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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
09/824,553	04/02/2001	Kirk Johnson	0370.1108C2/158203-US.01

CONFIRMATION NO. 9887

99499
Edell, Shapiro, & Finnan, LLC
9801 Washingtonian Blvd.
Suite 750
Gaithersburg, MD 20878

POA ACCEPTANCE LETTER

OC000000123271283

Date Mailed: 02/10/2021

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 01/05/2021.

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.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/nrhayden/

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
09/824,553	04/02/2001	Kirk Johnson	2762.2002-002

CONFIRMATION NO. 9887

POWER OF ATTORNEY NOTICE

21005
HAMILTON, BROOK, SMITH & REYNOLDS, P.C.
530 VIRGINIA ROAD
P.O. BOX 9133
CONCORD, MA 01742-9133

OC000000123271161

Date Mailed: 02/10/2021

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 01/05/2021.

- The Power of Attorney to you in this application has been revoked by the assignee who has intervened as provided by 37 CFR 3.71. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/nrhayden/

Doc Code: PA..
Document Description: Power of Attorney

PTO/AIA/82A (07-13)
Approved for use through 01/31/2018. 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) to identify the application to which the Power of Attorney is directed, in accordance with 37 CFR 1.5, unless the application number and filing date are identified in the Power of Attorney by Applicant form. If neither form PTO/AIA/82A nor form PTO/AIA82B identifies the application to which the Power of Attorney is directed, the Power of Attorney will not be recognized in the application.

Application Number	09/824,553
Filing Date	04-02-2001
First Named Inventor	Kirk Johnson
Title	METHOD AND APPARATUS FOR DETERMINING A NETWORK TOPOLOGY IN THE PRESENCE OF NETWORK ADDRESS TRANSLATION
Art Unit	2619
Examiner Name	PATEL, JAY P
Attorney Docket Number	0370.1108C2/158203-US.01

SIGNATURE of Applicant or Patent Practitioner

Signature	/D. Andrew Floam/	Date (Optional)	2021-01-05
Name	D. Andrew Floam	Registration Number	34597
Title (if Applicant is a juristic entity)			
Applicant Name (if Applicant is a juristic entity)			

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. If more than one applicant, use multiple forms.

☑ *Total of 1 forms are submitted.

This collection of information is required by 37 CFR 1.131, 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.

Doc Code: PA..
Document Description: Power of Attorney

PTO/AIA/82B (07-13)
Approved for use through 01/31/2018. 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 either the attached transmittal letter or the boxes below.

Application Number	Filing Date

(Note: The boxes above may be left blank if information is provided on form PTO/AIA/82A.)

☑ I hereby appoint the Patent 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 identified above: 99499

OR

☐ I hereby appoint Practitioner(s) named in the attached list (form PTO/AIA/82C) 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 patent application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above. (Note: Complete form PTO/AIA/82C.)

Please recognize or change the correspondence address for the application identified in the attached transmittal letter or the boxes above 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 (if the Applicant is a juristic entity, list the Applicant name in the box):

Cisco Technology, Inc.

☐ Inventor or Joint Inventor (title not required below)

☐ Legal Representative of a Deceased or Legally Incapacitated Inventor (title not required below)

☑ Assignee or Person to Whom the Inventor is Under an Obligation to Assign (provide signer's title if applicant is a juristic entity)

☐ 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) (provide signer's title if applicant is a juristic entity)

SIGNATURE of Applicant for Patent

The undersigned (whose title is supplied below) is authorized to act on behalf of the applicant (e.g., where the applicant is a juristic entity).

Signature		Date (Optional)	November 9, 2017
Name	Dan H. Lang		
Title	Vice President and Assistant Secretary, Cisco Technology, 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. If more than one applicant, use multiple forms.

☑ Total of 1 forms are submitted.

This collection of information is required by 37 CFR 1.131, 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 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.

PTO/AIA/96 (08-12)
Approved for use through 01/31/2013. 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 displays a valid OMB control number.

STATEMENT UNDER 37 CFR 3.73(c)

Applicant/Patent Owner: CISCO TECHNOLOGY, INC.

Application No./Patent No.: 09/824,553 / 7,349,348 Filed/Issue Date: 04-02-2001 / 03-25-2008

Titled: METHOD AND APPARATUS FOR DETERMINING A NETWORK TOPOLOGY IN THE PRESENCE OF NETWORK ADDRESS TRANSLATION

CISCO TECHNOLOGY, INC., a corporation

(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose **one** of options 1, 2, 3 or 4 below):

1. ☑ The assignee of the entire right, title, and interest.

2. ☐ An assignee of less than the entire right, title, and interest (check applicable box):

   ☐ The extent (by percentage) of its ownership interest is _____%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.

   ☐ There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3. ☐ The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4. ☐ The recipient, via a court proceeding or the like (*e.g.*, bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose **one** of options A or B below):

A. ☑ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel 012061, Frame 0962, or for which a copy thereof is attached.

B. ☐ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

   1. From: _____ To: _____

      The document was recorded in the United States Patent and Trademark Office at

      Reel _____, Frame _____, or for which a copy thereof is attached.

   2. From: _____ To: _____

      The document was recorded in the United States Patent and Trademark Office at

      Reel _____, Frame _____, or for which a copy thereof is attached.

This collection of information is required by 37 CFR 3.73(b). 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 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, 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/96 (08-12)
Approved for use through 01/31/2013. 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 displays a valid OMB control number.

STATEMENT UNDER 37 CFR 3.73(c)

3. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

4. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

5. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

6. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

☐ Additional documents in the chain of title are listed on a supplemental sheet(s).

☑ As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/D. Andrew Floam/	2021-01-05
Signature	Date
D. Andrew Floam	34597
Printed or Typed Name	Title or Registration 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

Electronic Acknowledgement Receipt

EFS ID:	41559942
Application Number:	09824553
International Application Number:	
Confirmation Number:	9887
Title of Invention:	METHOD AND APPARATUS FOR DETERMINING A NETWORK TOPOLOGY IN THE PRESENCE OF NETWORK ADDRESS TRANSLATION
First Named Inventor/Applicant Name:	Kirk Johnson
Customer Number:	21005
Filer:	D. Andrew Floam/Grace Chaparro
Filer Authorized By:	D. Andrew Floam
Attorney Docket Number:	2762.2002-002
Receipt Date:	05-JAN-2021
Filing Date:	02-APR-2001
Time Stamp:	16:30:33
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	Power of Attorney	CiscoExecutedPOA-1108C2.pdf	266602 [illegible]	no	3
Warnings:					

The page size in the PDF is too large. The pages should be 8.5 x 11 or A4. If this PDF is submitted, the pages will be resized upon entry into the Image File Wrapper and may affect subsequent processing					
Information:					
2	Assignee showing of ownership per 37 CFR 3.73	aia0096-1108C2.pdf	122952 a65fd6d0fd1fda19967e622fe8f82c4707ada580	no	3
Warnings:					
Information:					
			Total Files Size (in bytes):	389554	

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 NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/824,553	03/25/2008	7349348	2762.2002-002	9887

21005 7590 03/05/2008

HAMILTON, BROOK, SMITH & REYNOLDS, P.C.
530 VIRGINIA ROAD
P.O. BOX 9133
CONCORD, MA 01742-9133

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 1111 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 Customer Service Center of the Office of Patent Publication at (571)-272-4200.

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

Kirk Johnson, Boulder, CO;
James O'Toole, Somerville, MA;
M. Frans Kaashoek, Lexington, MA;
John Jannotti, Cambridge, MA;

IR103 (Rev. 11/05)

JAN 28 2008

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 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)

21005 7590 11/30/2007

HAMILTON, BROOK, SMITH & REYNOLDS, P.C.
530 VIRGINIA ROAD
P.O. BOX 9133
CONCORD, MA 01742-9133

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.

Nicole Isabelle	(Depositor's name)
Nicole Isabelle	(Signature)
1-25-08	(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/824,553	04/02/2001	Kirk Johnson	2762.2002-002	9887

TITLE OF INVENTION: METHOD AND APPARATUS FOR DETERMINING A NETWORK TOPOLOGY IN THE PRESENCE OF NETWORK ADDRESS TRANSLATION

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	$1440	$0	$0	$1440	02/29/2008

EXAMINER	ART UNIT	CLASS-SUBCLASS
PATEL, JAY P	2619	370-254000

01/29/2008 HNGUYEN2 00000049 09824553
01 FC:1501 1440.00 OP
02 FC:8001 45.00 OP

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 Hamilton, Brook, Smith, & Reynolds, PC
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: CISCO Technologies, Inc.
(B) RESIDENCE: (CITY and STATE OR COUNTRY): San Jose, California

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 15

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 credit any overpayment, to Deposit Account Number 08-0380 (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)
☐ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27.
☐ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature _____ Date 1/25/08

Typed or printed name Thomas J. Arria Registration No. 60,223

This collection of information 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.

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United States Patent and Trademark Office
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P.O. Box 1450
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www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

21005 7590 11/30/2007

HAMILTON, BROOK, SMITH & REYNOLDS, P.C.
530 VIRGINIA ROAD
P.O. BOX 9133
CONCORD, MA 01742-9133

EXAMINER	
PATEL, JAY P	
ART UNIT	PAPER NUMBER
2619	

DATE MAILED: 11/30/2007

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/824,553	04/02/2001	Kirk Johnson	2762.2002-002	9887

TITLE OF INVENTION: METHOD AND APPARATUS FOR DETERMINING A NETWORK TOPOLOGY IN THE PRESENCE OF NETWORK ADDRESS TRANSLATION

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	$1440	$0	$0	$1440	02/29/2008

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 SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

A. If the status is the same, pay the TOTAL FEE(S) DUE shown above.

B. If the status above is to be removed, check box 5b on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above, or

If the SMALL ENTITY is shown as NO:

A. Pay TOTAL FEE(S) DUE shown above, or

B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check box 5a on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and 1/2 the ISSUE FEE shown above.

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. 08/07) Approved for use through 08/31/2010.

Quicker Connections - Exhibit 2005
IPR2025-01088 - Page 13

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)

21005 7590 11/30/2007

HAMILTON, BROOK, SMITH & REYNOLDS, P.C.
530 VIRGINIA ROAD
P.O. BOX 9133
CONCORD, MA 01742-9133

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.
09/824,553	04/02/2001	Kirk Johnson	2762.2002-002	9887

TITLE OF INVENTION: METHOD AND APPARATUS FOR DETERMINING A NETWORK TOPOLOGY IN THE PRESENCE OF NETWORK ADDRESS TRANSLATION

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	$1440	$0	$0	$1440	02/29/2008

EXAMINER	ART UNIT	CLASS-SUBCLASS
PATEL, JAY P	2619	370-254000

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 credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

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

☐ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27. ☐ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

This collection of information 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.

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Quicker Connections - Exhibit 2005
IPR2025-01088 - Page 14

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/824,553	04/02/2001	Kirk Johnson	2762.2002-002	9887

21005 7590 11/30/2007

HAMILTON, BROOK, SMITH & REYNOLDS, P.C
530 VIRGINIA ROAD
P.O. BOX 9133
CONCORD, MA 01742-9133

EXAMINER	
PATEL, JAY P	
ART UNIT	PAPER NUMBER
2619	

DATE MAILED: 11/30/2007

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

The Patent Term Adjustment to date is 1111 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 1111 day(s).

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 Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

PTOL-85 (Rev. 08/07) Approved for use through 08/31/2010.

Notice of Allowability	Application No.	Applicant(s)	
	09/824,553	JOHNSON ET AL.	
	Examiner	Art Unit	
	Jay P. Patel	2619	

-- 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 *remarks/amendment filed 11/13/2007*.

2. ☒ The allowed claim(s) is/are *2-11, 14-16, 20-22, 25-27 and 36-38*.

3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
   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.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
      1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
   (b) ☐ 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. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____.
7. ☐ Examiner's Amendment/Comment
8. ☐ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

DETAILED ACTION

Allowable Subject Matter

1. Claims 2-11, 14-16, 20-22, 25-27 and 36-38 are allowed.

2. In regards to claim 14, the cited prior art fails to teach individually or in combination merging of translated address set when a determination is made that multiple apparent source addresses in different translated address sets correspond to the same actual source address.

3. In regards to claims 25 and 36, the cited prior art fails to teach individually or in combination a timeout mechanism for removing translated addresses from the translated address sets stored in memory, where upon the expiration of the timeout period the translated addresses are removed from memory.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jay P. Patel whose telephone number is (571) 272-3086. The examiner can normally be reached on M-F 9:00 am - 5:00 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edan Orgad can be reached on (571) 272-7884. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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.

JPP 11/28/07
Jay P. Patel
Examiner
Art Unit 2619

EDAN . ORGAD
SUPERVISORY PATENT EXAMINER

Issue Classification	Application/Control No. 09/824,553	Applicant(s)/Patent under Reexamination JOHNSON ET AL.
	Examiner Jay P. Patel	Art Unit 2619

ISSUE CLASSIFICATION

ORIGINAL		INTERNATIONAL CLASSIFICATION									
CLASS	SUBCLASS	CLAIMED					NON-CLAIMED				
370	254	G	06	F	15	/16					/
CROSS REFERENCES		H	04	L	12	/56					/
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)										
370	392					/					/
709	203					/					/
711	202	210				/					/
						/					/
						/					/

Jay P. Patel 11/21/07
(Assistant Examiner) (Date)

Marcia Gordon 11/27/07
(Legal Instruments Examiner) (Date)

EDAN . ORGAD
SUPERVISORY PATENT EXAMINER
(Primary Examiner) 11/26/07 (Date)

Total Claims Allowed: 22

O.G. Print Claim(s)	O.G. Print Fig.
14	3

☐ 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
	1		~~31~~		61		91		121		151		181
2	2		~~32~~		62		92		122		152		182
3	3		~~33~~		63		93		123		153		183
4	4		~~34~~		64		94		124		154		184
5	5		~~35~~		65		95		125		155		185
6	6	20	36		66		96		126		156		186
7	7	21	37		67		97		127		157		187
8	8	22	38		68		98		128		158		188
9	9		39		69		99		129		159		189
10	10		40		70		100		130		160		190
11	11		41		71		101		131		161		191
	~~12~~		42		72		102		132		162		192
	~~13~~		43		73		103		133		163		193
1	14		44		74		104		134		164		194
12	15		45		75		105		135		165		195
13	16		46		76		106		136		166		196
	~~17~~		47		77		107		137		167		197
	~~18~~		48		78		108		138		168		198
	~~19~~		49		79		109		139		169		199
15	20		50		80		110		140		170		200
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17	22		52		82		112		142		172		202
	~~23~~		53		83		113		143		173		203
	~~24~~		54		84		114		144		174		204
14	25		55		85		115		145		175		205
18	26		56		86		116		146		176		206
19	27		57		87		117		147		177		207
	~~28~~		58		88		118		148		178		208
	~~29~~		59		89		119		149		179		209
	~~30~~		60		90		120		150		180		210

Search Notes

Application/Control No.	Applicant(s)/Patent under Reexamination	
09/824,553	JOHNSON ET AL.	
Examiner	**Art Unit**	
Jay P. Patel	2619	

SEARCHED			
Class	Subclass	Date	Examiner
updated	class-subclass search	11/21/2007	JPP

INTERFERENCE SEARCHED			
Class	Subclass	Date	Examiner
370	**254**	**11/21/2007**	**JPP**
370	392	11/21/2007	JPP
709	203	11/21/2007	JPP
711/202, 711/210		11/21/2007	JPP

SEARCH NOTES (INCLUDING SEARCH STRATEGY)		
	DATE	EXMR
East keyword search; see attached search history printout	11/21/2007	JPP

EAST Search History

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	22560	(NAT or (network adj address adj translat$5)) and (partition$3 or divid$3)	US-PGPUB	OR	OFF	2007/11/21 17:22
L2	31	((NAT or (network adj address adj translat$5)) and (partition$3 or divid$3)).clm.	US-PGPUB	OR	OFF	2007/11/21 17:24
L3	1	L2 and 370/254.ccls.	US-PGPUB	OR	OFF	2007/11/21 17:25
L4	3	L2 and 370/392.ccls.	US-PGPUB	OR	OFF	2007/11/21 17:25
L5	0	L2 and 709/203.ccls.	US-PGPUB	OR	OFF	2007/11/21 17:25
L6	0	L2 and 711/202.ccls.	US-PGPUB	OR	OFF	2007/11/21 17:25
L7	0	L2 and 711/210.ccls.	US-PGPUB	OR	OFF	2007/11/21 17:25

EAST Search History

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	2585	(network near topology).ab.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L2	456	L1 and "370"/.clas.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L3	102	"370"/.clas. and (network near topology).ti.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L4	1809	370/254.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L5	59	L4 and (address near translation)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L6	0	370/254.clas. and (network near topology).ti.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L7	51	370/254.ccls. and (network near topology).ti.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35

EAST Search History

L8	13	(US-20020003780-$ or US-20020009086-$ or US-20020116493-$ or US-20020143935-$ or US-20030051032-$).did. or (US-5737319-$ or US-5796736-$ or US-5886643-$ or US-5926462-$ or US-5933416-$ or US-5966513-$ or US-6046988-$ or US-6118768-$ or US-6205122-$ or US-6347336-$ or US-6377987-$ or US-6483812-$ or US-6516345-$ or US-6625124-$ or US-6643269-$ or US-6728670-$ or US-6798752-$ or US-6822943-$ or US-6829641-$).did.	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L9	3	L8 and (address near translation)	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L10	3	L8 and (address near translation) and (server)	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L11	1003	(network near configuration).ti.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L12	0	L11 and 370/254.clas.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L13	29	L11 and 370/254.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L14	0	370/254.ccls and (passive near active near clients).ab.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L15	0	370/254.ccls and (passive near active).ab.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35

EAST Search History

L16	0	370/254.ccls and (passive near active)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L17	0	370/254.ccls and (mask$3 near IP)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L18	0	370/254.ccls and (network near translation)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L19	0	370/254.ccls and (network near address near translation)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L20	1775	370/254.ccls. and (network "adj." address "adj." translat$4)	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L21	1466	L20 and (topology or configuration)	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L22	0	L21 and (active near passive near client$2)	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L23	192	"6345294" or "6052718"	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L24	2	("6345294" or "6052718").pn.	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L25	498	2001/0039585 or "6571288" or "6134588" or "6078960" or "6539426" or "5870562" or "6035055" or "6041041" or "6081840" or "6185598" or "6304913" or "6338092" or "6505254" or "6581065" or 2002/0065938 or (2002/0186694 or 2003/0041094 or "6553413" or "6553420" or "6185619").pn.	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35

EAST Search History

L26	16	(2001/0039585, "6571288", "6134588", "6078960", "6539426", "5870562", "6035055", "6041041", "6081840", "6185598", "6304913", "6338092", "6505254", "6581065", 2002/0065938, 2002/0186694, 2003/0041094, "6553413", "6553420", "6185619").pn.	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L27	48	"370"/.clas. and "709"/.clas. and (group$4 near (topology or configuration))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L28	0	(NAT) with (partision) with (server or device) with (topology or configuration)	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L29	0	(NAT) with (partision) with (server or device)	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L30	0	(NAT) with (partision) with (server or device)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L31	0	(NAT) with (partition) with (server or device) with (topology or configuration)	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L32	9	(address near translation) with (partition) with (server or device)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L33	9	(NAT) with (partition)	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L34	7376	(network same address same translation)	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L35	35	L34 same partition	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L36	1157	L34 same (topology or configuration)	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L37	9	L36 same (partition)	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L38	856	L36 and ("370"/$.ccls. or "709"/$.ccls. or "711"/$.ccls.)	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L39	317	L38 and (server or device) same NAT	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35

EAST Search History

L40	36	L39 and (partition or divide)	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L41	8139	709/203.ccls.	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L42	2587	L41 and (network same (topology or configuration))	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L43	1675	L41 and (network same (topology or configuration) same server)	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L44	2056	L41 and (network same (topology or configuration) same server same partition$4 or divid$4)	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L45	40	L41 and (network same (topology or configuration) same server same (partition$4 or divid$4) same (network "adj." address "adj." translation))	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L46	1815	711/202.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L47	8	L46 and (NAT)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L48	0	L46 same (NAT same server)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L49	1117	L46 and (partition$4 or divid$3)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L50	837	L49 and (topology or configuration or arrange$4)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35

EAST Search History

L51	2	L50 and (network near address near translation)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L52	26	("4843541" | "5862357" | "5898883" | "5923847" | "5940870" | "6088770" | "6295584" | "6334177").PN. OR ("6510496"). URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2007/11/21 16:35
L53	1276	370/254.ccls. and (address "adj." translation)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L54	249	370/254.ccls. and (address "adj." translation).ab.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L55	18	(US-20010028654-$ or US-20020003780-$ or US-20020009086-$ or US-20020116493-$ or US-20020143935-$ or US-20030051032-$ or US-20030126202-$ or US-20050013255-$).did. or (US-5737319-$ or US-5796736-$ or US-5886643-$ or US-5926462-$ or US-5933416-$ or US-5940870-$ or US-5966513-$ or US-6046988-$ or US-6118768-$ or US-6205122-$ or US-6347336-$ or US-6377987-$ or US-6483812-$ or US-6510496-$ or US-6516345-$ or US-6625124-$ or US-6633560-$ or US-6643269-$ or US-6728670-$ or US-6798752-$ or US-6822943-$ or US-6829641-$). did.	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L56	6	L55 and (network same address same translat$4)	USPAT	OR	OFF	2007/11/21 16:35
L57	1	"6650641".pn.	USPAT	OR	OFF	2007/11/21 16:35

EAST Search History

L58	50	("5774660" | "5951694" | "6006264" | "6038233" | "6128642" | "6128657" | "6137777" | "6185619" | "6243379" | "6249801" | "6263368" | "6327622" | "6330602" | "6389462").PN. OR ("6650641"). URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2007/11/21 16:35
L59	3	L58 and (NAT same server same (topology or configuration))	US-PGPUB; USPAT; USOCR	OR	OFF	2007/11/21 16:35
L60	7	(NAT same server same (topology or configuration) same partition$4)	US-PGPUB; USPAT; USOCR	OR	OFF	2007/11/21 16:35
L61	1775	370/254.ccls. and (network "adj." address "adj." translat$4)	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L62	14	(network same (topology or configuration) same (partition or divide or allocate) same NAT)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L63	0	370/254.ccls. and (network same (topology or configuration) same (partition or divide or allocate) same NAT)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L64	0	370/254.ccls. and ((topology or configuration) same (partition or divide or allocate) same NAT)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L65	21	370/254.ccls. and ((topology or configuration) same NAT)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L66	2994	370/392.ccls.	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L67	1	L66 and (NAT same server same (partition or divide))	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L68	195	L66 and (NAT)	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L69	35	L66 and (NAT same (topology or configuration))	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L70	0	"20020038360".pn.	USPAT	OR	OFF	2007/11/21 16:35

EAST Search History

L71	1	"20020038360".pn.	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L72	1	"6092178".pn.	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L73	0	("network address translat$4") and (partition near servers)	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L74	0	("network address translation") and (partition near servers)	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L75	3434	("network address translation")	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L76	0	L75 and ("network (topology or configuration)")	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L77	288	L75 and (partition and server$1)	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L78	10	L77 and (@rlad<"20000124")	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L79	1	"6324580".pn.	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L80	1	"6959333".pn.	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L81	0	(network same topology) and (network same address same translatioin) and (server same monitor$3) and (behind same translat$4)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L82	0	(network same topology) and (network same address same translatioin) and (server same monitor$3)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L83	0	(network same topology) and (network same address same translatioin)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L84	0	(network same topology) and (network same address same translatioin)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35

EAST Search History

L85	0	(network same (topology or configuration)) and (network same address same translatioin)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L86	154390	(network same (topology or configuration))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L87	3024	L86 and (NAT)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L88	221	L87 and (monitor and partition)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L89	10	L88 and (@rlad<"20000124")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L90	996581	(network "adj." address "adj." translation).ab.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L91	3376	L90 and (partition$3 or divide) same server$1	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L92	511	L90 and ((partition$3 or divide) same server$1).ab.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35

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EAST Search History

L93	24	L92 and (@rlad<"20000124")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L94	488	L91 and (@rlad<"20000124")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L95	0	("network address translation") and ("partition$3 server$1")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L96	758	("network address translation").ab.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L97	15	L96 and (@rlad<"20000124")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L98	4946	370/392.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L99	0	L98 and (("network address translation") same partition$3 same (server$1 or workstation$1))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L100	0	L98 and (("network address translation") same partition$3)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35

EAST Search History

L101	189	L98 and (("network address translation"))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L102	28	L101 and(@rlad<"20000124")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L103	0	(detemin$3 same network same (topology or configuration)) and ("network address translation")	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L104	3	(detemin$3 same network same (topology or configuration))	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L105	6998	(partition$4 same server$1)	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L106	155	L105 and ("network address translation")	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L107	8	L106 and (@rlad<"20000124")	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L108	1802	370/254.ccls.	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L109	26	L108 and (partition$4 same (server$1 or worksation$1))	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L110	182	711/210.ccls.	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L111	35	L110 and (@rlad<"20000124")	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L112	1	"6449647".pn.	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L113	1	"6173322".pn.	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L114	0	(NAT same DNS same creat$4 same (sub-domain or workgroup))	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L115	337	(NAT same DNS)	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L116	2	(NAT same DNS same partition$4 same (server$1 or workgroup$1 or workstation$1))	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L117	2	(NAT same DNS same partition$4)	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L118	2	(NAT same DNS same sub same domain)	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35

EAST Search History

L119	0	(NAT same DNS same creat$4 same (sub))	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L120	20	(NAT same DNS) and (@rlad<"20000124")	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L121	439	(network near (topology or configuration)) and ((partition$3 or divid$4) near (group$1 or subgroup$1))	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L122	187	L121 and (@rlad<"20000124" or @ad<"20000124")	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L123	147	L121 and (@rlad<"20000124" or @ad<"20000124")	USPAT	OR	OFF	2007/11/21 16:35
L124	6	L121 and (NAT) and (@rlad<"20000124" or @ad<"20000124")	USPAT	OR	OFF	2007/11/21 16:35
L125	19	L121 and (NAT or (network$1 adj address$1 adj translat$4)) and (@rlad<"20000124" or @ad<"20000124")	USPAT	OR	OFF	2007/11/21 16:35
L126	19	L121 and (NAT or (network$1 adj address$1 adj translat$4)) and (@rlad<"20000124" or @ad<"20000124")	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L127	615	(partition$3 near server$1)	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L128	146	(partition$3 near server$1) and (@ad<"20000124" or @rlad<"20000124")	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L129	23280	(NAT) and (@ad<"20000124" or @rlad<"20000124")	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L130	23441	(NAT or (network adj address adj translation)) and (@ad<"20000124" or @rlad<"20000124")	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L131	0	((NAT or (network adj address adj translation)) same (partition$3 near server$1)) and (@ad<"20000124" or @rlad<"20000124")	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L132	0	((NAT or (network adj address adj translation)) and (partition$3 near server$1)) and (@ad<"20000124" or @rlad<"20000124")	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L133	11	((NAT or (network adj address adj translation)) and (partition$3 near server$1))	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35

EAST Search History

L134	460	(NAT or (network adj address adj translation)).ab. or (NAT or (network adj address adj translation)).ti.	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L135	62	L134 and (@ad<"20000124" or @rlad<"20000124")	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L136	55	L134 and (@ad<"20000124" or @rlad<"20000124")	USPAT	OR	OFF	2007/11/21 16:35
L137	0	L134 and (@ad<"20000124" or @rlad<"20000124") and (server$1 near partition$1)	USPAT	OR	OFF	2007/11/21 16:35
L138	1	L134 and (@ad<"20000124" or @rlad<"20000124") and (partition$1)	USPAT	OR	OFF	2007/11/21 16:35
L139	789	370/254.ccls.	USPAT	OR	OFF	2007/11/21 16:35
L140	38	L139 and (@ad<"20000124" or @rlad<"20000124") and (partition$1)	USPAT	OR	OFF	2007/11/21 16:35
L141	1	"6650641".pn.	USPAT	OR	OFF	2007/11/21 16:35
L142	1	"6092178".pn.	USPAT	OR	OFF	2007/11/21 16:35
L143	9	(apparent near source near address)	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L144	3	L143 and (@rlad<"20000124")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L145	4	L143 and (@rlad<"20000124" or @ad<"20000124")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L146	2	"6505254".pn.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L147	2	"6970944".pn.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35

EAST Search History

L148	48	(firewall same (network adj security)).ab. and (addres$5 same (database or stor$5 or record$3 or tabl$3))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L149	20	L148 and (@rlad<"20000124")	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L150	48	(firewall same (network adj security)).ab. and (addres$5 same (database or stor$5 or record$3 or tabl$3)) and (@rlad<"20000124" or ad<"20000124")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L151	0	(firewall same (network adj security)).ab. and (addres$5 near tabl$3) and (@rlad<"20000124" or ad<"20000124")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L152	966	(firewall same (network adj security)) and (@rlad<"20000124" or ad<"20000124")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L153	127	(firewall same (network adj security)).ab. and (@rlad<"20000124" or ad<"20000124")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L154	24	(firewall same (network adj security)).ab. and (addres$5 same tabl$3) and (@rlad<"20000124" or ad<"20000124")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L155	966	(firewall same (network adj security))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L156	78	(server$1 and (network adj security)).ab. and (addres$5 same (database or stor$5 or record$3 or tabl$3))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35

EAST Search History

L157	14	L156 and (@rlad<"20000124")	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L158	613	(address$3 and map$7).ab. and (@rlad<"20000124")	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L159	81	(address$3 and map$7).ab. and (compar$3 near address$3) and (@rlad<"20000124")	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L160	391	((NAT or (network adj address adj translat$5)) same (internal with IP) and (external with IP))	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L161	17	L160 and (@rlad<"20000124")	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L162	2585	(network near topology).ab.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L163	456	L162 and "370"/.clas.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L164	102	"370"/.clas. and (network near topology).ti.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L165	1809	370/254.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L166	59	L165 and (address near translation)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L167	0	370/254.clas. and (network near topology).ti.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35

EAST Search History

L168	51	370/254.ccls. and (network near topology).ti.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L169	13	(US-20020003780-$ or US-20020009086-$ or US-20020116493-$ or US-20020143935-$ or US-20030051032-$).did. or (US-5737319-$ or US-5796736-$ or US-5886643-$ or US-5926462-$ or US-5933416-$ or US-5966513-$ or US-6046988-$ or US-6118768-$ or US-6205122-$ or US-6347336-$ or US-6377987-$ or US-6483812-$ or US-6516345-$ or US-6625124-$ or US-6643269-$ or US-6728670-$ or US-6798752-$ or US-6822943-$ or US-6829641-$).did.	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L170	3	L169 and (address near translation)	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L171	3	L169 and (address near translation) and (server)	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L172	1003	(network near configuration).ti.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L173	0	L172 and 370/254.clas.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L174	29	L172 and 370/254.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L175	0	370/254.ccls and (passive near active near clients).ab.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35

EAST Search History

L176	0	370/254.ccls and (passive near active).ab.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L177	0	370/254.ccls and (passive near active)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L178	0	370/254.ccls and (network near address near translation)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L179	0	370/254.ccls and (mask$3 near IP)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L180	0	370/254.ccls and (network near translation)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L181	1775	370/254.ccls. and (network "adj." address "adj." translat$4)	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L182	1466	L181 and (topology or configuration)	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L183	0	L182 and (active near passive near client$2)	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L184	192	"6345294" or "6052718"	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L185	2	("6345294" or "6052718").pn.	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L186	498	2001/0039585 or "6571288" or "6134588" or "6078960" or "6539426" or "5870562" or "6035055" or "6041041" or "6081840" or "6185598" or "6304913" or "6338092" or "6505254" or "6581065" or 2002/0065938 or (2002/0186694 or 2003/0041094 or "6553413" or "6553420" or "6185619").pn.	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35

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L187	16	(2001/0039585, "6571288", "6134588", "6078960", "6539426", "5870562", "6035055", "6041041", "6081840", "6185598", "6304913", "6338092", "6505254", "6581065", 2002/0065938, 2002/0186694, 2003/0041094, "6553413", "6553420", "6185619").pn.	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L188	48	"370"/.clas. and "709"/.clas. and (group$4 near (topology or configuration))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L189	0	(NAT) with (partision) with (server or device) with (topology or configuration)	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L190	0	(NAT) with (partision) with (server or device)	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L191	0	(NAT) with (partision) with (server or device)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L192	0	(NAT) with (partition) with (server or device) with (topology or configuration)	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L193	9	(address near translation) with (partition) with (server or device)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L194	9	(NAT) with (partition)	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L195	7376	(network same address same translation)	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L196	35	L195 same partition	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L197	1157	L195 same (topology or configuration)	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L198	9	L197 same (partition)	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L199	856	L197 and ("370"/$.ccls. or "709"/$.ccls. or "711"/$.ccls.)	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L200	317	L199 and (server or device) same NAT	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35

EAST Search History

L201	36	L200 and (partition or divide)	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L202	8139	709/203.ccls.	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L203	2587	L202 and (network same (topology or configuration))	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L204	1815	711/202.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L205	1117	L204 and (partition$4 or divid$3)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L206	837	L205 and (topology or configuration or arrange$4)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L207	0	L204 same (NAT same server)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L208	1675	L202 and (network same (topology or configuration) same server)	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L209	2056	L202 and (network same (topology or configuration) same server same partition$4 or divid$4)	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L210	40	L202 and (network same (topology or configuration) same server same (partition$4 or divid$4) same (network "adj." address "adj." translation))	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L211	8	L204 and (NAT)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35

EAST Search History

L212	2	L206 and (network near address near translation)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L213	26	("4843541" | "5862357" | "5898883" | "5923847" | "5940870" | "6088770" | "6295584" | "6334177").PN. OR ("6510496"). URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2007/11/21 16:35
L214	1276	370/254.ccls. and (address "adj." translation)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L215	249	370/254.ccls. and (address "adj." translation).ab.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L216	18	(US-20010028654-$ or US-20020003780-$ or US-20020009086-$ or US-20020116493-$ or US-20020143935-$ or US-20030051032-$ or US-20030126202-$ or US-20050013255-$).did. or (US-5737319-$ or US-5796736-$ or US-5886643-$ or US-5926462-$ or US-5933416-$ or US-5940870-$ or US-5966513-$ or US-6046988-$ or US-6118768-$ or US-6205122-$ or US-6347336-$ or US-6377987-$ or US-6483812-$ or US-6510496-$ or US-6516345-$ or US-6625124-$ or US-6633560-$ or US-6643269-$ or US-6728670-$ or US-6798752-$ or US-6822943-$ or US-6829641-$). did.	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L217	6	L216 and (network same address same translat$4)	USPAT	OR	OFF	2007/11/21 16:35
L218	1	"6650641".pn.	USPAT	OR	OFF	2007/11/21 16:35

EAST Search History

L219	50	("5774660" | "5951694" | "6006264" | "6038233" | "6128642" | "6128657" | "6137777" | "6185619" | "6243379" | "6249801" | "6263368" | "6327622" | "6330602" | "6389462").PN. OR ("6650641"). URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2007/11/21 16:35
L220	3	L219 and (NAT same server same (topology or configuration))	US-PGPUB; USPAT; USOCR	OR	OFF	2007/11/21 16:35
L221	7	(NAT same server same (topology or configuration) same partition$4)	US-PGPUB; USPAT; USOCR	OR	OFF	2007/11/21 16:35
L222	1775	370/254.ccls. and (network "adj." address "adj." translat$4)	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L223	14	(network same (topology or configuration) same (partition or divide or allocate) same NAT)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L224	0	370/254.ccls. and (network same (topology or configuration) same (partition or divide or allocate) same NAT)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L225	0	370/254.ccls. and ((topology or configuration) same (partition or divide or allocate) same NAT)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L226	21	370/254.ccls. and ((topology or configuration) same NAT)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L227	2994	370/392.ccls.	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L228	1	L227 and (NAT same server same (partition or divide))	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L229	195	L227 and (NAT)	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L230	35	L227 and (NAT same (topology or configuration))	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L231	0	"20020038360".pn.	USPAT	OR	OFF	2007/11/21 16:35

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L232	1	"20020038360".pn.	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L233	1	"6092178".pn.	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L234	0	("network address translat$4") and (partition near servers)	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L235	0	("network address translation") and (partition near servers)	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L236	3434	("network address translation")	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L237	0	L236 and ("network (topology or configuration)")	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L238	288	L236 and (partition and server$1)	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L239	10	L238 and (@rlad<"20000124")	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L240	1	"6324580".pn.	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L241	1	"6959333".pn.	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L242	0	(network same topology) and (network same address same translatioin) and (server same monitor$3) and (behind same translat$4)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L243	0	(network same topology) and (network same address same translatioin) and (server same monitor$3)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L244	0	(network same topology) and (network same address same translatioin)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L245	996581	(network "adj." address "adj." translation).ab.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35

EAST Search History

L246	3376	L245 and (partition$3 or divide) same server$1	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L247	488	L246 and (@rlad<"20000124")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L248	0	(network same topology) and (network same address same translatioin)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L249	0	(network same (topology or configuration)) and (network same address same translatioin)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L250	154390	(network same (topology or configuration))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L251	3024	L250 and (NAT)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L252	221	L251 and (monitor and partition)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L253	10	L252 and (@rlad<"20000124")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35

EAST Search History

L254	511	L245 and ((partition$3 or divide) same server$1).ab.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L255	24	L254 and (@rlad<"20000124")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L256	0	("network address translation") and ("partition$3 server$1")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L257	758	("network address translation").ab.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L258	15	L257 and (@rlad<"20000124")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L259	4946	370/392.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L260	0	L259 and (("network address translation") same partition$3 same (server$1 or workstation$1))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L261	0	L259 and (("network address translation") same partition$3)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35

EAST Search History

L262	189	L259 and (("network address translation"))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L263	28	L262 and(@rlad<"20000124")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L264	0	(detemin$3 same network same (topology or configuration)) and ("network address translation")	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L265	3	(detemin$3 same network same (topology or configuration))	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L266	2	(NAT same DNS same partition$4)	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L267	6998	(partition$4 same server$1)	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L268	155	L267 and ("network address translation")	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L269	8	L268 and (@rlad<"20000124")	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L270	1802	370/254.ccls.	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L271	26	L270 and (partition$4 same (server$1 or worksation$1))	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L272	182	711/210.ccls.	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L273	35	L272 and (@rlad<"20000124")	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L274	1	"6449647".pn.	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L275	1	"6173322".pn.	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L276	0	(NAT same DNS same creat$4 same (sub-domain or workgroup))	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L277	337	(NAT same DNS)	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L278	2	(NAT same DNS same partition$4 same (server$1 or workgroup$1 or workstation$1))	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35

EAST Search History

L279	0	((NAT or (network adj address adj translation)) same (partition$3 near server$1)) and (@ad<"20000124" or @rlad<"20000124")	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L280	2	(NAT same DNS same sub same domain)	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L281	0	(NAT same DNS same creat$4 same (sub))	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L282	20	(NAT same DNS) and (@rlad<"20000124")	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L283	439	(network near (topology or configuration)) and ((partition$3 or divid$4) near (group$1 or subgroup$1))	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L284	187	L283 and (@rlad<"20000124" or @ad<"20000124")	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L285	147	L283 and (@rlad<"20000124" or @ad<"20000124")	USPAT	OR	OFF	2007/11/21 16:35
L286	6	L283 and (NAT) and (@rlad<"20000124" or @ad<"20000124")	USPAT	OR	OFF	2007/11/21 16:35
L287	19	L283 and (NAT or (network$1 adj address$1 adj translat$4)) and (@rlad<"20000124" or @ad<"20000124")	USPAT	OR	OFF	2007/11/21 16:35
L288	19	L283 and (NAT or (network$1 adj address$1 adj translat$4)) and (@rlad<"20000124" or @ad<"20000124")	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L289	615	(partition$3 near server$1)	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L290	146	(partition$3 near server$1) and (@ad<"20000124" or @rlad<"20000124")	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L291	23280	(NAT) and (@ad<"20000124" or @rlad<"20000124")	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L292	23441	(NAT or (network adj address adj translation)) and (@ad<"20000124" or @rlad<"20000124")	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L293	2	"6970944".pn.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35

EAST Search History

L294	0	((NAT or (network adj address adj translation)) and (partition$3 near server$1)) and (@ad<"20000124" or @rlad<"20000124")	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L295	11	((NAT or (network adj address adj translation)) and (partition$3 near server$1))	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L296	460	(NAT or (network adj address adj translation)).ab. or (NAT or (network adj address adj translation)).ti.	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L297	62	L296 and (@ad<"20000124" or @rlad<"20000124")	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L298	55	L296 and (@ad<"20000124" or @rlad<"20000124")	USPAT	OR	OFF	2007/11/21 16:35
L299	0	L296 and (@ad<"20000124" or @rlad<"20000124") and (server$1 near partition$1)	USPAT	OR	OFF	2007/11/21 16:35
L300	1	L296 and (@ad<"20000124" or @rlad<"20000124") and (partition$1)	USPAT	OR	OFF	2007/11/21 16:35
L301	789	370/254.ccls.	USPAT	OR	OFF	2007/11/21 16:35
L302	38	L301 and (@ad<"20000124" or @rlad<"20000124") and (partition$1)	USPAT	OR	OFF	2007/11/21 16:35
L303	1	"6650641".pn.	USPAT	OR	OFF	2007/11/21 16:35
L304	1	"6092178".pn.	USPAT	OR	OFF	2007/11/21 16:35
L305	9	(apparent near source near address)	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L306	3	L305 and (@rlad<"20000124")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L307	4	L305 and (@rlad<"20000124" or @ad<"20000124")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L308	2	"6505254".pn.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35

EAST Search History

L309	48	(firewall same (network adj security)).ab. and (addres$5 same (database or stor$5 or record$3 or tabl$3))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L310	20	L309 and (@rlad<"20000124")	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L311	48	(firewall same (network adj security)).ab. and (addres$5 same (database or stor$5 or record$3 or tabl$3)) and (@rlad<"20000124" or ad<"20000124")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L312	0	(firewall same (network adj security)).ab. and (addres$5 near tabl$3) and (@rlad<"20000124" or ad<"20000124")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L313	966	(firewall same (network adj security)) and (@rlad<"20000124" or ad<"20000124")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L314	127	(firewall same (network adj security)).ab. and (@rlad<"20000124" or ad<"20000124")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L315	24	(firewall same (network adj security)).ab. and (addres$5 same tabl$3) and (@rlad<"20000124" or ad<"20000124")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L316	966	(firewall same (network adj security))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35
L317	78	(server$1 and (network adj security)).ab. and (addres$5 same (database or stor$5 or record$3 or tabl$3))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/11/21 16:35

EAST Search History

L318	14	L317 and (@rlad<"20000124")	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L319	613	(address$3 and map$7).ab. and (@rlad<"20000124")	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L320	81	(address$3 and map$7).ab. and (compar$3 near address$3) and (@rlad<"20000124")	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L321	391	((NAT or (network adj address adj translat$5)) same (internal with IP) and (external with IP))	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35
L322	17	L321 and (@rlad<"20000124")	US-PGPUB; USPAT	OR	OFF	2007/11/21 16:35

751664_1
MBS/TJA
November 8, 2007



PATENT APPLICATION
Attorney's Docket No.: 2762.2002-002

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants:	Kirk Johnson, James O'Toole, M. Frans Kaashoek and John Jannotti		
Application No.:	09/824,553	Group:	2616
Filed:	April 2, 2001	Examiner:	Jay P. Patel
Confirmation No:	9887		
For:	METHOD AND APPARATUS FOR DETERMINING A NETWORK TOPOLOGY IN THE PRESENCE OF NETWORK ADDRESS TRANSLATION		

CERTIFICATE OF MAILING OR TRANSMISSION

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as First Class Mail in an envelope addressed to Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, or is being facsimile transmitted to the United States Patent and Trademark Office on:

11-8-07 Nicole Isabelle
Date Signature

Nicole Isabelle
Typed or printed name of person signing certificate

AMENDMENT

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This Amendment is being filed in response to the Office Action mailed from the U.S. Patent and Trademark Office on August 8, 2007 in the above-identified application. Reconsideration and further examination are requested.

Please amend the application as follows:

Amendments to the Claims

Please amend Claims 2, 5, 7-9, 14-16, 20, 25, and 36. Please cancel Claims 13, 17-18, 24, 28-29, 31, 33, and 35. The Claim Listing below will replace all prior versions of the claims in the application:

Claim Listing

1. (Cancelled)

2. (Currently Amended) The method according to Claim [[13]] 14 wherein the communications include at least one source address in a message.

3. (Original) The method according to Claim 2 wherein the source address includes an IP address.

4. (Original) The method according to Claim 2 wherein a unique identification number is included in the message.

5. (Currently Amended) The method according to Claim [[13]] 14 wherein monitoring includes distinguishing between communications affected by and not affected by network address translation.

6. (Original) The method according to Claim 5 wherein distinguishing includes comparing an apparent source address of a message against an actual source address provided in the message.

7. (Currently Amended) The method according to Claim [[13]] 14 further comprising assessing a range of network addresses behind the translating device.

8. (Currently Amended) The method according to Claim [[13]] 14 further comprising assessing a range of public network addresses associated with the translating device.

9. (Currently Amended) The method according to Claim [[13]] 14 further comprising distinguishing between active and passive clients.

10. (Original) The method according to Claim 9 further including directing a message from a passive client to an active client.

11. (Original) The method according to Claim 9 further including, from a processor beyond the translating device, causing a message to a passive client to be redirected to an active client, the active client responsively communicating with the processor beyond the translating device.

12. (Cancelled)

13. (Cancelled)

14. (Currently Amended) ~~The method according to Claim 13 further including~~ A method of determining a network topology induced by network address translation, comprising:

initiating communications, from a server behind a translating device, which effect the network address translation;

monitoring the communications beyond the translating device to infer partitioning of servers behind the translating device into equivalence sets relative to the network topology induced by the network address translation, maintaining at least one translated address set, and comparing apparent message source addresses with addresses in the at least one translated address set; and

merging translated address sets in response to determining that multiple apparent source addresses in distinct translated address sets correspond to the same actual source address.

15. (Currently Amended) The method according to Claim [[13]] 14 further including assessing whether the source address is behind a known address translation device.

16. (Currently Amended) The method according to Claim [[13]] 14 further comprising providing a timeout mechanism for removing an address from a translated address set.

17-19. (Cancelled)

20. (Currently Amended) The apparatus according to Claim [[24]] 25 wherein the messages received include at least one source address in the message.

21. (Original) The apparatus according to Claim 20 wherein the processor routine compares an apparent source address of a message against an actual source address provided in the message.

22. (Original) The apparatus according to Claim 20 further including at least one translated address set, the source address being stored in the translated address set.

23-24. (Cancelled)

25. (Currently Amended) ~~The apparatus according to Claim 24 wherein~~ Apparatus to be located beyond a network address translation device for determining a topology of a network in the presence of network address translation, comprising:

a processor coupled to a network interface for receiving communication from a network device effecting network address translation and further coupled to memory;

a processor routine operating on the processor, the processor routine to infer partitioning of servers behind a network address translation device into equivalence sets relative to the network topology induced by the network address translation and to store a database of translated address sets in the memory; and

a database manager to compare apparent message source addresses with addresses stored in the database of translated address sets, ~~the database manager provides~~ and to

provide a timeout mechanism for removing translated addresses from the translated address sets in the database.

26. (Previously Presented) Apparatus to be located behind a network address translation device for providing communications used to determine a topology of a network in the presence of network address translation, comprising:

a processor behind a network address translation device coupled to a network interface and to memory, the processor initiating communications to a server beyond the network address translation device to effect network address translation;

a processor routine operating on said processor, said processor routine providing the actual network address of the processor in a message of the communications unaffected by the network address translation; and

a processor routine storing a database of translated address sets in the memory.

27. (Original) The apparatus according to Claim 26 wherein said processor issues communications in response to receiving a communication from behind the network address translation device.

28-35. (Cancelled)

36. (Currently Amended) ~~The method according to Claim 35 further including~~ In a network device beyond a network address translation device, a method for determining a topology of a network in the presence of network address translation, the method comprising:

receiving communication messages from a network device effecting network address translation;

inferring partitioning of servers behind a network address translation device into equivalence sets relative to the network topology induced by the network address translation;

storing a database of translated address sets;

comparing apparent message source addresses with addresses stored in the database of translated address sets; and

removing translated addresses from the translated address sets in the database after exceeding a timeout duration.

37. (Previously Presented) In a network device located behind a network address translation device, a method for providing communications used to determine a topology of a network in the presence of network address translation, the method comprising:

initiating communications to a server beyond a network address translation device to effect network address translation;

providing the actual network address of a processor, behind the network address translation device, in a message of the communications unaffected by the network address translation; and

storing a database of translated address sets in the memory.

38. (Original) The method according to Claim 37 further including issuing communications in response to receiving a communication from behind the network address translation device.

REMARKS

Claims 2-11, 13-18, 20-22, 24-29, 31, 33, and 35-38 are pending in the application. Claims 2-11, 13, 15, 17, 18, 20-22, 24, 28-29, 31, 33, and 35 stand rejected. Claims 26-27 and 37-38 are allowed. Claims 14, 16, 25, and 36 are objected to. Claims 13, 17-18, 24, 28-29, 31, 33, and 35 are being cancelled. No new matter is being introduced by way of this amendment.

Allowable Subject matter

Applicants note, with appreciation, that the Office Action on page 18, part 10 states, "Claims 26-27 and 37-38 are allowed."

Claim Objections

Claims 14, 16, 25, and 36 stand objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Dependent Claim 14, which stands objected to, is being amended in the Claim Listing above to include all of the elements of independent Claim 13, which is being cancelled, accordingly.

Claims 2, 5, 7-9, and 16 are being amended in the Claim Listing above to depend from now amended Claim 14. Dependent claims 3-4, 6, 10-11, and 15 include all of the elements of now amended Claim 14 by way of their dependency.

Dependent Claim 16, which stands objected to, is being amended to now depend from Independent Claim 14.

Dependent Claim 25, which stands objected to, is being amended in the Claim Listing above to include all of the elements of independent Claim 24, which is being cancelled, accordingly.

Dependent Claim 20 is being amended in the Claim Listing above to depend from now amended Claim 25. Dependent Claims 21 and 22 include all of the elements of now amended Claim 25 by way of their dependency.

Claim 36, which stands objected to, is being amended in the Claim Listing above to include all of the elements of independent Claim 35, which is being cancelled, accordingly.

Accordingly, Applicants respectfully submit that Claims 2-11, 14-16, 20-22, 25-27, and 36-38 are in condition for allowance.

No new matter is being introduced by way of these amendments. Applicants have amended the claims as described above for the purposes of expediting prosecution. Applicants reserve the right to re-file the claims as originally filed or previously amended in a continuing application.

Claim Rejections

Claim 28 stands rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

In view of the foregoing amendments in the Claim Listing and remarks, Applicants respectfully submit that this rejection is now moot.

Claims 2-11, 13, 15, 17, 20-22, 24, and 28-35 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Albert et al., U.S. Patent No. 6,650,641 (hereinafter "Albert"), further in view of Jindal et al., U.S. Patent No. 6,092,178 (hereinafter "Jindal"), further in view of Bhatia et al., U.S. Patent No. 6,563,824 (hereinafter "Bhatia").

In view of the foregoing amendments in the Claim Listing and remarks, Applicants respectfully submit that this rejection is now moot.

Claim 18 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Albert further in view of Jindal further in view of Boden et al., U.S. Patent No. 6,717,949 (hereinafter "Boden").

In view of the foregoing amendments in the Claim Listing and remarks, Applicants respectfully submit that this rejection is now moot.

CONCLUSION

In view of the above amendments and remarks, it is believed that all claims that will be pending after entry of this Amendment, Claims 2-11, 14-16, 20-22, 25-27, and 36-38, are in condition for allowance, and it is respectfully requested that the application be passed to issue. If the Examiner feels that a telephone conference would expedite prosecution of this case, the Examiner is invited to call the undersigned.

Respectfully submitted,

HAMILTON, BROOK, SMITH & REYNOLDS, P.C.

By _____

Thomas J. Arria
Registration No. 60,223
Telephone: (978) 341-0036
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Concord, MA 01742-9133
Date: 11/8/07

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November 8, 2007

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PATENT & TRADEMARK OFFICE

2616
PATENT APPLICATION
DOCKET NO. 2762.2002-002

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: Kirk Johnson, James O'Toole, M. Frans Kaashoek and John Jannotti

Application No.: 09/824,553 Group: 2616

Filed: April 2, 2001 Examiner: Jay P. Patel

Confirmation No.: 9887

For: METHOD AND APPARATUS FOR DETERMINING A NETWORK TOPOLOGY IN THE PRESENCE OF NETWORK ADDRESS TRANSLATION

CERTIFICATE OF MAILING OR TRANSMISSION

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11-8-07 Nicole Isabelle
Date Signature

Nicole Isabelle
Typed or printed name of person signing certificate

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Transmitted herewith is an Amendment for filing in the above-identified application.

☐ Small entity status of this application under 37 CFR 1.9 and 1.27 has been established by a Small Entity Statement previously submitted.

☐ A Small Entity Statement to establish small entity status under 37 CFR 1.9 and 1.27 is enclosed.

The claims fee has been calculated as shown below:

	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NO. PREVIOUSLY PAID FOR	PRESENT EXTRA	SMALL ENTITY RATE	SMALL ENTITY ADDIT. FEE	OR	OTHER THAN SMALL ENTITY RATE	OTHER THAN SMALL ENTITY ADDIT. FEE
TOTAL	22	MINUS	* 38	0	X $25	$		X 50	$
INDEP	5	MINUS	** 7	0	X $105	$		X $210	$
☐ FIRST PRESENTATION OF MULTIPLE DEP. CLAIM					+ $185	$		+ $370	$
					TOTAL =	$ 0		TOTAL =	$ 0

* not fewer than 20
** not fewer than 3

The Application Size Fee has been calculated as shown below:
(Effective for cases filed on or after December 8, 2004)

Actual Sheets (Including current amendment)	Highest No. of Sheets Paid For (At least 100)	No. of Additional Units Required (Increments of 50 sheets)	SMALL ENTITY Rate	SMALL ENTITY Total Amount Owed	OTHER THAN SMALL ENTITY Rate	OTHER THAN SMALL ENTITY Total Amount Owed	Payment Sufficient for up to
			X $130	$[ ]	X $260	$[ ]	[ ] Sheets

Petition for Extension of Time

☐ Applicant hereby petitions to extend the time to respond to the [ ] dated [ ] for [ ] month(s) from [ ] to [ ]. The appropriate fee is set forth below.

☐ *[For action-specific language in an extension of time, select the appropriate option from the Firm Templates]*

Please charge Deposit Account No. 08-0380 for the following fees:

☐	Petition for [ ] month Extension of Time	$
☐	Claims Fee	$
☐	Application Size Fee	$
☐	Other Fees:	
	_____	$
	_____	$
	TOTAL:	$

A check is enclosed in payment of the following fees:

☐	Petition for [ ] month Extension of Time	$
☐	Claims Fee	$
☐	Application Size Fee	$
☐	Other Fees:	
	_____	$
	_____	$
	TOTAL:	$

☒ Please charge any deficiency or credit any overpayment in the fees that may be due in this matter to Deposit Account No. 08-0380. A copy of this letter is enclosed for accounting purposes.

Respectfully submitted,

HAMILTON, BROOK, SMITH & REYNOLDS, P.C.

By _____

Thomas J. Arria, Esq.
Registration No.: 60,223
Telephone (978) 341-0036
Facsimile (978) 341-0136

Concord, Massachusetts 01742-9133

Dated: 11/8/07

PTO/SB/06 (07-06)
Approved for use through 1/31/2007. 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 displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number	Filing Date	☐ To be Mailed
09/824,553	04/02/2001	

APPLICATION AS FILED – PART I

	(Column 1)	(Column 2)	SMALL ENTITY ☐		OR	OTHER THAN SMALL ENTITY	
FOR	NUMBER FILED	NUMBER EXTRA	RATE ($)	FEE ($)		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A	N/A			N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =		OR	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =			X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $250 ($125 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).						
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT	11/13/2007	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE ($)	ADDITIONAL FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 22	Minus	** 38	= 0	X $ =		OR	X $50=	0
	Independent (37 CFR 1.16(h))	* 5	Minus	*** 7	= 0	X $ =		OR	X $210=	0
	☐ 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	0

AMENDMENT		(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 number found in the appropriate box in column 1.

Legal Instrument Examiner:
/Margaret Byars/

This collection of information is required by 37 CFR 1.16. 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, 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.**

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/824,553	04/02/2001	Kirk Johnson	2762.2002-002	9887

21005 7590 08/08/2007

HAMILTON, BROOK, SMITH & REYNOLDS, P.C.
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P.O. BOX 9133
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EXAMINER	
PATEL, JAY P	
ART UNIT	**PAPER NUMBER**
2616	

MAIL DATE	DELIVERY MODE
08/08/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	09/824,553	JOHNSON ET AL.	
	Examiner	Art Unit	
	Jay P. Patel	2616	

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

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05 April 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *2-11,13-18,20-22,24-29,31,33 and 35-38* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *26,27,37 and 38* is/are allowed.

6)☒ Claim(s) *2-11,13,15,17,18,20-22,24,28,29,31,33 and 35* is/are rejected.

7)☒ Claim(s) *14, 16, 25 and 36* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

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)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. This office action is in response to the RCE/remarks/amendment filed 4/5/2007.

2. Claims 2-11, 13-18, 20-22, 24-29, 31, 33 and 35-38 are pending.

3. Claims 2-11, 13, 15, 17, 18 20-22, 24, 28-29, 31, 33 and 35 are rejected.

4. Claims 26-27 and 37-38 are allowed.

5. Claims 14, 16, 25 and 36 are objected to.

6. Claims 1, 12, 19, 23, 30, 32 and 34 are cancelled.

Claim Rejections - 35 USC § 101

7. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claim 28 is rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter (i.e. a computer program product).

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 2-11, 13, 15, 17, 20-22, 24 and 28-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Albert et al. (U.S. Patent No. 6650641 B1) further in view of Jindal et al. (U.S. Patent 6092178) further in view of Bhatia et al. (US Patent 6563824 B1).

3. In regards to claims 13 and 24, Albert discloses in figure 2 forwarding agents 231, 232, service mangers 241, 242 and a group of servers 220. Furthermore, figure 11 illustrates how a forwarding agent and a service manager implement NAT between a client and a virtual machine (see figure 11 and column 28, lines 1-19). The forwarding agent and the service manager are obvious over a translating device and the virtual machine is obvious over a server. The implementation of the NAT by the forwarding agent and a service manger is obvious over initiating communications, from a server behind the translating device, which effect the network address translation.

In further regards, Albert fails to particularly disclose monitoring the communication beyond the translation device to infer partitioning of servers behind the translation device into equivalent sets relative to the network topology induced by the network address translation. Jindal teaches the above-mentioned limitations in figure 2. Jindal describes that a load-balancing application may be exposed to requesting clients through a virtual server name; clients contact a DNS server to determine a server offering desired application. Jindal also mentions that it is well known in the art the DNS servers typically satisfy client request by resolving the virtual server name to an identity (i.e., a network address) of one network server within a pool of suitable servers (see column 7, lines 1-9). Jindal also mentions the a preferred server may be identified by the client on a regular or periodic basis, and may be the same as or different from the one previously identified; thus, client requests are distributed among the participating servers and the application is load-balanced (see column 6, lines 36-43). This disclosure is obvious over monitoring the communications beyond a translating device

to infer partitioning of servers. Jindal also discloses that based on the selected policy, each status object 200 may measure the response time of its associated server (110, 112, 114) or the application instance operating on the server to implement load balancing policies (See figure 2 and column 8, lines 30-46). This disclosure is obvious over partitioning servers behind the translating device into equivalence sets relative to the network topology induced by the network address translation.

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to combine the Network address translation (NAT) between a client and a virtual machine disclosed by Albert with the load balancing disclosed by Jindal. The advantage of doing so would be properly load balance client request based on NAT and load balancing policies. The motivation to combine comes from Jindal, which would be to enhance the functionality and flexibility of a network name service such as DNS (Domain Name Service).

In further regards to claims 13 and 24, neither Albert nor Jindal teach comparing the apparent message source address with the address in the translated address set. Bhatia however teaches the above-mentioned limitation in figure 7. Figure 7, illustrates a method carried out after a packet has passed a LAN modem, where the source address is disguised using NAT. Step 705 is a search is made in the NAT table for a public source port number that matches that of the packet's.

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to combine the address comparison taught by Bhatia into the Network address translation (NAT) between a client and a virtual machine disclosed by

Albert with the load balancing disclosed by Jindal. The motivation to combine would be to allow for secure routing even when the actual addresses are replaced by apparent addresses.

In regards to claims 2, 3 and 20 Albert discloses in figure 7, a wildcard affinity diagram. The wildcard affinity diagram includes a source IP address.

In regards to claim 4, the source IP address included in the wildcard affinity diagram also is obvious over a unique identification number in the message.

In regards to claim 5, Albert discloses in figure 13, a flowchart illustrating a process implemented on a forwarding agent for executing NAT as directed by a service manger. In the affinity step 1306, the forwarding agent checks the action specified in the affinity. If the action specifies that the packet be to be forwarded to the service manger, then control is transferred to step 1308 and the packet is sent to a service manger. If the action specifies that the packet is to undergo Nat then control is transferred to step 1310 where the source IP address is changed (see figure 13, and column 29, lines 56-67 and column 30, line 1). The action that specifies whether the packet is to go NAT or forwarded to the service manager, is obvious over distinguishing between communications affected by and not affected by network address translation.

In regards to claims 6, 15, 21 and 22, Albert in combination with Jindal and Bhatia teaches all the limitations of parent claim 13 and 24. Neither Albert nor Jindal teach comparing the apparent message source address with the address in the translated address set and assessing whether the source address is behind a know translation device. Bhatia however teaches the above-mentioned limitations in figures 7

and 8. Figure 7, illustrates a method carried out after a packet has passed a LAN modem, where the source address is disguised using NAT. Step 705 is a search is made in the NAT table for a public source port number that matches that of the packet's. In figure 8, at step 810, a packet is transmitted to the proper server/workstation if a match is found in the NAT table.

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to combine the address comparison taught by Bhatia into the Network address translation (NAT) between a client and a virtual machine disclosed by Albert with the load balancing disclosed by Jindal. The motivation to combine would be to allow for secure routing even when the actual addresses are replaced by apparent addresses.

In regards to claim 7, Albert discloses that to specify a single host the wildcard affinity include an IP address with a specific net mask. To specify the range of hosts (i.e. from 1.1.1.0 to 1.1.1.255), the wildcard affinity would include IP address of 1.1.1.0 with a net mask of 255.255.255.0 (see column 17, lines 47-54). The range of host with the IP address, anticipate, assessing a range of network addresses behind the translating device.

In regards to claim 8, from figure 2A, it is evident that the host whether they are clients or servers, are connected to the service managers and forward agents; therefore, the disclosure used with regards to claim 7, is also applicable to claim 8.

In regards to claims 9 and 10, figure 2A discloses a plurality of clients, forwarding agents, service mangers and servers. The servers communicate with network through

forwarding agents (see column 6, lines 46-53). The forward agents have knowledge of the network and since the servers communicate to the network via the forwarding agents, it is anticipated that passive and active clients are distinguished and that messages are directed from the passive to the active client.

In regards to clam 11, the service manager and the forwarding agent, respectively contain processors 252 and 272. Both processors are respectively connected to a network interface. The network interface in the forwarding agent is used to send and receive packets to and from other devices on the network (see column 9, lines 61-64). The network interface in the service manager allows the service manager to directly forward packets into the network from which it is providing a service (see column 10, lines 23-25). The respective processors and their connection to the network interface and its functions anticipate from a processor beyond the translating device, causing a message to a passive client to be redirected to an active client, the active client responsive communicating with the processor beyond the translating device.

4. In regards to claim 17 Albert discloses in figure 2 forwarding agents 231, 232, service mangers 241, 242 and a group of servers 220. Furthermore, figure 11 illustrates how a forwarding agent and a service manager implement NAT between a client and a virtual machine (see figure 11 and column 28, lines 1-19). The forwarding agent and the service manager are obvious over a translating device and the virtual machine is obvious over a server. The implementation of the NAT by the forwarding agent and a service manger is obvious over initiating communications, from a server behind the translating device, which effect the network address translation.

In further regards, Albert fails to particularly disclose monitoring the communication beyond the translation device to infer partitioning of servers behind the translation device into equivalent sets relative to the network topology induced by the network address translation. Jindal teaches the above-mentioned limitations in figure 2. Jindal describes that a load-balancing application may be exposed to requesting clients through a virtual server name; clients contact a DNS server to determine a server offering desired application. Jindal also mentions that it is well known in the art the DNS servers typically satisfy client request by resolving the virtual server name to an identity (i.e., a network address) of one network server within a pool of suitable servers (see column 7, lines 1-9). Jindal also mentions the a preferred server may be identified by the client on a regular or periodic basis, and may be the same as or different from the one previously identified; thus, client requests are distributed among the participating servers and the application is load-balanced (see column 6, lines 36-43). This disclosure is obvious over monitoring the communications beyond a translating device to infer partitioning of servers. Jindal also discloses that based on the selected policy, each status object 200 may measure the response time of its associated server (110, 112, 114) or the application instance operating on the server to implement load balancing policies (See figure 2 and column 8, lines 30-46). This disclosure is obvious over partitioning servers behind the translating device into equivalence sets relative to the network topology induced by the network address translation.

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to combine the Network address translation (NAT) between a client

and a virtual machine disclosed by Albert with the load balancing disclosed by Jindal. The advantage of doing so would be properly load balance client request based on NAT and load balancing policies. The motivation to combine comes from Jindal, which would be to enhance the functionality and flexibility of a network name service such as DNS (Domain Name Service).

In further regards to claim 17 neither Albert nor Jindal teach commanding a new client to contact a known client behind the same network address translation device. Bhatia however teaches the above-mentioned limitation in figure 8. In figure 8, at step 810, a packet is transmitted to the proper workstation behind the server if a match is found in the NAT table. Therefore, it would have been obvious to one skilled in the art at the time the invention was made to combine the address comparison taught by Bhatia into the Network address translation (NAT) between a client and a virtual machine disclosed by Albert with the load balancing disclosed by Jindal. The motivation to combine would be to allow for secure routing even when the actual addresses are replaced by apparent addresses.

5. In regards to claims 28 and 29, forwarding agent and the service manager respectively contain memories 254 and 274 connected to the respective processors (see figures 2B and 2C). The memories are obvious over a computer usable medium for storing data.

In further regards to claim 28 and claim 30, Albert discloses in figure 2, forwarding agents 231, 232, service mangers 241, 242 and a group of servers 220.

Furthermore, figure 11 illustrates how a forwarding agent and a service manager implement NAT between a client and a virtual machine (see figure 11 and column 28, lines 1-19). The implementation of the NAT by the forwarding agent and a service manger is obvious over receiving communications from a network device effecting network address translation.

In further regards, Albert fails to particularly disclose infer partitioning of servers behind the translation device into equivalent sets relative to the network topology induced by the network address translation. Jindal teaches the above-mentioned limitations in figure 2. Jindal describes that a load-balancing application may be exposed to requesting clients through a virtual server name; clients contact a DNS server to determine a server offering desired application. Jindal also mentions that it is well known in the art the DNS servers typically satisfy client request by resolving the virtual server name to an identity (i.e., a network address) of one network server within a pool of suitable servers (see column 7, lines 1-9). Jindal also mentions the a preferred server may be identified by the client on a regular or periodic basis, and may be the same as or different from the one previously identified; thus, client requests are distributed among the participating servers and the application is load-balanced (see column 6, lines 36-43). This disclosure is obvious over monitoring the communications beyond a translating device to infer partitioning of servers. Jindal also discloses that based on the selected policy, each status object 200 may measure the response time of its associated server (110, 112, 114) or the application instance operating on the server to implement load balancing policies (See figure 2 and column 8, lines 30-46). This

disclosure is obvious over partitioning servers behind the translating device into equivalence sets relative to the network topology induced by the network address translation.

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to combine the Network address translation (NAT) between a client and a virtual machine disclosed by Albert with the load balancing disclosed by Jindal. The advantage of doing so would be properly load balance client request based on NAT and load balancing policies. The motivation to combine comes from Jindal, which would be to enhance the functionality and flexibility of a network name service such as DNS (Domain Name Service).

In further regards to claims 28 and 29 neither Albert nor Jindal teach storing a database of translated address set in memory and comparing the address with the apparent address. Bhatia however teaches the above-mentioned limitation in figure 7. Figure 7, illustrates a method carried out after a packet has passed a LAN modem, where the source address is disguised using NAT. Step 705 is a search is made in the NAT table for a public source port number that matches that of the packet's.

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to combine the address comparison taught by Bhatia into the Network address translation (NAT) between a client and a virtual machine disclosed by Albert with the load balancing disclosed by Jindal. The motivation to combine would be to allow for secure routing even when the actual addresses are replaced by apparent addresses.

6. In regards to claim 31, Albert discloses in figure 2 forwarding agents 231, 232, service mangers 241, 242 and a group of servers 220. Furthermore, figure 11 illustrates how a forwarding agent and a service manager implement NAT between a client and a virtual machine (see figure 11 and column 28, lines 1-19). The forwarding agent and the service manager are obvious over a translating device and the virtual machine is obvious over a server. The implementation of the NAT by the forwarding agent and a service manger is obvious over initiating communications, from a server behind the translating device, which effect the network address translation.

In further regards, Albert fails to particularly disclose monitoring the communication beyond the translation device to infer partitioning of servers behind the translation device into equivalent sets relative to the network topology induced by the network address translation. Jindal teaches the above-mentioned limitations in figure 2. Jindal describes that a load-balancing application may be exposed to requesting clients through a virtual server name; clients contact a DNS server to determine a server offering desired application. Jindal also mentions that it is well known in the art the DNS servers typically satisfy client request by resolving the virtual server name to an identity (i.e., a network address) of one network server within a pool of suitable servers (see column 7, lines 1-9). Jindal also mentions the a preferred server may be identified by the client on a regular or periodic basis, and may be the same as or different from the one previously identified; thus, client requests are distributed among the participating servers and the application is load-balanced (see column 6, lines 36-43). This disclosure is obvious over monitoring the communications beyond a translating device

to infer partitioning of servers. Jindal also discloses that based on the selected policy, each status object 200 may measure the response time of its associated server (110, 112, 114) or the application instance operating on the server to implement load balancing policies (See figure 2 and column 8, lines 30-46). This disclosure is obvious over partitioning servers behind the translating device into equivalence sets relative to the network topology induced by the network address translation.

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to combine the Network address translation (NAT) between a client and a virtual machine disclosed by Albert with the load balancing disclosed by Jindal. The advantage of doing so would be properly load balance client request based on NAT and load balancing policies. The motivation to combine comes from Jindal, which would be to enhance the functionality and flexibility of a network name service such as DNS (Domain Name Service).

In further regards to claim 31 and dependent claim 33 neither Albert nor Jindal teach comparing the apparent message source address with the address in the translated address set and having the source address in the translated address set. Bhatia however teaches the above-mentioned limitation in figure 7. Figure 7, illustrates a method carried out after a packet has passed a LAN modem, where the source address is disguised using NAT. Step 705 is a search is made in the NAT table for a public source port number that matches that of the packet's.

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to combine the address comparison taught by Bhatia into the

Network address translation (NAT) between a client and a virtual machine disclosed by Albert with the load balancing disclosed by Jindal. The motivation to combine would be to allow for secure routing even when the actual addresses are replaced by apparent addresses.

7. In regards to claim 35, forwarding agent and the service manager respectively contain memories 254 and 274 connected to the respective processors (see figures 2B and 2C). The memories are obvious over a computer usable medium for storing data.

In further regards to claim 28 and claim 30, Albert discloses in figure 2, forwarding agents 231, 232, service mangers 241, 242 and a group of servers 220. Furthermore, figure 11 illustrates how a forwarding agent and a service manager implement NAT between a client and a virtual machine (see figure 11 and column 28, lines 1-19). The implementation of the NAT by the forwarding agent and a service manger is obvious over receiving communications from a network device effecting network address translation.

In further regards, Albert fails to particularly disclose infer partitioning of servers behind the translation device into equivalent sets relative to the network topology induced by the network address translation. Jindal teaches the above-mentioned limitations in figure 2. Jindal describes that a load-balancing application may be exposed to requesting clients through a virtual server name; clients contact a DNS server to determine a server offering desired application. Jindal also mentions that it is well known in the art the DNS servers typically satisfy client request by resolving the virtual server name to an identity (i.e., a network address) of one network server within

a pool of suitable servers (see column 7, lines 1-9). Jindal also mentions the a preferred server may be identified by the client on a regular or periodic basis, and may be the same as or different from the one previously identified; thus, client requests are distributed among the participating servers and the application is load-balanced (see column 6, lines 36-43). This disclosure is obvious over monitoring the communications beyond a translating device to infer partitioning of servers. Jindal also discloses that based on the selected policy, each status object 200 may measure the response time of its associated server (110, 112, 114) or the application instance operating on the server to implement load balancing policies (See figure 2 and column 8, lines 30-46). This disclosure is obvious over partitioning servers behind the translating device into equivalence sets relative to the network topology induced by the network address translation.

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to combine the Network address translation (NAT) between a client and a virtual machine disclosed by Albert with the load balancing disclosed by Jindal. The advantage of doing so would be properly load balance client request based on NAT and load balancing policies. The motivation to combine comes from Jindal, which would be to enhance the functionality and flexibility of a network name service such as DNS (Domain Name Service).

In further regards to claim 35 neither Albert nor Jindal teach storing a database of translated address set in memory and comparing the address with the apparent address. Bhatia however teaches the above-mentioned limitation in figure 7. Figure 7,

illustrates a method carried out after a packet has passed a LAN modem, where the source address is disguised using NAT. Step 705 is a search is made in the NAT table for a public source port number that matches that of the packet's.

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to combine the address comparison taught by Bhatia into the Network address translation (NAT) between a client and a virtual machine disclosed by Albert with the load balancing disclosed by Jindal. The motivation to combine would be to allow for secure routing even when the actual addresses are replaced by apparent addresses.

8. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Albert et al. (U.S. Patent No. 6650641 B1) further in view of Jindal et al. (U.S. Patent 6092178) further in view of Boden et al. (US Patent 6717949 B1).

9. In regards to claim 18, Albert discloses in figure 2 forwarding agents 231, 232, service mangers 241, 242 and a group of servers 220. Furthermore, figure 11 illustrates how a forwarding agent and a service manager implement NAT between a client and a virtual machine (see figure 11 and column 28, lines 1-19). The forwarding agent and the service manager are obvious over a translating device and the virtual machine is obvious over a server. The implementation of the NAT by the forwarding agent and a service manger is obvious over initiating communications, from a server behind the translating device, which effect the network address translation.

In further regards, Albert fails to particularly disclose monitoring the communication beyond the translation device to infer partitioning of servers behind the translation device into equivalent sets relative to the network topology induced by the network address translation. Jindal teaches the above-mentioned limitations in figure 2. Jindal describes that a load-balancing application may be exposed to requesting clients through a virtual server name; clients contact a DNS server to determine a server offering desired application. Jindal also mentions that it is well known in the art the DNS servers typically satisfy client request by resolving the virtual server name to an identity (i.e., a network address) of one network server within a pool of suitable servers (see column 7, lines 1-9). Jindal also mentions the a preferred server may be identified by the client on a regular or periodic basis, and may be the same as or different from the one previously identified; thus, client requests are distributed among the participating servers and the application is load-balanced (see column 6, lines 36-43). This disclosure is obvious over monitoring the communications beyond a translating device to infer partitioning of servers. Jindal also discloses that based on the selected policy, each status object 200 may measure the response time of its associated server (110, 112, 114) or the application instance operating on the server to implement load balancing policies (See figure 2 and column 8, lines 30-46). This disclosure is obvious over partitioning servers behind the translating device into equivalence sets relative to the network topology induced by the network address translation.

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to combine the Network address translation (NAT) between a client

and a virtual machine disclosed by Albert with the load balancing disclosed by Jindal. The advantage of doing so would be properly load balance client request based on NAT and load balancing policies. The motivation to combine comes from Jindal, which would be to enhance the functionality and flexibility of a network name service such as DNS (Domain Name Service).

In further regards to claim 18, neither Albert nor Jindal teach occasionally refreshing a partition list. Boden however, teaches the above-mentioned limitation. Boden discloses HIDE statements for a NAT procedure when a new datagram is received (thus refreshing takes place) and address translation needs to be performed. An example is shown in table 1 in column 3 where a server group behind a device with a public address is hidden.

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to incorporate the command statements as taught by Boden into the Network address translation (NAT) between a client and a virtual machine disclosed by Albert with the load balancing disclosed by Jindal. The motivation to combine would be to selectively masquerade individual source addresses into various public addresses.

Allowable Subject Matter

10. Claims 26-27 and 37-38 are allowed.

11. In regards to claims 26 and 37, the cited prior art fails to teach either individually or in combination, providing an actual network address when a packet isn't affected by Network address translation.

Response to Arguments

12. Applicant's arguments with respect to claims 13, 17-18, 24, 28-29, 31 and 35 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

13. Claims 14, 16, 25 and 36 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jay P. Patel whose telephone number is (571) 272-3086. The examiner can normally be reached on M-F 9:00 am - 5:00 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hassan Kizou can be reached on (571) 272-3088. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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.

jpp 7/31/07

Jay P. Patel
Assistant Examiner
Art Unit 2616

HASSAN KIZOU
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600

Notice of References Cited	Application/Control No. 09/824,553	Applicant(s)/Patent Under Reexamination JOHNSON ET AL.	
	Examiner Jay P. Patel	Art Unit 2616	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-6,563,824 B1	05-2003	Bhatia et al.	370/392
*	B	US-6,717,949 B1	04-2004	Boden et al.	370/401
*	C	US-6,510,154 B1	01-2003	Mayes et al.	370/389
*	D	US-6,768,743 B1	07-2004	Borella et al.	370/401
	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					
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	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
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	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.

Index of Claims

Application/Control No.	Applicant(s)/Patent under Reexamination
09/824,553	JOHNSON ET AL.
Examiner	**Art Unit**
Jay P. Patel	2616

√	Rejected	–	(Through numeral) Cancelled	N	Non-Elected	A	Appeal
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Search Notes	Application/Control No.	Applicant(s)/Patent under Reexamination
	09/824,553	JOHNSON ET AL.
	Examiner	Art Unit
	Jay P. Patel	2616

SEARCHED			
Class	Subclass	Date	Examiner
updated	East subclass search	7/30/2007	JPP

INTERFERENCE SEARCHED			
Class	Subclass	Date	Examiner

SEARCH NOTES (INCLUDING SEARCH STRATEGY)		
	DATE	EXMR
updated east keyword search	7/30/2007	JPP

EAST Search History

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S1	763	(network adj address adj translation).ti. or (network adj address adj translation).ab.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/30 16:27
S2	101	S1 and (@rlad<"20000124" or @ad<"20000124")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/31 15:08
S3	763	(network adj address adj translation).ti. or (network adj address adj translation).ab.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/31 15:08
S4	101	S3 and (@rlad<"20000124" or @ad<"20000124")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/31 15:08
S5	1	S4 and (partition$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/31 16:02
S6	9	S4 and (timeout or ((time or period) near elaps$4))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/31 16:02

EAST Search History

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	2430	(network near topology).ab.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/31 18:54
L4	1685	370/254.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/31 18:54
L6	0	370/254.clas. and (network near topology).ti.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/31 18:54
L11	942	(network near configuration).ti.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/31 18:54
L12	0	L11 and 370/254.clas.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/31 18:54
L14	0	370/254.ccls and (passive near active near clients).ab.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/31 18:54
L15	0	370/254.ccls and (passive near active).ab.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/31 18:54
L16	0	370/254.ccls and (passive near active)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/31 18:54

EAST Search History

L17	0	370/254.ccls and (mask$3 near IP)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/31 18:54
L18	0	370/254.ccls and (network near translation)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/31 18:54
L19	0	370/254.ccls and (network near address near translation)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/31 18:54
L20	1651	370/254.ccls. and (network "adj." address "adj." translat$4)	US-PGPUB; USPAT	OR	OFF	2007/07/31 18:54
L22	0	L21 and (active near passive near client$2)	US-PGPUB; USPAT	OR	OFF	2007/07/31 18:54
L23	184	"6345294" or "6052718"	US-PGPUB; USPAT	OR	OFF	2007/07/31 18:54
L28	0	(NAT) with (partision) with (server or device) with (topology or configuration)	US-PGPUB; USPAT	OR	OFF	2007/07/31 18:54
L29	0	(NAT) with (partision) with (server or device)	US-PGPUB; USPAT	OR	OFF	2007/07/31 18:54
L30	0	(NAT) with (partision) with (server or device)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/31 18:54
L31	0	(NAT) with (partition) with (server or device) with (topology or configuration)	US-PGPUB; USPAT	OR	OFF	2007/07/31 18:54
L34	6937	(network same address same translation)	US-PGPUB; USPAT	OR	OFF	2007/07/31 18:54
L36	1091	L34 same (topology or configuration)	US-PGPUB; USPAT	OR	OFF	2007/07/31 18:54
L39	292	L38 and (server or device) same NAT	US-PGPUB; USPAT	OR	OFF	2007/07/31 18:54
L41	7789	709/203.ccls.	US-PGPUB; USPAT	OR	OFF	2007/07/31 18:54
L42	2469	L41 and (network same (topology or configuration))	US-PGPUB; USPAT	OR	OFF	2007/07/31 18:54

EAST Search History

L43	1610	L41 and (network same (topology or configuration) same server)	US-PGPUB; USPAT	OR	OFF	2007/07/31 18:54
L44	1972	L41 and (network same (topology or configuration) same server same partition$4 or divid$4)	US-PGPUB; USPAT	OR	OFF	2007/07/31 18:54
L46	1736	711/202.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/31 18:54
L48	0	L46 same (NAT same server)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/31 18:54
L49	1068	L46 and (partition$4 or divid$3)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/31 18:54
L50	801	L49 and (topology or configuration or arrange$4)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/31 18:54
L61	1651	370/254.ccls. and (network "adj." address "adj." translat$4)	US-PGPUB; USPAT	OR	OFF	2007/07/31 18:54
L63	0	370/254.ccls. and (network same (topology or configuration) same (partition or divide or allocate) same NAT)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/31 18:54
L64	0	370/254.ccls. and ((topology or configuration) same (partition or divide or allocate) same NAT)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/31 18:54
L66	2759	370/392.ccls.	US-PGPUB; USPAT	OR	OFF	2007/07/31 18:54
L70	0	"20020038360".pn.	USPAT	OR	OFF	2007/07/31 18:54
L73	0	("network address translat$4") and (partition near servers)	US-PGPUB; USPAT	OR	OFF	2007/07/31 18:54

EAST Search History

L74	0	("network address translation") and (partition near servers)	US-PGPUB; USPAT	OR	OFF	2007/07/31 18:54
L75	3183	("network address translation")	US-PGPUB; USPAT	OR	OFF	2007/07/31 18:54
L76	0	L75 and ("network (topology or configuration)")	US-PGPUB; USPAT	OR	OFF	2007/07/31 18:54
L81	0	(network same topology) and (network same address same translatioin) and (server same monitor$3) and (behind same translat$4)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/31 18:54
L82	0	(network same topology) and (network same address same translatioin) and (server same monitor$3)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/31 18:54
L83	0	(network same topology) and (network same address same translatioin)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/31 18:54
L84	0	(network same topology) and (network same address same translatioin)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/31 18:54
L85	0	(network same (topology or configuration)) and (network same address same translatioin)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/31 18:54
L86	145965	(network same (topology or configuration))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/31 18:54
L87	2807	L86 and (NAT)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/31 18:54

Quicker Connections - Exhibit 2005
IPR2025-01088 - Page 92

EAST Search History

L90	960457	(network "adj." address "adj." translation).ab.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/31 18:54
L91	3217	L90 and (partition$3 or divide) same server$1	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/31 18:54
L95	0	("network address translation") and ("partition$3 server$1")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/31 18:54
L96	705	("network address translation").ab.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/31 18:54
L98	4711	370/392.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/31 18:54
L99	0	L98 and (("network address translation") same partition$3 same (server$1 or workstation$1))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/31 18:54
L100	0	L98 and (("network address translation") same partition$3)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/31 18:54
L103	0	(detemin$3 same network same (topology or configuration)) and ("network address translation")	US-PGPUB; USPAT	OR	OFF	2007/07/31 18:54
L105	6621	(partition$4 same server$1)	US-PGPUB; USPAT	OR	OFF	2007/07/31 18:54
L108	1678	370/254.ccls.	US-PGPUB; USPAT	OR	OFF	2007/07/31 18:54

EAST Search History

L110	181	711/210.ccls.	US-PGPUB; USPAT	OR	OFF	2007/07/31 18:54
L114	0	(NAT same DNS same creat$4 same (sub-domain or workgroup))	US-PGPUB; USPAT	OR	OFF	2007/07/31 18:54
L116	2	(NAT same DNS same partition$4 same (server$1 or workgroup$1 or workstation$1))	US-PGPUB; USPAT	OR	OFF	2007/07/31 18:54
L117	2	(NAT same DNS same partition$4)	US-PGPUB; USPAT	OR	OFF	2007/07/31 18:54
L119	0	(NAT same DNS same creat$4 same (sub))	US-PGPUB; USPAT	OR	OFF	2007/07/31 18:54
L126	19	L121 and (NAT or (network$1 adj address$1 adj translat$4)) and (@rlad<"20000124" or @ad<"20000124")	US-PGPUB; USPAT	OR	OFF	2007/07/31 18:54
L127	571	(partition$3 near server$1)	US-PGPUB; USPAT	OR	OFF	2007/07/31 18:54
L129	22950	(NAT) and (@ad<"20000124" or @rlad<"20000124")	US-PGPUB; USPAT	OR	OFF	2007/07/31 18:54
L130	23106	(NAT or (network adj address adj translation)) and (@ad<"20000124" or @rlad<"20000124")	US-PGPUB; USPAT	OR	OFF	2007/07/31 18:54
L131	0	((NAT or (network adj address adj translation)) same (partition$3 near server$1)) and (@ad<"20000124" or @rlad<"20000124")	US-PGPUB; USPAT	OR	OFF	2007/07/31 18:54
L132	0	((NAT or (network adj address adj translation)) and (partition$3 near server$1)) and (@ad<"20000124" or @rlad<"20000124")	US-PGPUB; USPAT	OR	OFF	2007/07/31 18:54
L134	432	(NAT or (network adj address adj translation)).ab. or (NAT or (network adj address adj translation)).ti.	US-PGPUB; USPAT	OR	OFF	2007/07/31 18:54
L137	0	L134 and (@ad<"20000124" or @rlad<"20000124") and (server$1 near partition$1)	USPAT	OR	OFF	2007/07/31 18:54
L139	741	370/254.ccls.	USPAT	OR	OFF	2007/07/31 18:54
L140	38	L139 and (@ad<"20000124" or @rlad<"20000124") and (partition$1)	USPAT	OR	OFF	2007/07/31 18:54
L143	9	(apparent near source near address)	US-PGPUB; USPAT	OR	OFF	2007/07/31 18:54

Quicker Connections - Exhibit 2005
IPR2025-01088 - Page 94

MAY 07 2007
PATENT & TRADEMARK OFFICE

HAMILTON, BROOK, SMITH & REYNOLDS, P.C.

RCE

REQUEST FOR CONTINUED EXAMINATION (RCE) TRANSMITTAL

Subsection (b) of 35 U.S.C. § 132, effective on May 29, 2000, provides for continued examination of a utility or plant application filed on or after June 8, 1995. See The American Inventors Protection Act of 1999 (AIPA)

Application Number	09/824,553
Filing Date	April 2, 2001
Confirmation Number	9887
First Named Inventor	Kirk Johnson
Group Art Unit	2616
Examiner Name	Jay P. Patel
Attorney Docket Number	2762.2002-002

This is a Request for Continued Examination (RCE) under 37 CFR § 1.114 of the above-identified application.

Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, or to any design application. See instruction Sheet for RCEs (not to be submitted to the USPTO) on page 2.

1. Submission required under 37 CFR § 1.114

Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).

a. ☒ Previously submitted
   i. ☒ Consider the amendment(s)/reply under 37 CFR § 1.116 previously filed on April 3, 2007. (Any unentered amendment(s) referred to above will be entered)
   ii ☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed on [ ].
   iii. ☐ Other - - [ ]
b. ☐ Please do not enter the amendment(s)/reply under 37 CFR § 1.116 previously filed on [ ]
c. ☒ Enclosed
   i. ☐ Amendment/Reply
   ii. ☐ Affidavit(s)/Declaration(s)
   iii. ☐ Information Disclosure Statement (IDS)
   iv. ☒ Petition for Extension of Time - one month - separate sheet
   v. ☐ Other - - [ ]

2. Miscellaneous

a. ☐ Suspension of action on the above-identified application is requested under 37 CFR § 1.103(c) for a period of [ ] months. (Period of suspension shall not exceed 3 months; Fee under 37 CFR § 1.17(i) **required**)
b. ☐ Other - - [ ]

3. Fees The RCE fee under 37 CFR § 1.17(e) is required by 37 CFR § 1.114 when the RCE is filed.

a. ☒ A check is enclosed for the fees indicated in b. in the total amount of $910
   OR
   ☐ Authorization is granted to charge the fees indicated in b. in the total amount of $[ ] to Deposit Account No. 08-0380. A copy of this document is enclosed for accounting purposes

05/08/2007 MGEBREM1 00000046 09824553
01 FC:1801 790.00 OP

b. i. ☒ RCE fee required under 37 CFR § 1.17(e)
   ii. ☒ Extension of time fee (37 CFR §§ 1.136 and 1.17)
   iii. ☐ Amendment Fee
   iv. ☐ Other - - [ ]
c. ☒ Authorization is hereby granted to charge any deficiency in fees or credit any overpayments to Deposit Account No. 08-0380. A copy of this document is enclosed for accounting purposes.

SIGNATURE OF APPLICANT, ATTORNEY OR AGENT REQUIRED

Signature		Registration No. (Attorney/Agent)	60,223
Name (Print/Type)	Thomas J. Arria	Date	5/3/07

CERTIFICATE OF MAILING OR TRANSMISSION

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Mail Stop RCE, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, or facsimile transmitted to the U.S. Patent and Trademark Office on the date shown below:

Signature	Marianne Lentini		
Name (Print/Type)	Marianne Lentini	Date	May 3, 2007

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MAY 07 2007
PATENT & TRADEMARK OFFICE

HAMILTON, BROOK, SMITH & REYNOLDS, P.C.

REQUEST FOR CONTINUED EXAMINATION (RCE) TRANSMITTAL

Subsection (b) of 35 U.S.C. § 132, effective on May 29, 2000, provides for continued examination of a utility or plant application filed on or after June 8, 1995. See The American Inventors Protection Act of 1999 (AIPA)

Application Number	09/824,553
Filing Date	April 2, 2001
Confirmation Number	9887
First Named Inventor	Kirk Johnson
Group Art Unit	2616
Examiner Name	Jay P. Patel
Attorney Docket Number	2762.2002-002

This is a Request for Continued Examination (RCE) under 37 CFR § 1.114 of the above-identified application.
Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, or to any design application. See instruction Sheet for RCEs (not to be submitted to the USPTO) on page 2.

1. Submission required under 37 CFR § 1.114

Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).

a. ☒ Previously submitted
   i. ☒ Consider the amendment(s)/reply under 37 CFR § 1.116 previously filed on April 3, 2007. (Any unentered amendment(s) referred to above will be entered).
   ii ☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed on [ ].
   iii. ☐ Other - - [ ]
b. ☐ Please do not enter the amendment(s)/reply under 37 CFR § 1.116 previously filed on [ ]
c. ☒ Enclosed
   i. ☐ Amendment/Reply
   ii. ☐ Affidavit(s)/Declaration(s)
   iii. ☐ Information Disclosure Statement (IDS)
   iv. ☒ Petition for Extension of Time - one month - separate sheet
   v. ☐ Other - - [ ]

2. Miscellaneous

a. ☐ Suspension of action on the above-identified application is requested under 37 CFR § 1.103(c) for a period of [ ] months. (Period of suspension shall not exceed 3 months; Fee under 37 CFR § 1.17(i) **required**)
b. ☐ Other - - [ ]

3. Fees The RCE fee under 37 CFR § 1.17(e) is required by 37 CFR § 1.114 when the RCE is filed.

a. ☒ A check is enclosed for the fees indicated in b. in the total amount of $910
   OR
   ☐ Authorization is granted to charge the fees indicated in b. in the total amount of $[ ] to Deposit Account No. 08-0380. A copy of this document is enclosed for accounting purposes
b. i. ☒ RCE fee required under 37 CFR § 1.17(e)
   ii. ☒ Extension of time fee (37 CFR §§ 1.136 and 1.17)
   iii. ☐ Amendment Fee
   iv. ☐ Other - - [ ]
c. ☒ Authorization is hereby granted to charge any deficiency in fees or credit any overpayments to Deposit Account No. 08-0380. A copy of this document is enclosed for accounting purposes.

SIGNATURE OF APPLICANT, ATTORNEY OR AGENT REQUIRED

Signature		Registration No. (Attorney/Agent)	60,223
Name (Print/Type)	Thomas J. Arria	Date	5/3/07

CERTIFICATE OF MAILING OR TRANSMISSION

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Mail Stop RCE, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, or facsimile transmitted to the U.S. Patent and Trademark Office on the date shown below:

Signature	Marianne Lentini		
Name (Print/Type)	Marianne Lentini	Date	May 3, 2007

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C:\NrPortbl\imanage\MLENTINI\722910_1.DOC
MBS/TJA
May 3, 2007

PATENT APPLICATION
DOCKET NO.: 2762.2002-002

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants:	Kirk Johnson, James O'Toole, M. Frans Kaashoek and John Jannotti		
Application No.:	09/824,553	Group:	2616
Filed:	April 2, 2001	Examiner:	Jay P. Patel
Confirmation No.:	9887		

METHOD AND APPARATUS FOR DETERMINING A NETWORK TOPOLOGY IN THE PRESENCE OF NETWORK ADDRESS TRANSLATION

OIPE
MAY 07 2007
PATENT & TRADEMARK OFFICE

CERTIFICATE OF MAILING OR TRANSMISSION

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as First Class Mail in an envelope addressed to Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, or is being facsimile transmitted to the United States Patent and Trademark Office on:

May 3, 2007 (Date) — Marianne Lentini (Signature)

MARIANNE LENTINI
Typed or printed name of person signing certificate

PETITION FOR EXTENSION OF TIME

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

The undersigned attorney petitions the Commissioner for Patents to extend the time for filing a Notice of Appeal in reply to the Office Action made Final dated January 3, 2007 for one month, from April 3, 2007 to May 3, 2007 under 37 C.F.R. § 1.136(a). In lieu of filing a Notice of Appeal, Applicants' Attorney is filing a Request for Continued Examination concurrently herewith.

	Small Entity	Other than Small Entity
1 month	☐ $ 60	☒ $ 120
2 months	☐ $ 225	☐ $ 450
3 months	☐ $ 510	☐ $1,020
4 months	☐ $ 795	☐ $1,590
5 months	☐ $1,080	☐ $2,160

☒ A check is enclosed in the amount of the extension fee indicated above, or the extension fee has been included in the check with the accompanying Reply.

☐ Please charge Deposit Account No. 08-0380 in the amount of $[ ] to cover the cost of the extension fee.

Any deficiency or overpayment should be charged or credited to Deposit Account No. 08-0380. A copy of this letter is enclosed for accounting purposes.

Respectfully submitted,

HAMILTON, BROOK, SMITH & REYNOLDS, P.C.

By _____
Thomas J. Arria
Registration No. 60,203/08/2007 MGEBREH1 00000046 09824553
Telephone (978) 341-0036 01 FC:1251 120.00 OP
Facsimile (978) 341-0136

Concord, Massachusetts 01742-9133
Dated: 5/3/07

PATENT APPLICATION FEE DETERMINATION RECORD
Effective October 1, 2000

Application or Docket Number: 09824553

CLAIMS AS FILED - PART I

	(Column 1)	(Column 2)
TOTAL CLAIMS	38	
FOR	NUMBER FILED	NUMBER EXTRA
TOTAL CHARGEABLE CLAIMS	38 minus 20=	* 18
INDEPENDENT CLAIMS	7 minus 3 =	* 4
MULTIPLE DEPENDENT CLAIM PRESENT		☐

* If the difference in column 1 is less than zero, enter "0" in column 2

SMALL ENTITY TYPE ☐		OR	OTHER THAN SMALL ENTITY	
RATE	FEE		RATE	FEE
BASIC FEE	355.00	OR	BASIC FEE	710.00
X$ 9=		OR	X$18=	324.00
X40=		OR	X80=	320.00
+135=		OR	+270=	
TOTAL		OR	TOTAL	1354.00

5/7/07

CLAIMS AS AMENDED - PART II

AMENDMENT

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA
Total	* 31	Minus	** 20	= 0
Independent	* 3	Minus	*** 3	= 0
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM				☐

SMALL ENTITY		OR	OTHER THAN SMALL ENTITY	
RATE	ADDITIONAL FEE		RATE	ADDITIONAL FEE
X$ 9=		OR	X$18=	
X40=		OR	X80=	
+135=		OR	+270=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

AMENDMENT

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA
Total	*	Minus	**	=
Independent	*	Minus	***	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM				☐

RATE	ADDITIONAL FEE		RATE	ADDITIONAL FEE
X$ 9=		OR	X$18=	
X40=		OR	X80=	
+135=		OR	+270=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

AMENDMENT

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA
Total	*	Minus	**	=
Independent	*	Minus	***	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM				☐

RATE	ADDITIONAL FEE		RATE	ADDITIONAL FEE
X$ 9=		OR	X$18=	
X40=		OR	X80=	
+135=		OR	+270=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. 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 number found in the appropriate box in column 1.

FORM PTO-875
(Rev. 8/00)

Patent and Trademark Office, U.S. DEPARTMENT OF COMMERCE
*U.S. GPO: 2000-460-708/50103

AF

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MBS/TJA/tlj
April 3, 2007

PATENT APPLICATION
DOCKET NO. 2762.2002-002
Expedited Procedure under 37 C.F.R. 1.116
Examining Group: 2616

U.S.P.T.O. APR 05 2007 PATENT & TRADEMARK OFFICE

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: Kirk Johnson, James O'Toole, M. Frans Kaashoek and John Jannotti

Application No.: 09/824,553 Group: 2616

Filed: April 2, 2001 Examiner: Jay P. Patel

Confirmation No.: 9887

For: METHOD AND APPARATUS FOR DETERMINING A NETWORK TOPOLOGY IN THE PRESENCE OF NETWORK ADDRESS TRANSLATION

CERTIFICATE OF MAILING OR TRANSMISSION

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as First Class Mail in an envelope addressed to Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, or is being facsimile transmitted to the United States Patent and Trademark Office on:

April 3, 2007 Marianne Lentini
Date Signature

Marianne Lentini
Typed or printed name of person signing certificate

Mail Stop AF
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Transmitted herewith is an Amendment After Final for filing in the above-identified application.

☐ Small entity status of this application under 37 CFR 1.9 and 1.27 has been established by a Small Entity Statement previously submitted.

☐ A Small Entity Statement to establish small entity status under 37 CFR 1.9 and 1.27 is enclosed.

The claims fee has been calculated as shown below:

	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NO. PREVIOUSLY PAID FOR	PRESENT EXTRA	SMALL ENTITY RATE	SMALL ENTITY ADDIT. FEE	OR	OTHER THAN SMALL ENTITY RATE	OTHER THAN SMALL ENTITY ADDIT. FEE
TOTAL	31	MINUS	* 38	0	X $25	$		X 50	$
INDEP	10	MINUS	** 7	3	X $100	$		X $200	$ 600
☐ FIRST PRESENTATION OF MULTIPLE DEP. CLAIM					+ $180	$		+ $360	$
					TOTAL =	$ 0		TOTAL =	$ 600

* not fewer than 20
** not fewer than 3

The Application Size Fee has been calculated as shown below:
(Effective for cases filed on or after December 8, 2004)

Actual Sheets (Including current amendment)	Highest No. of Sheets Paid For (At least 100)	No. of Additional Units Required (Increments of 50 sheets)	SMALL ENTITY Rate	SMALL ENTITY Total Amount Owed	OTHER THAN SMALL ENTITY Rate	OTHER THAN SMALL ENTITY Total Amount Owed	Payment Sufficient for up to
			X $125	$[ ]	X $250	$[ ]	[ ] Sheets

Petition for Extension of Time

☐ Applicant hereby petitions to extend the time to respond to the [ ] dated [ ] for [ ] month(s) from [ ] to [ ]. The appropriate fee is set forth below.

☐ *[For action-specific language in an extension of time, select the appropriate option from the Firm Templates]*

Please charge Deposit Account No. 08-0380 for the following fees:

☐	Petition for [ ] month Extension of Time	$
☐	Claims Fee	$
☐	Application Size Fee	$
☐	Other Fees:	
		$
		$
	TOTAL:	$

A check is enclosed in payment of the following fees:

☐	Petition for [ ] month Extension of Time	$
☒	Claims Fee	$ 600
☐	Application Size Fee	$
☐	Other Fees:	
		$
		$
	TOTAL:	$ 600

☒ Please charge any deficiency or credit any overpayment in the fees that may be due in this matter to Deposit Account No. 08-0380. A copy of this letter is enclosed for accounting purposes.

Respectfully submitted,

HAMILTON, BROOK, SMITH & REYNOLDS, P.C.

By _____
Thomas J. Arria
Registration No. 60,223
Telephone (978) 341-0036
Facsimile (978) 341-0136

Concord, Massachusetts 01742-9133
Dated: 4/3/07

715768_1
MBS/TJA/ml
April 03, 2007

PATENT APPLICATION
Attorney's Docket No.: 2762.2002-002
Expedited Procedure under 37 CFR § 1.116
Examining Group: 2616



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants:	Kirk Johnson, James O'Toole, M. Frans Kaashoek and John Jannotti		
Application No.:	09/824,553	Group:	2616
Filed:	April 2, 2001	Examiner:	Jay P. Patel
Confirmation No.:	9887		

For: METHOD AND APPARATUS FOR DETERMINING A NETWORK TOPOLOGY IN THE PRESENCE OF NETWORK ADDRESS TRANSLATION

CERTIFICATE OF MAILING OR TRANSMISSION

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April 3, 2007 Marianne Lentini
Date Signature

Marianne Lentini
Typed or printed name of person signing certificate

AMENDMENT AFTER FINAL REJECTION UNDER 37 CFR § 1.116

Mail Stop AF
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This Amendment After Final Rejection is being filed in response to the Final Office Action mailed from the U.S. Patent and Trademark Office on January 3, 2007 in the above-identified application. Applicants are amending the claims to accept 'objected-to' claims to put the application in condition for allowance. Reconsideration and further examination are requested.

Please amend the application as follows:

04/05/2007 SSESHE1 00000051 09824553
01 FC:1201 600.00 DP

Amendments to the Claims

Please cancel Claims 1, 12, 19, 23, 30, 32, and 34. Please amend Claims 2, 5, 7-9, 13, 16-18, 20, 24, 26, 28-29, 31, 35, and 37. The Claim Listing below will replace all prior versions of the claims in the application:

Claim Listing

1. (Cancelled)

2. (Currently Amended) The method according to Claim [[1]] 13 wherein the communications include at least one source address in a message.

3. (Original) The method according to Claim 2 wherein the source address includes an IP address.

4. (Original) The method according to Claim 2 wherein a unique identification number is included in the message.

5. (Currently Amended) The method according to Claim [[1]] 13 wherein monitoring includes distinguishing between communications affected by and not affected by network address translation.

6. (Original) The method according to Claim 5 wherein distinguishing includes comparing an apparent source address of a message against an actual source address provided in the message.

7. (Currently Amended) The method according to Claim [[1]] 13 further comprising assessing a range of network addresses behind the translating device.

8. (Currently Amended) The method according to Claim [[1]] 13 further comprising assessing a range of public network addresses associated with the translating device.

9. (Currently Amended) The method according to Claim [[1]] 13 further comprising distinguishing between active and passive clients.

10. (Original) The method according to Claim 9 further including directing a message from a passive client to an active client.

11. (Original) The method according to Claim 9 further including, from a processor beyond the translating device, causing a message to a passive client to be redirected to an active client, the active client responsively communicating with the processor beyond the translating device.

12. (Cancelled)

13. (Currently Amended) A method of determining a network topology induced by network address translation, comprising:

initiating communications, from a server behind a translating device, which effect the network address translation;

monitoring the communications beyond the translating device to infer partitioning of servers behind the translating device into equivalence sets relative to the network topology induced by the network address translation, maintaining at least one translated address set, and ~~The method according to Claim 12 wherein monitoring further includes~~ comparing apparent message source addresses with addresses in the translated address set.

14. (Original) The method according to Claim 13 further including merging translated address sets in response to determining that multiple apparent source addresses in distinct translated address sets correspond to the same actual source address.

15. (Original) The method according to Claim 13 further including assessing whether the source address is behind a known address translation device.

16. (Currently Amended) The method according to Claim [[12]] 13 ~~wherein maintaining includes~~ further comprising providing a timeout mechanism for removing an address from a translated address set.

17. (Currently Amended) ~~The method according to Claim 1 further including~~ A method of determining a network topology induced by network address translation, comprising:

initiating communications, from a server behind a translating device, which effect the network address translation;

monitoring the communications beyond the translating device to infer partitioning of servers behind the translating device into equivalence sets relative to the network topology induced by the network address translation; and

commanding a new client to contact a known client behind the same network address translation device.

18. (Currently Amended) ~~The method according to Claim 1 wherein~~ A method of determining a network topology induced by network address translation, comprising:

initiating communications, from a server behind a translating device, which effect the network address translation;

monitoring the communications beyond the translating device to infer partitioning of servers behind the translating device into equivalence sets relative to the network topology induced by the network address translation; and

~~monitoring includes~~ providing a soft-state mechanism to occasionally refresh partitioning.

19. (Cancelled)

20. (Currently Amended) The apparatus according to Claim [[19]] 24 wherein the messages received include at least one source address in the message.

21. (Original) The apparatus according to Claim 20 wherein the processor routine compares an apparent source address of a message against an actual source address provided in the message.

22. (Original) The apparatus according to Claim 20 further including at least one translated address set, the source address being stored in the translated address set.

23. (Cancelled)

24. (Currently Amended) Apparatus to be located beyond a network address translation device for determining a topology of a network in the presence of network address translation, comprising:

a processor coupled to a network interface for receiving communication from a network device effecting network address translation and further coupled to memory;

a processor routine operating on the processor, the processor routine to infer partitioning of servers behind a network address translation device into equivalence sets relative to the network topology induced by the network address translation and to store a database of translated address sets in the memory; and

~~The apparatus according to Claim 23 wherein the processor routine includes~~

a database manager to compare apparent message source addresses with addresses stored in the database of translated address sets.

25. (Original) The apparatus according to Claim 24 wherein the database manager provides a timeout mechanism for removing translated addresses from the translated address sets in the database.

26. (Currently Amended) Apparatus to be located behind a network address translation device for providing communications used to determine a topology of a network in the presence of network address translation, comprising:

a processor behind a network address translation device coupled to a network interface and to memory, the processor initiating communications to a server beyond the network address translation device to effect network address translation; ~~and~~

a processor routine operating on said processor, said processor routine providing the actual network address of the processor in a message of the communications unaffected by the network address translation; and

a processor routine storing a database of translated address sets in the memory.

27. (Original) The apparatus according to Claim 26 wherein said processor issues communications in response to receiving a communication from behind the network address translation device.

28. (Currently Amended) A computer program product comprising:

a computer usable medium for storing data; and

a set of computer program instructions embodied on the computer usable medium, including instructions to:

receive communications from a network device effecting network address translation; ~~and~~

infer partitioning of servers behind a network address translation device into equivalence sets relative to the network topology induced by the network address translation ;

store a database of translated address sets; and

compare apparent message source addresses with addresses stored in the database of translated address sets.

29. (Currently Amended) Apparatus for determining a topology of a network in the presence of network address translation, comprising:

means for initiating communications, from a server behind a translating device, ~~from a network~~ which ~~effects~~ effect the network address translation; ~~and~~

means for monitoring the ~~communication~~ communications beyond the translating device to infer partitioning of servers behind ~~a network address translation device~~ the translating device into equivalence sets relative to the network topology induced by the network address translation;

means for maintaining at least one translated address set; and

means for comparing apparent message source addresses with addresses in the translated address set.

30. (Cancelled)

31. (Currently Amended) ~~The method according to Claim 30 wherein the messages received include~~ In a network device beyond a network address translation device, a method for determining a topology of a network in the presence of network address translation, the method comprising:

receiving communication messages, including at least one source address in the message, from a network device effecting network address translation;

inferring partitioning of servers behind a network address translation device into equivalence sets relative to the network topology induced by the network address translation; and

comparing an apparent source address of a message against an actual source address provided in the message.

32. (Cancelled)

33. (Original) The method according to Claim 31 further including maintaining at least one translated address set, the source address being stored in the translated address set.

34. (Cancelled)

35. (Currently Amended) In a network device beyond a network address translation device, a method for determining a topology of a network in the presence of network address translation, the method comprising:

receiving communication messages from a network device effecting network address translation;

inferring partitioning of servers behind a network address translation device into equivalence sets relative to the network topology induced by the network address translation;

storing a database of translated address sets; and

~~The method according to Claim 34 further including~~ comparing apparent message source addresses with addresses stored in the database of translated address sets.

36. (Original) The method according to Claim 35 further including removing translated addresses from the translated address sets in the database after exceeding a timeout duration.

37. (Currently Amended) In a network device located behind a network address translation device, a method for providing communications used to determine a topology of a network in the presence of network address translation, the method comprising:

initiating communications to a server beyond a network address translation device to effect network address translation; ~~and~~

providing the actual network address of a processor, behind the network address translation device, in a message of the communications unaffected by the network address translation; and

storing a database of translated address sets in the memory.

38. (Original) The method according to Claim 37 further including issuing communications in response to receiving a communication from behind the network address translation device.

REMARKS

Claims 1-38 are pending in the application. Claims 1-12, 19-23, 26-34, and 37-38 stand rejected. Claims 13-18, 24, 25, 35, and 36 stand objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Dependent Claim 13, which stands objected to, is being amended in the Claim Listing above to include all of the limitations of Claim 1 and intervening Claim 12.

Claims 2, 5, 7-9, and 16 are being amended in the Claim Listing above to depend from now amended Claim 13. Dependent claims 3-4, 6, 10-11, and 14-15 include all of the limitations of now amended Claim 13 by way of their dependency.

Dependent Claim 17, which stands objected to, is being amended into Independent form in the Claim Listing above to include all of the limitations of Claim 1.

Dependent Claim 18, which stands objected to, is being amended into Independent form in the Claim Listing above to include all of the limitations of Claim 1.

Dependent Claim 24, which stands objected to, is being amended in the Claim Listing above to include all of the limitations of Claim 19 and intervening Claim 23.

Dependent Claim 20 is being amended in the Claim Listing above to depend from now amended Claim 24. Dependent Claims 21, 22, and 25 include all of the limitations of now amended Claim 24 by way of their dependency.

Claim 26 is being amended in the Claim Listing above to include similar limitations as in now amended Claim 24.

Dependent Claim 27 depends from Claim 26 and includes all of the limitations of now amended Claim 26 by way of dependency.

Claim 28 is being amended in the Claim Listing above to include similar limitations as in objected Claim 35.

Claim 29 is being amended in the Claim Listing above to include similar limitations as in objected Claim 13.

Dependent Claim 31 is being amended in the Claim Listing above to include similar limitations as in objected Claim 24.

Dependent Claim 33 depends from Claim 31 and includes all of the limitations of Claim 31 by way of dependency.

Claim 35, which stands objected to, is being amended in the Claim Listing above to include all of the limitations of Claim 30 and intervening Claim 34.

Dependent Claim 36 depends from Claim 35 and includes all of the limitations of Claim 35 by way of dependency.

Claim 37 is being amended in the Claim Listing above to include similar limitations as in objected Claim 24.

Dependent Claim 38 depends from Claim 37 and includes all of the limitations of Claim 37 by way of dependency.

Accordingly, Applicants respectfully submit that Claims 2-11, 13-18, 20-22, 24-29, 31, 33, and 35-38 are in condition for allowance.

No new matter is being introduced by way of these amendments. Applicants reserve the right to re-file the claims as originally filed in a continuing application. Applicants have amended the claims as described above for the purposes of expediting prosecution.

On page 2 of the present Office Action, Claims 1-12, 19-23, and 28-34 were rejected under 35 U.S.C. 103(a) as being unpatentable over Albert et al. (U.S. Patent No. 6,650,641) (hereinafter "Albert") further in view of Jindal et al. (U.S. Patent 6,092,178). In view of the foregoing amendments in the Claim Listing and remarks, Applicants respectfully submit that this rejection is now moot.

On page 11 of the present Office Action Claims 26-27 and 37-38 were rejected under 35 U.S.C. 103(a) as being unpatentable over Albert and further in view of Cunningham et al. (U.S. Patent 6,888,837). In view of the amendments in the Claim Listing above and remarks, Applicants respectfully submit that this rejection is now moot.

CONCLUSION

In view of the above amendments and remarks, it is believed that all claims pending after entry of this Amendment, Claims 2-11, 13-18, 20-22, 24-29, 31, 33, and 35-38, are in condition for allowance, and it is respectfully requested that the application be passed to issue. If the Examiner feels that a telephone conference would expedite prosecution of this case, the Examiner is invited to call the undersigned.

Respectfully submitted,

HAMILTON, BROOK, SMITH & REYNOLDS, P.C.

By 

Thomas J. Arria
Registration No. 60,223
Telephone: (978) 341-0036
Facsimile: (978) 341-0136

Concord, MA 01742-9133
Date: 4/3/07

PATENT APPLICATION FEE DETERMINATION RECORD
Effective October 1, 2000

Application or Docket Number: 09824553

CLAIMS AS FILED - PART I

	(Column 1)	(Column 2)
TOTAL CLAIMS	38	
FOR	NUMBER FILED	NUMBER EXTRA
TOTAL CHARGEABLE CLAIMS	38 minus 20=	* 18
INDEPENDENT CLAIMS	7 minus 3 =	* 4
MULTIPLE DEPENDENT CLAIM PRESENT	☐	

* If the difference in column 1 is less than zero, enter "0" in column 2

SMALL ENTITY TYPE ☐		OR	OTHER THAN SMALL ENTITY	
RATE	FEE		RATE	FEE
BASIC FEE	355.00	OR	BASIC FEE	710.00
X$ 9=		OR	X$18=	324
X40=		OR	X80=	3200
+135=		OR	+270=	
TOTAL		OR	TOTAL	1354

1/9/06

CLAIMS AS AMENDED - PART II

AMENDMENT A

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA
Total	* 38	Minus	** 38	=
Independent	* 7	Minus	*** 7	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM	☐			

SMALL ENTITY		OR	OTHER THAN SMALL ENTITY	
RATE	ADDITIONAL FEE		RATE	ADDITIONAL FEE
X$ 9=		OR	X$18=	
X40=		OR	X80=	
+135=		OR	+270=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

9/8/06

AMENDMENT B

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA
Total	*	Minus	** 40	=
Independent	*	Minus	***	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM	☐			

RATE	ADDITIONAL FEE		RATE	ADDITIONAL FEE
X$ 9=		OR	X$18=	
X40=		OR	X80=	
+135=		OR	+270=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

4/2/07

AMENDMENT C

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA
Total	* 31	Minus	** 40	= 1
Independent	* 3	Minus	*** 3	= 1
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM	☐			

RATE	ADDITIONAL FEE		RATE	ADDITIONAL FEE
X$ 9=		OR	X$18=	
X40=		OR	X80=	
+135=		OR	+270=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. 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 number found in the appropriate box in column 1.

FORM PTO-875 (Rev. 8/00)

Patent and Trademark Office, U.S. DEPARTMENT OF COMMERCE

UNITED STATES PATENT AND TRADEMARK OFFICE

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www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/824,553	04/02/2001	Kirk Johnson	2762.2002-002	9887

21005 7590 01/03/2007

HAMILTON, BROOK, SMITH & REYNOLDS, P.C.
530 VIRGINIA ROAD
P.O. BOX 9133
CONCORD, MA 01742-9133

EXAMINER	
PATEL, JAY P	
ART UNIT	**PAPER NUMBER**
2616	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	01/03/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	09/824,553	JOHNSON ET AL.	
	Examiner	Art Unit	
	Jay P. Patel	2616	

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

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 September 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-38* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-12,19-23,26-34 and 37- 38* is/are rejected.

7)☒ Claim(s) *13-18, 24, 25, 35 and 36* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

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)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. This office action is in response to the remarks/amendment filed 09/08/2006.

2. Claims 1-38 are pending.

3. Claims 1-12, 19-23, 26-34 and 37-38 are rejected.

4. Claims 13-18, 24, 25, 35 and 36 are objected.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-12, 19-23 and 28-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Albert et al. (U.S. Patent No. 6650641 B1) further in view of Jindal et al. (U.S. Patent 6092178).

3. In regards to claims 1 and 29, Albert discloses in figure 2 forwarding agents 231, 232, service mangers 241, 242 and a group of servers 220. Furthermore, figure 11 illustrates how a forwarding agent and a service manager implement NAT between a client and a virtual machine (see figure 11 and column 28, lines 1-19). The forwarding agent and the service manager are obvious over a translating device and the virtual machine is obvious over a server. The implementation of the NAT by the forwarding agent and a service manger is obvious over initiating communications, from a server behind the translating device, which effect the network address translation.

In further regards, Albert fails to particularly disclose monitoring the communication beyond the translation device to infer partitioning of servers behind the translation device into equivalent sets relative to the network topology induced by the network address translation. Jindal teaches the above-mentioned limitations in figure 2. Jindal describes that a load-balancing application may be exposed to requesting clients through a virtual server name; clients contact a DNS server to determine a server offering desired application. Jindal also mentions that it is well known in the art the DNS servers typically satisfy client request by resolving the virtual server name to an identity (i.e., a network address) of one network server within a pool of suitable servers (see column 7, lines 1-9). Jindal also mentions the a preferred server may be identified by the client on a regular or periodic basis, and may be the same as or different from the one previously identified; thus, client requests are distributed among the participating servers and the application is load-balanced (see column 6, lines 36-43). This disclosure is obvious over monitoring the communications beyond a translating device to infer partitioning of servers. Jindal also discloses that based on the selected policy, each status object 200 may measure the response time of its associated server (110, 112, 114) or the application instance operating on the server to implement load balancing policies (See figure 2 and column 8, lines 30-46). This disclosure is obvious over partitioning servers behind the translating device into equivalence sets relative to the network topology induced by the network address translation.

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to combine the Network address translation (NAT) between a client

and a virtual machine disclosed by Albert with the load balancing disclosed by Jindal. The advantage of doing so would be properly load balance client request based on NAT and load balancing policies. The motivation to combine comes from Jindal, which would be to enhance the functionality and flexibility of a network name service such as DNS (Domain Name Service).

In regards to claims 2 and 3, Albert discloses in figure 7, a wildcard affinity diagram. The wildcard affinity diagram includes a source IP address.

In regards to claim 4, the source IP address included in the wildcard affinity diagram also is obvious over a unique identification number in the message.

In regards to claim 5, Albert discloses in figure 13, a flowchart illustrating a process implemented on a forwarding agent for executing NAT as directed by a service manger. In the affinity step 1306, the forwarding agent checks the action specified in the affinity. If the action specifies that the packet be to be forwarded to the service manger, then control is transferred to step 1308 and the packet is sent to a service manger. If the action specifies that the packet is to undergo Nat then control is transferred to step 1310 where the source IP address is changed (see figure 13, and column 29, lines 56-67 and column 30, line 1). The action that specifies whether the packet is to go NAT or forwarded to the service manager, is obvious over distinguishing between communications affected by and not affected by network address translation.

In regards to claim 6, Albert discloses in figure 13, a flowchart illustrating a process implemented on a forwarding agent for executing NAT as directed by a service manger. If the action specifies that the packet is to undergo Nat then control is

transferred to step 1310 where the source IP address is changed (see figure 13, and column 29, lines 56-67 and column 30, line 1). The changing of the IP address is obvious over comparing an apparent source address of a message against an actual source address provided in the message.

In regards to claim 7, Albert discloses that to specify a single host the wildcard affinity include an IP address with a specific net mask. To specify the range of hosts (i.e. from 1.1.1.0 to 1.1.1.255), the wildcard affinity would include IP address of 1.1.1.0 with a net mask of 255.255.255.0 (see column 17, lines 47-54). The range of host with the IP address, anticipate, assessing a range of network addresses behind the translating device.

In regards to claim 8, from figure 2A, it is evident that the host whether they are clients or servers, are connected to the service managers and forward agents; therefore, the disclosure used with regards to claim 7, is also applicable to claim 8.

In regards to claims 9 and 10, figure 2A discloses a plurality of clients, forwarding agents, service mangers and servers. The servers communicate with network through forwarding agents (see column 6, lines 46-53). The forward agents have knowledge of the network and since the servers communicate to the network via the forwarding agents, it is anticipated that passive and active clients are distinguished and that messages are directed from the passive to the active client.

In regards to clam 11, the service manager and the forwarding agent, respectively contain processors 252 and 272. Both processors are respectively connected to a network interface. The network interface in the forwarding agent is used

to send and receive packets to and from other devices on the network (see column 9, lines 61-64). The network interface in the service manager allows the service manager to directly forward packets into the network from which it is providing a service (see column 10, lines 23-25). The respective processors and their connection to the network interface and its functions anticipate from a processor beyond the translating device, causing a message to a passive client to be redirected to an active client, the active client responsive communicating with the processor beyond the translating device.

In regards to claim 12, Albert discloses in figure 10F, a diagram illustration a NAT action segment (see figure 10F and column 24, lines 11-21). The NAT action segment is obvious over maintaining at least one translated address set.

4. In regards to claim 19, forwarding agents 231, 232, service mangers 241, 242 and a group of servers 220. Furthermore, figure 11 illustrates how a forwarding agent and a service manager implement NAT between a client and a virtual machine (see figure 11 and column 28, lines 1-19). The forwarding agent and the service manager are obvious over a translating device and the virtual machine is obvious over a server. The implementation of the NAT by the forwarding agent and a service manger is obvious over a processor routine for receiving communications, from a server behind the translating device, which effect the network address translation.

In further regards, Albert fails to particularly disclose monitoring the communication beyond the translating device to infer partitioning of servers behind the translation device into equivalent sets relative to the network topology induced by the

network address translation. Jindal teaches the above-mentioned limitations in figure 2. Jindal describes that a load-balancing application may be exposed to requesting clients through a virtual server name; clients contact a DNS server to determine a server offering desired application. Jindal also mentions that it is well known in the art the DNS servers typically satisfy client request by resolving the virtual server name to an identity (i.e., a network address) of one network server within a pool of suitable servers (see column 7, lines 1-9). Jindal also mentions the a preferred server may be identified by the client on a regular or periodic basis, and may be the same as or different from the one previously identified; thus, client requests are distributed among the participating servers and the application is load-balanced (see column 6, lines 36-43). This disclosure is obvious over monitoring the communications beyond a translating device to infer partitioning of servers. Jindal also discloses that based on the selected policy, each status object 200 may measure the response time of its associated server (110, 112, 114) or the application instance operating on the server to implement load balancing policies (See figure 2 and column 8, lines 30-46). This disclosure is obvious over a processor routine for partitioning servers behind the translating device into equivalence sets relative to the network topology induced by the network address translation.

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to combine the Network address translation (NAT) between a client and a virtual machine disclosed by Albert with the load balancing disclosed by Jindal. The advantage of doing so would be properly load balance client request based on NAT

and load balancing policies. The motivation to combine comes from Jindal, which would be to enhance the functionality and flexibility of a network name service such as DNS (Domain Name Service).

In regards to claim 20, Albert discloses in figure 7, a wildcard affinity diagram. The wildcard affinity diagram includes a source IP address.

In regards to claim 21, Albert discloses in figure 13, a flowchart illustrating a process implemented on a forwarding agent for executing NAT as directed by a service manger. If the action specifies that the packet is to undergo Nat then control is transferred to step 1310 where the source IP address is changed (see figure 13, and column 29, lines 56-67 and column 30, line 1). The changing of the IP address is obvious over comparing an apparent source address of a message against an actual source address provided in the message.

In regards to claim 22, Albert discloses in figure 10F, a diagram illustration a NAT action segment (see figure 10F and column 24, lines 11-21). The NAT action segment is obvious over including at least one translated address set, the source address being stored in the translated address set.

In regards to claim 23, Albert discloses in figures 2B and 2C that the forwarding agent and the service manager respectively contain memories 254 and 274 connected to the respective processors (see figures 2B and 2C). The memories anticipate, the processor coupled to the memory, the processor routine storing a database of translated address sets in the memory. Furthermore, Albert discloses in figure 10F, a

diagram illustration a NAT action segment (see figure 10F and column 24, lines 11-21), which contains the translated address set as, stated in regards to claim 22.

1. In regards to claim 28, forwarding agent and the service manager respectively contain memories 254 and 274 connected to the respective processors (see figures 2B and 2C). The memories are obvious over a computer usable medium for storing data.

In further regards to claim 28 and claim 30, Albert discloses in figure 2, forwarding agents 231, 232, service mangers 241, 242 and a group of servers 220. Furthermore, figure 11 illustrates how a forwarding agent and a service manager implement NAT between a client and a virtual machine (see figure 11 and column 28, lines 1-19). The implementation of the NAT by the forwarding agent and a service manger is obvious over receiving communications from a network device effecting network address translation.

In further regards, Albert fails to particularly disclose infer partitioning of servers behind the translation device into equivalent sets relative to the network topology induced by the network address translation. Jindal teaches the above-mentioned limitations in figure 2. Jindal describes that a load-balancing application may be exposed to requesting clients through a virtual server name; clients contact a DNS server to determine a server offering desired application. Jindal also mentions that it is well known in the art the DNS servers typically satisfy client request by resolving the virtual server name to an identity (i.e., a network address) of one network server within a pool of suitable servers (see column 7, lines 1-9). Jindal also mentions the a preferred server may be identified by the client on a regular or periodic basis, and may

be the same as or different from the one previously identified; thus, client requests are distributed among the participating servers and the application is load-balanced (see column 6, lines 36-43). This disclosure is obvious over monitoring the communications beyond a translating device to infer partitioning of servers. Jindal also discloses that based on the selected policy, each status object 200 may measure the response time of its associated server (110, 112, 114) or the application instance operating on the server to implement load balancing policies (See figure 2 and column 8, lines 30-46). This disclosure is obvious over partitioning servers behind the translating device into equivalence sets relative to the network topology induced by the network address translation.

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to combine the Network address translation (NAT) between a client and a virtual machine disclosed by Albert with the load balancing disclosed by Jindal. The advantage of doing so would be properly load balance client request based on NAT and load balancing policies. The motivation to combine comes from Jindal, which would be to enhance the functionality and flexibility of a network name service such as DNS (Domain Name Service).

In regards to claim 31, Albert discloses in figure 7, a wildcard affinity diagram. The wildcard affinity diagram includes a source IP address.

In regards to claim 32, Albert discloses in figure 13, a flowchart illustrating a process implemented on a forwarding agent for executing NAT as directed by a service manger. If the action specifies that the packet is to undergo Nat then control is

transferred to step 1310 where the source IP address is changed (see figure 13, and column 29, lines 56-67 and column 30, line 1). The changing of the IP address is obvious over comparing an apparent source address of a message against an actual source address provided in the message.

In regards to claim 33, Albert discloses in figure 10F, a diagram illustration a NAT action segment (see figure 10F and column 24, lines 11-21). The NAT action segment is obvious over including at least one translated address set, the source address being stored in the translated address set.

In regards to claim 34, Albert discloses in figures 2B and 2C that the forwarding agent and the service manager respectively contain memories 254 and 274 connected to the respective processors (see figures 2B and 2C). The memories anticipate, storing a database of translated address sets. Furthermore, Albert discloses in figure 10F, a diagram illustration a NAT action segment (see figure 10F and column 24, lines 11-21), which contains the translated address set as, stated in regards to claim 33.

5. Claims 26-27 and 37-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Albert et al. (U.S. Patent No. 6650641 B1) further in view of Cunningham et al. (US Patent 6888837 B1).

6. In regards to claim 26, Albert discloses in figure 2 forwarding agents 231, 232, service mangers 241, 242 and a group of servers 220. Furthermore, figure 11 illustrates how a forwarding agent and a service manager implement NAT between a client and a virtual machine (see figure 11 and column 28, lines 1-19). The forwarding

agent and the service manager, reads on an apparatus located beyond a network-translating device to determining a topology of a network.

In further regard to claims 26 and 37, the service manager and the forwarding agent, respectively contain processors 252 and 272. Both processors are respectively connected to a network interface. The network interface in the forwarding agent is used to send and receive packets to and from other devices on the network (see column 9, lines 61-64). The network interface in the service manager allows the service manager to directly forward packets into the network from which it is providing a service (see column 10, lines 23-25). The processors read on a processor behind a network address translation device coupled to a network interface for initiating communications to a server beyond the network address translation device effecting network address translation.

In further regards to claims 26 and 37, the processors are contained within the service manager or the forwarding agent, which have addresses of their own and therefore, also read on the processor routing provides the actual network address of the processor in a message of the communications.

In regards to claims 27 and 38, the service manager and the forwarding agent, respectively contain processors 252 and 272. Both processors are respectively connected to a network interface. The network interface in the forwarding agent is used to send and receive packets to and from other devices on the network (see column 9, lines 61-64). The connection between the processor and the network interface, read on

the said processor issuing communications in response to receiving a communication from behind the network address translation device.

In further regards to claims 26 and 37, Albert fails to particularly disclose, providing the actual network address of the processor in a message of the communications unaffected by network address translation. Cunningham teaches the above-mentioned limitation.

Figure 2A shows a source address translation table for address domain 1 of figure 1. The NAT 102, maps the host X local address (i.e A) to the host X global address for destination domains 2, 3, and 4. The address mapping is A12, A13 and A14. Therefore, the NAT maintains the local address of the host X in the source domain in the address translation table (network address unaffected by network address translation) (see figures 1, 2A, 2B and 2C and column 5, lines 40-46).

Therefore, would have been obvious to one skilled in the art at the time the invention was made to combine the Network address translation (NAT) between a client and a virtual machine disclosed by Albert with the NAT local to global address translation taught by Cunningham. The motivation to do so would have been to include the local address of the even during network address translation to an outside domain.

Response to Arguments

7. Applicant's arguments filed 09/08/2006 with regards to claims 1 have been fully considered but they are not persuasive.

8. The applicant argues on page 10 lines 6-8 that Jindal does not disclose monitoring communications beyond a translating device to infer partitioning of servers behind the translating device. However, the examiner respectfully disagrees. Jindal teaches the above-mentioned limitations in figure 2. Jindal describes that a load-balancing application may be exposed to requesting clients through a virtual server name; clients contact a DNS server to determine a server offering desired application. Jindal also mentions that it is well known in the art the DNS servers typically satisfy client request by resolving the virtual server name to an identity (i.e., a network address) of one network server within a pool of suitable servers (see column 7, lines 1-9). Jindal also mentions the a preferred server may be identified by the client on a regular or periodic basis, and may be the same as or different from the one previously identified; thus, client requests are distributed among the participating servers and the application is load-balanced (see column 6, lines 36-43). This disclosure is obvious over monitoring the communications beyond a translating device to infer partitioning of servers. Jindal also discloses that based on the selected policy, each status object 200 may measure the response time of its associated server (110, 112, 114) or the application instance operating on the server to implement load balancing policies (See figure 2 and column 8, lines 30-46).

9. Furthermore, the applicant also argues on page 10 lines 23-25 that the teaching of Jindal and Albert in combination results in DNS system with load balancing. However, on page 7 of the specification of the present application, it is stated, "Since a proxy server typically has a single public address, a subnet may employ more than one

proxy server to perform load balancing and provide multiple public (outbound) addresses." Therefore, it is the examiner's interpretation that load balancing to provide multiple public addresses using multiple proxy servers is also partitions the proxy servers.

10. In regards to claim 26, applicant argues that Albert fails to teach providing the actual network address of the processor unaffected by the network address translation. The examiner agrees and therefore has relied on Cunningham et al. (US Patent 6888837 B1) to teach this limitation (refer to the rejection of claim 26 above).

Conclusion

11. Claims 13-18, 24, 25, 35 and 36 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

12. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the

shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jay P. Patel whose telephone number is (571) 272-3086. The examiner can normally be reached on M-F 9:00 am - 5:00 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hassan Kizou can be reached on (571) 272-3088. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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.

jpp 12/17/06
Jay P. Patel
Assistant Examiner
Art Unit 2616

HASSAN KIZOU
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600

Notice of References Cited	Application/Control No. 09/824,553	Applicant(s)/Patent Under Reexamination JOHNSON ET AL.	
	Examiner Jay P. Patel	Art Unit 2616	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-6,888,837 B1	05-2005	Cunningham et al.	370/401
	B	US-			
	C	US-			
	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.

Index of Claims

Application/Control No.	Applicant(s)/Patent under Reexamination
09/824,553	JOHNSON ET AL.
Examiner	**Art Unit**
Jay P. Patel	2616

√	Rejected	–	(Through numeral) Cancelled	N	Non-Elected	A	Appeal
=	Allowed	+	Restricted	I	Interference	O	Objected

Claim		Date
Final	Original	12/17/06
	1	√
	2	√
	3	√
	4	√
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	9	√
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Search Notes

Application/Control No.	Applicant(s)/Patent under Reexamination
09/824,553	JOHNSON ET AL.
Examiner	**Art Unit**
Jay P. Patel	2616

SEARCHED			
Class	Subclass	Date	Examiner
370	254	12/17/2006	JPP

INTERFERENCE SEARCHED			
Class	Subclass	Date	Examiner

SEARCH NOTES (INCLUDING SEARCH STRATEGY)		
	DATE	EXMR
East updated search; see attached search history printout	12/17/2006	JPP

EAST Search History

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	514	(partition$3 near server$1)	US-PGPUB; USPAT	OR	OFF	2006/12/17 12:34
L2	144	(partition$3 near server$1) and (@ad<"20000124" or @rlad<"20000124")	US-PGPUB; USPAT	OR	OFF	2006/12/17 12:47
L3	22007	(NAT) and (@ad<"20000124" or @rlad<"20000124")	US-PGPUB; USPAT	OR	OFF	2006/12/17 13:11
L4	22156	(NAT or (network adj address adj translation)) and (@ad<"20000124" or @rlad<"20000124")	US-PGPUB; USPAT	OR	OFF	2006/12/17 12:48
L5	0	((NAT or (network adj address adj translation)) same (partition$3 near server$1)) and (@ad<"20000124" or @rlad<"20000124")	US-PGPUB; USPAT	OR	OFF	2006/12/17 12:49
L6	0	((NAT or (network adj address adj translation)) and (partition$3 near server$1)) and (@ad<"20000124" or @rlad<"20000124")	US-PGPUB; USPAT	OR	OFF	2006/12/17 12:49
L7	8	((NAT or (network adj address adj translation)) and (partition$3 near server$1))	US-PGPUB; USPAT	OR	OFF	2006/12/17 13:11
L8	382	(NAT or (network adj address adj translation)).ab. or (NAT or (network adj address adj translation)).ti.	US-PGPUB; USPAT	OR	OFF	2006/12/17 13:11
L9	61	L8 and (@ad<"20000124" or @rlad<"20000124")	US-PGPUB; USPAT	OR	OFF	2006/12/17 13:12
L10	54	L8 and (@ad<"20000124" or @rlad<"20000124")	USPAT	OR	OFF	2006/12/17 13:18
L11	0	L8 and (@ad<"20000124" or @rlad<"20000124") and (server$1 near partition$1)	USPAT	OR	OFF	2006/12/17 13:18
L12	1	L8 and (@ad<"20000124" or @rlad<"20000124") and (partition$1)	USPAT	OR	OFF	2006/12/17 14:16
L13	670	370/254.ccls.	USPAT	OR	OFF	2006/12/17 14:15
L14	38	L13 and (@ad<"20000124" or @rlad<"20000124") and (partition$1)	USPAT	OR	OFF	2006/12/17 14:16

Quicker Connections - Exhibit 2005
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: Kirk Johnson, James O'Toole, M. Frans Kaashoek and John Jannotti

Application No.: 09/824,553 Group: 2616

Filed: April 2, 2001 Examiner: Jay P. Patel

Confirmation No.: 9887

For: METHOD AND APPARATUS FOR DETERMINING A NETWORK TOPOLOGY IN THE PRESENCE OF NETWORK ADDRESS TRANSLATION

CERTIFICATE OF MAILING OR TRANSMISSION
I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as First Class Mail in an envelope addressed to Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, or is being facsimile transmitted to the United States Patent and Trademark Office on:

9/5/2006 Denise Caredo
Date Signature

Denise Caredo
Typed or printed name of person signing certificate

AMENDMENT

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This Amendment is being filed in response to the Office Action mailed from the U.S. Patent and Trademark Office on April 3, 2006 in the above-identified application. Reconsideration and further examination are requested.

An extension of time to respond to the Office Action is respectfully requested. A Petition for Extension of Time and the appropriate fee are being filed concurrently with this Amendment.

Please amend the application as follows:

09/08/2006 JBALINAN 00000039 080380 09824553
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Amendments to the Claims

Please amend claims 26 and 37. The Claim Listing below will replace all prior versions of the claims in the application:

Claim Listing

1. (Previously Presented) A method of determining a network topology induced by network address translation, comprising:

initiating communications, from a server behind a translating device, which effect the network address translation; and

monitoring the communications beyond the translating device to infer partitioning of servers behind the translating device into equivalence sets relative to the network topology induced by the network address translation.

2. (Original) The method according to Claim 1 wherein the communications include at least one source address in a message.

3. (Original) The method according to Claim 2 wherein the source address includes an IP address.

4. (Original) The method according to Claim 2 wherein a unique identification number is included in the message.

5. (Original) The method according to Claim 1 wherein monitoring includes distinguishing between communications affected by and not affected by network address translation.

6. (Original) The method according to Claim 5 wherein distinguishing includes comparing an apparent source address of a message against an actual source address provided in the message.

7. (Original) The method according to Claim 1 further comprising assessing a range of network addresses behind the translating device.

8. (Original) The method according to Claim 1 further comprising assessing a range of public network addresses associated with the translating device.

9. (Original) The method according to Claim 1 further comprising distinguishing between active and passive clients.

10. (Original) The method according to Claim 9 further including directing a message from a passive client to an active client.

11. (Original) The method according to Claim 9 further including, from a processor beyond the translating device, causing a message to a passive client to be redirected to an active client, the active client responsively communicating with the processor beyond the translating device.

12. (Original) The method according to Claim 1 wherein monitoring includes maintaining at least one translated address set.

13. (Original) The method according to Claim 12 wherein monitoring further includes comparing apparent message source addresses with addresses in the translated address set.

14. (Original) The method according to Claim 13 further including merging translated address sets in response to determining that multiple apparent source addresses in distinct translated address sets correspond to the same actual source address.

15. (Original) The method according to Claim 13 further including assessing whether the source address is behind a known address translation device.

16. (Original) The method according to Claim 12 wherein maintaining includes providing a timeout mechanism for removing an address from a translated address set.

17. (Original) The method according to Claim 1 further including commanding a new client to contact a known client behind the same network address translation device.

18. (Original) The method according to Claim 1 wherein monitoring includes providing a soft-state mechanism to occasionally refresh partitioning.

19. (Previously Presented) Apparatus to be located beyond a network address translation device for determining a topology of a network in the presence of network address translation, comprising:

a processor coupled to a network interface for receiving communication from a network device effecting network address translation; and

a processor routine operating on the processor, the processor routine to infer partitioning of servers behind a network address translation device into equivalence sets relative to the network topology induced by the network address translation.

20. (Original) The apparatus according to Claim 19 wherein the messages received include at least one source address in the message.

21. (Original) The apparatus according to Claim 20 wherein the processor routine compares an apparent source address of a message against an actual source address provided in the message.

22. (Original) The apparatus according to Claim 20 further including at least one translated address set, the source address being stored in the translated address set.

23. (Original) The apparatus according to Claim 19 wherein the processor is further coupled to memory, the processor routine storing a database of translated address sets in the memory.

24. (Original) The apparatus according to Claim 23 wherein the processor routine includes a database manager to compare apparent message source addresses with addresses stored in the database of translated address sets.

25. (Original) The apparatus according to Claim 24 wherein the database manager provides a timeout mechanism for removing translated addresses from the translated address sets in the database.

26. (Currently Amended) Apparatus to be located behind a network address translation device for providing communications used to determine a topology of a network in the presence of network address translation, comprising:

a processor behind a network address translation device coupled to a network interface, the processor initiating communications to a server beyond the network address translation device to effect network address translation; and

a processor routine operating on said processor, said processor routine providing the actual network address of the processor in a message of the communications unaffected by the network address translation.

27. (Original) The apparatus according to Claim 26 wherein said processor issues communications in response to receiving a communication from behind the network address translation device.

28. (Previously Presented) A computer program product comprising:

a computer usable medium for storing data; and

a set of computer program instructions embodied on the computer usable medium, including instructions to:

receive communications from a network device effecting network address translation; and

infer partitioning of servers behind a network address translation device into equivalence sets relative to the network topology induced by the network address translation.

29. (Previously Presented) Apparatus for determining a topology of a network in the presence of network address translation, comprising:

means for initiating communications from a network which effects network address translation; and

means for monitoring the communication to infer partitioning of servers behind a network address translation device into equivalence sets relative to the network topology induced by the network address translation.

30. (Previously Presented) In a network device beyond a network address translation device, a method for determining a topology of a network in the presence of network address translation, the method comprising:

receiving communication messages from a network device effecting network address translation; and

inferring partitioning of servers behind a network address translation device into equivalence sets relative to the network topology induced by the network address translation.

31. (Original) The method according to Claim 30 wherein the messages received include at least one source address in the message.

32. (Original) The method according to Claim 31 further including comparing an apparent source address of a message against an actual source address provided in the message.

33. (Original) The method according to Claim 31 further including maintaining at least one translated address set, the source address being stored in the translated address set.

34. (Original) The method according to Claim 30 further including storing a database of translated address sets.

35. (Original) The method according to Claim 34 further including comparing apparent message source addresses with addresses stored in the database of translated address sets.

36. (Original) The method according to Claim 35 further including removing translated addresses from the translated address sets in the database after exceeding a timeout duration.

37. (Currently Amended) In a network device located behind a network address translation device, a method for providing communications used to determine a topology of a network in the presence of network address translation, the method comprising:

initiating communications to a server beyond a network address translation device to effect network address translation; and

providing the actual network address of a processor, behind the network address translation device, in a message of the communications unaffected by the network address translation.

38. (Original) The method according to Claim 37 further including issuing communications in response to receiving a communication from behind the network address translation device.

REMARKS

Claims 1-38 are pending in the application. Claims 26 and 37 are being amended. No new matter is being introduced by way of this Amendment.

Remarks Regarding Rejection Under 35 U.S.C. 102(e)

The rejection under 35 U.S.C. 102(e) on pages 2 and 3 of the Office Action states, "Claims 26-27 and 37-38 are rejected under 35 U.S.C. 102(e) as being anticipated by Albert et al. (U.S. Patent No. 6650641)". Albert et al. is referred to hereinafter as "Albert."

Claim 26 as now amended recites, "a processor routine operating on said processor, said processor routine providing the actual network address of the processor in a message of the communications unaffected by the network address translation," where the underlined text is a limitation added by way of amendment in the Claim Listing above. Support for this claim amendment can be found at least on page 7, lines 16-22 and Figure 1 of the specification as originally filed. In particular, page 7, lines 19-20 states, "note, however, that the message areas of both packets 115a and 115b have the same server B 110b source address information, unfettered by the network address translation of ATD 130A." Referring further to Figure 1, although the source address information in the message portions of the packets 115a and 115b are unaffected by the network address translation, the source address information in the header portion of the packets does change due to the network address translation.

In contrast, Albert provides a processor, such as processor 252 of Fig. 2B, that transmits packets that communicate through a network translation device. Since there is nothing in Albert indicating the packet address is stored outside of the packet header, which is where a network translation device and other network devices look in a packet to determine source and destination information, Applicants are left to assume Albert's network operates in a traditional manner. Therefore, Applicants submit that the processor inserts its source address into the header portion of the packet, as currently done in the art.

During operation, the Albert processor, using the address in the packet header, sends data through the network translation device (Albert, col. 28, lines 27-33). Sending data through a network translation device is not the same as providing the actual network address of the

processor in a message of the communications, where the communications are unaffected by the network address translation. In other words, Applicants provide an address in the message and, as illustrated in Applicants example of Figure 1, also in the header portion of the packet. By having the network address in the message portion of the packet, Applicants, unlike Albert, the network address is unaffected by the network address translation.

Moreover, one skilled in the art would not be motivated by Albert to include a source network address in the message portion of the packet because first, Albert does not teach or suggest doing so, and second, including an address in the message portion of a packet uses bandwidth that is typically used to carry data for other purposes, not for carrying address information that is found in the header portion of the packet.

Therefore, Applicants respectfully submit Albert does not anticipate all of the limitations of Applicants' now amended claim 26 ("a processor routine operating on said processor, said processor routine providing the actual network address of the processor in a message of the communications unaffected by the network address translation").

Accordingly, Applicants respectfully submit that the rejection of amended claim 26 under 35 U.S.C. 102(e) based on Albert is overcome.

Independent claim 37 is being amended in the Claim Listing above to include similar limitations as now amended claim 26 and, therefore, should be allowed for similar reasons over Albert under 35 U.S.C. 102(e).

Dependent claims 27 and 38 should be allowable over Albert under 35 U.S.C. 102(e) for at least the same reasons as the base claims from which they depend.

Remarks Regarding Rejection Under 35 U.S.C. 103(a)

The rejections on pages 3-13 of the Office Action states, "Claims 1-12, 19-23, and 28-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Albert et al. (U.S. Patent No. 6650641 B1) further in view of Jindal et al. (U.S. Patent No. 6092178)." Jindal et al is hereafter referred to as "Jindal".

Claim 1 recites "monitoring the communications beyond the translating device to infer partitioning of servers behind the translating device."

With regard to Albert, the Office Action states on page 4, part 3, "Albert fails to particularly disclose monitoring the communication beyond the translation device to and infer partitioning of servers behind the translation device into equivalent sets relative to the network topology induced by the network address translation." Applicants agree. Thus, the question becomes whether Jindal makes up for these shortcomings.

With regard to Jindal, Applicants respectfully submit that Jindal does not disclose monitoring communications beyond a translating device to infer partitioning of servers behind the translating device. The Jindal network, as shown in Fig. 2, may be viewed as communicating in two directions (i.e., client to server and server to client). Applicants discuss each direction, in turn.

The first direction of the Jindal network Applicants discuss is of a client 120, located behind a translating device (e.g., DNS server 100), where the client 120 sends a request to identify a preferred server for load balancing purposes. (Jindal, col. 6, lines 33-44). In response to the request, the DNS server 100 identifies a preferred server using a Replicated Monitor Object (RMO) and Individual Monitor Objects (IMOs). However, at no point does the DNS server 100 consider partitioning of servers (e.g., the client 120) behind the translating device. Thus, the DNS server 100 does not infer partitioning of servers behind the translating device, as claimed in Claim 1 by Applicants.

Similarly, the second direction of the Jindal network, as shown in Fig. 2, is a group of servers (110, 112, and 114) in communication with the DNS server 100. In turn, the DNS server 100 communicates with the client 120. However, Jindal does not disclose the DNS server 100 infers partitioning of servers behind the translating device (e.g., the servers 110, 112 or 114).

Thus, Applicants respectfully submit that Jindal discloses a traditional DNS system with load balancing. Combining the teachings of Jindal and the teachings of Albert results in a traditional DNS system with load balancing.

Therefore, Applicants respectfully submit neither Albert nor Jindal, either alone or in combination, teach or suggest all of the limitations of Applicants' claim 1 ("monitoring the communications beyond the translating device to infer partitioning of servers behind the translating device").

Accordingly, Applicants respectfully submit that the rejection of claim 1 under 35 U.S.C. 103(a) as being unpatentable over Albert in view of Jindal should be withdrawn.

Independent claims 19, 28, 29, and 30 include similar limitations as claim 1 and, therefore, should be allowed for similar reasons presented above.

Dependent claims 2-18, 20-25, and 31-36 should be allowable for at least the same reasons as the base claims from which they depend.

CONCLUSION

In view of the above amendments and remarks, it is believed that all claims (claims 1-38) are in condition for allowance, and it is respectfully requested that the application be passed to issue. If the Examiner feels that a telephone conference would expedite prosecution of this case, the Examiner is invited to call the undersigned.

Respectfully submitted,

HAMILTON, BROOK, SMITH & REYNOLDS, P.C.

By Mark B Solomon

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MBS/TJM/TJA/ets(dab)
09/05/2006



IFW

PATENT APPLICATION
DOCKET NO. 2762.2002-002

2616

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	Kirk Johnson, James O'Toole, M. Frans Kaashoek and John Jannotti		
Application No.:	09/824,553	Group:	2616
Filed:	April 2, 2001	Examiner:	Jay P. Patel
Confirmation No.:	9887		

For: METHOD AND APPARATUS FOR DETERMINING A NETWORK TOPOLOGY IN THE PRESENCE OF NETWORK ADDRESS TRANSLATION

CERTIFICATE OF MAILING OR TRANSMISSION

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as First Class Mail in an envelope addressed to Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, or is being facsimile transmitted to the United States Patent and Trademark Office on:

9/5/2006 Denise Caredo
Date Signature

Denise Caredo
Typed or printed name of person signing certificate

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Transmitted herewith is an Reply for filing in the above-identified application.

[ ] Small entity status of this application under 37 C.F.R. 1.9 and 1.27 has been established by a Small Entity Statement previously submitted.

[ ] A Small Entity Statement to establish small entity status under 37 C.F.R. 1.9 and 1.27 is enclosed.

The claims fee has been calculated as shown below:

	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NO. PREVIOUSLY PAID FOR	PRESENT EXTRA	SMALL ENTITY RATE	SMALL ENTITY ADDIT. FEE	OR	OTHER THAN SMALL ENTITY RATE	OTHER THAN SMALL ENTITY ADDIT. FEE
TOTAL	38	MINUS	* 38	0	X $25	$		X $50	$ 0
INDEP	7	MINUS	** 7	0	X $100	$		X $200	$ 0
☐ FIRST PRESENTATION OF MULTIPLE DEP. CLAIM					+ $180	$		+ $360	$
					TOTAL=	$ 0		TOTAL=	$ 0

* not fewer than 20
** not fewer than 3

The Application Size Fee has been calculated as shown below:
(Effective for cases filed on or after December 8, 2004)

Actual Sheets (Including current amendment)	Highest No. of Sheets Paid For (At least 100)	No. of Additional Units Required (Increments of 50 sheets)	SMALL ENTITY Rate	SMALL ENTITY Total Amount Owed	OTHER THAN SMALL ENTITY Rate	OTHER THAN SMALL ENTITY Total Amount Owed	Payment Sufficient for up to
			X $125	$[ ]	X $250	$[ ]	[ ] Sheets

Petition for Extension of Time

[X] Applicant hereby petitions to extend the time to respond to the Office Action dated April 3, 2006 for two months from July 3, 2006 to September 3, 2006. The appropriate fee is set forth below.

[ ] [For action-specific language in an extension of time, go to insert, file, public folders, firm templates, and select the appropriate paragraph.]

Please charge Deposit Account No. 08-0380 for the following fees:

[x]	Petition for two month Extension of Time	$ 450
[ ]	Claims Fee	$
[ ]	Application Size Fee	$
[ ]	Other Fees:	
		$
		$
	TOTAL:	$ 450

A check is enclosed in payment of the following fees:

[ ]	Petition for [ ] month Extension of Time	$
[ ]	Claims Fee	$
[ ]	Application Size Fee	$
[ ]	Other Fees:	
		$
		$
	TOTAL:	$ 0

[X] Please charge any deficiency or credit any overpayment in the fees that may be due in this matter to Deposit Account No. 08-0380. A copy of this letter is enclosed for accounting purposes.

Respectfully submitted,

HAMILTON, BROOK, SMITH & REYNOLDS, P.C.

By Mark B Solomon

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Concord, Massachusetts 01742-9133
Dated: 9/5/06

PATENT APPLICATION FEE DETERMINATION RECORD
Effective October 1, 2000

Application or Docket Number: 09824553

CLAIMS AS FILED - PART I

	(Column 1)	(Column 2)
TOTAL CLAIMS	38	
FOR	NUMBER FILED	NUMBER EXTRA
TOTAL CHARGEABLE CLAIMS	38 minus 20=	* 18
INDEPENDENT CLAIMS	7 minus 3 =	* 4
MULTIPLE DEPENDENT CLAIM PRESENT		☐

* If the difference in column 1 is less than zero, enter "0" in column 2

SMALL ENTITY TYPE ☐		OR	OTHER THAN SMALL ENTITY	
RATE	FEE		RATE	FEE
BASIC FEE	355.00	OR	BASIC FEE	710.00
X$ 9=		OR	X$18=	324.00
X40=		OR	X80=	320.00
+135=		OR	+270=	
TOTAL		OR	TOTAL	1354.00

1/9/06

CLAIMS AS AMENDED - PART II

AMENDMENT A

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA
Total	* 35	Minus	** 38	=
Independent	* 7	Minus	*** 7	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM				☐

SMALL ENTITY		OR	OTHER THAN SMALL ENTITY	
RATE	ADDITIONAL FEE		RATE	ADDITIONAL FEE
X$ 9=		OR	X$18=	
X40=		OR	X80=	
+135=		OR	+270=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

9/8/06

AMENDMENT B

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA
Total	*	Minus	**	=
Independent	*	Minus	***	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM				☐

RATE	ADDITIONAL FEE		RATE	ADDITIONAL FEE
X$ 9=		OR	X$18=	
X40=		OR	X80=	
+135=		OR	+270=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

AMENDMENT C

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA
Total	*	Minus	**	=
Independent	*	Minus	***	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM				☐

RATE	ADDITIONAL FEE		RATE	ADDITIONAL FEE
X$ 9=		OR	X$18=	
X40=		OR	X80=	
+135=		OR	+270=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. 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 number found in the appropriate box in column 1.

FORM PTO-875 (Rev. 8/00)

Patent and Trademark Office, U.S. DEPARTMENT OF COMMERCE

*U.S. GPO: 2000-480-708/30103

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/824,553	04/02/2001	Kirk Johnson	2762.2002-002	9887

21005 7590 04/03/2006

HAMILTON, BROOK, SMITH & REYNOLDS, P.C.
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EXAMINER	
PATEL, JAY P	
ART UNIT	PAPER NUMBER
2616	

DATE MAILED: 04/03/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

Office Action Summary	Application No.	Applicant(s)	
	09/824,553	JOHNSON ET AL.	
	Examiner	Art Unit	
	Jay P. Patel	2616	

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

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 January 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-38* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-12,19-23,26-34,37 and 38* is/are rejected.

7)☒ Claim(s) *13-18,24,25,35 and 36* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

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)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 26-27 and 37-38 are rejected under 35 U.S.C. 102(e) as being anticipated by Albert et al. (U.S. Patent No. 6650641 B1).

3. In regards to claim 26, Albert discloses in figure 2 forwarding agents 231, 232, service mangers 241, 242 and a group of servers 220. Furthermore, figure 11 illustrates how a forwarding agent and a service manager implement NAT between a client and a virtual machine (see figure 11 and column 28, lines 1-19). The forwarding agent and the service manager, anticipate an apparatus located beyond a network-translating device to determining a topology of a network.

In further regard to claims 26 and 37, the service manager and the forwarding agent, respectively contain processors 252 and 272. Both processors are respectively connected to a network interface. The network interface in the forwarding agent is used to send and receive packets to and from other devices on the network (see column 9, lines 61-64). The network interface in the service manager allows the service manager

to directly forward packets into the network from which it is providing a service (see column 10, lines 23-25). The processors anticipate a processor behind a network address translation device coupled to a network interface for initiating communications to a server beyond the network address translation device effecting network address translation.

In further regards to claims 26 and 37, the processors are contained within the service manager or the forwarding agent, which have addresses of their own and therefore, it is anticipated that the processor routing provides the actual network address of the processor in a message of the communications.

In regards to claims 27 and 38, the service manager and the forwarding agent, respectively contain processors 252 and 272. Both processors are respectively connected to a network interface. The network interface in the forwarding agent is used to send and receive packets to and from other devices on the network (see column 9, lines 61-64). The connection between the processor and the network interface, anticipate the said processor issuing communications in response to receiving a communication from behind the network address translation device.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-12, 19-23 and 28-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Albert et al. (U.S. Patent No. 6650641 B1) further in view of Jindal et al. (U.S. Patent 6092178).

3. In regards to claims 1 and 29, Albert discloses in figure 2 forwarding agents 231, 232, service mangers 241, 242 and a group of servers 220. Furthermore, figure 11 illustrates how a forwarding agent and a service manager implement NAT between a client and a virtual machine (see figure 11 and column 28, lines 1-19). The forwarding agent and the service manager are obvious over a translating device and the virtual machine is obvious over a server. The implementation of the NAT by the forwarding agent and a service manger is obvious over initiating communications, from a server behind the translating device, which effect the network address translation.

In further regards, Albert fails to particularly disclose monitoring the communication beyond the translation device to infer partitioning of servers behind the translation device into equivalent sets relative to the network topology induced by the network address translation. Jindal teaches the above-mentioned limitations in figure 2. Jindal describes that a load-balancing application may be exposed to requesting clients through a virtual server name; clients contact a DNS server to determine a server offering desired application. Jindal also mentions that it is well known in the art the DNS servers typically satisfy client request by resolving the virtual server name to an identity (i.e., a network address) of one network server within a pool of suitable servers (see column 7, lines 1-9). Jindal also mentions the a preferred server may be identified by the client on a regular or periodic basis, and may be the same as or different from the

one previously identified; thus, client requests are distributed among the participating servers and the application is load-balanced (see column 6, lines 36-43). This disclosure is obvious over monitoring the communications beyond a translating device to infer partitioning of servers. Jindal also discloses that based on the selected policy, each status object 200 may measure the response time of its associated server (110, 112, 114) or the application instance operating on the server to implement load balancing policies (See figure 2 and column 8, lines 30-46). This disclosure is obvious over partitioning servers behind the translating device into equivalence sets relative to the network topology induced by the network address translation.

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to combine the Network address translation (NAT) between a client and a virtual machine disclosed by Albert with the load balancing disclosed by Jindal. The advantage of doing so would be properly load balance client request based on NAT and load balancing policies. The motivation to combine comes from Jindal, which would be to enhance the functionality and flexibility of a network name service such as DNS (Domain Name Service).

In regards to claims 2 and 3, Albert discloses in figure 7, a wildcard affinity diagram. The wildcard affinity diagram includes a source IP address.

In regards to claim 4, the source IP address included in the wildcard affinity diagram also is obvious over a unique identification number in the message.

In regards to claim 5, Albert discloses in figure 13, a flowchart illustrating a process implemented on a forwarding agent for executing NAT as directed by a service

manger. In the affinity step 1306, the forwarding agent checks the action specified in the affinity. If the action specifies that the packet be to be forwarded to the service manger, then control is transferred to step 1308 and the packet is sent to a service manger. If the action specifies that the packet is to undergo Nat then control is transferred to step 1310 where the source IP address is changed (see figure 13, and column 29, lines 56-67 and column 30, line 1). The action that specifies whether the packet is to go NAT or forwarded to the service manager, is obvious over distinguishing between communications affected by and not affected by network address translation.

In regards to claim 6, Albert discloses in figure 13, a flowchart illustrating a process implemented on a forwarding agent for executing NAT as directed by a service manger. If the action specifies that the packet is to undergo Nat then control is transferred to step 1310 where the source IP address is changed (see figure 13, and column 29, lines 56-67 and column 30, line 1). The changing of the IP address is obvious over comparing an apparent source address of a message against an actual source address provided in the message.

In regards to claim 7, Albert discloses that to specify a single host the wildcard affinity include an IP address with a specific net mask. To specify the range of hosts (i.e. from 1.1.1.0 to 1.1.1.255), the wildcard affinity would include IP address of 1.1.1.0 with a net mask of 255.255.255.0 (see column 17, lines 47-54). The range of host with the IP address, anticipate, assessing a range of network addresses behind the translating device.

In regards to claim 8, from figure 2A, it is evident that the host whether they are clients or servers, are connected to the service managers and forward agents; therefore, the disclosure used with regards to claim 7, is also applicable to claim 8.

In regards to claims 9 and 10, figure 2A discloses a plurality of clients, forwarding agents, service mangers and servers. The servers communicate with network through forwarding agents (see column 6, lines 46-53). The forward agents have knowledge of the network and since the servers communicate to the network via the forwarding agents, it is anticipated that passive and active clients are distinguished and that messages are directed from the passive to the active client.

In regards to clam 11, the service manager and the forwarding agent, respectively contain processors 252 and 272. Both processors are respectively connected to a network interface. The network interface in the forwarding agent is used to send and receive packets to and from other devices on the network (see column 9, lines 61-64). The network interface in the service manager allows the service manager to directly forward packets into the network from which it is providing a service (see column 10, lines 23-25). The respective processors and their connection to the network interface and its functions anticipate from a processor beyond the translating device, causing a message to a passive client to be redirected to an active client, the active client responsive communicating with the processor beyond the translating device.

In regards to claim 12, Albert discloses in figure 10F, a diagram illustration a NAT action segment (see figure 10F and column 24, lines 11-21). The NAT action segment is obvious over maintaining at least one translated address set.

4. In regards to claim 19, forwarding agents 231, 232, service mangers 241, 242 and a group of servers 220. Furthermore, figure 11 illustrates how a forwarding agent and a service manager implement NAT between a client and a virtual machine (see figure 11 and column 28, lines 1-19). The forwarding agent and the service manager are obvious over a translating device and the virtual machine is obvious over a server. The implementation of the NAT by the forwarding agent and a service manger is obvious over a processor routine for receiving communications, from a server behind the translating device, which effect the network address translation.

In further regards, Albert fails to particularly disclose monitoring the communication beyond the translating device to infer partitioning of servers behind the translation device into equivalent sets relative to the network topology induced by the network address translation. Jindal teaches the above-mentioned limitations in figure 2. Jindal describes that a load-balancing application may be exposed to requesting clients through a virtual server name; clients contact a DNS server to determine a server offering desired application. Jindal also mentions that it is well known in the art the DNS servers typically satisfy client request by resolving the virtual server name to an identity (i.e., a network address) of one network server within a pool of suitable servers (see column 7, lines 1-9). Jindal also mentions the a preferred server may be identified by the client on a regular or periodic basis, and may be the same as or different from the one previously identified; thus, client requests are distributed among the participating servers and the application is load-balanced (see column 6, lines 36-43). This

disclosure is obvious over monitoring the communications beyond a translating device to infer partitioning of servers. Jindal also discloses that based on the selected policy, each status object 200 may measure the response time of its associated server (110, 112, 114) or the application instance operating on the server to implement load balancing policies (See figure 2 and column 8, lines 30-46). This disclosure is obvious over a processor routine for partitioning servers behind the translating device into equivalence sets relative to the network topology induced by the network address translation.

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to combine the Network address translation (NAT) between a client and a virtual machine disclosed by Albert with the load balancing disclosed by Jindal. The advantage of doing so would be properly load balance client request based on NAT and load balancing policies. The motivation to combine comes from Jindal, which would be to enhance the functionality and flexibility of a network name service such as DNS (Domain Name Service).

In regards to claim 20, Albert discloses in figure 7, a wildcard affinity diagram. The wildcard affinity diagram includes a source IP address.

In regards to claim 21, Albert discloses in figure 13, a flowchart illustrating a process implemented on a forwarding agent for executing NAT as directed by a service manger. If the action specifies that the packet is to undergo Nat then control is transferred to step 1310 where the source IP address is changed (see figure 13, and column 29, lines 56-67 and column 30, line 1). The changing of the IP address is

obvious over comparing an apparent source address of a message against an actual source address provided in the message.

In regards to claim 22, Albert discloses in figure 10F, a diagram illustration a NAT action segment (see figure 10F and column 24, lines 11-21). The NAT action segment is obvious over including at least one translated address set, the source address being stored in the translated address set.

In regards to claim 23, Albert discloses in figures 2B and 2C that the forwarding agent and the service manager respectively contain memories 254 and 274 connected to the respective processors (see figures 2B and 2C). The memories anticipate, the processor coupled to the memory, the processor routine storing a database of translated address sets in the memory. Furthermore, Albert discloses in figure 10F, a diagram illustration a NAT action segment (see figure 10F and column 24, lines 11-21), which contains the translated address set as, stated in regards to claim 22.

4. In regards to claim 28, forwarding agent and the service manager respectively contain memories 254 and 274 connected to the respective processors (see figures 2B and 2C). The memories are obvious over a computer usable medium for storing data.

In further regards to claim 28 and claim 30, Albert discloses in figure 2, forwarding agents 231, 232, service mangers 241, 242 and a group of servers 220. Furthermore, figure 11 illustrates how a forwarding agent and a service manager implement NAT between a client and a virtual machine (see figure 11 and column 28, lines 1-19). The implementation of the NAT by the forwarding agent and a service

manger is obvious over receiving communications from a network device effecting network address translation.

In further regards, Albert fails to particularly disclose infer partitioning of servers behind the translation device into equivalent sets relative to the network topology induced by the network address translation. Jindal teaches the above-mentioned limitations in figure 2. Jindal describes that a load-balancing application may be exposed to requesting clients through a virtual server name; clients contact a DNS server to determine a server offering desired application. Jindal also mentions that it is well known in the art the DNS servers typically satisfy client request by resolving the virtual server name to an identity (i.e., a network address) of one network server within a pool of suitable servers (see column 7, lines 1-9). Jindal also mentions the a preferred server may be identified by the client on a regular or periodic basis, and may be the same as or different from the one previously identified; thus, client requests are distributed among the participating servers and the application is load-balanced (see column 6, lines 36-43). This disclosure is obvious over monitoring the communications beyond a translating device to infer partitioning of servers. Jindal also discloses that based on the selected policy, each status object 200 may measure the response time of its associated server (110, 112, 114) or the application instance operating on the server to implement load balancing policies (See figure 2 and column 8, lines 30-46). This disclosure is obvious over partitioning servers behind the translating device into equivalence sets relative to the network topology induced by the network address translation.

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to combine the Network address translation (NAT) between a client and a virtual machine disclosed by Albert with the load balancing disclosed by Jindal. The advantage of doing so would be properly load balance client request based on NAT and load balancing policies. The motivation to combine comes from Jindal, which would be to enhance the functionality and flexibility of a network name service such as DNS (Domain Name Service).

In regards to claim 31, Albert discloses in figure 7, a wildcard affinity diagram. The wildcard affinity diagram includes a source IP address.

In regards to claim 32, Albert discloses in figure 13, a flowchart illustrating a process implemented on a forwarding agent for executing NAT as directed by a service manger. If the action specifies that the packet is to undergo Nat then control is transferred to step 1310 where the source IP address is changed (see figure 13, and column 29, lines 56-67 and column 30, line 1). The changing of the IP address is obvious over comparing an apparent source address of a message against an actual source address provided in the message.

In regards to claim 33, Albert discloses in figure 10F, a diagram illustration a NAT action segment (see figure 10F and column 24, lines 11-21). The NAT action segment is obvious over including at least one translated address set, the source address being stored in the translated address set.

In regards to claim 34, Albert discloses in figures 2B and 2C that the forwarding agent and the service manager respectively contain memories 254 and 274 connected

to the respective processors (see figures 2B and 2C). The memories anticipate, storing a database of translated address sets. Furthermore, Albert discloses in figure 10F, a diagram illustration a NAT action segment (see figure 10F and column 24, lines 11-21), which contains the translated address set as, stated in regards to claim 33.

Response to Arguments

5. Applicant's arguments with respect to claims 1-12, 19-23, 26-34, 37 and 38 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Claims 13-18, 24-25 and 35-36 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jay P. Patel whose telephone number is (571) 272-3086. The examiner can normally be reached on M-F 9:00 am - 5:00 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hassan Kizou can be reached on (571) 272-3088. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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).

JPP 3/27/06
Jay P. Patel
Assistant Examiner
Art Unit 2616

HASSAN KIZOU
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600

PTO-1449 REPRODUCED	ATTORNEY DOCKET NO.	APPLICATION NO.
SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT IN AN APPLICATION January 5, 2005 (Use several sheets if necessary)	2762.2002-002	09/824,553
	FIRST NAMED INVENTOR Kirk Johnson	FILING DATE April 2, 2001
	EXAMINER Jay P. Patel	CONFIRMATION NO. 9887 / GROUP 2666

JAN 09 2006 PATENT & TRADEMARK OFFICE

U.S. PATENT DOCUMENTS

EXAMINER INITIAL	REF. NO.	DOCUMENT NUMBER Number-Kind Code (if known)	ISSUE DATE / PUBLICATION DATE MM-DD-YYYY	NAME OF PATENTEE OR APPLICANT OF CITED DOCUMENT
JPP	AE3	US 2002/0038360	03/28/2002	Andrews et al.
JPP	AF3	US 6,092,178	07/18/2000	Jindal et al.
JPP	AG3	US 6,324,580 B1	11/27/2001	Jindal et al.
JPP	AH3	US 6,959,333 B2	10/25/2005	Beaumont et al.

EXAMINER	DATE CONSIDERED
Jay Patel	3/18/06

@PFDesktop\:ODMA/MHODMA/HBSR05;iManage;596389;1

Notice of References Cited	Application/Control No. 09/824,553	Applicant(s)/Patent Under Reexamination JOHNSON ET AL.	
	Examiner Jay P. Patel	Art Unit 2616	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-6,829,239 B1	12-2004	Bhatia et al.	370/392
*	B	US-6,092,178	07-2000	Jindal et al.	712/27
	C	US-			
	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.

Index of Claims



Application/Control No.	Applicant(s)/Patent under Reexamination
09/824,553	JOHNSON ET AL.
Examiner	**Art Unit**
Jay P. Patel	2616

√	Rejected	–	(Through numeral) Cancelled	N	Non-Elected	A	Appeal
=	Allowed	+	Restricted	I	Interference	O	Objected

Claim		Date
Final	Original	3/27/06
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Search Notes	Application/Control No.	Applicant(s)/Patent under Reexamination	
	09/824,553	JOHNSON ET AL.	
	Examiner	Art Unit	
	Jay P. Patel	2616	

SEARCHED			
Class	Subclass	Date	Examiner

INTERFERENCE SEARCHED			
Class	Subclass	Date	Examiner

SEARCH NOTES (INCLUDING SEARCH STRATEGY)		
	DATE	EXMR
Updated East Search: see attached search history report	3/19/2006	JPP

EAST Search History

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S1	1627	(network near topology).ab.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/05/23 14:38
S2	273	S1 and "370"/.clas.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/05/19 15:11
S3	59	"370"/.clas. and (network near topology).ti.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/05/19 16:02
S4	835	370/254.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/05/19 15:29
S5	28	S4 and (address near translation)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/05/19 15:29
S6	0	370/254.clas. and (network near topology).ti.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/05/19 16:02
S7	30	370/254.ccls. and (network near topology).ti.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/05/19 16:03

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EAST Search History

S8	24	(US-20020003780-$ or US-20020009086-$ or US-20020116493-$ or US-20020143935-$ or US-20030051032-$).did. or (US-5737319-$ or US-5796736-$ or US-5886643-$ or US-5926462-$ or US-5933416-$ or US-5966513-$ or US-6046988-$ or US-6118768-$ or US-6205122-$ or US-6347336-$ or US-6377987-$ or US-6483812-$ or US-6516345-$ or US-6625124-$ or US-6643269-$ or US-6728670-$ or US-6798752-$ or US-6822943-$ or US-6829641-$).did.	US-PGPUB; USPAT	OR	OFF	2005/05/19 20:00
S9	8	S8 and (address near translation)	US-PGPUB; USPAT	OR	OFF	2005/05/23 15:18
S10	5	S8 and (address near translation) and (server)	US-PGPUB; USPAT	OR	OFF	2005/05/19 20:20
S11	674	(network near configuration).ti.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/05/23 14:39
S12	0	S11 and 370/254.clas.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/05/23 14:39
S13	16	S11 and 370/254.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/05/23 15:00
S14	0	370/254.ccls and (passive near active near clients).ab.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/05/23 15:01
S15	0	370/254.ccls and (passive near active).ab.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/05/23 15:01

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S16	0	370/254.ccls and (passive near active)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/05/23 15:01
S17	0	370/254.ccls and (mask$3 near IP)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/05/23 15:01
S18	0	370/254.ccls and (network near translation)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/05/23 15:01
S19	0	370/254.ccls and (network near address near translation)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/05/23 15:02
S20	810	370/254.ccls. and (network "adj." address "adj." translat$4)	US-PGPUB; USPAT	OR	OFF	2005/05/23 15:19
S21	673	S20 and (topology or configuration)	US-PGPUB; USPAT	OR	OFF	2005/05/23 15:25
S22	0	S21 and (active near passive near client$2)	US-PGPUB; USPAT	OR	OFF	2005/05/23 15:20
S23	90	"6345294" or "6052718"	US-PGPUB; USPAT	OR	OFF	2005/05/23 15:26
S24	2	("6345294" or "6052718").pn.	US-PGPUB; USPAT	OR	OFF	2005/05/23 15:31
S25	234	2001/0039585 or "6571288" or "6134588" or "6078960" or "6539426" or "5870562" or "6035055" or "6041041" or "6081840" or "6185598" or "6304913" or "6338092" or "6505254" or "6581065" or 2002/0065938 or (2002/0186694 or 2003/0041094 or "6553413" or "6553420" or "6185619").pn.	US-PGPUB; USPAT	OR	OFF	2005/05/23 15:34

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S26	16	(2001/0039585, "6571288", "6134588", "6078960", "6539426", "5870562", "6035055", "6041041", "6081840", "6185598", "6304913", "6338092", "6505254", "6581065", 2002/0065938, 2002/0186694, 2003/0041094, "6553413", "6553420", "6185619").pn.	US-PGPUB; USPAT	OR	OFF	2005/05/23 15:36
S27	29	"370"/.clas. and "709"/.clas. and (group$4 near (topology or configuration))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/05/26 15:48
S28	0	(NAT) with (partision) with (server or device) with (topology or configuration)	US-PGPUB; USPAT	OR	OFF	2005/06/16 15:14
S29	0	(NAT) with (partision) with (server or device)	US-PGPUB; USPAT	OR	OFF	2005/06/16 15:17
S30	0	(NAT) with (partision) with (server or device)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/06/16 15:13
S31	4	(address near translation) with (partition) with (server or device)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/06/16 15:14
S32	0	(NAT) with (partition) with (server or device) with (topology or configuration)	US-PGPUB; USPAT	OR	OFF	2005/06/16 15:14
S33	4	(NAT) with (partition)	US-PGPUB; USPAT	OR	OFF	2005/06/16 15:18
S34	4219	(network same address same translation)	US-PGPUB; USPAT	OR	OFF	2005/06/16 15:28
S35	23	S34 same partition	US-PGPUB; USPAT	OR	OFF	2005/06/16 15:18
S36	583	S34 same (topology or configuration)	US-PGPUB; USPAT	OR	OFF	2005/06/16 15:29
S37	4	S36 same (partition)	US-PGPUB; USPAT	OR	OFF	2005/06/16 15:28
S38	426	S36 and ("370"/$.ccls. or "709"/$.ccls. or "711"/$.ccls.)	US-PGPUB; USPAT	OR	OFF	2005/06/16 15:32

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S39	134	S38 and (server or device) same NAT	US-PGPUB; USPAT	OR	OFF	2005/06/16 15:32
S40	20	S39 and (partition or divide)	US-PGPUB; USPAT	OR	OFF	2005/06/18 16:32
S41	5432	709/203.ccls.	US-PGPUB; USPAT	OR	OFF	2005/06/18 16:32
S42	1695	S41 and (network same (topology or configuration))	US-PGPUB; USPAT	OR	OFF	2005/06/18 16:33
S43	1118	S41 and (network same (topology or configuration) same server)	US-PGPUB; USPAT	OR	OFF	2005/06/18 16:33
S44	1332	S41 and (network same (topology or configuration) same server same partition$4 or divid$4)	US-PGPUB; USPAT	OR	OFF	2005/06/18 16:34
S45	28	S41 and (network same (topology or configuration) same server same (partition$4 or divid$4) same (network "adj." address "adj." translation))	US-PGPUB; USPAT	OR	OFF	2005/06/20 15:36
S46	1325	711/202.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/06/20 15:38
S47	3	S46 and (NAT)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/06/20 15:40
S48	0	S46 same (NAT same server)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/06/20 15:39
S49	799	S46 and (partition$4 or divid$3)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/06/20 15:40
S50	587	S49 and (topology or configuration or arrange$4)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/06/20 15:41

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S51	1	S50 and (network near address near translation)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/06/20 15:42
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S53	595	370/254.ccls. and (address "adj." translation)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/06/21 14:28
S54	125	370/254.ccls. and (address "adj." translation).ab.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/06/21 14:28
S55	30	(US-20010028654-$ or US-20020003780-$ or US-20020009086-$ or US-20020116493-$ or US-20020143935-$ or US-20030051032-$ or US-20030126202-$ or US-20050013255-$).did. or (US-5737319-$ or US-5796736-$ or US-5886643-$ or US-5926462-$ or US-5933416-$ or US-5940870-$ or US-5966513-$ or US-6046988-$ or US-6118768-$ or US-6205122-$ or US-6347336-$ or US-6377987-$ or US-6483812-$ or US-6510496-$ or US-6516345-$ or US-6625124-$ or US-6633560-$ or US-6643269-$ or US-6728670-$ or US-6798752-$ or US-6822943-$ or US-6829641-$).did.	US-PGPUB; USPAT	OR	OFF	2005/09/27 12:49
S56	7	S55 and (network same address same translat$4)	USPAT	OR	OFF	2005/09/27 13:29
S57	1	"6650641".pn.	USPAT	OR	OFF	2005/09/27 13:29

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S58	17	("5774660" | "5951694" | "6006264" | "6038233" | "6128642" | "6128657" | "6137777" | "6185619" | "6243379" | "6249801" | "6263368" | "6327622" | "6330602" | "6389462").PN. OR ("6650641").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2005/09/28 13:57
S59	1	S58 and (NAT same server same (topology or configuration))	US-PGPUB; USPAT; USOCR	OR	OFF	2005/09/28 13:58
S60	3	(NAT same server same (topology or configuration) same partition$4)	US-PGPUB; USPAT; USOCR	OR	OFF	2005/09/28 13:59
S61	912	370/254.ccls. and (network "adj." address "adj." translat$4)	US-PGPUB; USPAT	OR	OFF	2005/09/29 12:18
S62	5	(network same (topology or configuration) same (partition or divide or allocate) same NAT)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/09/29 12:21
S63	0	370/254.ccls. and (network same (topology or configuration) same (partition or divide or allocate) same NAT)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/09/29 12:22
S64	0	370/254.ccls. and ((topology or configuration) same (partition or divide or allocate) same NAT)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/09/29 12:22
S65	10	370/254.ccls. and ((topology or configuration) same NAT)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/09/29 12:22
S66	1721	370/392.ccls.	US-PGPUB; USPAT	OR	OFF	2005/09/29 15:58
S67	1	S66 and (NAT same server same (partition or divide))	US-PGPUB; USPAT	OR	OFF	2005/09/29 15:59
S68	90	S66 and (NAT)	US-PGPUB; USPAT	OR	OFF	2005/09/29 16:03
S69	12	S66 and (NAT same (topology or configuration))	US-PGPUB; USPAT	OR	OFF	2005/09/29 16:03

Quicker Connections - Exhibit 2005
IPR2025-01088 - Page 176

EAST Search History

S70	0	"20020038360".pn.	USPAT	OR	OFF	2006/03/16 10:47
S71	1	"20020038360".pn.	US-PGPUB; USPAT	OR	OFF	2006/03/16 10:55
S72	1	"6092178".pn.	US-PGPUB; USPAT	OR	OFF	2006/03/16 14:17
S73	0	("network address translat$4") and (partition near servers)	US-PGPUB; USPAT	OR	OFF	2006/03/16 13:19
S74	0	("network address translation") and (partition near servers)	US-PGPUB; USPAT	OR	OFF	2006/03/16 13:19
S75	2096	("network address translation")	US-PGPUB; USPAT	OR	OFF	2006/03/16 13:19
S76	0	S75 and ("network (topology or configuration)")	US-PGPUB; USPAT	OR	OFF	2006/03/16 13:20
S77	203	S75 and (partition and server$1)	US-PGPUB; USPAT	OR	OFF	2006/03/16 13:20
S78	7	S77 and (@rlad<"20000124")	US-PGPUB; USPAT	OR	OFF	2006/03/16 13:21
S79	1	"6324580".pn.	US-PGPUB; USPAT	OR	OFF	2006/03/16 14:20
S80	1	"6959333".pn.	US-PGPUB; USPAT	OR	OFF	2006/03/16 14:20
S81	0	(network same topology) and (network same address same translatioin) and (server same monitor$3) and (behind same translat$4)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/03/22 13:03
S82	0	(network same topology) and (network same address same translatioin) and (server same monitor$3)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/03/22 13:03
S83	0	(network same topology) and (network same address same translatioin)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/03/22 13:03
S84	0	(network same topology) and (network same address same translatioin)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/03/22 13:03

Quicker Connections - Exhibit 2005
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EAST Search History

S85	0	(network same (topology or configuration)) and (network same address same translatioin)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/03/22 13:03
S86	112147	(network same (topology or configuration))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/03/22 13:04
S87	1897	S86 and (NAT)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/03/22 13:04
S88	155	S87 and (monitor and partition)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/03/22 13:05
S89	6	S88 and (@rlad<"20000124")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/03/22 13:16
S90	833732	(network "adj." address "adj." translation).ab.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/03/22 13:16
S91	2464	S90 and (partition$3 or divide) same server$1	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/03/22 13:17
S92	373	S90 and ((partition$3 or divide) same server$1).ab.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/03/22 13:17

Quicker Connections - Exhibit 2005
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EAST Search History

S93	409	S91 and (@rlad<"20000124")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/03/22 14:08
S94	22	S92 and (@rlad<"20000124")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/03/22 13:17
S95	0	("network address translation") and ("partition$3 server$1")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/03/22 14:09
S96	481	("network address translation"). ab.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/03/22 14:09
S97	12	S96 and (@rlad<"20000124")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/03/22 16:09
S98	3891	370/392.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/03/22 16:09
S99	0	S98 and (("network address translation") same partition$3 same (server$1 or workstation$1))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/03/22 16:10
S100	0	S98 and (("network address translation") same partition$3)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/03/22 16:10

Quicker Connections - Exhibit 2005
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EAST Search History

S101	106	S98 and (("network address translation"))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/03/22 16:10
S102	19	S101 and(@rlad<"20000124")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/03/22 16:10
S103	0	(detemin$3 same network same (topology or configuration)) and ("network address translation")	US-PGPUB; USPAT	OR	OFF	2006/03/23 13:19
S104	3	(detemin$3 same network same (topology or configuration))	US-PGPUB; USPAT	OR	OFF	2006/03/23 13:19
S105	4927	(partition$4 same server$1)	US-PGPUB; USPAT	OR	OFF	2006/03/23 13:20
S106	101	S105 and ("network address translation")	US-PGPUB; USPAT	OR	OFF	2006/03/23 13:20
S107	5	S106 and (@rlad<"20000124")	US-PGPUB; USPAT	OR	OFF	2006/03/23 13:24
S108	1094	370/254.ccls.	US-PGPUB; USPAT	OR	OFF	2006/03/23 13:24
S109	19	S108 and (partition$4 same (server$1 or worksation$1))	US-PGPUB; USPAT	OR	OFF	2006/03/23 14:16
S110	164	711/210.ccls.	US-PGPUB; USPAT	OR	OFF	2006/03/23 14:17
S111	34	S110 and (@rlad<"20000124")	US-PGPUB; USPAT	OR	OFF	2006/03/23 14:25
S112	1	"6449647".pn.	US-PGPUB; USPAT	OR	OFF	2006/03/23 14:26
S113	1	"6173322".pn.	US-PGPUB; USPAT	OR	OFF	2006/03/23 15:19
S114	0	(NAT same DNS same creat$4 same (sub-domain or workgroup))	US-PGPUB; USPAT	OR	OFF	2006/03/23 15:51
S115	214	(NAT same DNS)	US-PGPUB; USPAT	OR	OFF	2006/03/23 15:57
S116	0	(NAT same DNS same partition$4 same (server$1 or workgroup$1 or workstation$1))	US-PGPUB; USPAT	OR	OFF	2006/03/23 15:21
S117	0	(NAT same DNS same partition$4)	US-PGPUB; USPAT	OR	OFF	2006/03/23 15:21
S118	1	(NAT same DNS same sub same domain)	US-PGPUB; USPAT	OR	OFF	2006/03/23 15:21

EAST Search History

S119	0	(NAT same DNS same creat$4 same (sub))	US-PGPUB; USPAT	OR	OFF	2006/03/23 15:51
S120	15	(NAT same DNS) and (@rlad<"20000124")	US-PGPUB; USPAT	OR	OFF	2006/03/23 15:57

OIPE
JAN 09 2006
PATENT & TRADEMARK OFFICE

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants:	Kirk Johnson, James O'Toole, M. Frans Kaashoek and John Jannotti		
Application No.:	09/824,553	Group:	2666
Filed:	April 2, 2001	Examiner:	Jay P. Patel
Confirmation No.:	9887		

For: METHOD AND APPARATUS FOR DETERMINING A NETWORK TOPOLOGY IN THE PRESENCE OF NETWORK ADDRESS TRANSLATION

CERTIFICATE OF MAILING OR TRANSMISSION

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as First Class Mail in an envelope addressed to Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, or is being facsimile transmitted to the United States Patent and Trademark Office on:

1/5/2006 Denise Caredio
Date Signature

Denise Caredio
Typed or printed name of person signing certificate

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This Information Disclosure Statement is submitted:

[ ] under 37 CFR 1.129(a), or
(First/Second submission after Final Rejection)

[ ] under 37 CFR 1.97(b), or
(Within any one of the following time periods: three months of filing national application (other than a CPA) or date of entry of the national stage in an international application; or before the mailing date of a first office action on the merits in a non-provisional application, including a CPA, or a Request for Continued Examination).

[X] under 37 CFR 1.97(c) together with either:

[X] a Statement under 37 CFR 1.97(e), as checked below, or

[ ] a $180.00 fee under 37 CFR 1.17(p), or
(After the 37 CFR 1.97(b) time period, but before final action or notice of allowance, whichever occurs first)

[ ] under 37 CFR 1.97(d) together with:

[ ] a Statement under 37 CFR 1.97(e), as checked below, and

[ ] a $180.00 fee under 37 CFR 1.17(p), or
(Filed after final action or notice of allowance, whichever occurs first, but on or before payment of the issue fee)

[ ] under 37 CFR 1.97(i):
Applicant requests that the IDS and cited reference(s) be placed in the application file.
(Filed after payment of issue fee)

Statement Under 37 CFR 1.97(e)

[ ] Each item of information contained in this 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 this Information Disclosure Statement; or

[X] No item of information contained in this Information Disclosure Statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the undersigned, 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 this Information Disclosure Statement.

Statement Under 37 CFR 1.704(d) (Patent Term Adjustment)
Applies to original applications (other than design) filed on or after May 29, 2000

[ ] Each item of information contained in the Information Disclosure Statement was cited in a communication from a foreign patent office in a counterpart application and this communication was not received by any individual designated in § 1.56(c) more than thirty days prior to the filing of the Information Disclosure Statement.

[X] Enclosed herewith is form PTO-1449:

[ ] Copies of the cited references are enclosed.

[X] Copies of issued U.S. patents and published U.S. applications are not required and are not being provided.

[ ] Copies of the cited references are enclosed except those entered in prior application, U.S. Application No. [ ], to which priority under 35 U.S.C. 120 is claimed. [The earlier application contains copies of the cited references.]

[ ] The listed references were cited in the enclosed International Search Report in a counterpart foreign application.

[ ] The "concise explanation" requirement (non-English references) for reference(s) [ ] under 37 CFR 1.98(a)(3) is satisfied by:

[ ] the explanation provided on the attached sheet.

[ ] the explanation provided in the Specification.

[ ] submission of the enclosed International Search Report.

[ ] submission of the enclosed English-language version of a foreign Search Report and/or foreign Office Action.

[ ] the enclosed English language abstract.

[ ] Applicant requests that the following non-published pending applications be considered:

Examiner's Initials

_____ U.S. Patent Application No. [ ], by [inventor(s)], filed [ ], Docket No.: [ ]

_____ U.S. Patent Application No. [ ], by [inventor(s)], filed [ ], Docket No.: [ ]

_____ U.S. Patent Application No. [ ], by [inventor(s)], filed [ ], Docket No.: [ ]

_____ _____

Examiner Date

[ ] A copy of each above-cited application, including the current claims, is enclosed, except any application filed on or after June 30, 2003, which has been scanned into the PTO's Image File Wrapper (IFW) system and is available to the examiner.

[ ] A copy of each above-cited application, including the current claims, is enclosed, except those entered in prior application, U.S. Application No. [ ], to which priority under 35 U.S.C. 120 is claimed.

The Examiner is requested to return a copy of the above list of pending applications indicating which references were considered with the next office communication.

It is requested that the information disclosed herein be made of record in this application.

Method of payment:

[ ] A check for the fee noted above is enclosed, or the fee has been included in the check with the accompanying Reply. A copy of this Statement is enclosed.

[ ] Please charge Deposit Account 08-0380 in the amount of $[ ]. A copy of this Statement is enclosed.

[X] Please charge any deficiency in fees and credit any overpayment to Deposit Account 08-0380.

Respectfully submitted,

HAMILTON, BROOK, SMITH & REYNOLDS, P.C.

By Mark B Solomon

Mark B. Solomon
Registration No.: 44,348
Telephone: (978) 341-0036
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Concord, MA 01742-9133
Dated: 1/5/06

PTO-1449 REPRODUCED	ATTORNEY DOCKET NO.	APPLICATION NO.
SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT IN AN APPLICATION	2762.2002-002	09/824,553
	FIRST NAMED INVENTOR: Kirk Johnson	FILING DATE: April 2, 2001
January 5, 2005 (Use several sheets if necessary)	EXAMINER: Jay P. Patel	CONFIRMATION NO.: 9887 / GROUP: 2666

OIPE JAP6 JAN 09 2006 PATENT & TRADEMARK OFFICE

U.S. PATENT DOCUMENTS

EXAMINER INITIAL	REF. NO.	DOCUMENT NUMBER Number-Kind Code (if known)	ISSUE DATE / PUBLICATION DATE MM-DD-YYYY	NAME OF PATENTEE OR APPLICANT OF CITED DOCUMENT
	AE3	US 2002/0038360	03/28/2002	Andrews et al.
	AF3	US 6,092,178	07/18/2000	Jindal et al.
	AG3	US 6,324,580 B1	11/27/2001	Jindal et al.
	AH3	US 6,959,333 B2	10/25/2005	Beaumont et al.

EXAMINER	DATE CONSIDERED

@PFDesktop\::ODMA/MHODMA/HBSR05;iManage;596389;1

@PFDesktop\::ODMA/MHODMA/HBSR05;iManage;596461;1
TJM/MBS/TJA/ets/(dc)
01/05/2006

PATENT APPLICATION
DOCKET NO. 2762.2002-002

2666
IFW



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants:	Kirk Johnson, James O'Toole, M. Frans Kaashoek and John Jannotti		
Application No.:	09/824,553	Group:	2666
Filed:	April 2, 2001	Examiner:	Jay P. Patel
Confirmation No.:	9887		

For: METHOD AND APPARATUS FOR DETERMINING A NETWORK TOPOLOGY IN THE PRESENCE OF NETWORK ADDRESS TRANSLATION

CERTIFICATE OF MAILING OR TRANSMISSION

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1/5/2006 Denise Caredeo
Date Signature

Denise Caredeo
Typed or printed name of person signing certificate

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Transmitted herewith is an Amendment for filing in the above-identified application.

[ ] Small entity status of this application under 37 C.F.R. 1.9 and 1.27 has been established by a Small Entity Statement previously submitted.

[ ] A Small Entity Statement to establish small entity status under 37 C.F.R. 1.9 and 1.27 is enclosed.

The claims fee has been calculated as shown below:

	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NO. PREVIOUSLY PAID FOR	PRESENT EXTRA
TOTAL	38	MINUS	* 38	
INDEP	7	MINUS	** 7	
☐ FIRST PRESENTATION OF MULTIPLE DEP. CLAIM				

* not fewer than 20
** not fewer than 3

SMALL ENTITY		OR	OTHER THAN SMALL ENTITY	
RATE	ADDIT. FEE		RATE	ADDIT. FEE
X $25	$		X $50	$ 0
X $100	$		X $200	$ 0
+ $180	$		+ $360	$
TOTAL=	$ 0		TOTAL=	$ 0

The Application Size Fee has been calculated as shown below:
(Effective for cases filed on or after December 8, 2004)

Actual Sheets (Including current amendment)	Highest No. of Sheets Paid For (At least 100)	No. of Additional Units Required (Increments of 50 sheets)

SMALL ENTITY	
Rate	Total Amount Owed
X $125	$[ ]

OTHER THAN SMALL ENTITY	
Rate	Total Amount Owed
X $250	$[ ]

Payment Sufficient for up to
[ ] Sheets

Petition for Extension of Time

[ ] Applicant hereby petitions to extend the time to respond to the [ ] dated [ ] for [ ] month(s) from [ ] to [ ]. The appropriate fee is set forth below.

[ ] [For action-specific language in an extension of time, go to insert, file, public folders, firm templates, and select the appropriate paragraph.]

Please charge Deposit Account No. 08-0380 for the following fees:

[ ]	Petition for [ ] month Extension of Time	$
[ ]	Claims Fee	$
[ ]	Application Size Fee	$
[ ]	Other Fees:	
		$
		$
	TOTAL:	$ 0

A check is enclosed in payment of the following fees:

[ ]	Petition for [ ] month Extension of Time	$
[ ]	Claims Fee	$
[ ]	Application Size Fee	$
[ ]	Other Fees:	
		$
		$
	TOTAL:	$ 0

[X] Please charge any deficiency or credit any overpayment in the fees that may be due in this matter to Deposit Account No. 08-0380. A copy of this letter is enclosed for accounting purposes.

Respectfully submitted,

HAMILTON, BROOK, SMITH & REYNOLDS, P.C.

By Mark B Solomon

Mark B. Solomon
Registration No.: 44,348
Telephone (978) 341-0036
Facsimile (978) 341-0136

Concord, Massachusetts 01742-9133
Dated: 1/5/06

595688_1.DOC
TJA/MBS/TJA/ets
01/05/2006



PATENT APPLICATION
Attorney's Docket No.: 2762.2002-002

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: Kirk Johnson, James O'Toole, M. Frans Kaashoek, and John Jannotti

Application No.: 09/824,553 Group: 2666

Filed: April 2, 2001 Examiner: Jay P. Patel

Confirmation No.: 9887

For: METHOD AND APPARATUS FOR DETERMINING A NETWORK TOPOLOGY IN THE PRESENCE OF NETWORK ADDRESS TRANSLATION

CERTIFICATE OF MAILING OR TRANSMISSION

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1/5/2006 Denise Caredo
Date Signature

Denise Caredo
Typed or printed name of person signing certificate

AMENDMENT

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This Amendment is being filed in response to the Office Action mailed from the U.S. Patent and Trademark Office on October 5, 2005 in the above-identified application. Reconsideration and further examination are requested.

Please amend the application as follows:

Amendments to the Claims

Please amend Claims 1, 19, 26, 28, 29, 30 and 37. The Claim Listing below will replace all prior versions of the claims in the application:

Claim Listing

1. (Currently Amended) A method of determining a network topology induced by network address translation, comprising:

initiating communications, from a server behind a translating device, which effect the network address translation; and

monitoring the communications beyond the translating device to infer partitioning of servers behind the translating device into equivalence sets relative to the network topology induced by the network address translation.

2. (Original) The method according to Claim 1 wherein the communications include at least one source address in a message.

3. (Original) The method according to Claim 2 wherein the source address includes an IP address.

4. (Original) The method according to Claim 2 wherein a unique identification number is included in the message.

5. (Original) The method according to Claim 1 wherein monitoring includes distinguishing between communications affected by and not affected by network address translation.

6. (Original) The method according to Claim 5 wherein distinguishing includes comparing an apparent source address of a message against an actual source address provided in the message.

7. (Original) The method according to Claim 1 further comprising assessing a range of network addresses behind the translating device.

8. (Original) The method according to Claim 1 further comprising assessing a range of public network addresses associated with the translating device.

9. (Original) The method according to Claim 1 further comprising distinguishing between active and passive clients.

10. (Original) The method according to Claim 9 further including directing a message from a passive client to an active client.

11. (Original) The method according to Claim 9 further including, from a processor beyond the translating device, causing a message to a passive client to be redirected to an active client, the active client responsively communicating with the processor beyond the translating device.

12. (Original) The method according to Claim 1 wherein monitoring includes maintaining at least one translated address set.

13. (Original) The method according to Claim 12 wherein monitoring further includes comparing apparent message source addresses with addresses in the translated address set.

14. (Original) The method according to Claim 13 further including merging translated address sets in response to determining that multiple apparent source addresses in distinct translated address sets correspond to the same actual source address.

15. (Original) The method according to Claim 13 further including assessing whether the source address is behind a known address translation device.

16. (Original) The method according to Claim 12 wherein maintaining includes providing a timeout mechanism for removing an address from a translated address set.

17. (Original) The method according to Claim 1 further including commanding a new client to contact a known client behind the same network address translation device.

18. (Original) The method according to Claim 1 wherein monitoring includes providing a soft-state mechanism to occasionally refresh partitioning.

19. (Currently Amended) Apparatus to be located beyond a network address translation device for determining a topology of a network in the presence of network address translation, comprising:

a processor coupled to a network interface for receiving communication from a network device effecting network address translation; and

a processor routine operating on the processor, the processor routine to infer partitioning of servers behind a network address translation device into equivalence sets relative to the network topology induced by the network address translation.

20. (Original) The apparatus according to Claim 19 wherein the messages received include at least one source address in the message.

21. (Original) The apparatus according to Claim 20 wherein the processor routine compares an apparent source address of a message against an actual source address provided in the message.

22. (Original) The apparatus according to Claim 20 further including at least one translated address set, the source address being stored in the translated address set.

23. (Original) The apparatus according to Claim 19 wherein the processor is further coupled to memory, the processor routine storing a database of translated address sets in the memory.

24. (Original) The apparatus according to Claim 23 wherein the processor routine includes a database manager to compare apparent message source addresses with addresses stored in the database of translated address sets.

25. (Original) The apparatus according to Claim 24 wherein the database manager provides a timeout mechanism for removing translated addresses from the translated address sets in the database.

26. (Currently Amended) Apparatus to be located behind a network address translation device for providing communications used to determine a topology of a network in the presence of network address translation, comprising:

a processor behind a network address translation device coupled to a network interface, the processor initiating communications to a server beyond [[a]] the network address translation device to effect network address translation; and

a processor routine operating on said processor, said processor routine providing the actual network address of the processor in a message of the communications.

27. (Original) The apparatus according to Claim 26 wherein said processor issues communications in response to receiving a communication from behind the network address translation device.

28. (Currently Amended) A computer program product comprising:

a computer usable medium for storing data; and

a set of computer program instructions embodied on the computer usable medium, including instructions to:

receive communications from a network device effecting network address translation; and

infer partitioning of servers behind a network address translation device into equivalence sets relative to the network topology induced by the network address translation.

29. (Currently Amended) Apparatus for determining a topology of a network in the presence of network address translation, comprising:

means for initiating communications from a network which effects network address translation; and

means for monitoring the communication to infer partitioning of servers behind a network address translation device into equivalence sets relative to the network topology induced by the network address translation.

30. (Currently Amended) In a network device beyond a network address translation device, a method for determining a topology of a network in the presence of network address translation, the method comprising:

receiving communication messages from a network device effecting network address translation; and

inferring partitioning of servers behind a network address translation device into equivalence sets relative to the network topology induced by the network address translation.

31. (Original) The method according to Claim 30 wherein the messages received include at least one source address in the message.

32. (Original) The method according to Claim 31 further including comparing an apparent source address of a message against an actual source address provided in the message.

33. (Original) The method according to Claim 31 further including maintaining at least one translated address set, the source address being stored in the translated address set.

34. (Original) The method according to Claim 30 further including storing a database of translated address sets.

35. (Original) The method according to Claim 34 further including comparing apparent message source addresses with addresses stored in the database of translated address sets.

36. (Original) The method according to Claim 35 further including removing translated addresses from the translated address sets in the database after exceeding a timeout duration.

37. (Currently Amended) In a network device located behind a network address translation device, a method for providing communications used to determine a topology of a network in the presence of network address translation, the method comprising:

initiating communications to a server beyond a network address translation device to effect network address translation; and

providing the actual network address of [[the]] a processor, behind the network address translation device, in a message of the communications.

38. (Original) The method according to Claim 37 further including issuing communications in response to receiving a communication from behind the network address translation device.

REMARKS

Claims 1-38 are pending in the application. Claims 1-12, 19-23, 26-34, 37 and 38 stand rejected. Claims 1, 19, 26, 28, 29, 30 and 37 are being amended in the Claim Listing above. Claims 13-18, 24, 25, 35 and 36 stand objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. No new matter is being introduced by way of the amendments.

In part 2, beginning on page 2 of the Office Action at hand, Claims 1-12, 19-23, 26-34 and 37-38 were rejected under 35 U.S.C. 102(e) as being anticipated by Albert et al. (U.S. Patent No. 6,650,641) hereafter "Albert."

As part of a method of determining a network topology, Applicants disclose, and claim in claim 1, as now amended, "... monitoring the communications beyond the translating device to infer partitioning of servers behind the translation device into equivalence sets relative to the network topology induced by the network address translation." A description supporting Claim 1 is found in the specification as originally filed at least on page 3, lines 10-14.

In contrast, Albert discloses, in column 28, lines 20-27:

> [s]ervice manager 1110 selects one of the hosts using a load balancing algorithm. In one embodiment, a round robin load balancing algorithm is used. In other embodiments, load balancing algorithms that select the fastest available host, a host with the least number of connections, or a host determined by a feedback mechanism that measures the performance of the host to be the best host to handle the connection.

In this way, Albert provides a method of using load balancing algorithms to select an available host meeting a predefined performance criteria. However, these load balancing algorithms do not monitor communications beyond a translating device, infer a partitioning of servers, use equivalence sets relative to a network topology induced by network address translation, or combine any of these elements. Further, Applicants believe additional distinguishing features exist between Applicants' invention as recited in the claims and Albert's embodiment in Fig. 11. Specifically, Fig. 11 of Albert discloses a service manager 1110, as described above, that uses load balancing algorithms beyond a translating device. Thus, even if

these load balancing algorithms disclose partitioning of servers, the partitioning of servers would occur beyond the translating device rather that behind the translating device.

Therefore, Applicants respectfully submit Albert does not anticipate all of the limitations of Applicants' claim 1, as now amended ("monitoring the communications beyond the translating device to infer partitioning of servers behind the translating device into equivalence sets relative to the network topology induced by the network address translation").

Accordingly, Applicants respectfully submit that claim 1, as now amended, should be allowable over Albert under 35 U.S.C. 102(e) and that the rejection is improper and should be withdrawn.

Independent Claims 19, 26, 28, 29, 30 and 37, as now amended, include similar limitations as now amended Claim 1 and, therefore, should be allowed for similar reasons over Albert under 35 U.S.C. 102(e).

For at least the same reasons, dependent Claims 2-18, 20-25, 27 and 31-36 should be allowable over Albert under 35 U.S.C. 102(e) for at least the same reasons as the base claims from which they depend.

Information Disclosure Statement

A Supplemental Information Disclosure Statement (IDS) is being filed concurrently herewith. Entry of the IDS is respectfully requested.

CONCLUSION

In view of the above amendments and remarks, it is believed that all claims (claims 1-38) are in condition for allowance, and it is respectfully requested that the application be passed to issue. If the Examiner feels that a telephone conference would expedite prosecution of this case, the Examiner is invited to call the undersigned.

Respectfully submitted,

HAMILTON, BROOK, SMITH & REYNOLDS, P.C.

By Mark B Solomon

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Concord, MA 01742-9133
Dated: 1/5/06

PATENT APPLICATION FEE DETERMINATION RECORD
Effective October 1, 2000

Application or Docket Number: 09824553

CLAIMS AS FILED - PART I

	(Column 1)	(Column 2)
TOTAL CLAIMS	38	
FOR	NUMBER FILED	NUMBER EXTRA
TOTAL CHARGEABLE CLAIMS	38 minus 20=	* 18
INDEPENDENT CLAIMS	7 minus 3 =	* 4
MULTIPLE DEPENDENT CLAIM PRESENT		☐

* If the difference in column 1 is less than zero, enter "0" in column 2

SMALL ENTITY TYPE ☐		OR	OTHER THAN SMALL ENTITY	
RATE	FEE		RATE	FEE
BASIC FEE	355.00	OR	BASIC FEE	710.00
X$ 9=		OR	X$18=	3240.00
X40=		OR	X80=	32000
+135=		OR	+270=	
TOTAL		OR	TOTAL	135400

1/9/06

CLAIMS AS AMENDED - PART II

AMENDMENT A

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA
Total	* 38	Minus	** 38	=
Independent	* 7	Minus	*** 7	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM ☐				

SMALL ENTITY		OR	OTHER THAN SMALL ENTITY	
RATE	ADDITIONAL FEE		RATE	ADDITIONAL FEE
X$ 9=		OR	X$18=	
X40=		OR	X80=	
+135=		OR	+270=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

AMENDMENT B

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA
Total	*	Minus	**	=
Independent	*	Minus	***	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM ☐				

RATE	ADDITIONAL FEE		RATE	ADDITIONAL FEE
X$ 9=		OR	X$18=	
X40=		OR	X80=	
+135=		OR	+270=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

AMENDMENT C

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA
Total	*	Minus	**	=
Independent	*	Minus	***	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM ☐				

RATE	ADDITIONAL FEE		RATE	ADDITIONAL FEE
X$ 9=		OR	X$18=	
X40=		OR	X80=	
+135=		OR	+270=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. 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 number found in the appropriate box in column 1.

FORM PTO-875
(Rev. 8/00)

Patent and Trademark Office, U.S. DEPARTMENT OF COMMERCE
*U.S. GPO: 2000-450-705/30103

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/824,553	04/02/2001	Kirk Johnson	2762.2002-002	9887

21005 7590 10/05/2005

HAMILTON, BROOK, SMITH & REYNOLDS, P.C.
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P.O. BOX 9133
CONCORD, MA 01742-9133

EXAMINER	
PATEL, JAY P	

ART UNIT	PAPER NUMBER
2666	

DATE MAILED: 10/05/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

Office Action Summary	Application No.	Applicant(s)	
	09/824,553	JOHNSON ET AL.	
	Examiner	Art Unit	
	Jay P. Patel	2666	

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

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04/02/2001*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-38* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-12,19-23,26-34,37 and 38* is/are rejected.

7)☒ Claim(s) *13-18,24,25,35 and 36* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *02 April 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

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)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1-12, 19-23, 26-34 and 37-38 are rejected under 35 U.S.C. 102(e) as being anticipated by Albert et al. (U.S. Patent No. 6650641 B1).

The applied reference has a common assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

3. In regards to claims 1 and 29, Albert discloses in figure 2 a plurality of clients 201-203, a network 210, forwarding agents 231, 232, service mangers 241, 242 and a group of servers 220. Furthermore, figure 11 illustrates how a forwarding agent and a service manager implement NAT between a client and a virtual machine (see figure 11 and column 28, lines 1-19). The forwarding agent and the service manager, anticipate a translating device and the virtual machine anticipates a server. The implementation

of the NAT by the forwarding agent and a service manger anticipates initiating communications, from a server behind the translating device, which effect the network address translation.

In further regards to claims 1 and 29, the service manger selects on of the hosts using a load-balancing algorithm. The algorithms may include round robin, fastest available host, and a host with the least number of connections or a host determined by feedback mechanism to be the best host to handle the connection (see column 28, lines 20-27). The load-balancing algorithm anticipates monitoring the communications beyond the translating device to infer partitioning of servers into equivalence sets relative to the network topology induced by network address translation.

In regards to claims 2 and 3, Albert discloses in figure 7, a wildcard affinity diagram. The wildcard affinity diagram includes a source IP address.

In regards to claim 4, the source IP address included in the wildcard affinity diagram also anticipates a unique identification number in the message.

In regards to claim 5, Albert discloses in figure 13, a flowchart illustrating a process implemented on a forwarding agent for executing NAT as directed by a service manger. In the affinity step 1306, the forwarding agent checks the action specified in the affinity. If the action specifies that the packet is to be forwarded to the service manger, then control is transferred to step 1308 and the packet is sent to a service manger. If the action specifies that the packet is to undergo Nat then control is transferred to step 1310 where the source IP address is changed (see figure 13, and column 29, lines 56-67 and column 30, line 1). The action that specifies whether the

packet is to go NAT or forwarded to the service manager, anticipates distinguishing between communications affected by and not affected by network address translation.

In regards to claim 6, Albert discloses in figure 13, a flowchart illustrating a process implemented on a forwarding agent for executing NAT as directed by a service manger. If the action specifies that the packet is to undergo Nat then control is transferred to step 1310 where the source IP address is changed (see figure 13, and column 29, lines 56-67 and column 30, line 1). The changing of the IP address anticipates comparing an apparent source address of a message against an actual source address provided in the message.

In regards to claim 7, Albert discloses that to specify a single host the wildcard affinity include an IP address with a specific netmask. To specify the range of hosts (i.e from 1.1.1.0 to 1.1.1.255), the wildcard affinity would include IP address of 1.1.1.0 with a netmask of 255.255.255.0 (see column 17, lines 47-54). The range of host with the IP address, anticipate, assessing a range of network addresses behind the translating device.

In regards to claim 8, from figure 2A, it is evident that the host whether they are clients or servers, are connected to the service managers and forward agents; therefore, the disclosure used with regards to claim 7, is also applicable to claim 8.

In regards to claims 9 and 10, figure 2A discloses a plurality of clients, forwarding agents, service mangers and servers. The servers communicate with network through forwarding agents (see column 6, lines 46-53). The forward agents have a knowledge of the network and since the servers communicate to the network via the forwarding

agents, it is anticipated that passive and active clients are distinguished and that messages are directed from the passive to the active client.

In regards to clam 11, the service manager and the forwarding agent, respectively contain processors 252 and 272. Both processors are respectively connected to a network interface. The network interface in the forwarding agent is used to send and receive packets to and from other devices on the network (see column 9, lines 61-64). The network interface in the service manager allows the service manager to directly forward packets into the network from which it is providing a service (see column 10, lines 23-25). The respective processors and their connection to the network interface and its functions anticipate from a processor beyond the translating device, causing a message to a passive client to be redirected to an active client, the active client responsive communicating with the processor beyond the translating device.

In regards to claim 12, Albert discloses in figure 10F, a diagram illustration a NAT action segment (see figure 10F and column 24, lines 11-21). The NAT action segment anticipates maintaining at least one translated address set.

4. In regards to claim 19, Albert discloses in Albert discloses in figure 2 a plurality of clients 201-203, a network 210, forwarding agents 231, 232, service mangers 241, 242 and a group of servers 220. Furthermore, figure 11 illustrates how a forwarding agent and a service manager implement NAT between a client and a virtual machine (see figure 11 and column 28, lines 1-19). The forwarding agent and the service manager,

anticipate an apparatus located beyond a network-translating device to determining a topology of a network.

In further regard to claim 19, the service manager and the forwarding agent, respectively contain processors 252 and 272. Both processors are respectively connected to a network interface. The network interface in the forwarding agent is used to send and receive packets to and from other devices on the network (see column 9, lines 61-64). The network interface in the service manager allows the service manager to directly forward packets into the network from which it is providing a service (see column 10, lines 23-25). The processors anticipate a processor coupled to a network interface for receiving communication form a network device effecting network address translation.

In further regards to claim 19, the service manger selects on of the hosts using a load-balancing algorithm. The algorithms may include round robin, fastest available host, and a host with the least number of connections or a host determined by feedback mechanism to be the best host to handle the connection (see column 28, lines 20-27). The service manager algorithms, anticipate a processor routing operation on the processor, the processor routing to infer partitioning of servers into equivalent sets relative to the network topology induced by the network address translation.

In regards to claim 20, Albert discloses in figure 7, a wildcard affinity diagram. The wildcard affinity diagram includes a source IP address.

In regards to claim 21, Albert discloses in figure 13, a flowchart illustrating a process implemented on a forwarding agent for executing NAT as directed by a service

manger. If the action specifies that the packet is to undergo Nat then control is transferred to step 1310 where the source IP address is changed (see figure 13, and column 29, lines 56-67 and column 30, line 1). The changing of the IP address anticipates comparing an apparent source address of a message against an actual source address provided in the message.

In regards to claim 22, Albert discloses in figure 10F, a diagram illustration a NAT action segment (see figure 10F and column 24, lines 11-21). The NAT action segment anticipates including at least one translated address set, the source address being stored in the translated address set.

In regards to claim 23, Albert discloses in figures 2B and 2C that the forwarding agent and the service manager respectively contain memories 254 and 274 connected to the respective processors (see figures 2B and 2C). The memories anticipate, the processor coupled to the memory, the processor routine storing a database of translated address sets in the memory. Furthermore, Albert discloses in figure 10F, a diagram illustration a NAT action segment (see figure 10F and column 24, lines 11-21), which contains the translated address set as, stated in regards to claim 22.

5. In regards to claim 26, Albert discloses in Albert discloses in figure 2 a plurality of clients 201-203, a network 210, forwarding agents 231, 232, service mangers 241, 242 and a group of servers 220. Furthermore, figure 11 illustrates how a forwarding agent and a service manager implement NAT between a client and a virtual machine (see figure 11 and column 28, lines 1-19). The forwarding agent and the service manager,

anticipate an apparatus located beyond a network-translating device to determining a topology of a network.

In further regard to claims 26 and 37, the service manager and the forwarding agent, respectively contain processors 252 and 272. Both processors are respectively connected to a network interface. The network interface in the forwarding agent is used to send and receive packets to and from other devices on the network (see column 9, lines 61-64). The network interface in the service manager allows the service manager to directly forward packets into the network from which it is providing a service (see column 10, lines 23-25). The processors anticipate a processor coupled to a network interface for receiving communication form a network device effecting network address translation.

In further regards to claims 26 and 37, the processors are contained within the service manager or the forwarding agent, which have addresses of their own and therefore, it is anticipated that the processor routing provides the actual network address of the processor in a message of the communications.

In regards to claims 27 and 38, the service manager and the forwarding agent, respectively contain processors 252 and 272. Both processors are respectively connected to a network interface. The network interface in the forwarding agent is used to send and receive packets to and from other devices on the network (see column 9, lines 61-64). The connection between the processor and the network interface, anticipate the said processor issuing communications in response to receiving a communication from behind the network address translation device.

6. In regards to claim 28, forwarding agent and the service manager respectively contain memories 254 and 274 connected to the respective processors (see figures 2B and 2C). The memories anticipate a computer usable medium for storing data.

In further regards to claim 28 and claim 30, , Albert discloses in figure 2 a plurality of clients 201-203, a network 210, forwarding agents 231, 232, service mangers 241, 242 and a group of servers 220. Furthermore, figure 11 illustrates how a forwarding agent and a service manager implement NAT between a client and a virtual machine (see figure 11 and column 28, lines 1-19). The implementation of the NAT by the forwarding agent and a service manger anticipates receiving communications from a network device effecting network address translation.

In further regards to claim 28 and claim 30, the service manger selects on of the hosts using a load-balancing algorithm. The algorithms may include round robin, fastest available host, and a host with the least number of connections or a host determined by feedback mechanism to be the best host to handle the connection (see column 28, lines 20-27). The load-balancing algorithm anticipates inferring partitioning of servers into equivalence sets relative to the network topology by the network address translation.

In regards to claim 31, Albert discloses in figure 7, a wildcard affinity diagram. The wildcard affinity diagram includes a source IP address.

In regards to claim 32, Albert discloses in figure 13, a flowchart illustrating a process implemented on a forwarding agent for executing NAT as directed by a service manger. If the action specifies that the packet is to undergo Nat then control is

transferred to step 1310 where the source IP address is changed (see figure 13, and column 29, lines 56-67 and column 30, line 1). The changing of the IP address anticipates comparing an apparent source address of a message against an actual source address provided in the message.

In regards to claim 33, Albert discloses in figure 10F, a diagram illustration a NAT action segment (see figure 10F and column 24, lines 11-21). The NAT action segment anticipates including at least one translated address set, the source address being stored in the translated address set.

In regards to claim 34, Albert discloses in figures 2B and 2C that the forwarding agent and the service manager respectively contain memories 254 and 274 connected to the respective processors (see figures 2B and 2C). The memories anticipate, storing a database of translated address sets. Furthermore, Albert discloses in figure 10F, a diagram illustration a NAT action segment (see figure 10F and column 24, lines 11-21), which contains the translated address set as, stated in regards to claim 33.

Conclusion

7. Claims 13-18, 24-25 and 35-36 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jay P. Patel whose telephone number is (571) 272-3086. The examiner can normally be reached on M-F 9:00 am - 5:00 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Seema Rao can be reached on (571) 272-3174. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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).

JPP 9/30/05
Jay P. Patel
Assistant Examiner
Art Unit 2666

Seema S. Rao 10/1/05
SEEMA S. RAO
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600

Notice of References Cited	Application/Control No. 09/824,553	Applicant(s)/Patent Under Reexamination JOHNSON ET AL.	
	Examiner Jay P. Patel	Art Unit 2666	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
	A	US-6,650,641 B1	11-2003	Albert et al.	370/392
	B	US-6,484,257 B1	11-2002	Ellis, Alonzo	713/153
	C	US-6,046,988 A	04-2000	Schenkel et al.	370/254
	D	US-6,118,768 A	09-2000	Bhatia et al.	370/254
	E	US-6,205,122 B1	03-2001	Sharon et al.	370/254
	F	US-6,347,336 B1	02-2002	Song et al.	709/223
	G	US-6,510,496 B1	01-2003	Tarui et al.	711/147
	H	US-6,483,812 B1	11-2002	Prorock, Thomas Joseph	370/252
	I	US-6,643,269 B1	11-2003	Fan et al.	370/254
	J	US-6,728,670 B2	04-2004	Schenkel et al.	704/224
	K	US-6,798,752 B1	09-2004	Pope, Randall Paul	370/254
	L	US-6,822,943 B1	11-2004	Mantin, Sharon	370/254
	M	US-6,829,641 B2	12-2004	Schenkel et al.	709/224

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-1449 REPRODUCED	ATTORNEY DOCKET NO.	APPLICATION NO.	
SUPPLEMENTAL INFORMATION DISCLOSURE CITATION IN AN APPLICATION	2762.2002-002	09/824,553	
	FIRST NAMED INVENTOR	FILING DATE	
	Kirk Johnson	April 2, 2001	
OCTOBER 19, 2004 (Use several sheets if necessary)	EXAMINER	CONFIRMATION NO.	GROUP
	Not assigned	9887	2661

OIPE JC56 OCT 25 2004 PATENT & TRADEMARK OFFICE

U.S. PATENT DOCUMENTS

EXAMINER INITIAL	REF. NO.	DOCUMENT NUMBER Number-Kind Code (if known)	ISSUE DATE / PUBLICATION DATE MM-DD-YYYY	NAME OF PATENTEE OR APPLICANT OF CITED DOCUMENT
JPP	AC	2001/0039585 A1	11/08/2001	Primak *et al.*
JPP	AD	6,571,288 B1	05/27/2003	Sarukkai
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JPP	AF	6,078,960	06/20/2000	Ballard
JPP	AG	6,539,426 B1	03/25/2003	Meek, *et al.*
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JPP	AD2	6,505,254 B1	01/07/2003	Johnson *et al.*
JPP	AE2	6,581,065 B1	06/17/2003	Rodkin *et al.*
JPP	AF2	2002/0065938 A1	05/30/2002	Jungck *et al.*
JPP	AG2	2002/0186694 A1	12/12/2002	Mahajan *et al.*
JPP	AH2	2003/0041094 A1	02/27/2003	Lara *et al.*
JPP	AI2	6,553,413 B1	04/22/2003	Leighton *et al.*
JPP	AJ2	6,553,420 B1	04/22/2003	Karger *et al.*
JPP	AK2	6,185,619 B1	02/06/2001	Joffe *et al.*
	AA3			
	AB3			
	AC3			

EXAMINER	DATE CONSIDERED
	9/30/05

@PFDesktop\::ODMA/MHODMA/HBSR05;iManage;507017;1

PTO-1449 REPRODUCED

SUPPLEMENTAL INFORMATION DISCLOSURE CITATION IN AN APPLICATION

OCTOBER 19, 2004

(Use several sheets if necessary)

OIPE JC56 OCT 25 2004 PATENT & TRADEMARK OFFICE

ATTORNEY DOCKET NO.	APPLICATION NO.
2762.2002-002	09/824,553
FIRST NAMED INVENTOR	**FILING DATE**
Kirk Johnson	April 2, 2001
EXAMINER	**CONFIRMATION NO.** / **GROUP**
Not assigned	9887 / 2661

FOREIGN PATENT DOCUMENTS

		DOCUMENT NUMBER Country Code-Number-Kind Code (if known)	DATE MM-DD-YYYY	NAME OF PATENTEE OR APPLICANT OF CITED DOCUMENT	TRANSLATION YES	TRANSLATION NO
JPP	AL	WO 99/40514	08/12/1999	Farber et al.		
	AM					
	AN					
	AO					
	AP					
	AQ					
	AL2					
	AM2					
	AN2					
	AO2					
	AP2					
	AQ2					
	AL3					
	AM3					
	AN3					
	AO3					
	AP3					
	AQ3					
	AL4					
	AM4					
	AN4					
	AO4					
	AP4					
	AQ4					

EXAMINER	DATE CONSIDERED
	9/30/05

@PFDesktop\::ODMA/MHODMA/HBSR05;iManage;507017;1

PTO-1449 REPRODUCED	ATTORNEY DOCKET NO.	APPLICATION NO.	
SUPPLEMENTAL INFORMATION DISCLOSURE CITATION IN AN APPLICATION	2762.2002-002	09/824,553	
	FIRST NAMED INVENTOR	FILING DATE	
	Kirk Johnson	April 2, 2001	
OCTOBER 19, 2004	EXAMINER	CONFIRMATION NO.	GROUP
(Use several sheets if necessary)	Not assigned	9887	2661

OCT 25 2004 PATENT & TRADEMARK OFFICE

		OTHER DOCUMENTS *(Including Author, Title, Date, Pertinent Pages, Etc.)*
JPP	AR	Amir, Yair *et al.*, "Seamlessly selecting the best copy from Internet-wide replicated web servers" *The 12th International Symposium on Distributed Computing*, (DISC'98), 22-23, September 1998.
JPP	AS	Amir and Shaw, "WALRUS- a Low Latency, High Throughput Web Service Using Internet-wide Replication," In Proceedings of the 19th IEEE Workshop on Electronic Commerce and Web-Based Applications, pp. 31-40, Austin, May 1999, http://www.cnds.jhu.edu/publications/ 5/16/02.
JPP	AT	Bakker, A., *et al.* "The Globe Distribution Network," *Proc. 2000 USENIX Annual Conf. (FREENIX Track)*, San Diego, pp. 141-152, June 18-23, 2000, http://www.cs.vu.nl/globe/publications.html 5/16/02.
JPP	AU	Carter, R.L. and Crovella, M.E., "Dynamic Server Selection using Bandwidth Probing in Wide-Area Networks," BU-CS-96-007, March 18, 1996, http://citeseer.nj.nec.com/carter96dynamic.html 5/16/02.
JPP	AV	Francis, Paul. "YOID: Extending the Internet Multicast Architecture," [online] http://www.icir.org/yoid/docs/ycHtmlL/htmlRoot.html 5/21/02.
JPP	AW	Guyton, James D.and Schwartz, Michael F.,"Locating Nearby Copies of Replicated Internet Servers" *Computer Communications Review 25(4)*: 288-98 (1995).
JPP	AX	Karger, D.R. *et al.*,"Consistent hashing and random trees: Distributed caching protocols for relieving hot spots on the world wide web" *Proc. 29th ACM Symposium on Theory of Computing*,654-662, May 1997.
JPP	AY	Leach, Paul J., "Selecting a server from among many replicas," Internet Draft, [online] ASID working group, 2/23/1997, http://www.watersprings.org/pub/id/draft-ietf-asid-replica-selection-00.txt 5/21/02.
JPP	AZ	Sayal, M., *et al.* Selection Algorithms for Replicated Web Servers, [online] www.cs.wisc.edu/~cao/WISP98/html-versions/mehmet/SelectWeb1.html 5/16/02.
	AR2	
	AS2	
	AT2	
	AU2	

EXAMINER	DATE CONSIDERED
	9/30/05

@PFDesktop\::ODMA/MHODMA/HBSR05;iManage;507017;1

PTO-1449 REPRODUCED

INFORMATION DISCLOSURE CITATION IN AN APPLICATION

May 30, 2002

(Use several sheets if necessary)

OIPE JC16 JUN 05 2002 PATENT & TRADEMARK OFFICE

ATTORNEY DOCKET NO.	APPLICATION NO.
2762.2002-002	09/824,553
APPLICANT	
Kirk Johnson et al.	
FILING DATE	**GROUP**
April 2, 2001	2661

U.S. PATENT DOCUMENTS

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUB-CLASS	FILING DATE IF APPROPRIATE
JPP	AA	6,345,294	05 FEB 02	O'Toole et al.	709	222	
JPP	AB	6,052,718	18 APR 00	Gifford	809	219	
	AC						
	AD						
	AE						
	AF						
	AG						
	AH						
	AI						
	AJ						
	AK						

RECEIVED JUN 11 2002 Technology Center 2600

FOREIGN PATENT DOCUMENTS

		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUB-CLASS	TRANSLATION YES	TRANSLATION NO
	AL							
	AM							
	AN							
	AO							
	AP							
	AQ							

OTHER DOCUMENTS *(Including Author, Title, Date, Pertinent Pages, Etc.)*

	AR	
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EXAMINER	DATE CONSIDERED
	9/30/05

PTO-1449 REPRODUCED	ATTORNEY DOCKET NO.	APPLICATION NO.	
SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT IN AN APPLICATION June 14, 2005 (Use several sheets if necessary)	2762.2002-002	09/824,553	
	FIRST NAMED INVENTOR Kirk Johnson		FILING DATE April 2, 2001
	EXAMINER David Robert Vincent	CONFIRMATION NO. 9887	GROUP 2661

OIPE JUN 20 2005 PATENT & TRADEMARK OFFICE

U.S. PATENT DOCUMENTS

EXAMINER INITIAL	REF. NO.	DOCUMENT NUMBER Number-Kind Code (if known)	ISSUE DATE / PUBLICATION DATE MM-DD-YYYY	NAME OF PATENTEE OR APPLICANT OF CITED DOCUMENT
JPP	AA3	6,449,647 B1	09/10/2002	Colby *et al.*
JPP	AB3	6,173,322 B1	01/09/2001	Hu, Wei-Ming
JPP	AC3	6,249,800 B1	06/19/2001	Aman *et al.*
JPP	AD3	6,389,448 B1	05/14/2002	Primak *et al.*

EXAMINER	DATE CONSIDERED
	9/30/05

@PFDesktop\::ODMA/MHODMA/HBSR05;iManage;556030;1

Index of Claims

Application/Control No.	Applicant(s)/Patent under Reexamination
09/824,553	JOHNSON ET AL.
Examiner	**Art Unit**
Jay P. Patel	2666

√	Rejected	–	(Through numeral) Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

Claim		Date
Final	Original	9/30/05
	1	√
	2	√
	3	√
	4	√
	5	√
	6	√
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	9	√
	10	√
	11	√
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Claim		Date
Final	Original	
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Claim		Date
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Search Notes

Application/Control No.	Applicant(s)/Patent under Reexamination
09/824,553	JOHNSON ET AL.
Examiner	**Art Unit**
Jay P. Patel	2666

SEARCHED			
Class	Subclass	Date	Examiner
370	254	5/19/2005	JPP
370	392	9/29/2005	JPP
711	202	6/20/2005	JPP

INTERFERENCE SEARCHED			
Class	Subclass	Date	Examiner

SEARCH NOTES (INCLUDING SEARCH STRATEGY)		
	DATE	EXMR
370/254 with keywords: network near topology	5/19/2005	JPP
370/254 with keywords: ((topology or configuration) same NAT)	9/29/2005	JPP
370/392 with keywords: (NAT same server same (partition or divide))	9/29/2005	JPP

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. 9887

SERIAL NUMBER	FILING DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
09/824,553	04/02/2001 RULE	370	2666	2762.2002-002

APPLICANTS

Kirk Johnson, Boulder, CO;

James O'Toole, Somerville, MA;
M. Frans Kaashoek, Lexington, MA;John Jannotti, Cambridge, MA;

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

This application is a CON of 09/766,874 01/19/2001 ABN which claims benefit of 60/178,062 01/24/2000

Verified 9/30/05

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

IF REQUIRED, FOREIGN FILING LICENSE GRANTED
** 05/17/2001

Foreign Priority claimed	STATE OR	SHEETS	TOTAL	INDEPENDENT
☐ yes ☒ no				
35 USC 119 (a-d) conditions met ☐ yes ☐ no ☐ Met after Allowance				
Verified and Acknowledged Examiner's Signature Initials	COUNTRY CO	DRAWING 8	CLAIMS 38	CLAIMS 7

ADDRESS
21005
HAMILTON, BROOK, SMITH & REYNOLDS, P.C.
530 VIRGINIA ROAD
P.O. BOX 9133
CONCORD , MA
01742-9133

TITLE
Method and apparatus for determining a network topology in the presence of network address translation

FILING FEE	FEES: Authority has been given in Paper	☐ All Fees ☐ 1.16 Fees (Filing) ☐ 1.17 Fees (Processing Ext. of

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S1	1627	(network near topology).ab.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/05/23 14:38
S2	273	S1 and "370"/.clas.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/05/19 15:11
S3	59	"370"/.clas. and (network near topology).ti.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/05/19 16:02
S4	835	370/254.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/05/19 15:29
S5	28	S4 and (address near translation)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/05/19 15:29
S6	0	370/254.clas. and (network near topology).ti.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/05/19 16:02
S7	30	370/254.ccls. and (network near topology).ti.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/05/19 16:03

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S8	24	(US-20020003780-$ or US-20020009086-$ or US-20020116493-$ or US-20020143935-$ or US-20030051032-$).did. or (US-5737319-$ or US-5796736-$ or US-5886643-$ or US-5926462-$ or US-5933416-$ or US-5966513-$ or US-6046988-$ or US-6118768-$ or US-6205122-$ or US-6347336-$ or US-6377987-$ or US-6483812-$ or US-6516345-$ or US-6625124-$ or US-6643269-$ or US-6728670-$ or US-6798752-$ or US-6822943-$ or US-6829641-$).did.	US-PGPUB; USPAT	OR	OFF	2005/05/19 20:00
S9	8	S8 and (address near translation)	US-PGPUB; USPAT	OR	OFF	2005/05/23 15:18
S10	5	S8 and (address near translation) and (server)	US-PGPUB; USPAT	OR	OFF	2005/05/19 20:20
S11	674	(network near configuration).ti.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/05/23 14:39
S12	0	S11 and 370/254.clas.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/05/23 14:39
S13	16	S11 and 370/254.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/05/23 15:00
S14	0	370/254.ccls and (passive near active near clients).ab.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/05/23 15:01
S15	0	370/254.ccls and (passive near active).ab.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/05/23 15:01

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S16	0	370/254.ccls and (passive near active)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/05/23 15:01
S17	0	370/254.ccls and (mask$3 near IP)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/05/23 15:01
S18	0	370/254.ccls and (network near translation)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/05/23 15:01
S19	0	370/254.ccls and (network near address near translation)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/05/23 15:02
S20	810	370/254.ccls. and (network "adj." address "adj." translat$4)	US-PGPUB; USPAT	OR	OFF	2005/05/23 15:19
S21	673	S20 and (topology or configuration)	US-PGPUB; USPAT	OR	OFF	2005/05/23 15:25
S22	0	S21 and (active near passive near client$2)	US-PGPUB; USPAT	OR	OFF	2005/05/23 15:20
S23	90	"6345294" or "6052718"	US-PGPUB; USPAT	OR	OFF	2005/05/23 15:26
S24	2	("6345294" or "6052718").pn.	US-PGPUB; USPAT	OR	OFF	2005/05/23 15:31
S25	234	2001/0039585 or "6571288" or "6134588" or "6078960" or "6539426" or "5870562" or "6035055" or "6041041" or "6081840" or "6185598" or "6304913" or "6338092" or "6505254" or "6581065" or 2002/0065938 or (2002/0186694 or 2003/0041094 or "6553413" or "6553420" or "6185619").pn.	US-PGPUB; USPAT	OR	OFF	2005/05/23 15:34

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S26	16	(2001/0039585, "6571288", "6134588", "6078960", "6539426", "5870562", "6035055", "6041041", "6081840", "6185598", "6304913", "6338092", "6505254", "6581065", 2002/0065938, 2002/0186694, 2003/0041094, "6553413", "6553420", "6185619").pn.	US-PGPUB; USPAT	OR	OFF	2005/05/23 15:36
S27	29	"370"/.clas. and "709"/.clas. and (group$4 near (topology or configuration))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/05/26 15:48
S28	0	(NAT) with (partision) with (server or device) with (topology or configuration)	US-PGPUB; USPAT	OR	OFF	2005/06/16 15:14
S29	0	(NAT) with (partision) with (server or device)	US-PGPUB; USPAT	OR	OFF	2005/06/16 15:17
S30	0	(NAT) with (partision) with (server or device)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/06/16 15:13
S31	4	(address near translation) with (partition) with (server or device)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/06/16 15:14
S32	0	(NAT) with (partition) with (server or device) with (topology or configuration)	US-PGPUB; USPAT	OR	OFF	2005/06/16 15:14
S33	4	(NAT) with (partition)	US-PGPUB; USPAT	OR	OFF	2005/06/16 15:18
S34	4219	(network same address same translation)	US-PGPUB; USPAT	OR	OFF	2005/06/16 15:28
S35	23	S34 same partition	US-PGPUB; USPAT	OR	OFF	2005/06/16 15:18
S36	583	S34 same (topology or configuration)	US-PGPUB; USPAT	OR	OFF	2005/06/16 15:29
S37	4	S36 same (partition)	US-PGPUB; USPAT	OR	OFF	2005/06/16 15:28
S38	426	S36 and ("370"/$.ccls. or "709"/$.ccls. or "711"/$.ccls.)	US-PGPUB; USPAT	OR	OFF	2005/06/16 15:32
S39	134	S38 and (server or device) same NAT	US-PGPUB; USPAT	OR	OFF	2005/06/16 15:32

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S40	20	S39 and (partition or divide)	US-PGPUB; USPAT	OR	OFF	2005/06/18 16:32
S41	5432	709/203.ccls.	US-PGPUB; USPAT	OR	OFF	2005/06/18 16:32
S42	1695	S41 and (network same (topology or configuration))	US-PGPUB; USPAT	OR	OFF	2005/06/18 16:33
S43	1118	S41 and (network same (topology or configuration) same server)	US-PGPUB; USPAT	OR	OFF	2005/06/18 16:33
S44	1332	S41 and (network same (topology or configuration) same server same partition$4 or divid$4)	US-PGPUB; USPAT	OR	OFF	2005/06/18 16:34
S45	28	S41 and (network same (topology or configuration) same server same (partition$4 or divid$4) same (network "adj." address "adj." translation))	US-PGPUB; USPAT	OR	OFF	2005/06/20 15:36
S46	1325	711/202.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/06/20 15:38
S47	3	S46 and (NAT)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/06/20 15:40
S48	0	S46 same (NAT same server)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/06/20 15:39
S49	799	S46 and (partition$4 or divid$3)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/06/20 15:40
S50	587	S49 and (topology or configuration or arrange$4)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/06/20 15:41

S51	1	S50 and (network near address near translation)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/06/20 15:42
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S53	595	370/254.ccls. and (address "adj." translation)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/06/21 14:28
S54	125	370/254.ccls. and (address "adj." translation).ab.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/06/21 14:28
S55	30	(US-20010028654-$ or US-20020003780-$ or US-20020009086-$ or US-20020116493-$ or US-20020143935-$ or US-20030051032-$ or US-20030126202-$ or US-20050013255-$).did. or (US-5737319-$ or US-5796736-$ or US-5886643-$ or US-5926462-$ or US-5933416-$ or US-5940870-$ or US-5966513-$ or US-6046988-$ or US-6118768-$ or US-6205122-$ or US-6347336-$ or US-6377987-$ or US-6483812-$ or US-6510496-$ or US-6516345-$ or US-6625124-$ or US-6633560-$ or US-6643269-$ or US-6728670-$ or US-6798752-$ or US-6822943-$ or US-6829641-$).did.	US-PGPUB; USPAT	OR	OFF	2005/09/27 12:49
S56	7	S55 and (network same address same translat$4)	USPAT	OR	OFF	2005/09/27 13:29
S57	1	"6650641".pn.	USPAT	OR	OFF	2005/09/27 13:29

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IPR2025-01088 - Page 226

S58	17	("5774660" | "5951694" | "6006264" | "6038233" | "6128642" | "6128657" | "6137777" | "6185619" | "6243379" | "6249801" | "6263368" | "6327622" | "6330602" | "6389462").PN. OR ("6650641").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2005/09/28 13:57
S59	1	S58 and (NAT same server same (topology or configuration))	US-PGPUB; USPAT; USOCR	OR	OFF	2005/09/28 13:58
S60	3	(NAT same server same (topology or configuration) same partition$4)	US-PGPUB; USPAT; USOCR	OR	OFF	2005/09/28 13:59
S61	912	370/254.ccls. and (network "adj." address "adj." translat$4)	US-PGPUB; USPAT	OR	OFF	2005/09/29 12:18
S62	5	(network same (topology or configuration) same (partition or divide or allocate) same NAT)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/09/29 12:21
S63	0	370/254.ccls. and (network same (topology or configuration) same (partition or divide or allocate) same NAT)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/09/29 12:22
S64	0	370/254.ccls. and ((topology or configuration) same (partition or divide or allocate) same NAT)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/09/29 12:22
S65	10	370/254.ccls. and ((topology or configuration) same NAT)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/09/29 12:22
S66	1721	370/392.ccls.	US-PGPUB; USPAT	OR	OFF	2005/09/29 15:58
S67	1	S66 and (NAT same server same (partition or divide))	US-PGPUB; USPAT	OR	OFF	2005/09/29 15:59
S68	90	S66 and (NAT)	US-PGPUB; USPAT	OR	OFF	2005/09/29 16:03
S69	12	S66 and (NAT same (topology or configuration))	US-PGPUB; USPAT	OR	OFF	2005/09/29 16:03

Quicker Connections - Exhibit 2005
IPR2025-01088 - Page 227

OIPE JC32 JUN 20 2005 PATENT & TRADEMARK OFFICE

GP 2661

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	Kirk Johnson, James O'Toole, M. Frans Kaashoek and John Jannotti		
Application No.:	09/824,553	Group Art Unit:	2661
Filed:	April 2, 2001	Examiner:	David Robert Vincent
Confirmation No.:	9887		
Title:	METHOD AND APPARATUS FOR DETERMINING A NETWORK TOPOLOGY IN THE PRESENCE OF NETWORK ADDRESS TRANSLATION		

CERTIFICATE OF MAILING OR TRANSMISSION

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as First Class Mail in an envelope addressed to Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, or is being facsimile transmitted to the United States Patent and Trademark Office on:

June 17, 2005 — Date
Elaine Leahy — Signature
Elaine Leahy — Typed or printed name of person signing certificate

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This Information Disclosure Statement is submitted:

[ ] under 37 CFR 1.129(a), or
(First/Second submission after Final Rejection)

[X] under 37 CFR 1.97(b), or
(Within any one of the following time periods: three months of filing national application (other than a CPA) or date of entry of the national stage in an international application; or before the mailing date of a first office action on the merits in a non-provisional application, including a CPA, or a Request for Continued Examination).

[ ] under 37 CFR 1.97(c) together with either:

[ ] a Statement under 37 CFR 1.97(e), as checked below, or

[ ] a $180.00 fee under 37 CFR 1.17(p), or
(After the 37 CFR 1.97(b) time period, but before final action or notice of allowance, whichever occurs first)

[ ] under 37 CFR 1.97(d) together with:

[ ] a Statement under 37 CFR 1.97(e), as checked below, and

[ ] a $180.00 fee under 37 CFR 1.17(p), or
(Filed after final action or notice of allowance, whichever occurs first, but on or before payment of the issue fee)

[ ] under 37 CFR 1.97(i):
Applicant requests that the IDS and cited reference(s) be placed in the application file.

(Filed after payment of issue fee)

Statement Under 37 CFR 1.97(e)

[ ] Each item of information contained in this 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 this Information Disclosure Statement; or

[ ] No item of information contained in this Information Disclosure Statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the undersigned, 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 this Information Disclosure Statement.

Statement Under 37 CFR 1.704(d) (Patent Term Adjustment)
Applies to original applications (other than design) filed on or after May 29, 2000

[ ] Each item of information contained in the Information Disclosure Statement was cited in a communication from a foreign patent office in a counterpart application and this communication was not received by any individual designated in § 1.56(c) more than thirty days prior to the filing of the Information Disclosure Statement.

[X] Enclosed herewith is form PTO-1449:

[ ] Copies of the cited references are enclosed.

[X] Copies of issued U.S. patents and published U.S. applications are not required and are not being provided.

[ ] Copies of the cited references are enclosed except those entered in prior application, U.S. Application No. [ ], to which priority under 35 U.S.C. 120 is claimed. [The earlier application contains copies of the cited references.]

[ ] The listed references were cited in the enclosed International Search Report in a counterpart foreign application.

[ ] The "concise explanation" requirement (non-English references) for reference(s) [ ] under 37 CFR 1.98(a)(3) is satisfied by:

[ ] the explanation provided on the attached sheet.

[ ] the explanation provided in the Specification.

[ ] submission of the enclosed International Search Report.

[ ] submission of the enclosed English-language version of a foreign Search Report and/or foreign Office Action.

[ ] the enclosed English language abstract.

[ ] Applicant requests that the following non-published pending applications be considered:

Examiner's Initials

_____ U.S. Patent Application No. [ ], by [inventor(s)], filed [ ], Docket No.: [ ]

_____ U.S. Patent Application No. [ ], by [inventor(s)], filed [ ], Docket No.: [ ]

_____ U.S. Patent Application No. [ ], by [inventor(s)], filed [ ], Docket No.: [ ]

_____ _____

Examiner Date

[ ] A copy of each above-cited application, including the current claims, is enclosed, except any application filed on or after June 30, 2003, which has been scanned into the PTO's Image File Wrapper (IFW) system and is available to the examiner.

[ ] A copy of each above-cited application, including the current claims, is enclosed, except those entered in prior application, U.S. Application No. [ ], to which priority under 35 U.S.C. 120 is claimed.

The Examiner is requested to return a copy of the above list of pending applications indicating which references were considered with the next office communication.

It is requested that the information disclosed herein be made of record in this application.

Method of payment:

[ ] A check for the fee noted above is enclosed, or the fee has been included in the check with the accompanying Reply. A copy of this Statement is enclosed.

[ ] Please charge Deposit Account 08-0380 in the amount of $[ ]. A copy of this Statement is enclosed.

[X] Please charge any deficiency in fees and credit any overpayment to Deposit Account 08-0380.

Respectfully submitted,

HAMILTON, BROOK, SMITH & REYNOLDS, P.C.

By Mark B Solomon

Mark B. Solomon
Registration No.:44,348
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Concord, MA 01742-9133
Dated: 6/17/05

PTO-1449 REPRODUCED	ATTORNEY DOCKET NO.	APPLICATION NO.
SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT IN AN APPLICATION **June 14, 2005** (Use several sheets if necessary)	2762.2002-002	09/824,553
	FIRST NAMED INVENTOR Kirk Johnson	FILING DATE April 2, 2001
	EXAMINER David Robert Vincent	CONFIRMATION NO. 9887 / GROUP 2661

JUN 20 2005 PATENT & TRADEMARK OFFICE

U.S. PATENT DOCUMENTS

EXAMINER INITIAL	REF. NO.	DOCUMENT NUMBER Number-Kind Code (if known)	ISSUE DATE / PUBLICATION DATE MM-DD-YYYY	NAME OF PATENTEE OR APPLICANT OF CITED DOCUMENT
	AA3	6,449,647 B1	09/10/2002	Colby *et al.*
	AB3	6,173,322 B1	01/09/2001	Hu, Wei-Ming
	AC3	6,249,800 B1	06/19/2001	Aman *et al.*
	AD3	6,389,448 B1	05/14/2002	Primak *et al.*

EXAMINER	DATE CONSIDERED

@PFDesktop\::ODMA/MHODMA/HBSR05;iManage;556030;1

OIPE JC185 APR 2 5 2005 PATENT & TRADEMARK OFFICE

IFW 2661

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	Kirk Johnson, James O'Toole, M. Frans Kaashoek, and John Jannotti		
Application No.:	09/824,553	Group:	2661
Filed:	April 2, 2001	Examiner:	David Vincent
Confirmation No.:	9887		
For:	Method and Apparatus for Determining a Network Topology in the Presence of Network Address Translation		

CERTIFICATE OF MAILING OR TRANSMISSION

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April 22, 2005 — Date
Elaine Leahy — Signature
Elaine Leahy — Typed or printed name of person signing certificate

REQUEST FOR RE-SCAN FOR ENTRY IN THE PATENT OFFICE RECORDS

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Responsive to a telephone call on December 21, 2004 from Examiner David Vincent and a follow-up call on March 29, 2005 in which Examiner Vincent stated that pages 5-9 of the Specification of the above Patent Application were not scanned, a copy of the Application as originally filed is being submitted herewith. Also submitted are a copy of the transmittal page and postcard filing receipt indicating 25 pages of the specification were filed on April 2, 2001. Applicants also note that the subject application is a Continuation application of U.S. Application 09/766,874, filed January 19, 2001, now abandoned, but which included pages 5-9 and whose entire teachings of this application are incorporated in the subject application by reference. Applicant hereby states that no new matter is being introduced by this re-submission of the Application for inclusion of pages 5-9 for scanning purposes.

Authorization is granted to charge any additional fees due or credit any overpayment to Deposit Account No. 08-0380. A copy of this transmittal is enclosed for accounting purposes.

Respectfully submitted,
HAMILTON, BROOK, SMITH & REYNOLDS, P.C.

By Mark B Solomon

Mark B. Solomon
Registration No.: 44,348
Telephone: (978) 341-0036
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Concord, MA 01742-9133
Date: 4/22/05



Initials: LRR/MBS/jk/dcr(wlm) Docket No.: 2762.2002-002 Date: 4/2/01

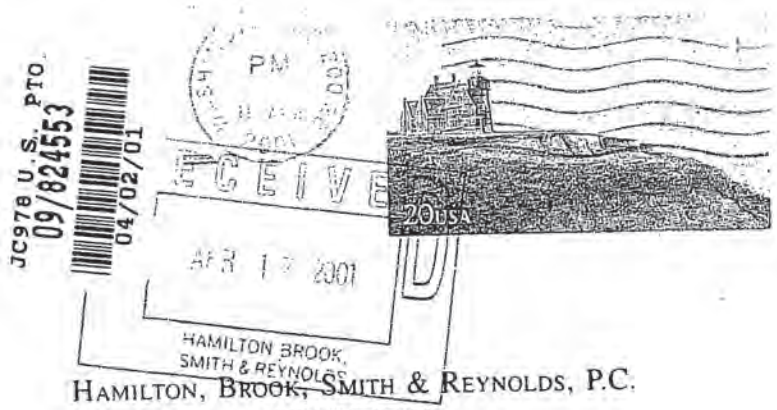
This acknowledges receipt of X CONTINUATION ___ DIVISION 53(b) as follows:

X Application Transmittal — Express Mail Label No.EL762238222US
___ Fee Transmittal w/copy — ___ Statement of S/E Status
X Specification - Total pages 25
X Drawings ___ Formal X Informal - Total sheets 8
___ Sequence Listing in Paper & CRF, Statement 1.821 (f)
X Other Nonpublication Request and Certification Under 35 U.S.C. 122(b)(2)(B)(i); and Remarks document

Applicants: Kirk Johnson, *et al.*
X Continuation ___ Division of Application No. 09/766,874
Title: Method and Apparatus for Determining a Network Topology in the Presence Of Network Address Translation

::ODMA\MHODMA\MANAGE;212644\1

Date received by the PTO:



HAMILTON, BROOK, SMITH & REYNOLDS, P.C.
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LEXINGTON, MASSACHUSETTS 02421-4799

02421+4799

OIPE JC15 APR 25 2005 PATENT & TRADEMARK OFFICE

HAMILTC ', BROOK, SMITH & REY OLDS, P.C.

UTILITY PATENT APPLICATION TRANSMITTAL

(Only for nonprovisional applications under 37 C.F.R. 1.53(b))

Attorney Docket No.	2762.2002-002
First Named Inventor or Application Identifier	Kirk Johnson
Express Mail Label No.	EL762238222US

FILE COPY

EL762238222US

Title of Invention: METHOD AND APPARATUS FOR DETERMINING A NETWORK TOPOLOGY IN THE PRESENCE OF NETWORK ADDRESS TRANSLATION

APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents.

ADDRESS TO: **Assistant Commissioner for Patents, Box Patent Application, Washington, D.C. 20231**

1. [ ] Fee Transmittal Form *(Submit an original, and a duplicate for fee processing)*
2. [X] Specification **Total Pages [25]** *(preferred arrangement set forth below)*
   - Descriptive title of the invention
   - Cross References to Related Applications
   - Statement Regarding Fed sponsored R & D
   - Reference to microfiche Appendix
   - Background of the Invention
   - Summary of the Invention
   - Brief Description of the Drawings
   - Detailed Description
   - Claim(s)
   - Abstract of the Disclosure
3. [X] Drawing(s) (35 U.S.C. 113) **Total Sheets [8]**
   [ ] Formal [X] Informal
   [ ] Fig. of the Drawings for Publication [ ]
4. [ ] Oath or Declaration/POA **[Total Pages [ ]]**
   a. [ ] Newly executed (original or copy)
   b. [ ] Copy from a prior application (37 C.F.R. 1.63(d)) *(for continuation/divisional with Box 18 completed)* **[NOTE Box 5 below]**
      i. [ ] DELETION OF INVENTOR(S) Signed statement attached deleting inventor(s) named in the prior application, see 37 C.F.R. 1.63(d)(2) and 1.33(b).
5. [ ] Incorporation By Reference *(useable if Box 4b is checked)* The entire disclosure of the prior application, from which a copy of the oath or declaration is supplied under Box 4b, is considered as being part of the disclosure of the accompanying application and is hereby incorporated by reference therein.
6. [ ] Microfiche Computer Program *(Appendix)*
7. [ ] Nucleotide and/or Amino Acid Sequence Submission (if applicable, all necessary)
   a. [ ] Computer Readable Copy
   b. [ ] Paper Copy (identical to computer copy) **[ ] Pages**
   c. [ ] Statement verifying identity of above copies

ACCOMPANYING APPLICATION PARTS

8. [ ] Assignment Papers (cover sheet & documents)
   [ ] Assignee -
9. [ ] 37 C.F.R. 3.73(b) Statement [ ] Power of Attorney *(when there is an assignee)*
10. [ ] English Translation Document *(if applicable)*
11. [ ] Information Disclosure Statement (IDS)/PTO-1449 [ ] Copies of IDS Citations
12. [ ] Preliminary Amendment
13. [X] Return Receipt Postcard (MPEP 503) *(Should be specifically itemized)*
14. [ ] Small Entity Statement(s) [ ] Statement filed in prior application, status still proper and desired
15. [ ] Certified Copy of Priority Document(s) *(if foreign priority is claimed)*
16. [X] Nonpublication Request *(check parent application)*
17. [X] Other: Remarks document

18. **If a CONTINUING APPLICATION,** check appropriate box and supply the requisite information:
    [X] Continuation [ ] Divisional [ ] Continuation-in-part (CIP) of prior application No.: 09/766,874
    Prior application information: Examiner: Not assigned Group Art Unit: 2152

19. CORRESPONDENCE ADDRESS

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Submitted by Typed or Printed Name	Mark B. Solomon	Reg. Number	44,348

Rev November 19, 2000 - .ODMA\MHODMA\MANAGE;212641;1

OIPE JC185 APR 2 5 2005 PATENT & TRADEMARK OFFICE

Date: 4-2-01 Express Mail Label No. EL762238222US

Inventors: Kirk Johnson, James O'Toole, M. Frans Kaaskoek, and John Jannotti

Attorney's Docket No.: 2762.2002-002

METHOD AND APPARATUS FOR DETERMINING A NETWORK TOPOLOGY IN THE PRESENCE OF NETWORK ADDRESS TRANSLATION

RELATED APPLICATIONS

This application is a continuation of Application No. 09/766,874, filed January 19, 2001, which claims the benefit of U.S. Provisional Application No. 60/178,062, filed on January 24,2000, entitled "Method and Apparatus for Determining a Network Topology in the Presence of Network Address Translation", by Johnson et al. The entire teachings of the above application is incorporated herein by reference.

BACKGROUND OF THE INVENTION

Computer networks have provided individuals, corporations, and governments with the means for transferring, sharing, and disseminating large amounts of information and data in digital form. Since the advent of the Internet, data communications has increased in volume and in ways previously unimagined.

An example of data being transferred is real-time video and/or audio. Either media is "packetized," or converted, from an analog or digital form into a series of data packets that are capable of being transferred across various computer networks. Routers, servers, or other data communication devices are used to effect the data transfer. The media is said to emanate from a host server/computer to one or more client servers/computers.

For instance, a White House press conference occurring in Washington, D.C. may be viewed over the Internet by thousands of viewers watching on client computers or other

devices. A single local, White House, host server is generally incapable of supporting all the clients at real-time video rates. Also, bottlenecks may occur at local, Washington D.C. routers supporting the packetized video/audio transfer from the host server to all the clients. To facilitate the high speed video data transfer for real-time video viewing, networks of redundant high-speed servers and routers operating around the Internet have had reasonably good success.

Computer network systems often contain routers, firewalls, proxy servers, and other devices that act to disguise or alter the network addresses of various clients and servers. These devices disguising or altering the network addresses do so in order to enhance the security or performance of the network or, in many cases, to make possible the interoperation of computer networks that use addresses that are incompatible for some reason.

A common scenario is a corporate network containing 100 computers using network addresses 10.0.0.1 through 10.0.0.100, using the TCP/IP network protocols. These numbers are used as "private" network addresses, and the public TCP/IP Internet does not route data packets to these private network addresses. In this scenario, the corporation installs one or more routers, firewalls, network address translators (NATs), proxy servers, or other address translation device (ATD) which are configured such that TCP/IP communications between the computers numbered 10.0.0.1 (and so on) and other computers in the Internet take place using one or more publically routable Internet addresses.

Clients in the private network must go through the address translating device(s) between the private network and the Internet to gain access to the real-time video available on the high-speed server network(s). This means that there may be multiple connections desiring real-time video and/or audio feeds through a single Internet access server, router, or other device. As a result of having this "indirect" access to the high-speed router/server network, the client provides the viewer with the real-time video/audio at non-real-time speeds.

To provide real-time access, a server may be placed behind the address translation device in the private network to receive a single stream of data and then distribute that data to other devices in the private network. Devices within the private network that attempt to access the data through a public server may be directed to the local server in the private network. To be able to direct the data communications to appropriate servers, a model of the network

hierarchy is maintained. However, the address translation devices interfere with the ability to identify devices within the hierarchy.

SUMMARY OF THE INVENTION

To calculate a model of how routers, firewalls, network-address-translators (NATs), proxy servers, and other address translation devices (ATDs - used in the discussion below to generically indicate any device employing network address translation so as not to specify NATs over proxy servers, etc.) in a network alter the (packet) traffic passing through them, several methods are used to probe the network and infer a model of the network address translation.

To determine a topology of a network induced by network address translation, communications are initiated, from a server behind a translating device, which effect the network address translation. The communications are monitored beyond the translating device to infer partitioning of servers into equivalence sets relative to the network topology induced by the network address translation.

Two types of clients, or devices, may initiate communications: active and passive devices. Active devices include routers, servers, or appliances that may have knowledge of at least one hierarchically superior active device in the hierarchical active device network. Note that an appliance may be equivalence of a server. Passive clients, for example, computers with web browsers, may have no inherent knowledge of the hierarchical server network.

In the communications, an active device may include a respective actual address (i.e., source address) in a message sent to a server outside the subnet, beyond the network address translation device. The actual address may include the sending server's IP address and/or unique identification number, such as the server's ethernet address. The external server beyond the translation device employs a method of distinguishing between communications affected by and not affected by network address translation. To that end, the external server may compare an apparent source address of the received message against the actual address provided in the message by the active device. If those addresses differ, the communication must have passed through an address translation device, and the apparent source address is a translation.

The external server may assess a range of network or subnet addresses behind an address translation device and may assess a range of public network addresses associated with the addresses translating device. In one embodiment, the external server also distinguishes between active and passive client messages. When a passive client communicates to the external server through the address translation device, the external server may respond by sending a redirect command to the passive client, which causes a message to be sent from the passive client to an active client (i.e., server) behind the same address translation device, if there is one. That active client, in turn, communicates with the external server. The communication (the redirect command) from the external server to the passive client may include parameters, thus providing information to the associated active client (server behind the same ATD). The external server may also cause an active client to communicate with another active client behind or beyond the address translation device.

In one embodiment, the external server includes a database which stores translated address sets providing a correspondence between actual client addresses (private addresses) and apparent/translated client addresses (public addresses). A database manager or data structure provides storage, search, and retrieve functions for the stored, translated, address sets. When a communication is received from a client, the external server accesses the translated address sets to compare the apparent message source address with addresses in the translated address sets and to assess whether the source address is behind a known address translation device. Translated address sets may be merged by the external server when it is determined that multiple apparent source addresses in distinct, translated, address sets correspond to the same actual source address.

In one embodiment, if an external server determines that a first apparent address is not already known to be associated with a translated address set but may be associated with a "nearby" translated address set, which is merely a translated address set that includes a second apparent address whose network address is within a predefined metric of the first apparent address , the server applies a timeout mechanism to remove the first apparent address, marked as "speculative," from the "nearby" translated address set. Marking the first apparent address "speculative" is done because it is sometimes advantageous to retain previously unknown

apparent addresses rather than to immediately discard the first apparent address. For example, another communication may enable the external server to change the speculative setting to "non-speculative". If, however, the first apparent address is determined to belong to a different translated address set or no translated address set at all, the first apparent address may be included in a so-called "excluded" list within translated address sets with which the first apparent address is not associated. Use of the excluded list reduces the likelihood that a client beyond a translating device is constantly redirected to a server behind a translating device, but as a result is never serviced.

To account for a dynamically changing network, the principles of the present invention teach a "soft state" mechanism. The soft state mechanism deletes known translated addresses from the server database of translated address sets after a predefined period of time. Occasionally deleting translated addresses, then recreating them using the techniques described above, refreshes information about the partitioning of servers induced by any ATDs in the network.

BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing and other objects, features and advantages of the invention will be apparent from the following more particular description of preferred embodiments of the invention, as illustrated in the accompanying drawings in which like reference characters refer to the same parts throughout the different views. The drawings are not necessarily to scale, emphasis instead being placed upon illustrating the principles of the invention.

Fig. 1 is a block diagram of an example network in which the present invention is deployed;

Fig. 2 is an illustration of a mapping between actual and apparent addresses for the network devices of Fig. 1;

Fig. 3 is a flow diagram of a general process of the present invention deployed in Fig. 1;

Fig. 4 is a flow diagram of a high-level active client routine of Fig. 3;

Fig. 5 is a flow diagram of a determine sender location routine of Fig. 4;

Fig. 6 is a structural diagram of a translated address set of Fig. 2;

Fig. 7 is a flow diagram of an embodiment of a passive client routine of Fig. 3; and

Fig. 8 is a flow diagram of a timeout routine applied to the translated address sets of Fig. 6.

DETAILED DESCRIPTION OF THE INVENTION

Fig. 1 is a block diagram of a network 100 that includes examples of various network topologies. Included in the network 100 are ATDs (address translation devices) 130a, 130b, 130c, 130d (collectively 130), active clients, which are typically servers A, B, C, ... H, respectively 110a, 110b, 110c, ..., 110h (collectively 110), and passive clients l,m,n,q,r, respectively 120a, 120b, 120c, 120d, 120e (collectively 120). The passive devices are sometimes referred to as end-users 120. The network 100 further includes a WAN (Wide Area Network) 140, e.g., the Internet, and CS (Central Server) 150.

The network 100 includes several subnets 180a, 180b, 180c, and 180d (collectively 180). The servers 110 have so-called "zones of coverage," where clients within a first server coverage zone get information from a first server, clients within a second server coverage zone get information from a second server, and so on. The servers 110 are usually configured in a hierarchical arrangement, as discussed in detail in U.S. Patent Application Serial No. 09/294,837, incorporated herein by reference in its entirety.

The network 100 may include wire and wireless links, interfaces, and devices. The servers 110 may be routers, computers, computer boards, computer chips, software, hand-held wireless devices or other electronic devices capable of operating the processor routines described herein. The end-users 120 may be computers with browsers, personal communication devices, cell-phones, etc. The ATDs 130 may be network address translation devices, proxies, and firewalls, TCP translators, or other address translation devices.

Proxies operate on the application layer of the standard, seven-layer, ISO, communication protocol stack. An application operating inside the subnet 180 having a proxy server does not have a pretense that it is talking to an outside server. In other words, an application contacts a proxy server to do work on the application's behalf. Since a proxy server

typically has a single public address (e.g., devices 130a, 130d), a subnet may employ more than one proxy server to perform load balancing and provide multiple public (outbound) addresses.

ATDs operate on the network layer of the standard, seven-layer, ISO, communication protocol stack. An application operating on the subnet 180 behind an ATD thinks it is talking directly to an outside server. ATDs can have more than one public address (e.g., devices 130b, 130c), which allows an ATD to use the public (i.e., external, proxy, apparent, perceived, etc.) addresses in a random or pseudo-random manner. In many cases, however, ATDs do not actually randomly use the public addresses; instead, multiple outbound addresses are employed/required to ensure sufficient capacity for the number of network communications that are passing through the ATD.

The devices 110, 120 behind the ATDs 130 communicate with devices 110h, 150 beyond the ATDs 130 through typical network communication packets. Two such packets are represented by packets 115a and 115b (collectively 115). The packets 115 have a header area, which includes network communication protocol information, and message area, which includes substantive device messages.

Packets 115 illustrate the effect of network address translation by the ATDs 130 on the packets 115. Behind the ATD 130a, packet 115a header has server B 110b source address information. Beyond the ATD 130a, packet 115b header has public address P1 information. Note, however, that the message areas of both packets 115a and 115b have the same server B 110b source address information, unfettered by the network address translation of ATD 130a. The servers 110 include their source address information in the message areas for network topology inferencing discussed below.

In the network 100, the CS 150 (or other server 110 used for data distribution purposes) seeks to learn the network addresses of each of the (other) servers 110 in an autonomous manner, or at least network topography relative to ATDs, through the use of a processor routine described in reference to Figs. 2-8. However, because of the presence of the ATDs 130, the CS 150 may be required to infer the network topology. To infer the topology, the CS 150 collects, organizes, and processes network transport level (from IPO guidelines) information from messages, sometimes referred to as data communication packets, received from both the active

and passive network devices, 110, 120 respectively. The CS 150 creates a list or database, which may be dynamic. The list or database may include public addresses used by the ATDs 130 and addresses of active and passive devices positioned behind respective ATDs 130. The associated ATDs 130 and active and/or passive device addresses are stored together and referred to as a translated address set, discussed further in reference to Fig. 2.

The present invention is used by servers 110, and possibly other network devices, to determine the network servers of a subset of related network devices. Servers 110 that have information of related network devices may reduce data latency between end-users 120 and the servers 110 in an effort to reduce and/or balance network loading. (See Patent Application Nos. 08/779,770, 08/294,837, 09/294,836, and 60/160,535, incorporated herein by reference). By knowing the network addresses of the servers 110, the CS 150, for example, can redirect an end-user 120 browser to an appropriate server 110 behind the end-user's respective ATD. Because the applications for the servers 110 typically include disseminating real-time video and/or voice data, several end-users (e.g., m 120b, n 120c) attempting to access data simultaneously from the CS 150, or other hierarchically intermediate server such as server H110h, cause congestion, thus limiting the effective data flow seen by any one object. However, by redirecting the end-users to appropriate, respective servers, for example servers E 110e, F 110f, or G 110g, the CS 150 or other server (e.g., H 110h) may issue a single feed of video and/or voice data to the subnet 180c server for distribution by the server rather than two, three, or more feeds to individual end-users-all through the same ATD. This redirection scheme allows the server network to balance the end-user load. Further, since subnet bandwidth is relatively fast, compared to communication with the Internet 140 via the ATDs 130 or other gateway device, the end-users 120 receive the real-time video and/or voice data at a much higher bandwidth than were each end-user 120 to independently spool the real-time data from the CS 150 or server H 110h.

The process of inferring network topology occurs on a continual basis each time a client-server 110 or client-end-user 120 requests data from an server not within the client's so-called "coverage zone". (See application no. 09/294,837 incorporated herein by reference).

Because computer networks are constantly changing, the present invention optionally provides dynamic monitoring of the clients 110, 120. Network changes may include adding, removing, shutting-off, relocating, crashing, network conflicts - and other such actions that make a network dynamic - which any of the network devices may experience at the hands of network administrators, users, power outages, software viruses, to name a few. To account for a dynamically changing network 100, the processor routines, operating on the CS 150 and/or other servers 110 provide a timeout mechanism, which may be applied to individual translated addresses. Once a timeout is reached, typically ranging from several minutes to several hours, the timed-out translated address is removed from storage. The removed translated address relationship is re-established through the processes discussed in relation to Figs. 2-8. Of course, the translated addresses may also be cleared in the event that the CS 150 or other server 110 detects a translated address is no longer valid. In one embodiment, each of many servers in the network 100, including subnets 180, performs network topology inferencing, making the server-network autonomous and dynamic, automatically accounting for the dynamic changes in the network topology. For purposes of the discussions related to Figs. 2-8, all references to hardware refer to Fig. 1, unless otherwise specified.

Fig. 2 is a block diagram representing associations between apparent addresses and client addresses. The apparent addresses of clients 110, 120 seen by devices external from the subnets 180 are due to network address translation by the ATDs 130. The server 110, 150 employing the present invention maps 215 a client address list 210 to translated address sets 220a, 220b, ..., 220h (collectively 220). Translated address set P1 220a includes server A 110a and server B 110b. In one embodiment, both the Ethernet addresses and IP addresses are included in the client address list 210, and optionally in the translated address sets 220. Translated address set P2 220b includes the addresses of server C 110c and server D 110d. Translated address set P3 220c includes the addresses of server C 110c and end-user k 120a. In one embodiment, the list of client addresses 210, mappings 215, and translated address sets 220 are stored in a translated address set database 200. A translated address set database manager 205 provides storage, search, and retrieve functions for the database.

The server H 110h or CS 150 storing and monitoring the translated address sets 220 seeks to identify various public addresses determined to be used by the same ATD 130. In this case, ATD 130a has only a single public address P1, whereas ATD 130b has two public addresses P2 and P3. Because the address of server C 110c is determined to be in both translated address sets 220b and 220c, the translated address sets P2, P3, 220b, 220c, respectively, are merged into a single translated address set 230a through techniques discussed later.

Further relationships and groupings of translated address sets can be determined empirically. Of special note, however, is translated address set P8, which is a member of translated address sets P4, P7, and possibly over time, P5 and P6 (recall the random public addressing schemes of ATDs discussed above). Translated address set P8 is included in translated address sets P4-P7 because, as can be seen in Fig. 1, subnet 180c includes an embedded subnet 180d. An example of such an arrangement is a corporate network (subnet 180c) that includes a proxy server 130d, behind which financial officers have their computers (q and r) storing financial records. As in the case of translated address sets P2 220b and P3 220c, the server storing the translated address sets 220 merges translated address sets P4 220d through P7 220g into a so-called "super" translated address set 230b.

In one embodiment, the client address list 210 includes all client addresses. In an alternate embodiment, the client address list 210 includes only server 110 addresses, and end-user 120 addresses are stored in a separate list (not shown and optionally stored in separate translated address sets 220).

Fig. 3 is a high-level flow diagram of an embodiment of a main processor routine 300 operating on a server 110, 150 performing network address translation inferencing. Receiving a client message in step 310 initiates the process in the server 110, 150. The server parses messages in step 320 and, in step 330, determines whether the received message is from an active or passive client. Active clients put their actual addresses in the message (according to a predefined protocol designable by a programmer knowledgeable in network communication protocols) where the ATD 130 is unable to affect the actual address; passive clients are unable to put their actual addresses in the message. If the message is determined to be from an active

client, then active client routines 340 are performed. If the message is determined to be from a passive client, such as a web browser, then passive client routines 350 are performed. The main processor routine 300 is finished in step 360.

Fig. 4 is a flow diagram of an embodiment of the active client routine 340. The active client routine 340 begins in step 410, which performs parameter passing and local variable initialization. In step 420, the active client routine 340 receives the active client 110 message/request. In step 430, the routine 340 parses the message for an apparent address. The apparent address is the address assigned to the message by an ATD 130. In step 440, the routine 340 parses the message for an actual source address. The active clients 110 provide a respective unique ID and/or source ID (i.e., ether address and network address) in the data portion of the message, which is unaffected by the network address translation being performed by the ATDs 130.

In step 450, the routine 340 performs a comparison between the apparent and actual addresses that were determined in steps 430, 440, respectively. If the apparent and actual addresses are the same, then no network address translation is being performed between the message sender and message receiver, which is stated in step 460. If the apparent and actual addresses are not the same, then processing continues in a "determine sender location" routine 340 (Fig. 5). The process of the active clients routine continues until all messages from active clients have been processed. Control is returned back to the main processor routine 300 in step 480.

Fig. 5 is a flow diagram of the "determine sender location" routine 470. This routine 470 uses information stored in the translated address sets 220 (Fig. 2) to determine if the active client 110 that issued the message being processed has been identified to be behind an ATD 130.

The determine sender location routine 470 begins in step 505, where parameters are passed and local variables are initialized. In step 510, the routine 470 scans the translated address sets for the apparent source address. To get a better understanding of the translated address sets 220 (Fig. 2), a generalized translated address set 220 schematic 600 is presented in Fig. 6.

Fig. 6 provides a schematic 600 of a generalized translated address set 220. The translated address set 220 can be thought of as a record having fields of information. A first field 610 stores included addresses, and, optionally, explicit timeouts for these included addresses. The included addresses include the public addresses (i.e. P1, P2, etc.). The explicit timeouts include times, associated with respective addresses, after which the respective apparent addresses are discarded. This concept is discussed in detail in reference to Fig. 8.

The translated address set 220 further includes a field 620, which stores server 110 actual addresses. As illustrated in Fig. 2, the server actual addresses in field 620 are related to the included apparent addresses of field 610. Lastly, the translated address set 220 optionally includes a third field 630 that is used to store excluded public addresses determined to have no association with an ATD. Optionally, the third field 630 may include explicit timeouts paired or associated with respective excluded addresses.

Referring again to Fig. 5, in step 515, the determine_ sender_ location routine 470 makes a determination as to whether the apparent source address is a member of the translated address set 220 associated with the sender address. If the apparent source address is a member of the same translated address set, then the routine 470 is done in step 560, returning control back to the active client routine 340 (Fig. 4). If the apparent source address is not a member of the first translated address set, then search continues in step 520. Note that a new, empty translated address set is created if the sending address has not been seen before.

The determine sender location routine makes a determination as to whether the apparent source address is a member of another translated address set in step 520. Where step 515 tests a simple case, subnet 180a, step 520 tests a more difficult case, subnet 180b or 180c. If the apparent source address is a member of another translated address set 220, then the two translated address sets are merged in step 522. Step 522 also includes updating the mapping 215 (Fig. 2) of server 110 actual addresses to translated address sets to reflect the merger of translated address sets. After step 522, step 560 returns control back to the determine active client routine 340 (Fig. 4).

If the apparent source address is not a member of another translated address set, then the external server 150, 110h has not received a communication from the sender. In step 525,

the process is not checking for a match, but looking for a "nearby" translated address set. If step 530 does not determine a so-called "nearby" match, then, in step 535, a new, translated, address set is created. The new, translated, address set includes the apparent source address. The new, translated, address set, is associated with the actual source address in the translated address set database 200 (Fig. 2). After step 530, the determine_sender_location routine 460 exits in step 560, returning control to the active client routine 340 (Fig. 4).

If step 530 does not determine a so-called "nearby" match, then, in step 535, a new, translated, address set is created. The new, translated, addressed includes the apparent source address. The new, translated, address set is associated with the actual source address in the translated address set database 200 (Fig.2). After step 530, the determine_sender_location routine 470 exits in step 560, returning control to the active client routine 340 (Fig. 4). If step 530 determines a "nearby" match, then the routine 470 takes a proactive step in step 540 to determine whether the sender is actually behind the "nearby" ATD 130.

"Nearness" may be determined or defined in many different ways. For example, using the IP addressing scheme:

(a) x.y.z.251

(b) x.y.z.254

(c) x.y.(z + 1).2 ,

where depending on the nearness scheme being used, addresses (a) and (b) may be considered near and/or addresses (a), (b), and (c) may also be considered near. Nearness schemes may require the first bits, for example the first twenty-four, of the thirty-two bit IP address to be the same. Another "nearness" scheme may include having a database of company networks that provide nearness metrics. Such metrics may be related to network distance, company geography, or other standard metric. The nearness may also be established heuristically over time.

In step 540, the external server 110h, 150, via the determine sender routine 470, asks the server 110, or active client 120 in some cases, that sent the message to contact a known server 110 behind a respective ATD 130 (e.g., "client 110c contact server D 110d"). In step 545, the routine 470 determines whether the contact was successful. If the contact was not

successful, then the apparent address (and any extra addresses found from the message communication) is excluded from the translated address set in step 550. The excluded addresses are stored in the excluded translated address list 630 (Fig. 6). The process continues to step 560, as discussed above. If the contact was successful, then the apparent source address is added to the included translated address list 610 (Fig. 6) in the translated address set 220 in step 555. The determine sender location routine 470 ends in step 560.

Referring again to Fig. 3, a description of an embodiment of a routine that services active client messages has been described in Figs. 4 - 6. Recalling that active clients, such as the servers 110, insert into the message their source addresses, a server, external from a subnet on which a sending server is located, is able to learn of the correlation between the apparent source address and the actual source address of the server by comparing the two addresses. However, in the case of a passive client, such as a computer 120 having a web browser, the passive client does not tell the external server of its source address in the message sent to the external server. Therefore, another technique must be used to service client messages, which is the subject of the passive client routine 350 (Fig. 7).

Fig. 7 is an embodiment of the passive client routine 350 operating on an external server 110h, 150. The passive client routine 350 receives a passive client request in step 705. The routine 350 parses the header for an apparent source address in step 710. In step 715, a list of servers 110 is consulted by the external server to determine whether the passive client 120 has already been associated with one of the subnet servers 110a-g. In one embodiment, the external server 110h or CS 150 may have passive client/server relationship information incorporated into its translated address set database 200, as depicted in Fig. 2. In an alternate embodiment, the external server contacts the subnet servers 110a-g of which the external server has knowledge in order to find out whether any of the subnet servers has local communication with the contacting passive device 120. If there is a match through either of these methods, then in step 725, the external server 110h or 150 tells the passive client 120 to contact the respective subnet server (in the passive client's zone). In this case, the passive client routine 350 is complete.

If step 720 finds no match, then in step 730, the translated address sets 220 (Fig. 6) are consulted to determine if there is a "nearby" translated address set 220. If step 730 determines there is not a translated address set 220 nearby, then, in step 745, the process continues to step 790, where the passive_client routine 350 returns control back to the main processor routine 300. Because no server behind the ATD is identified, the external server either provides the requested service from the passive client or, optionally redirects the passive client to a different external server for service, for reasons including efficiency, coverage area, or server congestion.

If there is a translated address set 220 nearby, then, in step 745, the external server passes "extra" information to the passive client 120 and causes (i.e., redirects) the passive client to contact an active client behind the ATD 130 associated with the nearby translated address set 220. Such "extra" information, for example, in HTTP, includes, at least one extra "CGI" argument (CGI arguments are syntactic parameters), extra "path" information, and/or other URL (uniform resource locator) syntax. The passive client 120 (i.e., so-called "dumb" browser) forwards the received extra information from the so-called "dumb" browser to the more "intelligent" server 110, which, in turn, contacts the server with notice that the internal subnet server did, in fact, receive a message from the passive client, thereby establishing a relationship between the passive client and the subnet server behind the same ATD.

Accordingly, after the extra information is passed to the passive client in step 745, in step 750, the external server tells the passive client to contact the server behind the possible "nearby" ATD 120 with this extra information. Responsively, in the external server translated address set 220, the external server marks the apparent source address as "speculative" in the "nearby" translated address set in step 755, along with a respective timeout. There are at least two options of what to do with the apparent source address upon executing a "speculative redirection" of this sort: (i) immediately exclude the address (possible to have it later removed from the excluded address set and added to the included address set if the speculative redirect is successful), or (ii) speculatively add the address to the included address set with a short timeout. Speculatively adding the address (instead of immediately excluding it) gives rise to a behavioral feature where subsequent clients making requests through the same apparent IP

address, *after* the speculative redirect but *before* a positive acknowledgment has been received, continue to be re/directed to the server behind the ATD. If one is optimistic and assumes networks are typically set-up such that speculatively adding the address set is the right thing to do, this is an advantage. Of course, if one is pessimistic, it is a disadvantage. In any case, immediately excluding the apparent source address is just a restricted case of a more general scheme in which addresses are added speculatively with a timeout (specifically, immediate exclusion is the degenerate case where the timeout is zero).

In step 760, the external server makes a determination as to whether a positive acknowledgment was received from the subnet server to which the passive client was redirected. If a positive acknowledgment was not received from the respective subnet server, then a timeout exceeded query 765 is performed by the passive client routine 350, which allows additional time for an subnet server to issue an acknowledgment to the external server. If the timeout has not been exceeded, then in step 760, the routine 350 checks again whether a positive acknowledgment has been received. If the timeout has been exceeded, then the routine 350 clears the speculative address in step 770. Following the step of clearing the speculative address in step 770, the apparent address is added to the "excluded" address list 630 (Fig. 6) in the translated address set 220, as depicted and described in Fig. 6. The excluded address list 630 provides the processor routine with a quick way to determine that the apparent address does not belong to the translated address set 220. Also, without the excluded address list 630, there may be a condition that every time a passive client tries to get service, it would be redirected to an active client (server) that it was not capable of communicating with due to the presence of an ATD, not get service, then continue to be redirected to the same active client; the exclude address list 630 breaks the endless cycle in this instance. Control returns back to the main processor routine 300 in step 790.

If, in step 760, the passive client routine 350 determines that a positive acknowledgment has been issued by subnet server associated with the passive client, then "speculative" setting marked with the apparent source address (in step 755) is cleared in step 780. The passive client source address is then added to the translated address set in step 785. Control is returned to the main processor routine 300 in step 790.

Fig. 8 is an embodiment of an assign timeout to apparent address routine 800. This timeout routine 800 is used to assign and test timeouts to data and translated address sets 220 (Fig. 6). This timeout routine 800 may be event or interrupt driven, depending upon the implementation of the processor routine within the servers 110 and central server 150.

The timeout routine 800 begins in step 810, where parameters are passed and local variables are initialized. Step 820 provides a periodic start point at which interrupt driven embodiments begin. In the embodiments shown, a loop, beginning in step 830 is used to scan through each apparent address in order to determine whether that apparent address is still valid or has reached a timeout, whereafter the apparent address should be removed from its respective included and/or excluded translated address list, 610, 630, respectively (Fig. 6).

In the loop, step 840 determines whether the apparent address has reached a timeout. If the apparent address has not reached a timeout, then the next apparent address is tested, starting again at step 830. If a timeout for the apparent address being tested has been reached, then the respective translated address set 220 (Fig. 6) is updated. When each of the addresses in each of the translated address sets has been tested for a timeout condition, the time-out routine 800 is complete in step 860. The use of the timeout routine 800 is for information and factual timeouts, where factual timeouts refers to network dynamics reasons, as discussed above. In an alternate embodiment, each translated address set 220 is simply purged from the translated address set database 200 (Fig. 2) rather than on an individual apparent address basis, as described above. Each purged translated address set 220 is re-learned through the processes described above.

Timing out translated address sets by the external server is referred to as a so-called "soft state." In this case, the mapping 215 (Fig. 2) from the servers 110 address list 210 (Fig. 2) to the translated address sets 220 (Fig. 2) is timed-out and brought back on line. This timeout occurs, for example, at a start time plus three hours, start time plus three minutes, or other such reasonable time. The other case in which the timeout is used is for the translated address sets included and excluded lists 610, 630, respectively. The timeouts are determined through an empirical balance, which may be dynamic, adaptive, heuristic, or configurable.

Using the timeout routine 800, the servers 110 and, more generally the server network, becomes a more tolerant and robust system, accounting for such network changes as adding or removing devices, ATDs, servers, additional subnets, and experiencing power outages. Each such event changes the loading on one or more of the established servers 110, which, through the use of these timeouts, may be brought back on line with a modified coverage area, for example, in the case of additional servers in the hierarchical server network.

It should be understood that the method of the present invention can be implemented by a processor in a server that executes computer instructions, which are stored on a computer readable medium device, such as a ROM, CD ROM, hard disk, or other form of computer storage device.

This application is related to Application No. 08/779,770 filed January 7, 1997 entitled "Replica Routing;" Application No. 09/294,836 filed April 19, 1999 entitled "Self-Organizing Distributed Appliances;" Application No. 09/294,837 filed April 19, 1999 entitled "Replica Routing;" and Provisional Application No. 60/160,535 filed October 20, 1999 entitled "Automatic Network Address Assignment and Translation Inference;" Provisional Application filed January 21, 2000 entitled "Method and Apparatus for a Minimalist Approach to Implementing Server Selection;" and Provisional Application filed on this same day entitled "Method and Apparatus for Automatic Network Address Assignment." The contents of the above applications are herein incorporated by reference in their entirety.

While this invention has been particularly shown and described with references to preferred embodiments thereof, it will be understood by those skilled in the art that various changes in form and details may be made therein without departing from the spirit and scope of the invention as defined by the appended claims.

CLAIMS

What is claimed is:

1. A method of determining a network topology induced by network address translation, comprising:

initiating communications, from a server behind a translating device, which effect the network address translation; and

monitoring the communications beyond the translating device to infer partitioning of servers into equivalence sets relative to the network topology induced by the network address translation.

2. The method according to Claim 1 wherein the communications include at least one source address in a message.

3. The method according to Claim 2 wherein the source address includes an IP address.

4. The method according to Claim 2 wherein a unique identification number is included in the message.

5. The method according to Claim 1 wherein monitoring includes distinguishing between communications affected by and not affected by network address translation.

6. The method according to Claim 5 wherein distinguishing includes comparing an apparent source address of a message against an actual source address provided in the message.

7. The method according to Claim 1 further comprising assessing a range of network addresses behind the translating device.

8. The method according to Claim 1 further comprising assessing a range of public network addresses associated with the translating device.

9. The method according to Claim 1 further comprising distinguishing between active and passive clients.

10. The method according to Claim 9 further including directing a message from a passive client to an active client.

11. The method according to Claim 9 further including, from a processor beyond the translating device, causing a message to a passive client to be redirected to an active client, the active client responsively communicating with the processor beyond the translating device.

12. The method according to Claim 1 wherein monitoring includes maintaining at least one translated address set.

13. The method according to Claim 12 wherein monitoring further includes comparing apparent message source addresses with addresses in the translated address set.

14. The method according to Claim 13 further including merging translated address sets in response to determining that multiple apparent source addresses in distinct translated address sets correspond to the same actual source address.

15. The method according to Claim 13 further including assessing whether the source address is behind a known address translation device.

16. The method according to Claim 12 wherein maintaining includes providing a timeout mechanism for removing an address from a translated address set.

17. The method according to Claim 1 further including commanding a new client to contact a known client behind the same network address translation device.

18. The method according to Claim 1 wherein monitoring includes providing a soft-state mechanism to occasionally refresh partitioning.

19. Apparatus to be located beyond a network address translation device for determining a topology of a network in the presence of network address translation, comprising:

a processor coupled to a network interface for receiving communication from a network device effecting network address translation; and

a processor routine operating on the processor, the processor routine to infer partitioning of servers into equivalence sets relative to the network topology induced by the network address translation.

20. The apparatus according to Claim 19 wherein the messages received include at least one source address in the message.

21. The apparatus according to Claim 20 wherein the processor routine compares an apparent source address of a message against an actual source address provided in the message.

22. The apparatus according to Claim 20 further including at least one translated address set, the source address being stored in the translated address set.

23. The apparatus according to Claim 19 wherein the processor is further coupled to memory, the processor routine storing a database of translated address sets in the memory.

24. The apparatus according to Claim 23 wherein the processor routine includes a database manager to compare apparent message source addresses with addresses stored in the database of translated address sets.

25. The apparatus according to Claim 24 wherein the database manager provides a timeout mechanism for removing translated addresses from the translated address sets in the database.

26. Apparatus to be located behind a network address translation device for providing communications used to determine a topology of a network in the presence of network address translation, comprising:

a processor coupled to a network interface, the processor initiating communications to a server beyond a translation device to effect network address translation; and

a processor routine operating on said processor, said processor routine providing the actual network address of the processor in a message of the communications.

27. The apparatus according to Claim 26 wherein said processor issues communications in response to receiving a communication from behind the network address translation device.

28. A computer program product comprising:

a computer usable medium for storing data; and

a set of computer program instructions embodied on the computer usable medium, including instructions to:

receive communications from a network device effecting network address translation; and

infer partitioning of servers into equivalence sets relative to the network topology induced by the network address translation.

29. Apparatus for determining a topology of a network in the presence of network address translation, comprising:

means for initiating communications from a network which effects network address translation; and

means for monitoring the communication to infer partitioning of servers into equivalence sets relative to the network topology induced by the network address translation.

30. In a network device beyond a network address translation device, a method for determining a topology of a network in the presence of network address translation, the method comprising:

receiving communication messages from a network device effecting network address translation; and

inferring partitioning of servers into equivalence sets relative to the network topology induced by the network address translation.

31. The method according to Claim 30 wherein the messages received include at least one source address in the message.

32. The method according to Claim 31 further including comparing an apparent source address of a message against an actual source address provided in the message.

33. The method according to Claim 31 further including maintaining at least one translated address set, the source address being stored in the translated address set.

34. The method according to Claim 30 further including storing a database of translated address sets.

35. The method according to Claim 34 further including comparing apparent message source addresses with addresses stored in the database of translated address sets.

36. The method according to Claim 35 further including removing translated addresses from the translated address sets in the database after exceeding a timeout duration.

37. In a network device located behind a network address translation device, a method for providing communications used to determine a topology of a network in the presence of network address translation, the method comprising:

initiating communications to a server beyond a translation device to effect network address translation; and

providing the actual network address of the processor in a message of the communications.

38. The method according to Claim 37 further including issuing communications in response to receiving a communication from behind the network address translation device.

METHOD AND APPARATUS FOR DETERMINING A NETWORK TOPOLOGY IN THE PRESENCE OF NETWORK ADDRESS TRANSLATION

ABSTRACT OF THE DISCLOSURE

The present invention may be used for determining a topology of a network in the presence of network address translation. From an active client behind a translating device, communications are initiated that effect the network address translation. The communications are monitored beyond the translating device to infer partitioning of servers into equivalence sets relative to the network topology induced by the network address translation. Active clients behind the translating device may include a respective actual sending address in a message sent to a server beyond the translating device. The server beyond the translating device distinguishes between communications affected by and not affected by network address translation, which may include comparing an apparent source address of a message against an actual address provided in the message by the active client behind the translation device. The external server may also distinguish between active and passive client messages. The server server may cause a message to a passive client to be redirected to an active client; the active client, in turn, communicates to the external-server. The external server stores addresses of devices in translated address sets, which may be maintained in a database and managed in a database manager.

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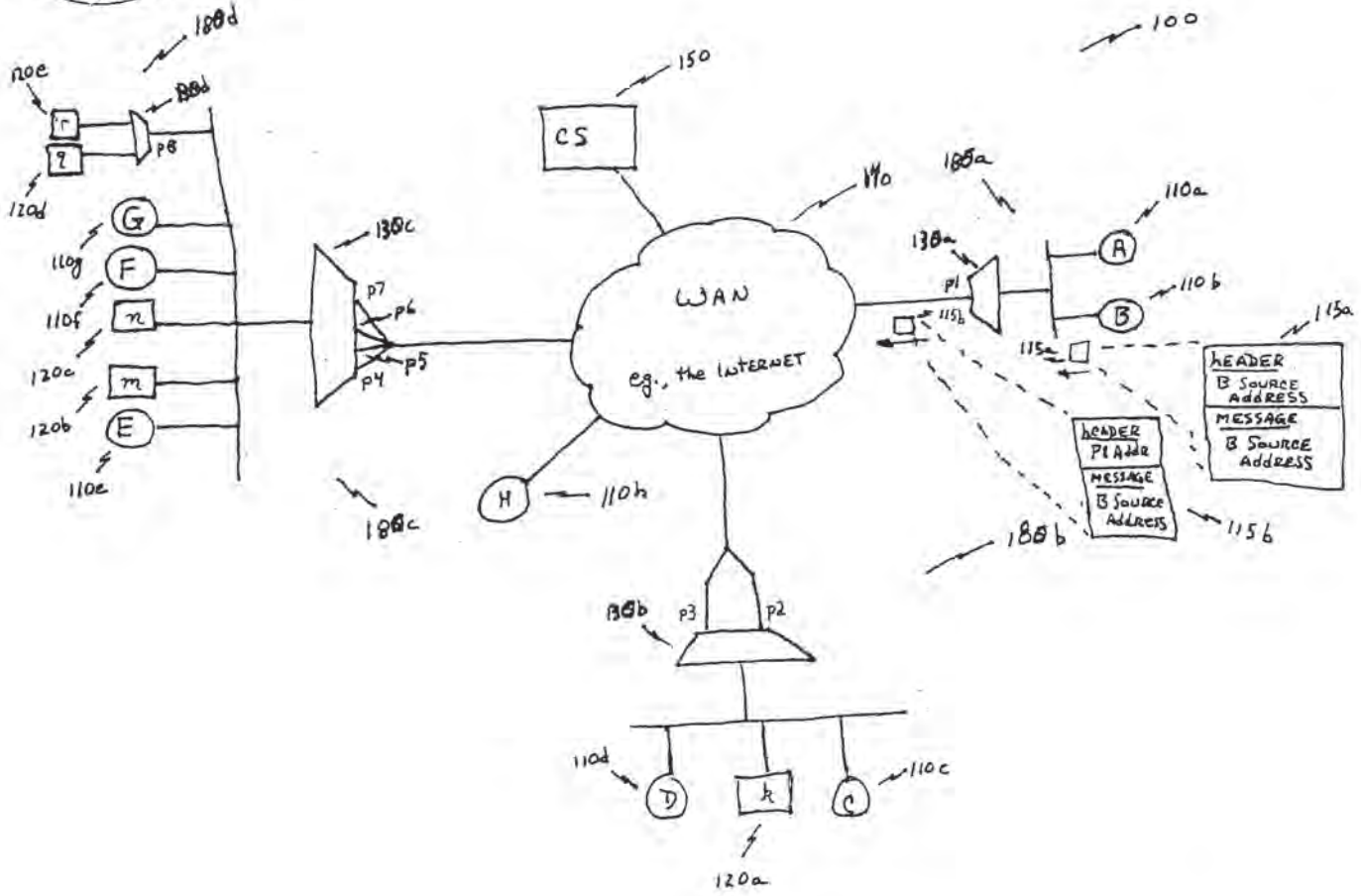


FIG. 1

Title: Method and Apparatus for Determining
Inventors: Kirk Johnson

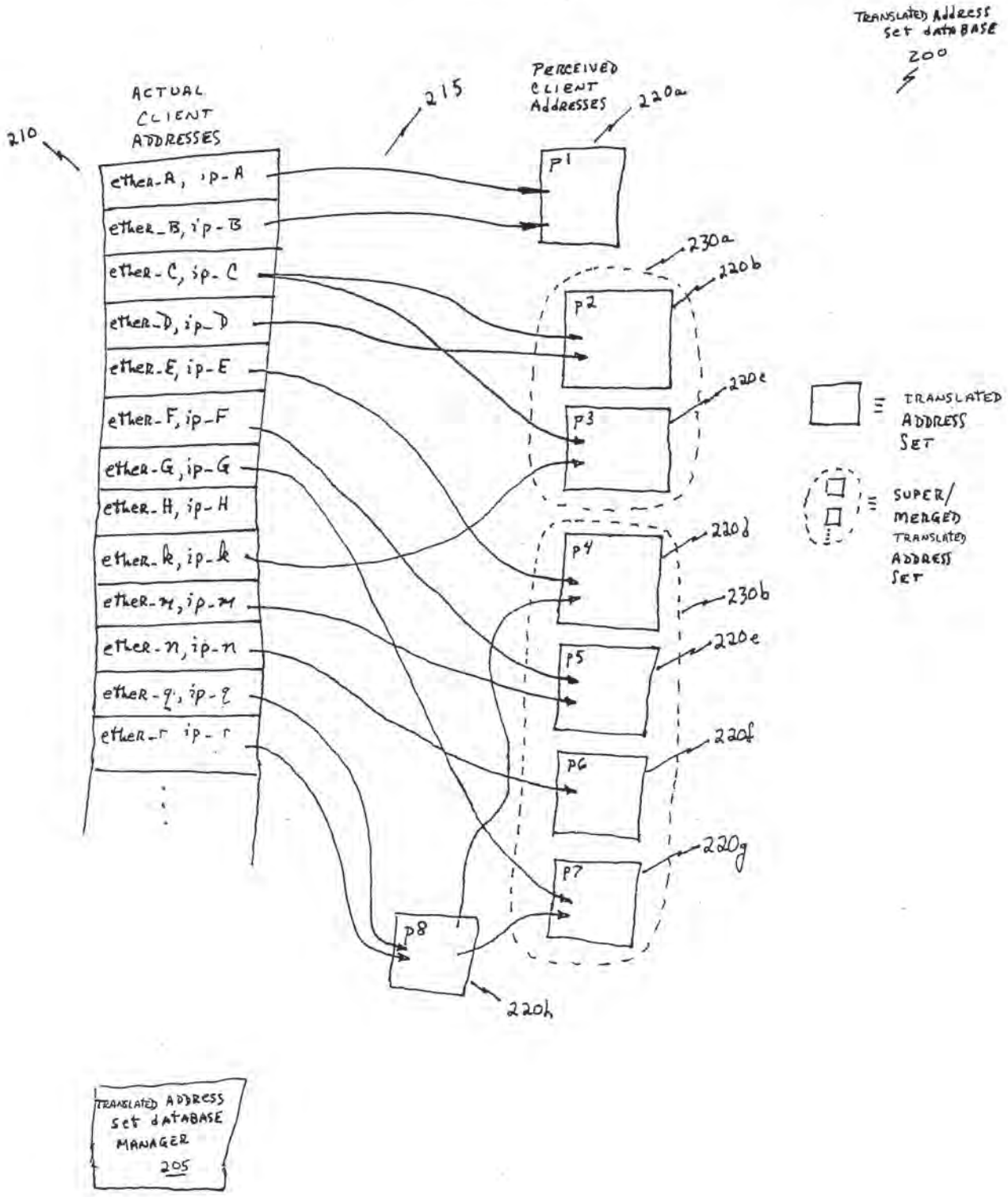


FIG. 2

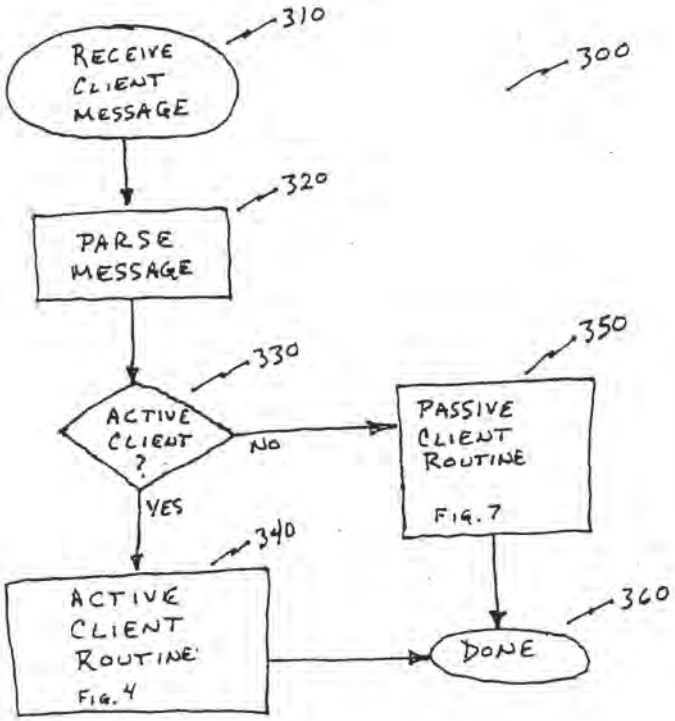

RECEIVE CLIENT MESSAGE
310
300
PARSE MESSAGE
320
ACTIVE CLIENT ?
330
NO
YES
PASSIVE CLIENT ROUTINE
FIG. 7
350
ACTIVE CLIENT ROUTINE
FIG. 4
340
DONE
360

FIG. 3

Title: Method and Apparatus for Determining
Inventors: Kirk Johnson

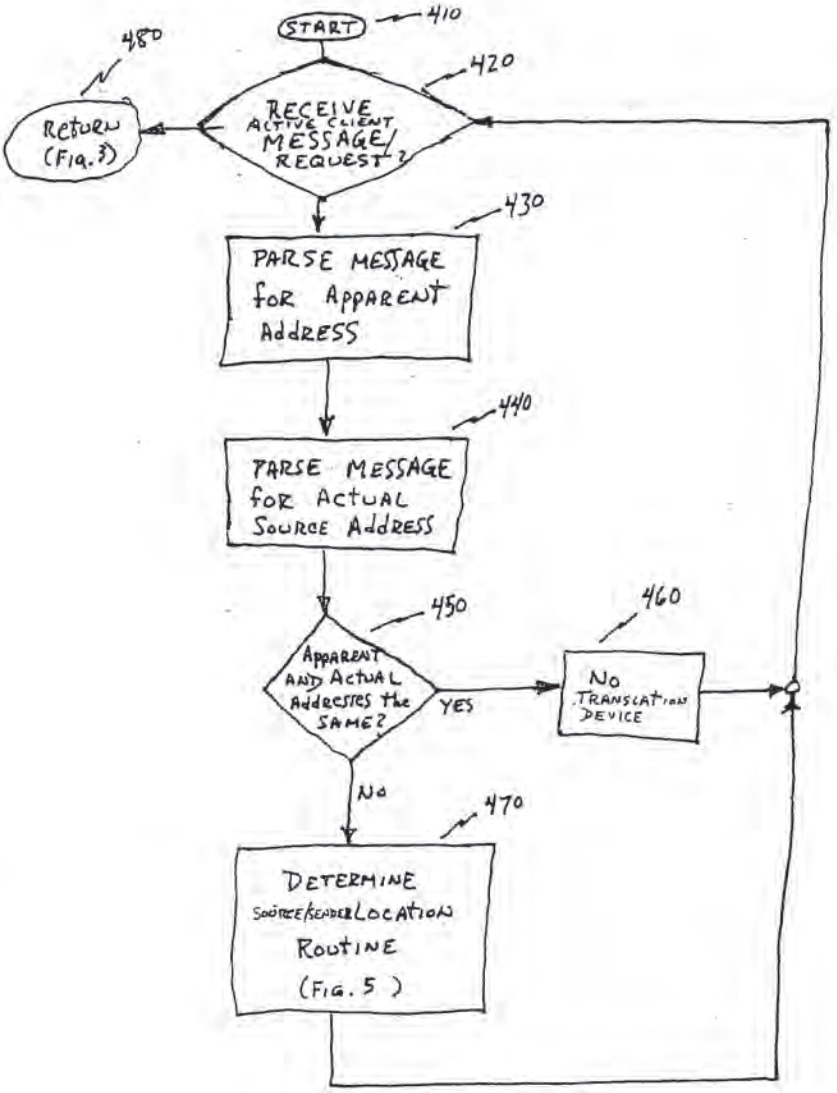


Fig. 4

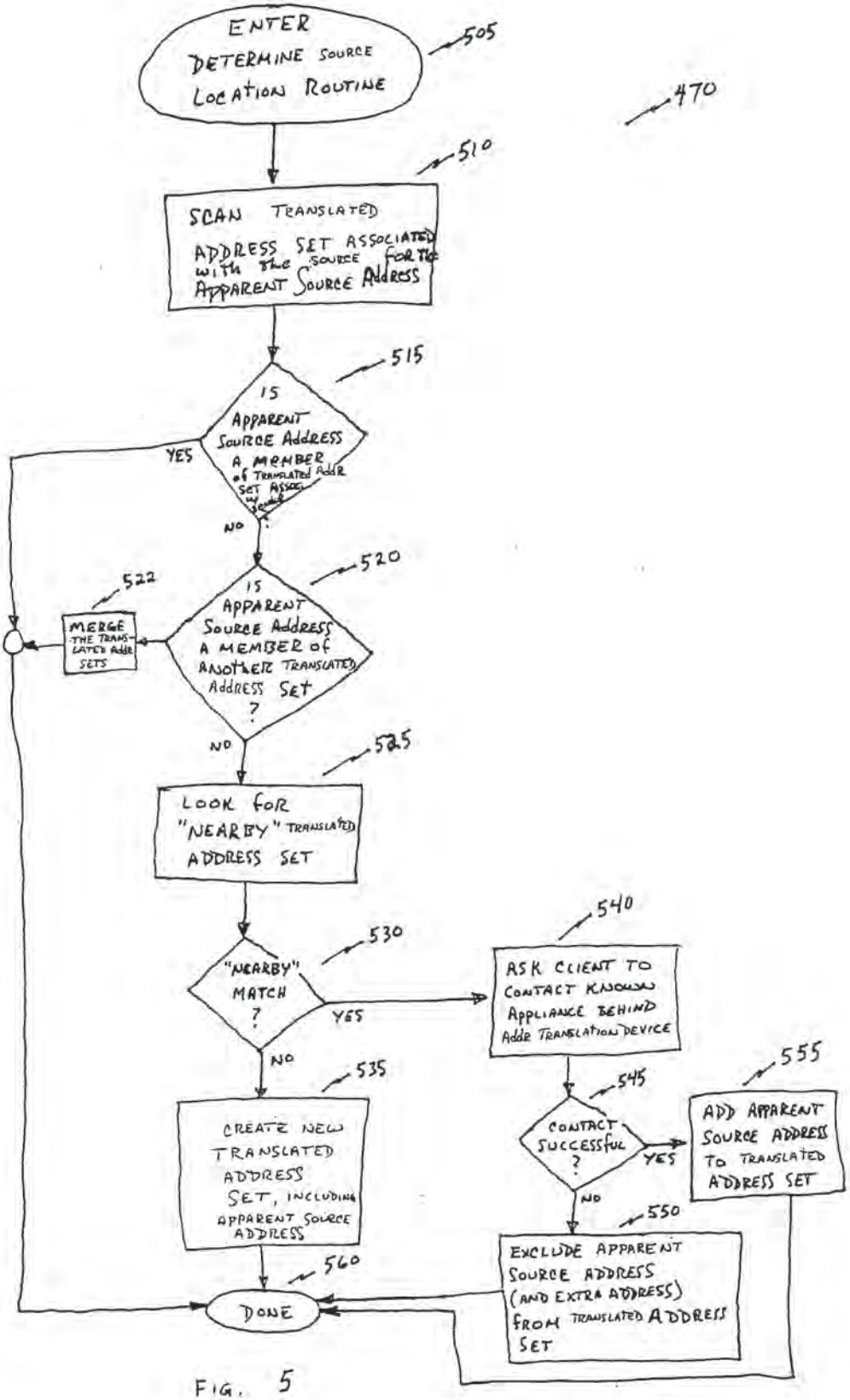

ENTER
DETERMINE SOURCE LOCATION ROUTINE
505
470
510
SCAN TRANSLATED ADDRESS SET ASSOCIATED WITH THE SOURCE FOR THE APPARENT SOURCE ADDRESS
515
IS APPARENT SOURCE ADDRESS A MEMBER of TRANSLATED ADDR SET ASSOC. W/ SOURCE ?
YES
NO
520
IS APPARENT SOURCE ADDRESS A MEMBER OF ANOTHER TRANSLATED ADDRESS SET ?
522
MERGE THE TRANSLATED ADDR SETS
NO
525
LOOK FOR "NEARBY" TRANSLATED ADDRESS SET
530
"NEARBY" MATCH ?
YES
540
ASK CLIENT TO CONTACT KNOWN APPLIANCE BEHIND ADDR TRANSLATION DEVICE
NO
535
CREATE NEW TRANSLATED ADDRESS SET, INCLUDING APPARENT SOURCE ADDRESS
545
CONTACT SUCCESSFUL ?
YES
555
ADD APPARENT SOURCE ADDRESS TO TRANSLATED ADDRESS SET
NO
550
EXCLUDE APPARENT SOURCE ADDRESS (AND EXTRA ADDRESS) FROM TRANSLATED ADDRESS SET
560
DONE

FIG. 5

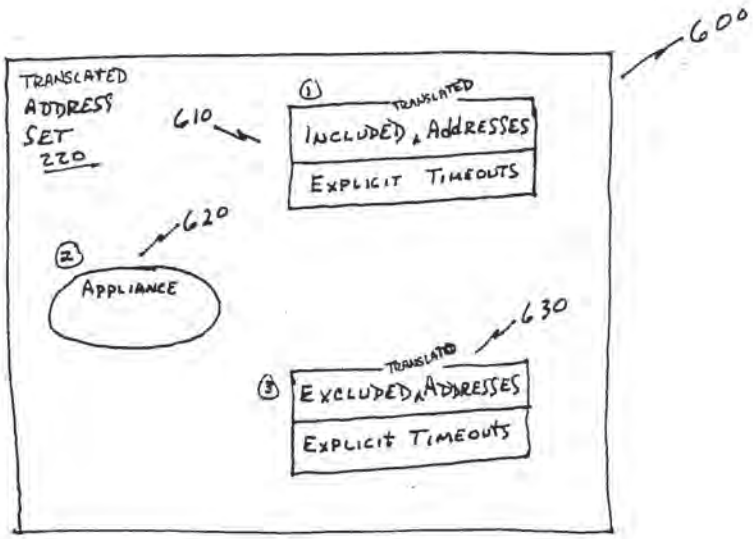

600
TRANSLATED ADDRESS SET 220
610
1
TRANSLATED
INCLUDED ADDRESSES
EXPLICIT TIMEOUTS
620
2
APPLIANCE
630
3
TRANSLATED
EXCLUDED ADDRESSES
EXPLICIT TIMEOUTS

FIG. 6

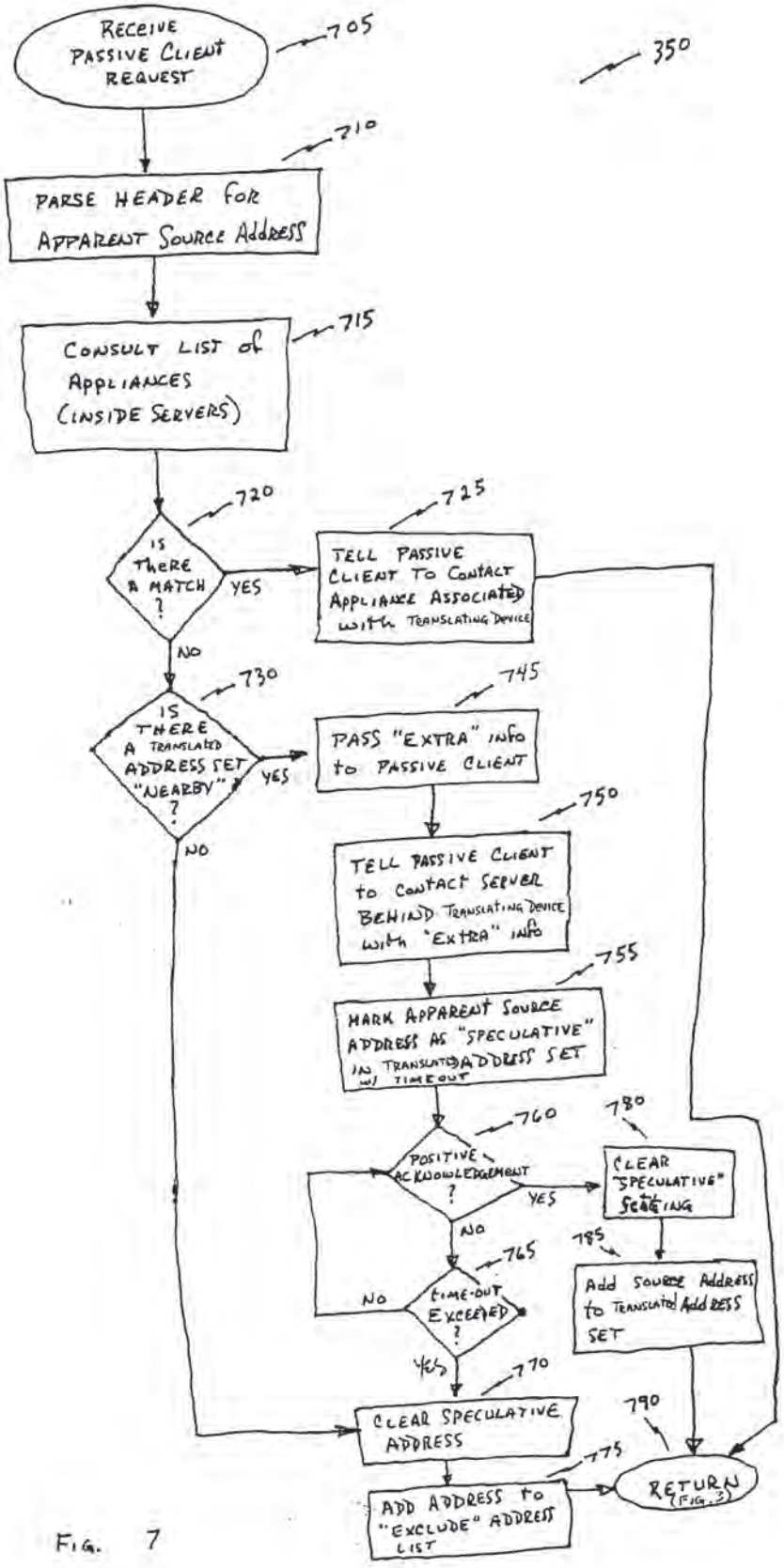

RECEIVE PASSIVE CLIENT REQUEST
705
350
PARSE HEADER FOR APPARENT SOURCE ADDRESS
710
CONSULT LIST of APPLIANCES (INSIDE SERVERS)
715
IS THERE A MATCH ?
720
YES
TELL PASSIVE CLIENT TO CONTACT APPLIANCE ASSOCIATED with TRANSLATING DEVICE
725
NO
IS THERE A TRANSLATED ADDRESS SET "NEARBY" ?
730
YES
PASS "EXTRA" INFO to PASSIVE CLIENT
745
NO
TELL PASSIVE CLIENT to CONTACT SERVER BEHIND TRANSLATING DEVICE with "EXTRA" INFO
750
MARK APPARENT SOURCE ADDRESS AS "SPECULATIVE" IN TRANSLATED ADDRESS SET W/ TIMEOUT
755
POSITIVE ACKNOWLEDGEMENT ?
760
YES
CLEAR "SPECULATIVE" SETTING
780
NO
TIME-OUT EXCEEDED ?
765
NO
YES
Add SOURCE ADDRESS to TRANSLATED ADDRESS SET
785
CLEAR SPECULATIVE ADDRESS
770
ADD ADDRESS to "EXCLUDE" ADDRESS LIST
775
RETURN (FIG. 3)
790

FIG. 7

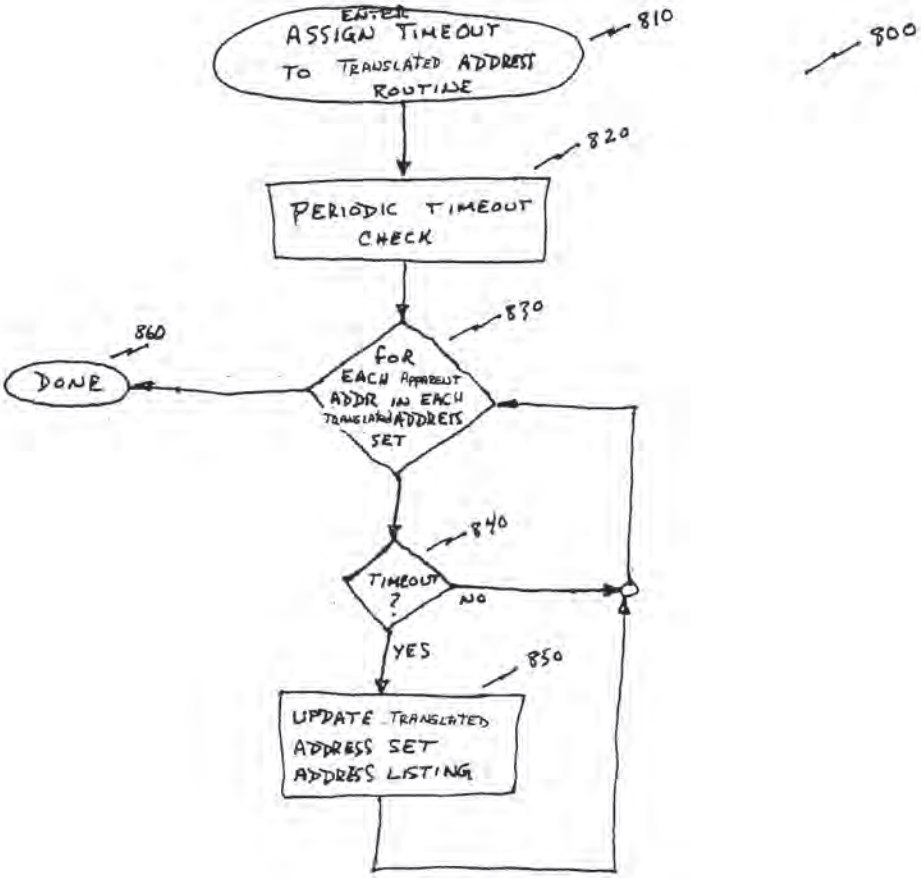

ENTER
ASSIGN TIMEOUT TO TRANSLATED ADDRESS ROUTINE
810
800
820
PERIODIC TIMEOUT CHECK
830
FOR EACH APPARENT ADDR IN EACH TRANSLATED ADDRESS SET
860
DONE
840
TIMEOUT ?
NO
YES
850
UPDATE TRANSLATED ADDRESS SET ADDRESS LISTING

FIG. 8

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.
09/824,553	04/02/2001	Kirk Johnson	2762.2002-002	9887

21005 7590 02/08/2005

HAMILTON, BROOK, SMITH & REYNOLDS, P.C.
530 VIRGINIA ROAD
P.O. BOX 9133
CONCORD, MA 01742-9133

EXAMINER	
VINCENT, DAVID ROBERT	
ART UNIT	PAPER NUMBER
2661	

DATE MAILED: 02/08/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

Interview Summary	Application No.	Applicant(s)	
	09/824,553	JOHNSON ET AL.	
	Examiner	Art Unit	
	David R Vincent	2661	

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

(1) *David R Vincent*. (3)_____.

(2) *Mark Solomon*. (4)_____.

Date of Interview: *21 December 2004*.

Type: a)☒ Telephonic b)☐ Video Conference
c)☐ Personal [copy given to: 1)☐ applicant 2)☐ applicant's representative]

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

Claim(s) discussed: *none*.

Identification of prior art discussed: *none*.

Agreement with respect to the claims f)☒ was reached. g)☐ was not reached. h)☐ N/A.

Substance of Interview including description of the general nature of what was agreed to if an agreement was reached, or any other comments: *Pages 5-9 of the specification are not in the application and need to be sent in with evidence that they were filied*.

(A fuller description, if necessary, and a copy of the amendments which the examiner agreed would render the claims allowable, if available, must be attached. Also, where no copy of the amendments that would render the claims allowable is available, a summary thereof must be attached.)

THE FORMAL WRITTEN REPLY TO THE LAST OFFICE ACTION MUST INCLUDE THE SUBSTANCE OF THE INTERVIEW. (See MPEP Section 713.04). If a reply to the last Office action has already been filed, APPLICANT IS GIVEN ONE MONTH FROM THIS INTERVIEW DATE, OR THE MAILING DATE OF THIS INTERVIEW SUMMARY FORM, WHICHEVER IS LATER, TO FILE A STATEMENT OF THE SUBSTANCE OF THE INTERVIEW. See Summary of Record of Interview requirements on reverse side or on attached sheet.

Examiner Note: You must sign this form unless it is an Attachment to a signed Office action.

2/5/05
Examiner's signature, if required

Quicker Connections - Exhibit 2005
IPR2025-01088 - Page 270

Summary of Record of Interview Requirements

Manual of Patent Examining Procedure (MPEP), Section 713.04, Substance of Interview Must be Made of Record
A complete written statement as to the substance of any face-to-face, video conference, or telephone interview with regard to an application must be made of record in the application whether or not an agreement with the examiner was reached at the interview.

Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews
Paragraph (b)
In every instance where reconsideration is requested in view of an interview with an examiner, a complete written statement of the reasons presented at the interview as warranting favorable action must be filed by the applicant. An interview does not remove the necessity for reply to Office action as specified in §§ 1.111, 1.135. (35 U.S.C. 132)

37 CFR §1.2 Business to be transacted in writing.
All business with the Patent or Trademark Office should be transacted in writing. The personal attendance of applicants or their attorneys or agents at the Patent and Trademark Office is unnecessary. The action of the Patent and Trademark Office will be based exclusively on the written record in the Office. No attention will be paid to any alleged oral promise, stipulation, or understanding in relation to which there is disagreement or doubt.

The action of the Patent and Trademark Office cannot be based exclusively on the written record in the Office if that record is itself incomplete through the failure to record the substance of interviews.

It is the responsibility of the applicant or the attorney or agent to make the substance of an interview of record in the application file, unless the examiner indicates he or she will do so. It is the examiner's responsibility to see that such a record is made and to correct material inaccuracies which bear directly on the question of patentability.

Examiners must complete an Interview Summary Form for each interview held where a matter of substance has been discussed during the interview by checking the appropriate boxes and filling in the blanks. Discussions regarding only procedural matters, directed solely to restriction requirements for which interview recordation is otherwise provided for in Section 812.01 of the Manual of Patent Examining Procedure, or pointing out typographical errors or unreadable script in Office actions or the like, are excluded from the interview recordation procedures below. Where the substance of an interview is completely recorded in an Examiners Amendment, no separate Interview Summary Record is required.

The Interview Summary Form shall be given an appropriate Paper No., placed in the right hand portion of the file, and listed on the "Contents" section of the file wrapper. In a personal interview, a duplicate of the Form is given to the applicant (or attorney or agent) at the conclusion of the interview. In the case of a telephone or video-conference interview, the copy is mailed to the applicant's correspondence address either with or prior to the next official communication. If additional correspondence from the examiner is not likely before an allowance or if other circumstances dictate, the Form should be mailed promptly after the interview rather than with the next official communication.

The Form provides for recordation of the following information:
- Application Number (Series Code and Serial Number)
- Name of applicant
- Name of examiner
- Date of interview
- Type of interview (telephonic, video-conference, or personal)
- Name of participant(s) (applicant, attorney or agent, examiner, other PTO personnel, etc.)
- An indication whether or not an exhibit was shown or a demonstration conducted
- An identification of the specific prior art discussed
- An indication whether an agreement was reached and if so, a description of the general nature of the agreement (may be by attachment of a copy of amendments or claims agreed as being allowable). Note: Agreement as to allowability is tentative and does not restrict further action by the examiner to the contrary.
- The signature of the examiner who conducted the interview (if Form is not an attachment to a signed Office action)

It is desirable that the examiner orally remind the applicant of his or her obligation to record the substance of the interview of each case. It should be noted, however, that the Interview Summary Form will not normally be considered a complete and proper recordation of the interview unless it includes, or is supplemented by the applicant or the examiner to include, all of the applicable items required below concerning the substance of the interview.

A complete and proper recordation of the substance of any interview should include at least the following applicable items:
1) A brief description of the nature of any exhibit shown or any demonstration conducted,
2) an identification of the claims discussed,
3) an identification of the specific prior art discussed,
4) an identification of the principal proposed amendments of a substantive nature discussed, unless these are already described on the Interview Summary Form completed by the Examiner,
5) a brief identification of the general thrust of the principal arguments presented to the examiner,
   (The identification of arguments need not be lengthy or elaborate. A verbatim or highly detailed description of the arguments is not required. The identification of the arguments is sufficient if the general nature or thrust of the principal arguments made to the examiner can be understood in the context of the application file. Of course, the applicant may desire to emphasize and fully describe those arguments which he or she feels were or might be persuasive to the examiner.)
6) a general indication of any other pertinent matters discussed, and
7) if appropriate, the general results or outcome of the interview unless already described in the Interview Summary Form completed by the examiner.

Examiners are expected to carefully review the applicant's record of the substance of an interview. If the record is not complete and accurate, the examiner will give the applicant an extendable one month time period to correct the record.

Examiner to Check for Accuracy

If the claims are allowable for other reasons of record, the examiner should send a letter setting forth the examiner's version of the statement attributed to him or her. If the record is complete and accurate, the examiner should place the indication, "Interview Record OK" on the paper recording the substance of the interview along with the date and the examiner's initials.

Quicker Connections - Exhibit 2005
IPR2025-01088 - Page 271

According to MPEP 608.01(d)

APPLICATION LOCATED IN A TECHNOLOGY CENTER

If it is discovered that an application, located in a Technology Center (TC), was filed without all of the page(s) of the specification, and a Notice of Omitted Items has not been mailed by OIPE, the examiner should review the application to determine whether the application is entitled to a filing date. An application is entitled to a filing date if the application contains something that can be construed as a written description, at least one drawing figure (if necessary under 35 U.S.C. 113, first sentence), and at least one claim.

Application Entitled to a Filing Date

If the application is entitled to a filing date, the examiner should notify applicant of the omission in the next Office action and require applicant to do one of the following:

(A) accept the application, as filed, without all of the page(s) of the specification;

(B) file any omitted page(s) with an oath or declaration in compliance with 37 CFR 1.63 and 37 CFR 1.64 referring to the omitted page(s) and a petition under 37 CFR 1.182 with the petition fee set forth in 37 CFR 1.17(h), requesting the date of submission of the omitted page(s) as the application filing date; or

(C) file a petition under 37 CFR 1.53(e) with the petition fee set forth in 37 CFR 1.17(h) alleging that the page(s) indicated as omitted was in fact deposited with the USPTO with the application papers, including any and all evidence supporting the allegation. See MPEP § 503. The petition fee will be refunded if it is determined that the page(s) was in fact received by the USPTO with the application papers deposited on filing.

If applicant is willing to accept the application, as filed, without all of the page(s) of the application (item A above), an amendment of the specification is required to renumber the pages of the application consecutively and to cancel any incomplete sentences caused by the absence of the omitted page(s). The amendment should be submitted in response to the Office action.

Any petition filed in accordance with item B or C above should be filed with the TC. The TC will match the petition with the application file and forward the application file with the petition to the Office of Petitions, along with a brief explanation as to the page(s) of the specification that has been omitted on filing, for consideration of the petition in due course.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David R Vincent whose telephone number is 571 272 3080. The examiner can normally be reached on M-TH.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chau Nguyen can be reached on 571 272 3126. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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).

2/5/05

David R Vincent
Primary Examiner
Art Unit 2661

February 5, 2005

2661



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	Kirk Johnson, James O'Toole, M. Frans Kaashoek and John Jannotti	
Application No.:	09/824,553	Group Art Unit: 2661
Filed:	April 2, 2001	Examiner: Not assigned
Confirmation No.:	9887	
Title:	METHOD AND APPARATUS FOR DETERMINING A NETWORK TOPOLOGY IN THE PRESENCE OF NETWORK ADDRESS TRANSLATION	

CERTIFICATE OF MAILING OR TRANSMISSION

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as First Class Mail in an envelope addressed to Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, or is being facsimile transmitted to the United States Patent and Trademark Office on:

Oct 22, 2004 — Date
Elaine Leahy — Signature
Elaine Leahy — Typed or printed name of person signing certificate

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This Information Disclosure Statement is submitted:

[ ] under 37 CFR 1.129(a), or
(First/Second submission after Final Rejection)

[X] under 37 CFR 1.97(b), or
(Within any one of the following time periods: three months of filing national application (other than a CPA) or date of entry of the national stage in an international application; or before the mailing date of a first office action on the merits in a non-provisional application, including a CPA, or a Request for Continued Examination).

[ ] under 37 CFR 1.97(c) together with either:

[ ] a Statement under 37 CFR 1.97(e), as checked below, or

[ ] a $180.00 fee under 37 CFR 1.17(p), or
(After the 37 CFR 1.97(b) time period, but before final action or notice of allowance, whichever occurs first)

[ ] under 37 CFR 1.97(d) together with:

[ ] a Statement under 37 CFR 1.97(e), as checked below, and

[ ] a $180.00 fee under 37 CFR 1.17(p), or
(Filed after final action or notice of allowance, whichever occurs first, but on or before payment of the issue fee)

[ ] under 37 CFR 1.97(i):
Applicant requests that the IDS and cited reference(s) be placed in the application filewrapper.
(Filed after payment of issue fee)

Statement Under 37 CFR 1.97(e)

[ ] Each item of information contained in this 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 this Information Disclosure Statement; or

[ ] No item of information contained in this Information Disclosure Statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the undersigned, 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 this Information Disclosure Statement.

Statement Under 37 CFR 1.704(d) (Patent Term Adjustment)
Applies to original applications (other than design) filed on or after May 29, 2000

[ ] Each item of information contained in the Information Disclosure Statement was cited in a communication from a foreign patent office in a counterpart application and this communication was not received by any individual designated in § 1.56(c) more than thirty days prior to the filing of the Information Disclosure Statement.

[X] Enclosed herewith is form PTO-1449:

[X] Copies of the cited references are enclosed.

[ ] Since this application was filed after June 30, 2003, copies of issued U.S. patents and published U.S. applications are not required and are not being provided.

[ ] Copies of the cited references are enclosed except those entered in prior application, U.S. Application No. [ ], to which priority under 35 U.S.C. 120 is claimed. [The earlier application contains copies of the cited references.]

[ ] The listed references were cited in the enclosed International Search Report in a counterpart foreign application.

[ ] The "concise explanation" requirement (non-English references) for reference(s) [ ] under 37 CFR 1.98(a)(3) is satisfied by:

[ ] the explanation provided on the attached sheet.

[ ] the explanation provided in the Specification.

[ ] submission of the enclosed International Search Report.

[ ] submission of the enclosed English-language version of a foreign Search Report and/or foreign Office Action.

[ ] the enclosed English language abstract.

[ ] Applicant requests that the following non-published pending applications be considered:

Examiner's Initials

_____ U.S. Patent Application No. [ ], by [inventor(s)], filed [ ], Docket No.: [ ]

_____ U.S. Patent Application No. [ ], by [inventor(s)], filed [ ], Docket No.: [ ]

_____ U.S. Patent Application No. [ ], by [inventor(s)], filed [ ], Docket No.: [ ]

_____ _____

Examiner Date

[ ] A copy of each above-cited application, including the current claims, is enclosed.

[ ] A copy of each above-cited application, including the current claims, is enclosed, except those entered in prior application, U.S. Application No. [ ], to which priority under 35 U.S.C. 120 is claimed.

The Examiner is requested to return a copy of the above list of pending applications indicating which references were considered with the next office communication.

It is requested that the information disclosed herein be made of record in this application.

Method of payment:

[ ] A check for the fee noted above is enclosed, or the fee has been included in the check with the accompanying Reply. A copy of this Statement is enclosed.

[ ] Please charge Deposit Account 08-0380 in the amount of $[ ]. A copy of this Statement is enclosed.

[X] Please charge any deficiency in fees and credit any overpayment to Deposit Account 08-0380.

Respectfully submitted,

HAMILTON, BROOK, SMITH & REYNOLDS, P.C.

By Mark B Solomon

Mark B. Solomon
Registration No.:44,348
Telephone: (978) 341-0036
Facsimile: (978) 341-0136

Concord, MA 01742-9133
Dated: 10/22/04

PTO-1449 REPRODUCED	ATTORNEY DOCKET NO.	APPLICATION NO.	
SUPPLEMENTAL INFORMATION DISCLOSURE CITATION IN AN APPLICATION	2762.2002-002	09/824,553	
	FIRST NAMED INVENTOR	FILING DATE	
	Kirk Johnson	April 2, 2001	
OCTOBER 19, 2004	EXAMINER	CONFIRMATION NO.	GROUP
(Use several sheets if necessary)	Not assigned	9887	2661

OIPE JC54 OCT 25 2004 PATENT & TRADEMARK OFFICE

U.S. PATENT DOCUMENTS

EXAMINER INITIAL	REF. NO.	DOCUMENT NUMBER Number-Kind Code (if known)	ISSUE DATE / PUBLICATION DATE MM-DD-YYYY	NAME OF PATENTEE OR APPLICANT OF CITED DOCUMENT
	AC	2001/0039585 A1	11/08/2001	Primak *et al.*
	AD	6,571,288 B1	05/27/2003	Sarukkai
	AE	6,134,588	10/17/2000	Guenthner *et al.*
	AF	6,078,960	06/20/2000	Ballard
	AG	6,539,426 B1	03/25/2003	Meek, *et al.*
	AH	5,870,562	02/09/1999	Butman *et al.*
	AI	6,035,055	03/07/2000	Wang *et al.*
	AJ	6,041,041	03/21/2000	Ramanathan *et al.*
	AK	6,081,840	06/27/2000	Zhao
	AA2	6,185,598 B1	02/06/2001	Farber *et al.*
	AB2	6,304,913 B1	10/16/2001	Rune
	AC2	6,338,092 B1	01/08/2002	Chao *et al.*
	AD2	6,505,254 B1	01/07/2003	Johnson *et al.*
	AE2	6,581,065 B1	06/17/2003	Rodkin *et al.*
	AF2	2002/0065938 A1	05/30/2002	Jungck *et al.*
	AG2	2002/0186694 A1	12/12/2002	Mahajan *et al.*
	AH2	2003/0041094 A1	02/27/2003	Lara *et al.*
	AI2	6,553,413 B1	04/22/2003	Leighton *et al.*
	AJ2	6,553,420 B1	04/22/2003	Karger *et al.*
	AK2	6,185,619 B1	02/06/2001	Joffe *et al.*
	AA3			
	AB3			
	AC3			

EXAMINER	DATE CONSIDERED

@PFDesktop\::ODMA/MHODMA/HBSR05;iManage;507017;1

PTO-1449 REPRODUCED	ATTORNEY DOCKET NO.	APPLICATION NO.
SUPPLEMENTAL INFORMATION DISCLOSURE CITATION IN AN APPLICATION	2762.2002-002	09/824,553
	FIRST NAMED INVENTOR: Kirk Johnson	FILING DATE: April 2, 2001
OCTOBER 19, 2004 (Use several sheets if necessary)	EXAMINER: Not assigned	CONFIRMATION NO.: 9887 / GROUP: 2661

OCT 25 2004 JC56 PATENT & TRADEMARK OFFICE

FOREIGN PATENT DOCUMENTS

		DOCUMENT NUMBER Country Code-Number-Kind Code (if known)	DATE MM-DD-YYYY	NAME OF PATENTEE OR APPLICANT OF CITED DOCUMENT	TRANSLATION YES	TRANSLATION NO
	AL	WO 99/40514	08/12/1999	Farber et al.		
	AM					
	AN					
	AO					
	AP					
	AQ					
	AL2					
	AM2					
	AN2					
	AO2					
	AP2					
	AQ2					
	AL3					
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	AN3					
	AO3					
	AP3					
	AQ3					
	AL4					
	AM4					
	AN4					
	AO4					
	AP4					
	AQ4					

EXAMINER	DATE CONSIDERED

@PFDesktop\::ODMA/MHODMA/HBSR05;iManage;507017;1

PTO-1449 REPRODUCED	ATTORNEY DOCKET NO. 2762.2002-002	APPLICATION NO. 09/824,553	
SUPPLEMENTAL INFORMATION DISCLOSURE CITATION IN AN APPLICATION	FIRST NAMED INVENTOR Kirk Johnson	FILING DATE April 2, 2001	
OCTOBER 19, 2004 (Use several sheets if necessary)	EXAMINER Not assigned	CONFIRMATION NO. 9887	GROUP 2661

OCT 25 2004 JC56 PATENT & TRADEMARK OFFICE

		OTHER DOCUMENTS *(Including Author, Title, Date, Pertinent Pages, Etc.)*
	AR	Amir, Yair *et al.*, "Seamlessly selecting the best copy from Internet-wide replicated web servers" *The 12th International Symposium on Distributed Computing*, (DISC'98), 22-23, September 1998.
	AS	Amir and Shaw, "WALRUS- a Low Latency, High Throughput Web Service Using Internet-wide Replication," In Proceedings of the 19th IEEE Workshop on Electronic Commerce and Web-Based Applications, pp. 31-40, Austin, May 1999, http://www.cnds.jhu.edu/publications/ 5/16/02.
	AT	Bakker, A., *et al.* "The Globe Distribution Network," *Proc. 2000 USENIX Annual Conf. (FREENIX Track)*, San Diego, pp. 141-152, June 18-23, 2000, http://www.cs.vu.nl/globe/publications.html 5/16/02.
	AU	Carter, R.L. and Crovella, M.E., "Dynamic Server Selection using Bandwidth Probing in Wide-Area Networks," BU-CS-96-007, March 18, 1996, http://citeseer.nj.nec.com/carter96dynamic.html 5/16/02.
	AV	Francis, Paul. "YOID: Extending the Internet Multicast Architecture," [online] http://www.icir.org/yoid/docs/ycHtmlL/htmlRoot.html 5/21/02.
	AW	Guyton, James D.and Schwartz, Michael F.,"Locating Nearby Copies of Replicated Internet Servers" *Computer Communications Review 25(4)*: 288-98 (1995).
	AX	Karger, D.R. *et al.*,"Consistent hashing and random trees: Distributed caching protocols for relieving hot spots on the world wide web" *Proc. 29th ACM Symposium on Theory of Computing*,654-662, May 1997.
	AY	Leach, Paul J., "Selecting a server from among many replicas," Internet Draft, [online] ASID working group, 2/23/1997, http://www.watersprings.org/pub/id/draft-ietf-asid-replica-selection-00.txt 5/21/02.
	AZ	Sayal, M., *et al.* Selection Algorithms for Replicated Web Servers, [online] www.cs.wisc.edu/~cao/WISP98/html-versions/mehmet/SelectWeb1.html 5/16/02.
	AR2	
	AS2	
	AT2	
	AU2	

EXAMINER	DATE CONSIDERED

@PFDesktop\::ODMA/MHODMA/HBSR05;iManage;507017;1

PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : G06F 9/46, H04L 29/06 — A1

(11) International Publication Number: **WO 99/40514**

(43) International Publication Date: 12 August 1999 (12.08.99)

(21) International Application Number: PCT/US99/01477

(22) International Filing Date: 9 February 1999 (09.02.99)

(30) Priority Data:
09/021,506 10 February 1998 (10.02.98) US

(71) Applicant *(for all designated States except US)*: SANDPIPER NETWORKS INC. [US/US]; Suite 210, 125 Auburn Court, Westlake Village, CA 91362 (US).

(72) Inventors; and

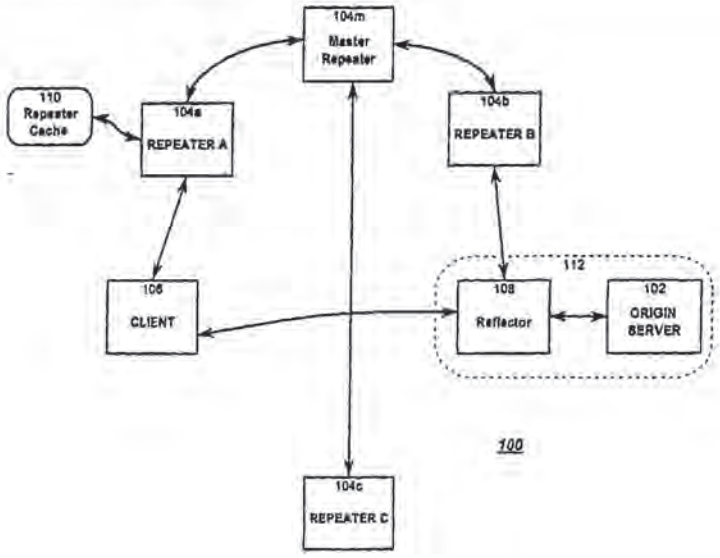
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(57) Abstract

Resource requests made by clients of origin servers in a network are intercepted by reflector mechanisms and selectively reflected to other servers called repeaters. The reflectors select a best repeater from a set of possible repeaters and redirect the client to the selected best repeater. The client then makes the request of the selected best repeater. The resource is possibly rewritten to replace at least some of the resource identifiers contained therein with modified resource identifiers designating the repeater instead of the origin server.

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OPTIMIZED NETWORK RESOURCE LOCATION

1. Field of the Invention

This invention relates to replication of resources in computer networks.

2. Background of the Invention

The advent of global computer networks, such as the Internet, have led to entirely new and different ways to obtain information. A user of the Internet can now access information from anywhere in the world, with no regard for the actual location of either the user or the information. A user can obtain information simply by knowing a network address for the information and providing that address to an appropriate application program such as a network browser.

The rapid growth in popularity of the Internet has imposed a heavy traffic burden on the entire network. Solutions to problems of demand (e.g., better accessibility and faster communication links) only increase the strain on the supply. Internet Web sites (referred to here as "publishers") must handle ever-increasing bandwidth needs, accommodate dynamic changes in load, and improve performance for distant browsing clients, especially those overseas. The adoption of content-rich applications, such as live audio and video, has further exacerbated the problem.

To address basic bandwidth growth needs, a Web publisher typically subscribes to additional bandwidth from an Internet service provider (ISP), whether in the form of larger or additional "pipes" or channels from the ISP to the publisher's premises, or in the form of large bandwidth commitments in an ISP's remote hosting server collection. These increments are not always as fine-grained as the publisher needs, and quite often lead times can cause the publisher's Web site capacity to lag behind demand.

To address more serious bandwidth growth problems, publishers may develop more complex and costly custom solutions. The solution to the most common need, increasing capacity, is generally based on replication of hardware resources and site

content (known as mirroring), and duplication of bandwidth resources. These solutions, however, are difficult and expensive to deploy and operate. As a result, only the largest publishers can afford them, since only those publishers can amortize the costs over many customers (and Web site hits).

A number of solutions have been developed to advance replication and mirroring. In general, these technologies are designed for use by a single Web site and do not include features that allow their components to be shared by many Web sites simultaneously.

Some solution mechanisms offer replication software that helps keep mirrored servers up-to-date. These mechanisms generally operate by making a complete copy of a file system. One such system operates by transparently keeping multiple copies of a file system in synch. Another system provides mechanisms for explicitly and regularly copying files that have changed. Database systems are particularly difficult to replicate, as they are continually changing. Several mechanisms allow for replication of databases, although there are no standard approaches for accomplishing it. Several companies offering proxy caches describe them as replication tools. However, proxy caches differ because they are operated on behalf of clients rather than publishers.

Once a Web site is served by multiple servers, a challenge is to ensure that the load is appropriately distributed or balanced among those servers. Domain name-server-based round-robin address resolution causes different clients to be directed to different mirrors.

Another solution, load balancing, takes into account the load at each server (measured in a variety of ways) to select which server should handle a particular request.

Load balancers use a variety of techniques to route the request to the appropriate server. Most of those load-balancing techniques require that each server be an exact replica of the primary Web site. Load balancers do not take into account the "network distance" between the client and candidate mirror servers.

Assuming that client protocols cannot easily change, there are two major problems in the deployment of replicated resources. The first is how to select which copy of the resource to use. That is, when a request for a resource is made to a single server, how should the choice of a replica of the server (or of that data) be made. We call this problem the "rendezvous problem". There are a number of ways to get clients to rendezvous at distant mirror servers. These technologies, like load balancers, must route a request to an appropriate server, but unlike load balancers, they take network performance and topology into account in making the determination.

A number of companies offer products which improve network performance by prioritizing and filtering network traffic.

Proxy caches provide a way for client aggregators to reduce network resource consumption by storing copies of popular resources close to the end users. A client aggregator is an Internet service provider or other organization that brings a large number of clients operating browsers to the Internet. Client aggregators may use proxy caches to reduce the bandwidth required to serve web content to these browsers. However, traditional proxy caches are operated on behalf of Web clients rather than Web publishers.

Proxy caches store the most popular resources from all publishers, which means they must be very large to achieve reasonable cache efficiency. (The efficiency of a cache is defined as the number of requests for resources which are already cached divided by the total number of requests.)

Proxy caches depend on cache control hints delivered with resources to determine when the resources should be replaced. These hints are predictive, and are necessarily often incorrect, so proxy caches frequently serve stale data. In many cases, proxy cache operators instruct their proxy to ignore hints in order to make the cache more efficient, even though this causes it to more frequently serve stale data.

Proxy caches hide the activity of clients from publishers. Once a resource is cached, the publisher has no way of knowing how often it was accessed from the cache.

SUMMARY OF THE INVENTION

This invention provides a way for servers in a computer network to off-load their processing of requests for selected resources by determining a different server (a "repeater") to process those requests. The selection of the repeater can be made dynamically, based on information about possible repeaters.

If a requested resource contains references to other resources, some or all of these references can be replaced by references to repeaters.

Accordingly, in one aspect, this invention is a method of processing resource requests in a computer network. First a client makes a request for a particular resource from an origin server, the request including a resource identifier for the particular resource, the resource identifier sometimes including an indication of the origin server. Requests arriving at the origin server do not always include an indication of the origin server; since they are sent to the origin server, they do not need to name it. A mechanism referred to as a reflector, co-located with the origin server, intercepts the request from the client to the origin server and decides whether to reflect the request or to handle it locally. If the reflector decides to handle the request locally, it forwards it to the origin server, otherwise it selects a "best" repeater to process the request. If the request is reflected, the client is provided with a modified resource identifier designating the repeater.

The client gets the modified resource identifier from the reflector and makes a request for the particular resource from the repeater designated in the modified resource identifier.

When the repeater gets the client's request, it responds by returning the requested resource to the client. If the repeater has a local copy of the resource then it returns that copy, otherwise it forwards the request to the origin server to get the resource, and saves a local copy of the resource in order to serve subsequent requests.

The selection by the reflector of an appropriate repeater to handle the request can be done in a number of ways. In the preferred embodiment, it is done by first pre-

partitioning the network into "cost groups" and then determining which cost group the client is in. Next, from a plurality of repeaters in the network, a set of repeaters is selected, the members of the set having a low cost relative to the cost group which the client is in. In order to determine the lowest cost, a table is maintained and regularly updated to define the cost between each group and each repeater. Then one member of the set is selected, preferably randomly, as the best repeater.

If the particular requested resource itself can contain identifiers of other resources, then the resource may be rewritten (before being provided to the client). In particular, the resource is rewritten to replace at least some of the resource identifiers contained therein with modified resource identifiers designating a repeater instead of the origin server. As a consequence of this rewriting process, when the client requests other resources based on identifiers in the particular requested resource, the client will make those requests directly to the selected repeater, bypassing the reflector and origin server entirely.

Resource rewriting must be performed by reflectors. It may also be performed by repeaters, in the situation where repeaters "peer" with one another and make copies of resources which include rewritten resource identifiers that designate a repeater.

In a preferred embodiment, the network is the Internet and the resource identifier is a uniform resource locator (URL) for designating resources on the Internet, and the modified resource identifier is a URL designating the repeater and indicating the origin server (as described in step B3 below), and the modified resource identifier is provided to the client using a REDIRECT message. Note, only when the reflector is "reflecting" a request is the modified resource identifier provided using a REDIRECT message.

In another aspect, this invention is a computer network comprising a plurality of origin servers, at least some of the origin servers having reflectors associated therewith, and a plurality of repeaters.

BRIEF DESCRIPTION OF THE DRAWINGS

The above and other objects and advantages of the invention will be apparent upon consideration of the following detailed description, taken in conjunction with the accompanying drawings, in which the reference characters refer to like parts throughout and in which:

FIGURE 1 depicts a portion of a network environment according to the present invention; and

FIGURES 2-6 are flow charts of the operation of the present invention.

DETAILED DESCRIPTION OF THE PRESENTLY PREFERRED EXEMPLARY EMBODIMENTS

Overview

FIGURE 1 shows a portion of a network environment 100 according to the present invention, wherein a mechanism (reflector 108, described in detail below) at a server (herein origin server 102) maintains and keeps track of a number of partially replicated servers or repeaters 104a, 104b, and 104c. Each repeater 104a, 104b, and 104c replicates some or all of the information available on the origin server 102 as well as information available on other origin servers in the network 100. Reflector 108 is connected to a particular repeater known as its "contact" repeater ("Repeater B" 104b in the system depicted in FIGURE 1). Preferably each reflector maintains a connection with a single repeater known as its contact, and each repeater maintains a connection with a special repeater known as its master repeater (e.g., repeater 104m for repeaters 104a, 104b and 104c in FIGURE 1).

Thus, a repeater can be considered as a dedicated proxy server that maintains a partial or sparse mirror of the origin server 102, by implementing a distributed coherent cache of the origin server. A repeater may maintain a (partial) mirror of more than one origin server. In some embodiments, the network 100 is the Internet and repeaters

mirror selected resources provided by origin servers in response to clients' HTTP (hypertext transfer protocol) and FTP (file transfer protocol) requests.

A client **106** connects, via the network **100**, to origin server **102** and possibly to one or more repeaters **104a** etc.

Origin server **102** is a server at which resources originate. More generally, the origin server **102** is any process or collection of processes that provide resources in response to requests from a client **106**. Origin server **102** can be any off-the-shelf Web server. In a preferred embodiment, origin server **102** is typically a Web server such as the Apache server or Netscape Communications Corporation's Enterprise™ server.

Client **106** is a processor requesting resources from origin server **102** on behalf of an end user. The client **106** is typically a user agent (e.g., a Web browser such as Netscape Communications Corporation's Navigator™) or a proxy for a user agent. Components other than the reflector **108** and the repeaters **104a, 104b**, etc., may be implemented using commonly available software programs. In particular, this invention works with any HTTP client (e.g., a Web browser), proxy cache, and Web server. In addition, the reflector **108** might be fully integrated into the data server **112** (for instance, in a Web Server). These components might be loosely integrated based on the use of extension mechanisms (such as so-called add-in modules) or tightly integrated by modifying the service component specifically to support the repeaters.

Resources originating at the origin server **102** may be static or dynamic. That is, the resources may be fixed or they may be created by the origin server **102** specifically in response to a request. Note that the terms "static" and "dynamic" are relative, since a static resource may change at some regular, albeit long, interval.

Resource requests from the client **106** to the origin server **102** are intercepted by reflector **108** which for a given request either forwards the request on to the origin server **102** or conditionally reflects it to some repeater **104a, 104b**, etc. in the network **100**. That is, depending on the nature of the request by the client **106** to the origin server **102**, the reflector **108** either serves the request locally (at the origin server **102**), or selects one

of the repeaters (preferably the best repeater for the job) and reflects the request to the selected repeater. In other words, the reflector 108 causes requests for resources from origin server 102, made by client 106, to be either served locally by the origin server 102 or transparently reflected to the best repeater 104a, 104b, etc. The notion of a best repeater and the manner in which the best repeater is selected are described in detail below.

Repeaters 104a, 104b, etc. are intermediate processors used to service client requests thereby improving performance and reducing costs in the manner described herein. Within repeaters 104a, 104b, etc., are any processes or collections of processes that deliver resources to the client 106 on behalf of the origin server 102. A repeater may include a repeater cache 110, used to avoid unnecessary transactions with the origin server 102.

The reflector 108 is a mechanism, preferably a software program, that intercepts requests that would normally be sent directly to the origin server 102. While shown in the drawings as separate components, the reflector 108 and the origin server 102 are typically co-located, e.g., on a particular system such as data server 112. (As discussed below, the reflector 108 may even be a "plug in" module that becomes part of the origin server 102.

FIGURE 1 shows only a part of a network 100 according to this invention. A complete operating network consists of any number of clients, repeaters, reflectors, and origin servers. Reflectors communicate with the repeater network, and repeaters in the network communicate with one another.

Uniform Resource Locators

Each location in a computer network has an address which can generally be specified as a series of names or numbers. In order to access information, an address for that information must be known. For example, on the World Wide Web ("the Web") which is a subset of the Internet, the manner in which information address locations are

provided has been standardized into Uniform Resource Locators (URLs). URLs specify the location of resources (information, data files, etc.) on the network.

The notion of URLs becomes even more useful when hypertext documents are used. A hypertext document is one which includes, within the document itself, links (pointers or references) to the document itself or to other documents. For example, in an on-line legal research system, each case may be presented as a hypertext document. When other cases are cited, links to those cases can be provided. In this way, when a person is reading a case, they can follow cite links to read the appropriate parts of cited cases.

In the case of the Internet in general and the World Wide Web specifically, documents can be created using a standardized form known as the Hypertext Markup Language (HTML). In HTML, a document consists of data (text, images, sounds, and the like), including links to other sections of the same document or to other documents. The links are generally provided as URLs, and can be in relative or absolute form. Relative URLs simply omit the parts of the URL which are the same as for the document including the link, such as the address of the document (when linking to the same document), etc. In general, a browser program will fill in missing parts of a URL using the corresponding parts from the current document, thereby forming a fully formed URL including a fully qualified domain name, etc.

A hypertext document may contain any number of links to other documents, and each of those other documents may be on a different server in a different part of the world. For example, a document may contain links to documents in Russia, Africa, China and Australia. A user viewing that document at a particular client can follow any of the links transparently (i.e., without knowing where the document being linked to actually resides). Accordingly, the cost (in terms of time or money or resource allocation) of following one link versus another may be quite significant.

URLs generally have the following form (defined in detail in T. Berners-Lee et al, *Uniform Resource Locators (URL)*, Network Working Group, Request for Comments: 1738,

Category: Standards Track, December 1994, located at "http://ds.internic.net/rfc/rfc1738.txt", which is hereby incorporated herein by reference):

scheme://host[:port]/url-path

where "scheme" can be a symbol such as "*file*" (for a file on the local system), "*ftp*" (for a file on an anonymous FTP file server), "*http*" (for a file on a file on a Web server),and "*telnet*" (for a connection to a Telnet-based service). Other schemes, can also be used and new schemes are added every now and then. The port number is optional, the system substituting a default port number (depending on the scheme) if none is provided. The "host" field maps to a particular network address for a particular computer. The "url-path" is relative to the computer specified in the "host" field. A url-path is typically, but not necessarily, the pathname of a file in a web server directory.

For example, the following is a URL identifying a file "F" in the path "A/B/C" on a computer at "*www.uspto.gov*":

http://www.uspto.gov/A/B/C/F

In order to access the file "F" (the resource) specified by the above URL, a program (e.g., a browser) running on a user's computer (i.e., a client computer) would have to first locate the computer (i.e., a server computer) specified by the host name. I.e., the program would have to locate the server "*www.uspto.gov*". To do this, it would access a Domain Name Server (DNS), providing the DNS with the host name ("*www.uspto.gov*"). The DNS acts as a kind of centralized directory for resolving addresses from names. If the DNS determines that there is a (remote server) computer corresponding to the name "*www.uspto.gov*", it will provide the program with an actual computer network address for that server computer. On the Internet this is called an Internet Protocol (or IP) address and it has the form "123.345.456.678". The program on the user's (client) computer would then use the actual address to access the remote (server) computer.

The program opens a connection to the HTTP server (Web server) on the remote computer "*www.uspto.gov*" and uses the connection to send a request message to the remote computer (using the HTTP scheme). The message is typically an HTTP GET request which includes the url-path of the requested resource, "A/B/C/F". The HTTP server receives the request and uses it to access the resource specified by the url-path "A/B/C/F". The server returns the resource over the same connection.

Thus, conventionally HTTP client requests for Web resources at an origin server **102** are processed as follows (see **FIGURE 2**) (This is a description of the process when no reflector **108** is installed.):

A1. A browser (e.g., Netscape's Navigator) at the client receives a resource identifier (i.e., a URL) from a user.

A2. The browser extracts the host (origin server) name from the resource identifier, and uses a domain name server (DNS) to look up the network (IP) address of the corresponding server. The browser also extracts a port number, if one is present, or uses a default port number (the default port number for http requests is 80).

A3. The browser uses the server's network address and port number to establish a connection between the client **106** and the host or origin server **102**.

A4. The client **106** then sends a (GET) request over the connection identifying the requested resource.

A5. The origin server **102** receives the request and

A6. locates or composes the corresponding resource.

A7. The origin server 102 then sends back to the client 106 a reply containing the requested resource (or some form of error indicator if the resource is unavailable). The reply is sent to the client over the same connection as that on which the request was received from the client.

A8. The client 106 receives the reply from the origin server 102.

There are many variations of this basic model. For example, in one variation, instead of providing the client with the resource, the origin server can tell the client to re-request the resource by another name. To do so, in A7 the server 102 sends back to the client 106 a reply called a "REDIRECT" which contains a new URL indicating the other name. The client 106 then repeats the entire sequence, normally without any user intervention, this time requesting the resource identified by the new URL.

System Operation

In this invention reflector 108 effectively takes the place of an ordinary Web server or origin server 102. The reflector 108 does this by taking over the origin server's IP address and port number. In this way, when a client tries to connect to the origin server 102, it will actually connect to the reflector 108. The original Web server (or origin server 102) must then accept requests at a different network (IP) address, or at the same IP address but on a different port number. Thus, using this invention, the server referred to in A3-A7 above is actually a reflector 108.

Note that it is also possible to leave the origin server's network address as it is and to let the reflector run at a different address or on a different port. In this way the reflector does not intercept requests sent to the origin server, but can still be sent requests addressed specifically to the reflector. Thus the system can be tested and configured without interrupting its normal operation.

The reflector 108 supports the processing as follows (see FIGURE 3):

upon receipt of a request,

B1 The reflector 108 analyzes the request to determine whether or not to reflect the request. To do this, first the reflector determines whether the sender (client 106) is a browser or a repeater. Requests issued by repeaters must be served locally by the origin server 102. This determination can be made by looking up the network (IP) address of the sender in a list of known repeater network (IP) addresses. Alternatively, this determination could be made by attaching information to a request to indicate that the request is from a specific repeater, or repeaters can request resources from a special port other than the one used for ordinary clients.

B2 If the request is not from a repeater, the reflector looks up the requested resource in a table (called the "rule base") to determine whether the resource requested is "repeatable". Based on this determination, the reflector either reflects the request (B3, described below) or serves the request locally (B4, described below).

The rule base is a list of regular expressions and associated attributes. (Regular expressions are well-known in the field of computer science. A small bibliography of their use is found in *Aho, et al.*, "Compilers, Principles, techniques and tools", Addison-Wesley, 1986, pp. 157-158.) The resource identifier (URL) for a given request is looked up in the rule base by matching it sequentially with each regular expression. The first match identifies the attributes for the resource, namely repeatable or local. If there is no match in the rule base, a default attribute is used. Each reflector has its own rule base, which is manually configured by the reflector operator.

B3. To reflect a request, (to serve a request locally go to B4), as shown in FIGURE 4, the reflector determines (B3-1) the best repeater to reflect the request to, as described in detail below. The reflector then creates (B3-2) a new resource identifier (URL) (using the requested URL and the best repeater) that identifies the same resource at the selected repeater.

It is necessary that the reflection step create a single URL containing the URL of the original resource, as well as the identity of the selected repeater. A special form of URL is created to provide this information. This is done by creating a new URL as follows:

D1. Given a repeater name, scheme, origin server name and path, create a new URL. If the scheme is "http", the preferred embodiment uses the following format:

http://<repeater>/<server>/<path>

If the form used is other than "http", the preferred embodiment uses the following format:

http://<repeater>/<server>@proxy=<scheme>@/<path>

The reflector can also attach a MIME type to the request, to cause the repeater to provide that MIME type with the result. This is useful because many protocols (such as FTP) do not provide a way to attach a MIME type to a resource. The format is

http://<repeater>/<server>@proxy=<scheme>;<type>@/<path>

This URL is interpreted when received by the repeater.

The reflector then sends (B3-3) a REDIRECT reply containing this new URL to the requesting client. The HTTP REDIRECT command allows the reflector to send the browser a single URL to retry the request.

B4. To serve a request locally, the request is sent by the reflector to ("forwarded to") the origin server 102. In this mode, the reflector acts as a reverse proxy server. The origin server 102 processes the request in the normal manner (A5-A7). The reflector then obtains the origin server's reply to the request which it inspects to determine if the requested resource is an HTML document, i.e., whether the requested resource is one which itself contains resource identifiers.

B5. If the resource is an HTML document then the reflector rewrites the HTML document by modifying resource identifiers (URLs) within it, as described below. The resource, possibly as modified by rewriting, is then returned in a reply to the requesting client 106.

If the requesting client is a repeater, the reflector may temporarily disable any cache-control modifiers which the origin server attached to the reply. These disabled cache-control modifiers are later re-enabled when the content is served from the repeater. This mechanism makes it possible for the origin server to prevent resources from being cached at normal proxy caches, without affecting the behavior of the cache at the repeater.

B6. Whether the request is reflected or handled locally, details about the transaction, such as the current time, the address of the requester, the URL requested, and the type of response generated, are written by the

reflector to a local log file.

By using a rule base (B2), it is possible to selectively reflect resources. There are a number of reasons that certain particular resources cannot be effectively repeated (and therefore should not be reflected), for instance:

- the resource is composed uniquely for each request;
- the resource relies on a so-called cookie (browsers will not send cookies to repeaters with different domain names);
- the resource is actually a program (such as a Java applet) that will run on the client and that wishes to connect to a service (Java requires that the service be running on the same machine that provided the applet).

In addition, the reflector **108** can be configured so that requests from certain network addresses (e.g., requests from clients on the same local area network as the reflector itself) are never reflected. Also, the reflector may choose not to reflect requests because the reflector is exceeding its committed aggregate information rate, as described below.

A request which is reflected is automatically mirrored at the repeater when the repeater receives and processes the request.

The combination of the reflection process described here and the caching process described below effectively creates a system in which repeatable resources are migrated to and mirrored at the selected reflector, while non-repeatable resources are not mirrored.

Alternate Approach

Placing the origin server name in the reflected URL is generally a good strategy, but it may be considered undesirable for aesthetic or (in the case, e.g., of cookies) certain technical reasons.

It is possible to avoid the need for placing both the repeater name and the server name in the URL. Instead, a "family" of names may be created for a given origin server, each name identifying one of the repeaters used by that server.

For instance, if www.example.com is the origin server, names for three repeaters might be created:

wr1.example.com
wr2.example.com
wr3.example.com

The name "wr1.example.com" would be an alias for repeater 1, which might also be known by other names such as "wr1.anotherExample.com" and "wr1.example.edu".

If the repeater can determine by which name it was addressed, it can use this information (along with a table that associates repeater alias names with origin server names) to determine which origin server is being addressed. For instance, if repeater 1 is addressed as wr1.example.com, then the origin server is "www.example.com"; if it is addressed as "wr1.anotherExample.com", then the origin server is "www.anotherExample.com".

The repeater can use two mechanisms to determine by which alias it is addressed:

1. Each alias can be associated with a different IP address. Unfortunately, this solution does not scale well, as IP addresses are currently scarce, and the number of IP addresses required grows as the product of origin servers and repeaters.
2. The repeater can attempt to determine the alias name used by inspecting the "host:" tag in the HTTP header of the request. Unfortunately, some old browsers still in use do not attach the "host:" tag to a request. Reflectors would need to identify such browsers (the browser identity is a part of each request) and avoid this form of reflection.

How a Repeater Handles a Request

When a browser receives a REDIRECT response (as produced in B3), it reissues

a request for the resource using the new resource identifier (URL) (A1-A5). Because the new identifier refers to a repeater instead of the origin server, the browser now sends a request for the resource to the repeater which processes a request as follows, with reference to FIGURE 5:

C1. First the repeater analyzes the request to determine the network address of the requesting client and the path of the resource requested. Included in the path is an origin server name (as described above with reference to B3).

C2. The repeater uses an internal table to verify that the origin server belongs to a known "subscriber". A subscriber is an entity (e.g., a company) that publishes resources (e.g., files) via one or more origin servers. When the entity subscribes, it is permitted to utilize the repeater network. The subscriber tables described below include the information that is used to link reflectors to subscribers.

If the request is not for a resource from a known subscriber, the request is rejected. To reject a request, the repeater returns a reply indicating that the requested resource does not exist.

C3. The repeater then determines whether the requested resource is cached locally. If the requested resource is in the repeater's cache it is retrieved. On the other hand, if a valid copy of the requested resource is not in the repeater's cache, the repeater modifies the incoming URL, creating a request that it issues directly to the originating reflector which processes it (as in B1-B6). Because this request to the originating reflector is from a repeater, the reflector always returns the requested resource rather than reflecting the request. (Recall that reflectors always handle requests from repeaters locally.) If the repeater obtained the resource from the origin

server, the repeater then caches the resource locally.

If a resource is not cached locally, the cache can query its "peer caches" to see if one of them contains the resource, before or at the same time as requesting the resource from the reflector/origin server. If a peer cache responds positively in a limited period of time (preferably a small fraction of a second), the resource will be retrieved from the peer cache.

C4. The repeater then constructs a reply including the requested resource (which was retrieved from the cache or from the origin server) and sends that reply to the requesting client.

C5. Details about the transaction, such as the associated reflector, the current time, the address of the requester, the URL requested, and the type of response generated, are written to a local log file at the repeater.

Note that the bottom row of FIGURE 2 refers to an origin server, or a reflector, or a repeater, depending on what the URL in step A1 identifies.

Selecting the Best Repeater

If the reflector 108 determines that it will reflect the request, it must then select the best repeater to handle that request (as referred to in step B3-1). This selection is performed by the Best Repeater Selector (BRS) mechanism described here.

The goal of the BRS is to select, quickly and heuristically, an appropriate repeater for a given client given only the network address of the client. An appropriate repeater is one which is not too heavily loaded and which is not too far from the client in terms

of some measure of network distance. The mechanism used here relies on specific, compact, pre-computed data to make a fast decision. Other, dynamic solutions can also be used to select an appropriate repeater.

The BRS relies on three pre-computed tables, namely the Group Reduction Table, the Link Cost Table, and the Load Table. These three tables (described below) are computed off-line and downloaded to each reflector by its contact in the repeater network.

The Group Reduction Table places every network address into a group, with the goal that addresses in a group share relative costs, so that they would have the same best repeater under varying conditions (i.e., the BRS is invariant over the members of the group).

The Link Cost Table is a two dimensional matrix which specifies the current cost between each repeater and each group. Initially, the link cost between a repeater and a group is defined as the "normalized link cost" between the repeater and the group, as defined below. Over time, the table will be updated with measurements which more accurately reflect the relative cost of transmitting a file between the repeater and a member of the group. The format of the Link Cost Table is <Group ID> <Group ID> <link cost>, where the Group ID's are given as AS numbers.

The Load Table is a one dimensional table which identifies the current load at each repeater. Because repeaters may have different capacities, the load is a value that represents the ability of a given repeater to accept additional work. Each repeater sends its current load to a central master repeater at regular intervals, preferably at least approximately once a minute. The master repeater broadcasts the Load Table to each reflector in the network, via the contact repeater.

A reflector is provided entries in the Load Table only for repeaters which it is assigned to use. The assignment of repeaters to reflectors is performed centrally by a repeater network operator at the master repeater. This assignment makes it possible to modify the service level of a given reflector. For instance, a very active reflector may use

many repeaters, whereas a relatively inactive reflector may use few repeaters.

Tables may also be configured to provide selective repeater service to subscribers in other ways, e.g., for their clients in specific geographic regions, such as Europe or Asia.

Measuring Load

In the presently preferred embodiments, repeater load is measured in two dimensions, namely

1. requests received by the repeater per time interval *(RRPT)*, and
2. bytes sent by the repeater per time interval *(BSPT)*.

For each of these dimensions, a maximum *capacity* setting is set. The maximum capacity indicates the point at which the repeater is considered to be fully loaded. A higher RRPT capacity generally indicates a faster processor, whereas a higher BSPT capacity generally indicates a wider network pipe. This form of load measurement assumes that a given server is dedicated to the task of repeating.

Each repeater regularly calculates its *current* RRPT and BSPT, by accumulating the number of requests received and bytes sent over a short time interval. These measurements are used to determine the repeater's load in each of these dimensions. If a repeater's load exceeds its configured capacity, an alarm message is sent to the repeater network administrator.

The two current load components are combined into a single value indicating overall current load. Similarly, the two maximum capacity components are combined into a single value indicating overall maximum capacity. The components are combined as follows:

$$\text{current-load} = B \times \text{current RRPT} + (1 - B) \times \text{current BSPT}$$

$$\text{max-load} = B \times \text{max RRPT} + (1 - B) \times \text{max BSPT}$$

The factor B, a value between 0 and 1, allows the relative weights of RRPT and BSPT to be adjusted, which favors consideration of either processing power or

bandwidth.

The overall current load and overall maximum capacity values are periodically sent from each repeater to the master repeater, where they are aggregated in the Load Table, a table summarizing the overall load for all repeaters. Changes in the Load Table are distributed automatically to each reflector.

While the preferred embodiment uses a two-dimensional measure of repeater load, any other measure of load can be used.

Combining Link Costs and Load

The BRS computes the cost of servicing a given client from each eligible repeater. The cost is computed by combining the available capacity of the candidate repeater with the cost of the link between that repeater and the client. The link cost is computed by simply looking it up in the Link Cost table.

The cost is determined using the following formula:

$$threshold = K * max\text{-}load$$
$$capacity = max(\, max\text{-}load - current\text{-}load, \varepsilon \,)$$
$$capacity = min(\, capacity, threshold \,)$$
$$cost = link\text{-}cost * threshold \,/\, capacity$$

In this formula, ε is a very small number (epsilon) and K is a tuning factor initial set to 0.5. This formula causes the cost to a given repeater to be increased, at a rate defined by K, if its capacity falls below a configurable threshold.

Given the cost of each candidate repeater, the BRS selects all repeaters within a delta factor of the best score. From this set, the result is selected at random.

The delta factor prevents the BRS from repeatedly selecting a single repeater when scores are similar. It is generally required because available information about load

and link costs loses accuracy over time. This factor is tunable.

Best Repeater Selector (BRS)

The BRS operates as follows, with reference to FIGURE 6:

Given a client network address and the three tables described above

E1. Determine which group the client is in using the Group Reduction Table.

E2. For each repeater in the Link Cost Table and Load Table, determine that repeater's combined cost as follows:

E2a. Determine the maximum and current load on the repeater (using the Load Table).

E2b. Determine the link cost between the repeater and the client's group (using the Link Cost Table).

E2c. Determine the combined cost as described above.

E3. Select a small set of repeaters with the lowest cost.

E4. Select a random member from the set.

Preferably the results of the BRS processing are maintained in a local cache at the reflector 108. Thus, if the best repeater has recently been determined for a given client (i.e., for a given network address), that best repeater can be reused quickly without being re-determined. Since the calculation described above is based on statically, pre-computed tables, if the tables have not changed then there is no need to re-determine the best repeater.

Determining the Group Reduction and Link Cost Tables

The Group Reduction Table and Link Cost Table used in BRS processing are created and regularly updated by an independent procedure referred to herein as *NetMap*. The *NetMap* procedure is run by executing several phases (described below) as needed.

The term *Group* is used here to refers to an IP "address group".

The term *Repeater Group* refers to a Group that contains the IP address of a repeater.

The term *link cost* refers to a statically determined cost for transmitting data between two Groups. In a presently preferred implementation, this is the minimum of the sums of the costs of the links along each path between them. The link costs of primary concern here are link costs between a Group and a Repeater Group.

The term *relative link cost* refers to the link cost relative to other link costs for the same Group which is calculated by subtracting the minimum link cost from a Group to any Repeater Group from each of its link costs to a Repeater Group.

The term Cost Set refers to a set of Groups that are equivalent in regard to Best Repeater Selection. That is, given the information available, the same repeater would be selected for any of them.

The *NetMap* procedure first processes input files to create an internal database called the Group Registry. These input files describe groups, the IP addresses within groups, and links between groups, and come a variety of sources, including publicly available Internet Routing Registry (IRR) databases, BGP router tables, and probe services that are located at various points around the Internet and use publicly available tools (such as "traceroute") to sample data paths. Once this processing is complete, the Group Registry contains essential information used for further processing, namely (1) the identity of each group, (2) the set of IP addresses in a given group, (3) the presence of links between groups indicating paths over which information may travel, and (4) the

cost of sending data over a given link.

The following processes are then performed on the Group Registry file.

Calculate Repeater Group link costs

The *NetMap* procedure calculates a "link cost" for transmission of data between each Repeater Group and each Group in the Group Registry. This overall link cost is defined as the minimum cost of any path between the two groups, where the cost of a path is equal to the sum of the costs of the individual links in the path. The link cost algorithm presented below is essentially the same as algorithm #562 from ACM journal Transactions on Mathematical Software: "Shortest Path From a Specific Node to All Other Nodes in a Network" by U. Pape, ACM TOMS 6 (1980) pp. 450-455, http://www.netlib.org/toms/562.

In this processing, the term Repeater Group refers to a Group that contains the IP address of a repeater. A group is a neighbor of another group if the Group Registry indicates that there is a link between the two groups.

For each target Repeater Group **T**:

- Initialize the link cost between **T** and itself to zero.
- Initialize the link cost between **T** and every other Group to infinity.
- Create a list **L** that will contain Groups that are equidistant from the target Repeater Group **T**.
- Initialize the list **L** to contain just the target Repeater Group **T** itself.
- While the list **L** is not empty:
    - Create an empty list **L'** of neighbors of members of the list **L**.
    - For each Group **G** in the list **L**:
        - For each Group **N** that is a neighbor of **G**:
            - Let cost refer to the sum of the link cost between **T** and **G**, and the link cost between **G** and **N**.

The cost between T and G was determined in the previous pass of the algorithm; the link cost between G and N is from the Group Registry.

- If cost is less than the link cost between T and N:
  - Set the link cost between T and N to cost.
  - Add N to L' if it is not already on it.

- Set L to L'.

Calculate Cost Sets

A Cost Set is a set of Groups that are equivalent with respect to Best Repeater Selection. That is, given the information available, the same repeater would be selected for any of them.

The "cost profile" of a Group G is defined herein as the set of costs between G and each Repeater. Two cost profiles are said to be equivalent if the values in one profile differ from the corresponding values in the other profile by a constant amount.

Once a client Group is known, the Best Repeater Selection algorithm relies on the cost profile for information about the Group. If two cost profiles are equivalent, the BRS algorithm would select the same repeater given either profile.

A Cost Set is then a set of groups that have equivalent cost profiles.

The effectiveness of this method can be seen, for example, in the case where all paths to a Repeater from some Group A pass through some other Group B. The two Groups have equivalent cost profiles (and are therefore in the same Cost Set) since whatever Repeater is best for Group A is also going to be best for Group B, regardless of what path is taken between the two Groups.

By normalizing cost profiles, equivalent cost profiles can be made identical. A normalized cost profile is a cost profile in which the minimum cost has the value zero. A normalized cost profile is computed by finding the minimum cost in the profile, and subtracting that value from each cost in the profile.

Cost Sets are then computed using the following algorithm:

- For each Group G:
  - Calculate the normalized cost profile for G
  - Look for a Cost Set with the same normalized cost profile.
  - If such as set is found, add G to the existing Cost Set;
  - otherwise, create a new Cost Set with the calculated normalized cost profile, containing only G.

The algorithm for finding Cost Sets employs a hash table to reduce the time necessary to determine whether the desired Cost Set already exists. The hash table uses a hash value computed from cost profile of G.

Each Cost Set is then numbered with a unique Cost Sent Index number. Cost Sets are then used in a straightforward manner to generate the Link Cost Table, which gives the cost from each Cost Set to each Repeater.

As described below, the Group Reduction Table maps every IP address to one of these Cost Sets.

Build IP Map

The IP Map is a sorted list of records which map IP address ranges to Link Cost Table keys. The format of the IP map is:

<base IP address> <max IP address> <Link Cost Table key>

where IP addresses are presently represented by 32-bit integers. The entries are sorted by descending base address, and by ascending maximum address among equal base addresses, and by ascending Link Cost Table key among equal base addresses and maximum addresses. Note that ranges may overlap.

The *NetMap* procedure generates an intermediate IP map containing a map between IP address ranges and Cost Set numbers as follows:

- For each Cost Set S:
    - For each Group G in S:
        - For each IP address range in G:
            - Add a triple (low address, high address, Cost Set number of S) to the IP map.

The IP map file is then sorted by descending base address, and by ascending maximum address among equal base addresses, and by ascending Cost Set number among equal base addresses and maximum addresses. The sort order for the base address and maximum address minimizes the time to build the Group Reduction Table and produces the proper results for overlapping entries.

Finally, the *NetMap* procedure creates the Group Reduction Table by processing the sorted IP map. The Group Reduction Table maps IP addresses (specified by ranges) into Cost Set numbers. Special processing of the IP map file is required in order to detect overlapping address ranges, and to merge adjacent address ranges in order to minimize the size of the Group Reduction Table.

An ordered list of address range segments is maintained, each segment consisting of a base address **B** and a Cost Set number **N**, sorted by base address **B**. (The maximum address of a segment is the base address of the next segment minus one.)

The following algorithm is used:

- Initialize the list with the elements [-infinity, NOGROUP], [+infinity, NOGROUP].
    - For each entry in the IP map, in sorted order, consisting of (b, m, s),
        - Insert (b, m, s) in the list (recall that IP map entries are of the form (low address, high address Cost Set number of S))
    - For each reserved LAN address range (b, m):

Insert (b, m, LOCAL) in the list.

- For each Repeater at address a:

  Insert (a, a, REPEATER) in the list.

- For each segment S in the ordered list:
  - Merge S with following segments with the same Cost Set
  - Create a Group Reduction Table entry with base address from the base address of S,
    - max address = next segment's base – 1,
    - group ID = Cost Set number of S.

A reserved LAN address range is an address range reserved for use by LANs which should not appear as a global Internet address. LOCAL is a special Cost Set index different from all others, indicating that the range maps to a client which should never be reflected. REPEATER is a special Cost Set index different from all others, indicating that the address range maps to a repeater. NOGROUP is a special Cost Set index different from all others, indicating that this range of addresses has no known mapping.

Given (B, M, N), insert an entry in the ordered address list as follows:
Find the last segment (AB, AN) for which AB is less than or equal to B.
If AB is less than B, insert a new segment (B, N) after (AB, AN).
Find the last segment (YB, YN) for which YB is less than or equal to M.
Replace by (XB, N) any segment (XB, NOGROUP) for which XB is greater than B and less than YB.
If YN is not N, and either YN is NOGROUP or YB is less than or equal to B,
    Let (ZB, ZN) be the segment following (YB, YN).
    If M+1 is less than ZB, insert a new segment (M+1, YN)
        before (ZB, ZN).

Replace (YB, YN) by (YB, N).

Rewriting HTML Resources

As explained above with reference to FIGURE 3 (B5), when a reflector or repeater serves a resource which itself includes resource identifiers (e.g., a HTML resource), that resource is modified (rewritten) to pre-reflect resource identifiers (URLs) of repeatable resources that appear in the resource. Rewriting ensures that when a browser requests repeatable resources identified by the requested resource, it gets them from a repeater without going back to the origin server, but when it requests non-repeatable resources identified by the requested resource, it will go directly to the origin server. Without this optimization, the browser would either make all requests at the origin server (increasing traffic at the origin server and necessitating far more redirections from the origin server), or it would make all requests at the repeater (causing the repeater to redundantly request and copy resources which could not be cached, increasing the overhead of serving such resources).

Rewriting requires that a repeater has been selected (as described above with reference to the Best Repeater Selector). Rewriting uses a so-called BASE directive. The BASE directive lets the HTML identify a different base server. (The base address is normally the address of the HTML resource.)

Rewriting is performed as follows:

F1. A BASE directive is added at the beginning of the HTML resource, or modified where necessary. Normally, a browser interprets relative URLs as being relative to the default base address, namely, the URL of the HTML resource (page) in which they are encountered. The BASE address added specifies the resource at the reflector which originally served the resource. This means that unprocessed relative URLs (such as

those generated by Javascript™ programs) will be interpreted as relative to the reflector. Without this BASE address, browsers would combine relative addresses with repeater names to create URLs which were not in the form required by repeaters (as described above in step D1).

F2. The rewriter identifies directives, such as embedded images and anchors, containing URLs. If the rewriter is running in a reflector, it must parse the HTML file to identify these directives.
If it is running in a repeater, the rewriter may have access to pre-computed information that identifies the location of each URL (placed in the HTML file in step F4).

F3. For each URL encountered in the resource to be re-written, the rewriter must determine whether the URL is repeatable (as in steps B1-B2). If the URL is not repeatable, it is not modified. On the other hand, if the URL is repeatable, it is modified to refer to the selected repeater.

F4. After all URLs have been identified and modified, if the resource is being served to a repeater, a table is appended at the beginning of the resource that identifies the location and content of each URL encountered in the resource. (This step is an optimization which eliminates the need for parsing HTML resources at the repeater.)

F5. Once all changes have been identified, a new length is computed for the resource (page). The length is inserted in the HTTP header prior to serving the resource.

An extension of HTML, known as XML, is currently being developed. The

process of rewriting URLs will be similar for XML, with some differences in the mechanism that parses the resource and identifies embedded URLs.

Handling Non-HTTP Protocols

This invention makes it possible to reflect references to resources that are served by protocols other than HTTP, for instance, the File Transfer Protocol (FTP) and audio/video stream protocols. However, many protocols do not provide the ability to redirect requests. It is, however, possible to redirect references before requests are actually made by rewriting URLs embedded in HTML pages. The following modifications to the above algorithms are used to support this capability.

In F4, the rewriter rewrites URLs for servers if those servers appear in a configurable table of cooperating origin server or so-called co-servers. The reflector operator can define this table to include FTP servers and other servers. A rewritten URL that refers to a non-HTTP resource takes the form:

http://<repeater>/<origin server>@proxy=<scheme>[:<type>]@/resource

where <scheme> is a supported protocol name such as "ftp". This URL format is an alternative to the form shown in B3.

In C3, the repeater looks for a protocol embedded in the arriving request. If a protocol is present and the requested resource is not already cached, the repeater uses the selected protocol instead of the default HTTP protocol to request the resource when serving it and storing it in the cache.

System Configuration and Management

In addition to the processing described above, the repeater network requires various mechanisms for system configuration and network management. Some of these mechanisms are described here.

Reflectors allow their operators to synchronize repeater caches by performing publishing operations. The process of keeping repeater caches synchronized is described below. Publishing indicates that a resource or collection of resources has changed.

Repeaters and reflectors participate in various types of log processing. The results of logs collected at repeaters are collected and merged with logs collected at reflectors, as described below.

Adding Subscribers to the Repeater Network

When a new subscriber is added to the network, information about the subscriber is entered in a Subscriber Table at the master repeater and propagated to all repeaters in the network. This information includes the *Committed Aggregate Information Rate* (CAIR) for servers belonging to the subscriber, and a list of the repeaters that may be used by servers belonging to the subscriber.

Adding Reflectors to the Repeater Network

When a new reflector is added to the network, it simply connects to and announces itself to a contact repeater, preferably using a securely encrypted certificate including the repeater's subscriber identifier.

The contact repeater determines whether the reflector network address is permitted for this subscriber. If it is, the contact repeater accepts the connection and updates the reflector with all necessary tables (using version numbers to determine which tables are out of date).

The reflector processes requests during this time, but is not "enabled" (allowed to reflect requests) until all of its tables are current.

Keeping Repeater Caches Synchronized

Repeater caches are coherent, in the sense that when a change to a resource is identified by a reflector, all repeater caches are notified, and accept the change in a single transaction.

Only the identifier of the changed resource (and not the entire resource) is transmitted to the repeaters; the identifier is used to effectively invalidate the corresponding cached resource at the repeater. This process is far more efficient than broadcasting the content of the changed resource to each repeater.

A repeater will load the newly modified resource the next time it is requested.

A resource change is identified at the reflector either manually by the operator, or through a script when files are installed on the server, or automatically through a change detection mechanism (e.g., a separate process that checks regularly for changes).

A resource change causes the reflector to send an "invalidate" message to its contact repeater, which forwards the message to the master repeater. The invalidate message contains a list of resource identifiers (or regular expressions identifying patterns of resource identifiers) that have changed. (Regular expressions are used to invalidate a directory or an entire server.) The repeater network uses a two-phase commit process to ensure that all repeaters correctly invalidate a given resource.

The invalidation process operates as follows:

The master broadcasts a "phase 1" invalidation request to all repeaters indicating the resources and regular expressions describing sets of resources to be invalidated.

When each repeater receives the phase 1 message, it first places the resource identifiers or regular expressions into a list of resource identifiers pending invalidation.

Any resource requested (in C3) that is in the pending invalidation list may not be served from the cache. This prevents the cache from requesting the resource from a peer cache which may not have received an invalidation notice. Were it to request a resource in this manner, it might replace the newly invalidated resource by the same, now stale, data.

The repeater then compares the resource identifier of each resource in its cache against the resource identifiers and regular expressions in the list.

Each match is invalidated by marking it stale and optionally removing it from the cache. This means that a future request for the resource will cause it to retrieve a new copy of the resource from the reflector.

When the repeater has completed the invalidation, it returns an acknowledgment to the master. The master waits until all repeaters have acknowledged the invalidation request.

If a repeater fails to acknowledge within a given period, it is disconnected from the master repeater. When it reconnects, it will be told to flush its entire cache, which will eliminate any consistency problem. (To avoid flushing the entire cache, the master could keep a log of all invalidations performed, sorted by date, and flush only files invalidated since the last time the reconnecting repeater successfully completed an invalidation. In the presently preferred embodiments this is not done since it is believed that repeaters will seldom disconnect.)

When all repeaters have acknowledged invalidation (or timed out) the repeater broadcasts a "phase 2" invalidation request to all repeaters. This causes the repeaters to remove the corresponding resource identifiers and regular expressions from the list of resource identifiers pending invalidation.

In another embodiment, the invalidation request will be extended to allow a "server push". In such requests, after phase 2 of the invalidation process has completed, the repeater receiving the invalidation request will immediately request a new copy of the invalidated resource to place in its cache.

Logs and Log Processing

Web server activity logs are fundamental to monitoring the activity in a Web site. This invention creates "merged logs" that combine the activity at reflectors with the

activity at repeaters, so that a single activity log appears at the origin server showing all Web resource requests made on behalf of that site at any repeater.

This merged log can be processed by standard processing tools, as if it had been generated locally.

On a periodic basis, the master repeater (or its delegate) collects logs from each repeater. The logs collected are merged, sorted by reflector identifier and timestamp, and stored in a dated file on a per-reflector basis. The merged log for a given reflector represents the activity of all repeaters on behalf of that reflector. On a periodic basis, as configured by the reflector operator, a reflector contacts the master repeater to request its merged logs. It downloads these and merges them with its locally maintained logs, sorting by timestamp. The result is a merged log that represents all activity on behalf of repeaters and the given reflector.

Activity logs are optionally extended with information important to the repeater network, if the reflector is configured to do so by the reflector operator. In particular, an "extended status code" indicates information about each request, such as:

1. request was served by a reflector locally;
2. request was reflected to a repeater;*
3. request was served by a reflector to a repeater;*
4. request for non-repeatable resource was served by repeater;*
5. request was served by a repeater from the cache;
6. request was served by a repeater after filling cache;
7. request pending invalidation was served by a repeater.

(The activities marked with "*" represent intermediate states of a request and do not normally appear in a final activity log.)

In addition, activity logs contain a duration, and extended precision timestamps. The duration makes it possible to analyze the time required to serve a resource, the bandwidth used, the number of requests handled in parallel at a given time, and other quite useful information. The extended precision timestamp makes it possible to

accurately merge activity logs.

Repeaters use the Network Time Protocol (NTP) to maintain synchronized clocks. Reflectors may either use NTP or calculate a time bias to provide roughly accurate timestamps relative to their contact repeater.

Enforcing Committed Aggregate Information Rate

The repeater network monitors and limits the aggregate rate at which data is served on behalf of a given subscriber by all repeaters. This mechanism provides the following benefits:

1. provides a means of pricing repeater service;
2. provides a means for estimating and reserving capacity at repeaters;
3. provides a means for preventing clients of a busy site from limiting access to other sites.

For each subscriber, a "threshold aggregate information rate" (TAIR) is configured and maintained at the master repeater. This threshold is not necessarily the committed rate, it may be a multiple of committed rate, based on a pricing policy.

Each repeater measures the information rate component of each reflector for which it serves resources, periodically (typically about once a minute), by recording the number of bytes transmitted on behalf of that reflector each time a request is delivered. The table thus created is sent to the master repeater once per period. The master repeater combines the tables from each repeater, summing the measured information of each reflector over all repeaters that serve resources for that reflector, to determine the "measured aggregate information rate" (MAIR) for each reflector.

If the MAIR for a given reflector is greater than the TAIR for that reflector, the MAIR is transmitted by the master to all repeaters and to the respective reflector.

When a reflector receives a request, it determines whether its most recently calculated MAIR is greater than its TAIR. If this is the case, the reflector

probabilistically decides whether to suppress reflection, by serving the request locally (in B2). The probability of suppressing the reflection increases as an exponential function of the difference between the MAIR and the CAIR.

Serving a request locally during a peak period may strain the local origin server, but it prevents this subscriber from taking more than allocated bandwidth from the shared repeater network.

When a repeater receives a request for a given subscriber (in C2), it determines whether the subscriber is running near its threshold aggregate information rate. If this is the case, it probabilistically decides whether to reduce its load by redirecting the request back to the reflector. The probability increases exponentially as the reflector's aggregate information rate approaches its limit.

If a request is reflected back to a reflector, a special character string is attached to the resource identifier so that the receiving reflector will not attempt to reflect it again. In the current system, this string has the form

"src=overload".

The reflector tests for this string in B2.

The mechanism for limiting Aggregate Information Rate described above is fairly coarse. It limits at the level of sessions with clients (since once a client has been reflected to a given repeater, the rewriting process tends to keep the client coming back to that repeater) and, at best, individual requests for resources. A more fine-grained mechanism for enforcing TAIR limits within repeaters operates by reducing the bandwidth consumption of a busy subscriber when other subscribers are competing for bandwidth.

The fine-grained mechanism is a form of data "rate shaping". It extends the mechanism that copies resource data to a connection when a reply is being sent to a client. When an output channel is established at the time a request is received, the repeater identifies which subscriber the channel is operating for, in C2, and records the subscriber in a data field associated with the channel. Each time a "write" operation is

about to be made to the channel, the Metered Output Stream first inspects the current values of the MAIR and TAIR, calculated above, for the given subscriber. If the MAIR is larger than the TAIR, then the mechanism pauses briefly before performing the write operation. The length of the pause is proportional to the amount the MAIR exceeds the TAIR. The pause ensures that tasks sending other resources to other clients, perhaps on behalf of other subscribers, will have an opportunity to send their data.

Repeater Network Resilience

The repeater network is capable of recovering when a repeater or network connection fails.

A repeater cannot operate unless it is connected to the master repeater. The master repeater exchanges critical information with other repeaters, including information about repeater load, aggregate information rate, subscribers, and link cost.

If a master fails, a "succession" process ensures that another repeater will take over the role of master, and the network as a whole will remain operational. If a master fails, or a connection to a master fails through a network problem, any repeater attempting to communicate with the master will detect the failure, either through an indication from TCP/IP, or by timing out from a regular "heartbeat" message it sends to the master.

When any repeater is disconnected from its master, it immediately tries to reconnect to a series of potential masters based on a configurable file called its "succession list".

The repeater tries each system on the list in succession until it successfully connects to a master. If in this process, it comes to its own name, it takes on the role of master, and accepts connections from other repeaters. If a repeater which is not at the top of the list becomes the master, it is called the "temporary master".

A network partition may cause two groups of repeaters each to elect a master. When the partition is corrected, it is necessary that the more senior master take over the

network. Therefore, when a repeater is temporary master, it regularly tries to reconnect to any master above it in the succession list. If it succeeds, it immediately disconnects from all of the repeaters connected to it. When they retry their succession lists, they will connect to the more senior master repeater.

To prevent losses of data, a temporary master does not accept configuration changes and does not process log files. In order to take on these tasks, it must be informed that it is primary master by manual modification of its successor list. Each repeater regularly reloads its successor list to determine whether it should change its idea of who the master is.

If a repeater is disconnected from the master, it must resynchronize its cache when it reconnects to the master. The master can maintain a list of recent cache invalidations and send to the repeater any invalidations it was not able to process while disconnected. If this list is not available for some reason (for instance, because the reflector has been disconnected too long), the reflector must invalidate its entire cache.

A reflector is not permitted to reflect requests unless it is connected to a repeater. The reflector relies on its contact repeater for critical information, such as load and Link Cost Tables, and current aggregate information rate. A reflector that is not connected to a repeater can continue to receive requests and handle them locally.

If a reflector loses its connection with a repeater, due to a repeater failure or network outage, it continues to operate while it tries to connect to a repeater.

Each time a reflector attempts to connect to a repeater, it uses DNS to identify a set of candidate repeaters given a domain name that represents the repeater network. The reflector tries each repeater in this set until it makes a successful contact. Until a successful contact is made, the reflector serves all requests locally. When a reflector connects to a repeater, the repeater can tell it to attempt to contact a different repeater; this allows the repeater network to ensure that no individual repeater has too many contacts.

When contact is made, the reflector provides the version number of each of its tables to its contact repeater. The repeater then decides which tables should be updated and sends appropriate updates to the reflector. Once all tables have been updated, the repeater notifies the reflector that it may now start reflecting requests.

5

Using a Proxy Cache within a Repeater

Repeaters are intentionally designed so that any proxy cache can be used as a component within them. This is possible because the repeater receives HTTP requests and converts them to a form recognized by the proxy cache.

10 On the other hand, several modifications to a standard proxy cache have been or may be made as optimizations. This includes, in particular, the ability to conveniently invalidate a resource, the ability to support cache quotas, and the ability to avoid making an extra copy of each resource as it passes from the proxy cache through the repeater to the requester.

15 In a preferred embodiment, a proxy cache is used to implement C3. The proxy cache is dedicated for use only by one or more repeaters. Each repeater requiring a resource from the proxy cache constructs a proxy request from the inbound resource request. A normal HTTP GET request to a server contains only the pathname part of the URL—the scheme and server name are implicit. (In an HTTP GET request to a 20 repeater, the pathname part of the URL includes the name of the origin server on behalf of which the request is being made, as described above.) However, a proxy agent GET request takes an entire URL. Therefore, the repeater must construct a proxy request containing the entire URL from the path portion of the URL it receives. Specifically, if the incoming request takes the form:

25

GET / <origin server> / <path>

then the repeater constructs a proxy request of the form:

GET http://<origin server>/<path>

and if the incoming request takes the form:

GET <origin server>@proxy=<scheme>:<type>@/<path>

then the repeater constructs a proxy request of the form:

GET <scheme>://<origin server>/<path>

Cache Control

HTTP replies contain directives called cache control directives, which are used to indicate to a cache whether the attached resource may be cached and if so, when it should expire. A Web site administrator configures the Web site to attach appropriate directives. Often, the administrator will not know how long a page will be fresh, and must define a short expiration time to try to prevent caches from serving stale data. In many cases, a Web site operator will indicate a short expiration time only in order to receive the requests (or hits) that would otherwise be masked by the presence of a cache. This is known in the industry as "cache-busting". Although some cache operators may consider cache-busting to be impolite, advertisers who rely on this information may consider it imperative.

When a resource is stored in a repeater, its cache directives can be ignored by the repeater, because the repeater receives explicit invalidation events to determine when a resource is stale. When a proxy cache is used as the cache at the repeater, the associated cache directives may be temporarily disabled. However, they must be re-enabled when the resource is served from the cache to a client, in order to permit the cache-control policy (including any cache-busting) to take effect.

The present invention contains mechanisms to prevent the proxy cache within a repeater from honoring cache control directives, while permitting the directives to be served from the repeater.

When a reflector serves a resource to a repeater in B4, it replaces all cache directives by modified directives that are ignored by the repeater proxy cache. It does this by prefixing a distinctive string such as "wr-" to the beginning of the HTTP tag. Thus, "expires" becomes "wr-expires", and "cache-control" becomes "wr-cache-control". This prevents the proxy cache itself from honoring the directives. When a repeater serves a resource in C4, and the requesting client is not another repeater, it searches for HTTP tags beginning with "wr-" and removes the "wr-". This allows the clients retrieving the resource to honor the directives.

Resource Revalidation

There are several cases where a resource may be cached so long as the origin server is consulted each time it is served. In one case, the request for the resource is attached to a so-called "cookie". The origin server must be presented with the cookie to record the request and determine whether the cached resource may be served or not. In another case, the request for the resource is attached to an authentication header (which identifies the requester with a user id and password). Each new request for the resource must be tested at the origin server to assure that the requester is authorized to access the resource.

The HTTP 1.1 specification defines a reply header titled "Must-Revalidate" which allows an origin server to instruct a proxy cache to "revalidate" a resource each time a request is received. Normally, this mechanism is used to determine whether a resource is still fresh. In the present invention, Must-Revalidate makes it possible to ask an origin server to validate a request that is otherwise served from a repeater.

The reflector rule base contains information that determines which resources may be repeated but must be revalidated each time they are served. For each such resource, in B4, the reflector attaches a Must-Revalidate header. Each time a request comes to a repeater for a cached resource marked with a Must-Revalidate header, the request is forwarded to the reflector for validation prior to serving the requested resource.

Cache Quotas

The cache component of a repeater is shared among those subscribers that reflect clients to that repeater. In order to allow subscribers fair access to storage facilities, the cache may be extended to support quotas.

Normally, a proxy cache may be configured with a disk space threshold T. Whenever more than T bytes are stored in the cache, the cache attempts to find resources to eliminate.

Typically a cache uses the least-recently-used (LRU) algorithm to determine which resources to eliminate; more sophisticated caches use other algorithms. A cache may also support several threshold values—for instance, a lower threshold which, when reached, causes a low priority background process to remove items from the cache, and a higher threshold which, when reached, prevents resources from being cached until sufficient free disk space has been reclaimed.

If two subscribers A and B share a cache, and more resources of subscriber A are accessed during a period of time than resources of subscriber B, then fewer of B's resources will be in the cache when new requests arrive. It is possible that, due to the behavior of A, B's resources will never be cached when they are requested. In the present invention, this behavior is undesirable. To address this issue, the invention extends the cache at a repeater to support cache quotas.

The cache records the amount of space used by each subscriber in D_S, and supports a configurable threshold T_S for each subscriber.

Whenever a resource is added to the cache (at C3), the value D_S is updated for the subscriber providing the resource. If D_S is larger than T_S, the cache attempts to find resources to eliminate, from among those resources associated with subscriber S. The cache is effectively partitioned into separate areas for each subscriber.

The original threshold T is still supported. If the sum of reserved segments for each subscriber is smaller than the total space reserved in the cache, the remaining area is "common" and subject to competition among subscribers.

Note, this mechanism might be implemented by modifying the existing proxy cache discussed above, or it might also be implemented without modifying the proxy cache—if the proxy cache at least makes it possible for an external program to obtain a list of resources in the cache, and to remove a given resource from the cache.

Rewriting from Repeaters

When a repeater receives a request for a resource, its proxy cache may be configured to determine whether a peer cache contains the requested resource. If so, the proxy cache obtains the resource from the peer cache, which can be faster than obtaining it from the origin server (the reflector). However, a consequence of this is that rewritten HTML resources retrieved from the peer cache would identify the wrong repeater. Thus, to allow for cooperating proxy caches, resources are preferably rewritten at the repeater.

When a resource is rewritten for a repeater, a special tag is placed at the beginning of the resource. When constructing a reply, the repeater inspects the tag to determine whether the resource indicates that additional rewriting is necessary. If so, the repeater modifies the resource by replacing references to the old repeater with references to the new repeater.

It is only necessary to perform this rewriting when a resource is served to the proxy cache at another repeater.

Repeater-Side Include

Sometimes, an origin server constructs a custom resource for each request (for instance, when inserting an advertisement based on the history of the requesting client). In such a case, that resource must be served locally rather than repeated. Generally, a custom resource contains, along with the custom information, text and references to other, repeatable, resources.

The process that assembles a "page" from a text resource and possibly one or more image resources is performed by the Web browser, directed by HTML. However, it is not possible using HTML to cause a browser to assemble a page using text or directives from a separate resource. Therefore, custom resources often necessarily contain large amounts of static text that would otherwise be repeatable.

To resolve this potential inefficiency, repeaters recognize a special directive called a "repeater side include". This directive makes it possible for the repeater to assemble a custom resource, using a combination of repeatable and local resources. In this way, the static text can be made repeatable, and only the special directive need be served locally by the reflector.

For example, a resource X might consist of custom directives selecting an advertising banner, followed by a large text article. To make this resource repeatable, the Web site administrator must break out a second resource, Y, to select the banner. Resource X is modified to contain a repeater-side include directive identifying resource Y, along with the article. Resource Y is created and contains only the custom directives selecting an ad banner. Now resource X is repeatable, and only resource Y, which is relatively small, is not repeatable.

When a repeater constructs a reply, it determines whether the resource being served is an HTML resource, and if so, scans it for repeater-side include directives. Each such directive includes a URL, which the repeater resolves and substitutes in place of the directive. The entire resource must be assembled before it is served, in order to determine its final size, as the size is included in a reply header ahead of the resource.

Thus, a method and apparatus for dynamically replicating selected resources in computer networks is provided. One skilled in the art will appreciate that the present invention can be practiced by other than the described embodiments, which are presented for purposes of illustration and not limitation, and the present invention is limited only by the claims that follow.

What is claimed:

1. A method of processing resource requests in a computer network, the method comprising,

(i) by a client:

(A) making a request for a particular resource from an origin server, the request including a resource identifier for the particular resource;

(ii) by a reflector:

(B) intercepting the request from the client to the origin server;

(C) selecting a repeater to process the request;

(D) providing to the client a modified resource identifier designating the repeater;

(iii) by the client:

(E) receiving the modified resource identifier from the reflector; and

(F) making a request for the particular resource from the repeater designated in the modified resource identifier;

(iv) by the repeater:

(G) receiving the request from the client; and

(H) returning the requested resource to the client. 2. A method as in claim 1 further comprising, by the repeater:

(I) making a request for the resource from the origin server; and

(J) receiving the resource from the origin server.

3. A method as in claim 1 wherein the selecting of a repeater by the reflector comprises:

(C1) partitioning the network into groups;

(C2) determining which group the client is in;

(C3) selecting, from a plurality of repeaters in the network, a set of repeaters having a lowest cost relative to the group which the client is in; and

(C4) selecting as the repeater a member of the selected set of repeaters.

4. A method as in claim 3, wherein the cost of a repeater is a value based on that repeater's current load and a maximum load for that repeater.

5. A method as in claim 3, wherein the cost of a repeater is a value based on a predicted cost or speed of transmission between the repeater and a client in the group.

6. A method as in claim 1 wherein the particular resource itself contains at least one other resource identifier of at least one other resource, the method further comprising:

rewriting the particular resource to replace at least some of the resource identifiers contained therein with modified resource identifiers designating a repeater instead of the origin server.

7. A method as in claim 6 wherein the rewriting is performed by one of the repeater, the reflector or another repeater.

8. A method of processing resource requests in a computer network, the method comprising,

(i) by a client:

(A) making a request for a particular resource from an origin server, the request including a resource identifier for the particular resource;

(ii) by a reflector:

(B) intercepting the request from the client to the origin server;

(C) determining whether to reflect the request to a repeater;

(D) when the reflector determines not to reflect the request, forwarding the request to the origin server, otherwise

(D1) selecting a repeater to process the request;

(D2) providing to the client a modified resource identifier designating the repeater.

9. A method as in claim 8, further comprising, when the reflector determines to reflect the request,

(iii) by the client:

(E) receiving the modified resource identifier from the reflector; and

(F) making a request for the particular resource from the repeater designated in the modified resource identifier;

(iv) by the repeater:

(G) receiving the request from the client; and

(H) returning the requested resource to the client.

10. A method as in claim 8 wherein the reflector determines whether to reflect a request by comparing the resource identifier with regular expression patterns of repeatable resources.

11. A method as in claim 8, wherein the reflector has a threshold aggregate information rate (TAIR) associated therewith, and wherein the determining of whether to reflect the request to a repeater comprises:

determining whether the TAIR of the reflector is exceeded by a measured aggregate information rate (MAIR) for the reflector, wherein the reflector determines not to reflect the request when the MAIR exceeds the TAIR for the reflector.

12. A method as in claim 8, wherein the reflector has a threshold aggregate information rate (TAIR) associated therewith, and wherein the determining of whether to reflect the request to a repeater comprises:

probabilistically determining whether the TAIR of the reflector is exceeded by a measured aggregate information rate (MAIR) for the reflector, wherein the reflector determines not to reflect the request as an exponential function of the difference between the MAIR and the TAIR.

13. A method as in any of claims 11-12, wherein the MAIR is obtained from repeaters according to the rate at which they have transmitted data on behalf of the reflector during a given time interval.

14. A method as in any one of claims 1-12 wherein the network is the Internet and wherein the resource identifier is a uniform resource locator (URL) for designating resources on the Internet, and wherein the modified resource identifier is a URL designating the repeater and indicating the reflector or origin server, and wherein the modified resource identifier is provided to the client using a REDIRECT message.

15. In a computer network wherein clients request resources from origin servers, a method comprising:

providing at least one repeater;

providing reflectors at some of the origin servers, each reflector intercepting client resource requests made to its respective origin server; and

each reflector selectively redirecting client resource requests for certain resources to one of the repeaters.

16. A method as in claim 15 further comprising, by repeaters in the network:

servicing redirected client resource requests; and

selectively maintaining copies of requested resources,

whereby resources corresponding to redirected resource requests are selectively migrated from their origin servers to one or more repeaters.

17. A computer network comprising:

a plurality of origin servers, at least some of the origin servers having reflectors associated therewith;

a plurality of repeaters; and

a plurality of clients,

wherein each reflector is adapted to intercept resource requests made to its respective origin server and to selectively redirect the resource requests to a dynamically selected repeater.

18. In a computer network wherein clients request resources from origin servers, a reflector mechanism associated with an origin server, the reflector mechanism comprising:

means for intercepting a resource request made by client of an origin server;

means for analyzing the resource request to determine whether to service the request locally at the origin server;

means for determining a best repeater in the network to service the request when

the analyzing means determines that the request should not be serviced locally; and

means for redirecting the client to the best repeater.

19. A reflector mechanism as in claim 18 wherein the network is partitioned into groups and the means for determining the best repeater comprises:

means for determining which group the client is in;

means for selecting, from a plurality of repeaters in the network, a set of repeaters having a lowest cost relative to the group the client is in; and

means for selecting as the best repeater a member of the set of repeaters.

20. A reflector mechanism as in claim 19, wherein the cost of a repeater is a value based on a predicted cost or speed of transmission between the repeater and a client in the group.

21. A mechanism as in claim 19, wherein the cost of a repeater is a value based on that repeaters current load and a maximum load for that repeater.

22. A reflector as in claim 16 wherein the resource itself contains resource identifiers, the reflector further comprising:

means for rewriting the resource to replace at least some of the resource identifiers contained therein with modified resource identifiers designating the repeater instead of the origin server.

23. In a computer network wherein clients request resources from origin servers, a repeater mechanism comprising:

means for receiving a resource request from a client;

means for determining whether the resource is available locally;

means for, when it is determined that the resource is not available locally,

obtaining the resource from an origin server; and

means for providing the resource to the client.

24. A reflector as in claim 18 wherein the resource itself contains resource identifiers, the repeater further comprising:

means for rewriting the resource to replace at least some of the resource identifiers contained therein with modified resource identifiers designating the repeater instead of the origin server.

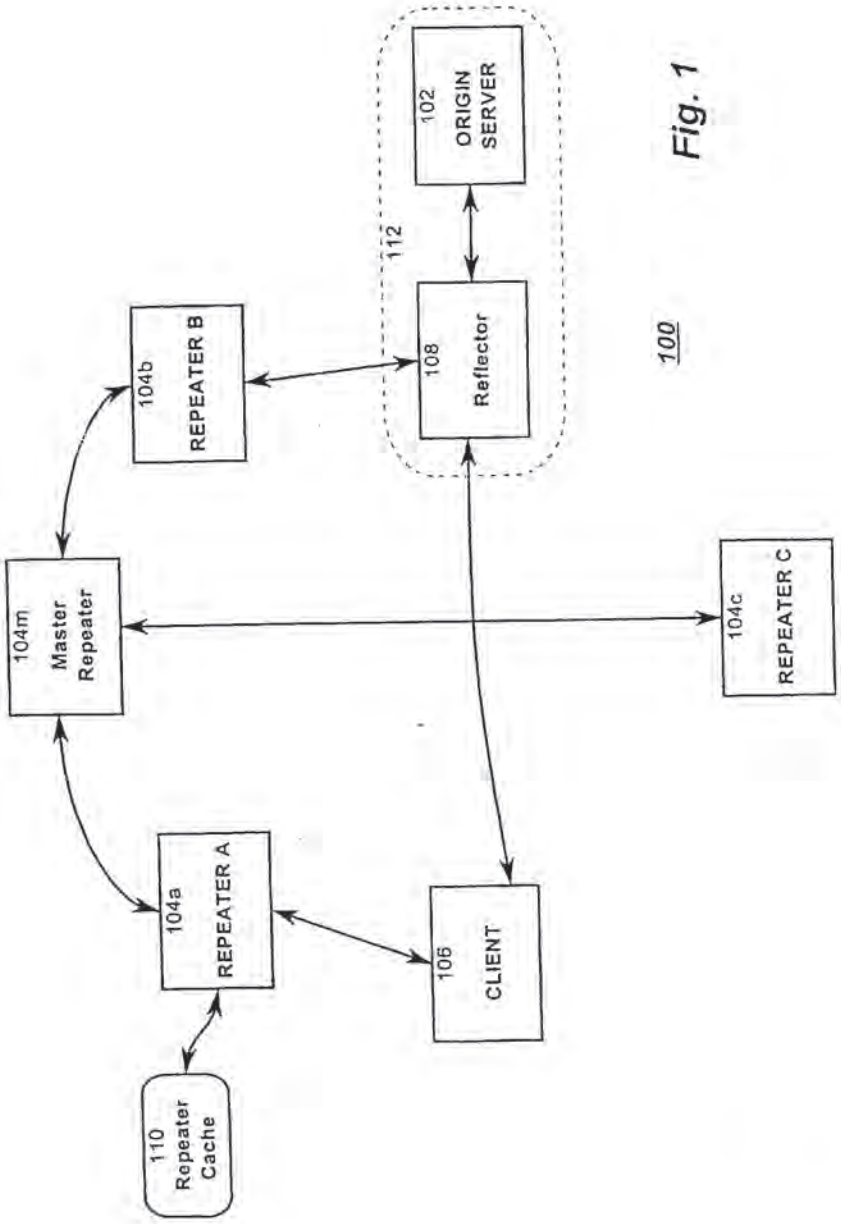

102
ORIGIN SERVER
112
104b
REPEATER B
108
Reflector
100
104m
Master Repeater
104c
REPEATER C
104a
REPEATER A
106
CLIENT
110
Repeater Cache

Fig. 1

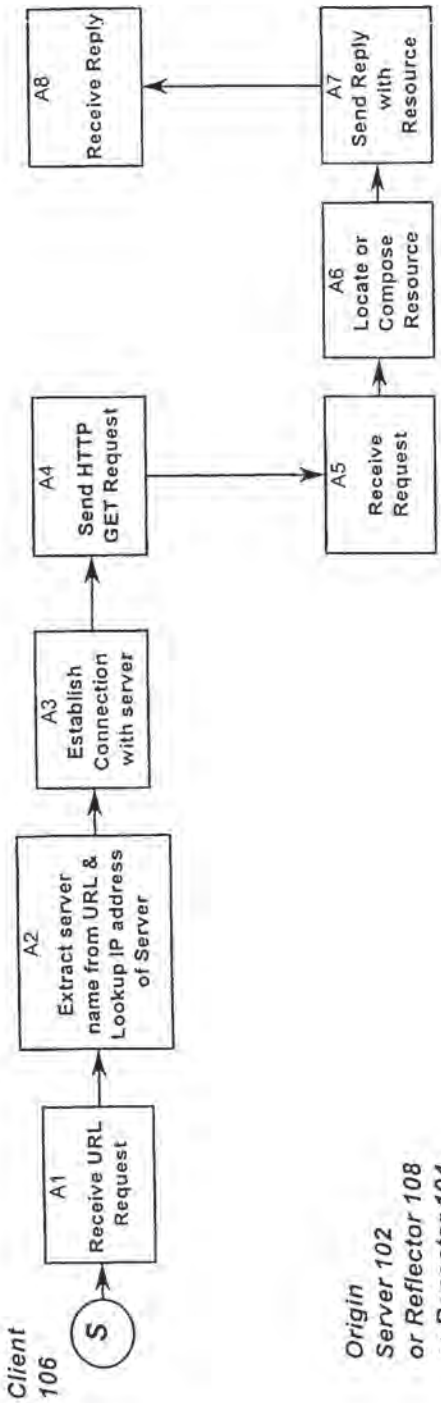

Client 106
S
A1 Receive URL Request
A2 Extract server name from URL & Lookup IP address of Server
A3 Establish Connection with server
A4 Send HTTP GET Request
A5 Receive Request
A6 Locate or Compose Resource
A7 Send Reply with Resource
A8 Receive Reply
Origin Server 102 or Reflector 108 or Repeater 104

Fig. 2

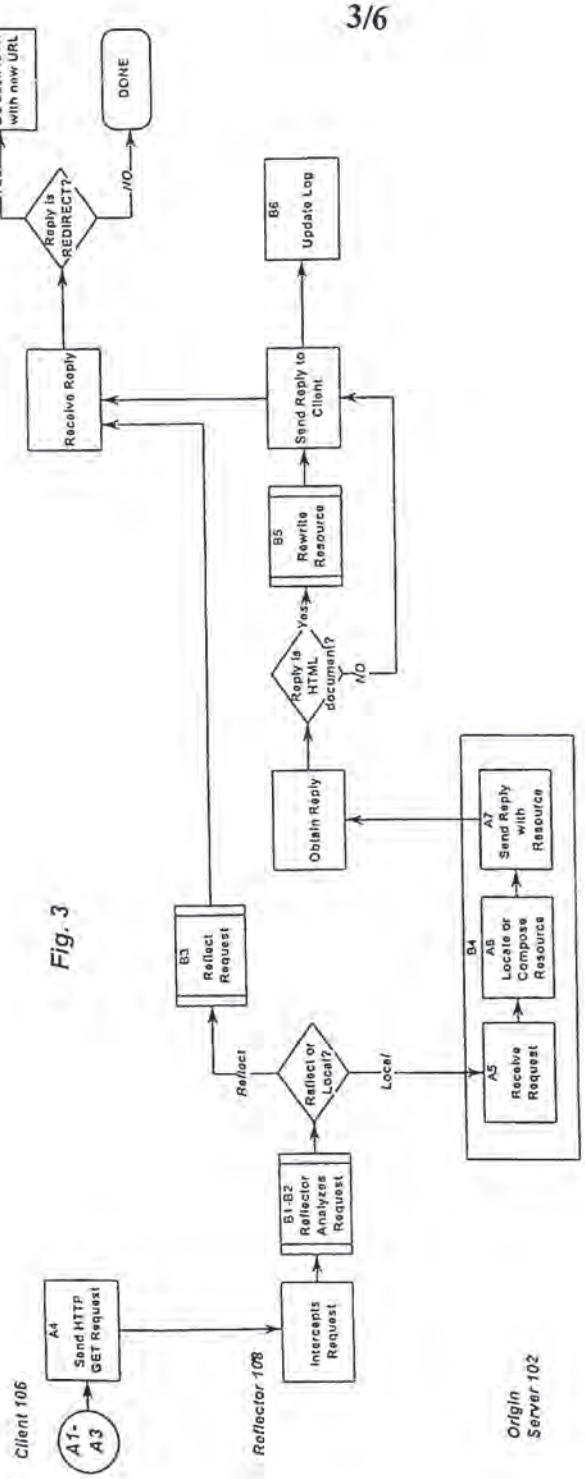

Client 106
A1-A3
A4 Send HTTP GET Request
Reflector 108
Intercepts Request
B1-B2 Reflector Analyzes Request
Reflect or Local?
Reflect
Local
B3 Reflect Request
Origin Server 102
A5 Receive Request
B4 A6 Locate or Compose Resource
A7 Send Reply with Resource
Obtain Reply
Reply is HTML document?
Yes
No
B5 Rewrite Resource
Send Reply to Client
B6 Update Log
Receive Reply
Reply is REDIRECT?
YES
NO
Go back to A1 with new URL
DONE

Fig. 3

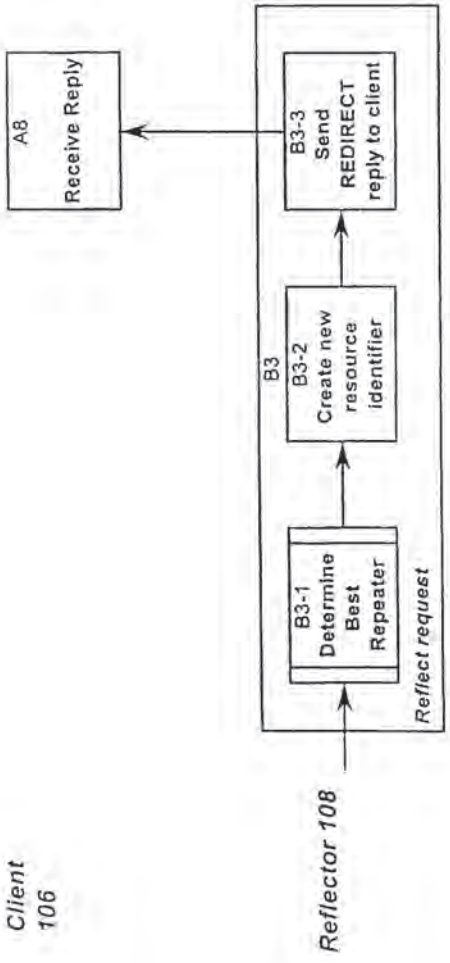

Client
106
Reflector 108
Reflect request
B3
B3-1
Determine
Best
Repeater
B3-2
Create new
resource
identifier
B3-3
Send
REDIRECT
reply to client
A8
Receive Reply

Fig. 4

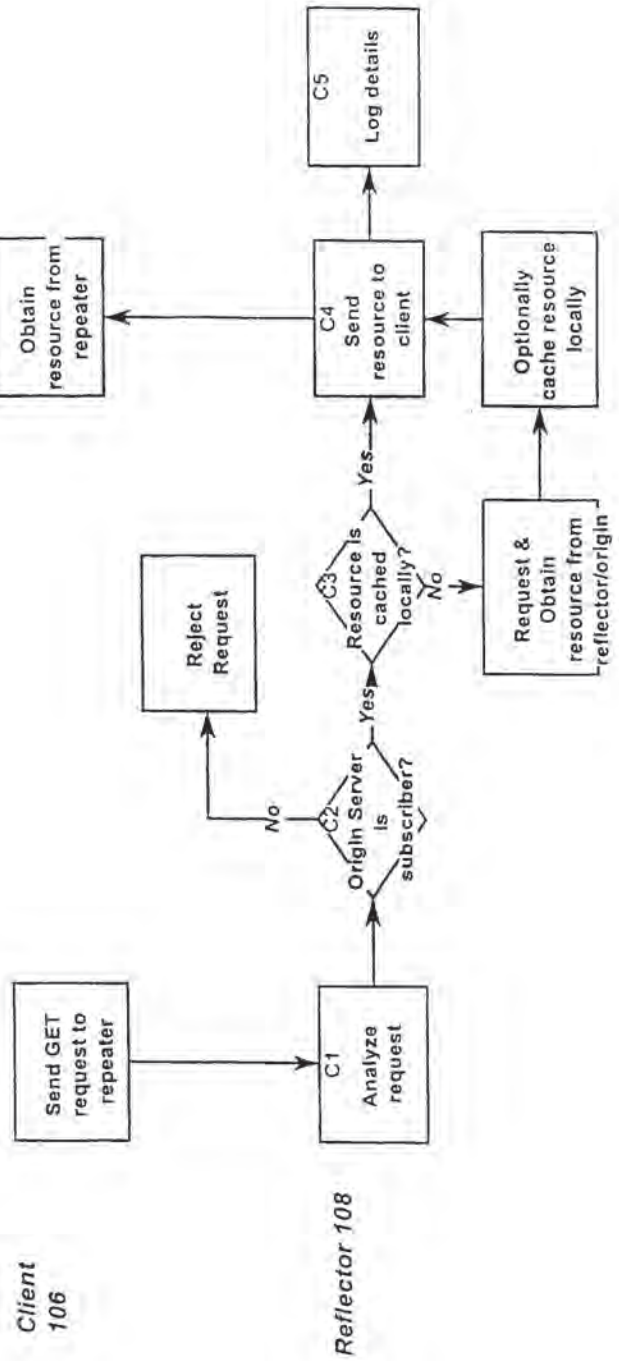

Client 106
Reflector 108
Send GET request to repeater
C1 Analyze request
C2 Origin Server Is subscriber?
No
Yes
Reject Request
C3 Resource is cached locally?
Yes
No
Request & Obtain resource from reflector/origin
Optionally cache resource locally
C4 Send resource to client
Obtain resource from repeater
C5 Log details

Fig. 5

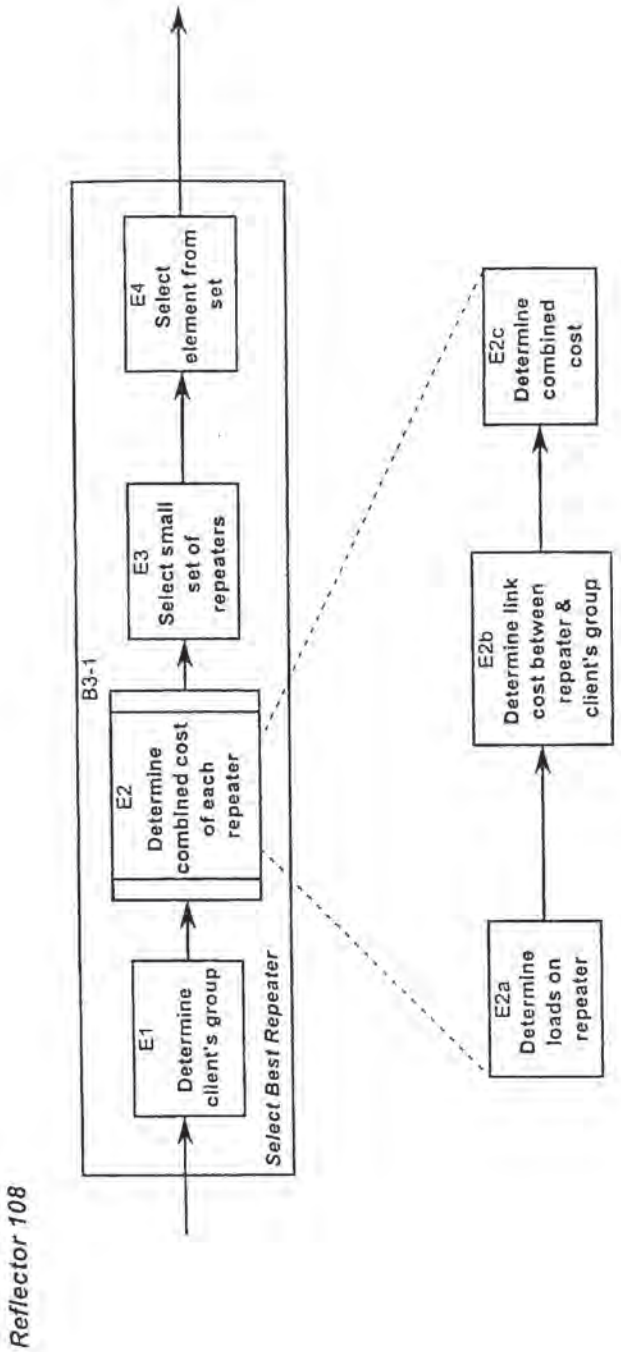

Reflector 108
Select Best Repeater
B3-1
E1
Determine client's group
E2
Determine combined cost of each repeater
E3
Select small set of repeaters
E4
Select element from set
E2a
Determine loads on repeater
E2b
Determine link cost between repeater & client's group
E2c
Determine combined cost

Fig. 6

INTERNATIONAL SEARCH REPORT

Inte onal Application No
PCT/US 99/01477

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 G06F9/46 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)
IPC 6 G06F 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)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y A	GB 2 281 793 A (IBM) 15 March 1995 see page 3, line 23 - page 5, line 26 see page 7, line 1 - page 10, line 12 see page 10, line 22 - page 13, line 19 --- -/--	1,14,18 24 3-13, 15-17, 19-22,24

[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

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"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
8 June 1999	14/06/1999

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	Michel, T

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IPR2025-01088 - Page 342

INTERNATIONAL SEARCH REPORT

Inter onal Application No
PCT/US 99/01477

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
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Y		24
A	see page 852, line 12 - line 36 see page 852, right-hand column, line 11 see page 853, left-hand column, line 31 - line 42	5,20
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A	WO 97 11429 A (INFONAUTICS CORP) 27 March 1997 see the whole document	1,6,14, 18,22

1

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Quicker Connections - Exhibit 2005
IPR2025-01088 - Page 343

INTERNATIONAL SEARCH REPORT

...ormation on patent family members

Interr nal Application No
PCT/US 99/01477

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		AU 7240396 A	09-04-1997

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#6
11-19-02

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FILE LOCATION 2FC1 SERIAL NUMBER 09824553 PATENT NUMBER

THE CORRESPONDENCE ADDRESS HAS BEEN CHANGED TO CUSTOMER # 21005

THE FEE ADDRESS HAS BEEN CHANGED TO CUSTOMER # 21005

ON 03/18/02 THE ADDRESS OF RECORD FOR CUSTOMER NUMBER 21005 IS:

HAMILTON, BROOK, SMITH & REYNOLDS, P.C.
530 VIRGINIA ROAD
P.O. BOX 9133
CONCORD MA 01742-9133

RECEIVED
NOV 13 2002
Technology Center 2600

PTO INSTRUCTIONS: PLEASE TAKE THE FOLLOWING ACTION WHEN THE CORRESPONDENCE ADDRESS HAS BEEN CHANGED TO CUSTOMER NUMBER: RECORD, ON THE NEXT AVAILABLE CONTENTS LINE OF THE FILE JACKET, 'ADDRESS CHANGE TO CUSTOMER NUMBER'. LINE THROUGH THE OLD ADDRESS ON THE FILE JACKET LABEL AND ENTER ONLY THE 'CUSTOMER NUMBER' AS THE NEW ADDRESS. FILE THIS LETTER IN THE FILE JACKET. WHEN ABOVE CHANGES ARE ONLY TO FEE ADDRESS AND/OR PRACTITIONERS OF RECORD, FILE LETTER IN THE FILE JACKET.
THIS FILE IS ASSIGNED TO GAU 2664.

PTO-FMD
TALBOT-1/97

::ODMA\MHODMA\iManage;298285;1
LRR/MBS/jas(rem/dc)
May 30, 2002

MB

#5 MF 6-13-02

PATENT APPLICATION
DOCKET NO.: 2762.2002-002

2661

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: Kirk Johnson, James O'Toole, M. Frans Kaashoek and John Jannotti

Application No.: 09/824,553 Group Art Unit: 2661

Filed: April 2, 2001 Examiner: Not yet assigned

Title: Method and Apparatus for Determining a Network Topology in the Presence of Network Address Translation

OIPE JC184 JUN 05 2002 PATENT & TRADEMARK OFFICE

RECEIVED
JUN 11 2002
Technology Center 2600

RECEIVED JUN 12 2002

CERTIFICATE OF MAILING
I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as First Class Mail in an envelope addressed to Assistant Commissioner for Patents, P.O. Box 2327, Arlington, VA 22202
on 5/30/02 (Date) J Simen (Signature)
Judith Simen
Typed or printed name of person signing certificate

INFORMATION DISCLOSURE STATEMENT

Assistant Commissioner for Patents
P.O. Box 2327
Arlington, VA 22202

Sir:

This Information Disclosure Statement is submitted:

[ ] under 37 CFR 1.129(a), or
(First/Second submission after Final Rejection)

[X] under 37 CFR 1.97(b), or
(Within any one of the following time periods: three months of filing national application (other than a CPA) or date of entry of the national stage in an international application; or before the mailing date of a first office action on the merits in a non-provisional application, including a CPA, or a Request for Continued Examination).

[ ] under 37 CFR 1.97(c) together with either:

[ ] a Statement under 37 CFR 1.97(e), as checked below, or

[ ] a $180.00 fee under 37 CFR 1.17(p), or
(After the 37 CFR 1.97(b) time period, but before final action or notice of allowance, whichever occurs first)

[ ] under 37 CFR 1.97(d) together with:

[ ] a Statement under 37 CFR 1.97(e), as checked below, and

[ ] a $180.00 fee under 37 CFR 1.17(p), or
(Filed after final action or notice of allowance, whichever occurs first, but on or before payment of the issue fee)

[ ] under 37 CFR 1.97(i):
Applicant requests that the IDS and cited reference(s) be placed in the application filewrapper.
(Filed after payment of issue fee)

Statement Under 37 CFR 1.97(e)

[ ] Each item of information contained in this 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 this Information Disclosure Statement; or

[ ] No item of information contained in this Information Disclosure Statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the undersigned, 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 this Information Disclosure Statement.

Statement Under 37 CFR 1.704(d) (Patent Term Adjustment)
Applies to original applications (other than design) filed on or after May 29, 2000

[ ] Each item of information contained in the Information Disclosure Statement was cited in a communication from a foreign patent office in a counterpart application and this communication was not received by any individual designated in § 1.56(c) more than thirty days prior to the filing of the Information Disclosure Statement.

[X] Enclosed herewith is form PTO-1449:

[X] Copies of the cited references are enclosed.

[ ] Copies of cited references are enclosed except those entered in prior application, U.S. Application No. [ ], to which priority under 35 U.S.C. 120 is claimed. [The earlier application contains copies of the cited references.]

[ ] The listed references were cited in the enclosed International Search Report in a counterpart foreign application.

[ ] The "concise explanation" requirement (non-English references) for reference(s) [ ] under 37 CFR 1.98(a)(3) is satisfied by:

[ ] the explanation provided on the attached sheet.

[ ] the explanation provided in the Specification.

[ ] submission of the enclosed International Search Report.

[ ] submission of the enclosed English-language version of a foreign Search Report and/or foreign Office Action.

[ ] the enclosed English language abstract.

[X] Applicant requests that the following non-published pending applications be considered:

Examiner's Initials

_____ U.S. Application No. 09/294,837, filed April 19, 1999, entitled "Dynamic Server Organization" (Not available).

_____ U.S. Application No.09/535,279, by Gang Lu et al., filed March 24, 2000, Docket No.: 2762.2001-002.

_____ U.S. Application No. 09/824,527, by Kirk Johnson, filed April 2, 2001, Docket No.: 2762.2006-002.

_____ U.S. Application No. 09/642,165, by Barbara Liskov et al., filed August 18, 2000, Docket No.: 2762.2007-000

_____ U.S. Application No. 09/642,143, by Mark Day et al., filed August 18, 2000, Docket No.: 2762.2008-000

_____ _____

Examiner Date

[X] A copy of the 2nd - 5th above-cited applications, including the current claims, is enclosed.

[ ] A copy of each above-cited application, including the current claims, is enclosed, except those entered in prior application, U.S. Application No. [ ], to which priority under 35 U.S.C. 120 is claimed.

The Examiner is requested to return a copy of the above list of pending applications indicating which references were considered with the next office communication.

It is requested that the information disclosed herein be made of record in this application.

Method of payment:

[ ] A check for the fee noted above is enclosed, or the fee has been included in the check with the accompanying Reply. A copy of this Statement is enclosed.

[ ] Please charge Deposit Account 08-0380 in the amount of $[ ]. A copy of this Statement is enclosed.

[X] Please charge any deficiency in fees and credit any overpayment to Deposit Account 08-0380.

Respectfully submitted,

HAMILTON, BROOK, SMITH & REYNOLDS, P.C.

By Mark B Solomon

Mark B. Solomon
Registration No.: 44,348
Telephone: (978) 341-0036
Facsimile: (978) 341-0136

Concord, MA 01742-9133
Dated: 5/30/2

PTO-1449 REPRODUCED

INFORMATION DISCLOSURE CITATION IN AN APPLICATION

May 30, 2002

(Use several sheets if necessary)

JC1764 JUN 05 2002 PATENT & TRADEMARK OFFICE

ATTORNEY DOCKET NO.	APPLICATION NO.
2762.2002-002	09/824,553
APPLICANT	
Kirk Johnson *et al.*	
FILING DATE	**GROUP**
April 2, 2001	2661

U.S. PATENT DOCUMENTS

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUB-CLASS	FILING DATE IF APPROPRIATE
	AA	6,345,294	05 FEB 02	O'Toole *et al.*	709	222	
	AB	6,052,718	18 APR 00	Gifford	809	219	
	AC						
	AD						
	AE						
	AF						
	AG						
	AH						
	AI						
	AJ						
	AK						

RECEIVED JUN 11 2002 Technology Center 2600

FOREIGN PATENT DOCUMENTS

		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUB-CLASS	TRANSLATION YES	TRANSLATION NO
	AL							
	AM							
	AN							
	AO							
	AP							
	AQ							

OTHER DOCUMENTS ***(Including Author, Title, Date, Pertinent Pages, Etc.)***

	AR	
	AS	
	AT	

EXAMINER	DATE CONSIDERED

::ODMA\MHODMA\MANAGE;246877;1
LRR/MBS
08/08/01

PATENT APPLICATION
Docket No.: 2762.2002-002

SECTOR/A

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants:	Kirk Johnson, James O'Toole, M. Frans Kaashoek & John Jannotti
Application No.:	09/824,553 Group: 2661
Filed:	April 2, 2001
For:	Method and Apparatus for Determining a Network Topology in the Presence of Network Address Translation

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as First Class Mail in an envelope addressed to Assistant Commissioner for Patents, Washington, D.C. 20231

on 08/08/01 Ellen T. Spear
Date Signature

Ellen T. Spear
Typed or printed name of person signing certificate

REPLY TO NOTICE TO FILE MISSING PARTS OF APPLICATION

Box Missing Parts
Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

In reply to the Notice to File Missing Parts dated May 18, 2001, the following documents and fees are being submitted for filing in the captioned application. A copy of the Notice is attached.

[X] **EXECUTED DECLARATION/POWER OF ATTORNEY**
(Separate transmittal letter and postcard not required)

[X] **FILING FEE** - with Fee Transmittal for Patent Applications in duplicate.
(Separate transmittal letter and postcard not required)

[X] **SURCHARGE** - surcharge fee of $130.
(Separate transmittal letter and postcard not required)

[ ] **SEQUENCE LISTING** - Filed concurrently and is attached.
(Separate transmittal letter and postcard required)

08/14/2001 WYUSUF1 00000039 09824553
01 FC:115 110.00 DP

[ ] **TRANSMITTAL OF SUBSTITUTE DRAWINGS**

[ ] Sheets of substitute drawings consisting of Figs. 1 - [ ] are enclosed.
(Separate transmittal letter and postcard not required)

[X] **PETITION FOR EXTENSION OF TIME**

[X] Applicant hereby petitions to extend the time to respond to the Notice to File Missing Parts dated May 18, 2001 for one month(s) from July 18, 2001 to August 18, 2001. The appropriate fee of $110 is included in the enclosed check.

[ ] A [ ] month extension of time to respond to the Notice to File Missing Parts dated [ ] was filed on [ ] with payment of a $[ ] fee.

[ ] Applicant hereby petitions for an additional [ ] month extension of time to respond to the Notice to File Missing Parts. The appropriate fee of $[ ] is included in the enclosed check.

(Separate Petition for Extension of Time and postcard not required)

[ ] **REQUEST FOR CORRECTED FILING RECEIPT** - Filed concurrently and is attached.
(Separate transmittal letter and postcard required)

[ ] **STATEMENT CLAIMING SMALL ENTITY STATUS**

[ ] Was filed on [ ].

[ ] Is enclosed herewith.
(Separate transmittal letter and postcard not required

[ ] In view of the small entity status of the captioned application, we hereby request a reimbursement of 50% of the filing fees in the amount of $[ ] which were paid on [ ] to be deposited in Deposit Account No. 08-0380.

The fees required for filing the indicated documents are enclosed in the form of a check in the total amount of $1594. Please charge any deficiency or credit any overpayment in the fees that may be due in this matter to Deposit Account No. 08-0380. A copy of this letter is enclosed for accounting purposes.

Respectfully submitted,

HAMILTON, BROOK, SMITH & REYNOLDS, P.C.

By Mark B Solomon
Mark B. Solomon
Registration No.: 44,348
Tel.: (781) 861-6240
Fax: (781) 861-9540

Lexington, Massachusetts 02421-4799
Date: 8/8/01

OIPE JC54 AUG 10 2001 PATENT & TRADEMARK OFFICE

HAMILTON, BROOK, SMITH & REYNOLDS, P.C.

43

FEE TRANSMITTAL FOR PATENT APPLICATIONS

Attorney Docket Number	2762.2002-002
Application Number	09/824,553
First Named Inventor	Kirk Johnson

CLAIM CALCULATION (includes any preliminary amendment)

CLAIMS	(1) FOR	(2) NUMBER FILED	(3) NUMBER EXTRA	(4) RATE	(5) CALCULATIONS
	TOTAL CLAIMS (37 CFR 1.16(c) or (j))	38 – 20* =	18	x $ 18 =	$ 324
	INDEPENDENT CLAIMS (37 CFR 1.16(b) or (i))	7 – 3** =	4	x $ 80 =	$ 320
	MULTIPLE DEPENDENT CLAIMS (if applicable) (37 CFR 1.16(d))			+ $ 270 =	$
				BASIC FEE (37 CFR 1.16(a) or (h))	$ 710
			Total of above Calculations =		$ 1354
	Reduction by 50% for filing by small entity (37 CFR 1.9, 1.27, 1.28) =				$
	TOTAL =				$ 1354
	Surcharge - Late Filing of Declaration or Filing Fees (37 C.F.R. 1.16(e)) =				$ 130
	Petition for Extension of Time Fee (37 C.F.R. 1.17) =				$ 110
	Assignment Recordation Fee = (only when filed with application)				$
	* Reissue claims in excess of 20 and over original patent ** Reissue independent claims over original patent			TOTAL =	$ 1594

1. Small entity status:

   a. [ ] A small entity statement is enclosed.

   b. [ ] A small entity statement was filed in the prior non-provisional application and such status is still proper and desired.

   c. [ ] Is no longer claimed.

2. [X] A general authorization is hereby granted to charge deposit account number 08-0380 for any fees required under 37 CFR 1.16 and 1.17 in order to maintain pendency of this application. A copy of this authorization is enclosed for accounting purposes.

3. [X] A check is enclosed for **$1594**. [ ] Please charge **$[ ]** to Deposit Account No. 08-0380.

4. [ ] Other: _____

Signature	Mark B Solomon	Date	8/8/01
Submitted by Typed or Printed Name	Mark B. Solomon	Reg. Number	44,348

::ODMA\MHODMA\IMANAGE;246883;1 Rev. May 10, 2000

#3

OIPE JC54 AUG 10 2001 PATENT & TRADEMARK OFFICE

UNITED STATES PATENT AND TRADEMARK OFFICE

COMMISSIONER FOR PATENTS
UNITED STATES PATENT AND TRADEMARK OFFICE
WASHINGTON, D.C. 20231
www.uspto.gov

APPLICATION NUMBER	FILING/RECEIPT DATE	FIRST NAMED APPLICANT	ATTORNEY DOCKET NUMBER
09/824,553	04/02/2001	Kirk Johnson	2762.2002-002

CONFIRMATION NO. 9887

FORMALITIES LETTER

OC000000006092944

Leo R. Reynolds, Esq.
HAMILTON, BROOK, SMITH & REYNOLDS, P.C.
Two Militia Drive
Lexington, MA 02421-4799

Date Mailed: 05/18/2001

NOTICE TO FILE MISSING PARTS OF NONPROVISIONAL APPLICATION

FILED UNDER 37 CFR 1.53(b)

Filing Date Granted

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 and pay any fees required 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).

- The statutory basic filing fee is missing.
  Applicant must submit $ **710** *to complete the basic filing fee and/or file a small entity statement claiming such status (37 CFR 1.27).*
- Total additional claim fee(s) for this application is $644.
  - **$324** for **18** total claims over 20.
  - **$320** for **4** independent claims over 3 .
- The oath or declaration is missing.
  A properly signed oath or declaration in compliance with 37 CFR 1.63, identifying the application by the above Application Number and Filing Date, is required.
- To avoid abandonment, a late filing fee or oath or declaration surcharge as set forth in 37 CFR 1.16(e) of $130 for a non-small entity, must be submitted with the missing items identified in this letter.
- **The balance due by applicant is $ 1484.**

08/14/2001 MYUSUF1 00000038 09824553
01 FC:101 710.00 DP
02 FC:103 324.00 DP
03 FC:102 320.00 DP
04 FC:105 130.00 DP

A copy of this notice MUST be returned with the reply.

Customer Service Center
Initial Patent Examination Division (703) 308-1202
PART 2 - COPY TO BE RETURNED WITH RESPONSE

OIPE JC54
AUG 10 2001
PATENT & TRADEMARK OFFICE

#3

DOCKET NO. 2762.2002-002

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Declaration for Patent Application

As a named inventor, I hereby declare that:

My residence, mailing address and citizenship are as stated next to my name;

I believe I am the original, first and sole inventor (if only one name is listed) or an original, first and joint inventor (if plural names are listed in the signatory page(s) commencing at page 3 hereof) of the subject matter which is claimed and for which a patent is sought on the invention entitled

Method and Apparatus for Determining a Network Topology in the Presence of Network Address Translation

the specification of which (check one)

[ ] is attached hereto.

[X] was filed on April 2, 2001 as United States Application Number or PCT International Application No. 09/824,553 and was amended on _____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 C.F.R. §1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the national or PCT international filing date of the continuation-in-part application.

I hereby claim foreign priority benefits under 35 U.S.C. 119(a)-(d) or 365(b) of any foreign application(s) for patent or inventor's certificate, or 365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or of any PCT international application having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s)			Priority Not Claimed	Certified Copy Filed? YES	NO
(Number)	(Country)	(Day/Month/Year filed)	[ ]	[ ]	[ ]
(Number)	(Country)	(Day/Month/Year filed)	[ ]	[ ]	[ ]
(Number)	(Country)	(Day/Month/Year filed)	[ ]	[ ]	[ ]

I hereby claim the benefit under 35 U.S.C. §119(e) of any United States provisional application(s) listed below.

60/178,062 (Application Number)	January 24, 2000 (Filing Date)
(Application Number)	(Filing Date)

I hereby claim the benefit under 35 U.S.C. 120 of any United States application(s), or 365(c) of any PCT international application designating the United States of America, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of 35 U.S.C. 112, I acknowledge the duty to disclose information known by me to be material to patentability as defined in 37 C.F.R. 1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application:

09/766,874	January 19, 2001	Pending
(Application Serial No.)	(Filing date)	(Status: patented, pending, abandoned)
(Application Serial No.)	(Filing date)	(Status: patented, pending, abandoned)
(Application Serial No.)	(Filing date)	(Status: patented, pending, abandoned)
(Application Serial No.)	(Filing date)	(Status: patented, pending, abandoned)

As a named inventor, I hereby appoint the attorneys and/or agents associated with **Hamilton, Brook, Smith & Reynolds, P.C., Two Militia Drive, Lexington, Massachusetts 02421-4799 Customer No. 21005,**

and _____,

to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith.

Please send correspondence to:

[X] Customer No. **21005**
HAMILTON, BROOK, SMITH & REYNOLDS, P.C.
Two Militia Drive
Lexington, MA 02421-4799

or

[ ] Address as follows:

Direct telephone calls to: Leo R. Reynolds Telephone No.: 781-861-6240

Direct facsimiles to: Leo R. Reynolds Facsimile No.: 781-861-9540

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full name of sole or first inventor: Kirk Johnson

Inventor's Signature: [signature] Date: 26 JUN 2001

Residence: 640 Linden Avenue
Boulder, CO 80304

Citizenship: USA

Mailing Address: same as above

Full name of second joint inventor, if any James O'Toole

Inventor's Signature _____ Date _____

Residence 15 Munroe Street
Somerville, MA 02143

Citizenship USA

Mailing Address same as above

Full name of third joint inventor, if any M. Frans Kaashoek

Inventor's Signature _____ Date _____

Residence 2 Patriots Drive
Lexington, MA 02420

Citizenship USA

Mailing Address same as above

Full name of fourth joint inventor, if any John Jannotti

Inventor's Signature _____ Date _____

Residence 233 Massachusetts Avenue
Cambridge, MA 02139

Citizenship USA

Mailing Address same as above

::ODMA\MHODMA\iManage;228797;1

OIPE JC54
AUG 10 2001
PATENT & TRADEMARK OFFICE

#3

DOCKET NO. 2762.2002-002

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Declaration for Patent Application

As a named inventor, I hereby declare that:

My residence, mailing address and citizenship are as stated next to my name;

I believe I am the original, first and sole inventor (if only one name is listed) or an original, first and joint inventor (if plural names are listed in the signatory page(s) commencing at page 3 hereof) of the subject matter which is claimed and for which a patent is sought on the invention entitled

Method and Apparatus for Determining a Network Topology in the Presence of Network Address Translation

the specification of which (check one)

[ ] is attached hereto.

[X] was filed on April 2, 2001 as United States Application

Number or PCT International Application No. 09/824,553

and was amended on _____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 C.F.R. §1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the national or PCT international filing date of the continuation-in-part application.

I hereby claim foreign priority benefits under 35 U.S.C. 119(a)-(d) or 365(b) of any foreign application(s) for patent or inventor's certificate, or 365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or of any PCT international application having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s)			Priority Not Claimed	Certified Copy Filed? YES	NO
(Number)	(Country)	(Day/Month/Year filed)	[ ]	[ ]	[ ]
(Number)	(Country)	(Day/Month/Year filed)	[ ]	[ ]	[ ]
(Number)	(Country)	(Day/Month/Year filed)	[ ]	[ ]	[ ]

I hereby claim the benefit under 35 U.S.C. §119(e) of any United States provisional application(s) listed below.

60/178,062 (Application Number)	January 24, 2000 (Filing Date)
(Application Number)	(Filing Date)

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09/766,874	January 19, 2001	Pending
(Application Serial No.)	(Filing date)	(Status: patented, pending, abandoned)
(Application Serial No.)	(Filing date)	(Status: patented, pending, abandoned)
(Application Serial No.)	(Filing date)	(Status: patented, pending, abandoned)
(Application Serial No.)	(Filing date)	(Status: patented, pending, abandoned)

As a named inventor, I hereby appoint the attorneys and/or agents associated with **Hamilton, Brook, Smith & Reynolds, P.C., Two Militia Drive, Lexington, Massachusetts 02421-4799 Customer No. 21005,**

and _____,

to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith.

Please send correspondence to:

[X] Customer No. **21005**
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Lexington, MA 02421-4799

or

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full name of sole or first inventor Kirk Johnson

Inventor's Signature _____ Date _____

Residence 3520 Copper Street
Boulder, CO 80304

Citizenship USA

Mailing Address same as above

Full name of second joint inventor, if any James O'Toole

Inventor's Signature _____ Date 6/15/2001

Residence 15 Munroe Street
Somerville, MA 02143

Citizenship USA

Mailing Address same as above

Full name of third joint inventor, if any M. Frans Kaashoek

Inventor's Signature _____ Date 6/7/2001

Residence 2 Patriots Drive
Lexington, MA 02420

Citizenship USA

Mailing Address same as above

Full name of fourth joint inventor, if any John Jannotti

Inventor's Signature _____ Date 6/11/2001

Residence 233 Massachusetts Avenue
Cambridge, MA 02139

Citizenship USA

Mailing Address same as above

::ODMA\MHODMA\iManage;228797;1

UNITED STATES PATENT AND TRADEMARK OFFICE

COMMISSIONER FOR PATENTS
UNITED STATES PATENT AND TRADEMARK OFFICE
WASHINGTON, D.C. 20231
www.uspto.gov

APPLICATION NUMBER	FILING/RECEIPT DATE	FIRST NAMED APPLICANT	ATTORNEY DOCKET NUMBER
09/824,553	04/02/2001	Kirk Johnson	2762.2002-002

CONFIRMATION NO. 9887

FORMALITIES LETTER

OC000000006092944

Leo R. Reynolds, Esq.
HAMILTON, BROOK, SMITH & REYNOLDS, P.C.
Two Militia Drive
Lexington, MA 02421-4799

Date Mailed: 05/18/2001

NOTICE TO FILE MISSING PARTS OF NONPROVISIONAL APPLICATION

FILED UNDER 37 CFR 1.53(b)

Filing Date Granted

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 and pay any fees required 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).

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  Applicant must submit $ **710** *to complete the basic filing fee and/or file a small entity statement claiming such status (37 CFR 1.27).*
- Total additional claim fee(s) for this application is $644.
  - **$324** for **18** total claims over 20.
  - **$320** for **4** independent claims over 3 .
- The oath or declaration is missing.
  A properly signed oath or declaration in compliance with 37 CFR 1.63, identifying the application by the above Application Number and Filing Date, is required.
- To avoid abandonment, a late filing fee or oath or declaration surcharge as set forth in 37 CFR 1.16(e) of $130 for a non-small entity, must be submitted with the missing items identified in this letter.
- **The balance due by applicant is $ 1484.**

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04-03-01

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HAMILTON, BROOK, SMITH & REYNOLDS, P.C.

UTILITY PATENT APPLICATION TRANSMITTAL (Only for new nonprovisional applications under 37 C.F.R. 1.53(b))		
	Attorney Docket No.	2762.2002-002
	First Named Inventor or Application Identifier	Kirk Johnson
	Express Mail Label No.	EL762238222US

JC978 U.S. PTO 09/824553 04/02/01

04/02/01 JC978 U.S. PTO

Title of Invention	METHOD AND APPARATUS FOR DETERMINING A NETWORK TOPOLOGY IN THE PRESENCE OF NETWORK ADDRESS TRANSLATION

APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents.

ADDRESS TO: **Assistant Commissioner for Patents, Box Patent Application, Washington, D.C. 20231**

1. [ ] Fee Transmittal Form
(Submit an original, and a duplicate for fee processing)

2. [X] Specification **Total Pages [25]**
(preferred arrangement set forth below)
- Descriptive title of the invention
- Cross References to Related Applications
- Statement Regarding Fed sponsored R & D
- Reference to microfiche Appendix
- Background of the Invention
- Summary of the Invention
- Brief Description of the Drawings
- Detailed Description
- Claim(s)
- Abstract of the Disclosure

3. [X] Drawing(s) (35 U.S.C. 113) **Total Sheets [8]**
[ ] Formal [X] Informal
[ ] Fig. of the Drawings for Publication [ ]

4. [ ] Oath or Declaration/POA **[Total Pages [ ]]**
a. [ ] Newly executed (original or copy)
b. [ ] Copy from a prior application (37 C.F.R. 1.63(d)) *(for continuation/divisional with Box 18 completed)* **[NOTE Box 5 below]**
i. [ ] DELETION OF INVENTOR(S) Signed statement attached deleting inventor(s) named in the prior application, see 37 C.F.R. 1.63(d)(2) and 1.33(b).

5. [ ] Incorporation By Reference *(useable if Box 4b is checked)* The entire disclosure of the prior application, from which a copy of the oath or declaration is supplied under Box 4b, is considered as being part of the disclosure of the accompanying application and is hereby incorporated by reference therein.

6. [ ] Microfiche Computer Program *(Appendix)*

7. [ ] Nucleotide and/or Amino Acid Sequence Submission (if applicable, all necessary)
a. [ ] Computer Readable Copy
b. [ ] Paper Copy (identical to computer copy) **[ ] Pages**
c. [ ] Statement verifying identity of above copies

ACCOMPANYING APPLICATION PARTS

8. [ ] Assignment Papers (cover sheet & documents)
[ ] Assignee -

9. [ ] 37 C.F.R. 3.73(b) Statement [ ] Power of Attorney *(when there is an assignee)*

10. [ ] English Translation Document *(if applicable)*

11. [ ] Information Disclosure Statement (IDS)/PTO-1449 [ ] Copies of IDS Citations

12. [ ] Preliminary Amendment

13. [X] Return Receipt Postcard (MPEP 503) *(Should be specifically itemized)*

14. [ ] Small Entity Statement(s) [ ] Statement filed in prior application, status still proper and desired

15. [ ] Certified Copy of Priority Document(s) *(if foreign priority is claimed)*

16. [X] Nonpublication Request *(check parent application)*

17. [X] Other: Remarks document

18. **If a CONTINUING APPLICATION,** check appropriate box and supply the requisite information:
[X] Continuation [ ] Divisional [ ] Continuation-in-part (CIP) of prior application No.: 09/766,874
Prior application information: Examiner: Not assigned Group Art Unit: 2152

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Rev. November 19, 2000 - :ODMA\MHODMA\IMANAGE;212641;1

HAMILTON, BROOK, SMITH & REYNOLDS, P.C.

NONPUBLICATION REQUEST AND CERTIFICATION UNDER 35 U.S.C. 122(b)(2)(B)(i)	First Named Inventor	Kirk Johnson
	Attorney Docket No.	2762.2002-002
	Express Mail Label No.	EL762238222US
Title of Invention	METHOD AND APPARATUS FOR DETERMINING A NETWORK TOPOLOGY IN THE PRESENCE OF NETWORK ADDRESS TRANSLATION	

Pursuant to 37 C.F.R. § 1.213(a)(3), I hereby 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. I hereby request that the attached application not be published under 35 U.S.C. 122(b).

The undersigned is an attorney/agent for applicant(s).

4/2/01
Date

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If applicant subsequently files an application directed to the invention disclosed in the attached application in another country, or under a multilateral international agreement, that requires publication of applications eighteen months after filing, the applicant **must** notify that United States Patent and Trademark Office of such filing within forty-five (45) days after that date of the filing of such foreign or international application. **Failure to do so will result in abandonment of this application (35 U.S.C. 122(b)(2)(B)(iii)).**

::ODMA\MHODMA\iManage;205272;1

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: Kirk Johnson, James O'Toole, M. Frans Kaaskoek and John Jannotti

Continuation Application of
Application No.: 09/766,874
Filed: January 19, 2001

For: Method and Apparatus for Determining a Network Topology in the Presence of Network Address Translation

Date: 4-2-01

EXPRESS MAIL LABEL NO. EL762238222US

REMARKS

Box PATENT APPLICATION
Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

The above-captioned application is a continuation of application number 09/766,874 filed on January 19, 2001 to which priority is claimed under 35 U.S.C. §120.

Applicant is submitting under separate cover, and under Express Mail procedure, a processing and retention fee in the parent application, as well as any extension of time fees which may be due, to maintain copendency between the parent application and the instant continuation application.

The related applications paragraph has been revised to include the parent application.

Respectfully submitted,

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Dated: 4/2/01

Date: 4-2-01 Express Mail Label No. EL762238222US

Inventors: Kirk Johnson, James O'Toole, M. Frans Kaaskoek, and John Jannotti

Attorney's Docket No.: 2762.2002-002

METHOD AND APPARATUS FOR DETERMINING A NETWORK TOPOLOGY IN THE PRESENCE OF NETWORK ADDRESS TRANSLATION

RELATED APPLICATIONS

This application is a continuation of Application No. 09/766,874, filed January 19, 2001, which claims the benefit of U.S. Provisional Application No. 60/178,062, filed on January 24,2000, entitled "Method and Apparatus for Determining a Network Topology in the Presence of Network Address Translation", by Johnson et al. The entire teachings of the above application is incorporated herein by reference.

BACKGROUND OF THE INVENTION

Computer networks have provided individuals, corporations, and governments with the means for transferring, sharing, and disseminating large amounts of information and data in digital form. Since the advent of the Internet, data communications has increased in volume and in ways previously unimagined.

An example of data being transferred is real-time video and/or audio. Either media is "packetized," or converted, from an analog or digital form into a series of data packets that are capable of being transferred across various computer networks. Routers, servers, or other data communication devices are used to effect the data transfer. The media is said to emanate from a host server/computer to one or more client servers/computers.

For instance, a White House press conference occurring in Washington, D.C. may be viewed over the Internet by thousands of viewers watching on client computers or other

devices. A single local, White House, host server is generally incapable of supporting all the clients at real-time video rates. Also, bottlenecks may occur at local, Washington D.C. routers supporting the packetized video/audio transfer from the host server to all the clients. To facilitate the high speed video data transfer for real-time video viewing, networks of redundant high-speed servers and routers operating around the Internet have had reasonably good success.

Computer network systems often contain routers, firewalls, proxy servers, and other devices that act to disguise or alter the network addresses of various clients and servers. These devices disguising or altering the network addresses do so in order to enhance the security or performance of the network or, in many cases, to make possible the interoperation of computer networks that use addresses that are incompatible for some reason.

A common scenario is a corporate network containing 100 computers using network addresses 10.0.0.1 through 10.0.0.100, using the TCP/IP network protocols. These numbers are used as "private" network addresses, and the public TCP/IP Internet does not route data packets to these private network addresses. In this scenario, the corporation installs one or more routers, firewalls, network address translators (NATs), proxy servers, or other address translation device (ATD) which are configured such that TCP/IP communications between the computers numbered 10.0.0.1 (and so on) and other computers in the Internet take place using one or more publically routable Internet addresses.

Clients in the private network must go through the address translating device(s) between the private network and the Internet to gain access to the real-time video available on the high-speed server network(s). This means that there may be multiple connections desiring real-time video and/or audio feeds through a single Internet access server, router, or other device. As a result of having this "indirect" access to the high-speed router/server network, the client provides the viewer with the real-time video/audio at non-real-time speeds.

To provide real-time access, a server may be placed behind the address translation device in the private network to receive a single stream of data and then distribute that data to other devices in the private network. Devices within the private network that attempt to access the data through a public server may be directed to the local server in the private network. To be able to direct the data communications to appropriate servers, a model of the network

hierarchy is maintained. However, the address translation devices interfere with the ability to identify devices within the hierarchy.

SUMMARY OF THE INVENTION

To calculate a model of how routers, firewalls, network-address-translators (NATs), proxy servers, and other address translation devices (ATDs - used in the discussion below to generically indicate any device employing network address translation so as not to specify NATs over proxy servers, etc.) in a network alter the (packet) traffic passing through them, several methods are used to probe the network and infer a model of the network address translation.

To determine a topology of a network induced by network address translation, communications are initiated, from a server behind a translating device, which effect the network address translation. The communications are monitored beyond the translating device to infer partitioning of servers into equivalence sets relative to the network topology induced by the network address translation.

Two types of clients, or devices, may initiate communications: active and passive devices. Active devices include routers, servers, or appliances that may have knowledge of at least one hierarchically superior active device in the hierarchical active device network. Note that an appliance may be equivalence of a server. Passive clients, for example, computers with web browsers, may have no inherent knowledge of the hierarchical server network.

In the communications, an active device may include a respective actual address (i.e., source address) in a message sent to a server outside the subnet, beyond the network address translation device. The actual address may include the sending server's IP address and/or unique identification number, such as the server's ethernet address. The external server beyond the translation device employs a method of distinguishing between communications affected by and not affected by network address translation. To that end, the external server may compare an apparent source address of the received message against the actual address provided in the message by the active device. If those addresses differ, the communication must have passed through an address translation device, and the apparent source address is a translation.

The external server may assess a range of network or subnet addresses behind an address translation device and may assess a range of public network addresses associated with the addresses translating device. In one embodiment, the external server also distinguishes between active and passive client messages. When a passive client communicates to the external server through the address translation device, the external server may respond by sending a redirect command to the passive client, which causes a message to be sent from the passive client to an active client (i.e., server) behind the same address translation device, if there is one. That active client, in turn, communicates with the external server. The communication (the redirect command) from the external server to the passive client may include parameters, thus providing information to the associated active client (server behind the same ATD). The external server may also cause an active client to communicate with another active client behind or beyond the address translation device.

In one embodiment, the external server includes a database which stores translated address sets providing a correspondence between actual client addresses (private addresses) and apparent/translated client addresses (public addresses). A database manager or data structure provides storage, search, and retrieve functions for the stored, translated, address sets. When a communication is received from a client, the external server accesses the translated address sets to compare the apparent message source address with addresses in the translated address sets and to assess whether the source address is behind a known address translation device. Translated address sets may be merged by the external server when it is determined that multiple apparent source addresses in distinct, translated, address sets correspond to the same actual source address.

In one embodiment, if an external server determines that a first apparent address is not already known to be associated with a translated address set but may be associated with a "nearby" translated address set, which is merely a translated address set that includes a second apparent address whose network address is within a predefined metric of the first apparent address , the server applies a timeout mechanism to remove the first apparent address, marked as "speculative," from the "nearby" translated address set. Marking the first apparent address "speculative" is done because it is sometimes advantageous to retain previously unknown

The server H 110h or CS 150 storing and monitoring the translated address sets 220 seeks to identify various public addresses determined to be used by the same ATD 130. In this case, ATD 130a has only a single public address P1, whereas ATD 130b has two public addresses P2 and P3. Because the address of server C 110c is determined to be in both translated address sets 220b and 220c, the translated address sets P2, P3, 220b, 220c, respectively, are merged into a single translated address set 230a through techniques discussed later.

Further relationships and groupings of translated address sets can be determined empirically. Of special note, however, is translated address set P8, which is a member of translated address sets P4, P7, and possibly over time, P5 and P6 (recall the random public addressing schemes of ATDs discussed above). Translated address set P8 is included in translated address sets P4-P7 because, as can be seen in Fig. 1, subnet 180c includes an embedded subnet 180d. An example of such an arrangement is a corporate network (subnet 180c) that includes a proxy server 130d, behind which financial officers have their computers (q and r) storing financial records. As in the case of translated address sets P2 220b and P3 220c, the server storing the translated address sets 220 merges translated address sets P4 220d through P7 220g into a so-called "super" translated address set 230b.

In one embodiment, the client address list 210 includes all client addresses. In an alternate embodiment, the client address list 210 includes only server 110 addresses, and end-user 120 addresses are stored in a separate list (not shown and optionally stored in separate translated address sets 220).

Fig. 3 is a high-level flow diagram of an embodiment of a main processor routine 300 operating on a server 110, 150 performing network address translation inferencing. Receiving a client message in step 310 initiates the process in the server 110, 150. The server parses messages in step 320 and, in step 330, determines whether the received message is from an active or passive client. Active clients put their actual addresses in the message (according to a predefined protocol designable by a programmer knowledgeable in network communication protocols) where the ATD 130 is unable to affect the actual address; passive clients are unable to put their actual addresses in the message. If the message is determined to be from an active

client, then active client routines 340 are performed. If the message is determined to be from a passive client, such as a web browser, then passive client routines 350 are performed. The main processor routine 300 is finished in step 360.

Fig. 4 is a flow diagram of an embodiment of the active client routine 340. The active client routine 340 begins in step 410, which performs parameter passing and local variable initialization. In step 420, the active client routine 340 receives the active client 110 message/request. In step 430, the routine 340 parses the message for an apparent address. The apparent address is the address assigned to the message by an ATD 130. In step 440, the routine 340 parses the message for an actual source address. The active clients 110 provide a respective unique ID and/or source ID (i.e., ether address and network address) in the data portion of the message, which is unaffected by the network address translation being performed by the ATDs 130.

In step 450, the routine 340 performs a comparison between the apparent and actual addresses that were determined in steps 430, 440, respectively. If the apparent and actual addresses are the same, then no network address translation is being performed between the message sender and message receiver, which is stated in step 460. If the apparent and actual addresses are not the same, then processing continues in a "determine sender location" routine 340 (Fig. 5). The process of the active clients routine continues until all messages from active clients have been processed. Control is returned back to the main processor routine 300 in step 480.

Fig. 5 is a flow diagram of the "determine sender location" routine 470. This routine 470 uses information stored in the translated address sets 220 (Fig. 2) to determine if the active client 110 that issued the message being processed has been identified to be behind an ATD 130.

The determine sender location routine 470 begins in step 505, where parameters are passed and local variables are initialized. In step 510, the routine 470 scans the translated address sets for the apparent source address. To get a better understanding of the translated address sets 220 (Fig. 2), a generalized translated address set 220 schematic 600 is presented in Fig. 6.

Fig. 6 provides a schematic 600 of a generalized translated address set 220. The translated address set 220 can be thought of as a record having fields of information. A first field 610 stores included addresses, and, optionally, explicit timeouts for these included addresses. The included addresses include the public addresses (i.e. P1, P2, etc.). The explicit timeouts include times, associated with respective addresses, after which the respective apparent addresses are discarded. This concept is discussed in detail in reference to Fig. 8.

The translated address set 220 further includes a field 620, which stores server 110 actual addresses. As illustrated in Fig. 2, the server actual addresses in field 620 are related to the included apparent addresses of field 610. Lastly, the translated address set 220 optionally includes a third field 630 that is used to store excluded public addresses determined to have no association with an ATD. Optionally, the third field 630 may include explicit timeouts paired or associated with respective excluded addresses.

Referring again to Fig. 5, in step 515, the determine_ sender_ location routine 470 makes a determination as to whether the apparent source address is a member of the translated address set 220 associated with the sender address. If the apparent source address is a member of the same translated address set, then the routine 470 is done in step 560, returning control back to the active client routine 340 (Fig. 4). If the apparent source address is not a member of the first translated address set, then search continues in step 520. Note that a new, empty translated address set is created if the sending address has not been seen before.

The determine sender location routine makes a determination as to whether the apparent source address is a member of another translated address set in step 520. Where step 515 tests a simple case, subnet 180a, step 520 tests a more difficult case, subnet 180b or 180c. If the apparent source address is a member of another translated address set 220, then the two translated address sets are merged in step 522. Step 522 also includes updating the mapping 215 (Fig. 2) of server 110 actual addresses to translated address sets to reflect the merger of translated address sets. After step 522, step 560 returns control back to the determine active client routine 340 (Fig. 4).

If the apparent source address is not a member of another translated address set, then the external server 150, 110h has not received a communication from the sender. In step 525,

the process is not checking for a match, but looking for a "nearby" translated address set. If step 530 does not determine a so-called "nearby" match, then, in step 535, a new, translated, address set is created. The new, translated, address set includes the apparent source address. The new, translated, address set, is associated with the actual source address in the translated address set database 200 (Fig. 2). After step 530, the determine_sender_location routine 460 exits in step 560, returning control to the active client routine 340 (Fig. 4).

If step 530 does not determine a so-called "nearby" match, then, in step 535, a new, translated, address set is created. The new, translated, addressed includes the apparent source address. The new, translated, address set is associated with the actual source address in the translated address set database 200 (Fig.2). After step 530, the determine_sender_location routine 470 exits in step 560, returning control to the active client routine 340 (Fig. 4). If step 530 determines a "nearby" match, then the routine 470 takes a proactive step in step 540 to determine whether the sender is actually behind the "nearby" ATD 130.

"Nearness" may be determined or defined in many different ways. For example, using the IP addressing scheme:

(a) x.y.z.251

(b) x.y.z.254

(c) x.y.(z + 1).2 ,

where depending on the nearness scheme being used, addresses (a) and (b) may be considered near and/or addresses (a), (b), and (c) may also be considered near. Nearness schemes may require the first bits, for example the first twenty-four, of the thirty-two bit IP address to be the same. Another "nearness" scheme may include having a database of company networks that provide nearness metrics. Such metrics may be related to network distance, company geography, or other standard metric. The nearness may also be established heuristically over time.

In step 540, the external server 110h, 150, via the determine sender routine 470, asks the server 110, or active client 120 in some cases, that sent the message to contact a known server 110 behind a respective ATD 130 (e.g., "client 110c contact server D 110d"). In step 545, the routine 470 determines whether the contact was successful. If the contact was not

successful, then the apparent address (and any extra addresses found from the message communication) is excluded from the translated address set in step 550. The excluded addresses are stored in the excluded translated address list 630 (Fig. 6). The process continues to step 560, as discussed above. If the contact was successful, then the apparent source address is added to the included translated address list 610 (Fig. 6) in the translated address set 220 in step 555. The determine sender location routine 470 ends in step 560.

Referring again to Fig. 3, a description of an embodiment of a routine that services active client messages has been described in Figs. 4 - 6. Recalling that active clients, such as the servers 110, insert into the message their source addresses, a server, external from a subnet on which a sending server is located, is able to learn of the correlation between the apparent source address and the actual source address of the server by comparing the two addresses. However, in the case of a passive client, such as a computer 120 having a web browser, the passive client does not tell the external server of its source address in the message sent to the external server. Therefore, another technique must be used to service client messages, which is the subject of the passive client routine 350 (Fig. 7).

Fig. 7 is an embodiment of the passive client routine 350 operating on an external server 110h, 150. The passive client routine 350 receives a passive client request in step 705. The routine 350 parses the header for an apparent source address in step 710. In step 715, a list of servers 110 is consulted by the external server to determine whether the passive client 120 has already been associated with one of the subnet servers 110a-g. In one embodiment, the external server 110h or CS 150 may have passive client/server relationship information incorporated into its translated address set database 200, as depicted in Fig. 2. In an alternate embodiment, the external server contacts the subnet servers 110a-g of which the external server has knowledge in order to find out whether any of the subnet servers has local communication with the contacting passive device 120. If there is a match through either of these methods, then in step 725, the external server 110h or 150 tells the passive client 120 to contact the respective subnet server (in the passive client's zone). In this case, the passive client routine 350 is complete.

If step 720 finds no match, then in step 730, the translated address sets 220 (Fig. 6) are consulted to determine if there is a "nearby" translated address set 220. If step 730 determines there is not a translated address set 220 nearby, then, in step 745, the process continues to step 790, where the passive_client routine 350 returns control back to the main processor routine 300. Because no server behind the ATD is identified, the external server either provides the requested service from the passive client or, optionally redirects the passive client to a different external server for service, for reasons including efficiency, coverage area, or server congestion.

If there is a translated address set 220 nearby, then, in step 745, the external server passes "extra" information to the passive client 120 and causes (i.e., redirects) the passive client to contact an active client behind the ATD 130 associated with the nearby translated address set 220. Such "extra" information, for example, in HTTP, includes, at least one extra "CGI" argument (CGI arguments are syntactic parameters), extra "path" information, and/or other URL (uniform resource locator) syntax. The passive client 120 (i.e., so-called "dumb" browser) forwards the received extra information from the so-called "dumb" browser to the more "intelligent" server 110, which, in turn, contacts the server with notice that the internal subnet server did, in fact, receive a message from the passive client, thereby establishing a relationship between the passive client and the subnet server behind the same ATD.

Accordingly, after the extra information is passed to the passive client in step 745, in step 750, the external server tells the passive client to contact the server behind the possible "nearby" ATD 120 with this extra information. Responsively, in the external server translated address set 220, the external server marks the apparent source address as "speculative" in the "nearby" translated address set in step 755, along with a respective timeout. There are at least two options of what to do with the apparent source address upon executing a "speculative redirection" of this sort: (i) immediately exclude the address (possible to have it later removed from the excluded address set and added to the included address set if the speculative redirect is successful), or (ii) speculatively add the address to the included address set with a short timeout. Speculatively adding the address (instead of immediately excluding it) gives rise to a behavioral feature where subsequent clients making requests through the same apparent IP

address, *after* the speculative redirect but *before* a positive acknowledgment has been received, continue to be re/directed to the server behind the ATD. If one is optimistic and assumes networks are typically set-up such that speculatively adding the address set is the right thing to do, this is an advantage. Of course, if one is pessimistic, it is a disadvantage. In any case, immediately excluding the apparent source address is just a restricted case of a more general scheme in which addresses are added speculatively with a timeout (specifically, immediate exclusion is the degenerate case where the timeout is zero).

In step 760, the external server makes a determination as to whether a positive acknowledgment was received from the subnet server to which the passive client was redirected. If a positive acknowledgment was not received from the respective subnet server, then a timeout exceeded query 765 is performed by the passive client routine 350, which allows additional time for an subnet server to issue an acknowledgment to the external server. If the timeout has not been exceeded, then in step 760, the routine 350 checks again whether a positive acknowledgment has been received. If the timeout has been exceeded, then the routine 350 clears the speculative address in step 770. Following the step of clearing the speculative address in step 770, the apparent address is added to the "excluded" address list 630 (Fig. 6) in the translated address set 220, as depicted and described in Fig. 6. The excluded address list 630 provides the processor routine with a quick way to determine that the apparent address does not belong to the translated address set 220. Also, without the excluded address list 630, there may be a condition that every time a passive client tries to get service, it would be redirected to an active client (server) that it was not capable of communicating with due to the presence of an ATD, not get service, then continue to be redirected to the same active client; the exclude address list 630 breaks the endless cycle in this instance. Control returns back to the main processor routine 300 in step 790.

If, in step 760, the passive client routine 350 determines that a positive acknowledgment has been issued by subnet server associated with the passive client, then "speculative" setting marked with the apparent source address (in step 755) is cleared in step 780. The passive client source address is then added to the translated address set in step 785. Control is returned to the main processor routine 300 in step 790.

Fig. 8 is an embodiment of an assign timeout to apparent address routine 800. This timeout routine 800 is used to assign and test timeouts to data and translated address sets 220 (Fig. 6). This timeout routine 800 may be event or interrupt driven, depending upon the implementation of the processor routine within the servers 110 and central server 150.

The timeout routine 800 begins in step 810, where parameters are passed and local variables are initialized. Step 820 provides a periodic start point at which interrupt driven embodiments begin. In the embodiments shown, a loop, beginning in step 830 is used to scan through each apparent address in order to determine whether that apparent address is still valid or has reached a timeout, whereafter the apparent address should be removed from its respective included and/or excluded translated address list, 610, 630, respectively (Fig. 6).

In the loop, step 840 determines whether the apparent address has reached a timeout. If the apparent address has not reached a timeout, then the next apparent address is tested, starting again at step 830. If a timeout for the apparent address being tested has been reached, then the respective translated address set 220 (Fig. 6) is updated. When each of the addresses in each of the translated address sets has been tested for a timeout condition, the time-out routine 800 is complete in step 860. The use of the timeout routine 800 is for information and factual timeouts, where factual timeouts refers to network dynamics reasons, as discussed above. In an alternate embodiment, each translated address set 220 is simply purged from the translated address set database 200 (Fig. 2) rather than on an individual apparent address basis, as described above. Each purged translated address set 220 is re-learned through the processes described above.

Timing out translated address sets by the external server is referred to as a so-called "soft state." In this case, the mapping 215 (Fig. 2) from the servers 110 address list 210 (Fig. 2) to the translated address sets 220 (Fig. 2) is timed-out and brought back on line. This timeout occurs, for example, at a start time plus three hours, start time plus three minutes, or other such reasonable time. The other case in which the timeout is used is for the translated address sets included and excluded lists 610, 630, respectively. The timeouts are determined through an empirical balance, which may be dynamic, adaptive, heuristic, or configurable.

Using the timeout routine 800, the servers 110 and, more generally the server network, becomes a more tolerant and robust system, accounting for such network changes as adding or removing devices, ATDs, servers, additional subnets, and experiencing power outages. Each such event changes the loading on one or more of the established servers 110, which, through the use of these timeouts, may be brought back on line with a modified coverage area, for example, in the case of additional servers in the hierarchical server network.

It should be understood that the method of the present invention can be implemented by a processor in a server that executes computer instructions, which are stored on a computer readable medium device, such as a ROM, CD ROM, hard disk, or other form of computer storage device.

This application is related to Application No. 08/779,770 filed January 7, 1997 entitled "Replica Routing;" Application No. 09/294,836 filed April 19, 1999 entitled "Self-Organizing Distributed Appliances;" Application No. 09/294,837 filed April 19, 1999 entitled "Replica Routing;" and Provisional Application No. 60/160,535 filed October 20, 1999 entitled "Automatic Network Address Assignment and Translation Inference;" Provisional Application filed January 21, 2000 entitled "Method and Apparatus for a Minimalist Approach to Implementing Server Selection;" and Provisional Application filed on this same day entitled "Method and Apparatus for Automatic Network Address Assignment." The contents of the above applications are herein incorporated by reference in their entirety.

While this invention has been particularly shown and described with references to preferred embodiments thereof, it will be understood by those skilled in the art that various changes in form and details may be made therein without departing from the spirit and scope of the invention as defined by the appended claims.

CLAIMS

What is claimed is:

1. A method of determining a network topology induced by network address translation, comprising:

initiating communications, from a server behind a translating device, which effect the network address translation; and

monitoring the communications beyond the translating device to infer partitioning of servers into equivalence sets relative to the network topology induced by the network address translation.

2. The method according to Claim 1 wherein the communications include at least one source address in a message.

3. The method according to Claim 2 wherein the source address includes an IP address.

4. The method according to Claim 2 wherein a unique identification number is included in the message.

5. The method according to Claim 1 wherein monitoring includes distinguishing between communications affected by and not affected by network address translation.

6. The method according to Claim 5 wherein distinguishing includes comparing an apparent source address of a message against an actual source address provided in the message.

7. The method according to Claim 1 further comprising assessing a range of network addresses behind the translating device.

8. The method according to Claim 1 further comprising assessing a range of public network addresses associated with the translating device.

9. The method according to Claim 1 further comprising distinguishing between active and passive clients.

10. The method according to Claim 9 further including directing a message from a passive client to an active client.

11. The method according to Claim 9 further including, from a processor beyond the translating device, causing a message to a passive client to be redirected to an active client, the active client responsively communicating with the processor beyond the translating device.

12. The method according to Claim 1 wherein monitoring includes maintaining at least one translated address set.

13. The method according to Claim 12 wherein monitoring further includes comparing apparent message source addresses with addresses in the translated address set.

14. The method according to Claim 13 further including merging translated address sets in response to determining that multiple apparent source addresses in distinct translated address sets correspond to the same actual source address.

15. The method according to Claim 13 further including assessing whether the source address is behind a known address translation device.

16. The method according to Claim 12 wherein maintaining includes providing a timeout mechanism for removing an address from a translated address set.

17. The method according to Claim 1 further including commanding a new client to contact a known client behind the same network address translation device.

18. The method according to Claim 1 wherein monitoring includes providing a soft-state mechanism to occasionally refresh partitioning.

19. Apparatus to be located beyond a network address translation device for determining a topology of a network in the presence of network address translation, comprising:

a processor coupled to a network interface for receiving communication from a network device effecting network address translation; and

a processor routine operating on the processor, the processor routine to infer partitioning of servers into equivalence sets relative to the network topology induced by the network address translation.

20. The apparatus according to Claim 19 wherein the messages received include at least one source address in the message.

21. The apparatus according to Claim 20 wherein the processor routine compares an apparent source address of a message against an actual source address provided in the message.

22. The apparatus according to Claim 20 further including at least one translated address set, the source address being stored in the translated address set.

23. The apparatus according to Claim 19 wherein the processor is further coupled to memory, the processor routine storing a database of translated address sets in the memory.

24. The apparatus according to Claim 23 wherein the processor routine includes a database manager to compare apparent message source addresses with addresses stored in the database of translated address sets.

25. The apparatus according to Claim 24 wherein the database manager provides a timeout mechanism for removing translated addresses from the translated address sets in the database.

26. Apparatus to be located behind a network address translation device for providing communications used to determine a topology of a network in the presence of network address translation, comprising:

a processor coupled to a network interface, the processor initiating communications to a server beyond a translation device to effect network address translation; and

a processor routine operating on said processor, said processor routine providing the actual network address of the processor in a message of the communications.

27. The apparatus according to Claim 26 wherein said processor issues communications in response to receiving a communication from behind the network address translation device.

28. A computer program product comprising:

a computer usable medium for storing data; and

a set of computer program instructions embodied on the computer usable medium, including instructions to:

receive communications from a network device effecting network address translation; and

infer partitioning of servers into equivalence sets relative to the network topology induced by the network address translation.

29. Apparatus for determining a topology of a network in the presence of network address translation, comprising:

means for initiating communications from a network which effects network address translation; and

means for monitoring the communication to infer partitioning of servers into equivalence sets relative to the network topology induced by the network address translation.

30. In a network device beyond a network address translation device, a method for determining a topology of a network in the presence of network address translation, the method comprising:

receiving communication messages from a network device effecting network address translation; and

inferring partitioning of servers into equivalence sets relative to the network topology induced by the network address translation.

31. The method according to Claim 30 wherein the messages received include at least one source address in the message.

32. The method according to Claim 31 further including comparing an apparent source address of a message against an actual source address provided in the message.

33. The method according to Claim 31 further including maintaining at least one translated address set, the source address being stored in the translated address set.

34. The method according to Claim 30 further including storing a database of translated address sets.

35. The method according to Claim 34 further including comparing apparent message source addresses with addresses stored in the database of translated address sets.

36. The method according to Claim 35 further including removing translated addresses from the translated address sets in the database after exceeding a timeout duration.

37. In a network device located behind a network address translation device, a method for providing communications used to determine a topology of a network in the presence of network address translation, the method comprising:

initiating communications to a server beyond a translation device to effect network address translation; and

providing the actual network address of the processor in a message of the communications.

38. The method according to Claim 37 further including issuing communications in response to receiving a communication from behind the network address translation device.

Quicker Connections - Exhibit 2005
IPR2025-01088 - Page 385

METHOD AND APPARATUS FOR DETERMINING A NETWORK TOPOLOGY IN THE PRESENCE OF NETWORK ADDRESS TRANSLATION

ABSTRACT OF THE DISCLOSURE

The present invention may be used for determining a topology of a network in the presence of network address translation. From an active client behind a translating device, communications are initiated that effect the network address translation. The communications are monitored beyond the translating device to infer partitioning of servers into equivalence sets relative to the network topology induced by the network address translation. Active clients behind the translating device may include a respective actual sending address in a message sent to a server beyond the translating device. The server beyond the translating device distinguishes between communications affected by and not affected by network address translation, which may include comparing an apparent source address of a message against an actual address provided in the message by the active client behind the translation device. The external server may also distinguish between active and passive client messages. The server server may cause a message to a passive client to be redirected to an active client; the active client, in turn, communicates to the external server. The external server stores addresses of devices in translated address sets, which may be maintained in a database and managed in a database manager.

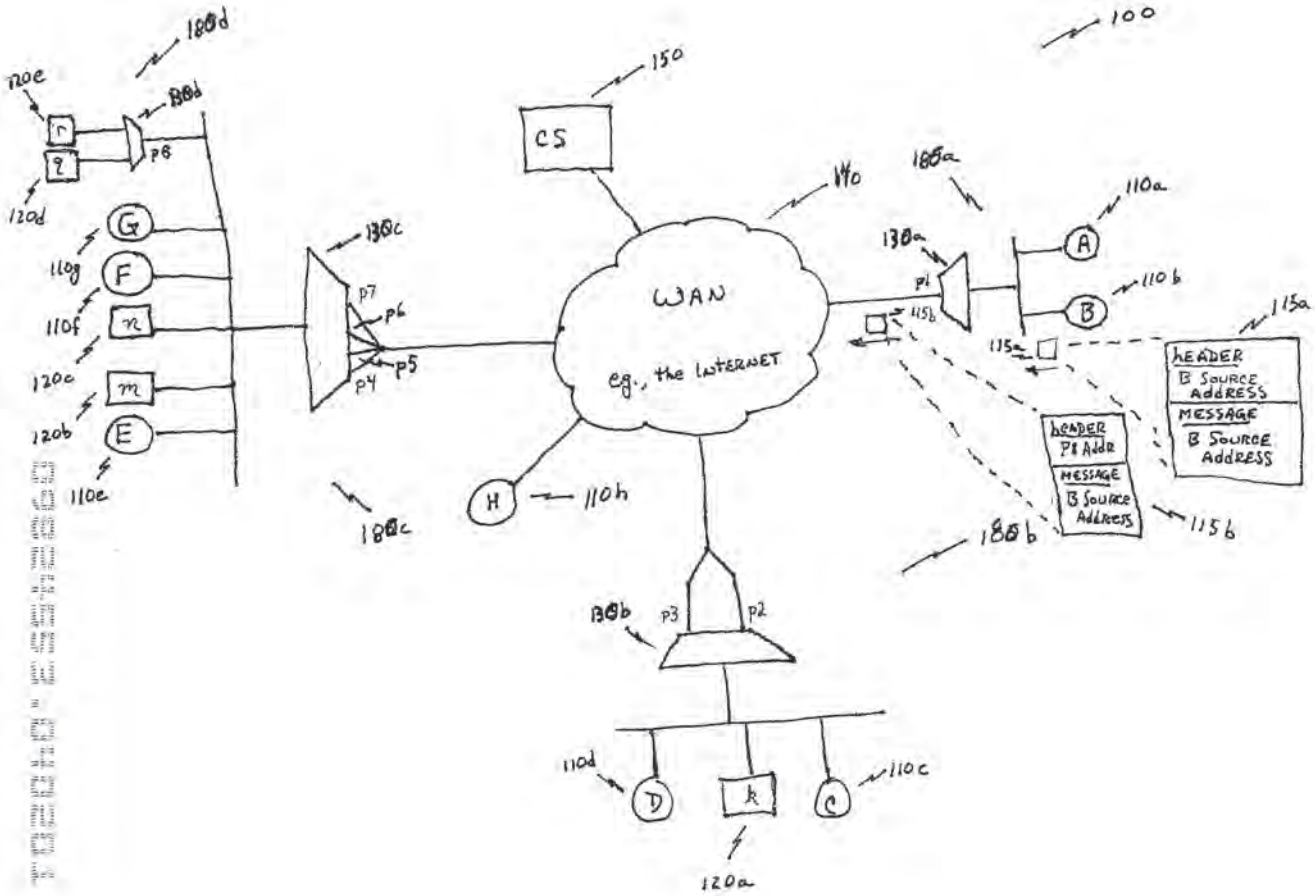

100
150
CS
140
WAN
eg., the INTERNET
180a
180b
180c
180d
130a
130b
130c
130d
P1
P2
P3
P4
P5
P6
P7
P8
110a
110b
110c
110d
110e
110f
110g
110h
115a
115b
HEADER
B SOURCE ADDRESS
MESSAGE
B SOURCE ADDRESS
HEADER
P1 ADDR
MESSAGE
B SOURCE ADDRESS
120a
120b
120c
120d
120e

FIG. 1

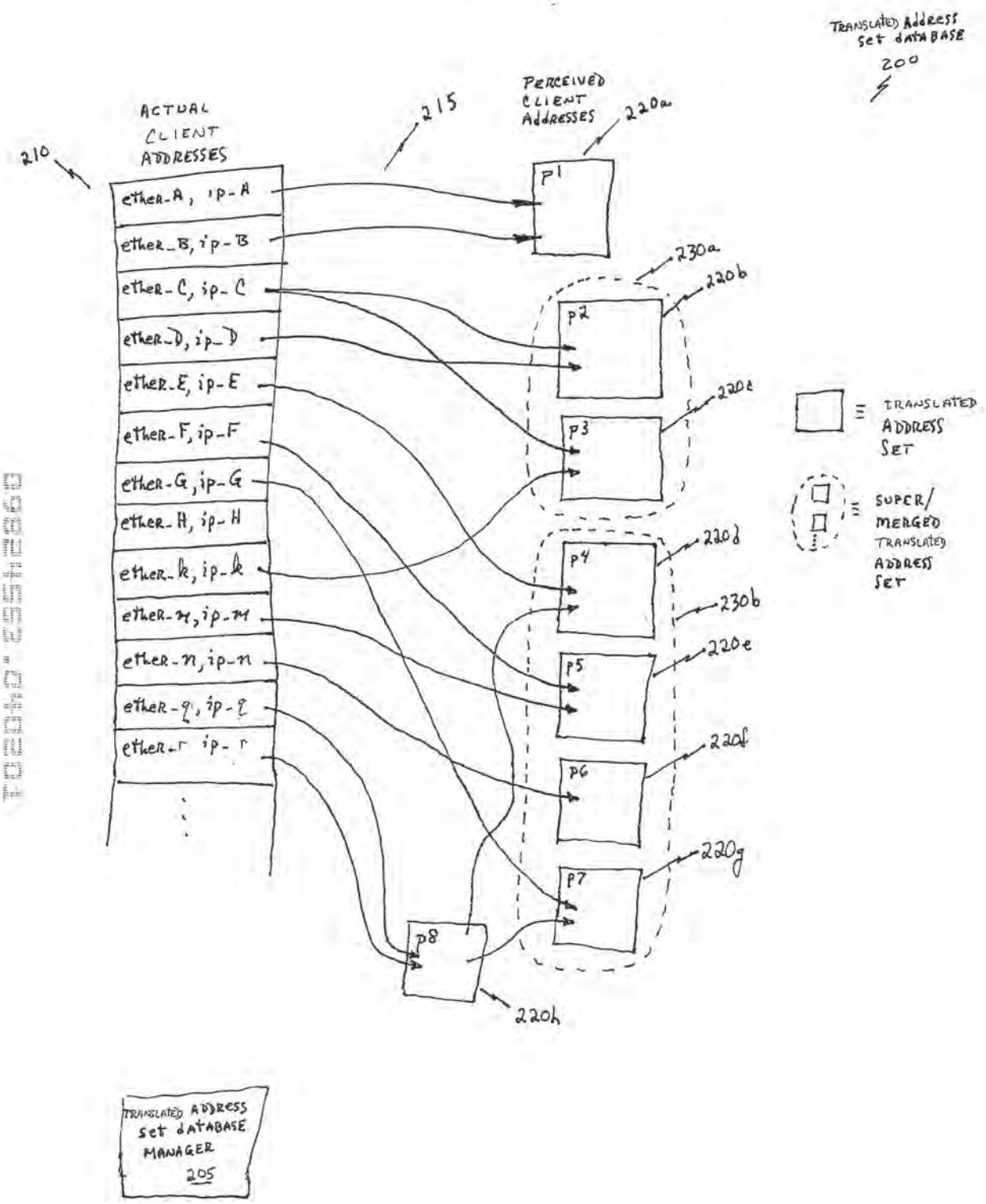

TRANSLATED Address set database
200
ACTUAL CLIENT ADDRESSES
210
215
PERCEIVED CLIENT Addresses
220a
ether-A, ip-A
ether-B, ip-B
ether-C, ip-C
ether-D, ip-D
ether-E, ip-E
ether-F, ip-F
ether-G, ip-G
ether-H, ip-H
ether-k, ip-k
ether-m, ip-m
ether-n, ip-n
ether-q, ip-q
ether-r ip-r
P1
P2
P3
P4
P5
P6
P7
P8
230a
220b
220c
220d
230b
220e
220f
220g
220h
= TRANSLATED ADDRESS SET
= SUPER/ MERGED TRANSLATED ADDRESS SET
TRANSLATED ADDRESS set database MANAGER
205

FIG. 2

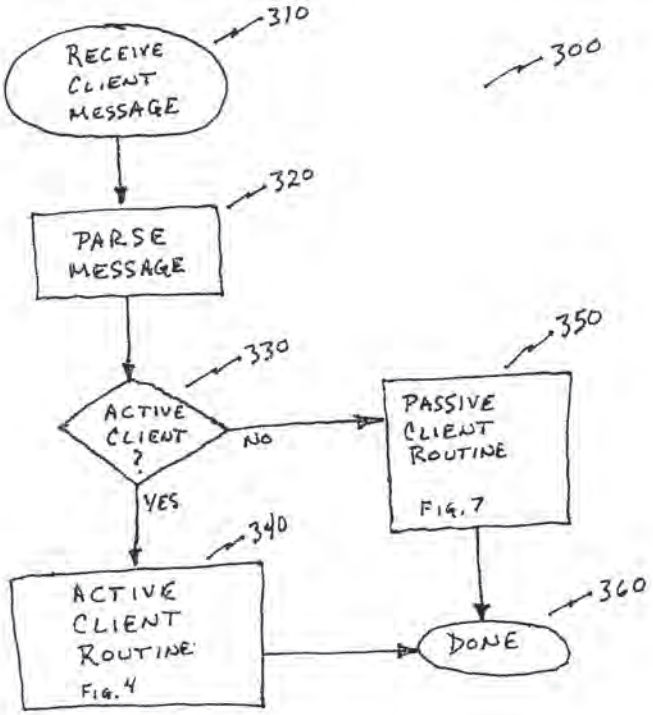

RECEIVE CLIENT MESSAGE
310
300
PARSE MESSAGE
320
ACTIVE CLIENT ?
330
NO
YES
PASSIVE CLIENT ROUTINE
FIG. 7
350
ACTIVE CLIENT ROUTINE
FIG. 4
340
DONE
360

FIG. 3

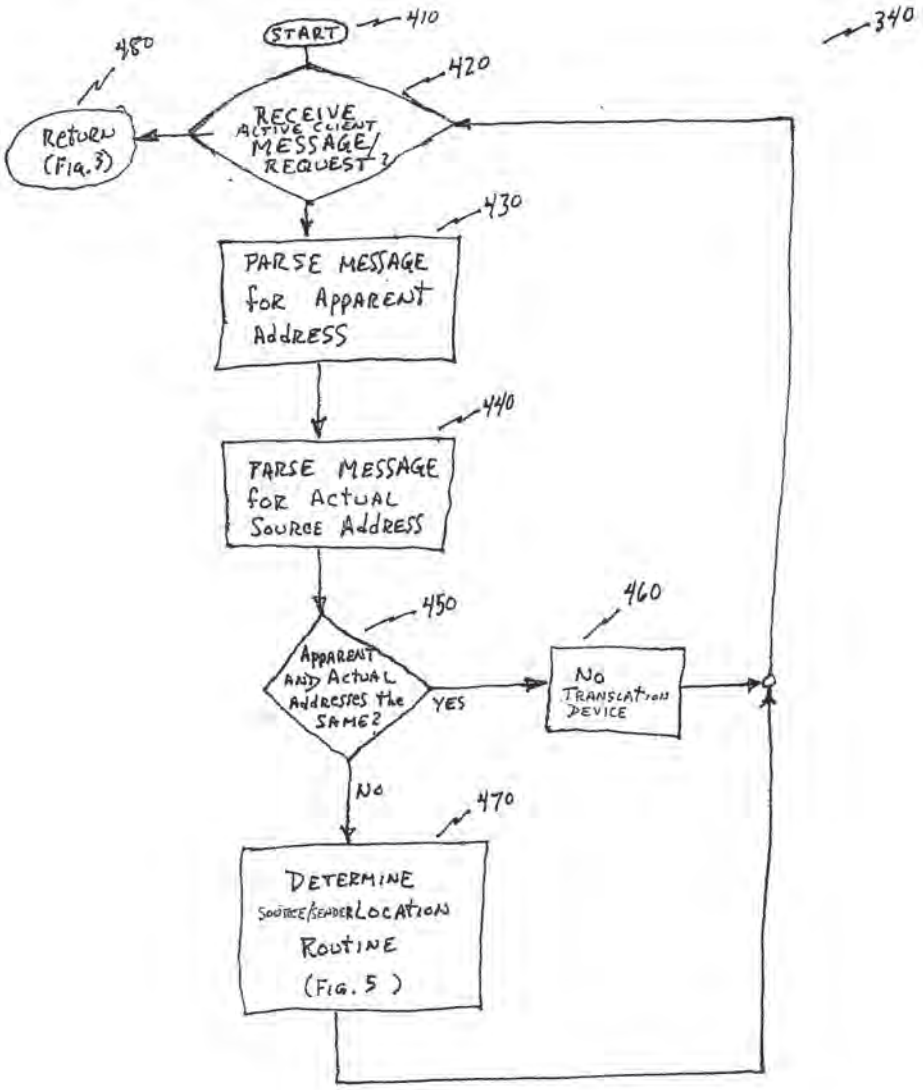

START
410
340
480
420
Return (Fig. 3)
RECEIVE ACTIVE CLIENT MESSAGE/ REQUEST?
430
PARSE MESSAGE for Apparent Address
440
PARSE MESSAGE for Actual Source Address
450
460
Apparent and Actual Addresses the SAME?
YES
No Translation Device
NO
470
DETERMINE Source/Sender Location Routine (Fig. 5)

Fig. 4

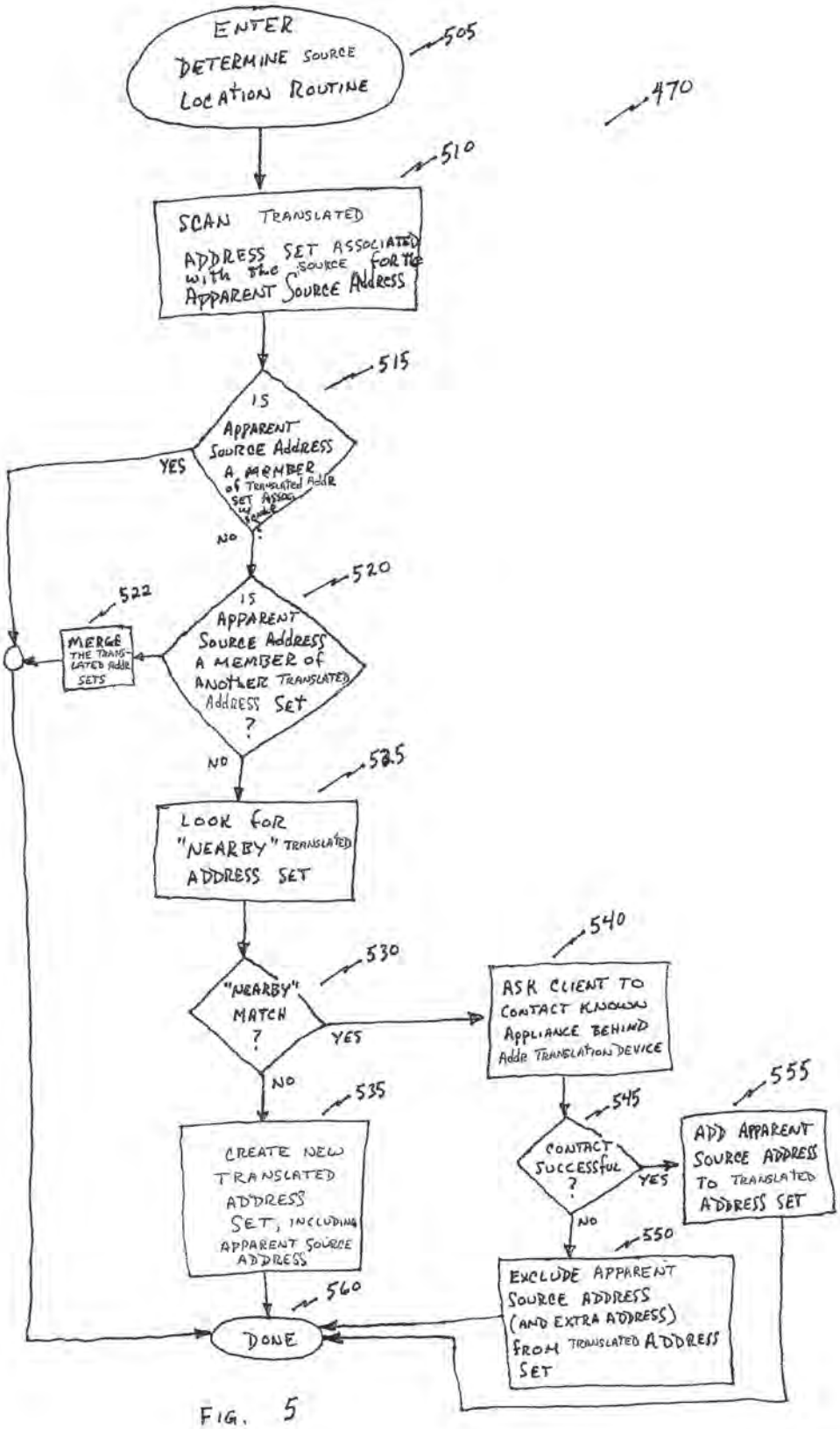

ENTER
DETERMINE SOURCE LOCATION ROUTINE
505
470
510
SCAN TRANSLATED ADDRESS SET ASSOCIATED WITH THE SOURCE FOR THE APPARENT SOURCE ADDRESS
515
IS APPARENT SOURCE ADDRESS A MEMBER of TRANSLATED ADDR SET ASSOC. W/ SOURCE
YES
NO
520
IS APPARENT SOURCE ADDRESS A MEMBER of ANOTHER TRANSLATED ADDRESS SET ?
522
MERGE THE TRANSLATED ADDR SETS
NO
525
LOOK FOR "NEARBY" TRANSLATED ADDRESS SET
530
"NEARBY" MATCH ?
YES
540
ASK CLIENT TO CONTACT KNOWN APPLIANCE BEHIND ADDR TRANSLATION DEVICE
NO
535
CREATE NEW TRANSLATED ADDRESS SET, INCLUDING APPARENT SOURCE ADDRESS
545
CONTACT SUCCESSFUL ?
YES
555
ADD APPARENT SOURCE ADDRESS TO TRANSLATED ADDRESS SET
NO
550
EXCLUDE APPARENT SOURCE ADDRESS (AND EXTRA ADDRESS) FROM TRANSLATED ADDRESS SET
560
DONE

FIG. 5

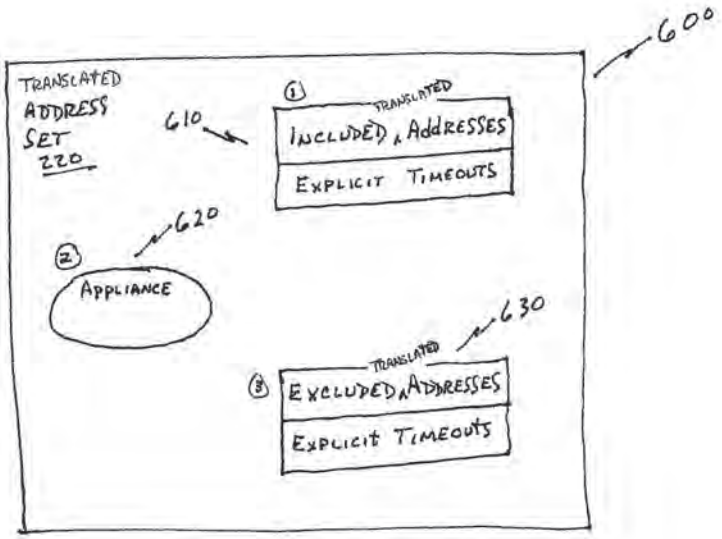

600
TRANSLATED ADDRESS SET 220
610
1
TRANSLATED
INCLUDED ADDRESSES
EXPLICIT TIMEOUTS
620
2
APPLIANCE
630
3
TRANSLATED
EXCLUDED ADDRESSES
EXPLICIT TIMEOUTS

FIG. 6

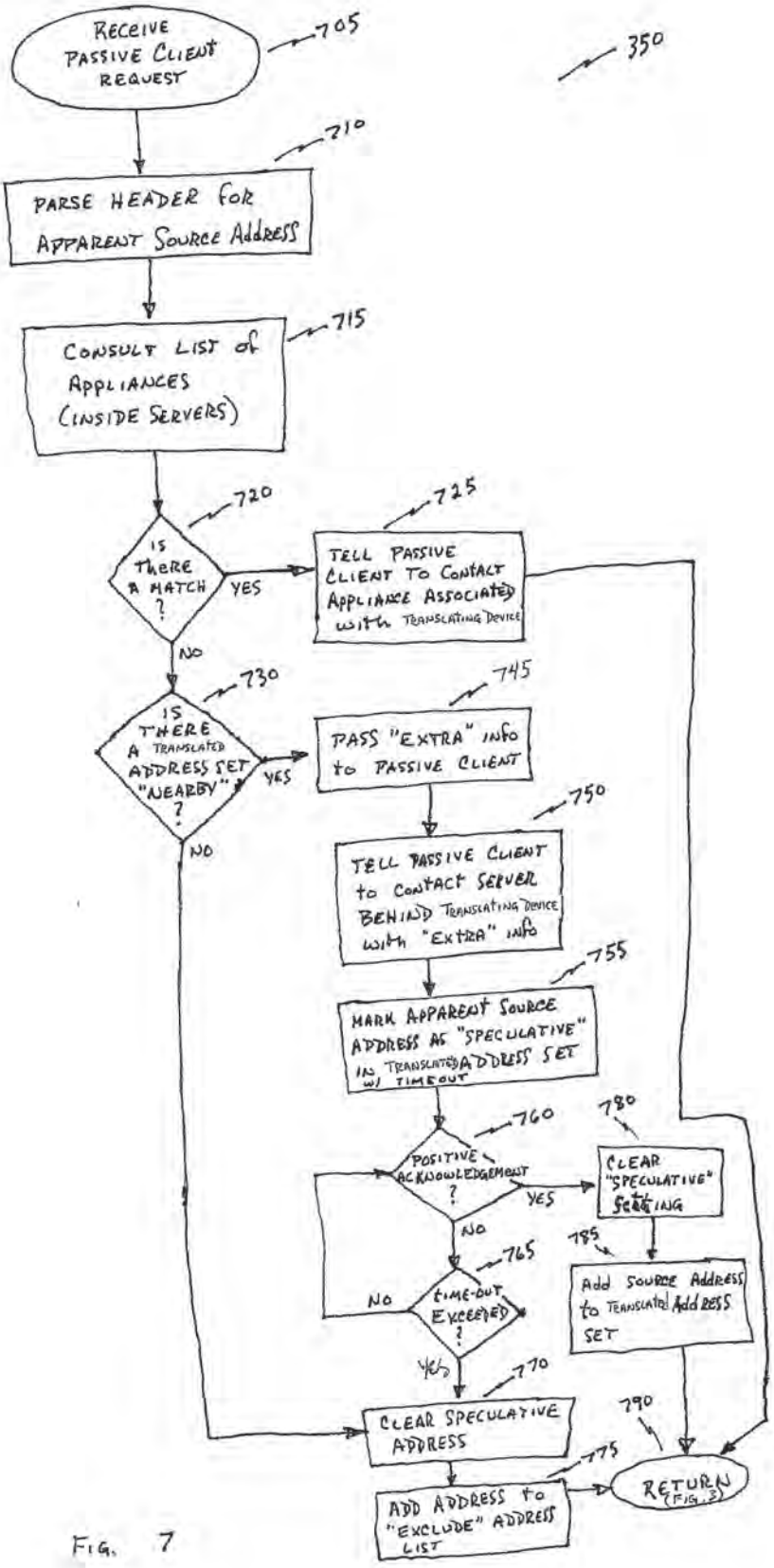

RECEIVE PASSIVE CLIENT REQUEST
705
350
PARSE HEADER FOR APPARENT SOURCE ADDRESS
710
CONSULT LIST of APPLIANCES (INSIDE SERVERS)
715
IS THERE A MATCH ?
720
YES
TELL PASSIVE CLIENT TO CONTACT APPLIANCE ASSOCIATED WITH TRANSLATING DEVICE
725
NO
IS THERE A TRANSLATED ADDRESS SET "NEARBY" ?
730
YES
PASS "EXTRA" INFO to PASSIVE CLIENT
745
NO
TELL PASSIVE CLIENT to CONTACT SERVER BEHIND TRANSLATING DEVICE WITH "EXTRA" INFO
750
MARK APPARENT SOURCE ADDRESS AS "SPECULATIVE" IN TRANSLATED ADDRESS SET W/ TIMEOUT
755
POSITIVE ACKNOWLEDGEMENT ?
760
YES
CLEAR "SPECULATIVE" SETTING
780
NO
TIME-OUT EXCEEDED ?
765
NO
YES
Add SOURCE ADDRESS to TRANSLATED ADDRESS SET
785
CLEAR SPECULATIVE ADDRESS
770
ADD ADDRESS to "EXCLUDE" ADDRESS LIST
775
RETURN (FIG. 3)
790

FIG. 7

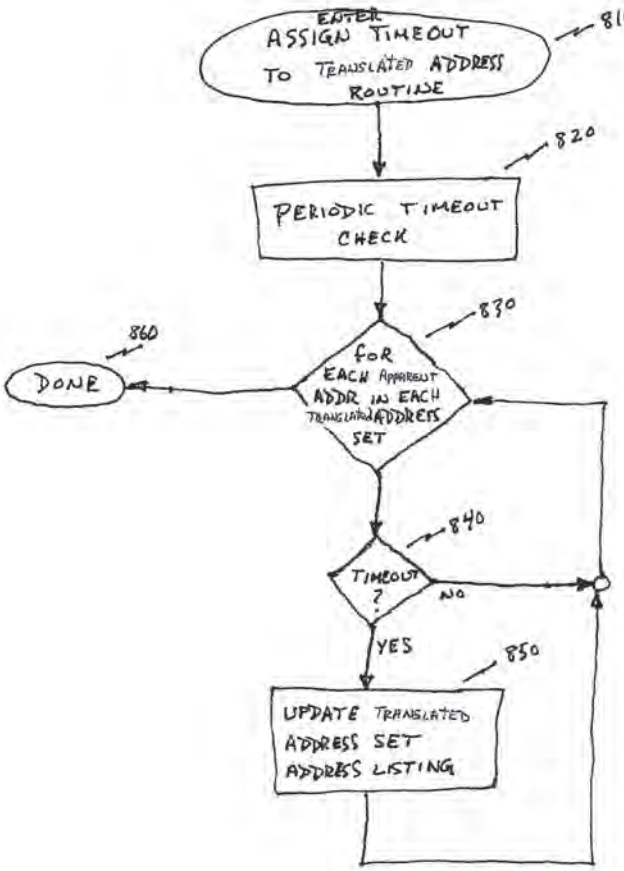

ENTER
ASSIGN TIMEOUT TO TRANSLATED ADDRESS ROUTINE
810
800
820
PERIODIC TIMEOUT CHECK
830
FOR EACH APPARENT ADDR IN EACH TRANSLATED ADDRESS SET
860
DONE
840
TIMEOUT ?
NO
YES
850
UPDATE TRANSLATED ADDRESS SET ADDRESS LISTING

FIG. 8

PATENT APPLICATION FEE DETERMINATION RECORD
Effective October 1, 2000

Application or Docket Number

CLAIMS AS FILED - PART I

	(Column 1)	(Column 2)
TOTAL CLAIMS	38	
FOR	NUMBER FILED	NUMBER EXTRA
TOTAL CHARGEABLE CLAIMS	38 minus 20=	* 18
INDEPENDENT CLAIMS	7 minus 3 =	* 4
MULTIPLE DEPENDENT CLAIM PRESENT		☐

* If the difference in column 1 is less than zero, enter "0" in column 2

SMALL ENTITY TYPE ☐		OR	OTHER THAN SMALL ENTITY	
RATE	FEE		RATE	FEE
BASIC FEE	355.00	OR	BASIC FEE	710.00
X$ 9=		OR	X$18=	324.00
X40=		OR	X80=	320.00
+135=		OR	+270=	
TOTAL		OR	TOTAL	1354.00

CLAIMS AS AMENDED - PART II

AMENDMENT A

	(Column 1)		(Column 2)	(Column 3)
	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
Total	*	Minus	**	=
Independent	*	Minus	***	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM				☐

SMALL ENTITY		OR	OTHER THAN SMALL ENTITY	
RATE	ADDITIONAL FEE		RATE	ADDITIONAL FEE
X$ 9=		OR	X$18=	
X40=		OR	X80=	
+135=		OR	+270=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

AMENDMENT B

	(Column 1)		(Column 2)	(Column 3)
	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
Total	*	Minus	**	=
Independent	*	Minus	***	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM				☐

RATE	ADDITIONAL FEE		RATE	ADDITIONAL FEE
X$ 9=		OR	X$18=	
X40=		OR	X80=	
+135=		OR	+270=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

AMENDMENT C

	(Column 1)		(Column 2)	(Column 3)
	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
Total	*	Minus	**	=
Independent	*	Minus	***	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM				☐

RATE	ADDITIONAL FEE		RATE	ADDITIONAL FEE
X$ 9=		OR	X$18=	
X40=		OR	X80=	
+135=		OR	+270=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. 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 number found in the appropriate box in column 1.

FORM PTO-875
(Rev. 8/00)

Patent and Trademark Office, U.S. DEPARTMENT OF COMMERCE
*U.S. GPO: 2000-460-703/30103

CLAIMS ONLY

SERIAL NO.	FILING DATE
APPLICANT(S)	

CLAIMS

	AS FILED		AFTER 1st AMENDMENT		AFTER 2nd AMENDMENT	
	IND.	DEP.	IND.	DEP.	IND.	DEP.
1	1					
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19	1					
20						
21						
22						
23						
24						
25						
26	1					
27		1				
28	1					
29	1					
30	1					
31						
32						
33						
34						
35						
36						
37	1					
38		1				
39						
40						
41						
42						
43						
44						
45						
46						
47						
48						
49						
50						
TOTAL IND.	7	⇩		⇩		⇩
TOTAL DEP.	31					
TOTAL CLAIMS	38					

	*		*		*	
	IND.	DEP.	IND.	DEP.	IND.	DEP.
51						
52						
53						
54						
55						
56						
57						
58						
59						
60						
61						
62						
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64						
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90						
91						
92						
93						
94						
95						
96						
97						
98						
99						
100						
TOTAL IND.		⇩		⇩		⇩
TOTAL DEP.						
TOTAL CLAIMS						

* *MAY BE USED FOR ADDITIONAL CLAIMS OR ADMENDMENTS*

FORM PTO-2022 (1-98)

U.S.DEPARTMENT OF COMMERCE
Patent and Trademark Office

*U.S. Government Printing Office: 1998 - 433-214/70303

HAMILTON, BROOK, SMITH & REYNOLDS, P.C.

NONPUBLICATION REQUEST AND CERTIFICATION UNDER 35 U.S.C. 122(b)(2)(B)(i)	First Named Inventor	Kirk Johnson
	Attorney Docket No.	2762.2002-002
	Express Mail Label No.	EL762238222US
Title of Invention	METHOD AND APPARATUS FOR DETERMINING A NETWORK TOPOLOGY IN THE PRESENCE OF NETWORK ADDRESS TRANSLATION	

Pursuant to 37 C.F.R. § 1.213(a)(3), I hereby 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. I hereby request that the attached application not be published under 35 U.S.C. 122(b).

The undersigned is an attorney/agent for applicant(s).

4/2/01
Date

Mark B Solomon
Mark B. Solomon
Registration No. 44,348
Telephone No. (781) 861-6240
Facsimile No. (781) 861-9540

If applicant subsequently files an application directed to the invention disclosed in the attached application in another country, or under a multilateral international agreement, that requires publication of applications eighteen months after filing, the applicant **must** notify that United States Patent and Trademark Office of such filing within forty-five (45) days after that date of the filing of such foreign or international application. **Failure to do so will result in abandonment of this application (35 U.S.C. 122(b)(2)(B)(iii)).**

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