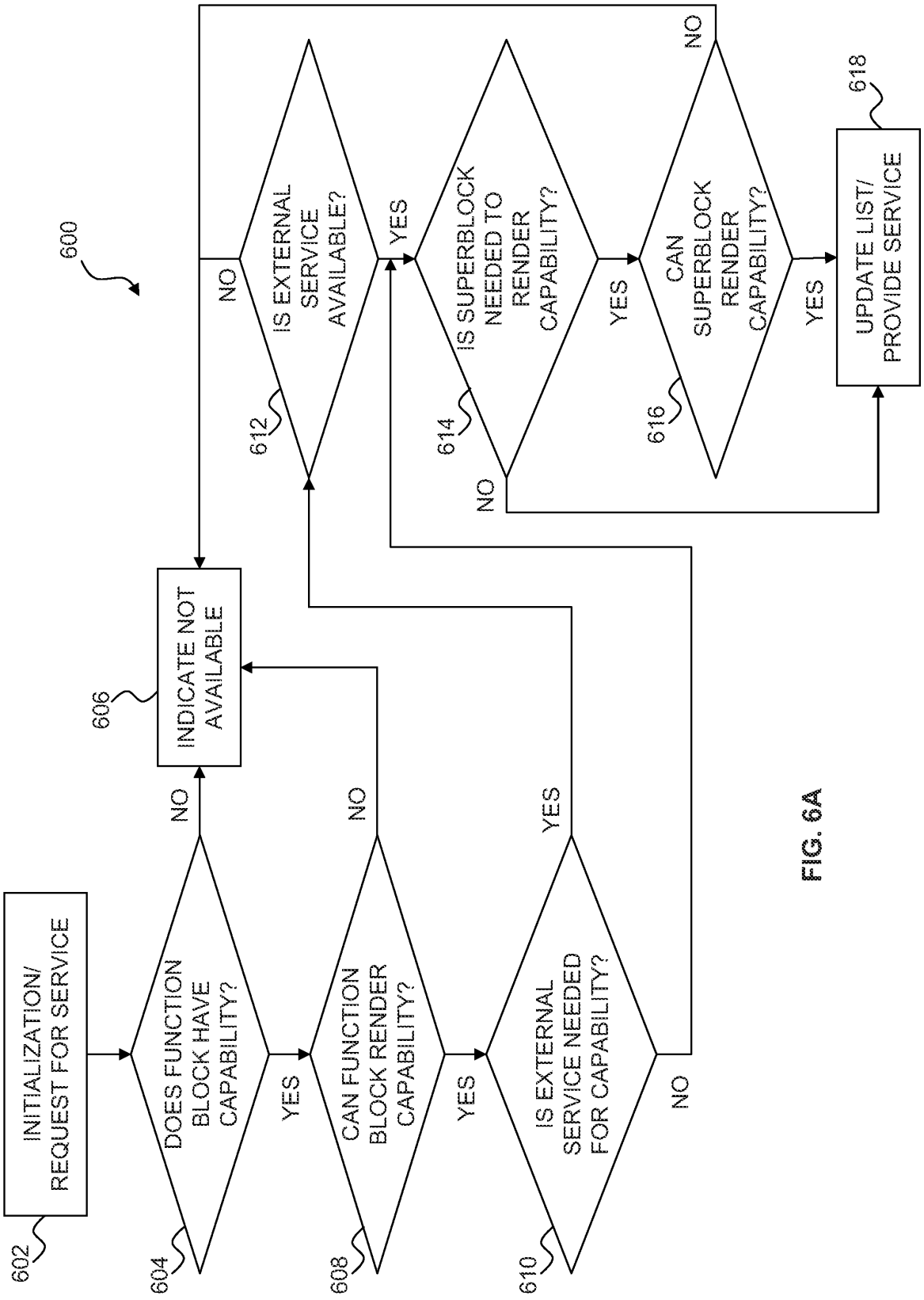

600
INITIALIZATION/ REQUEST FOR SERVICE
602
DOES FUNCTION BLOCK HAVE CAPABILITY?
604
NO
YES
CAN FUNCTION BLOCK RENDER CAPABILITY?
608
NO
YES
IS EXTERNAL SERVICE NEEDED FOR CAPABILITY?
610
YES
NO
INDICATE NOT AVAILABLE
606
IS EXTERNAL SERVICE AVAILABLE?
612
NO
YES
IS SUPERBLOCK NEEDED TO RENDER CAPABILITY?
614
YES
NO
CAN SUPERBLOCK RENDER CAPABILITY?
616
NO
YES
UPDATE LIST/ PROVIDE SERVICE
618

FIG. 6A

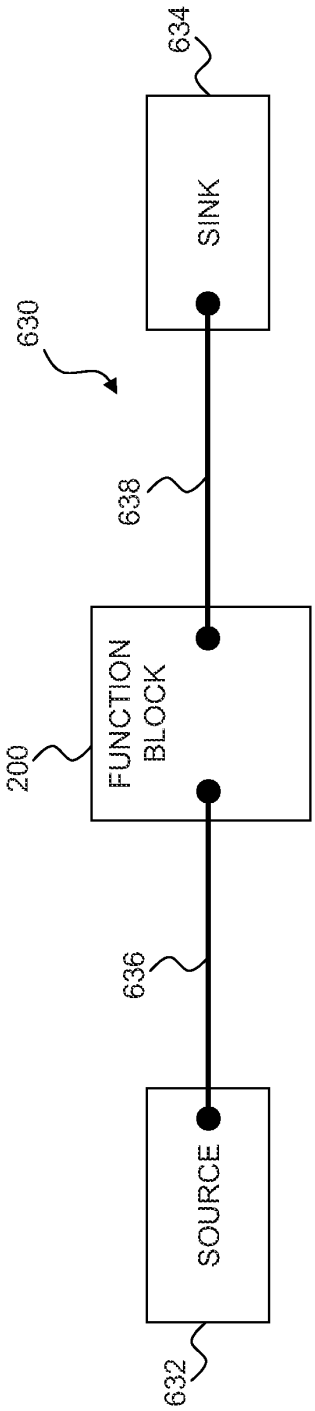

630
634
SINK
638
200
FUNCTION BLOCK
636
SOURCE
632

FIG. 6B

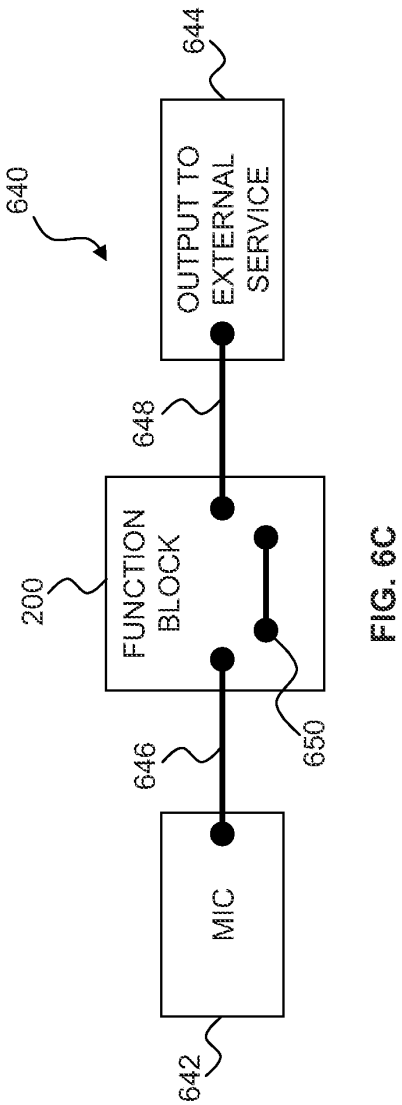

640
644
OUTPUT TO EXTERNAL SERVICE
648
200
FUNCTION BLOCK
650
646
MIC
642

FIG. 6C

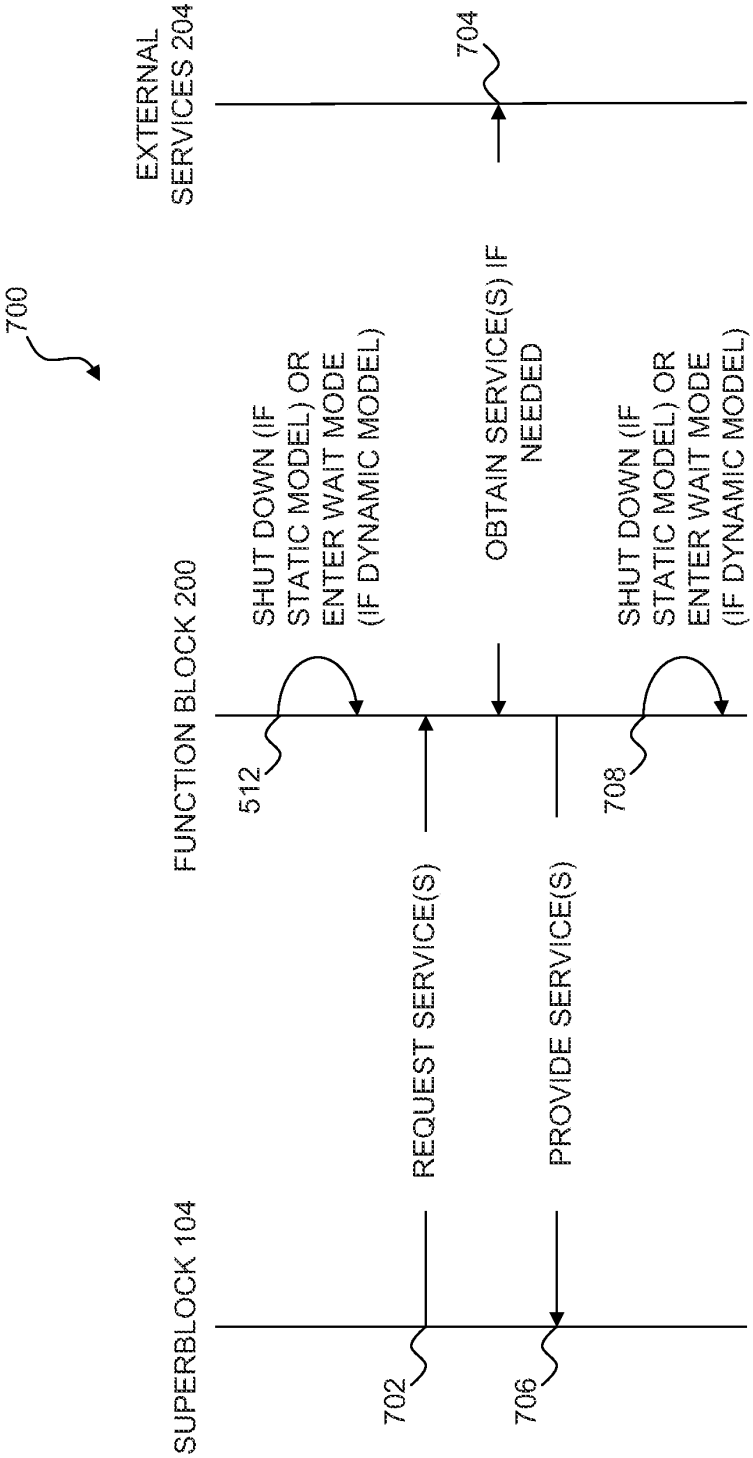

700
SUPERBLOCK 104
FUNCTION BLOCK 200
EXTERNAL SERVICES 204
REQUEST SERVICE(S)
PROVIDE SERVICE(S)
SHUT DOWN (IF STATIC MODEL) OR ENTER WAIT MODE (IF DYNAMIC MODEL)
OBTAIN SERVICE(S) IF NEEDED
SHUT DOWN (IF STATIC MODEL) OR ENTER WAIT MODE (IF DYNAMIC MODEL)
512
702
704
706
708

FIG. 7

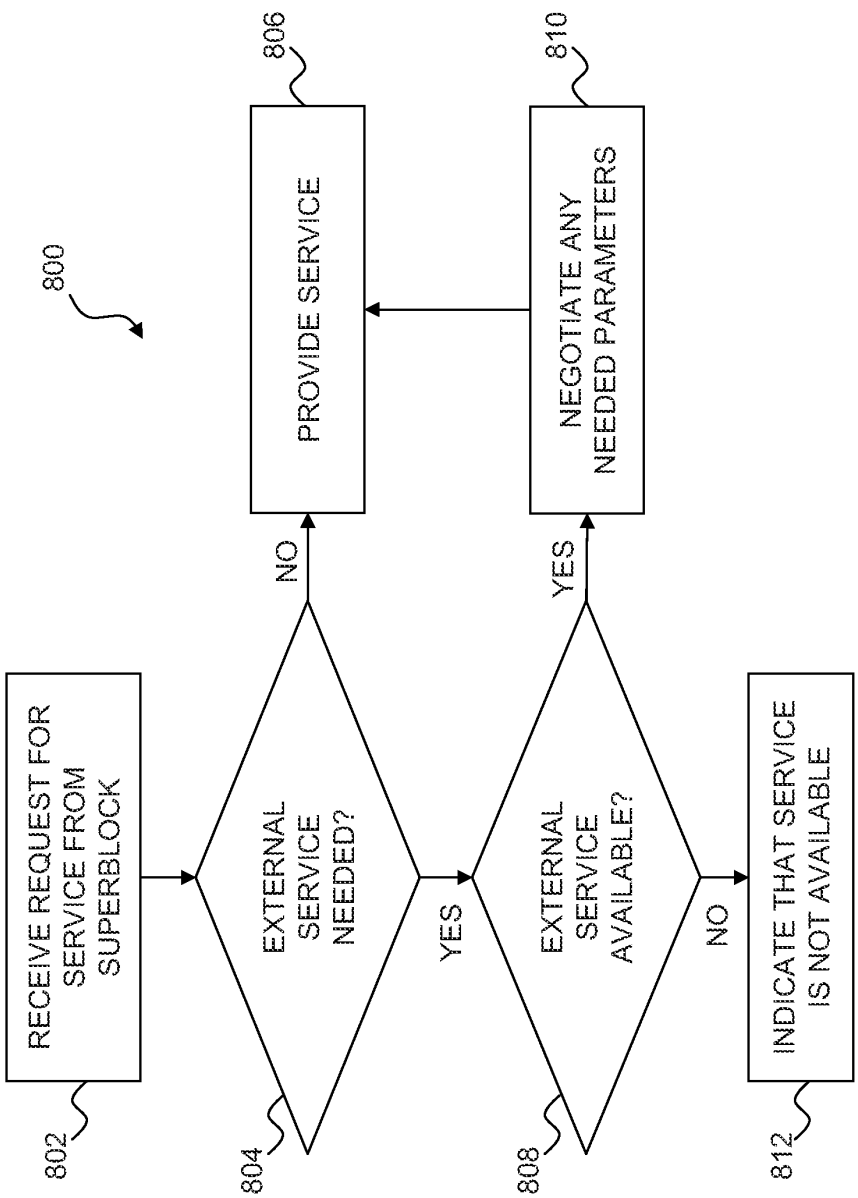

800
RECEIVE REQUEST FOR SERVICE FROM SUPERBLOCK
802
EXTERNAL SERVICE NEEDED?
804
NO
YES
PROVIDE SERVICE
806
EXTERNAL SERVICE AVAILABLE?
808
YES
NO
NEGOTIATE ANY NEEDED PARAMETERS
810
INDICATE THAT SERVICE IS NOT AVAILABLE
812

FIG. 8

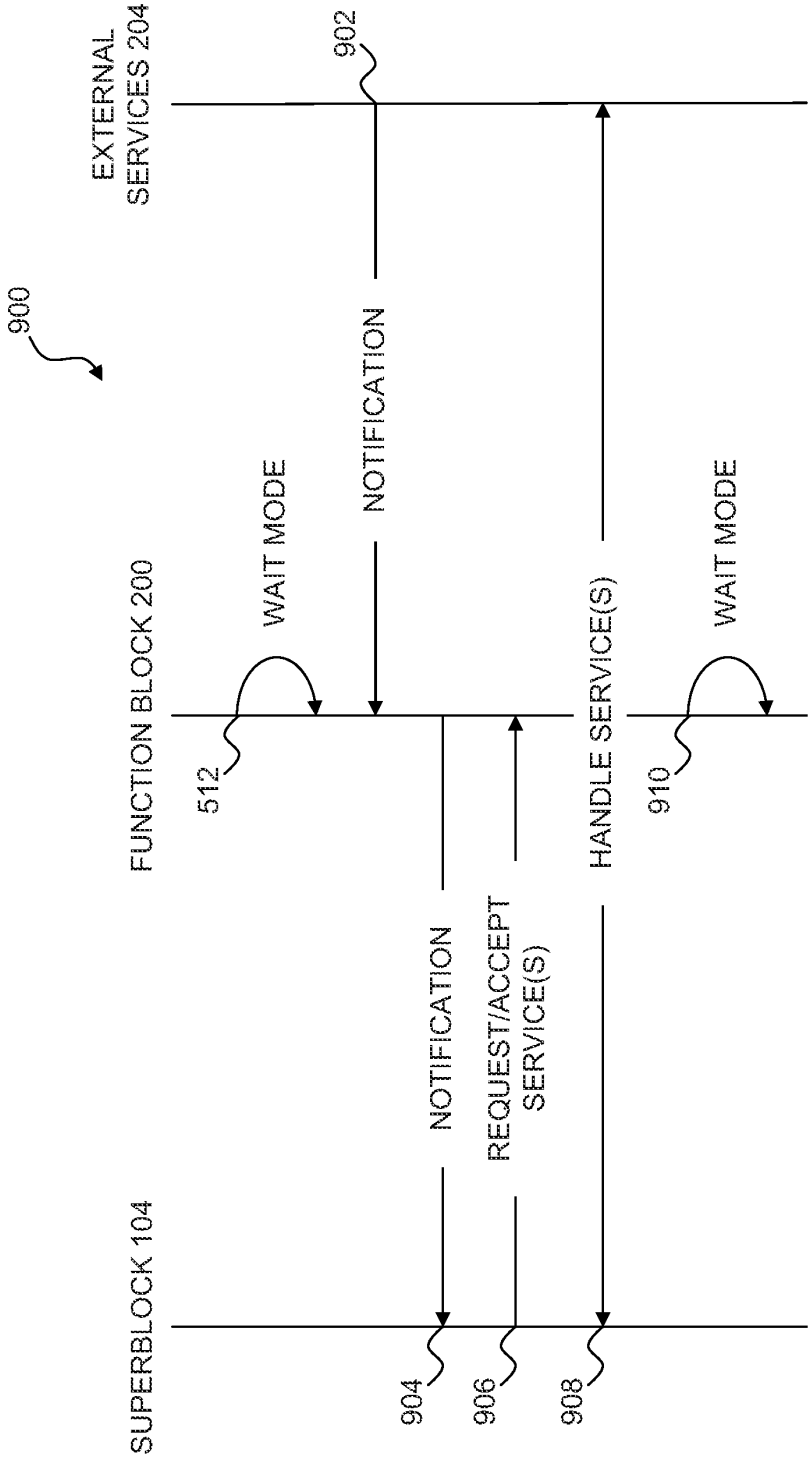

900
EXTERNAL SERVICES 204
902
FUNCTION BLOCK 200
WAIT MODE
512
NOTIFICATION
HANDLE SERVICE(S)
WAIT MODE
910
SUPERBLOCK 104
NOTIFICATION
904
REQUEST/ACCEPT SERVICE(S)
906
908

FIG. 9

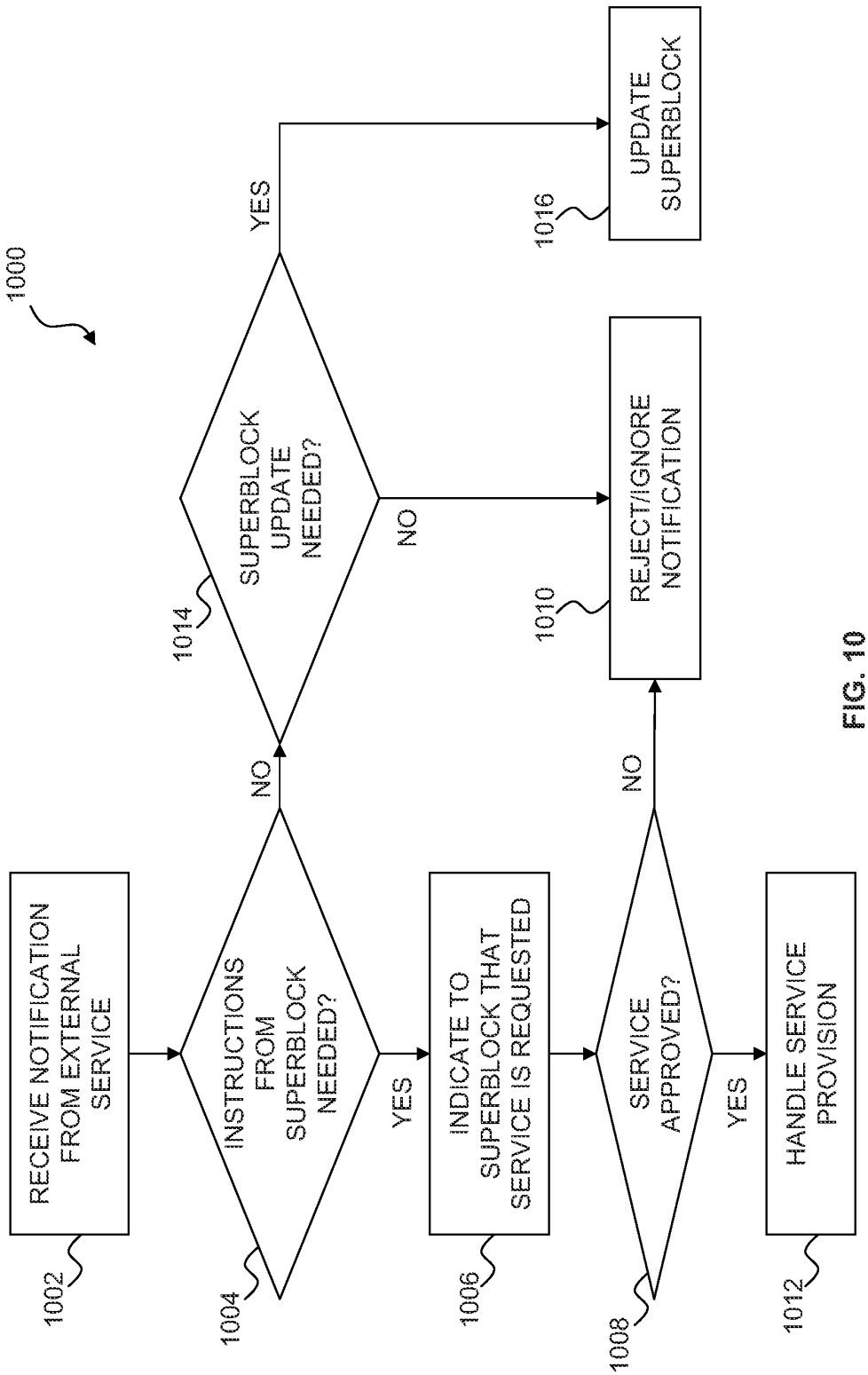

1000
RECEIVE NOTIFICATION FROM EXTERNAL SERVICE
1002
INSTRUCTIONS FROM SUPERBLOCK NEEDED?
1004
YES
NO
INDICATE TO SUPERBLOCK THAT SERVICE IS REQUESTED
1006
SERVICE APPROVED?
1008
YES
NO
HANDLE SERVICE PROVISION
1012
SUPERBLOCK UPDATE NEEDED?
1014
YES
NO
UPDATE SUPERBLOCK
1016
REJECT/IGNORE NOTIFICATION
1010

FIG. 10

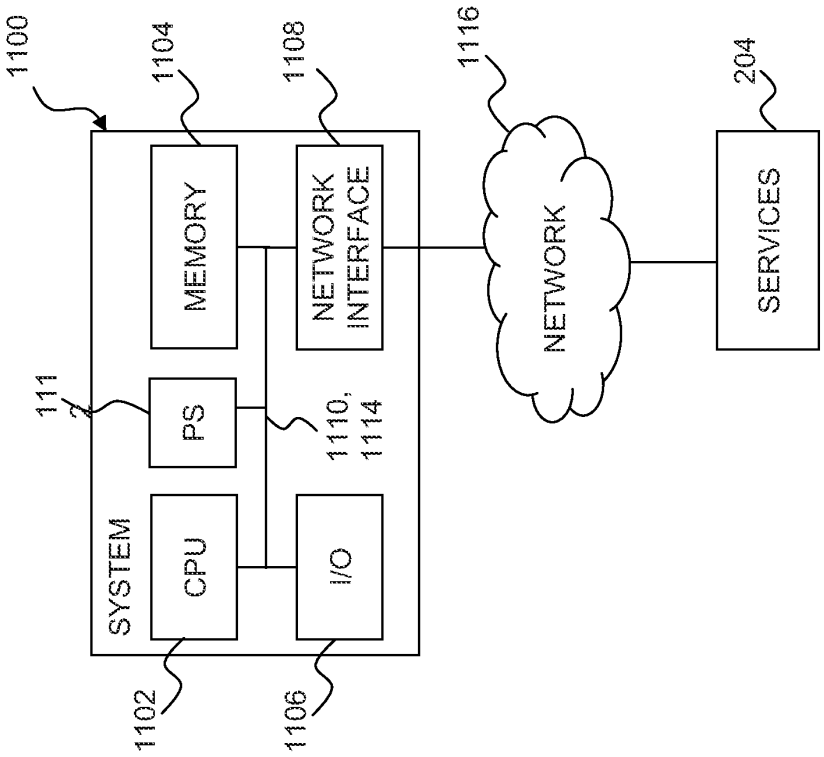

1100
1104
1108
1116
204
MEMORY
NETWORK INTERFACE
NETWORK
SERVICES
111
2
PS
1110,
1114
SYSTEM
CPU
I/O
1102
1106

FIG. 11

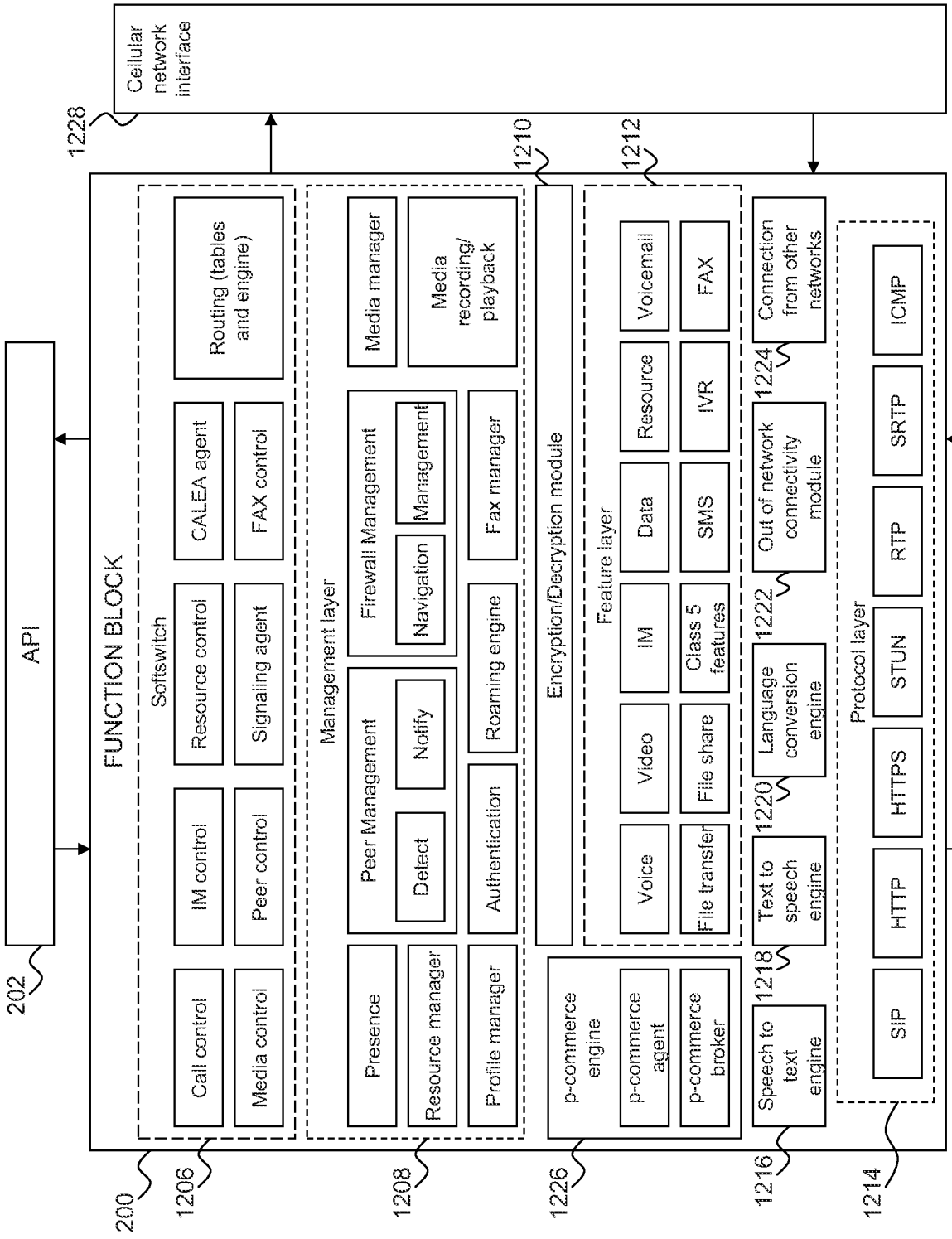

Cellular network interface
1228
API
202
FUNCTION BLOCK
200
Softswitch
1206
Call control
Media control
IM control
Peer control
Resource control
Signaling agent
CALEA agent
FAX control
Routing (tables and engine)
Management layer
1208
Presence
Resource manager
Profile manager
Peer Management
Detect
Notify
Authentication
Firewall Management
Navigation
Management
Roaming engine
Media manager
Media recording/ playback
Fax manager
Encryption/Decryption module
1210
1226
p-commerce engine
p-commerce agent
p-commerce broker
Feature layer
1212
Voice
Video
IM
Data
Resource
Voicemail
File transfer
File share
Class 5 features
SMS
IVR
FAX
1216
Speech to text engine
1218
Text to speech engine
1220
Language conversion engine
1222
Out of network connectivity module
1224
Connection from other networks
Protocol layer
1214
SIP
HTTP
HTTPS
STUN
RTP
SRTP
ICMP
1204
OPERATING SYSTEM

Fig. 12