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APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/815,165	05/13/2014	8725700	08610004C3	1819

30743 7590 04/23/2014

WHITHAM, CURTIS & CHRISTOFFERSON & COOK, P.C.
11491 SUNSET HILLS ROAD
SUITE 340
RESTON, VA 20190

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 284 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

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

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

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

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

Theodore S. Rappaport, Riner, VA;

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PTO/SB/08a (07-09)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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Substitute for form 1449/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 2 of 3

Complete if Known	
Application Number	12/815,165
Filing Date	06-14-2010
First Named Inventor	Rappaport
Art Unit	2157
Examiner Name	Channavajjala
Attorney Docket Number	08610004C3

U. S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	20	US- 20100165862	07-01-2010	Nylander et al.	
	21	US- 20010034204	10-25-2001	Pentikainen	
	22	US- 20060143111	06-29-2006	Mylet	
	23	US- 20080031211	02-07-2008	Kalavade et al.	
	24	US- 20090089399	04-02-2009	Beck et al.	
	25	US- 20100167732	07-01-2010	Vakil et al.	
	26	US- 20110058657	03-10-2011	Alegret et al.	
	27	US- 20110257986	10-20-2011	Deanne et al.	
	28	US- 20020155843	10-24-2002	Bahl et al.	
	29	US- 20030026231	02-06-2003	Lazaridis et al.	
	30	US- 20060203738	09-14-2006	Fok et al.	
	31	US- 20030072425	04-17-2003	Hurst, Michael	
	32	US- 20070155411	07-05-2007	Morrison, James	
	33	US- 20040088333	05-06-2004	Sidman, David	
	34	US- 20030200296	10-23-2003	Lindsey, Terry P.	
Change(s) applied to document, /A.E.M./ 2/25/2014	35	US- 20050130667	06-16-2005	Boiero et al.	
	36	US- 20110002242	~~08-18-2004~~ 01/2011	Perlow et al.	
	37	US- 20040143529	07-22-2004	Frattalone, Nicholas	
		US-			

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3]-Number[4]-Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages Or Relevant Figures Appear	T[6]

Examiner Signature	/Srirama Channavajjala/	Date Considered	12/06/2013

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. [1] Applicant's unique citation designation number (optional). [2] See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [3] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [6] Applicant is to place a check mark here if English language Translation is attached.

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours 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, 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 (1-800-786-9199) and select option 2.

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

Doc code: IDS

Doc description: Information Disclosure Statement (IDS) Filed

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

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	12815165
Filing Date	2010-06-14
First Named Inventor	Theodore S. Rappaport
Art Unit	2165
Examiner Name	Abel Jalil Neveen
Attorney Docket Number	110-009US

U.S.PATENTS

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	6757543		2004-06-29	Moran et al.	
	2	6542588		2003-04-03	Mashinsky	
	3	6405028		2002-06-11	DePaola et al.	
Change(s) applied to document, /AEM/ 2/26/2014	4	6061558		2000 ~~2009~~-05-09	Kennedy, III ~~Kennedy~~ et al.	
	5	6628934		2003-09-30	Rosenberg et al.	
	6	7246045		2007-07-17	Rappaport et al.	
	7	7286971		2007-10-23	Rappaport et al.	
	8	7096160		2006-08-22	Skidmore et al.	

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

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

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United States Patent and Trademark Office
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www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
12/815,165	06/14/2010	2157	2664	08610004C3	82	7

CONFIRMATION NO. 1819

CORRECTED FILING RECEIPT

30743
WHITHAM, CURTIS & CHRISTOFFERSON & COOK, P.C.
11491 SUNSET HILLS ROAD
SUITE 340
RESTON, VA 20190

Date Mailed: 03/31/2014

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

Inventor(s)

Theodore S. Rappaport, Riner, VA;

Applicant(s)

Theodore S. Rappaport, Riner, VA;

Power of Attorney: The patent practitioners associated with Customer Number 30743

Domestic Priority data as claimed by applicant

This application is a CON of 12/208,007 09/10/2008 PAT 8224794
which claims benefit of 60/971,175 09/10/2007
and claims benefit of 60/977,582 10/04/2007
and claims benefit of 61/028,261 02/13/2008

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

If Required, Foreign Filing License Granted: 06/21/2010

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 12/815,165**

Projected Publication Date: Not Applicable

Non-Publication Request: No

Early Publication Request: No
** **SMALL ENTITY** **

Title

CLEARINGHOUSE SYSTEMS AND METHODS FOR COLLECTING OR PROVIDING QUALITY OR PERFORMANCE DATA FOR ENHANCED AVAILABILITY OF WIRELESS COMMUNICATIONS

Preliminary Class

707

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

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

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

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

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

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

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

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

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PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail Mail Stop ISSUE FEE
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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)

30743 7590 01/08/2014
WHITHAM, CURTIS & CHRISTOFFERSON & COOK, P.C.
11491 SUNSET HILLS ROAD
SUITE 340
RESTON, VA 20190

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
12/815,165	06/14/2010	Theodore S. Rappaport	08610004C3	1819

TITLE OF INVENTION: CLEARINGHOUSE SYSTEMS AND METHODS FOR COLLECTING OR PROVIDING QUALITY OR PERFORMANCE DATA FOR ENHANCED AVAILABILITY OF WIRELESS COMMUNICATIONS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$480	$0	$0	$480	04/08/2014

EXAMINER	ART UNIT	CLASS-SUBCLASS
CHANNAVAJJALA, SRIRAMA T	2157	707-688000

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 Whitham Curtis Christofferson & Cook, 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 (B) RESIDENCE: (CITY and STATE OR COUNTRY)

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

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

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**
☐ A check is enclosed.
☐ Payment by credit card. Form PTO-2038 is attached.
☒ The Director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number 50-2041 (enclose an extra copy of this form).

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

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

Authorized Signature _____ Date March 28, 2014

Typed or printed name Michael E. Whitham Registration No. 32,635

Samsung Ex. 1004, page 7 of 974

Electronic Patent Application Fee Transmittal

Application Number:	12815165
Filing Date:	14-Jun-2010
Title of Invention:	CLEARINGHOUSE SYSTEMS AND METHODS FOR COLLECTING OR PROVIDING QUALITY OR PERFORMANCE DATA FOR ENHANCED AVAILABILITY OF WIRELESS COMMUNICATIONS
First Named Inventor/Applicant Name:	Theodore S. Rappaport
Filer:	Michael E. Whitham/karen lumpkins
Attorney Docket Number:	08610004C3

Filed as Small Entity

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Utility Appl Issue Fee	2501	1	480	480
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
			Total in USD ($)	**480**

Electronic Acknowledgement Receipt

EFS ID:	18614412
Application Number:	12815165
International Application Number:	
Confirmation Number:	1819
Title of Invention:	CLEARINGHOUSE SYSTEMS AND METHODS FOR COLLECTING OR PROVIDING QUALITY OR PERFORMANCE DATA FOR ENHANCED AVAILABILITY OF WIRELESS COMMUNICATIONS
First Named Inventor/Applicant Name:	Theodore S. Rappaport
Customer Number:	30743
Filer:	Michael E. Whitham/karen lumpkins
Filer Authorized By:	Michael E. Whitham
Attorney Docket Number:	08610004C3
Receipt Date:	28-MAR-2014
Filing Date:	14-JUN-2010
Time Stamp:	15:14:54
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	$480
RAM confirmation Number	1514
Deposit Account	502041
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)

1	Issue Fee Payment (PTO-85B)	08610004C3-payIF.pdf	52410 8e4b27dde05dce77f90fce28e47b1J5/8eca7442	no	1
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	30604 dda63563733b1d3510a84a5364504d77ed7dab3a	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	83014		

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.

IN THE U.S. PATENT AND TRADEMARK OFFICE

In re Application of:
Rappaport

Ser. No. 12,815,165

Filed: June 14, 2010

Confirmation No.: 1819

Group Art Unit: 2157

Examiner: Channavajjala

For: Clearinghouse Systems and Methods for Collecting or Providing Quality or Performance Data for Enhanced Availability of Wireless Communications

REQUEST FOR CORRECTED FILING RECEIPT

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

Sir:

This application has been allowed but the issue fee has not yet been paid. Attached is a copy of the Official Filing Receipt. Please delete the current title and insert the following correct title:

Clearinghouse Systems and Methods for Collecting or Providing Quality or Performance Data for Enhanced Availability of Wireless Communications

The title was amended in a Supplemental Amendment filed in the USPTO May 29, 2013

Also attached is an "corrected" ADS that now give the correct, amended title. Please forward to the undersigned a Corrected Filing Receipt. If any fees are due by the filing of this paper, please charge Deposit Account 50-2041.

Respectfully submitted,

Michael E. Whitham/Reg. No. 32,635

Date: 3-12-14

Whitham, Curtis & Christofferson, PC
11491 Sunset Hills Road - #340
Reston, VA 20190
703/787-9400
Customer No. 30743

UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
12/815,165	06/14/2010	2617	2514	110-009US	82	7

CONFIRMATION NO. 1819

Whitham Curtis Christofferson & Cook, PC
11491 Sunset Hills Road - #340
Reston, VA 20190
703/787-9400
CUSTOMER NO. 30743

FILING RECEIPT

OC000000042211394

COPY

Date Mailed: 06/22/2010

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

Applicant(s)

Theodore S. Rappaport, Residence Not Provided;

Power of Attorney: The patent practitioners associated with Customer Number 63409

Domestic Priority data as claimed by applicant

This application is a CON of 12/208,007 09/10/2008
which claims benefit of 60/971,175 09/10/2007
and claims benefit of 60/977,582 10/04/2007
and claims benefit of 61/028,261 02/13/2008

Foreign Applications

If Required, Foreign Filing License Granted: 06/21/2010

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 12/815,165**

Projected Publication Date: 09/30/2010

Non-Publication Request: No

Early Publication Request: No
** SMALL ENTITY **

CLEARINGHOUSE SYSTEMS AND METHODS FOR COLLECTING OR PROVIDING QUALITY OR PERFORMANCE DATA FOR ENHANCED AVAILABILITY OF WIRELESS COMMUNICATIONS

Title

Clearinghouse System and Method for Determining Availability of Carrier-Based Services and Enhancing the Quality, Operation and Accessibility of Carrier-Based Networks

Preliminary Class

455

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

COPY

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

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

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

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

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4158).

LICENSE FOR FOREIGN FILING UNDER

COPY

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where

the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

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

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

NOT GRANTED

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

CORRECTED ADS

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

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	08610004C3
	Application Number	
Title of Invention	Clearinghouse Systems and Method Collecting or Providing Quality or Performance Data for Enhanced Availability of Wireless Communications	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Inventor Information:

Inventor 1 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Theodore	S.	Rappaport	

Residence Information (Select One) ◉ US Residency ○ Non US Residency ○ Active US Military Service

City	Riner	State/Province	VA	Country of Residence	US

Mailing Address of Inventor:

Address 1	2515 Camp Carysbrook Road		
Address 2			
City	Riner	State/Province	
Postal Code	24149	Country	US

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below.
For further information see 37 CFR 1.33(a).

☐ **An Address is being provided for the correspondence Information of this application.**

Customer Number	30743		
Email Address	action@wcc-ip.com	Add Email	Remove Email

Application Information:

Title of the Invention	Clearinghouse Systems and Method Collecting or Providing Quality or Performance Data for Enhanced Availability of Wireless Communications		
Attorney Docket Number	08610004C3	Small Entity Status Claimed	☒
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	15	Suggested Figure for Publication (if any)	

Filing By Reference :

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	08610004C3
	Application Number	
Title of Invention	Clearinghouse Systems and Method Collecting or Providing Quality or Performance Data for Enhanced Availability of Wireless Communications	

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).
Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	◉ Customer Number	○ US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	30743		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) or indicate National Stage entry from a PCT application. Providing this information in the application data sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.
When referring to the current application, please leave the application number blank.

Prior Application Status	Patented			Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
	Continuation of	12208007	2008-09-10	8224794	2012-07-17

Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
12208007	Claims benefit of provisional	61028261	2008-02-13

Prior Application Status	Expired	Remove

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	08610004C3
	Application Number	
Title of Invention	Clearinghouse Systems and Method Collecting or Providing Quality or Performance Data for Enhanced Availability of Wireless Communications	

Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
12208007	Claims benefit of provisional	60977582	2007-10-04
Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
12208007	Claims benefit of provisional	60971175	2007-09-10

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button.

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55(d). When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)[i] the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(h)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Remove

Application Number	Country[i]	Filing Date (YYYY-MM-DD)	Access Code[j] (if applicable)

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button.

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.
NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

Authorization to Permit Access:

☒ Authorization to Permit Access to the Instant Application by the Participating Offices

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

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	08610004C3
	Application Number	
Title of Invention	Clearinghouse Systems and Method Collecting or Providing Quality or Performance Data for Enhanced Availability of Wireless Communications	

If checked, the undersigned hereby grants the USPTO authority to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the World Intellectual Property Office (WIPO), and any other intellectual property offices in which a foreign application claiming priority to the instant patent application is filed access to the instant patent application. See 37 CFR 1.14(c) and (h). This box should not be checked if the applicant does not wish the EPO, JPO, KIPO, WIPO, or other intellectual property office in which a foreign application claiming priority to the instant patent application is filed to have access to the instant patent application.

In accordance with 37 CFR 1.14(h)(3), access will be provided to a copy of the instant patent application with respect to: 1) the instant patent application-as-filed; 2) any foreign application to which the instant patent application claims priority under 35 U.S.C. 119(a)-(d) if a copy of the foreign application that satisfies the certified copy requirement of 37 CFR 1.55 has been filed in the instant patent application; and 3) any U.S. application-as-filed from which benefit is sought in the instant patent application.

In accordance with 37 CFR 1.14(c), access may be provided to information concerning the date o f filing this Authorization.

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Applicant 1

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

◯ Assignee	◯ Legal Representative under 35 U.S.C. 117	◯ Joint Inventor
◯ Person to whom the inventor is obligated to assign.	◯ Person who shows sufficient proprietary interest	

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor :

If the Applicant is an Organization check here. ☐

Prefix	Given Name	Middle Name	Family Name	Suffix

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	08610004C3
	Application Number	
Title of Invention	Clearinghouse Systems and Method Collecting or Providing Quality or Performance Data for Enhanced Availability of Wireless Communications	

Mailing Address Information For Applicant:			
Address 1			
Address 2			
City		**State/Province**	
Country		Postal Code	
Phone Number		Fax Number	
Email Address			

Additional Applicant Data may be generated within this form by selecting the Add button.

Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not subsitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Assignee 1

Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication . An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.

If the Assignee or Non-Applicant Assignee is an Organization check here. ☐

Prefix	**Given Name**	Middle Name	**Family Name**	Suffix

Mailing Address Information For Assignee including Non-Applicant Assignee:			
Address 1			
Address 2			
City		**State/Province**	
Country		Postal Code	
Phone Number		Fax Number	
Email Address			

Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	08610004C3
	Application Number	
Title of Invention	Clearinghouse Systems and Method Collecting or Providing Quality or Performance Data for Enhanced Availability of Wireless Communications	

Signature:

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications.					
Signature	/Michael E. Whitham/			Date (YYYY-MM-DD)	2014-03-13
First Name	Michael	Last Name	Whitham	Registration Number	32635
Additional Signature may be generated within this form by selecting the Add button.					

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

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

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

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

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

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

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

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

Electronic Acknowledgement Receipt

EFS ID:	18454346
Application Number:	12815165
International Application Number:	
Confirmation Number:	1819
Title of Invention:	CLEARINGHOUSE SYSTEMS AND METHODS FOR COLLECTING OR PROVIDING QUALITY OR PERFORMANCE DATA FOR ENHANCED AVAILABILITY OF WIRELESS COMMUNICATIONS
First Named Inventor/Applicant Name:	Theodore S. Rappaport
Customer Number:	30743
Filer:	Michael E. Whitham/karen lumpkins
Filer Authorized By:	Michael E. Whitham
Attorney Docket Number:	08610004C3
Receipt Date:	13-MAR-2014
Filing Date:	14-JUN-2010
Time Stamp:	08:42:14
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	Request for Corrected Filing Receipt	08610004C3-req_corr_ofr.pdf	339302 bd70e73a3f9838ed59bc038d2a5306db1d80d/295	no	12

Warnings:	
Information:	

Total Files Size (in bytes):	339302

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

New Applications Under 35 U.S.C. 111

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

National Stage of an International Application under 35 U.S.C. 371

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

New International Application Filed with the USPTO as a Receiving Office

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

UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
12/815,165	06/14/2010	2157	2664	08610004C3	82	7

CONFIRMATION NO. 1819

CORRECTED FILING RECEIPT

30743
WHITHAM, CURTIS & CHRISTOFFERSON & COOK, P.C.
11491 SUNSET HILLS ROAD
SUITE 340
RESTON, VA 20190

Date Mailed: 02/24/2014

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

Inventor(s)

Theodore S. Rappaport, Riner, VA;

Applicant(s)

Theodore S. Rappaport, Riner, VA;

Power of Attorney: The patent practitioners associated with Customer Number 30743

Domestic Priority data as claimed by applicant

This application is a CON of 12/208,007 09/10/2008 PAT 8224794
which claims benefit of 60/971,175 09/10/2007
and claims benefit of 60/977,582 10/04/2007
and claims benefit of 61/028,261 02/13/2008

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

If Required, Foreign Filing License Granted: 06/21/2010

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 12/815,165**

Projected Publication Date: Not Applicable

Non-Publication Request: No

Early Publication Request: No
** **SMALL ENTITY** **

Title

CLEARINGHOUSE SYSTEMS AND METHODS FOR COLLECTING OR PROVIDING QUALITY OR PERFORMANCE DATA FOR ENHANCED AVAILABILITY OF WIRELESS COMMUNICATIONS

Preliminary Class

707

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

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

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

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

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

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

NOT GRANTED

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

SelectUSA

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

UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
12/815,165	06/14/2010	2157	2664	08610004C3	82	7

CONFIRMATION NO. 1819

CORRECTED FILING RECEIPT

30743
WHITHAM, CURTIS & CHRISTOFFERSON & COOK, P.C.
11491 SUNSET HILLS ROAD
SUITE 340
RESTON, VA 20190

Date Mailed: 02/21/2014

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

Inventor(s)

Theodore S. Rappaport, Riner, VA;

Applicant(s)

Theodore S. Rappaport, Riner, VA;

Power of Attorney: The patent practitioners associated with Customer Number 30743

Domestic Priority data as claimed by applicant

This application is a CON of 12/208,007 09/10/2008 PAT 8224794
which claims benefit of 60/971,175 09/10/2007
and claims benefit of 60/977,582 10/04/2007
and claims benefit of 61/028,261 02/13/2008

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

If Required, Foreign Filing License Granted: 06/21/2010

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 12/815,165**

Projected Publication Date: Not Applicable

Non-Publication Request: No

Early Publication Request: No
** **SMALL ENTITY** **

Title

CLEARINGHOUSE SYSTEM AND METHOD FOR DETERMINING AVAILABILITY OF CARRIER-BASED SERVICES AND ENHANCING THE QUALITY, OPERATION AND ACCESSIBILITY OF CARRIER-BASED NETWORKS

Preliminary Class

707

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications:

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

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

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

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

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

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

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

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

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

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

NOT GRANTED

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

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

IN THE U.S. PATENT AND TRADEMARK OFFICE

In re patent application of

T. Rappaport		Confirmation No.:	1819
Serial No.:	12/815,165	Group Art Unit:	2157
Filed:	June 14, 2010	Examiner:	CHANNAVAJJALA
For:	***CLEARINGHOUSE SYSTEM AND METHOD FOR DETERMINING...***		

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

RESPONSE TO NOTICE TO FILE CORRECTED APPLICATION PAPERS

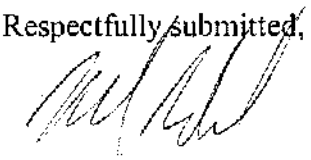
Sir:

In response to the Notice to File Corrected Application Papers mailed February 13, 2014, submitted herewith is the following:

1. An Application Data Sheet, correctly identifying the inventor's residence.

If any extension of time is required with this document, applicant hereby makes a written conditional petition for extension of time. Please charge any deficiencies in fees or credit any overpayment to Attorney's Deposit Account Number 50-3041.

Respectfully submitted,



Michael E. Whitham
Reg. No. 32,635

Whitham, Curtis, Christofferson & Cook, P.C.
11491 Sunset Hills Road, Suite 340
Reston, VA 20190
(703) 787-9400

Customer Number 30743

PTO/AIA/14 (12-13)
Approved for use through 01/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	08610004C3
	Application Number	
Title of Invention	CLEARINGHOUSE SYSTEM AND METHOD FOR DETERMINING AVAILABILITY OF CARRIER-BASED SERVICES AND ENHANCING THE QUALITY, OPERATION AND ACCESSIBILITY OF CARRIER-BASED NETWORKS	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Inventor Information:

Inventor 1 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Theodore	S.	Rappaport	

Residence Information (Select One) ◉ US Residency ○ Non US Residency ○ Active US Military Service

City	Riner	State/Province	VA	Country of Residence i	US

Mailing Address of Inventor:

Address 1	2515 Camp Carysbrook Road		
Address 2			
City	Riner	State/Province	
Postal Code	24149	Country i	US

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below.
For further information see 37 CFR 1.33(a).

☐ **An Address is being provided for the correspondence Information of this application.**

Customer Number	30743		
Email Address	action@wcc-ip.com	Add Email	Remove Email

Application Information:

Title of the Invention	CLEARINGHOUSE SYSTEM AND METHOD FOR DETERMINING AVAILABILITY OF CARRIER-BASED SERVICES AND ENHANCING THE QUALITY, OPERATION AND ACCESSIBILITY OF CARRIER-BASED NETWORKS		
Attorney Docket Number	08610004C3	Small Entity Status Claimed	☒
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	15	Suggested Figure for Publication (if any)	

Filing By Reference :

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Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).
Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	◉ Customer Number	○ US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	30743		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) or indicate National Stage entry from a PCT application. Providing this information in the application data sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.
When referring to the current application, please leave the application number blank.

Prior Application Status	Patented			Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
	Continuation of	12208007	2008-09-10	8224794	2012-07-17

Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
12208007	Claims benefit of provisional	61028261	2008-02-13

Prior Application Status	Expired	Remove

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	08610004C3
	Application Number	
Title of Invention	CLEARINGHOUSE SYSTEM AND METHOD FOR DETERMINING AVAILABILITY OF CARRIER-BASED SERVICES AND ENHANCING THE QUALITY, OPERATION AND ACCESSIBILITY OF CARRIER-BASED NETWORKS	

Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
12208007	Claims benefit of provisional	60977582	2007-10-04
Prior Application Status	Expired	Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
12208007	Claims benefit of provisional	60971175	2007-09-10
Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button.		Add	

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55(d). When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX) [i] the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(h)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Remove

Application Number	Country [i]	Filing Date (YYYY-MM-DD)	Access Code [i] (if applicable)

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button. Add

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.
NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

Authorization to Permit Access:

☒ Authorization to Permit Access to the Instant Application by the Participating Offices

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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	08610004C3
	Application Number	
Title of Invention	CLEARINGHOUSE SYSTEM AND METHOD FOR DETERMINING AVAILABILITY OF CARRIER-BASED SERVICES AND ENHANCING THE QUALITY, OPERATION AND ACCESSIBILITY OF CARRIER-BASED NETWORKS	

If checked, the undersigned hereby grants the USPTO authority to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the World Intellectual Property Office (WIPO), and any other intellectual property offices in which a foreign application claiming priority to the instant patent application is filed access to the instant patent application. See 37 CFR 1.14(c) and (h). This box should not be checked if the applicant does not wish the EPO, JPO, KIPO, WIPO, or other intellectual property office in which a foreign application claiming priority to the instant patent application is filed to have access to the instant patent application.

In accordance with 37 CFR 1.14(h)(3), access will be provided to a copy of the instant patent application with respect to: 1) the instant patent application-as-filed; 2) any foreign application to which the instant patent application claims priority under 35 U.S.C. 119(a)-(d) if a copy of the foreign application that satisfies the certified copy requirement of 37 CFR 1.55 has been filed in the instant patent application; and 3) any U.S. application-as-filed from which benefit is sought in the instant patent application.

In accordance with 37 CFR 1.14(c), access may be provided to information concerning the date of filing this Authorization.

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Applicant 1 Remove

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

◯ Assignee	◯ Legal Representative under 35 U.S.C. 117	◯ Joint Inventor
◯ Person to whom the inventor is obligated to assign.	◯ Person who shows sufficient proprietary interest	

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor :

If the Applicant is an Organization check here. ☐

Prefix	**Given Name**	Middle Name	**Family Name**	Suffix

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	08610004C3
	Application Number	
Title of Invention	CLEARINGHOUSE SYSTEM AND METHOD FOR DETERMINING AVAILABILITY OF CARRIER-BASED SERVICES AND ENHANCING THE QUALITY, OPERATION AND ACCESSIBILITY OF CARRIER-BASED NETWORKS	

Mailing Address Information:			
Address 1			
Address 2			
City		**State/Province**	
Country i		Postal Code	
Phone Number		Fax Number	
Email Address			

Additional Applicant Data may be generated within this form by selecting the Add button. Add

Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not subsitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Assignee 1

Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication . An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.

Remove

If the Assignee or Non-Applicant Assignee is an Organization check here. ☐

Prefix	**Given Name**	Middle Name	**Family Name**	Suffix

Mailing Address Information For Assignee including Non-Applicant Assignee:			
Address 1			
Address 2			
City		**State/Province**	
Country i		Postal Code	
Phone Number		Fax Number	
Email Address			

Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button. Add

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	Application Number	
Title of Invention	CLEARINGHOUSE SYSTEM AND METHOD FOR DETERMINING AVAILABILITY OF CARRIER-BASED SERVICES AND ENHANCING THE QUALITY, OPERATION AND ACCESSIBILITY OF CARRIER-BASED NETWORKS	

Signature:

Remove

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

Signature	/Michael E. Whitham/			Date (YYYY-MM-DD)	2014-02-19
First Name	Michael	Last Name	Whitham	Registration Number	32635

Additional Signature may be generated within this form by selecting the Add button. Add

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

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

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

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

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

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

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

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

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

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

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

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

Electronic Acknowledgement Receipt

EFS ID:	18237038
Application Number:	12815165
International Application Number:	
Confirmation Number:	1819
Title of Invention:	CLEARINGHOUSE SYSTEM AND METHOD FOR DETERMINING AVAILABILITY OF CARRIER-BASED SERVICES AND ENHANCING THE QUALITY, OPERATION AND ACCESSIBILITY OF CARRIER-BASED NETWORKS
First Named Inventor/Applicant Name:	Theodore S. Rappaport
Customer Number:	30743
Filer:	Michael E. Whitham/Walter Richardson
Filer Authorized By:	Michael E. Whitham
Attorney Docket Number:	08610004C3
Receipt Date:	19-FEB-2014
Filing Date:	14-JUN-2010
Time Stamp:	11:21:46
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	Transmittal Letter	08610004c3_corrapp.pdf	16504 40b1c47bf2c1ba275f2c45f1b518dfc8e9721f6b	no	1

Warnings:	
Information:	

2	Application Data Sheet	08610004C3_ADS.pdf	1561521 0ad2aJ0b19632d6daf0317b7130c0858d4852fa6	no	7

Warnings:	
Information:	
Total Files Size (in bytes):	1578025

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.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/815,165	06/14/2010	Theodore S. Rappaport	08610004C3	1819

30743 7590 02/13/2014

WHITHAM, CURTIS & CHRISTOFFERSON & COOK, P.C.
11491 SUNSET HILLS ROAD
SUITE 340
RESTON, VA 20190

EXAMINER	
CHANNAVAJJALA, SRIRAMA T	
ART UNIT	**PAPER NUMBER**
2157	
MAIL DATE	**DELIVERY MODE**
02/13/2014	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.

UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

Application No. : 12815165
Applicant : Rappaport
Filing Date : 06/14/2010
Date Mailed : 02/13/2014

NOTICE TO FILE CORRECTED APPLICATION PAPERS

Notice of Allowance Mailed

This application has been accorded an Allowance Date and is being prepared for issuance. The application, however, is incomplete for the reasons below.

Applicant is given two (2) months from the mail date of this Notice within which to respond. This time period for reply is extendable under 37 CFR 1.136(a) for only TWO additional MONTHS.

The informalities requiring correction are indicated in the attachment(s). If the informality pertains to the abstract, specification (including claims) or drawings, the informality must be corrected with an amendment in compliance with 37 CFR 1.121 (or, if the application is a reissue application, 37 CFR 1.173). Such an amendment may be filed after payment of the issue fee if limited to correction of informalities noted herein. See Waiver of 37 CFR 1.312 for Documents Required by the Office of Patent Publication, 1280 Off. Gaz. Patent Office 918 (March 23, 2004). In addition, if the informality is not corrected until after payment of the issue fee, for purposes of 35 U.S.C. 154(b)(1)(iv), "all outstanding requirements" will be considered to have been satisfied when the informality has been corrected. A failure to respond within the above-identified time period will result in the application being ABANDONED.

See attachment(s).

A copy of this notice MUST be returned with the reply. Please address response to "Mail Stop Issue Fee, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450".

/Anthony McPhail/
Publication Branch
Office of Data Management
(571) 272-4200

Application No. 12815165

IDENTIFICATION OF APPLICATION DEFICIENCIES

☐ Applicant must provide legible text for the following item(s).

- ☐ Specification filed , page(s) .
- ☐ Claims filed , claim(s) .
- ☐ Oath/declaration filed .
- ☐ Other: .

☐ Applicant must provide missing information on the following page(s) of the specification by amending the specification to add the missing text. No new matter may be added.

☐ The specification refers to one or more applications by attorney docket number and does not show the U.S. application number(s). Applicant must supply the U.S. application number in place of each attorney docket number.

☐ Applicant must provide an Abstract of the Disclosure.

☐ Applicant has submitted a DECLARATION (37 CFR 1.63) FOR A UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76) (e.g., form PTO/SB/01A). The Application Data Sheet, however, is not present with the filed application. Applicant must submit an Application Data Sheet or file a new oath or declaration (e.g., PTO/SB/01) executed by the inventors and containing the information required in 37 CFR 1.63.

☐ Applicant must provide an executed declaration.

☐ Applicant must provide the missing page(s) of the oath/declaration or Application Data Sheet filed

☐ Applicant must provide a declaration signed by inventor(s) .

☐ The oath/declaration filed shows non-initialed and/or non-dated alterations. Applicant must file a new oath/declaration in compliance with 37 CFR 1.67(a).

☒ Applicant(s) Theodore S. Rappaport in the latest-filed oath/declaration or Application Data Sheet (ADS) did not show the inventor's residence at all, or did not show both a city and state in the U.S. inventor's residence, or did not show both a city and country in the non-U.S. inventor's residence. Applicant must supply an oath/declaration or Application Data Sheet (ADS) that shows each U.S. inventor's city and state of residence and each non-U.S. inventor's city and country of residence.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
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NOTICE OF ALLOWANCE AND FEE(S) DUE

30743 7590 01/08/2014

WHITHAM, CURTIS & CHRISTOFFERSON & COOK, P.C.
11491 SUNSET HILLS ROAD
SUITE 340
RESTON, VA 20190

EXAMINER	
CHANNAVAJJALA, SRIRAMA T	
ART UNIT	PAPER NUMBER
2157	

DATE MAILED: 01/08/2014

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/815,165	06/14/2010	Theodore S. Rappaport	08610004C3	1819

TITLE OF INVENTION: CLEARINGHOUSE SYSTEM AND METHOD FOR DETERMINING AVAILABILITY OF CARRIER-BASED SERVICES AND ENHANCING THE QUALITY, OPERATION AND ACCESSIBILITY OF CARRIER-BASED NETWORKS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$480	$0	$0	$480	04/08/2014

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

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

HOW TO REPLY TO THIS NOTICE:

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

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

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

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

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

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

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

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)

30743 7590 01/08/2014
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11491 SUNSET HILLS ROAD
SUITE 340
RESTON, VA 20190

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.
12/815,165	06/14/2010	Theodore S. Rappaport	08610004C3	1819

TITLE OF INVENTION: CLEARINGHOUSE SYSTEM AND METHOD FOR DETERMINING AVAILABILITY OF CARRIER-BASED SERVICES AND ENHANCING THE QUALITY, OPERATION AND ACCESSIBILITY OF CARRIER-BASED NETWORKS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$480	$0	$0	$480	04/08/2014

EXAMINER	ART UNIT	CLASS-SUBCLASS
CHANNAVAJJALA, SRIRAMA T	2157	707-688000

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, 1
(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. 2 3

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

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

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

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

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

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

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

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

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

Samsung Ex. 1004, page 46 of 974

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.
12/815,165	06/14/2010	Theodore S. Rappaport	086100004C3	1819

30743 7590 01/08/2014

WHITHAM, CURTIS & CHRISTOFFERSON & COOK, P.C.
11491 SUNSET HILLS ROAD
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RESTON, VA 20190

EXAMINER	
CHANNAVAJJALA, SRIRAMA T	
ART UNIT	PAPER NUMBER
2157	

DATE MAILED: 01/08/2014

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 368 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 368 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.

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

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

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

Privacy Act Statement

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

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

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

Examiner-Initiated Interview Summary	**Application No.**	**Applicant(s)**	
	12/815,165	RAPPAPORT, THEODORE S.	
	Examiner	**Art Unit**	
	SRIRAMA CHANNAVAJJALA	2157	

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

(1) *SRIRAMA CHANNAVAJJALA*. (3)_____.

(2) *Michael E. Whitham, Reg. No. 32,635*. (4)_____.

Date of Interview: *06 December 2013*.

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

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

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

Claim(s) discussed: *8,10-12,14,20,22,24,103-105*.

Identification of prior art discussed: _____.

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

On 12/6/ 2013, a telephone call was made to applicant's representative Michael E. Whitham , Reg. no. 32,635, about the amendment to the claims 8,11,14,20,104-105 and cancelling claim 10,12,22,24,103 in order to allow the case. The attorney agreed with the Examiner's proposal and authorization has given for an Examiner's Amendment. Total claims allowed: 8,11,14-20,23,26-28,30,104-105 [re-numbered as 1-16]..

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

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

☒ Attachment

/SRIRAMA CHANNAVAJJALA/ Primary Examiner, Art Unit 2157	

Notice of Allowability	Application No. 12/815,165	Applicant(s) RAPPAPORT, THEODORE S.	
	Examiner SRIRAMA CHANNAVAJJALA	Art Unit 2157	AIA (First Inventor to File) Status No

-- 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 *2/6/2013*.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on_____.
2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.
3. ☒ The allowed claim(s) is/are *8,11,14-20,23,26-28,30,104-105 [re-numbered as: 1-16]*. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPH-feedback@uspto.gov .
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

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

   * Certified copies not received: _____.

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

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

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
4. ☒ Interview Summary (PTO-413), Paper No./Mail Date *12/6/2013* .
5. ☒ Examiner's Amendment/Comment
6. ☒ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/SRIRAMA CHANNAVAJJALA/
Primary Examiner, Art Unit 2157

The present application is being examined under the pre-AIA first to invent provisions.

DETAILED ACTION

Response to RCE-1

1. Claims 8,11,14-20,23,26-28,30,104-105 are allowed in this application.

2. Examiner acknowledges applicants' amendment filed on 2/6/2013.

3. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed 1/19/2007 in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 2/6/2013 is entered.

Drawings

4. The Drawings filed on 6/14/2010 are acceptable for examination purpose

Information Disclosure Statement

5. The information disclosure statement filed on 4/22/2013 .is in compliance with the provisions of 37 CFR 1.97, and has been considered and a copy is enclosed with this Office Action

6. The information disclosure statement filed on 9/24/2012 & 4/4/2012 .is in compliance with the provisions of 37 CFR 1.97, and has been considered and a copy was enclosed with the previous Office Action

7. The information disclosure statement filed on 3/22/2012;1/9/2012;1/27/2011; and 6/14/2010.is in compliance with the provisions of 37 CFR 1.97, and has been considered and a copy was enclosed with the previous Office Action

Priority

8. Acknowledgment is made of applicant's claim for domestic priority under 35 U.S.C. 119(e) based on provisional application 60/971,175 filed on 9/10/2007;60/977,582 filed on 10/4/2007, 61/028,261 filed on 2/13/2008.

Double Patenting

9. In view of applicant submitted "terminal disclaimer" [8/6/12] and approved [8/9/2012], the rejection under "double patent" as set forth in the previous office action is hereby withdrawn.

Interview:

10. On 12/6/ 2013, a telephone call was made to applicant's representative Michael E. Whitham , Reg. no. 32,635, about the amendment to the claims 8,11,14,20,104-105 and cancelling claim 10,12,22,24,103 in order to allow the case. The attorney agreed with the Examiner's proposal and authorization has given for an Examiner's Amendment. Total claims allowed: 8,11,14-20,23,26-28,30,104-105 [re-numbered as 1-16].

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing Of Claims:

Please amend the claims as follows:

1-7. (canceled)

8. (currently amended) A method of collecting and providing access to quality or service information associated with one or more wireless communications networks, mobile devices, or end users, comprising:

using a computer, receiving mobile device location information of a plurality of mobile devices or end users that are associated with one or more wireless communications networks and quality or service information pertaining to wireless access characteristics for one or more mobile devices of said plurality of mobile devices or end users, and said quality or service information comprising coverage, availability or performance information of one or more wireless communications networks or said one or more mobile devices,

storing, by action of said computer, said mobile device location information and said quality or service information in a memory or database;

updating, by action of said computer, said mobile device location information stored in said memory or database when a mobile device of said plurality of mobile devices travels from one location to another;

providing access to said quality or service information stored in said memory or database to one or more end users or one or more end user communication devices or one or more carriers or third parties that provide services to said one or more end users or one or more end user communication devices or one or more carriers, or to said one or more wireless communications networks; and

wherein said wireless access characteristics comprise one or more of identified, perceived or measured:

radio reception quality,

network performance,

quality of service,

data rate,

spectrum availability or suitability,

capacity or bandwidth,

availability or quality of coverage,

availability or quality of capacity,

availability or quality of one or more services or carriers,

availability or quality of air interfaces,

average use profile,

average availability profile,

statistics on outage or reliability or coverage or capacity carrying capabilities for one or more service providers,

frequencies,

radio frequency or quality of service or coverage or service map or addresses for one or more service providers,

radio frequency or end-user application performance, and

cost of service.

9-10. (Canceled)

11. (currently amended) The method of Claim 8 ~~10~~ wherein said step of providing access provides access to said one or more end users or one or more end user communications devices by ~~comprises~~ reporting quality or service information to said one or more end users or said one or more end user communications devices.

12-13. (Canceled)

14. (currently amended) The method of Claim 8 ~~12~~ wherein said quality or service ~~availability of service~~ information is location specific.

15. (previously presented) The method of Claim 8, further comprising serving data based on mobile device location information and quality or service information stored in said memory or database.

16. (previously presented) The method of Claim 15 wherein said data comprises one or more of a recommended operating band, operating mode, communications network and/or carrier for end users or end user communications devices.

17. (previously presented) The method of Claim 16 wherein said data is formatted and served to end users or end user communications devices as one or more web pages.

18. (previously presented) The method of Claim 8, further comprising serving data based on mobile device location information or quality or service information stored in said memory or database to one or more carriers.

19. (previously presented) The method of Claim 8, further comprising providing access to quality or service information stored in said memory or database to a party or parties other than subscribers and carriers of said one or more wireless communications networks.

20. (currently amended) A system for collecting and providing access to quality or service information associated with one or more wireless communications networks, mobile devices, or end users, comprising:

a computer configured to receive mobile device location information of a plurality of mobile devices or end users that are associated with one or more wireless communications networks and quality or service information pertaining to wireless

access characteristics for one or more mobile devices of said plurality of mobile devices or end users, and said quality or service information comprising coverage, availability or performance information of one or more wireless communications networks or said one or more mobile devices;

a memory or database configured to store the received mobile device location information and quality or service information;

an interface through which one or more end users or one or more end user communication devices, or one or more carriers, or one or more third parties that provide services to

said one or more end users or one or more end user communication devices or

said one or more carriers, or

one or more wireless communications networks may access said quality or service information or mobile device location information stored in said memory or database; and

wherein said wireless access characteristics comprise one or more of identified, perceived or measured:

radio reception quality,

network performance,

quality of service,

data rate,

spectrum availability or suitability,

capacity or bandwidth,

availability or quality of coverage,

availability or quality of capacity,

availability or quality of one or more services or carriers,

availability or quality of air interfaces,

average use profile,

average availability profile,

statistics on outage or reliability or coverage or capacity carrying capabilities for one or more service providers,

frequencies,

radio frequency or quality of service or coverage or service map or addresses for one or more service providers,

radio frequency or end-user application performance, and

cost of service.

21-22. (canceled)

23. (previously presented) The system of Claim 20, further comprising a server configured to serve quality or service information stored in said memory or database to one or more carriers.

24-25. (Canceled)

26. (previously presented) The system of Claim 20, further comprising a server configured to generate and serve data based on mobile device location information and quality or service information stored in said memory or database to one or more end users or one or more end user communications devices.

27. (previously presented) The system of Claim 26 wherein said data comprises one or more of a recommended operating band, operating mode, communications network and/or carrier for said one or more end users or one or more of said end user communications devices.

28. (previously presented) The system of Claim 27 wherein said server comprises a web server and said data is formatted as one or more web pages served to said one or more end users or one or more of said end user communications devices.

29. (Canceled).

30. (previously presented) The system of Claim 20 wherein said computer is configured to provide access to quality or service information stored in said memory or database to a party or parties other than subscribers and carriers of said one or more wireless communications networks.

31-103. (Canceled)

104. (currently amended) The method of Claim 8,

wherein said quality or service information further comprises ~~further comprising the step of providing~~ rank ordering or preferred preferences for one or more of ranked or preferred:

wireless performance,

telecommunication services,

service providers,

carriers,

frequencies,

spectrum allocations,

wireless connection options,

power levels,

data rates,

modulation types,

air interface specifications, and

bandwidths[[.]], and

wherein said providing step further provides access to one or more of said ranked ordering or preferred preferences to said one or more end users or said one or more end user communication devices or said one or more carriers or said third parties

that provide services to said one or more carriers, or to said one or more wireless communications networks.

105. (currently amended) The system of Claim 20,

wherein said quality or service information further comprises ~~wherein said computer is configured to provide~~ rank ordering or preferred preferences for one or more of ranked or preferred:

wireless performance,

telecommunication services,

service providers,

carriers,

frequencies,

spectrum allocations,

wireless connection options,

power levels,

data rates,

modulation types,

air interface specifications, and

bandwidths[[.]], and

wherein said interface is configured to provide access to one or more of said rank ordering or preferred preferences to said one or more end users or said one or more

end user communication devices or said one or more carriers or said one or more third parties, or to said one or more wireless communications networks.

Reasons for Allowance

Claims 8,11,14-20,23,26-28,30,104-105 are allowed.

The following is an examiner's statement of reasons:

The newly cited reference Hendrickson, Keith et al., US 20020069037 is directed to wireless network usage and performance metrics, more specifically gathering information concerning wireless mobile device usage. The method involves prescribing a panel of respective users of respective mobile wireless devices in which each respective mobile device includes electronic memory encoded with data gathering software and data transfer software. The data gathering software gathers information pertaining to device usage. The gathered information includes event data in association with respective location information indicative of device location during the occurrences of such events. The data transfer software provides the gathered information for transmission. The method also includes collecting the gathered information provided by respective mobile devices of said panel of users. [Abstract, 0022-0026].

The newly cited reference Nath Badri et al., US 20070026854 is directed to events related to the quality of service experienced by a wireless device in a wireless network, more specifically, the system comprises wireless device capable of establishing a connection with a target server in a network, and a device agent constructed and arranged to interface with software on the wireless device to detect and record performance data relating to the network. The performance data may include, for example, a number of connection attempt failures between the wireless device and the target server. In one example, the system may further comprise a management server capable of communicating with the device agent and which may provide a performance test command to the device agent. The performance test command may include instructions for the device agent to conduct a test to detect the performance data and/or may specify details of a trap to be installed on the wireless device by the device agent to detect the performance data. The device agent may also provide the recorded performance data to the management server. [Abstract, 0009-0010]

It is however, noted that in view of applicant amendment to the claims, remarks filed on 2/6/2013, further examiner's amendment to claims 8,11,14,20,104-105, cancel claims 10,12,22,24,103 prior art of record, the prior art of record Hendrickson, Keith et al., US 20020069037, Nath Badri et al., US 20070026854 do not disclose, make obvious, or otherwise suggest the structure of the applicant's

"*updating, by action of said computer, said mobile device location information stored in said memory or database when a mobile device of said plurality of mobile devices travels from one location to another;*

providing access to said quality or service information stored in said memory or database to one or more end users or one or more end user communication devices or one or more carriers or third parties that provide services to said one or more end users or one or more end user communication devices or one or more carriers, or to said one or more wireless communications networks", in Claim 8,20

These features, together with the other limitations of the independent claims are novel and non-obvious over the prior art of record. The dependent claims 2-11,14-19,23,26-28,30,104-105 being definite, enabled by the specification, and further limiting to the independent claims are also allowable.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Srirama Channavajjala whose telephone number is 571-272-4108. The examiner can normally be reached on Monday-Friday from 8:00 AM to 5:30 PM Eastern Time.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ajay Bhatia, can be reached on (571) 272- 3906. The fax phone numbers for the organization where the 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)

/Srirama Channavajjala/
Primary Examiner, Art Unit 2157.

Examiner-Initiated Interview Summary	Application No.	Applicant(s)	
	12/815,165	RAPPAPORT, THEODORE S.	
	Examiner	Art Unit	
	SRIRAMA CHANNAVAJJALA	2157	

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

(1) *SRIRAMA CHANNAVAJJALA*. (3)_____.

(2) *Michael E. Whitham, Reg. No. 32,635*. (4)_____.

Date of Interview: *06 December 2013*.

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

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

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

Claim(s) discussed: *8,10-12,14,20,22,24,103-105*.

Identification of prior art discussed: _____.

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

On 12/6/ 2013, a telephone call was made to applicant's representative Michael E. Whitham , Reg. no. 32,635, about the amendment to the claims 8,11,14,20,104-105 and cancelling claim 10,12,22,24,103 in order to allow the case. The attorney agreed with the Examiner's proposal and authorization has given for an Examiner's Amendment. Total claims allowed: 8,11,14-20,23,26-28,30,104-105 [re-numbered as 1-16]..

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

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

☒ Attachment

/SRIRAMA CHANNAVAJJALA/ Primary Examiner, Art Unit 2157	

Notice of References Cited	Application/Control No. 12/815,165	Applicant(s)/Patent Under Reexamination RAPPAPORT, THEODORE S.	
	Examiner SRIRAMA CHANNAVAJJALA	Art Unit 2157	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-2002/0069037	06-2002	Hendrickson et al.	702/186
*	B	US-2007/0026854	02-2007	Nath et al.	455/423
*	C	US-2006/0224730	10-2006	Fok et al.	709/224
*	D	US-2006/0217116	09-2006	Cassett et al.	455/423
*	E	US-2002/0069037	06-2002	Hendrickson et al.	702/186
*	F	US-8,200,212	06-2012	Rappaport et al.	455/426.2
*	G	US-8,515,925	08-2013	Rappaport, Theodore S.	707/694
*	H	US-8,224,794	07-2012	Rappaport, Theodore S.	707/694
*	I	US-8,489,546	07-2013	Rappaport, Theodore S.	707/609
*	J	US-7,019,753	03-2006	Rappaport et al.	345/582
*	K	US-7,434,076	10-2008	Altounian et al.	713/324
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N	EP 1 760 958	03-2007	European	Wang, Ynjiun P	
	O	WO 2007022301	02-2007	PCT	Yaqub Raziq	
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	Li Tang et al., "A Comparative Evaluation of Mobile Agent Performance for network management",Proceedings ninth annual IEEE International conference, IEEE 2002, 10 pages
	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.

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

(11) EP 1 760 958 A2

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06.03.2006 US 369185

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(54) Data collection device having dynamic access to multiple wireless networks

(57) A data collection device incorporating an encoded information reading unit operates within a system including an access point that is wireline connected to a. The encoded information reading unit includes at least one of a bar code reading unit, an RFID tag reading unit and a credit/debit card reading unit. Further incorporated in the data collection device is a dynamic access module. The dynamic access communication module enables the data collection device to participate in a self organized network that supports multi-hop data packet transmissions between data collection device and which further enables the device to transmit data received from a peer device to the system access point.

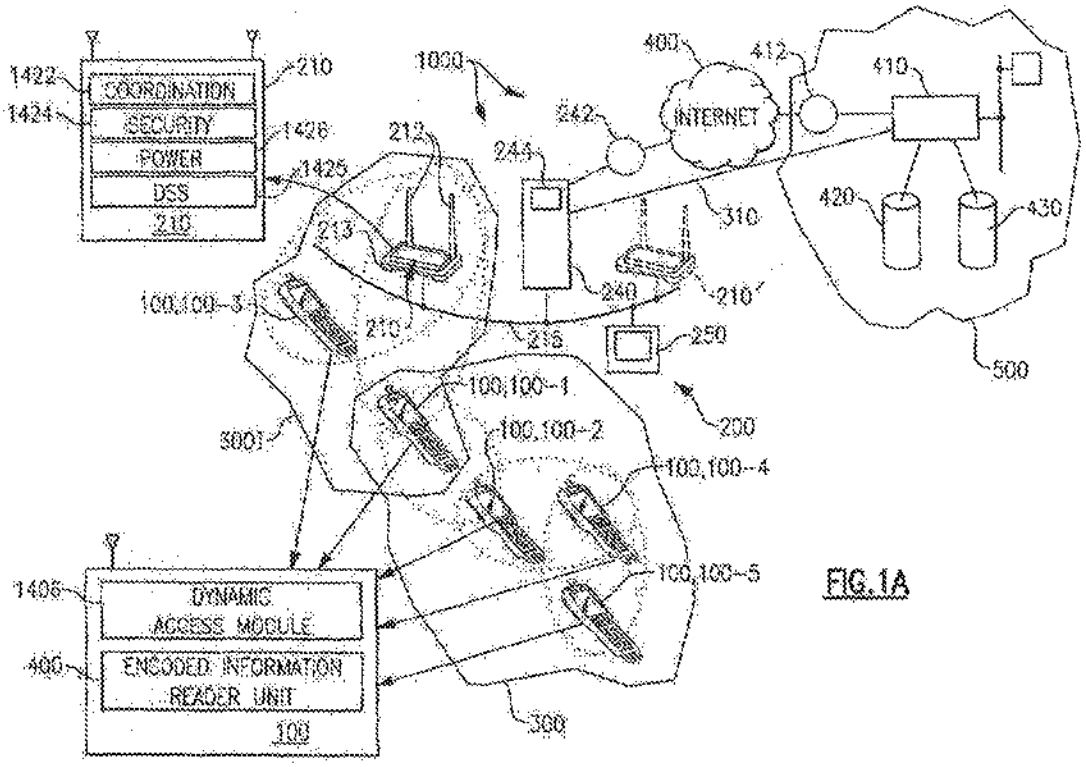

FIG.1A

EP 1 760 958 A2

Description

Cross Reference

[0001] This application claims priority under 35 U.S.C. §119 of Provisional Application No. 60/712,037, filed August 26, 2005 entitled "Data Collection Device Having Dynamic Access To Multiple Wireless Networks." The priority of the above application is claimed and the disclosure of the above application is incorporated herein by reference in its entirety.

Field of the Invention

[0002] The invention is generally related to system and methods of data communication among data collection device; and specifically related to a system and method of data communication in a data collection system having data collection devices.

Background of the Invention

[0003] In recent years significant advances have been made in the art of data collection devices and networks containing the same.

[0004] In U. S. Patent No. 5,900,613, a data collection device system is described having a data collection device adapted to read bar code data wherein the data collection device is in communication with a local host processor and a remote host processor. The data collection device of U. S. Patent No. 5,900,613 is configured to report bar code data to a remote computer and execute reprogramming routines to receive program data either or both from the remote host processor and the local host processor.

[0005] In U. S. Patent No. 6,298,176, a data collection device system is described having a bar code reading device and a host computer. The bar code reading device is equipped to send bar code data and associated image data to the host. The image data may contain digital images associated with transmitted bar code data. In one example described in U. S. Patent No. 6,298,176, image data sent to a host includes image data representing a handwritten signature.

[0006] In U. S. Publication No. US2002/0171745, a data collection device system is described having a bar code reading device which is in communication with a remote computer. The bar code reading device sends image data and associated bar code data to a remote computer. In one combined bar code/image data transmission scheme described in the above patent application publication decoded bar code message data identifying a parcel is stored within an open byte header location of an image file including an image representation of the parcel.

[0007] U. S. Publication No. US2002/0171745, an image data file in .PDF, .TIFF, or .BMP file format is created at a data collection device which includes an image representation of a decoded bar code message and an image representation of the package including the bar code encoding the decoded message.

[0008] In U. S. Publication No. US2003/0132292, a data collection device is described having a data collection terminal including a bar code reading unit, an RFID reading unit, a mag stripe data reading unit, a chip card reading unit, and a fingerprint reading unit. The terminal is coupled to a network, which is configured to facilitate financial transactions involving data collected utilizing the various reading units.

[0009] As significant as the above developments are, shortcomings have been noted with the operation of presently available data collection devices and the systems in which they are incorporated. For example, while wireless data collection systems have proliferated, connectivity issues remain with such systems. In deploying a wireless data collection system a costly "site survey" is often commissioned to search for "dead zones" in work environments Dead zones are prevalent in many data collection work environments, particularly where obstructions to free radio wave propagation exist. Metal structures and water are known to obstruct the free propagation of radio waves. Since metallic structures (*e.g.*, shelving, equipment including medical test equipment) and water (plumbing and piping) are common in data collection work environments, data collection work environments are often found to have numerous dead zones. Where a data collection work environment to be serviced by an IEEE 802.11 wireless communication system is found to have numerous "dead zones," the "solution" proposed by a site surveyor is often to integrate numerous additional access points into the system. The additional access points are costly and typically require connection to an expanded wireline bus. In many data collection systems the number of integrated access points is equal or greater than the number of data collection devices.

[0010] Accordingly, there is a need for further advances in data collection devices and systems in which they are connected, and management of data collected utilizing such networks.

Summary of the Invention

[0011] According to a major aspect and broadly stated, the invention relates to a data collection system comprising

a plurality of data collection devices and an access point. The access point can be wireline connected to a local server so that the access point provides access to local and remote server applications and databases. Each of the system's data collection devices can have an encoded information reader unit and a dynamic access module. The dynamic access module, among other functions, enables a data collection device to receive a data packet containing payload data from a peer device and transmit that payload data to a system access point and similarly receive a data packet containing payload data from an access point and transmit that payload data to a peer device.

[0012] An access point of a system of the invention may examine data packets of devices of a system according to the invention to determine whether a power save function has been selected, and if a power save function has been selected, may buffer data packets that are addressed to the device selecting the power save function.

[0013] A dynamic access module of each data collection device may include a linking component, a switching component, a self-healing component, and a self-routing component.

[0014] In accordance with the linking component of the dynamic access module, a data collection device according to the invention evaluates whether it is in range of an access point and in range of a peer device. If the data collection device determines that it is in range of an access point but not a peer device, communications between the data collection device and the access point are enabled and communications between the data collection device and peer devices are disabled. If a data collection device determines that it is in range of a peer device but not in range of an access point, communications between the data collection device and peer devices are enabled and communications between the data collection device and the access point are disabled. If the data collection device determines that it is in range of both an access point and a peer device, a switching component of the dynamic access module is activated to enable both communications between the data collection device and the system access point and between the data collection device and its peer devices.

[0015] In one illustrative embodiment of the invention, the system incorporates an IEEE 802.11 wireless network, including an IEEE 802.11 access point. IEEE 802.11 networks provide two major communication modes; namely, an infrastructure mode and an ad hoc mode. In general, when a device operates in the infrastructure mode, it is enabled to transmit to and receive data packets from an access point running in infrastructure mode but not a peer device. When a device operates in an ad hoc mode, the device is enabled to transmit and receive data packets from peer devices and access points running in ad hoc mode but not the access point running in infrastructure mode. According to the invention, where implemented in a wireless communication system in accordance with the IEEE 802.11 Standard, activation of the switching component of the dynamic access module causes a data collection device of the invention to dynamically (continuously) switch between communicating in an infrastructure mode and an ad hoc mode so that payload data of data packets received from a peer device in an ad hoc mode can be transmitted to an access point in an infrastructure mode and further so that payload data of data packets received from an infrastructure mode can be transmitted to a peer device in an ad hoc mode.

[0016] In accordance with a self-healing component of the dynamic access module, a data collection device monitors data throughput and activates a change in the present communication mode depending on the result of the monitoring. For example, if the device determines that throughput in a presently enabled mode is too low, the device may automatically activate an alternative communication mode such as infrastructure mode, ad hoc mode, or dynamic access mode (which is switching between infrastructure and ad hoc mode continuously).

[0017] In accordance with a self-routing component of the dynamic access module, each data collection device of a data collection device system incorporates a self-routing algorithm so that each device is equipped to participate in a self-organized network (SO). Where a plurality of portable or remountable data collection devices incorporate self-routing algorithms, long range data packet communications can be facilitated by deployment of a plurality of data collection devices that are in accordance with the invention in a data collection system with little or no reconfiguration of existing system equipment. When a plurality of data collection devices are deployed in a data collection system, multi-hop data communications may be supported between a device and a system access point where the device is out of range of the access point.

[0018] According to the invention, as will be described in greater detail herein, there is provided:

A) A data collection system comprising:

[0019] (first and second portable data collection devices, each data collection device having an encoded information reader unit selected from the group consisting of a bar code decode unit, an RFID reader unit and a credit/debit card reading unit;

an access point, said access point being adapted for wireline connection to a local wireline bus and further being configured to examine data packets received thereby to determine whether a transmitting station has requested a power save function, and if said power save function is selected, buffering data packets destined for said requesting transmitting station,

wherein said first portable data collection device is configured to operate in an operating mode in which said first portable

Samsung Ex. 1004, page 70 of 974

data collection device receives a data packet data containing payload data from said second portable data collection device and transmits said payload data to said access point.

[0020] There is also provided the data collection system of (A), wherein said first portable data collection device includes a hand held bar code reading device and said second portable data collection device includes a credit card reading unit.

[0021] There is also provided the data collection system of (A), wherein each of said first and second data collection devices are configured to broadcast routing table data.

[0022] In addition, there is provided, (B) a portable bar code reading device for incorporation in a data collection system having an access point and at least one peer data collection device, said data collection device comprising:

an imaging assembly including a two dimensional solid state image sensor array and a lens focusing an image onto said solid state image sensor array;
a radio transceiver for wireless transmission of data packets;
a housing, wherein said identification decode unit and said radio transceiver unit are supported within said housing, wherein said housing is one of a hand held housing and a remountable housing; and
a dynamic access module enabling said data collection device to (i) receive data packets from said access point and route payload data of said data packets to said peer device, and (ii) transmit at least one of routing table data and a route request (RREQ) data packet to said at least one peer data collection device.

[0023] There is also provided the data collection device of (B), wherein said data collection device further includes a packet content discriminator.

[0024] In addition, there is provided, according to the invention, (C) a data collection system comprising:

first and second, and third data collection devices, D1, D2, and D3, each data collection device having an identification decode unit selected from the group consisting of a bar code decode unit, an RFID reader unit and a credit/debit card reading unit; and
an access point, AP, said access point being wireline connected to a local server and further being configured to broadcast a network identifier, and wherein said access point is further configured to coordinate the wireless sending of Clear to Send (CTS) messages to various devices in communication with said access point in such manner that collisions resulting from two devices attempting to send data packets to said access point at a common time are avoided,

wherein said data collection system is configured to support a transmission of a data packet along the hop sequence D1-D2-D3-AP, whereby said first data collection device can be out of range of said access point, yet in communication with said access point.

[0025] There is also provided the data collection system of (C), wherein said first data collection device includes a hand held bar code reading device and said second data collection device includes a credit card reading unit, and wherein said third data collection device includes an RFID reading unit.

[0026] There is also provided the data collection system of (C), wherein each of said first and second, and third data collection devices are configured to broadcast routing table data enabling peer devices to update their respective routing tables, each routing table including a plurality of network addresses.

[0027] In addition, there is provided, according to the invention, (D), a data collection device for incorporation in a data collection system having an access point wireline connected to a local server and at least one peer data collection device, said data collection device comprising:

an encoded information reading unit selected from the group consisting of a bar code decode unit, an RFID reader unit, and a credit/debit card reader;
a radio transceiver;
a portable housing, wherein said encoded information reader unit and said radio transceiver unit are supported by said portable housing;
a dynamic access circuit incorporated in said data collection device, said dynamic access circuit enabling said data collection device to operate in accordance with a set of linking rules when introduced to said data collection system, said set of linking rules including the rules of: (a) detecting whether said data collection device is in range of said access point; (b) detecting whether said data collection device is in range of said at least one peer device; (c) operating said data collection device in an infrastructure mode if said data collection device is in range of said access point only and not in range of any peer device; (d) operating said data collection device in ad hoc mode if said data collection device is in range of said access point only and not in range of any peer device; and (e) operating said data collection device in dynamic switching mode to dynamically switch between an infrastructure mode and an ad

hoc mode if said data collection device determines that said data collection device is in range of both said access point and said at least one peer device.

[0028] There is also provided the data collection device of (D), wherein said data collection device is configured to operate in a mode in which said data collection device wirelessly broadcasts a routing table data packet.

[0029] There is also provided the data collection device of (D), wherein said data collection device, when operating in said dynamic switching mode switches between said infrastructure and ad hoc modes at fixed time intervals.

[0030] In addition, there is provided, according to the invention, (E), a portable data collection device for incorporation in a data collection system having an access point wireline connected to a local server and at least one peer data collection device, said data collection device comprising:

an encoded information reading unit selected from the group consisting of a bar code decode unit, an RFID tag reader unit, and a credit/debit card reader unit;
a radio transceiver;
a portable housing, wherein said encoded information reader unit and said radio transceiver unit are supported by said portable housing;

wherein said data collection device is configured to operate in a present communication operating mode, the communication operating mode selected from the candidate group consisting of: (a) an infrastructure mode; (b) an ad hoc mode; and (c) a dynamic switching mode in which said data collection device dynamically switches between an infrastructure and ad hoc communication mode; and
a dynamic access module incorporated into said data collection device, said dynamic access module having a self healing component enabling said data collection device to (i) monitor data throughput of said device; and (ii) change a present mode of said data collection device from said present communication operating mode to another of said candidate group of communication operating modes in response to said throughput monitoring.

[0031] There is also provided the data collection device of (E), wherein said data collection device is configured to operate in a mode in which said data collection device broadcasts a routing table data packet.

[0032] There is also provided the data collection device of (E), wherein said data collection device, when operating in said dynamic switching mode switches between said infrastructure and ad hoc modes at fixed time intervals.

[0033] In addition, there is provided, according to the invention, (F), a data collection device for incorporation in a data collection system having an access point wireline connected to a local server and at least one peer data collection device, said data collection device comprising:

an encoded information reading unit selected from the group consisting of a bar code decode unit, an RFID reader unit, and a credit/debit card reader unit;
a radio transceiver;
a portable housing, wherein said encoded information reader unit and said radio transceiver unit are supported by said portable housing; and
a dynamic access circuit incorporated in said data collection device, said dynamic access circuit enabling said data collection device to operate in accordance with a set of linking rules when introduced to said data collection system, said set of linking rules including the rules of: (a) detecting whether said data collection device is in range of said access point; (b) detecting whether said data collection device is in range of said at least one peer device; (c) operating said data collection device in an infrastructure mode if said data collection device is in range of said access point only and not in range of any peer device; (d) operating said data collection device in ad hoc mode if said data collection device is in range of said access point only and not in range of any peer device; and (e) operating said data collection device in dynamic switching mode to dynamically switch between said infrastructure mode and said ad hoc mode if said data collection device determines that said data collection device is in range of both said access point and said at least one peer device, said dynamic access circuit having a self-healing component;

wherein said data collection device is configured to operate in a present communication operating mode, the present communication operating mode selected from the candidate group consisting of: (1) said infrastructure mode; (2) said ad hoc mode; and (3) said dynamic switching mode in which said data collection device dynamically switches between an infrastructure and ad hoc communication mode;
said self healing component enabling said data collection device to (i) monitor data throughput of said device; and (ii) change a present mode of said data collection device from said present communication operating mode to another of said candidate communication operating modes in response to said throughput monitoring.

[0034] There is also provided the data collection device of (F), when said data collection device operates in a mode in which said data collection device sends a power save request, in a data packet to said access point.

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[0035] In addition, there is provided, according to the invention, (G), a data collection device for incorporation in a data collection system having an access point adapted for wireline connection to a wireline bus and at least one peer data collection device, said data collection device comprising:

an encoded information reading unit selected from the group consisting of a bar code decode unit, an RFID reader unit, and a credit/debit card reader unit;
a radio transceiver;
a housing, wherein said identification decode unit and said radio transceiver unit are supported by said housing, wherein said housing is one of a hand held housing and a remountable housing; and
a dynamic access module enabling said data collection device to (i) determine whether said data collection device is in range said access point, and (ii) determine whether said data collection device is in range of said peer data collection device, said dynamic access module further enabling said data collection device to receive data packets from said access point and route payload data of said data packets to said peer device if said data collection device determines that it is in range of both of said access point and said peer device.

[0036] In addition, there is provided, according to the invention, (H), a data collection device for incorporation in a data collection system having an access point adapted for wireline connection to a local wireline network and at least one peer data collection device, said data collection device comprising:

an encoded information reading unit selected from the group consisting of a bar code decode unit, an RFID reader unit, and a credit/debit card reader unit;
a radio transceiver;
a housing, wherein said identification decode unit and said radio transceiver unit are supported within said housing, wherein said housing is one of a hand held housing and a remountable housing; and
a microphone;
a Voice Over-Internet Protocol (VOIP) encoder/decoder receiving and processing an analog signal output of said microphone, said data collection device being configured to generate VOIP data packets by process a voice analog signal output from said microphone;
a dynamic access module enabling said data collection device to (i) receive data packets from said access point and route payload data of said data packets to said peer device, and (ii) transmit at least one of a routing table data packet and a route request (RREQ) data packet to said at least one peer data collection device.

[0037] There is also provided the data collection device of (H), when said data collection device further includes a packet content discriminator.

[0038] In addition, there is provided, according to the invention, (I), a data collection system comprising:

first, second, and third portable data collection devices, D1, D2, and D3, each portable data collection device being separately housed and having an encoded information reader unit selected from the group consisting of a bar code reader unit, an RFID reader unit and a credit/debit card reading unit, said each portable data collection device being capable of operation in (a) infrastructure mode; (b) ad hoc mode and (c) dynamic switching mode in which a data collection device dynamically switches between infrastructure mode and ad hoc mode;
an access point, AP, said access point being adapted for wireline connection to a local server,

wherein said data collection system is configured to support a transmission of a data packets along the hop sequence D1-D2-D3-AP in such manner that when packet data is transmitted from D1 to D2 in ad hoc mode, said third data collection device, D3 operates in dynamic switching mode.

[0039] In addition, there is provided, according to the invention, (J), a data collection system comprising:

first, second, and third portable data collection devices, D1, D2, and D3, each portable data collection device being separately housed and having an encoded information reader unit selected from the group consisting of a bar code reader unit, an RFID reader unit and a credit/debit card reading unit, and each portable data collection device being capable of operation in (a) infrastructure mode; (b) ad hoc mode and (c) dynamic switching mode in which a data collection device dynamically switches between infrastructure mode and ad hoc mode;
an access point, AP, said access point being adapted for wireline connection to wireline bus;

wherein said data collection system is configured to support a transmission of a data packets along the hop sequence D1-D2-D3-AP in such manner that when packet data is transmitted from said third portable data collection device, D3 to said access point, AP, said first and second data collection devices operate in ad hoc mode.

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[0040] In addition, there is provided, according to the invention, (K), a data collection device for incorporation in a data collection system having an access point wireline connected to a local server and at least one peer data collection device, said data collection device comprising:

an imaging assembly including a two dimensional solid state image sensor array and a lens focusing an image onto said solid state image sensor array;
a radio transceiver;
a portable housing, wherein said encoded information reader unit and said radio transceiver unit are supported by said portable housing;
a manual trigger, wherein said data collection device in response to said trigger being actuated, processes image signals generated by said imaging assembly to at least one of (a) decode and transmit a decoded bar code message utilizing said radio transceiver, and (b) transmit said frame of image data utilizing said radio transceiver,
a dynamic access circuit incorporated in said data collection device, said dynamic access circuit enabling said data collection device to operate in accordance with a set of linking rules when introduced to said data collection system, said set of linking rules including the rules of: (a) detecting whether said data collection device is in range of said access point; (b) detecting whether said data collection device is in range of said at least one peer device; (c) operating said data collection device in an infrastructure mode if said data collection device is in range of said access point only and not in range of any peer device; (d) operating said data collection device in ad hoc mode if said data collection device is in range of said access point only and not in range of any peer device; and (e) operating said data collection device in dynamic switching mode to dynamically switch between said infrastructure mode and said ad hoc mode if said data collection device determines that said data collection device is in range of both said access point and said at least one peer device, said dynamic access circuit having a self-healing component;

wherein said data collection device is configured to operate in a present communication operating mode, the present communication operating mode selected from the candidate group consisting of: (1) said infrastructure mode; (2) said ad hoc mode; and (3) said dynamic switching mode in which said data collection device dynamically switches between an infrastructure and ad hoc communication mode;
said self healing component enabling said data collection device to (i) monitor data throughput of said device; and (ii) change a present mode of said data collection device from said present communication operating mode to another of said candidate communication operating modes in response to said throughput monitoring; and
a packet content discriminator discriminating whether data packets transmitted utilizing said radio transceiver are decoded message data packets or image frame data packets.

[0041] In addition, there is provided, according to the invention, (L), a portable bar code reading device for incorporation in a system having an access point wireline connected to a local server and at least one peer data collection device, said data collection device comprising:

an imaging assembly including a two dimensional solid state image sensor array and a lens focusing an image onto said solid state image sensor array;
a radio transceiver;
a housing, wherein said identification decode unit and said radio transceiver unit are supported by said housing, wherein said housing is one of a hand held housing and a remountable housing; and
a dynamic access module enabling said data collection device to (i) determine whether said data collection device is in range said access point, and (ii) determine whether said data collection device is in range of said peer data collection device, said dynamic access module further enabling said data collection device to receive data packets from said access point and route payload data of said data packets to said peer device if said data collection device determines that it is in range of both of said access point and said peer device.

[0042] In addition, there is provided, according to the invention, (M), a data collection system comprising:

first, second, and third portable data collection devices, D1, D2, and D3, each portable data collection device being separately housed and having an encoded information reader unit selected from the group consisting of a bar code reader unit, an RFID reader unit and a credit/debit card reading unit, and each being capable of operation in (a) infrastructure mode; (b) ad hoc mode and (c) dynamic switching mode in which a data collection device dynamically switches between infrastructure mode and ad hoc mode;
an access point, AP, said access point being adapted for wireline connection to a local wireline bus;

wherein said data collection system is configured to support a transmission of a data packet along the hop sequence D1-D2-D3-AP in such manner that throughout a time that packet data is transmitted along said hop sequence D1-D2-

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D3-AP, said first and second data collection devices D1 and D2 remain in ad hoc mode while said third data collection device, D3, dynamically switches between infrastructure mode and ad hoc mode.

[0043] In addition, there is provided, according to the invention, (N), a data collection device for operation in a data communication system, having a local server and an access point configured for wireline connection to said local server, said data collection device comprising:

an encoded information reader unit selected from the group consisting of a bar code reader unit, an RFID reader unit, and a credit card reader unit, said encoded information reader unit producing decoded out message data;
a radio frequency transceiver;
a portable housing supporting said radio frequency transceiver and components of said encoded information reader;
a microphone;
a Voice Over-Internet Protocol (VOIP) encoder/decoder receiving and processing an analog signal output of said microphone, said data collection device being configured to generate VOIP data packets for transmission utilizing said radio transceiver by processing a voice analog signal output from said microphone;

wherein said data collection device is configured to send a request to said access point to buffer data packets addressed to said data collection device, said data collection device further being configured to operate in a mode of operation in which said data collection device broadcasts at least one of a routing table data packet and a Route Request (RREQ) data packet;

wherein said data collection device further includes a data packet content discriminator discriminating whether a data packet transmitted by said data collection device is (a) a VOIP data packet or (b) a data packet containing said decoded output message data.

[0044] There is also provided the data collection device of (N), wherein said data packet content discriminator examines data packets buffered for wireless transmission by said data collection device.

[0045] There is also provided the data collection device of (N), wherein said data packet content discriminator receives a data content identifier from a control circuit of said data collection device.

[0046] There is also provided the data collection device of (N), wherein said data collection device further includes a plurality of selectable self-routing algorithm modules, and wherein said data collection device activates one of said plurality of selectable self routing algorithm modules based upon an output provided by said data packet content discriminator.

[0047] These and other aspects of the invention are described in further detail in ensuing written description in connection with the referenced drawings.

Brief Description of the Drawings

[0048] Other objects and advantages of the invention will be apparent from the following description and drawings, in which:

[0049] Fig. 1a illustrates a data collection system according to the invention;

[0050] Fig. 1b is a block diagram illustrating electrical components which may be incorporated in a data collection device according to the invention;

[0051] Fig. 1c illustrates a data collection system according to the invention including a retail store;

[0052] Fig. 1d is a system diagram illustrating a specific implementation of a system according to the invention;

[0053] Fig. 1e is a rear perspective view of an access point of a system according to the invention showing a port for adapting the access point for connection to a wireline bus;

[0054] Fig. 2a is a system diagram illustrating a data collection system according to the invention wherein the presence of double arrows between a pair of spaced apart devices indicates that the devices are in connection range of one another;

[0055] Figs. 2b-2e are additional system diagrams illustrating aspects of the invention;

[0056] Fig. 2f is a system diagram illustrating a data collection system according to the invention wherein the presence of double arrows between a pair of spaced apart devices indicates that the devices are in connection range of one another;

[0057] Figs. 3a-3c are a series of diagrams for purposes of describing integrations of various processing modules in accordance with the invention;

[0058] Figs. 4 is a diagram illustrating operation of a device operating in accordance with a dynamic access module according to the invention;

[0059] Figs. 5a and 5b are diagrams illustrating construction of a data packet which may be transmitted and received by a data collection device according to the invention;

[0060] Figs. 6a-6d are diagrams illustrating construction of various data packets according to the invention;

[0061] Fig. 7 is a timing diagram illustrating timing in an illustrative multi-hop data packet transmission according to the invention;

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[0062] Figs 8a and 8b illustrate an exemplary hand held portable data collection device housing into which all of the components of Fig. 1d may be integrated;

[0063] Figs 9a-9c illustrate an exemplary portable and remountable housing into which all of the components of Fig. 1b may be integrated, and which may support all of the components of Fig. 1b;

[0064] Fig. 10a illustrates a first exemplary deployment of a data collection device according to the invention within a retail store;

[0065] Fig. 10b illustrates a second exemplary deployment of a data collection device according to the invention within a retail store;

[0066] Figs. 10c and 10d illustrate PIN and signature data entry operational modes of a data collection device according to the invention;

[0067] Figs. 11a-11b illustrate perspective and perspective assembly views of a first exemplary imaging module which may be incorporated into a data collection device according to the invention;

[0068] Fig. 11c illustrates exemplary illumination and aiming patterns which may be projected by an imaging module according to the invention;

[0069] Figs. 12a-12c illustrate exemplary structures carrying RFID tags which may be read by a data collection device according to the invention;

[0070] Fig. 13 is a table which may be utilized by a device according to the invention when operating in a mode in which a device activates one out of a plurality of self-routing algorithm modules based on the content of a data packet being transmitted.

Detailed Description of the Invention

[0071] Referring to Fig. 1a, a portable data collection device 100 is incorporated into a data collection system 1000 including a plurality of networks 200, 300I, 300A, 400, and 500. Network 200 is a wireline local area network, network 300I is a wireless infrastructure network, network 300A is a local ad hoc network, network 400 is an IP network shown in the specific embodiment as the Internet and network 500 is a remote data archiving network managed by a data archiving entity. The data collection system 1000 includes a plurality of data collection devices 100-1, 100-2, 100-3, 100-4, 100-5 and network access point 210. The network access point 210 functions as a node within the wireline local area network 200 and as a node within the wireless infrastructure network 300I. The wireline local area network 200 also includes a server 240 and a plurality of computer devices such as a personal computer (PC) 250. As will be described more fully herein, wireless infrastructure network 300I in the specific illustrative embodiment of Fig. 1a includes access point 210, 210', device 100-1, and device 100-3 whereas ad hoc network 300A includes devices 100-1, 100-2, 100-4, 100-5. In accordance with the invention device 100-1 in the particular illustrative embodiment shown in Fig. 1 a is enabled to function as a node within wireless infrastructure network 300I and as a node within ad hoc network 300A. System 1000 may also include a gateway 242 between network 200 and network 400 and a gateway 412 between network 400 and network 500. While different "networks" are designated herein, it is recognized that a single network as seen from the network layer 3106 of the OSI module (Fig. 3b) can comprise a plurality of lower layer networks, e.g., what can be regarded as a single IP network can include a plurality of different physical networks.

[0072] Referring to further aspects of the networks of data collection system 1000, network 500 is located remotely from the network 200 and can be located thousands of miles from network 200. Network 500, for example, can include a webpage server 410, which is in communication with various databases 420, 430. Network 500 can be in communication with network 200 via Internet network 400 or another communications path, such as a publicly accessible network, and/or through a private lease line, such as line 310.

[0073] In one embodiment of the invention, access point 210 of system 1000 is an access point in accordance with the IEEE 802.11 Standard, (*i.e.*, in accordance with one of the 802.11, 802.11a, 802.11b, 802.11g, 802.11e, and 802.11i Specifications). Each device 100 of system 1000 can incorporate a radio transceiver in accordance with the 802.11 Standard, (*i.e.*, in accordance with one of the 802.11, 802.11a, 802.11b, 802.11g, 802.11e, and 802.11i Specifications) and can have an associated unique Internet Protocol (IP) address. All devices 100 of system 1000 in range of access point 210 can share a common station service identification (SSID).

[0074] Referring to attributes of access point 210, access point 210 is wireline connected to server 240 via wireline bus 215 shown throughout the views and in communication with remote server 410 via network 400. Thus, communication with access point 210 provides access to all files and applications stored on server 240 or server 410. Access point 210 can be designed to have a large antennae 212 boosting the transmit and receive range and throughput of data through access point 210. Wireline bus 215, can be provided by e.g., an Ethernet cable, to form a backbone of the network 200.

[0075] Access point 210 can include coordination module 1422 which enables access point 210 to manage the receipt of data packets from several data collection devices. For example, the access point can coordinate the sending of clear to send (CTS) messages to each of several devices 100-1, 100-2, 100-3 so that each of several devices 100-1, 100-2, 100-3 are given different time slots in which to transmit data to access point 210 to the end that data collisions which

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might otherwise result from several devices communicating data packets to access point 210 simultaneously are avoided.

[0076] Access point 210 may also be implemented with enhanced security features, and can manage a system power conservation scheme. According to a security feature (e.g., the WEP feature, where access point is an 802.11 access point), access point 210 may incorporate security module 1424 which enables access point 210 to encrypt data packets transmitted to a device and decrypt data packets received from a device. In accordance with security module 1424 access point 210 may examine a control field of a received data packet to determine if a security feature (*e.g.*, WEP) is enabled, and if it is enabled, decrypt the received data packet.

[0077] Referring to power management services, access point 210 can incorporate a power management module 1426. According to a power save function which can be managed by access point 210 in accordance with power management module 1426, access point 210 may examine control fields of received data packets to determine whether a transmitting device, e.g., device 100, 100-1 has requested a power save mode. If such examination indicates a power save mode has been selected, access point 210 may buffer data packets addressed to a device 100, 100-1, and send them at appropriate times when requested by device 100, 100-1.

[0078] In another aspect, access point 210 may include a Distribution Data Service (DSS) module 1428. The DSS module 1428 enables association with new portable data terminals that enter a communication range with access point 210. Access point 210 may be constructed to have high data throughput capacity and may be alternating current (AC) powered, making access point 210 impervious to battery failures.

[0079] As indicated by the view of Fig. 1a, the above access point processing modules may be incorporated in a portable housing 213, which is portable so that access point 210 may be moved from location to location within a system in which it is incorporated in order to optimize performance of access point 210. Access point 210 can be equipped with a suitable port 211 (*e.g.*, an Ethernet connector port) which adapts access point 210 to be wireline connected to bus 215 of wireline network 200 so that when access point 210 is wireline connected to bus 215, access point 210 is wireline connected to network 200 and part of network 200 and further so that access point 210 is wireline connected to server 240 via wireline bus 215.

[0080] Now referring to attributes of data collection device 100 in further detail with reference to Figs. 1a and 1b, a data collection device 100 according to the invention can have a radio frequency communication interface block 5711, a dynamic access module 1406, and an encoded information reader unit 400. As will be described more fully herein, dynamic access module 1406 can be a software implemented processing module which, among other functions, enables a data collection device 100 to wirelessly receive a data packet containing payload data from a peer device 100 over a wireless transceiver and transmit that payload data to a system access point 210 and similarly receive a data packet containing payload data from an access point 210 and transmit that payload data to a peer device 100. Encoded information reader unit 400 can include one or more of a bar code reader unit, an RFID reader unit, and a credit/debit card reader unit. In the illustrative embodiment of Fig. 1b, an exemplary bar code reader unit is shown as being provided by an imaging assembly 200 and a control circuit 552 which manages the capture of image data into memory 566 and the subsequent decoding of image data in accordance with a symbology decoding program stored in memory 566. A bar code reader unit may also be provided by a product having dedicated decode circuit such as an IT 4XXX or IT 5XXX imaging module with decode out circuit as is available from Hand Held Products, Inc. of Skaneateles Falls, NY. An RFID reader unit 1250 in the illustrative embodiment of Fig. 1b comprises RF oscillator and receiver circuit 1252 and decode circuit 1254 while card reader unit 1350 includes signal detection circuit 1352 and card decoder 1354. A control circuit 552, which may be incorporated in a processor IC chip 548, may manage the control of various components of device 100, including one or more radio transceivers or RF block 5711. Components of exemplary data collection device 100 as shown in Fig. 1b are described in greater detail herein.

[0081] Referring to aspects of dynamic access module 1406 in further detail with reference to Fig. 3a, dynamic access module 1406 of each data collection device 100 may include a linking component 1462, a self-healing component 1464, a switching component 1472, a self-routing component 1466 and a packet discrimination component 1480. The modules described herein, such as access point modules 1422, 1424, 1426, 1428, and dynamic access module 1406 of device 100 including component modules 1462, 1464, 1472, 1480, 1466, 1467, 1468, 1469, 1490 typically are provided by software programming of a programmable processing device, but may also be implemented with dedicated hardware circuitry or by a combination of software and dedicated hardware circuitry. In that the programming of a programmable processing device in a particular manner results in a specifically configured circuit being provided, processing modules described herein such as modules 1422, 1424, 1426, 1428, 1462, 1464, 1472, 1480, 1466, 1467, 1468, 1469, 1490 can alternatively be regarded as "circuits."

[0082] In accordance with the linking component of dynamic access module 1406 in one embodiment, data collection device 100 evaluates whether it is in range of an access point 210 and in range of a peer device 100. If data collection device 100 determines that it is in range of an access point 210 but not a peer device 100, communications between the data collection device 100 and the access point 210 are enabled and communications between the data collection device 100 and peer devices 100 are disabled. If a data collection device 100 determines that it is in range of a peer device 100 but not in range of an access point 210, communications between the data collection device 100 and peer

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devices 100 are enabled and communications between the data collection device 100 and the access point 210 are disabled. If the data collection device 100 determines that it is in range of both an access point 210 and a peer device 100, switching component 1472 of the dynamic access module 1406 is activated to enable both communications between the data collection device 100 and the system access point 210 and between the data collection device 100 and the peer devices 100.

[0083] System 1000 can incorporate an IEEE 802.11 wireless network, including an IEEE 802.11 access point 210, and devices 100 that incorporate one or more radio transceivers 5712, as shown in Fig. 1b, in accordance with the IEEE 802.11 Standard. IEEE 802.11 networks provide two major communication modes; namely infrastructure mode, as part of the Basic Service Set (BSS) available in and IEEE 802.11 network and ad hoc mode, as part of the Independent Basic Service Set (IBSS) available in an IEEE 802.11 network. In general, when a device 100 operates in infrastructure mode it is enabled to transmit and receive data packets from an access point 210 operating in infrastructure mode but not a peer device 100. In infrastructure mode, as is depicted in Fig. 2b and 2c, all communications between devices 100-1, 100-2 are through access point 210, which operates as a bridge to broadcast data packets received. When device 100 incorporating an 802.11 radio transceiver 5712 operates in ad hoc mode, the device is enabled to transmit and receive data packets from peer devices 100 and access points 210 running in ad hoc mode but not an access point 210 operating in infrastructure mode. In ad hoc mode, as depicted in Fig. 2d and 2e, data packets can be sent directly between peer devices 100. According to the invention, where implemented in a wireless communication system in accordance with the IEEE 802.11 Standard, activation of switching component 1472 of the dynamic access module 1406 causes a data collection device 100 of the invention dynamically (continuously) switch between communicating in infrastructure mode and ad hoc mode so that payload data of data packets received from a peer device in ad hoc mode can be transmitted to an access point in infrastructure mode and further so that payload data of data packets received from an access point in infrastructure mode can be transmitted to a peer device in an ad hoc mode.

[0084] Functionality of a device 100 operating in accordance with linking component 1462 of dynamic access module 1406 is described with reference to the flow diagram of Fig. 4. At block 5102 data collection device 100 queries nodes of system 1000 via switching between infrastructure mode and ad hoc mode. If data collection device 100 at block 5104 determines that it is in range of access point 210 but not in range of a peer device 100, data collection device 100 commences operation in an infrastructure mode at block 5106 by joining a BSS network in range of device 100. If at block 5108 data collection device 100 determines that it is in range of a peer device 100 but not in range of an access point 210, data collection device 100 at block 5110 commences operation in ad hoc mode by joining an IBSS network in range of device 100. If at block 5112 data collection device 100 determines that it is in range of both an access point 210 and a peer device 100, data collection device 100 at block 5114 activates switching component 1472 to activate infrastructure/ad hoc mode network switching.

[0085] When network switching is activated, data collection device 100 continuously dynamically (continuously) switches between communicating in an infrastructure mode and ad hoc mode. The switching may be at fixed time intervals, *e.g.*, as governed by the maximum packet transmission time or at variable time intervals. In an illustrative embodiment of the invention, device 100 operating in accordance with switching component 1472 dynamically switches between infrastructure and ad hoc mode at 100ms intervals; that is, device 100 operates in infrastructure mode for 100ms; switches to ad hoc mode; operates in ad hoc mode for 100ms; switches back to infrastructure mode; operates in infrastructure mode for 100ms and so on. In another illustrative embodiment, device 100 dynamically switches between infrastructure and ad hoc mode at 200ms intervals. With network switching activated, data collection device 100 is enabled to receive data packets containing payload data from an access point 210 in infrastructure mode and transmit the payload data to a peer device 100 in ad hoc mode and is similarly enabled to receive a data packet containing payload data from a peer device 100 in ad hoc mode and transmit the data to an access point 210 in infrastructure mode. Further, in accordance with switching component 1472, device 100, while conducting switching may buffer data packet as is necessary and might reformat the data packet for data transmission.

[0086] In another aspect of switching component 1472 of dynamic access module 1406, a device 100 in switching mode (*e.g.*, device 100-1 of Fig. 1a) sends data packets at certain times to access point 210, and to peer devices 100 that indicate to nodes of the system 1000 the timing of the switching. Specifically, just prior to ceasing operation in ad hoc mode, and prior to entering infrastructure mode, a device in dynamic switching mode (*e.g.*, device 100-1, Fig. 1a) may send a data packet requesting a power save function. Peer devices 100 receiving the data packet may examine the data packet to confirm that a power save function is requested and can thereafter buffer data packets addressed to the switching device 100-1 (Fig. 1a). Just after entering infrastructure mode, device 100-1 (Fig. 1a) in switching mode can send a data packet to access point 210, requesting the sending of data packets buffered by access point and addressed to the switching device 100-1 (Fig. 1a). Just prior to ceasing operation in infrastructure mode and prior to reentering ad hoc mode, a switching data collection device 100-1 (Fig. 1a) can send a data packet to access point 210, requesting a power save function and thereafter access point 210 can buffer data packets addressed to the switching device. After reentering ad hoc mode, data collection device 100-1 (Fig. 1a) operating in dynamic switching mode can send a data packet to peer devices requesting sending of data packets buffered by the peer devices 100 and addressed

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to the switching device 100-1.

[0087] A set of rules governing operation of device 100 in accordance with linking component are summarized in Table A. Device 100 can be configured to operate in accordance with the linking rules of Table A when device is introduced to (initialized in) system 1000, *i.e.*, when device is powered on in a position in range of a device 100 or access point 210 or is moved while in a powered-up state into a position in range of a device 100 or access point 210.

Table A Linking Rules
1. Initialize data collection device 100 in infrastructure mode and detect whether there is an access point operating in infrastructure mode in range of the device.
2. Switch data collection device 100 to ad hoc mode and detect if the device is in range of a peer device.
3. If there is only an access point operating in infrastructure mode in range of data collection device 100, switch to infrastructure mode
4. If there is only peer device(s) in range of the device, switch to ad hoc mode
5. If both an access point and peer devices are in range of the data collection device, activate switching component 1472 to continuously switch between infrastructure mode and ad hoc mode.

[0088] With reference to system 1000 of Fig. 1a, wherein each of devices 100-1, 100-2, 100-3, 100-4, 100-5 incorporates dynamic access module 1406 having linking component 1462 operating in accordance with the linking rules of Table A, it is seen that device 100-3 is in range of an access point 210 only. Accordingly, device 100-3 communicates in infrastructure mode and is enabled to send to and receive data packets from access point 210 in infrastructure mode. Devices 100-2, 100- 4, 100- 5 are in range of a peer device 100 but not access point 210 and are, therefore, enabled to communicate in ad hoc mode. Devices 100 are enabled to communicate with peer devices 100-2, 100-4, 100-5 operating in ad hoc mode but not access point 210 (unless the access point is also operating in ad hoc mode and one of devices 100 enters the range of the access point 210). Device 100-1 is in range of both access point 210 and a peer device 100 and is, therefore, activated to switch continuously between infrastructure and ad hoc modes. Device 100 can be configured so that the process steps described relative to Fig. 4, and Table A can occur automatically, *i.e.*, there need not be human intervention to cause processing to advance from a particular step to a next step.

[0089] The linking rules of Table A describe operation of device 100 when device 100 is first introduced into system 1000. However, over time, the relative positioning of devices 100 in system 1000 is expected to change. For purposes of illustrating the invention, the illustrative embodiment describing operation of the linking rules of Table A in connection with Fig. 1a assumes that each device 100 is introduced into system 1000 in the position indicated contemporaneously.

[0090] Referring to Fig. 2f, another illustrative embodiment of the invention is shown and described. In the illustrative embodiment of Fig. 2f, devices 100-3, 100-2, 100-1 each having dynamic access module and operating in accordance with the linking rules of Table A are introduced into system 1000 contemporaneously. System 1000 includes access point 210 which operates continuously in infrastructure mode and which is wireline connected to server 240. Introduced and initialized in the relative positions shown, with connectivity designated by double arrows *(i.e.*, with device 100-3 in range of a peer 100-2 and access point 210, device 100-2 in range of peer 100-3 and peer 100-1 and device 100-1 in range of peer 100-2), device 100-3 operates in dynamic switching mode, while devices 100-2, 100-1 operate in ad hoc mode. Referring to the timing diagram of Fig. 7, time TS_0 designates a time when device 100-3 switches between infrastructure and ad hoc modes, time TS_1 designates a time at which device 100-3 switches from ad hoc to infrastructure mode, time TS_2 designates a succeeding switching time at which device 100-3 switches from infrastructure to ad hoc mode and time TS_3 designates a succeeding time at which device 100-3 switches to infrastructure mode. A data packet transmitted from device 100-1 and addressed to server 240 can be transmitted along the hop sequence 100-1, 100-2, 100-3, 210, 240. At time T_1 device 100-1 may transmit a data packet addressed to server 240. A self-routing algorithm of device 100-1 may resolve that the hop sequence is 100-1 100-2, 100-3, 210, 240. At time T_1, devices 100-1, 100-2 in accordance with the Table A linking rules, operate in ad hoc mode while device 100-3 in dynamic switching mode operates in infrastructure mode. Between times T_1 and TS_2 (the time that device 100-3 switches modes), data packets destined for device 100-3 can be buffered by device 100-2, or device 100-1. At time T_2, after switching to ad hoc mode, switching device 100-3 (Fig. 2f) receives the previously buffered data packet data from device 100-2. Switching data collection device 100-3 buffers the data packet data until time T_3, a time after data collection device 100-3 switches back to infrastructure mode. At time T_3, while operating in infrastructure mode, data collection device 100-3 sends data of the received data packet to access point 210. At time T_3, switching device 100-3 operates in infrastructure mode to send data packet data to access point 210 also in infrastructure mode. It is noted that during the time of the multi-hop transmission of data along the hop sequence 100-1, 100-2, 100-3, 210, devices 100-1, 100-2 continuously operate in ad hoc mode without switching to infrastructure mode between times T_1 and T_3.

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[0091] In accordance with a self-healing component 1464 of dynamic access module 1406, device 100 automatically monitors data throughput through device 100 and automatically changes a communication mode in response to the throughput monitoring. For example, in accordance with self-healing component 1464, device 100 can be configured so that if device 100 determines that data transmissions have dropped below a predetermined level, device 100 automatically switches communication modes (*e.g.*, from infrastructure mode to ad hoc, from infrastructure to infrastructure/ad hoc switching mode, from ad hoc mode to infrastructure mode, from ad hoc mode to infrastructure/ad hoc switching mode, from infrastructure/ad hoc switching mode to infrastructure mode, from infrastructure/ad hoc switching mode to ad hoc mode). Device 100 can be configured so that the predetermined level of acceptable data throughput is operator selectable by an operator of device 100 or system 1000. Where device 100 is configured so that an acceptable level of data throughput is operator selectable, the data throughput level can be set to a non-zero level so that mode changing occurs when data throughput falls below the operator established threshold. Where device 100 is configured so that an acceptable level of data throughput is operator selectable, the data throughput level can be set to a zero so that mode changing occurs only when data throughput ceases (*e.g.*, a network failure). Device 100 can be configured to carry out the steps described relative to self-healing component 1464 automatically, *i.e.*, without human intervention to advance processing from a first step to a next step.

[0092] Referring to the view of Fig. 8a, device 100 can be configured so that a throughput threshold setting for device 100 is selected by clicking on an appropriate icon 1502, 1504, 1506 of graphical user interface 910 (GUI). A threshold can also be set utilizing a GUI selector bar 1508. GUI 910 can be created using an API of a closed standard operating system (*e.g.*, WINCE) or with use of an appropriate windows manager for an open standard operating system where device 100 incorporates an open standard OS such as Linux. Available open standard windows managers include OPIE, QTOPIA, FVWM, and KDE. When icon 1502 is selected, a 50% of maximum throughput is set as the throughput threshold. When icon 1504 is selected, a 25% of maximum throughput is set as a throughput threshold. When icon 1506 is selected, the throughput threshold is set to zero so that device 100 will attempt to switch from its current mode (infrastructure, ad hoc, dynamic switching) only in the event of a network failure.

[0093] With reference to Fig. 3b, an OSI model diagram is shown for further description of the invention. According to the OSI network layer model, data protocols may be implemented in one of seven layers; *i.e.*, the physical layer 3102 the link layer 3104, the network layer 3106, the transport layer 3110, the session layer 3112, the presentation layer 3114, and the application layer 3116. Dynamic access module 1406 which modifies the standard functioning of a NIC radio driver, can have several components, such as linking component 1462, self-healing component 1464, and switching component 1472 that can be regarded as being inserted in the link layer 3104 above the physical/Mac layer 3102. Commercially available operating systems provide application program interfaces (APIs) enabling programmers to alter radio drivers. For example, WINDOWS XP provides a Network Driver Interface Specification (NDIS) enabling programmers to custom define radio communication protocols and other drivers for a variety of processor interfacing devices. WINDOWS CE (WINCE) also provides an NDIS. Where device 100 incorporates a Linux kernel, a protocol driver for a radio of device 100 can be defined using an open source API such as "Linux Wireless Extensions."

[0094] In accordance with a self-routing component 1466 of the dynamic access module 1406, each data collection device 100 of a data collection device system 1000 can incorporate a self-routing algorithm so that each device is equipped to participate in a self-organized network (SO) such that where a plurality of portable or remountable data collection devices in ad hoc mode will automatically activate self-routing algorithms to form a Self-Organized (SO) network. The multi-hop data packet transmissions are supported between devices of the SO network.

[0095] In one specific embodiment, self-routing component 1466 of dynamic access module 1406 is implemented using MESHNETWORKS SCALABLE ROUTING (MSR) protocol of the type available from MESHNETWORKS of Maitland, FL. In another illustrative embodiment, SO service algorithms of the type available from GREENPACKETS, INC. are incorporated into devices 100. In a particular illustrative embodiment, self-routing component 1466 of each device 100 of system 1000 incorporates SONbuddy self-organized network routing algorithm software of the type available from GREENPACKETS, INC. of Cupertino, CA. The Self Organized routing algorithms (SO services) of the data collection device 100 for implementation of the dynamic access module can be proactive, reactive, hierarchical, geographical, power aware, or multicast routing algorithms. The MSR protocol from MESHNETWORKS comprises elements of proactive and reactive routing. Available self organizing routing algorithms base routing on a variety of factors including such as signal strength, error rate, power consumption and availability, security concerns, quality of service (QOS) parameters, and latency (the time of transmission from a transmission mode to a destination mode). In the illustrative embodiment of Fig. 3c, dynamic access communication protocol module 1406 incorporates a latency based SO routing algorithm module 1467, a power aware SO routing algorithm module 1468, and a bit error rate SO routing algorithm module 1469.

[0096] When incorporating an SO routing algorithm module as part of self-routing component 1466, each data collection device 100 as shown in Fig. 1a can periodically broadcast one or more routing table data packets to one or more other data collection devices 100 which are in ad hoc mode or in dynamic access mode. Each data collection device of network 300A can also periodically receive one or more routing table data packets from neighboring peer devices 100 in connecting range of device. Routing table data packets that are transmitted and received by a device 100 can include metrics or

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other messages that enable device 100 to update a routing table stored in a memory of the device 100. A routing table can include network addresses of all or a subset of nodes within a self-organized network, such as network 300A shown in Fig. 1a. When data collection device 100 activates an on demand routing algorithm module, data collective device 100 can send a Route Request (RREQ) data packet and receive a Route Reply (RREP) data packet.

[0097] For larger SO networks, nodes of the network can be divided into "clusters" or "zones" and routing tables updated with routing table data packets broadcast and received by a data collection device 100 can include information characterizing the various clusters. In one illustrative embodiment, a designated first set of nodes 100 of network 300A can be designated to store complete routing tables, and a designated second set of nodes 100 can be configured to relay packet data to those nodes storing complete routing tables.

[0098] Referring to self-routing algorithm modules 1467, 1468, 1469 in greater detail, a device 100 operating with latency based routing algorithm module 1467 active can determine a routing path primarily based on which routing path out of a plurality of possible routing paths will yield the shortest transmission time for transmitting a data packet between a source node and a destination node. Device 100 operating with power aware routing algorithm module 1468 active can determine a routing path primarily based on which routing path out of a plurality of possible routing paths will increase the battery life of one or more devices of the self-organized network. Device 100 operating with bit error rate based routing algorithm module 1469 active can determine a routing path primarily based on which routing path out of a plurality of possible routing paths can be expected to yield the smallest bit error in transmitting a data packet between a source node and a destination node.

[0099] Aspects of latency based routing algorithms are described in various publications such as A New Method to Make Communication Latency Uniform: Distributed Routing Balancing, D. Franco, et al. of the Universitat Autònoma de Barcelona Department d'Informàtica, 1999, 10 pgs., Barcelona, Spain, Adaptive Routing of QoS-Constrained Media over Scalable Overlay Topologies, Gerald Fry, et al., Boston University Department of Computer Science, 2003, 28 pgs., Boston, MA, A Low-Latency Routing Protocol for Wireless Sensor Networks, Antonio G. Ruzzelli, et al., Adaptive Information Cluster, Smart Media Institute in the Department of Computer Science at the University College Dublin, 2003, 6 pgs., Belfield, Dublin and A Low Latency Router Supporting Adaptivity for On-Chip Interconnects, Jongman Kim, et al., Department of Computer Science and Engineering at Pennsylvania State University, June 2005, 6 pgs., University Park, PA, Request For Comments: 1058 - Routing Information Protocol, C. Hedrick, Network Working Group, Rutgers University, June 1988, 33 pgs., Request For Comments: 2453 - RIP Version 2, G. Malkin, Network Working Group, Bay Networks, November 1998, 39 pgs. and Internetworking Technologies Handbook: Routing Information Protocol, Cisco Systems, Inc., Third Edition, Cisco Press, Dec. 1, 2001, pp. 47-1-47-5, Indianapolis, IN. Aspects of power-aware based routing algorithms are described in various publications such as Online Power-Aware Routing in Wireless Ad-hoc Networks, Qun Li, et al., Department of Computer Science at Dartmouth College, 2001, 10 pgs., Hanover, NH, Power-Aware Routing in Mobile Ad Hoc Networks, Mike Woo, et al., Department of Electrical and Computer Engineering at Oregon State University and Aerospace Corporation, 1998, 15 pgs., Carvallis, OR and El Segundo, CA and Fair Coalitions For Power-Aware Routing in Wireless Networks, Ratul K. Guha, et al., Department of Engineering and Applied Science, Computer and Information Science, and Electrical Engineering at the University of Pennsylvania, July 20, 2004, 21 pgs., Pennsylvania. Aspects of bit error rate routing algorithms are described in such publications as Congestion-Optimized Multi-Path Streaming of Video Over Ad Hoc Wireless Networks, Eric Setton, et al., Information Systems Laboratory in the Department of Electrical Engineering at Stanford University, 2004, 4 pgs., Stanford, CA. and Minimizing Distortion for Multi-Path Video Streaming Over Ad Hoc Networks, Eric Setton, et al., Information Systems Laboratory in the Department of Electrical Engineering at Stanford University, 2004, 4 pgs., Stanford, CA.

[0100] In one illustrative embodiment, latency based routing algorithm module 1467 for enabling device 100 to participate in a self-organized network can incorporate a simple, low overhead distance-vector protocol implementing features seen in protocols such as the Routing Information Protocol (RIP). Operating in accordance with RIP, a source device 100 receives routing table data packets indicating the number of hops between various nodes of network 300A, and determines a lowest latency routing path for a source to destination data transmission on the basis of which path yields the fewest number of hops. Referring to system 1000 as shown in Fig. 1a, any given node, such as device 100-4 of network 300A can receive a routing table data packet including metric information from its neighbor peer devices 100-2, 100-5 describing the hosts (*e.g.*, node 100-1 for device 100-2) that each neighbor, 100-2, 100-5, can reach and how many hops will be required to reach the hosts from devices 100-2, 100-5. Host 100-4 will then insert the destination hosts, *e.g.*, host 100-1 into its routing table, and include peer neighboring devices (*e.g.*, device 100-2 for destination node 100-1) as the next node on the path to the destination, and include a total distance d, which will be the number of hops to the destination. Eventually, every node 100-1, 100-2, 100-4, 100-5 of the self-organized network 300A will store in a memory thereof a table of all destinations that it can possibly reach. All nodes can periodically send routing table data updates to their neighbors with entries for all possible destinations and the distance. In accordance with RIP, nodes 100 can be configured to request updates. If a device 100 receives a routing table data packet message with a destination that is already in a routing table, then a simple comparison is made and the path with the shortest distance is entered. A timeout value for certain paths can be included to help smooth transitions and updates for a changing topology. A

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device 100 can send a routing table data packet including a message indicating that that some nodes are unreachable.

[0101] Accordingly, the routing information of the device routing tables can change when devices 100 are added to or deleted from system 1000, or when a location of the one or more of devices 100 of the system 1000 changes. The data collection device 100 can route data packets according to a particular route described within routing table information stored within it.

[0102] Addresses of local server 240 or remote server 410 may or may not appear on any of the routing tables of devices 100 that incorporate dynamic access module 1404. Where system 1000 is configured so that server addresses do not appear on device routing tables, packets addressed to servers 240, 410 are transmitted to a device operating in dynamic switching mode (*e.g.*, device 100-1, as shown in Fig. 1a) which serves as a default gateway for packets addressed to destinations outside of the SO network 300A.

[0103] As indicated, the incorporation of self-routing component 1466 into devices 100 facilitates multi-hop data packet transmissions across multiple peer devices. With reference again to system 1000 of Fig. 1a every data collection device has access to (*i.e.*, can receive data transmissions to and from local server 240 and remote server 410). In data collection systems, it is important that data collection device 100 have constant access to applications and data bases of local server 240 and remote server 410. For example, data collection devices 100 may make repeated requests for price information from a price lookup table (PLU) stored in server 240 or server 410 utilizing bar code decoded data. Data collection devices 100 may also repeatedly send credit/debit account information to remote server 410 for purposes of requesting authorization of a credit transaction. In shipping and inventory applications, data is repeatedly sent for archiving and tracking to a remote server 410. In retail store applications, customer number information may be repeatedly sent to remote server 410 which is configured to respond with customer specific data such as customer targeted advertising messages.

[0104] Referring again to the system of Fig. 1a, device 100-3 is in range of access point 210 only. Accordingly, device 100-3 will operate in infrastructure mode and be in communication with access point 210 which also operates in infrastructure mode. Device 100-1, in range of both an access point 210 and a peer device 100, operates in a dynamic switching mode. Operating in a dynamic switching mode, device 100-1 is able to send and receive data packets to and from access point 210 operating in infrastructure mode and is able to send and receive data packets from peer devices operating in ad hoc mode. Device 100-2 is in range of a peer device 100 only. For data communications between device 100-2 and server 240, data packets can be transmitted forwardly and backwardly along the hop sequence 100-2, 100-1, 210, 240. Data collection devices 100-4, 100-5 are also in communication with peer devices 100 only and not access point 210 and, therefore, operate in ad hoc mode. Because devices 100 in accordance with self-routing component 1466 incorporate self-routing algorithms, devices 100-4, 100-5 are nevertheless in communication with server 240, and server 410. For data communications between device 100-5 and server 240, data packets can be transmitted forwardly and backwardly along the hop sequence 100-5, 100-4, 100-2, 100-1, 210, 410.

[0105] In another useful embodiment, system 1000 is devoid of a management module for synchronizing infrastructure/ad hoc switching between several devices. The inventor discovered that by incorporating a linking component in accordance with the linking rules of Table A into each of several devices and equipped each of the several devices with self-routing functionality, each device 100 remains in communication with each other node of system 1000 without the incorporation of a management module to synchronize infrastructure/ad hoc mode switching of several devices.

[0106] Referring to the system diagram of Fig. 2a, the system of Fig. 2a is similar to the system of Fig. 1a except that at the time of initialization, device 100-2, like device 100-1, is in range of both an access point 210 and a peer device 100. In accordance with the linking rules of linking component summarized in table A, both device 100-1 and device 100-2 will be in a mode in which they continuously switch between an infrastructure mode and an ad hoc mode. It will be seen that under certain circumstances, the devices in a dynamic switching mode may not be synchronized (*e.g.*, device 100-1 may be in ad hoc mode at the time that device 100-2 is in infrastructure mode or vice versa). Nevertheless, in spite of possible desynchronized conditions, all devices 100 of system 1000 remain in communication with one another. For example, where a data packet transmitted from a first device 100-2 in dynamic switching mode is addressed to a second device 100-1 in a dynamic switching mode the data packet transmission request may be carried out with a single hop transmission along the path 100-2, 100-1 provided switching of the devices is synchronized such that the ad hoc operation times of the devices overlap for sufficient time to facilitate the packet transmission. It is also seen with reference to the system view of Fig. 2a that system 1000 can be configured so that a data packet transmitted by a first device 100-1 in dynamic switching mode and addressed to a second device 100-2 in a dynamic switching mode can be routed to second device 100-2 even where the switching of the two devices is not sufficiently synchronized to facilitate a single hop data packet transmission. In accordance with the invention, system 1000 can be configured so that a packet transmitted from device 100-1 addressed to device 100-2 can be routed by default along the path 100-1, 210, 100-2 where direct transmission along the path 100-1, 100-2 is not possible due to network desynchronization and where access point 210 incorporates routing functionality. In accordance with linking rules of Table A, switching desynchronization cannot prevent data transmissions between devices 100-4, 100-5 out of range of access point 210 since, according to the linking rules, devices 100-4, 100-5 in range of a peer device 100 but out of range of an access point 210 are caused

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to operate in ad hoc mode continuously and do not attempt to switch out of ad hoc mode unless switching is driven in response to throughput monitoring. Accordingly, it can be seen that a highly functional and flexible system can be created without incorporating a high overhead synchronization management module into system 1000.

[0107] Operation of self-healing component 1464 and self-routing component 1466 of dynamic access module 1406 is further described with reference to the illustrative embodiment of Fig. 1d, wherein data collection system 1000 includes two access points 210, 210'. Remaining components of the system 1000 of Fig. 1d are as described in connection with Fig. 1c. The connectivity of each device is 100 illustrated with double arrows (the presence of a double arrow between devices indicates that the devices are in a connection range distance). In normal operation, data packets addressed to server 240 or server 410 propagate through access point 210 or access point 210'. In normal operation, with all nodes functioning, devices 100-1 and 100-2 (Fig. 1d) are in range of access point 210 and operate in infrastructure mode. Devices 100-1, 100-2 are also in range of at least one of peer devices 100-4 and 100-5, but, in the specific embodiment described are not initially connected to peer devices 100-4, 100-5 since, at the time of initialization, devices 100-4, 100-5 were not in range of either of devices 100-1, 100-2. Devices 100-14 and 100-15 are in range of a both an access point 210' and a peer device 100 and operate in dynamic switching mode. Remaining data collection devices 100 of system are in range of a peer device only and therefore operate in ad hoc mode.

[0108] The operation of self-healing component 1464 is illustrated further when considering the case of a failure of access point 210. When access point 210 fails, data throughput through devices 100-1 and 100-2 (Fig. 1d) drops. Devices 100-1 and 100-2 in accordance with self-healing component 1464 can automatically monitor their respective data throughputs and may switch their operating modes to ad hoc mode. Notwithstanding the failure of access point device 210, data collection devices 100-1, 100-2 build a new connection to server 240 and server 410 through access point 210'. Devices 100-1 and 100-2 build a new connection to server 240 since (1) by switching to ad hoc mode in response to a throughput drop, device 100-1 becomes connected to device 100-4 and device 100-5 and (2) by switching to ad hoc mode, device 100-2 becomes connected to device 100-5. Further, through operation of a self-routing algorithm module 1266, multi-hop data transmissions are supported between devices 100-1 and 100-2 and an access point 210'. It is seen that packets which prior to failure of access point 210 would have been transmitted along the hop sequence 100-2, 210, 240, may instead be transmitted along the hop sequence 100-2, 100-5, 100-8, 100-13, 100-14, 210', 240 by operation of self-healing component 1464 and self-routing component 1466 which together enable device 100-2 to build a connection between device 100-2 and device 100-5 upon the failure of access point 210, and to establish a multi-hop data communication path between device 100-2 and server 240.

[0109] In another illustrative embodiment, it is seen that incorporation of dynamic access module 1406 into devices 100 of system 1000 can greatly establish the ease with which connectivity is established. With reference again to system 1000 of Fig. 1d, assume again that access point 210 fails but that devices 100-13, 100-12 have not been introduced into system 1000 (Fig. 1d) at the time of failure of access point 210'. At the time of failure, device 100-14 in range of access point 210' only at the time of initialization operates in infrastructure mode, device 100-15 in range of access point 210' and peer 100 at the time of initialization operates in dynamic switching mode, and device 100-16 in range of a peer device only at the time of initialization operates in ad hoc mode. It is seen that when device 100-12 is introduced into system 1000 in the position shown wherein all devices 100 incorporate dynamic access module 1406 and operate in accordance with the linking rules of Table A, a data communication path is established to enable data packets transmitted by devices 100-1, 100-2 addressed to server 240 to reach server 240 (*i.e.*, through the hop sequence [100-1 or 100-2], 100-5, 100-9, 100-10, 100-12, 100-15, 210', 240). Further, an alternative path to server 240 is created by introducing into system 1000 device 100-13 in range of device 100-8 and device 100-14 as shown. Device 100-14 is initialized in infrastructure mode, and, in accordance with the embodiment of dynamic access module 1406 described may not originally be in communication with device 100-13. Nevertheless, packets transmitted by device 100-13 and addressed to server 240 may be transmitted along the hop sequence 100-13, 100-8, 100-9, 100-10, 100-12, 100-15, 210', 240 notwithstanding a lack of a communication link between device 100-13 and device 100-14. Further, a communication link between device 100-13 and device 100-14 may be established by manually activating switching of device 100-14 by adjusting the throughput threshold of device 100-14 using GUI 910 as described in connection with Fig. 8a. Specifically, if the throughput threshold level is adjusted to a significantly high level, device 100-14 in accordance with self-healing component 1464 can switch to dynamic switching mode to establish connectivity with device 100-13, and to thereby establish the possible hop sequence 100-13, 100-14, 210', 240. In addition to representing a retail store, the view of Fig. 1d can represent a shipping warehouse, and a patient care center such as a hospital.

[0110] The invention therefore is in one aspect is a method for repairing a network connection in a retail store data collection system having an access point 210 wireline connected to and being part of a wireline network 200, the wireline network including a wireline bus 215 and a local server 240, and where the access point can buffer data packets destined for devices requesting a power save function, the method including the step of providing dynamic access module 1406 in a plurality of data collection devices 100, and introducing (*e.g.*, by powering up or by physical movement) a new device 100 into the system 1000 at a certain position such that the new device 100 is in connection range of both of first and second device nodes 100 of the system 1000, and wherein the first and second device nodes 100 are not in connection

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range of one another, wherein the second node is connected to the local server 240, so that a network connection is established between the first node and the server 240 by introduction of the new device at the certain position.

[0111] The invention in another aspect is a method for repairing a network connection in a shipping warehouse data collection system 1000 having an access point 210 wireline connected to and being part of wireline network 200, the wireline network including a wireline bus 215 and a local server 240, and when the access point can buffer data packets destined for devices requesting a power save function, the method including the step of providing dynamic access module 1406 in a plurality of data collection devices 100, and introducing (*e.g.*, by powering up or by physical movement) a new device 100 into the system 1000 at a certain position such that the new device 100 is in connection range of both of first and second device nodes 100 of the system 1000, and wherein the first and second device nodes 100 are not in connection range of one another, wherein the second node is connected to the local server 240, so that a network connection is established between the first node and the server 240 by introduction of the new device at the certain position.

[0112] The invention in another aspect is a method for repairing a network connection in a patient care center data collection system having an access point 210 wireline connected to and being part of wireline network 200, the wireline network including a wireline bus 215 and a local server 240, and where the access point can buffer data packets destined for devices requesting a power save function, the method including the step of providing dynamic access module 1406 in a plurality of data collection devices 100, and introducing (*e.g.*, by powering up or by physical movement) a new device 100 into the system 1000 at a certain position such that the new device 100 is in connection range of both of first and second device nodes 100 of the system 1000, and wherein the first and second device nodes 100 are not in connection range of one another, wherein the second node is connected to the local server 240, so that a network connection is established between the first node and the server 240 by introduction of the new device at the certain position.

[0113] It is seen that the invention can significantly improve data collection procedures at facilities incorporating data collection system. Network down times can be reduced as the invention enables network failures to be quickly addressed by introducing one or more devices 100 constructed according to the invention into data collection systems at e.g., retail stores, shipping warehouses, and patient care centers, to repair network connections where network connection is lost due to power loss node failures, congestion node failures and other node failures. In that devices 100 can be portable and capable of wireless communication, network connections can be repaired rapidly without installation of any wireline infrastructure. The likelihood of repairing a network connection is increased as additional devices 100 are added to systems. In addition to aiding in repairs to legacy networks, the invention enables new networks to be rapidly deployed. For example, the invention enables a fleet of devices 100 needed on a temporary basis (*e.g.*, as in an inventory application at a retail store) to be quickly connected to a wireline network 200 to gain access to server 240 and 410 without altering or servicing of the existing wireline network 200.

[0114] The invention is further illustrated with reference to the data packet diagrams of Figs. 5a-5b, 6a-6d. The packet diagrams of Figs. 5a-5b, 6a-6d illustrate a packet stripping and repackaging function which may be carried out by device 100 in accordance with a switching component of dynamic access module 1406. In general, a data packet received and transmitted by device 100-1, where incorporated into an IEEE 802.11 wireless communication system can include the format as shown in Fig. 5a. The packet 1502 includes a Media Access Control (MAC) header 1504 that includes frame control field 1510. The packet 1502 also includes network layer bytes 1506 and (payload) data bytes 1508. The packet 1502 can be transmitted in accordance with the TCP/IP suite of protocols. The frame control bytes 1510 include (ToDS) bit 1612 and (FromDS) bit 1614.

[0115] A structure of a control field 1510 of a data packet in accordance with the IEEE 802.11 Standard is described with further reference to the diagram of Fig. 5b. Bits 1606 indicate the current version of the 802.11 protocol used, bits 1608, 1610 indicate the function of the current frame (*i.e.*, control, data and management), bits 1612, 1614 as are explained more fully herein below, indicate the path of the frame (*i.e.*, from access point, to access point, or ad hoc communication), bit 1616 indicates whether additional fragments of a current frame will follow, bit 1618 indicates whether the present frame is being retransmitted, bit 1620 indicates whether a sending device is in an active mode or a power save mode as described earlier herein, bit 1622 indicates whether an access point is sending additional frames, bit 1624 indicates whether the present frame is WEP encrypted while bit 1626 indicates whether it is necessary to process a received frame in a particularized order. The operation of access point 210 in reference to its examination of power bit 1620, and encryption bit 1624 has been described herein above.

[0116] For data packet transmission from an access point 210, to a data collection device 100-1, the bits 1612, 1614 are encoded as the value 01. For data packet transmissions to access point 210 from data collection device 100-1, the bits 1612, 1614 are encoded as 10. For peer to peer data packet transmissions, the control bits 1612, 1614 are encoded as the value 00.

[0117] Referring to Fig. 6a, the data packet 1530 is received by the data collection device 100-1, from the access point 210, when it 100-1 is operating in an infrastructure mode. Referring to Fig. 6b, the data packet 1540 is transmitted from data collection device 100-1, to the access point 210, when it 100-1 is operating in an infrastructure mode. The DS bits 1612, 1614 are encoded as value equal to 01 to indicate that the packet is being sent from the data collection device 100-1 to the access point 210.

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[0118] Referring to Fig. 6c, the data packet 1550 is transmitted from the data collection device 100-1 to a peer device 100-2. The DS bits 1612, 1614 are encoded as a value equal to 00 to indicate that the packet is being transmitted from a data collection device 100-1 to a data collection device 100-2, via the IBSS.

[0119] Referring to Fig. 6d, the data packet 1560 is transmitted from a peer data collection device 100-2 to the data collection device 100-1. The DS bits 1612, 1614 are encoded as a value equal to 00 to indicate that the transmission of the data packet 1560 is from a data collection device 100-1 to a data collection device 100-2, via the IBSS.

[0120] When performing network switching in accordance with switching module 1472, data collection device 100 may receive a data packet from peer data collection device in the form of packet 1560 and repackage the payload data of the packet in the form of packet 1540 in order to route the payload data to access point 210. Also, when performing network switching, data collection device 100, 100-1 may receive a data packet from an access point in the form of packet 1530 and repackage the payload data of the packet into the form of packet 1550 when routing that payload data to peer device 100, 100-2. In an 802.11 radio communication system "media disconnect" and "media connect" notification messages are passed to the network (IP) layer when there is a switching of a network. The IP layer delays processing of such notification messages to protect layer 3106 from spurious media connects and disconnects. In order to reduce the processing delay resulting from network switching, the dynamic access module 1460 can be authored so that media disconnect and media disconnect notification messages to the IP layer are suppressed. In addition, switching delays can be further reduced by avoiding resetting of firmware of radio transceiver 5712 when switching, and by storing the state of the presently associated network (infrastructure or ad hoc) prior to switching so that device 100 does not have to re-execute a network association protocol each time device 100 switches networks. Such switching time reduction methods are discussed in U. S. Patent Application Publication No. US2004/0218580, published November 4, 2004 and entitled, "Method To Enable Simultaneous Connections To Multiple Wireless Networks Using A Single Radio."

[0121] In embodiments described thus far, switching component 1472 is incorporated in a device 100 having a single processor IC chip 548 and a single radio transceiver 5712, also referred to as a network interface card (NIC) capable of switching between infrastructure and ad hoc modes *(i.e.,* a single 802.11 radio transceiver). A real time operating system can be loaded into processor IC chip 540 and, in accordance with switching component; the processor IC chip 548 can be configured so that processing time is divided between managing communication in infrastructure mode and managing communication in an ad hoc mode.

[0122] In a variation of the invention, device 100 can incorporate a second radio transceiver of the same protocol Standard as a first radio transceiver. The second radio transceiver may be a second radio transceiver 5712. In accordance with the IEEE 802.11 Standard, second radio transceiver 5712 is capable of switching between infrastructure and ad hoc communication modes. One of the radio transceivers can be dedicated for conducting infrastructure communications and the second radio transceiver can be dedicated for conducting ad hoc data communications. In such an embodiment, device 100 in accordance with switching component 1472, need not switch a communication mode of an individual NIC, but rather, in accordance with switching component 1472, need only strip received data packets, buffer payload data and repackage the payload data into a suitable form for transmission by the device's second NIC.

[0123] Further aspects of the invention are described with reference to Fig. 1c showing a data collection system 1000 partially integrated in a retail store. System 1000 as shown in Fig. 1c includes a plurality of hand held data collection devices 100H and a plurality of mounted data collection devices. The mounted data collection devices 100 include retail transaction aiding credit/debit card reading devices 100R located at front end cashier stations 260 and price verifiers 100V deployed throughout the store to facilitate price lookups by customers. Data collection devices 100H can have the form described further with reference to Figs. 8a and 8b, and data collection devices 100R, 100V can have the form described with further reference to Figs. 9a, 9b and 9c. Several prices verifiers 100V can be mounted on or proximate to store shelves 262 *(i.e.,* on posts) while other mobile price verifiers 100P can be mounted on shopping carts 264. The mounted portable data collection devices 100R, 100V can be replaceably mounted; that is, they can be demounted from their current mounting position and remounted in another mounting position within the retail store or other facility. The plurality of hand held portable devices 100H can be carried by agents of a store or by agents of an inventory-conducting entity. All of the devices 100 in the system described can be controlled to make repeated data transmissions to local store server 240 or to one of remote servers 410, which in certain embodiments may be server centers including a plurality of servers. For example, debit/credit card reading data collection devices 100R may make repeated requests to send transaction data including account number data to credit/debit authorizing network 414. Credit/debit card reading devices 100R and price verifiers 100V may also send customer ID information to customer data base server 410C to request profiling information respecting a particular customer. Hand held portable data collection devices 100H may make repeated requests for price information from a price lookup table (PLU) stored in store server 240. Hand held portable data collection devices 100H may also make item ordering requests to retailer supplier server 410S. Price verifiers 100V may make repeated requests to store server 240 for price information respecting items that are subject to bar code or RFID tag reading by a customer. Item ordering data may also be submitted from a price verifier 100V to supplier server 410S along with credit/debit card amount information as read by an optional card reader 1348 of price verifier 100V. It will be seen that the need for data collection devices 100 to remain connected to a store server 240 and

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remote servers, *e.g.*, servers 240, 410 is substantial. Each of the data collection devices 100H, 100R, 100V is a data collection device 100 as described herein which can incorporate the components of Fig. 1b.

[0124] According to the invention, several additional devices that are configured to include a dynamic access module 1406 can be added to system 1000 with no modification of the components of a legacy local infrastructure network 200. There is no need, for example, to boost the radio transmission range of access point 210, since the communication range of a particular device 100 can be increased by disposing devices 100 intermediate of the device and the access point 210. Legacy access points 210 may be operated continuously in infrastructure mode so that access point 210 provides continuous access to the wireline network to which it is connected. With the present invention devices 100 can be deployed in system 1000 without disrupting the continuous operation of access point 210 in infrastructure mode.

[0125] New devices 100H, 100R, 100V that are added to system 1000 have connectivity to servers 240, 410 even where out of range of access point 210 provided that devices 100 of the system define a self organized network with an available hopping sequence communication path between the added device 100 and the access point 210 of the legacy infrastructure network.

[0126] In a further aspect, dynamic access communication protocol module 1406 may incorporate a packet content discriminator module 1480. Packet content discriminator module 1480 can examine the content of a data packet buffered for transmission by device 100. Packet content discriminator module 1480 may also discriminate content of a data packet by receipt of a content identifier from control circuit 552, without examination of packet content wherein control circuit 552 has prior knowledge of data content. For example, when control circuit 552 executes a data collection routine to transmit decoded bar code data, it is known that the content of the packet is bar code data without examination of a data packet.

[0127] Referring to the table of Fig. 13 correlating data packet content with self routing algorithm modules 1467, 1468, 1469, data collection device 100 may activate one out a plurality of self-routing algorithm modules 1467, 1468, 1469 based upon the particular type of data being transmitted by device 100 over a radio transceiver, *e.g.*, transceiver 2712. In accordance with dynamic access module 1406 in another aspect, dynamic access module 1406 may include a routing algorithm selection component 1490 which enables data collection device 100 to activate a particular one routing algorithm module 1467, 1468, 1469 for establishing a hop sequence based on the content of the data packet being transmitted. Data collection device 100 may utilize the output from packet content discriminator 1480 in order to activate a select one of routing algorithms modules 1467, 1468, 1469. Referring to the table of Fig. 13, first and second embodiments are shown and described.

[0128] Referring to embodiment 1, data collection device 100 discriminates whether the data packet being transmitted is streaming video data, still image data, decoded bar code data, decoded RFID data, credit card information data or VOIP data. If device 100 in accordance with packet content discriminator module 1480 determines that the data packet to be transmitted contains streaming video data, latency based routing algorithm module 1467 is activated. If device 100 in accordance with packet content discriminator module 1480 determines that the data packet to be transmitted is still image data *(i.e.,* a frame of image data) data collection device 100 activates power aware routing algorithm module 1468. If device 100 in accordance with packet content discriminator module 1480 determines that the data packet to be transmitted contains decoded bar code data, device 100 activates bit error rate based routing algorithm module 1469. If device 100 in accordance with packet content discriminator module 1480 determines that the data packet to be transmitted contains decoded RFID data, device 100 activates power aware routing algorithm module 1468. If device 100 in accordance with packet content discriminator module 1480 determines that the data packet to be transmitted contains credit card account information, device 100 activates bit error rate routing algorithm module 1469. If device 100 in accordance with packet content discriminator module 1480 determines that the data packet to be transmitted contains VOIP data, device 100 activates latency routing algorithm module 1467.

[0129] Referring to embodiment 2, data collection device 100 discriminates whether the data packet being transmitted is streaming video data, still image data, decoded bar code data, decoded RFID data, credit card information data or VOIP data. If device 100 in accordance with packet content discriminator module 1480 determines that the data packet to be transmitted contains streaming video data, latency based routing algorithm module 1467 is activated. If device 100 in accordance with packet content discriminator module 1480 determines that the data packet to be transmitted is still image data *(i.e.,* a frame of image data) data collection device 100 activates bit error rate routing algorithm module 1468. If device 100 in accordance with packet content discriminator module 1480 determines that the data packet to be transmitted contains decoded bar code data, device 100 activates power aware based routing algorithm module 1468. If device 100 in accordance with packet content discriminator module 1480 determines that the data packet to be transmitted contains decoded RFID data, device 100 activates power aware routing algorithm module 1468. If device 100 in accordance with packet content discriminator module 1480 determines that the data packet to be transmitted contains credit card account information, device 100 activates power aware routing algorithm module 1468. If device 100 in accordance with packet content discriminator module 1480 determines that the data packet to be transmitted contains VOIP data, device 100 activates latency routing algorithm module 1467.

[0130] Packet content discriminator component 1490 which can examine payload data can be regarded as being

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inserted into application layer 3116 (Fig. 3b), while self-routing component 1466 can be regarded as being inserted in network layer 3106 (Fig. 3b). Accordingly, routing algorithm selection component 1490 can include providing commands in network layer 3106 based on processing of data within application layer 3116.

[0131] With reference to Fig. 1a, devices 100 may operate with ESS (Extended Service Set) if network 200 has more than one access point, *e.g.*, access point 210'. Operating in accordance with ESS, system 1000 may pass communication between device 100-1 and access point 210 to device 100, 100-1 and another access point 210' if device 100, 100-1 passes out of range from access point 210' and into communication range of access point 210'.

[0132] An electrical block diagram of a data collection device 100, according to the invention is shown in Fig. 1b. Reader 100 includes a solid state image sensor array 182A, incorporated on an image sensor integrated circuit chip 1082A shown in Fig. 1d as a CMOS image sensor integrated circuit (IC) chip. In an important aspect, as will be described herein, image sensor array 182A includes a plurality of pixels and wavelength sensitive color filter elements associated with a color sensitive subset of the pixels, wherein the remaining pixels external to the color sensitive subset of pixels are devoid of associated wavelength selective filter elements. Because image sensor array 182A includes both monochrome pixels and color sensitive pixels, image sensor array 182A may be termed a hybrid monochrome and color image sensor array. Image sensor array 182A incorporated in device 100 can take on a variety of forms. For example, as described in connection with Figs. 11a-11b, an image sensor array or device 100 can be provided by incorporating an IT4XXX /IT5XXX imaging module of the type available from Hand Held Products, Inc., Skaneateles Falls, NY into device 100. Device 100 further includes a processor IC chip 548 and a control circuit 552. Control circuit 552 in the embodiment of Fig. 1b is shown as being provided by a central processing unit (CPU) of processor IC chip 548. In other embodiments, control circuit 552 may be provided by *e.g.*, a programmable logic function execution device such as a field programmable gate array (FPGA) or an application specific integrated circuit (ASIC). Imaging lens 212 focuses images onto an active surface of image sensor array 182A together with image sensor array 182A forms an imaging assembly 200. Control circuit 552 executes picture taking and indicia decoding algorithms in accordance with instructions stored in program memory EPROM 562 which together with RAM 560 and Flash memory 564 forms a reader memory 566. Reader memory 566 is in communication with processor IC chip 548 via system bus 570. Main processor IC chip 548 may be a multifunctional IC chip such as an XSCALE PXA25x processor IC chip including central processing unit (CPU) 552 or an OMAP processor IC chip such as an OMAP 1710 processor IC chip with core ARM 926 of the type available from TEXAS INSTRUMENTS. Device 100 further includes a field programmable gate array (FPGA) 580. Operating under the control of control circuit 552, FPGA 580 receives digital image data from image sensor IC chip 1082A and transfers that image data into RAM 560 so that the image data can be further processed (*e.g.*, by the decoding of a bar code symbol). Processor IC chip 548 can include an integrated frame grabber. For example, processor IC chip 548 can be an XSCALE PXA27X processor IC chip with "Quick Capture Camera Interface" available from INTEL. Where processor IC chip 548 includes an integrated frame grabber, the integrated frame grabber may provide the frame acquisition functionality of FPGA 580. By incorporation of appropriate software, such as the PVPLAT-FORM wireless multimedia software platform available from PACKETVIDEO, device 100 can be configured to transmit streaming video data packets over radio frequency communication interface block 5711, as is described further herein below. Device 100 further includes an illumination assembly 104 and a manual trigger 216. Image sensor IC chip 1082A in the embodiment of Fig. 1b includes an on-chip control/timing circuit 1092, an on-chip gain circuit 1084, an on-chip analog-to-digital converter 1086 and an on-chip line driver 1090. An image sensor array which is incorporated into device 100 may take on a variety of forms. Variations of image sensor arrays which may be incorporated in device 100 are described in detail in Provisional Patent Application Nos. 60/687,606, filed June 3, 2005, 60/690,268, filed June 14, 2005, 60/692,890, filed June 22, 2005, and 60/694,371, filed June 27, 2005, all of which are entitled Digital Picture Taking Optical Reader Having Hybrid Monochrome And Color Image Sensor, and all of which are incorporated herein by reference. In the above provisional patent applications, data collection devices having numerous types of image sensor arrays; *e.g.*, hybrid monochrome and color (uniform and non-uniform pixel size), monochrome, color, hybrid monochrome and light polarizing) together with associated processing methods are shown and described. All device specific components and processing features described in the above referenced provisional applications can be incorporated into device 100. All system related components and processing features described in the above referenced provisional applications can be incorporated into system 1000. Data collection device 100 may be configured to process image data to discriminate between decodable symbols and handwritten characters as is described in U. S. Patent Application No. 10/958,779 filed October 5, 2004 and incorporated herein by reference. An excerpt from the above referenced U. S. Patent Application No. 60/694,371 is attached as Appendix A. The above referenced U. S. Patent Application No. 10/958,779, a copy of which was filed as part of Provisional Patent Application No. 60/694,371 is attached as part of Appendix A. Device 100 can incorporate an image sensor IC chip (modified or off-the-shelf, color or monochrome) provided by *e.g.*, an MT9V022 or MT9M413 image sensor IC chip available from Micron, Inc. or a KAC-0311 image sensor IC chip by Kodak, Inc.

[0133] In a further aspect, device 100 includes a radio frequency (RF) communication interface block 5711. Radio frequency communication interface block 5711 may include one or more radio transceivers. Referring to the schematic diagram of Fig. 1b, radio frequency communication interface block 5711 may include one or more of an 802.11 radio

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transceiver 5712, a Bluetooth radio transceiver 5714, a cellular radio transceiver 5716, or a WIMAX (802.16) radio transceiver 5718. Radio frequency communication interface 5711 facilitates wireless communication of data between device 100 and a spaced apart device 150 of the referenced applications. I/O communication interface 572 includes one or more serial or parallel hard-wired communication interfaces facilitating communication with a spaced apart device 150 as will be described further in connection with Fig. 10. I/O communication interface 572 may include one or more of an Ethernet communication interface, a universal serial bus (USB) interface, or an RS-232 communication interface. Data collection device 100 may further include a keyboard 508 for entering data, a pointer mover 512 for moving a pointer of a graphical user interface (GUI) and a trigger 216 for initiating bar code reading and/or picture taking. Data collection device 100 may also include a display 504, such as a monochrome or color LED display and a touch screen 504T overlaid over display 504. Display 504 may be coupled to display controller for displaying color image data. All of the components of Fig. 1b can be encapsulated and supported by a portable hand held housing 101, *e.g.*, as shown in Figs. 8a and 8b or a replaceably mountable portable housing 102 as shown in Figs. 8a-9a. The components shown in fig. 1b can be powered by a multi-voltage power system 1095 that is coupled redundantly to multiple power sources, including serial power source (USB) 1097, transformer based AC/DC power supply 1098 that is adapted to receive AC wall outlet power and rechargeable battery 1099. Power system 1096 can provide power to circuit boards 1077 as shown in Fig. 8b.

[0134] In another aspect, device 100 includes an RFID reader unit 1250. RFID reader unit 1250 includes an RF oscillation and receiver circuit 1252 and a data decode processing circuit 1254. RFID reader unit 1250 may be configured to read RF encoded data from a passive RFID tag, such as tag 1260, which may be disposed on article 1202. Where RFID reader unit 1250 is configured to read RF encoded data from a passive RFID tag 1260, RF oscillation and receiver circuit 1252 transmits a carrier signal from antenna 1255 to passive tag 1260. Passive RFID tag 1260 converts the carrier energy to voltage form and a transponder 1266 of tag 1260 is actuated to transmit a radio signal representing the encoded tag data. RF oscillator and receiver circuit 1252, in turn, receives the radio signal from the tag and converts the data into a processable digital format. Data decode processing circuit 1254, typically including a low cost microcontroller IC chip, decodes the received radio signal information received by RF oscillator and receiver circuit 1252 to decode the encoded identification data originally encoded into RFID tag 1260.

[0135] An expanded view of RFID label 1260 is shown in Fig. 12a. RFID label 1260 includes a tag 1262 comprising an antenna 1264, a transponder 1266, and storage circuit 1268 for storing encoded identification data. Label 1260 can be affixed to articles such as articles of parcel or products held in retail store. Data from storage circuit 1268 is read from tag 1262 when tag 1262 is activated by RFID reader unit 1255. Further, reader unit 1250 may write data to tag 1262. Data written to tag 1262 by reader module 1250 may be, *e.g.*, new identification data. Tag 1260 may be incorporated in physical structures other article labels. As shown in Fig. 12c, tag 1262 may be incorporated on an identification card 1270, such as a driver license or an employee identification card. Identification card 1270 may carry a photograph 1271 of an employee. One specific type of employee identification card into which tag may be incorporated is a security badge. Tag 1262 may also be incorporated into a financial transaction card 1272 having a mag stripe 1273 as shown in Fig. 12b, such as a credit card, a debit card, or an electronic benefits card. Card 1272 can also carry magnetic stripe 1263.

[0136] RFID reader unit 1250 may operate in a selective activation mode or in a continuous read operating mode. In a selective activation mode, RFID reader unit 1250 broadcasts radio signals in an attempt to activate a tag or tags in its vicinity in response to an RFID trigger signal being received. In a continuous read mode, RFID reader unit 1250 continuously broadcasts radio signals in an attempt to actuate a tag or tags in proximity with unit automatically, without module 1250 receiving a trigger signal. In a selective activation mode, RFID reader unit 1250 selectively broadcasts radio signals in an attempt to activate a tag or tags in its vicinity selectively and automatically in response to a receipt by control circuit 1010 of an RFID trigger signal. Device 100 may be configured so that control circuit 552 receives a trigger signal under numerous conditions, such as: (1) an RFID trigger button such as button 1050 is actuated; (2) an RFID trigger instruction is received from a spaced apart device such as remote processor 1850, or local host processor 1350; and (3) control circuit 552 determines that a predetermined condition has been satisfied.

[0137] Still further, device 100 may include a card reader unit 1350 such as credit and debit card reader unit. Card reader unit 1350 includes a signal detection circuit 1352 and a data decode circuit 1354. Signal detection circuit 1352 receives an electrical signal from a card and data decode circuit 1354 decodes data encoded in the signal. When data decode circuit 1354 decodes a signal, the decode out information is transmitted to control circuit 1010 for further processing. Card reader unit 1350 forms part of a card reader 1348 which, in addition to including card reader unit 1350, includes a portion of housing 102 as shown in the embodiments of Figs. 8a and 8b. Card reader 1348 includes card receiving slot 1349 defined by housing 105. Card reader unit 1350 is configured to read more than one type of card. Device 100, with use of card reader unit 1350, may read e.g., credit cards, customer loyalty cards, electronic benefits cards and identification cards such as employee identification cards and driver license cards. Card reader unit 1350 can be selected to be of a type that reads card information encoded in more than one data format. Where card reader unit 1350 is a Panasonic ZU-9A36CF4 Integrated Smart Reader, card reader unit 1350 reads any one of magnetic stripe data, smart card or Integrated circuit card (IC card) data, and RF transmitted data. Where card reader unit 1350 reads RF transmitted

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identification data via RFID reading capability thereof, card reader 1348 may read RF transmitted identification data from a card when a card is inserted into slot, or else card reader unit 1350 may read RF transmitted identification data from a card or another object (*e.g.*, an RFID "key fob") when the card or object is merely brought into proximity with card reader 1348 without being inserted into slot 1349. Accordingly, where card reader unit 1350 is a Panasonic ZU-9A36CF4 Integrated Smart Reader, device 100 has dual RFID reader modules; namely, RFID reader module 1250 and the RFID reader module incorporated in card reader unit 1350.

[0138] In another aspect data collection device 100 as shown in Fig. 1b includes Voice Over IP (VOIP) processing unit 1450. Voice processing unit 1450 includes VOIP dual coder/decoder (CODEC) 1444, microphone 1446, and speaker 1448. VOIP CODEC 1444 receives an analog voice output signal from microphone 1446 and processes the output signal to produce a digital output. VOIP CODEC 1444 further processes digital voice data into analog form for output to speaker 1448. Voice data can be further processed by appropriately configured digital signal processing (DSP) circuitry of processor IC chip 548. In one example, VOIP dual CODEC 1444 is provided by a TLV320AIC22C DUAL CODEC, available from Texas Instruments, and is incorporated in association with a processor IC chip 548 provided by an OMAP series processor with TMS320C55X DSP also available from Texas Instruments.

[0139] As indicated herein, the components of device 100 shown and described in Fig. 1b can be incorporated into a variety of different housings. As indicated by the embodiment of Figs. 8a and 8b, the components of Fig. 1b can be incorporated into a hand held housing 101 as shown in Figs. 8a and 8b which is shaped to be held in a human hand. Data collection device 100 of Figs. 8a and 8b is in the form factor of a hand held portable data terminal. Data collection device 100 as shown in Figs. 8a and 8b includes a keyboard 508 a display 504 having an associated touch screen overlay 504T, a card reader 1348 and an imaging module 360 which includes the components of imaging assembly 200 as described herein; namely image sensor array 182A incorporated on an image sensor IC chip 1082A. Imaging module 360 has an associated imaging axis, a_i. As indicated by the side view of Fig. 8b, the components of the block diagram of Fig. 1b may be supported within housing 101 on a plurality of circuit boards 1077. Imaging module 360 may include an image sensor array having color sensitive pixels as described in Provisional Patent Application Nos. 60/687,606, filed June 3, 2005, 60/690,268, filed June 14, 2005, 60/692,890, filed June 22, 2005, and 60/694,371, filed June 27, 2005, all of which are entitled Digital Picture Taking Optical Reader Having Hybrid Monochrome And Color Image Sensor, and all of which are incorporated herein by reference.

[0140] In the embodiment of Figs. 9a-9c data collection device 100 is in the form of a transaction terminal which may be configured as a retail purchase transaction terminal or as a price verifier. Housing 102 of the transaction terminal shown in Figs. 9a-9c is configured to be portable so that it can be moved from location to location and is further configured to be replaceably mounted on a fixed structure such as a fixed structure of a cashier station or a fixed structure of the retail store floor (*e.g.*, a shelf, a column 264). Referring to bottom view of Fig. 9c, the housing 102 data collection device 100 has formations 268 facilitating the replaceable mounting of data collection device 100 on a fixed structure. Data collection device 100 includes a display 504 having an associated touch screen 504T, a card reader 1348, and an imaging module 360 having an imaging axis, a_i. Referring to further details of data collection device 100, data collection device 100 further includes a luminous shroud 362. When light from illumination block 104 strikes luminous shroud 362, the shroud glows to attract attention to the location of imaging assembly. In certain operating modes as indicated in Fig. 10c, data collection device 100 in accordance with any of Figs. 8a-9c, displays on display 504 a PIN entry screen prompting a customer to enter PIN information into touch screen 504T. In other operating modes, as indicated in Fig. 10d, data collection device 100 displays on display 504 a signature prompt screen prompting a customer to enter signature information into the device with use of a stylus 505.

[0141] Referring to Figs. 11a-11c construction detail of imaging module 360 are shown. Imaging module 360 may be an IT 4XXX imaging module of the type sold by Hand Held Products, Inc. of Skaneateles Falls, NY. An IT 4XXXX imaging module may be sold in association with a decode circuit which processes image signals generated by module 360 and decodes the signals to generate decoded out message data, such as decoded out bar code message data from numerous symbologies such as PDF417, MicroPDF417, MaxiCode, Data Matrix, QR Code, Aztec, Aztec Mesa, Code 49, UCC Composite, Snowflake, Dataglyphs, Code 39, Code 128, Codabar, UPC, EAN, Interleaved 2of5, RSS, Code 93, Codablock, BC 412, Postnet (US), Planet Code, BPO 4 State, Canadian 4 State, Japanese Post, Kix (Dutch Post) and OCR-A, OCR-B. Imaging module 360 includes a first circuit board 6314A carrying image sensor IC chip 1082 and aiming LEDs 6318 while a second circuit board 6314B carries illumination LEDs 6316. Image sensor array 182 in the embodiment of Fig. 11b can be a two dimensional monochrome image sensor array. The circuit boards are sandwiched about support 6380 which has a retainer 6382. Retainer 6382 receives a lens barrel 6340 which holds imaging lens 212. Conductive support posts 6384 support the structure and provide electrical communication between the circuit boards 6382. An optical plate 6326 is fitted over circuit board 6314B after circuit board 6314B is mounted onto support 6380. Optical plate 6326 carries aiming lenses 6325 which image aiming slits 6343 onto a substrate, s, which may carry a bar code symbol. Optical plate 6326 may also carry diffusers which diffuse light from illumination LEDs 6316. Referring to the view of Fig. 11c, illumination LEDs 6316 in combination with diffusers may project an illumination pattern 6388 substantially corresponding to a field of view 6390 of imaging assembly 200, while the aiming system including aiming LEDs 6318 slits

6343 and aiming lenses 6325 project an aiming pattern 6392 comprising a thin horizontal line.

[0142] Referring to Figs. 10a and 10b, various installation configurations for the data collection device of Figs. 8a-9c are shown. In the view of Fig. 10a, data collection device 100 is installed as a retail purchase transaction terminal at a point of sale cashier station 260. In the setup of Fig. 10a, data collection device 100 is configured as a retail purchase transaction terminal and is utilized to aid and facilitate retail transactions at a point of sale. A customer may enter a credit card or a debit card into card reader 1348 and retail purchase transaction terminal 100R may transmit the credit card information to credit/debit authorization network 414. Referring to the view of Fig. 1c and 1d, data collection devices 100 configured in accordance with the view of Fig. 10a are designated with the reference numeral 100R.

[0143] In the view of Fig. 10b, data collection device 100 is configured as a price verifier to aid customers in checking prices of products located on a store floor 258. Data collection device 100 may be mounted on a shelf 262 as depicted in the view of Fig. 1 c and 1d or on a column 264 as shown in Fig. 10b or other fixed structure of the retail store. Data collection device 100 may decode bar code data from bar codes on store products and send decoded out bar code messages to store server 240 for lookup of price information which is sent back from server 240 to terminal 100 for display on display 504. Referring to the view of Fig. 1c and 1d, data collection devices 100 configured in accordance with the view of Fig. 10b are designated with the numeral 100V.

[0144] While the present invention has necessarily been described with reference to a number of specific embodiments, it will be understood that the true spirit and scope of the present invention should be determined only with reference to claims that can be supported by the present specification.

Claims

1. A portable bar code reading device for incorporation in a data collection system having an access point and at least one peer data collection device, the access point adapted for wireline connection to a wireline bus, said portable bar code reading device comprising:

   an imaging assembly including a two dimensional solid state image sensor array and a lens focusing an image onto said solid state image sensor array;
   a radio transceiver for wireless transmission of data packets;
   a housing, wherein said image assembly and said radio transceiver are supported within said housing, wherein said housing is one of a hand held housing and a remountable housing; and
   a dynamic access module enabling said portable bar code reading device to (i) receive data packets from said access point and route payload data of said data packets to said peer device, and (ii) transmit at least one of routing table data and a route request (RREQ) data packet to said at least one peer data collection device.

2. The portable bar code reading device of claim 1, wherein said portable bar code reading device further includes a packet content discriminator.

3. A portable bar code reading device for incorporation in a system having an access point wireline connected to a local server and at least one peer data collection device, said portable bar code reading device comprising:

   an imaging assembly including a two dimensional solid state image sensor array and a lens focusing an image onto said solid state image sensor array;
   a radio transceiver;
   a housing, wherein said imaging assembly and said radio transceiver are supported within said housing, wherein said housing is one of a hand held housing and a remountable housing; and
   a dynamic access module enabling said portable bar code reading device to (i) determine whether said portable bar code reading device is in range said access point, and (ii) determine whether said portable bar code reading device is in range of said peer data collection device, said dynamic access module further enabling said portable bar code reading device to receive data packets from said access point and route payload data of said data packets to said peer device if said portable bar code reading device determines that it is in range of both of said access point and said peer device.

4. A data collection system comprising:

   first and second portable data collection devices, each data collection device having an encoded information reader unit selected from the group consisting of a bar code decode unit, an RFID reader unit and a credit/debit card reading unit;

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an access point, said access point being adapted for wireline connection to a local wireline bus and further being configured to examine data packets received thereby to determine whether a transmitting station has requested a power save function, and if said power save function is selected, buffering data packets destined for said requesting transmitting station,

wherein said first portable data collection device is configured to operate in an operating mode in which said first portable data collection device receives a data packet data containing payload data from said second portable data collection device and transmits said payload data to said access point.

5. The data collection system of claim 4, wherein said first portable data collection device includes a hand held bar code reading device and said second portable data collection device includes a credit card reading unit.

6. The data collection system of claim 4, wherein each of said first and second data collection devices are configured to broadcast routing table data.

7. A data collection system comprising:

first and second, and third data collection devices, D1, D2, and D3, each data collection device having an identification decode unit selected from the group consisting of a bar code decode unit, an RFID reader unit and a credit/debit card reading unit; and
an access point, AP, said access point being wireline connected to a local server and further being configured to broadcast a network identifier, and wherein said access point is further configured to coordinate the wireless sending of Clear to Send (CTS) messages to various devices in communication with said access point in such manner that collisions resulting from two devices attempting to send data packets to said access point at a common time are avoided,

wherein said data collection system is configured to support a transmission of a data packet along the hop sequence D1-D2-D3-AP, whereby said first data collection device can be out of range of said access point, yet in communication with said access point.

8. The data collection system of claim 7, wherein said first data collection device includes a hand held bar code reading device and said second data collection device includes a credit card reading unit, and wherein said third data collection device includes an RFID reading unit.

9. The data collection system of claim 7, wherein each of said first and second, and third data collection devices are configured to broadcast routing table data enabling peer devices to update their respective routing tables, each routing table including a plurality of network addresses.

10. A data collection device for incorporation in a data collection system having an access point wireline connected to a local server and at least one peer data collection device, said data collection device comprising:

an encoded information reading unit selected from the group consisting of a bar code decode unit, an RFID reader unit, and a credit/debit card reader;
a radio transceiver;
a portable housing, wherein said encoded information reading unit and said radio transceiver are supported by said portable housing;
a dynamic access circuit incorporated in said data collection device, said dynamic access circuit enabling said data collection device to operate in accordance with a set of linking rules when introduced to said data collection system, said set of linking rules including the rules of: (a) detecting whether said data collection device is in range of said access point; (b) detecting whether said data collection device is in range of said at least one peer device; (c) operating said data collection device in an infrastructure mode if said data collection device is in range of said access point only and not in range of any peer device; (d) operating said data collection device in ad hoc mode if said data collection device is in range of said access point only and not in range of any peer device; and (e) operating said data collection device in dynamic switching mode to dynamically switch between an infrastructure mode and an ad hoc mode if said data collection device determines that said data collection device is in range of both said access point and said at least one peer device.

11. The data collection device of claim 10, wherein said data collection device is configured to operate in a mode in

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which said data collection device wirelessly broadcasts a routing table data packet.

12. The data collection device of claim 10, wherein said data collection device, when operating in said dynamic switching mode switches between said infrastructure and ad hoc modes at fixed time intervals.

13. A portable data collection device for incorporation in a data collection system having an access point wireline connected to a local server and at least one peer data collection device, said data collection device comprising:

an encoded information reader unit selected from the group consisting of a bar code decode unit, an RFID tag reader unit, and a credit/debit card reader unit;
a radio transceiver;
a portable housing, wherein said encoded information reader unit and said radio transceiver are supported by said portable housing;

wherein said data collection device is configured to operate in a present communication operating mode, the communication operating mode selected from the candidate group consisting of: (a) an infrastructure mode; (b) an ad hoc mode; and (c) a dynamic switching mode in which said data collection device dynamically switches between an infrastructure and ad hoc communication mode; and
a dynamic access module incorporated into said data collection device, said dynamic access module having a self healing component enabling said data collection device to (i) monitor data throughput of said device; and (ii) change a present mode of said data collection device from said present communication operating mode to another of said candidate group of communication operating modes in response to said throughput monitoring.

14. The portable data collection device of claim 13, wherein said data collection device is configured to operate in a mode in which said data collection device broadcasts a routing table data packet.

15. The portable data collection device of claim 13, wherein said data collection device, when operating in said dynamic switching mode switches between said infrastructure and ad hoc modes at fixed time intervals.

16. A data collection device for incorporation in a data collection system having an access point wireline connected to a local server and at least one peer data collection device, said data collection device comprising:

an encoded information reader unit selected from the group consisting of a bar code decode unit, an RFID reader unit, and a credit/debit card reader unit;
a radio transceiver;
a portable housing, wherein said encoded information reader unit and said radio transceiver are supported by said portable housing; and
a dynamic access circuit incorporated in said data collection device, said dynamic access circuit enabling said data collection device to operate in accordance with a set of linking rules when introduced to said data collection system, said set of linking rules including the rules of: (a) detecting whether said data collection device is in range of said access point; (b) detecting whether said data collection device is in range of said at least one peer device; (c) operating said data collection device in an infrastructure mode if said data collection device is in range of said access point only and not in range of any peer device; (d) operating said data collection device in ad hoc mode if said data collection device is in range of said access point only and not in range of any peer device; and (e) operating said data collection device in dynamic switching mode to dynamically switch between said infrastructure mode and said ad hoc mode if said data collection device determines that said data collection device is in range of both said access point and said at least one peer device;

wherein said data collection device is configured to operate in a present communication operating mode, the present communication operating mode selected from the candidate group consisting of: (1) said infrastructure mode; (2) said ad hoc mode; and (3) said dynamic switching mode in which said data collection device dynamically switches between an infrastructure and ad hoc communication mode;
a dynamic access module incorporated into said data collection device, said dynamic access module having a self healing component enabling said data collection device to (i) monitor data throughput of said device; and (ii) change a present mode of said data collection device from said present communication operating mode to another of said candidate communication operating modes in response to said throughput monitoring.

17. The data collection device of claim 16, when said data collection device operates in a mode in which said data

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collection device sends a power save request, in a data packet to said access point.

18. A data collection device for incorporation in a data collection system having an access point adapted for wireline connection to a wireline bus connected to a local server and at least one peer data collection device, said data collection device comprising:

an encoded information reader unit selected from the group consisting of a bar code decode unit, an RFID reader unit, and a credit/debit card reader unit;
a radio transceiver;
a housing, wherein said encoded information reader unit and said radio transceiver are supported by said housing, wherein said housing is one of a hand held housing and a re-mountable housing; and
a dynamic access module enabling said data collection device to (i) determine whether said data collection device is in range said access point, and (ii) determine whether said data collection device is in range of said peer data collection device, said dynamic access module further enabling said data collection device to receive data packets from said access point and route payload data of said data packets to said peer device if said data collection device determines that it is in range of both of said access point and said peer device.

19. A data collection device for incorporation in a data collection system having an access point adapted for wireline connection to a local wireline network and at least one peer data collection device, said data collection device comprising:

an encoded information reader unit selected from the group consisting of a bar code decode unit, an RFID reader unit, and a credit/debit card reader unit;
a radio transceiver;
a housing, wherein said encoded information reader unit and said radio transceiver are supported within said housing, wherein said housing is one of a hand held housing and a re-mountable housing; and
a microphone;
a Voice Over-Internet Protocol (VOIP) encoder/decoder receiving and processing an analog signal output of said microphone, said data collection device being configured to generate VOIP data packets by process a voice analog signal output from said microphone;
a dynamic access module enabling said data collection device to (i) receive data packets from said access point and route payload data of said data packets to said peer device, and (ii) transmit at least one of a routing table data packet and a route request (RREQ) data packet to said at least one peer data collection device.

20. The data collection device of claim 19, when said data collection device further includes a packet content discriminator.

21. A data collection system comprising:

first, second, and third portable data collection devices, D1, D2, and D3, each portable data collection device being separately housed and having an encoded information reader unit selected from the group consisting of a bar code reader unit, an RFID reader unit and a credit/debit card reading unit, said each portable data collection device being capable of operation in (a) infrastructure mode; (b) ad hoc mode and (c) dynamic switching mode in which a data collection device dynamically switches between infrastructure mode and ad hoc mode;
an access point, AP, said access point being adapted for wire-line connection to a local server,

wherein said data collection system is configured to support a transmission of a data packets along the hop sequence D1-D2-D3-AP in such manner that when packet data is transmitted from D 1 to D2 in ad hoc mode, said third data collection device, D3 operates in dynamic switching mode.

22. A data collection system comprising:

first, second, and third portable data collection devices, D1, D2, and D3, each portable data collection device being separately housed and having an encoded information reader unit selected from the group consisting of a bar code reader unit, an RFID reader unit and a credit/debit card reading unit, and each portable data collection device being capable of operation in (a) infrastructure mode; (b) ad hoc mode and (c) dynamic switching mode in which a data collection device dynamically switches between infrastructure mode and ad hoc mode;
an access point, AP, said access point being adapted for wireline connection to a wireline bus;

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wherein said data collection system is configured to support a transmission of a data packets along the hop sequence D1-D2-D3-AP in such manner that when packet data is transmitted from said third portable data collection device, D3 to said access point, AP, said first and second data collection devices operate in ad hoc mode.

23. A data collection device for incorporation in a data collection system having an access point wireline connected to a local server and at least one peer data collection device, said data collection device comprising:

an imaging assembly including a two dimensional solid state image sensor array and a lens focusing an image onto said solid state image sensor array;
a radio transceiver;
a portable housing, wherein said imaging assembly and said radio transceiver unit are supported by said portable housing;
a manual trigger, wherein said data collection device in response to said trigger being actuated, processes image signals generated by said imaging assembly to at least one of (a) decode and transmit a decoded bar code message utilizing said radio transceiver, and (b) transmit said frame of image data utilizing said radio transceiver,
a dynamic access circuit incorporated in said data collection device, said dynamic access circuit enabling said data collection device to operate in accordance with a set of linking rules when introduced to said data collection system, said set of linking rules including the rules of: (a) detecting whether said data collection device is in range of said access point; (b) detecting whether said data collection device is in range of said at least one peer device; (c) operating said data collection device in an infrastructure mode if said data collection device is in range of said access point only and not in range of any peer device; (d) operating said data collection device in ad hoc mode if said data collection device is in range of said access point only and not in range of any peer device; and (e) operating said data collection device in dynamic switching mode to dynamically switch between said infrastructure mode and said ad hoc mode if said data collection device determines that said data collection device is in range of both said access point and said at least one peer device;

wherein said data collection device is configured to operate in a present communication operating mode, the present communication operating mode selected from the candidate group consisting of: (1) said infrastructure mode; (2) said ad hoc mode; and (3) said dynamic switching mode in which said data collection device dynamically switches between an infrastructure and ad hoc communication mode;
a dynamic access module incorporated into said data collection device, said dynamic access module having a self healing component enabling said data collection device to (i) monitor data throughput of said device; and (ii) change a present mode of said data collection device from said present communication operating mode to another of said candidate communication operating modes in response to said throughput monitoring; and
a packet content discriminator discriminating whether data packets transmitted utilizing said radio transceiver are decoded message data packets or image frame data packets.

24. A data collection system comprising:

first, second, and third portable data collection devices, D1, D2, and D3, each portable data collection device being separately housed and having an encoded information reader unit selected from the group consisting of a bar code reader unit, an RFID reader unit and a credit/debit card reading unit, and each being capable of operation in (a) infrastructure mode; (b) ad hoc mode and (c) dynamic switching mode in which a data collection device dynamically switches between infrastructure mode and ad hoc mode;
an access point, AP, said access point being adapted for wireline connection to a local wireline bus;

wherein said data collection system is configured to support a transmission of a data packet along the hop sequence D1-D2-D3-AP in such manner that throughout a time that packet data is transmitted along said hop sequence D1-D2-D3-AP, said first and second data collection devices D1 and D2 remain in ad hoc mode while said third data collection device, D3, dynamically switches between infrastructure mode and ad hoc mode.

25. A data collection device for operation in a data communication system, having a local server and an access point configured for wireline connection to said local server, said data collection device comprising:

an encoded information reader unit selected from the group consisting of a bar code reader unit, an RFID reader unit, and a credit card reader unit, said encoded information reader unit producing decoded out message data;
a radio frequency transceiver;

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a portable housing supporting said radio frequency transceiver and components of said encoded information reader unit;
a microphone;
a Voice Over-Internet Protocol (VOIP) encoder/decoder receiving and processing an analog signal output of said microphone, said data collection device being configured to generate VOIP data packets for transmission utilizing said radio transceiver by processing a voice analog signal output from said microphone;

wherein said data collection device is configured to send a request to said access point to buffer data packets addressed to said data collection device, said data collection device further being configured to operate in a mode of operation in which said data collection device broadcasts at least one of a routing table data packet and a Route Request (RREQ) data packet;
wherein said data collection device further includes a data packet content discriminator discriminating whether a data packet transmitted by said data collection device is (a) a VOIP data packet or (b) a data packet containing said decoded output message data.

26. The data collection device of claim 25, wherein said data packet content discriminator examines data packets buffered for wireless transmission by said data collection device.

27. The data collection device of claim 25, wherein said data packet content discriminator receives a data content identifier from a control circuit of said data collection device.

28. The data collection device of claim 25, wherein said data collection device further includes a plurality of selectable self-routing algorithm modules, and wherein said data collection device activates one of said plurality of selectable self routing algorithm modules based upon an output provided by said data packet content discriminator.

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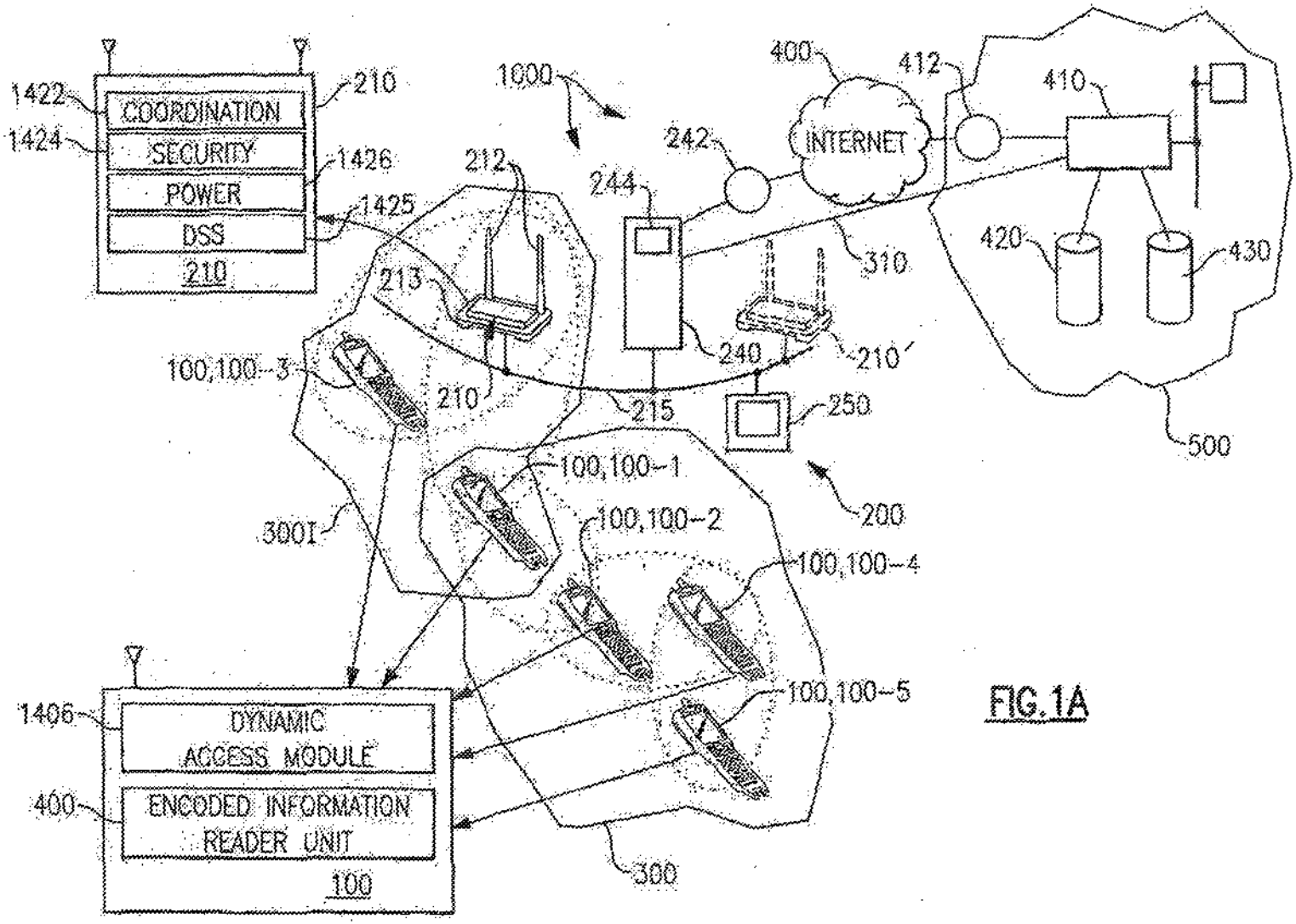

FIG.1A

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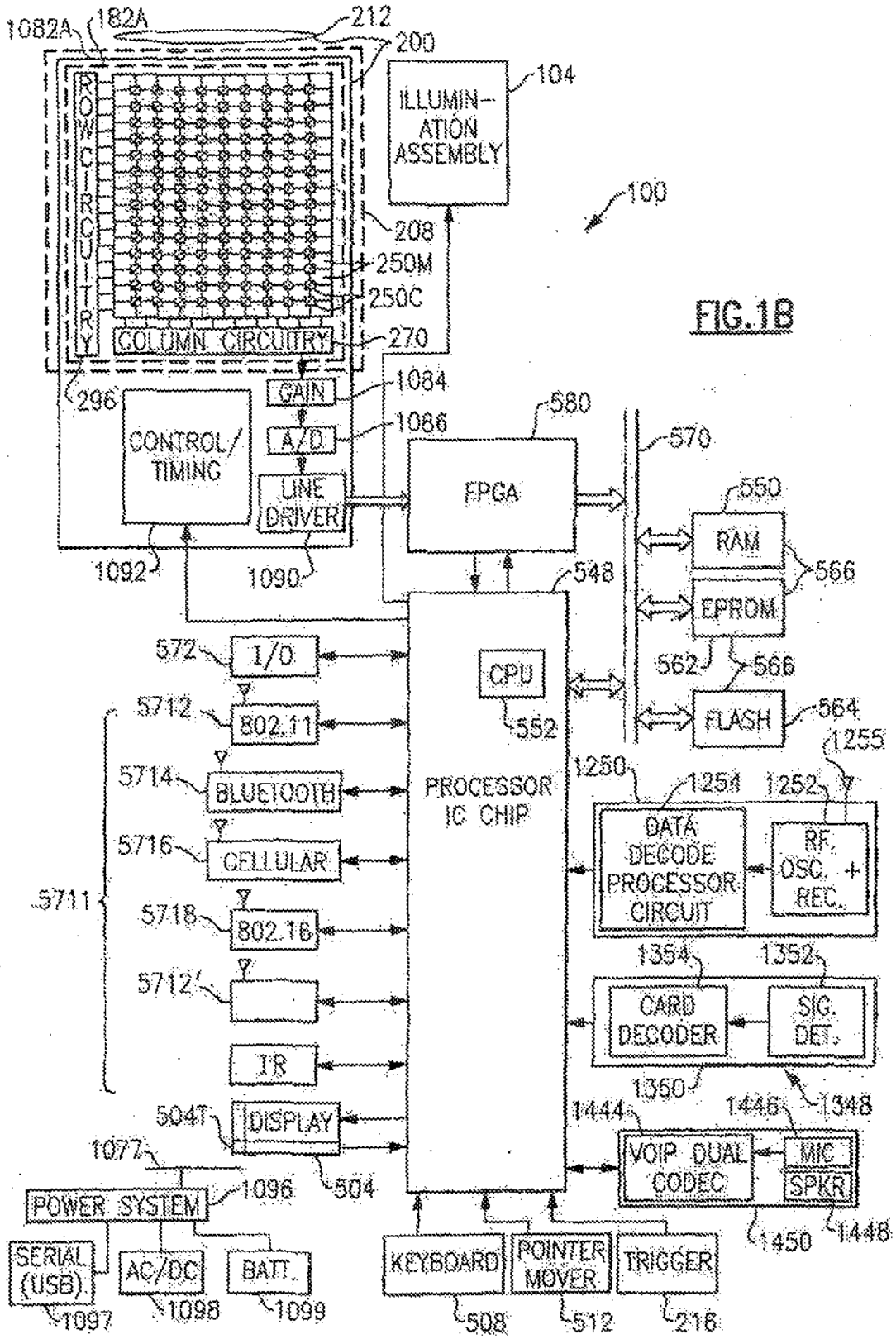

FIG.1B

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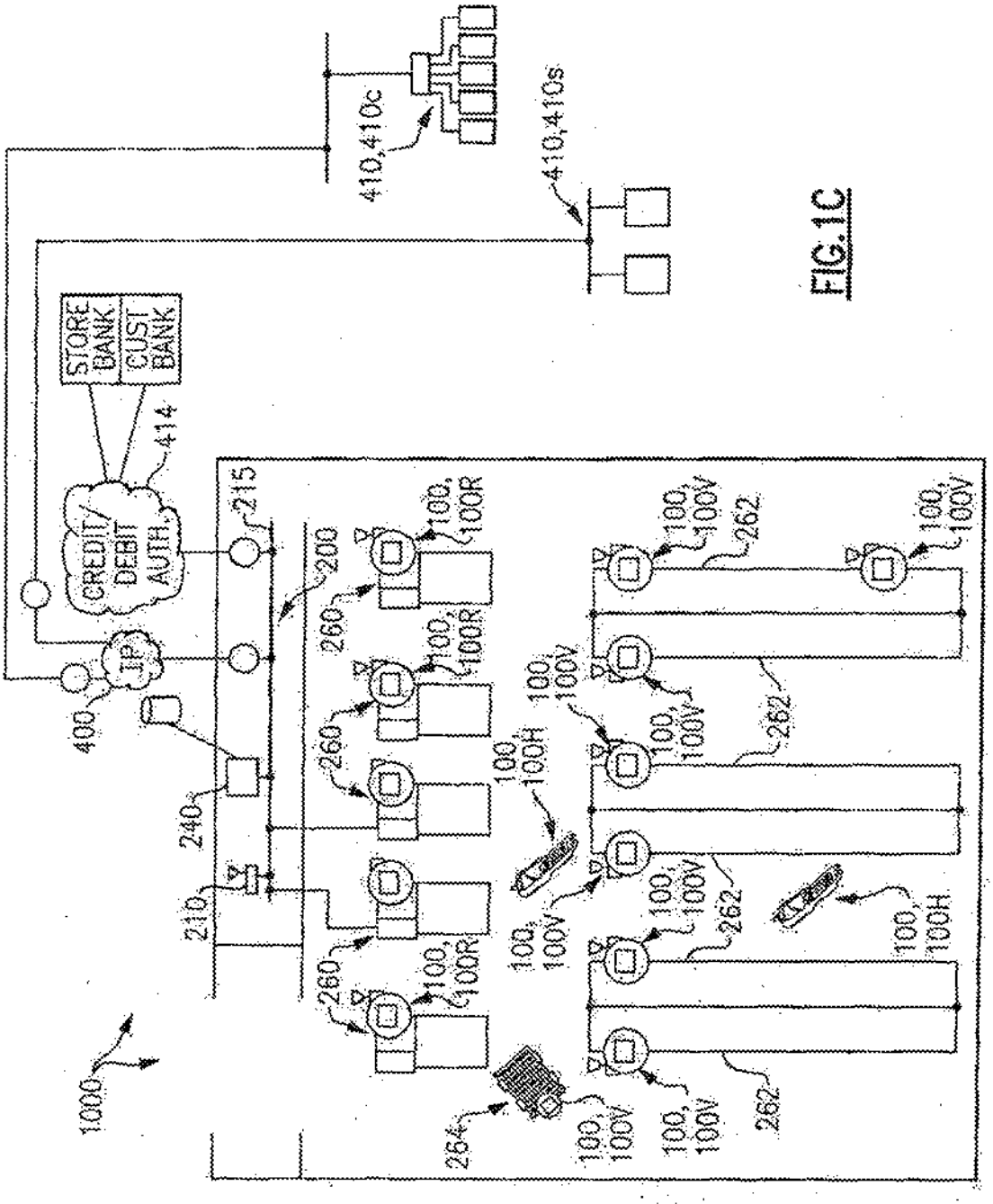

FIG.1C

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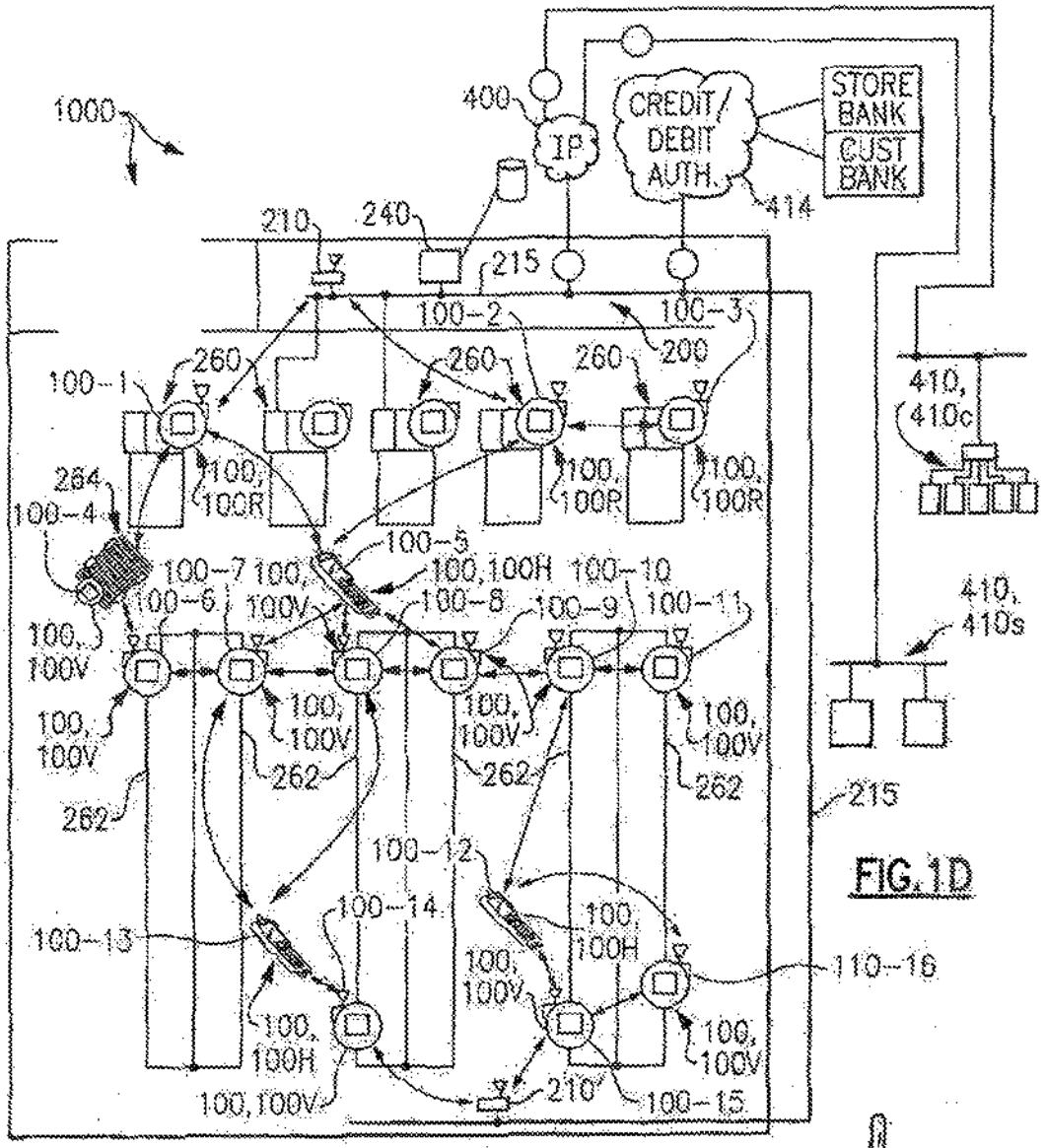

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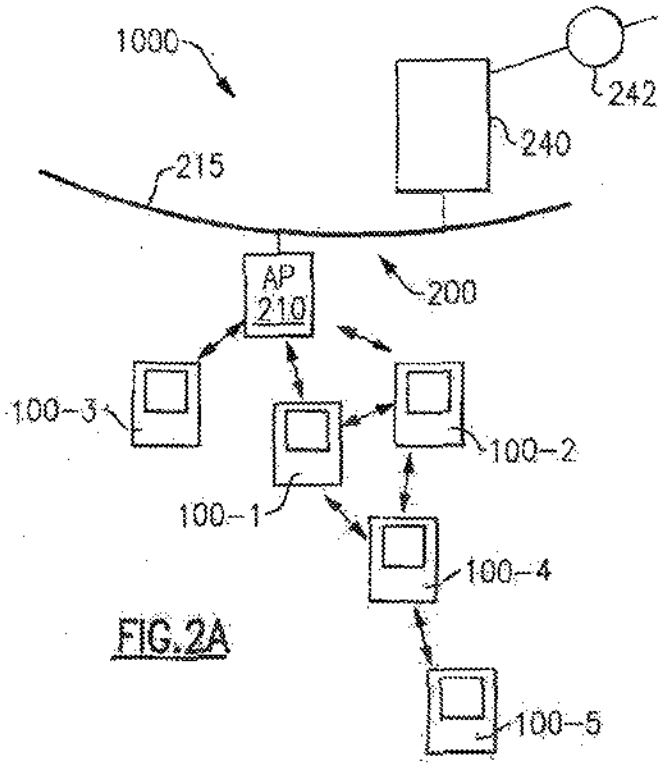

FIG.2A

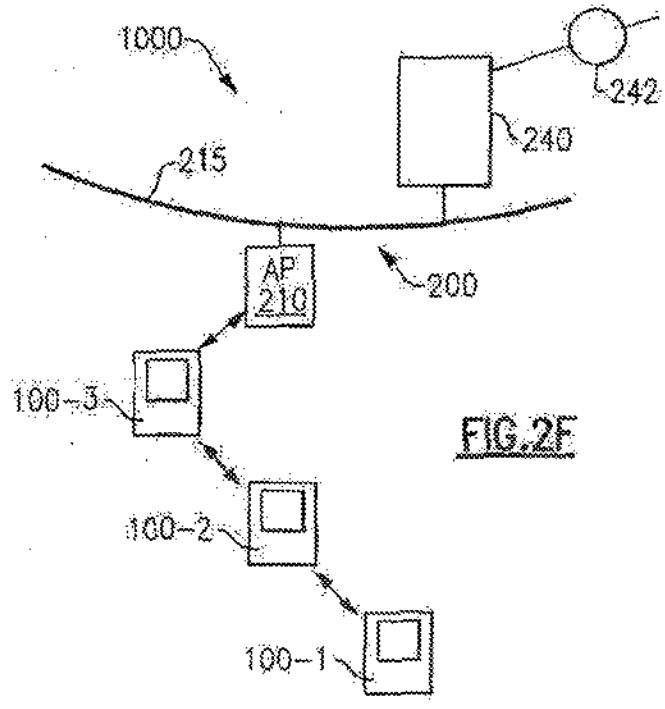

FIG.2F

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FIG.2B

FIG.2D

FIG.2C

FIG.2E

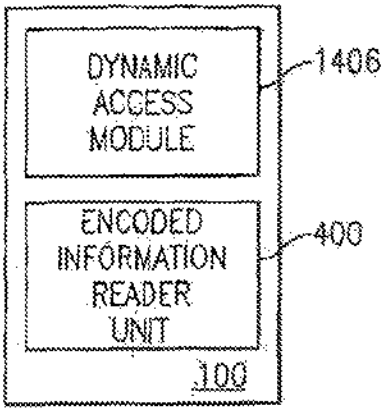

FIG.3A

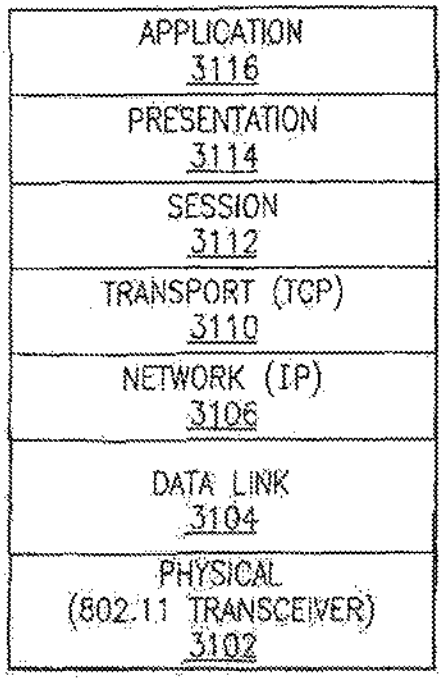

FIG.3B

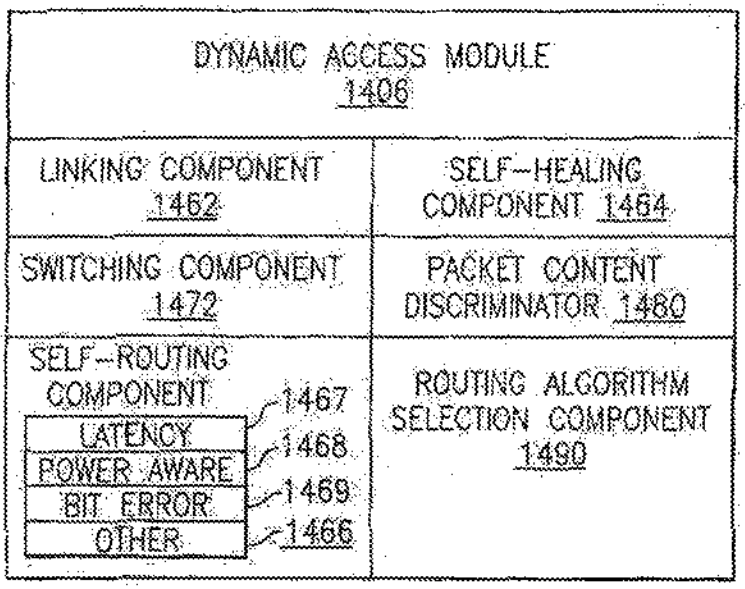

FIG.3C

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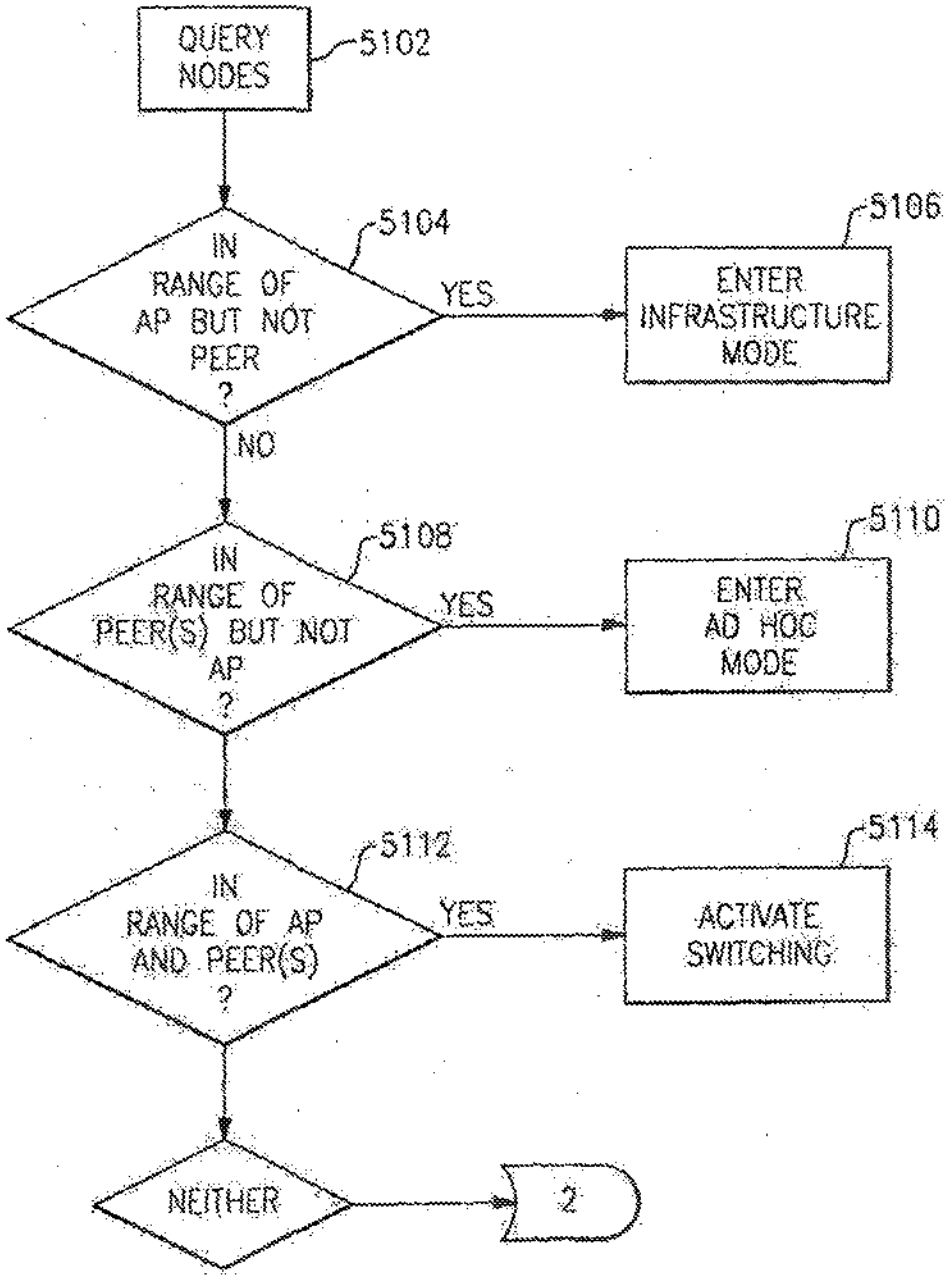

FIG.4

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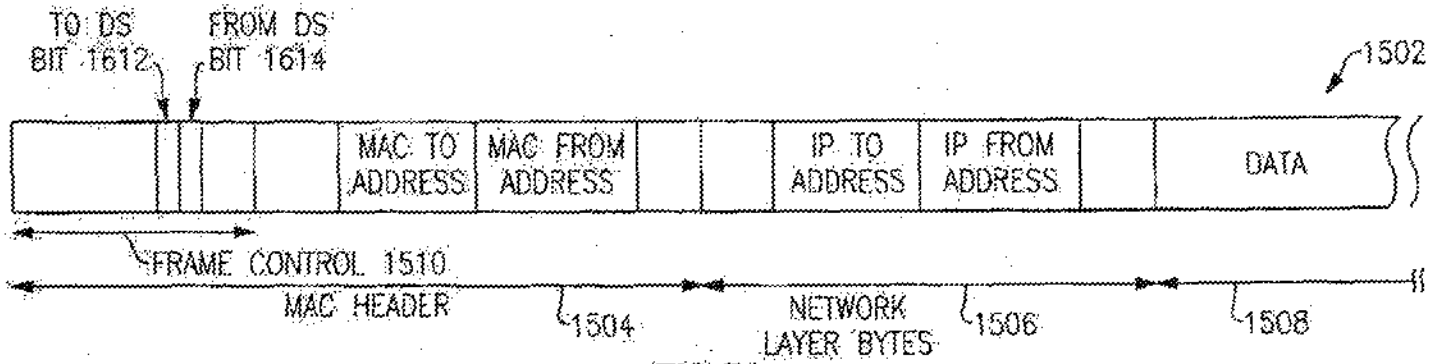

FIG.5A

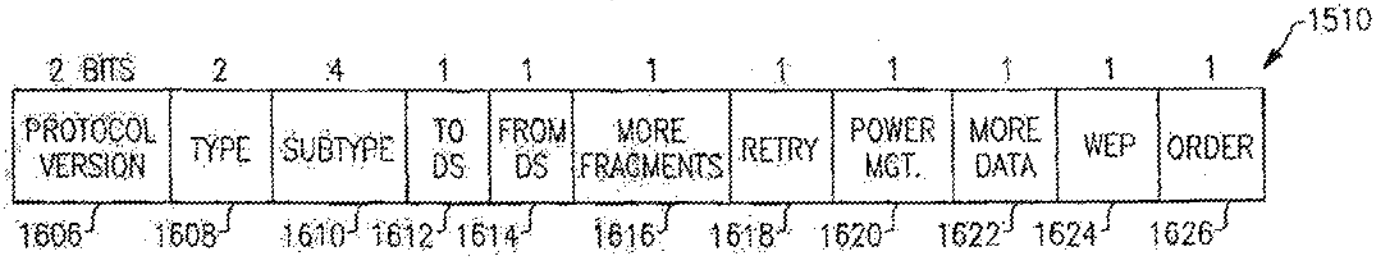

FIG.5B

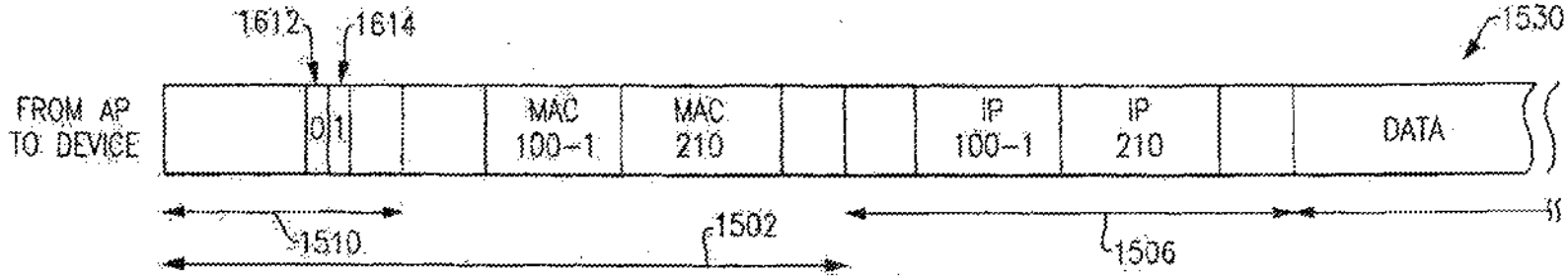

FIG.6A

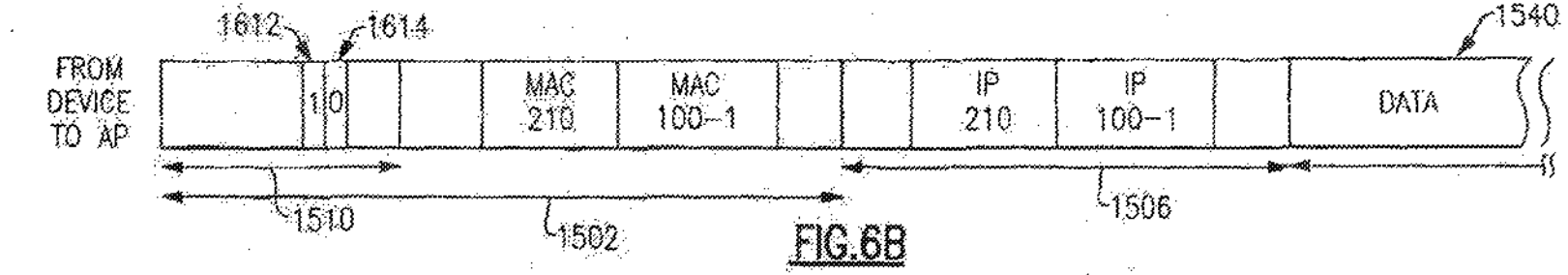

FIG.6B

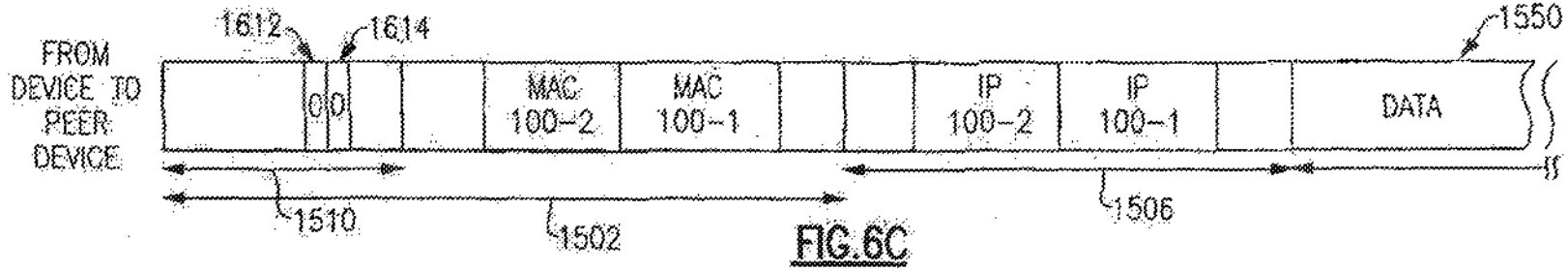

FIG.6C

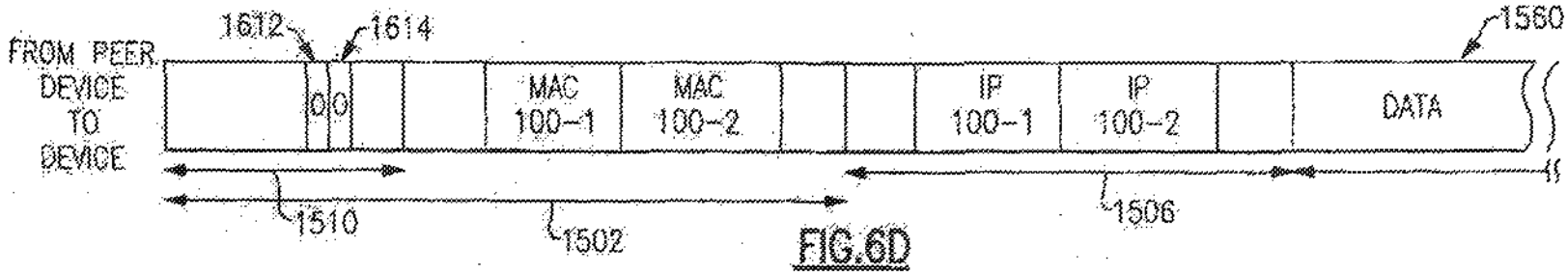

FIG.6D

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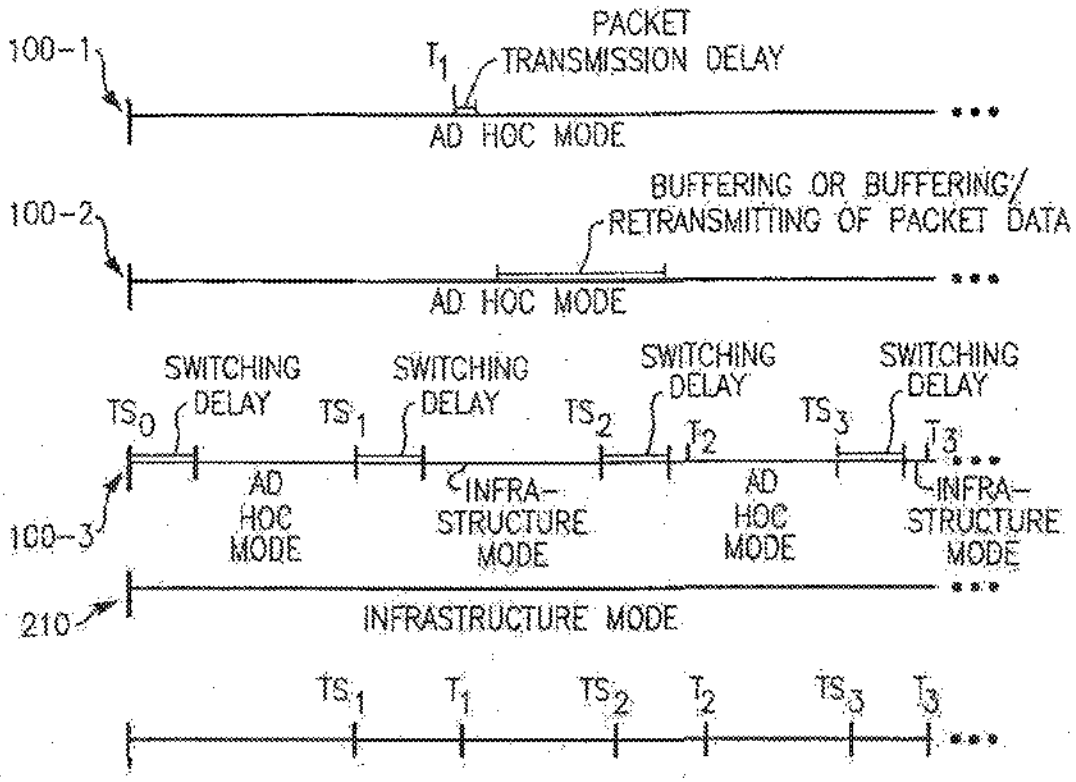

FIG.7

DATA TYPE	EMBODIMENT 1 – SO ROUTING ALGORITHM	EMBODIMENT 2 – SO ROUTING ALGORITHM
STREAMING VIDEO	LATENCY (ACTIVATE MODULE 1467)	LATENCY (ACTIVATE MODULE 1467)
STILL IMAGE	POWER AWARE (ACTIVATE MODULE 1468)	BIT ERROR (ACTIVATE MODULE 1469)
DECODED BAR CODE	BIT ERROR (ACTIVATE MODULE 1469)	POWER AWARE (ACTIVATE MODULE 1468)
DECODED RFID DATA	POWER AWARE (ACTIVATE MODULE 1468)	POWER AWARE (ACTIVATE MODULE 1468)
CREDIT CARD NUMBER	BIT ERROR (ACTIVATE MODULE 1469)	POWER AWARE (ACTIVATE MODULE 1468)
VOIP	LATENCY (ACTIVATE MODULE 1467)	LATENCY (ACTIVATE MODULE 1467)

FIG.13

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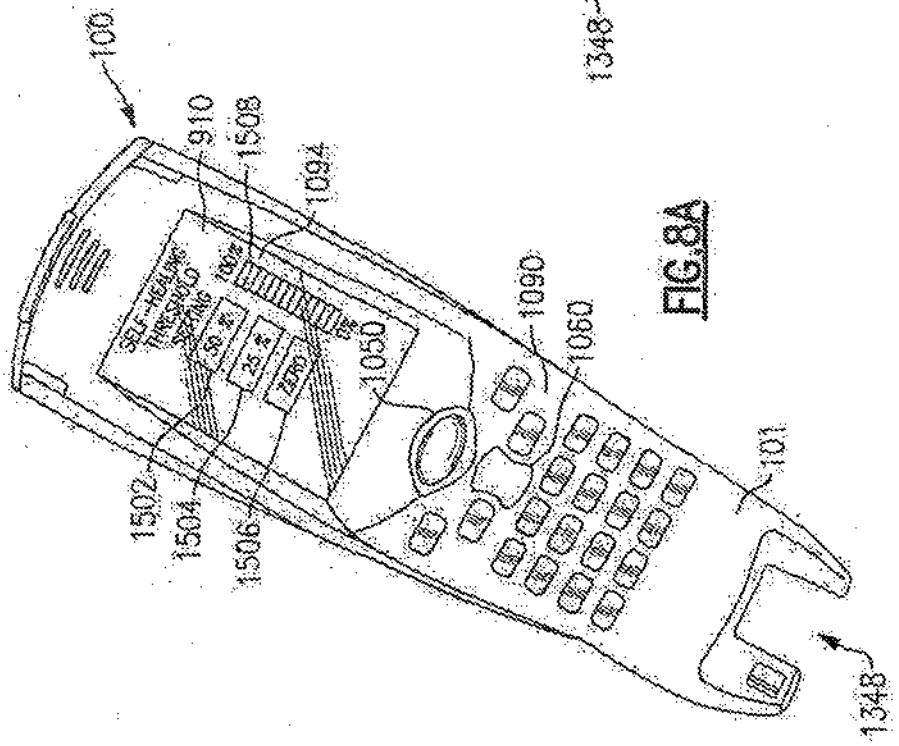

FIG.8A

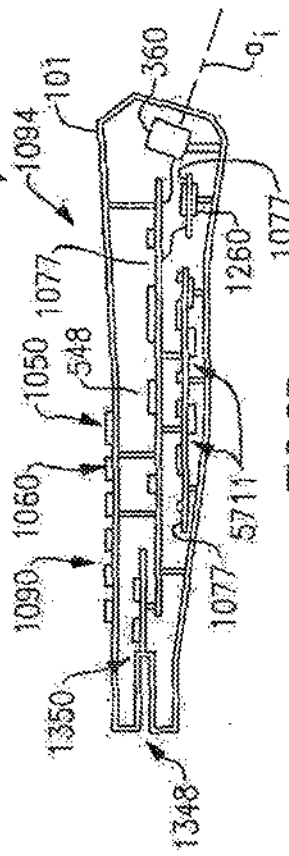

FIG.8B

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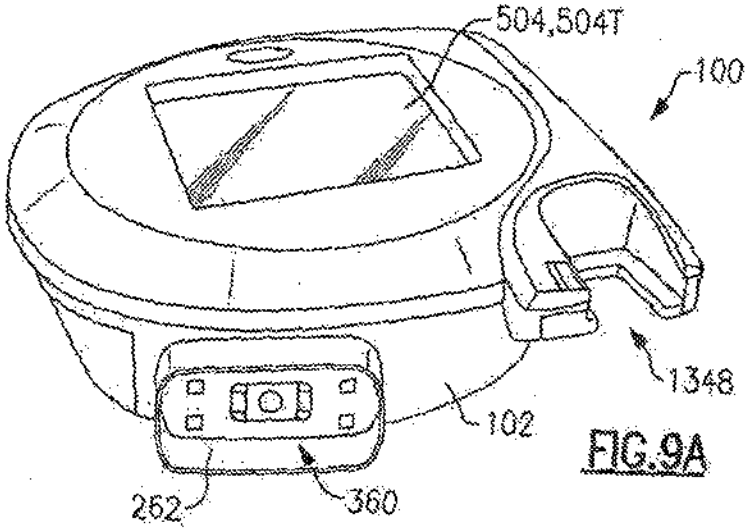

FIG.9A

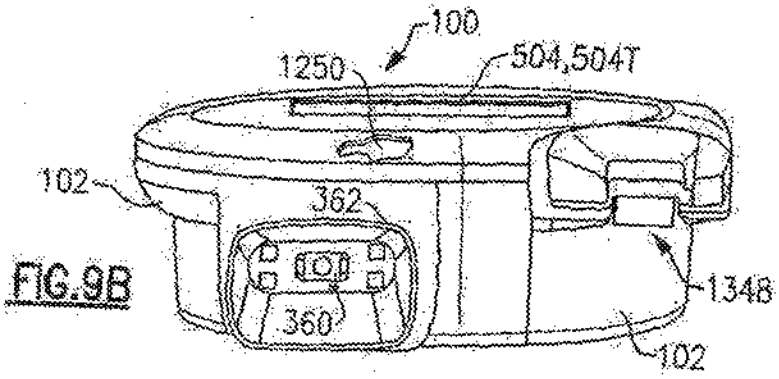

FIG.9B

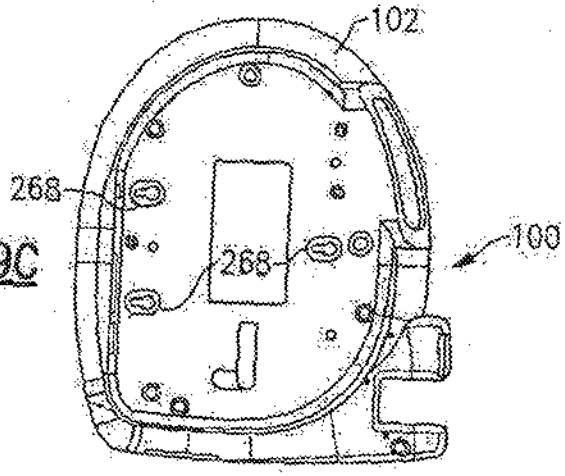

FIG.9C

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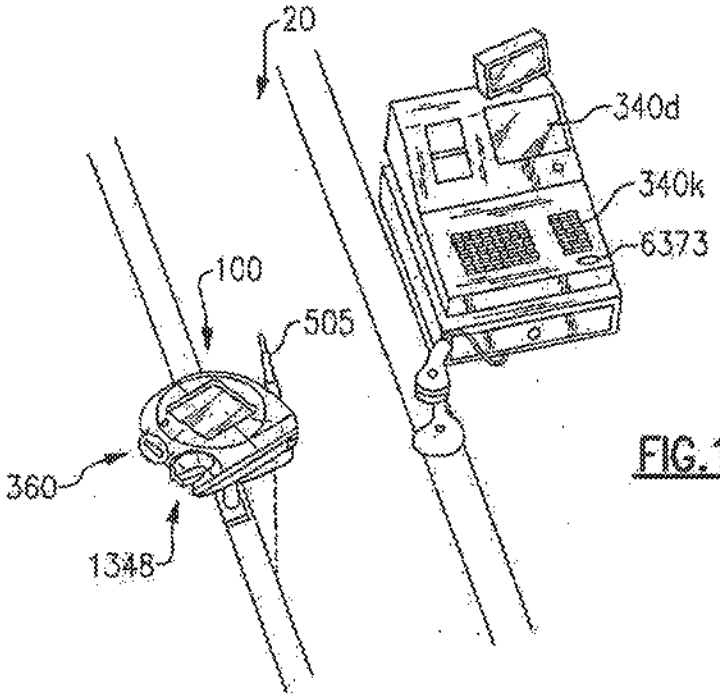

FIG.10A

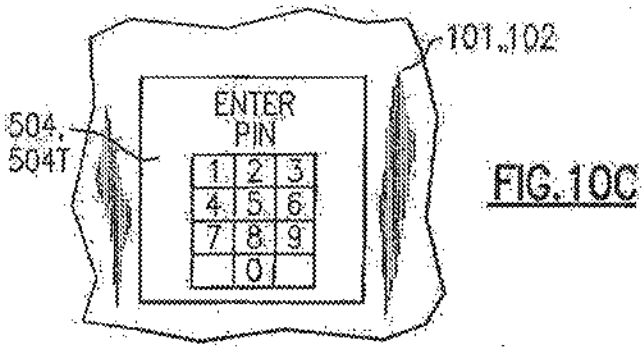

FIG.10C

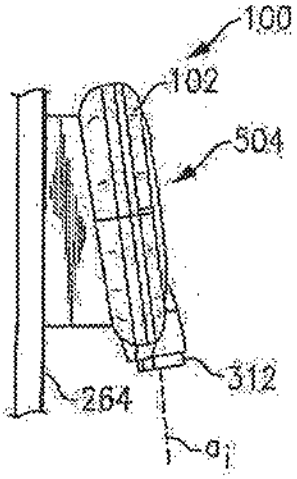

FIG.10B

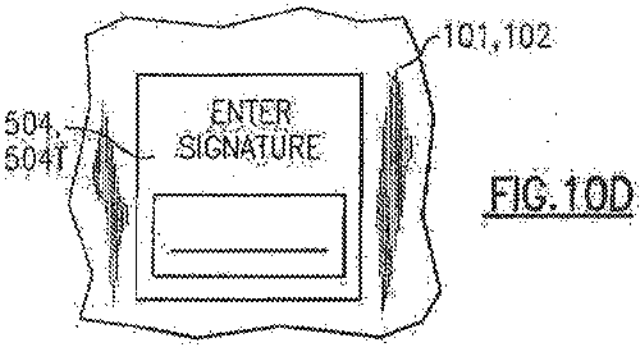

FIG.10D

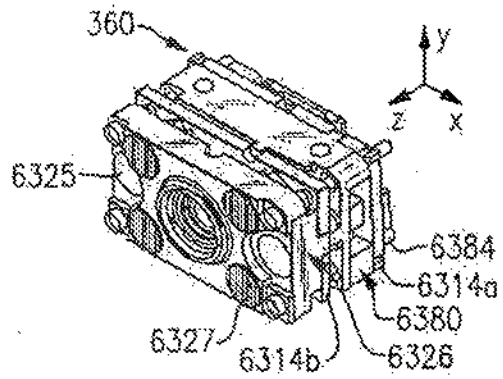

FIG.11A

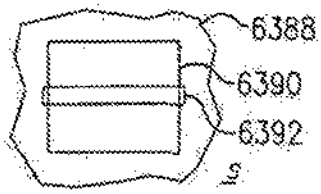

FIG.11C

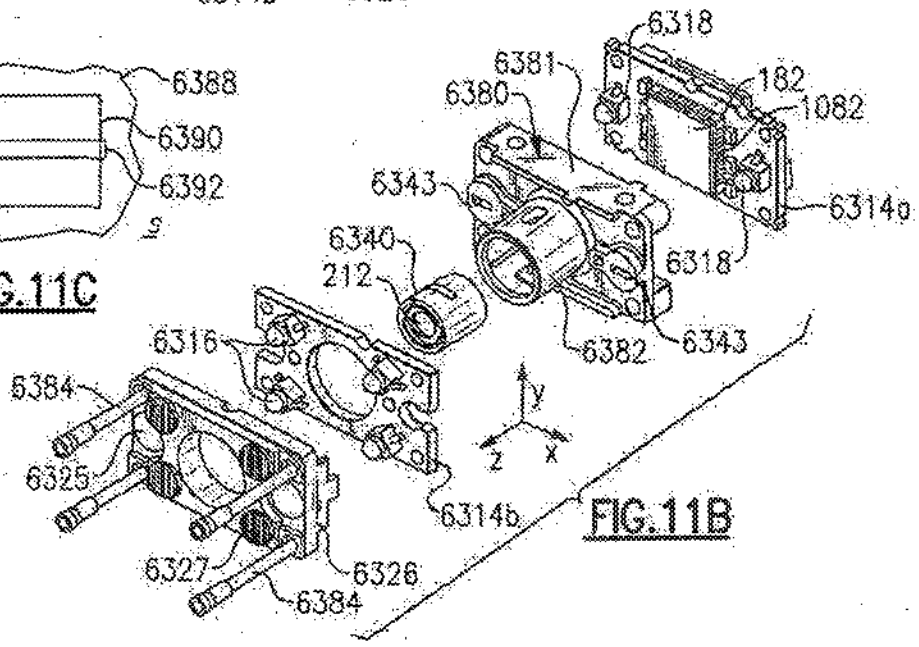

FIG.11B

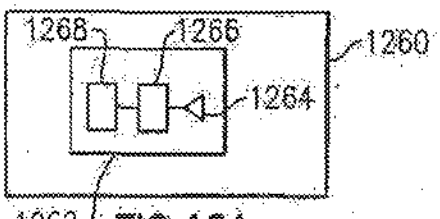

FIG.12A

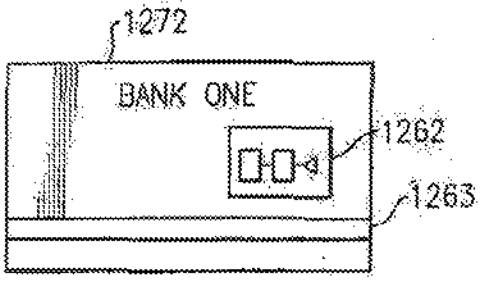

FIG.12B

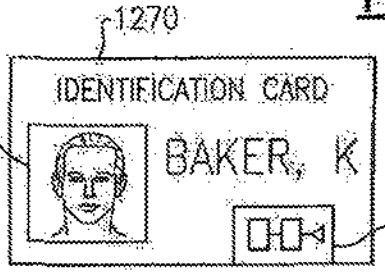

FIG.12C

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REFERENCES CITED IN THE DESCRIPTION

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Inventor Name	City	State/Country
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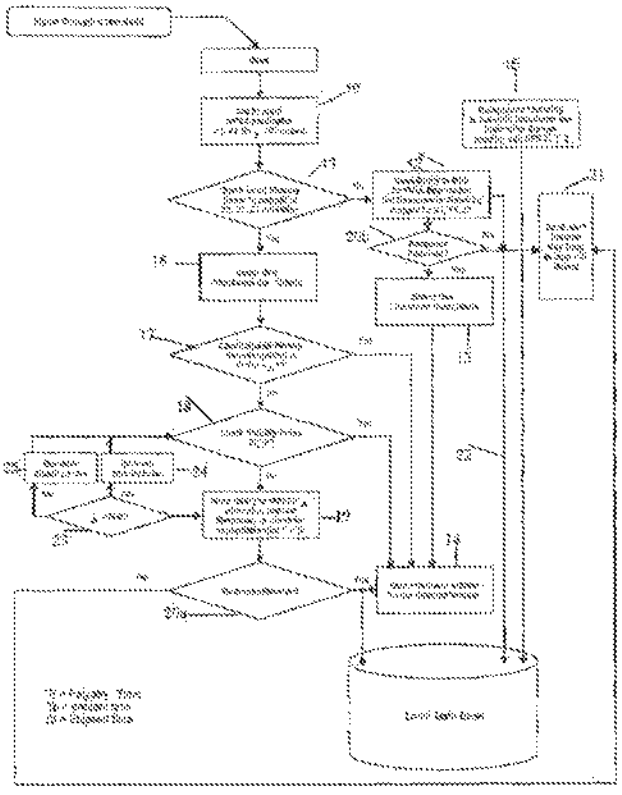
(54) Title: IP NETWORK INFORMATION DATABASE IN MOBILE DEVICES FOR USE WITH MEDIA INDEPENDENT INFORMATION SERVER



(57) Abstract: A mobile device receives wireless network information from a MIIS (Media Independent Information Server), and builds its own database of existing networks with their associated characteristics, appropriately mapped with GPS (Global Positioning Satellite) coordinates or other appropriate form of geographical location identifying information. Consequently, the mobile device becomes "smart" over time through the learning process of first attempting to utilize its own developed database and, only if such database information falls short, making a remote query to a MIIS to get required information for session continuity and performing handovers. The mobile device may store the information received from the MIIS in its own local database together with a time-stamp. Each time the mobile device needs to get updated or new information, it sends a request to the MIIS along with the time-stamp appended to the request. In this way, the mobile device is sent only the information that it does not already have stored in its database

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IP NETWORK INFORMATION DATABASE IN MOBILE DEVICES FOR USE WITH MEDIA INDEPENDENT INFORMATION SERVER

DESCRIPTION

BACKGROUND

[Para 1] Field of the Invention:

[Para 2] The present application relates generally to wireless networking, and more particularly to systems and methods for supporting the seamless handoff or transfer of mobile devices across different network access points of homogeneous or heterogeneous wireless networks, whereby such mobile devices may connect to different wireless networks and/or wireless network access points as needed to maintain session continuity.

General Background Discussion:

[Para 3] Internet Protocol

[Para 4] IP is a connectionless protocol. The connection between end points during a communication is not continuous. When a user sends or receives data or messages, the data or messages are divided into components known as packets. Every packet is treated as an independent unit of data.

[Para 5] In order to standardize the transmission between points over the Internet or the like networks, an OSI (Open Systems Interconnection) model was established. The OSI model separates the communications processes between two points in a network into seven stacked layers, with each layer adding its own set of functions. Each device handles a message so that there is a downward flow through each layer at a sending end point and an upward flow through the layers at a receiving end point. The programming and/or

hardware that provides the seven layers of function is typically a combination of device operating systems, application software, TCP/IP and/or other transport and network protocols, and other software and hardware.

[Para 6] Typically, the top four layers are used when a message passes from or to a user and the bottom three layers are used when a message passes through a device (e.g., an IP host device). An IP host is any device on the network that is capable of transmitting and receiving IP packets, such as a server, a router or a workstation. Messages destined for some other host are not passed up to the upper layers but are forwarded to the other host. In the OSI and other similar models, IP is in Layer-3, the network layer. The layers of the OSI model are listed below.

[Para 7] Layer 7 (i.e., the application layer) is a layer at which, e.g., communication partners are identified, quality of service is identified, user authentication and privacy are considered, constraints on data syntax are identified, etc.

[Para 8] Layer 6 (i.e., the presentation layer) is a layer that, e.g., converts incoming and outgoing data from one presentation format to another, etc.

[Para 9] Layer 5 (i.e., the session layer) is a layer that, e.g., sets up, coordinates, and terminates conversations, exchanges and dialogs between the applications, etc.

[Para 10] Layer-4 (i.e., the transport layer) is a layer that, e.g., manages end-to-end control and error-checking, etc.

[Para 11] Layer-3 (i.e., the network layer) is a layer that, e.g., handles routing and forwarding, etc.

[Para 12] Layer-2 (i.e., the data-link layer) is a layer that, e.g., provides synchronization for the physical level, does bit-stuffing and furnishes transmission protocol knowledge and management, etc. The Institute of Electrical and Electronics Engineers (IEEE) sub-divides the data-link layer into two further sub-layers, the MAC (Media Access Control) layer that

controls the data transfer to and from the physical layer and the LLC (Logical Link Control) layer that interfaces with the network layer and interprets commands and performs error recovery.

[Para 13] Layer 1 (i.e., the physical layer) is a layer that, e.g., conveys the bit stream through the network at the physical level. The IEEE sub-divides the physical layer into the PLCP (Physical Layer Convergence Procedure) sub-layer and the PMD (Physical Medium Dependent) sub-layer.

[Para 14] Typically, layers higher than layer-2 (such as layers including the network layer or layer-3 in the OSI model and the like) are referred to as the higher-layers.

Wireless Networks

[Para 15] Wireless networks can incorporate a variety of types of mobile devices, such as cellular and wireless telephones, PCs (personal computers), laptop computers, wearable computers, cordless phones, pagers, headsets, printers, PDAs, etc. For example, mobile devices may include digital systems to secure fast wireless transmissions of voice and/or data.

[Para 16] Wireless LANs (WLANs) in which a mobile user can connect to a local area network (LAN) through a wireless connection may be employed for wireless communications. Wireless communications can include communications that propagate via electromagnetic waves, such as light, infrared, radio, microwave. There are a variety of different WLAN standards that currently exist, such as Bluetooth, IEEE 802.11, and HomeRF.

[Para 17] For example, Bluetooth products may be used to provide links between mobile computers, mobile phones, portable handheld devices, personal digital assistants (PDAs), and other mobile devices and connectivity to the Internet. Bluetooth is a computing and telecommunications industry specification that details how mobile devices can easily

interconnect with each other and with non-mobile devices using a short-range wireless connection. Bluetooth creates a digital wireless protocol to address end-user problems arising from the proliferation of various mobile devices that need to keep data synchronized and consistent from one device to another, thereby allowing equipment from different vendors to work seamlessly together. Bluetooth devices may be named according to a common naming concept. For example, a Bluetooth device may possess a Bluetooth Device Name (BDN) or a name associated with a unique Bluetooth Device Address (BDA). Bluetooth devices may also participate in an Internet Protocol (IP) network. If a Bluetooth device functions on an IP network, it may be provided with an IP address and an IP (network) name. Thus, a Bluetooth Device configured to participate on an IP network may contain, e.g., a BDN, a BDA, an IP address and an IP name. The term "IP name" refers to a name corresponding to an IP address of an interface.

[Para 18] Similarly, IEEE 802.11 specifies technologies for wireless LANs and devices. Using 802.11, wireless networking may be accomplished with each single base station supporting several devices. In some examples, devices may come pre-equipped with wireless hardware or a user may install a separate piece of hardware, such as a card, that may include an antenna. By way of example, devices used in 802.11 typically include three notable elements, whether or not the device is an access point (AP), a mobile station (STA), a bridge, a PCMCIA card or another device: a radio transceiver; an antenna; and a MAC (Media Access Control) layer that controls packet flow between points in a network.

[Para 19] Wireless networks also may involve methods and protocols found in Mobile IP (Internet Protocol) systems, in PCS systems, and in other mobile network systems. With respect to Mobile IP, this involves a standard communications protocol created by the Internet Engineering Task Force (IETF). With Mobile IP, mobile device users may move across networks while maintaining their IP Address assigned once. See Request for

Comments (RFC) 3344. Mobile IP enhances Internet Protocol (IP) and adds means to forward Internet traffic to mobile devices when connecting outside their home network. Mobile IP assigns each mobile node a home address on its home network and a care-of-address (CoA) that identifies the current location of the device within a network and its subnets. When a device is moved to a different network, it receives a new care-of address. A mobility agent on the home network can associate each home address with its care-of address. The mobile node can send the home agent a binding update each time it changes its care-of address by using a protocol such as Internet Control Message Protocol (ICMP).

[Para 20] In basic IP routing, routing mechanisms typically rely on the assumptions that each network node always has a constant attachment point to the Internet and that each node's IP address identifies the network link it is attached to. In this document, the terminology "node" includes a connection point, which can include a redistribution point or an end point for data transmissions, and which can recognize, process and/or forward communications to other nodes. For example, Internet routers can look at an IP address prefix or the like identifying a device's network. Then, at a network level, routers can look at a set of bits identifying a particular subnet. Then, at a subnet level, routers can look at a set of bits identifying a particular device. With typical mobile IP communications, if a user disconnects a mobile device from the Internet and tries to reconnect it at a new subnet, then the device has to be reconfigured with a new IP address, a proper netmask and a default router. Otherwise, routing protocols would not be able to deliver the packets properly.

Handoffs of Mobile Devices

[Para 21] In the context of a mobile device with an IP-based wireless network interface, the mobile device needs to perform roaming or handoffs when it moves from one network

to another network, or from one access point of a network to another, in order to maintain session continuity, thus making it imperative for a mobile device to find immediately an appropriate point of network attachment and remain connected to ensure session continuity. With existing handoff methodologies, handoff is typically accomplished by performing the following sequence of protocol layer specific handoffs:

* First, handoff takes place at the physical layer. In this regard, the mobile device switches its radio channel to a wireless base station or wireless access point in the target network.
* Second, handoff takes place at layer-2. In this regard, the mobile device switches its layer-2 (i.e., link-layer) connections to the target network. As explained above, the link layer or layer-2 refers to the protocol immediately below the IP-layer that carries user traffic. The mobile device performs layer-2 authentication with the target network if the target network requires such authentication.
* Third, handoff takes place at the IP-layer. In this regard, the mobile device obtains a local IP address from the target network, performs IP-layer authentication if required by the target network, and then performs IP-layer location update so that IP packets destined to the mobile device can be routed by the IP network to the mobile device via the target network. In some instances, one way to support IP layer location update is to use Mobile IP defined by the Internet Engineering Task Force (IETF).
* Fourth, handoff takes place at the application-layer. The mobile device performs necessary steps at the application layer to ensure that its application traffic will flow correctly to the applications on the mobile device via the target network. For example, when the mobile device uses the Session Initiation Protocol (SIP) defined by the IETF to manage its application-layer signaling, an application layer handoff can be achieved by the mobile device updating its current location with its home SIP server.

The mobile device may also need to carry out application-layer authentication with the target network if required by the target network. This is the case, for example, when the mobile device is using the IP Multimedia Subsystem (IMS) in a visited 3GPP (3rd Generation Partnership Project) wireless network, where the IMS is a SIP-based system supporting application-layer signaling and management for multimedia applications over 3GPP networks.

Media Independent Information Servers and Access Point/Network Handoffs

[Para 22] Network Discovery refers to the identification of an appropriate point of network attachment that meets the application requirements and the characteristics of the mobile device, in a timely, accurate and efficient manner. It is important for the mobile device to obtain this information before it becomes necessary to carry out a handoff or connectivity transfer operation. Network Discovery thus involves obtaining network information when a mobile device has IP connectivity. Network information is any information that is used by a mobile device for identifying networks, and seamlessly transitioning from one network connection to another. The network connections may be homogeneous (e.g., access points belonging to the same network) or heterogeneous (e.g., access points belonging to different networks). With the proliferation of wireless network service providers, seamless handover across heterogeneous networks is becoming as important as handover between homogeneous networks. However, heterogeneous handover requires the following key capabilities:

- Real-Time Information Availability: To discover the most recent and accurate information of various network elements of available networks as that information becomes available.

- Quick Network Discovery: To discover the existence of available networks and information regarding the networks to which the mobile device may connect in a handover operation.
- Quick Selection of Candidate Networks: To quickly select one network that the mobile device will prefer to use, when multiple networks are available at the same time.
- Proactive Handover Actions: To perform required handover actions before the mobile device is actually handed over to a target network to reduce delay and possible session discontinuity. For example, the mobile device may pre-acquire a local IP address and perform pre-authentication with a target network while still connected to a first network, so that when the time comes for the handover, the mobile is already assigned a valid IP address and already is authenticated with the target network.

[Para 23] Network Discovery and acquisition of a local IP address can be performed either by direct interaction of the mobile device with the candidate network(s), or through sending of queries to a Media Independent Information Server (MIIS), the location of which the mobile device is assumed to be aware. MIIS is a server that provides users with useful information for making effective handover decisions. The MIIS query is the latest approach in seamless wireless network handoff, being still in the research phase and extensively discussed among peers in the industry, such as the IEEE 802.21 Working Group. In its present state of development, the MIIS query is contemplated to be triggered by variations in radio signal strength. Thus, any perceived weakness in the radio signal quality will cause a query to be sent to the MIIS asking for the list of available neighborhood networks and their associated parameters.

[Para 24] However, the present inventors believe that the variation of radio signal strength could be reflective of an actual network deterioration necessitating the switching of a mobile device from one network to another, or it could be a false alarm because of inherent characteristics of network radio signals that result in transient variations. Consequently, where the perceived network deterioration because of signal strength variation is false, the mobile device will unnecessarily send MIIS queries and will repeatedly receive the same superfluous information. Further, a mobile device is likely to repeatedly traverse the same geographical area (e.g., an office employee will mostly travel from home to office and back). Consequently, repeatedly sending MIIS queries to get information pertaining to the same geographical coordinates will generate an unnecessary signaling burden. There thus exists a need in the art for improvement in the interactivity between mobile devices and MIIS apparatus.

SUMMARY OF THE PREFERRED EMBODIMENTS

[Para 25] The preferred embodiments of the present invention fulfill the existing need as explained above, by providing systems and methods for efficiently acquiring network discovery information by a mobile device. According to various aspects of the invention disclosed hereinbelow:

[Para 26] A mobile device, whenever it receives information from a remote MIIS, saves the information for future use. Consequently, the mobile device builds its own local database of existing networks with their associated characteristics, appropriately mapped with GPS (Global Positioning System) coordinates or other appropriate form of geographical location identifying information.

[Para 27] As a consequence of the above, a mobile device becomes "smart" over time through the learning process (e.g., it builds its own local database over the time). Thus, it

first attempts to utilize its own developed databaseand, only if such database information falls short, makes a remote query to a MIIS to get required information for session continuity and performing handovers.

[Para 28] The mobile device may store the information received from the MIIS in its own local database together with a time-stamp. Each time the mobile device needs to get updated or new information, it sends a request to the MIIS along with the time-stamp appended to the request. The time-stamp enables the mobile device to fetch information from the MIIS only if:

(i) the desired information is not available at all in the mobile device's local database;

(ii) the available information is considered to be old enough that an update should be obtained; or

(iii) a Network Stability Index (NSI), which is established through the learning process, is low. NSI is determined based on the frequency of changes/evolutions experienced by the mobile device in a given period of time. In other words, the mobile device looks at its database to determine how many times updates were obtained for a given network. If the mobile device finds that a database entry has been updated/modified more than a certain number of times in a given period of time, the given network is considered unstable for the given time period and the NSI may be decremented or reduced. On the other hand, if the mobile device finds that an entry has not been updated/modified at all over a given period of time, the given network may be considered to be stable over such period. Based on this observation, the NSI can be increased or incremented by some discrete value.

[Para 29] The time-stamp also facilitates the fetching of only delta information from the MIIS (i.e., the difference between the information stored in the mobile device's database and

the information held by the MIIS). Thus, the time-stamp based query causes the MIIS to send only the updates, if any exist, after the time specified in the time-stamp appended to the MIIS query. The MIIS will accordingly respond with only the updates instead of flooding the mobile device with information that the mobile device might already have.

[Para 30] The preferred embodiments of the invention thus make the mobile device MIIS query and response communication optimum and efficient. This will not only reduce superfluous traffic on the network but also will eliminate unnecessary burdens on the MIIS, thus making the interaction between the MIIS and the mobile device faster and more effective.

[Para 31] The above and/or other aspects, features and/or advantages of various embodiments will be further appreciated in view of the following description in conjunction with the accompanying figures. Various embodiments can include and/or exclude different aspects, features and/or advantages where applicable. In addition, various embodiments can combine one or more aspect or feature of other embodiments where applicable. The descriptions of aspects, features and/or advantages of particular embodiments should not be construed as limiting other embodiments or the claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[Para 32] The preferred embodiments of the present invention are shown by a way of example, and not limitation, in the accompanying figures, in which:

[Para 33] FIG. 1 is a flow diagram illustrating an implementation of a MIIS query in conjunction with a handover process by a mobile device Client according to one preferred embodiment of the invention;

[Para 34] FIG. 2A is a flow diagram illustrating an implementation of a MIIS query in conjunction with updating database information by a mobile device Client when traversing a

particular geographic region, according to another preferred embodiment of the invention; and

[Para 35] FIG. 2B is a flow diagram illustrating an implementation of a handover process by a mobile device Client according to another preferred embodiment of the invention, when updated database information is automatically performed as in Fig. 2A.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[Para 36] In conjunction with describing preferred embodiments of the invention, a brief discussion of current MIIS functionality will first be provided. MIIS maintains updated information about networks, lower layers and available information about higher layer services. The information contained by the MIIS can be classified generally into three groups:

1. General Network Information (GNI): includes a general overview of the network such as Network ID, Location of different PoAs (Point of Access) in the Network, the IP Version(s) supported by the Network, Network Operator (service provider), etc.
2. Link Layer Information (LLI): includes information related to neighbor maps and link layer parameters (channel, frequency, PHY (physical) types), data rates, neighbor information, security, QoS, etc.
3. Higher Layer Information (HLI): includes higher layer services or applications that are supported by the network. For example, Internet connectivity, Multimedia Message Service (MMS), Mobile IP (MIP), Virtual Private Network (VPN), VoIP, e-mail, IPsec, Streaming Media, Pricing of Access (e.g. fee versus free access), Use of NAT, Roaming Partners, etc. would constitute HLI.

[Para 37] The above information has an associated time-stamp. MIIS provides the above information to a mobile device when the mobile device sends a query so that it can make a

proper handover decision when roaming across either homogeneous or heterogeneous networks. While all of the above information service elements are necessary and will be available via an 802.21 information service framework, LLI will be mostly available directly through media specific technologies. In cases where media specific amendments are not available or not possible, link layer information can be enabled via higher layer information. The following table provides a list of Information Elements (IEs) that can be retrieved from the MIIS:

Information Element	Examples
List of available networks and standards	802.3, 802.11(a, b, g), 802.15, 802.16, GSM, GPRS, 3GPP, 3GPP2, etc.
ID of PoA	PoA ID based on location.
Network identifier	SSID in 802.11 or ITU-T E.212 MCC+MNC
Name of Operator/Network Provider	Vodafone, Orange, etc. Could be equivalent to Network ID.
IP Version supported	IPv4 and/or IPv6
Roaming Partners	In form of NAIs or MCC+MNC
Cost for service/network usage	Flat rate, hourly, day or weekly rate
Neighbor networks Information	Technology specific information
Link layer security supported	WEP in 802.11, 802.11i, PKM in 802.16 UEA in 3G,
Quality of Service	BER, SNR, Data Rate Kbps, Latency
Access Route Information	Access Router Address, IP version, Mobility Protocol Support
Cellular networks specific service supported	IMS, MMS, SMS, Presence, Instant messaging, Push-to-Talk etc.
802 networks specific services supported	Location, VPN, NAT, MIP versions and services, etc.

TABLE 1

[Para 38] Another capability of the MIIS is keeping a Media Independent Neighbor Graph (MING). MING contains a set of different types of neighbors relative to a given PoA. This set can be kept by the MIIS functional entity and can help a mobile device to identify quickly the potential candidate PoAs for handover. A MING may be manually configured, e.g., manually listing the neighbors for a given AP, or via a PoA that can learn about its neighbors of other

media types dynamically through the course of report/response message exchanges. Similarly, an updated record of Information Elements can be maintained by having reporting agents that when traversing certain networks send the essential information about those networks to the MIIS. Enhancements in such MIIS capabilities are part of the present invention and are described below.

[Para 39] MIIS is also capable of being accessed from any single network. Thus, for example, using an 802.11 access network it may be possible to get information not only about all other 802 networks in a particular region but also that of 3GPP and 3GPP2 networks as well. Similarly using a 3GPP2 radio transmission, it may be possible to get access to information about all 802 and 3GPP networks in a given region. This capability allows a mobile device to use its currently active access network and scan for other available access networks in a particular geographical region. Thus a multi-interface mobile device does not have to power up each of its individual radios to get information pertaining to each network corresponding to such radios.

[Para 40] In accordance with the preferred embodiments of the invention, it is proposed that MIIS be capable of receiving information from the reporting agents and storing it together with a time-stamp. It is also proposed that the MIIS be capable of rejecting received information if that information is a duplicate of previously stored information. These capabilities are not present in the MIIS that is presently under research.

[Para 41] A mobile device in accordance with the present invention would be provided with multiple radio network interfaces, such as IEEE WLAN interfaces (e.g., 802.11, 802.16, and 802.21 interfaces) and 3GPP/3GPP2 cellular network interfaces (e.g., WCDMA, GPRS, GSM, cdma2000). When a mobile device moves about in a particular region, it may need to execute a handover between WLANs, or between a WLAN and a cellular network. When the

mobile device is covered in the region by multiple WLANs simultaneously, it needs to select one WLAN to use if it decides to use a WLAN.

In accordance with one embodiment of the invention, the mobile device will:

1. Receive network information by detecting and receiving radio signals in its current geographical neighborhood. The mobile device may be either in idle mode or in connected mode. In connected mode, it discovers additional information (for instance higher layer information), as compared to idle mode where it perceives PHY layer information only (for instance Service Set Identifiers (SSIDs));

2. Receive desired information about the networks by communication with MIIS. The mobile device either may wish to get the information about the networks in its current neighborhood or in the upcoming neighborhood that the mobile device is heading towards. Communication with MIIS also may be commenced in the idle mode (i.e., when the mobile device is not actually involved in any active session) or carried out in the background when the active session is ongoing. The idle mode communication option can be activated when the mobile device is connected to an exhaustible power supply (car battery, battery-powered AC supply, etc.) for battery power saving;

3. Retain the information that it receives from the above noted methods even after it disconnects, leaves the neighborhood, or ends the session with MIIS. The mobile device will save the information in its local memory dully mapped with location coordinates and mapped with a time-stamp. This enables it to establish its own local database of networks. Location coordinates can be obtained from a built-in GPS device or other device having access to GPS or similar locational coordinates. The time signal for the time-stamp can be received from a built-in clock, a GPS clock or any other radio clock. Either GPS or a radio clock is recommended on accuracy and

synchronism grounds. The information received from MIIS can be saved as is and updated only when the mobile device again connects to the target network, if it happens to come back to the same neighborhood in the future;

4. Reuse the information saved in its own local database if it comes back to the same neighborhood in the future. This saves the mobile device from having to re-sense the PHY layer or re-query the MIIS.

5. Fetch only the delta information from MIIS based on the time-stamp. The time-stamp based query will ask MIIS to send only the updates, if present, after the time specified in the time-stamp attached to the query. The MIIS will accordingly respond with the delta updates instead of flooding the mobile device with the information that it already has. (The time-stamp is a part of the message format. It essentially makes the query appear like "Send me the requested information if you have updated information after time xx:yy; if you do not have any updates available after time xx:yy, then do not send).

[Para 42] Thus, the preferred embodiments of the invention provide the following functional components:

a) Storing a recent history of movements of a mobile device in its own local database.

b) Storing the identifications of WLANs and their IEs, which the mobile device either actually connected to or traversed in the movement pattern.

c) Communicating with MIIS to discover the Networks and their IEs, and storing the received information. The mobile device will receive the full information about the networks only if it does not currently exist in the mobile device's database. Alternately, the mobile device will receive either confirmation that its existing

information is up to date, or delta updates if the information is old. The MIIS queries appended with time-stamps facilitate achievement of these objectives.

d) Storing the information received in steps a, b and c mapped together with GPS coordinates and time-stamps.

e) Selecting the most suitable candidate network based on the location coordinates and user criteria and offering the user the selected candidate while the session is ongoing.

f) Performing pre-authentication with the selected network and making the target network ready for the possible handover.

g) Recording a log of performance of the networks used.

[Para 43] These steps will populate the mobile device's own database and prioritize the candidate networks according to the user's preferred criteria. The stored advance knowledge will reduce the network detection time; help proactively decide the next attachment point to be used, and perform a proactive Vertical or Horizontal handover. The pro-active handover actions include acquiring a local IP address from, or performing pre-authentication with, the target network. These enable the user to attain seamless roaming across several radio networks.

[Para 44] Referring now to Fig. 1, an example of mobile device functionality in accordance with the principles of the invention is described. First, the variation in the received signal strength triggers the mobile device to get GPS parameters (Step 10) and check the local memory to check for the existence of networks in proximity to the current geographic location (a 100 meter range is shown in the figure for the sake of example) (Step 11). If the mobile device does not find the availability of networks in the local database, it sends a query to MIIS for full information (Step 12). The information received in

response from MIIS (Step 20b) is used for handover (Steps 13, 14). Besides using the acquired information for handover, it is also saved in the local database (Step 15).

[Para 45] On the other hand, if the mobile finds the availability of networks in the database, it selects one according to the user preference (Step 16). User preferences may be based on Security, or Cost, or Performance, or Capability of interfacing with Cellular Networks. User preference may vary from user to user or from time to time even for the same user. A process coupled with user interface (not shown in the figure) can be used to realize this feature.

[Para 46] After selecting a potential candidate network using the local database, the algorithm checks the update history to determine how old the information in the database is (Step 17). If the retrieved information has been updated within the set elapsed time Δt and is deemed usable, then the algorithm advances to start handover actions. (Step 14). On the other hand, if the update history indicates that a significant amount of time has elapsed since the last update, the algorithm checks the Network Stability Index (NSI) (Step 18) which is evaluated based on how frequently the network parameters varied over a given period of time. A high NSI indicates an excellent stability record and reveals that query to MIIS to get update at this time is not necessary. Accordingly, in this case the algorithm advances to start handover actions (Step 14). The NSI can also be made a function of time so that it gradually decreases with the passage of time ensuring that after a sufficiently long course of time, updated information must be obtained from MIIS.

[Para 47] If the time elapsed since the last update is greater than the set Δt, and the NSI is below a certain preset threshold, the algorithm initiates communication with MIIS to get the updates (Step 19). If the response of MIIS query (Step 20a or Step 20b) is negative (i.e., no networks are available, then an alert can be sent to the user saying for example that

"session may be dropped in next 100 meters" (Step 21). The same can also be stored for future use (Step 22).

[Para 48] Concurrently with the checking of the NSI at step 18, the number of times that the information has been updated (i.e., the number of deltas) within the predetermined time period is checked at Step 23. If it is found that no variation occurred in network parameters over the extended period of time, it is assumed that the network is relatively stable and the NSI is increased (Step 24). If it is found that variations did occur, the NSI is decreased (Step 25). After each increase or decrease of the NSI, processing returns to Step 18 to re-check the NSI value to determine acceptability.

[Para 49] Figures 2A and 2B show alternate implementations of the same concept as Fig. 1. The algorithm shown in Figure 2A tracks Steps 10-13,16-19 and 23-25 of Fig. 1, and is used solely to build the local database whenever the mobile device is ON. As such the explanation of these steps will not be repeated. The process can run either in the background or parallel to a main session. The algorithm shown in Figure 2B is used in conjunction with the continuous database building algorithm of Fig. 2A and tracks Steps 10, 11, 16 and 14 of Fig. 1, and is used only to select a network for handover. As such, the explanation of these steps will not be repeated. As shown, a preliminary query can be sent to the MIIS for general information only relating to cost, features, etc. of available networks, followed by selection of the available networks that meet with user-specified preferences. A subsequent query is then sent to request full network information for the network(s) that meet the user's specified criteria.

[Para 50] Thus, using the algorithms of Figs. 2A and 2B, the mobile device will always check its database as it traverses a particular geographic region to determine whether network information is stored for such region; send a MIIS query to build its database if no information is stored; send an update MIIS query if stored information is old and needs to

be updated; and will look for a candidate network in its local database when a handover is necessary, select a candidate network from the local database, and perform the handover process.

[Para 51] While the present invention may be embodied in many different forms, a number of illustrative embodiments are described herein with the understanding that the present disclosure is to be considered as providing examples of the principles of the invention and that such examples are not intended to limit the invention to preferred embodiments described herein and/or illustrated herein.

Broad Scope of the Invention

[Para 52] While illustrative embodiments of the invention have been described herein, the present invention is not limited to the various preferred embodiments described herein, but includes any and all embodiments having equivalent elements, modifications, omissions, combinations (e.g., of aspects across various embodiments), adaptations and/or alterations as would be appreciated by those in the art based on the present disclosure. The limitations in the claims are to be interpreted broadly based on the language employed in the claims and not limited to examples described in the present specification or during the prosecution of the application, which examples are to be construed as non-exclusive. For example, in the present disclosure, the term "preferably" is non-exclusive and means "preferably, but not limited to." In this disclosure and during the prosecution of this application, means-plus-function or step-plus-function limitations will only be employed where for a specific claim limitation all of the following conditions are present in that limitation: a) "means for" or "step for" is expressly recited; b) a corresponding function is expressly recited; and c) structure, material or acts that support that structure are not recited. In this disclosure and during the prosecution of this application, the terminology

"present invention" or "invention" may be used as a reference to one or more aspect within the present disclosure. The language present invention or invention should not be improperly interpreted as an identification of criticality, should not be improperly interpreted as applying across all aspects or embodiments (i.e., it should be understood that the present invention has a number of aspects and embodiments), and should not be improperly interpreted as limiting the scope of the application or claims. In this disclosure and during the prosecution of this application, the terminology "embodiment" can be used to describe any aspect, feature, process or step, any combination thereof, and/or any portion thereof, etc. In some examples, various embodiments may include overlapping features. In this disclosure, the following abbreviated terminology may be employed: "e.g." which means "for example."

What is claimed is:

[Claim 1] 1. A method of performing a handoff operation for a wireless IP mobile device, comprising the steps of:

providing a local database in said mobile device that stores wireless network information;

comparing a received signal strength of said mobile device with a threshold value, and if said received signal strength is determined to be weak as compared with said threshold value,

checking said local database for available wireless networks in a current geographic region in which said mobile device is located and initiating handoff actions to a target network if an available network exists as stored in said database;

if no available network information for said region exists in said database, sending a query to a MIIS for available network information, and initiating handoff actions to a target network if an available network exists as indicated in a response from said MIIS.

[Claim 2] 2. The method of claim 1, further comprising the step of obtaining geographical coordinates to determine a present geographic region location of said mobile device.

[Claim 3] 3. The method of claim 1, further comprising the step of storing network information received in response to a query to said MIIS in said local database.

[Claim 4] 4. The method of claim 1, further comprising the steps of storing network information received in response to a query to said MIIS in said local database, and

associating a time-stamp with information stored in said local database, where said time-stamp indicates the time that said information has been updated.

[Claim 5] 5. The method of claim 4, further comprising the steps of determining whether network information stored in said local database is in need of being updated by comparing a current time with said time-stamp, sending a MIIS update query including said time-stamp to said MIIS if stored network information needs updating, and updating said network information with updated information received in an update response from said MIIS.

[Claim 6] 6. The method of claim 5, wherein the updated information provided by said MIIS includes only information that is different from the network information already stored in said local database.

[Claim 7] 7. The method of claim 5, further comprising the step of creating a Network Stability Index (NSI), which is indicative of the frequency with which network information updates are provided for a certain network over a predetermined period of time, and storing said NSI in said local database.

[Claim 8] 8. The method of claim 7, further comprising the step of consulting said NSI when it is determined that stored network information is determined to need updating, and proceeding to send an update MIIS query if the value of said NSI is below a predetermined threshold indicative of sufficient network stability.

[Claim 9] 9. The method of claim 7, further comprising the step of consulting said NSI when it is determined that stored network information is determined to need updating, and refraining from sending an update MIIS query if the value of said NSI is at or above a predetermined threshold indicative of sufficient network stability.

[Claim 10] 10. The method of claim 8, further comprising the step of decreasing said NSI value when network update information is received within said predetermined time period.

[Claim 11] 11. The method of claim 8, further comprising the step of increasing said NSI value when no network update information is received within said predetermined time period.

[Claim 12] 12. The method of claim 2, wherein the step of obtaining geographical coordinates comprises the step of receiving GPS signals.

[Claim 13] 13. A method of maintaining a network information database in a wireless IP mobile device, comprising the steps of:

providing a local database in said mobile device that stores wireless network information;

checking said local database for available wireless networks in a current geographic region in which said mobile device is located;

if an available network exists as stored in said database, determining whether stored network information of said available network needs to be updated, sending a MIIS update query to a MIIS if said stored network information needs updating, and updating

said network information with updated information received in an update response from said MIIS;

if no available network information for said region exists in said database, sending a query to said MIIS for available network information, and storing network information received in a response from said MIIS in said database.

[Claim 14] 14. The method of claim 13, further comprising the step of obtaining geographic coordinates to determine said current geographic region.

[Claim 15] 15. The method of claim 13, wherein the step of determining whether stored network information needs to be updated comprises the step of comparing a stored time-stamp associated with said stored network information with a current time.

[Claim 16] 16. The method of claim 15, wherein said time-stamp is appended to said MIIS update query.

[Claim 17] 17. The method of claim 15, wherein the step of determining whether stored network information needs to be updated comprises the further step of consulting a Network Stability Index (NSI) when result of said comparison indicates a need for network information update, and sending a MIIS update query only if a value of said NSI is below a predetermined network stability threshold level.

[Claim 18] 18. The method of claim 13, wherein the step of sending a query to said MIIS for available network information comprises the steps of:

sending a preliminary query for general network information;

comparing received general network information with user-specified preferences; and

sending a second query to receive full network information for at lease one network that meets said user-specified preferences.

[Claim 19] 19. A method of performing a handoff operation for a wireless IP mobile device, comprising the steps of:

providing a local database in said mobile device that stores wireless network information;

comparing a received signal strength of said mobile device with a threshold value, and if said received signal strength is determined to be weak as compared with said threshold value, and

checking said local database for available wireless networks in a current geographic region in which said mobile device is located and initiating handoff actions to a target network if an available network exists as stored in said database.

[Claim 20] 20. The method of claim 19, wherein information in said local database is obtained and updated in accordance with the method as set forth in claim 13.

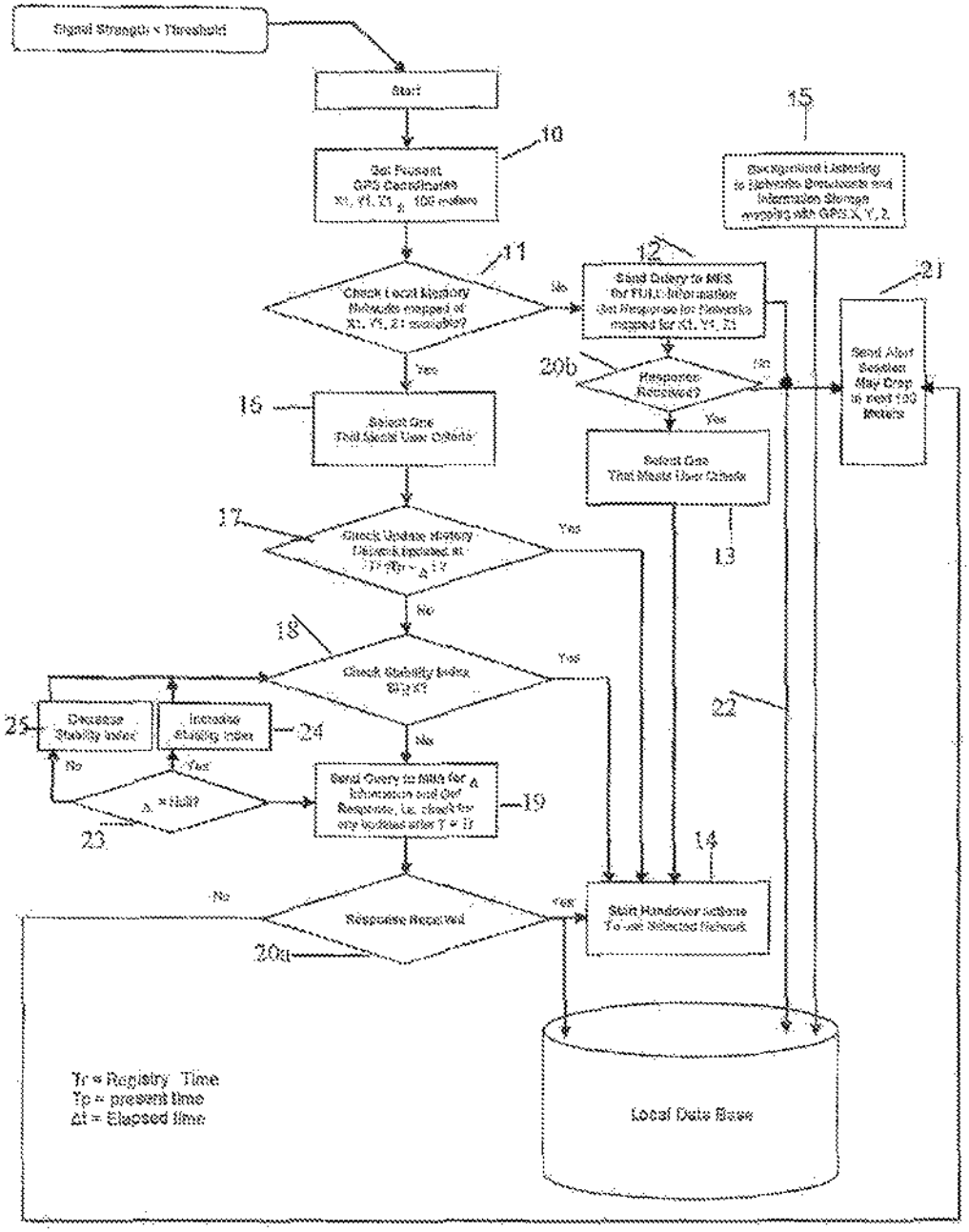
Signal Strength < Threshold
Start
10
11
12
15
16
17
18
19
20a
20b
21
22
23
24
25
13
14
Yes
No
Local Data Base
Tr = Registry Time
Tp = present time
Δt = Elapsed time

FIG. 1

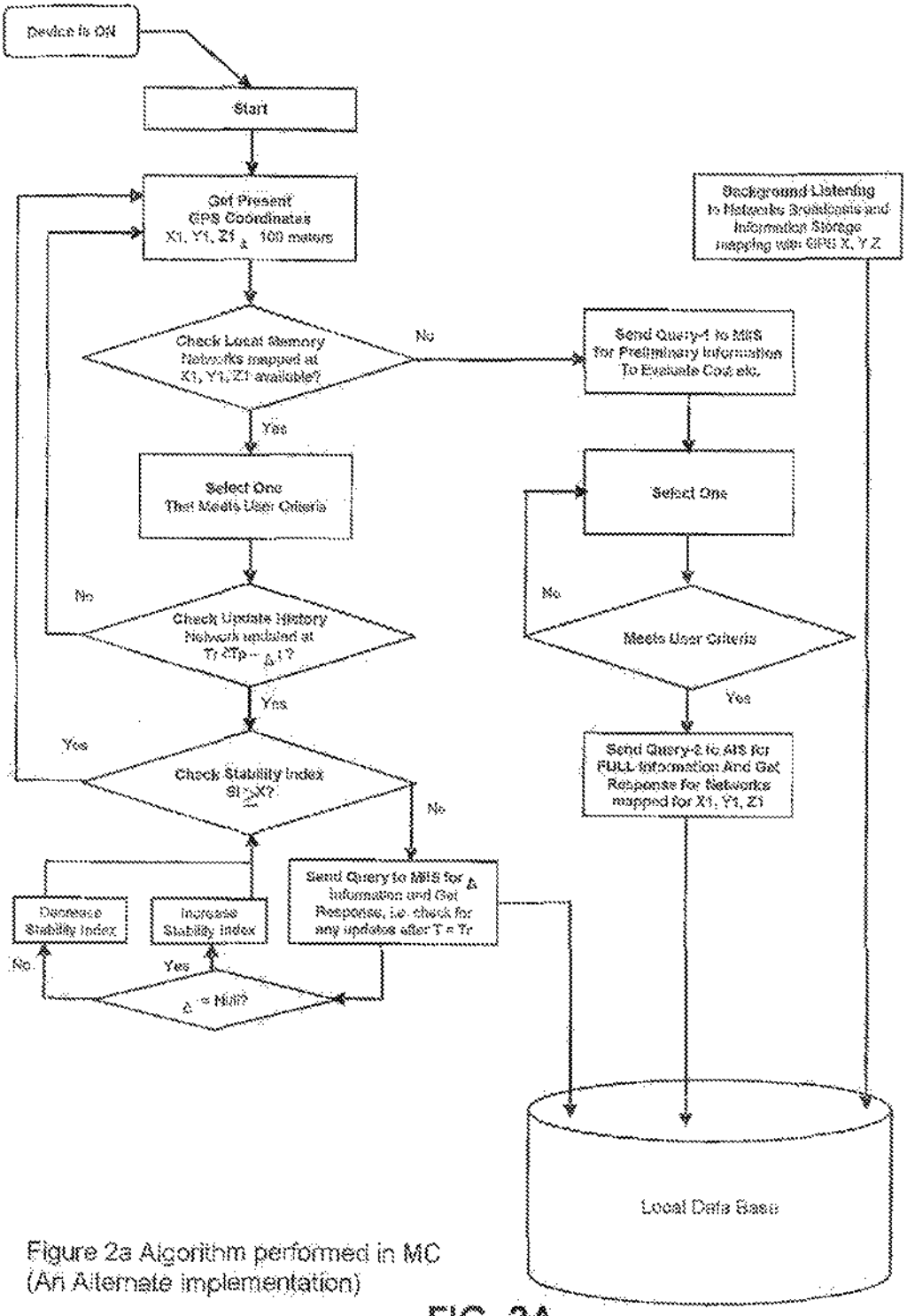

Figure 2a Algorithm performed in MC
(An Alternate implementation)

FIG. 2A

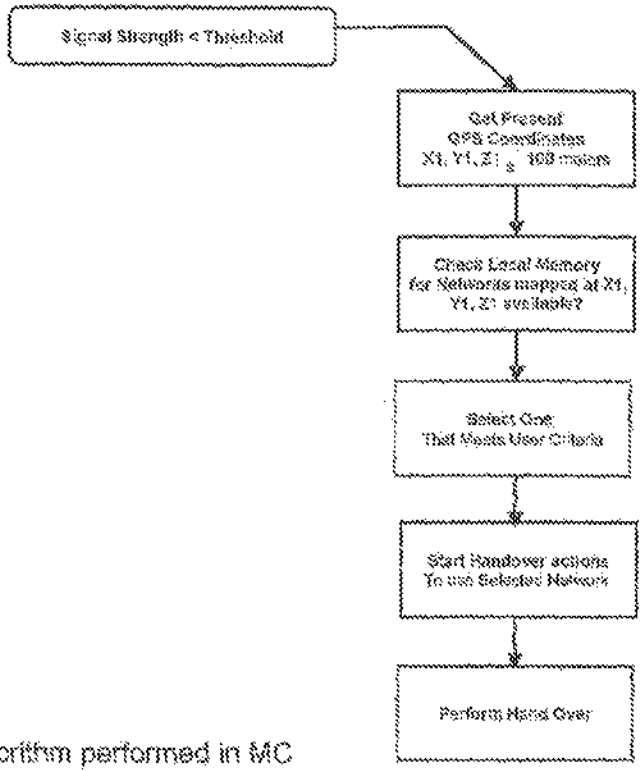

Figure 2b. Algorithm performed in MC
(An Alternate implementation)

FIG. 2B

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Data collection device having dynamic access to multiple **wireless** ...
www.google.com/patents/EP1760958A2?cl=en
App. - Filed Aug 21, 2006 - Published Mar 7, 2007 - Ynjun P. Wang - Hand Held Products, Inc.
Data collection device having dynamic access to multiple **wireless** networks. EP 1760958 A2. Abstract. A **data collection device** incorporating ...
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www.google.com/patents/US8496181
Grant - Filed Aug 31, 2010 - Issued Jul 30, 2013 - Ynjun P Wang - Hand Held Products, Inc.
There is set forth herein a method of providing network connectivity. The method can include introducing a new communication **device** within a ...
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Data collection device having dynamic access to multiple **wireless** ...
www.google.com/patents/US8256681
Grant - Filed May 10, 2010 - Issued Sep 4, 2012 - Ynjun P. Wang - Hand Held Products, Inc.
There is described a **data collection device** that can incorporate an encoded information reading unit that can operate within a system including ...
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Data collection system, **data collection device**, **wireless** ...
www.google.com/patents/US20120250561
App. - Filed Jan 5, 2011 - Published Oct 4, 2012 - Hiroshi Kubota - Mitsubishi Electric Corporation
A **wireless** communication **device** in a **data collection** system starts measuring a time when the **wireless** communication **device** receives a ...
Overview - Related - Discuss

Data collection device
www.google.com/patents/EP2541968A1?cl=en
App. - Filed Jun 28, 2011 - Published Jan 2, 2013 - Frank Schaich - Alcatel Lucent
Method according to claim 10, wherein said **data collection device** (100) establishes at least one **wireless** ad-hoc network with one or more ...
Overview - Related - Discuss

Panic button for **data collection device**
www.google.com/patents/US8548420
Grant - Filed Oct 5, 2007 - Issued Oct 1, 2013 - Jonathan T. Grunow - Hand Held Products, Inc.
A **data collection device** comprising: a **data collection** subsystem; a **wireless** communication **device**; a dedicated panic button, and a processor ...
Overview - Related - Discuss

Data collection device and method
www.google.com/patents/WO2010100485A1?cl=en
App. - Filed Mar 2, 2010 - Published Sep 10, 2010 - Michael Gordel - E-Plate Limited
2 A **data collection device** according to claim 1, in which in that the **wireless** detection means comprises a radio-frequency identification (RFID) ...
Overview - Related - Discuss

A method and **device** for **data** transmission between a **wireless** ...
www.google.com/patents/EP2157733A1?cl=en
App. - Filed Aug 22, 2008 - Published Feb 24, 2010 - Marek Budyn - ABB Research LTD
The invention deals with a method and a **device** for transmitting data between a **wireless** sensor network and a **data collection** system, in which ...
Overview - Related - Discuss

Public **wireless** network performance management system with mobil...
www.google.com/patents/US20120289258
App. - Filed Jul 30, 2012 - Published Nov 15, 2012 - Christian E Holstaeder - Netmotion Wireless, Inc.
Within the last two decades, **wireless** networks and the surrounding ... Therefore, a need exists for enterprises to **collect data** about **devices** ...

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Application of low power rfid tags to **data collection devices** and ...
www.google.com/patents/WO2013138080A1?cl=en
App. - Filed Feb 25, 2013 - Published Sep 13, 2013 - Matthew John RASMUSSEN - Trimble Navigation Ltd.
(C) employing a **Data Collection device** having an ID tag reader ... at least one Data Generation **device** for delivery via **wireless** internet to a ...
Overview - Related - Discuss

A low-power **wireless** beaconing network supporting proximal ...
www.google.com/patents/WO1998035453A1?cl=en
App. - Filed Feb 6, 1998 - Published Aug 13, 1998 - Kubler Joseph J - Kubler Joseph J
more specifically, to low power **wireless** networks that include a plurality of **wireless devices**, such **wireless devices** used in **data collection** applications, parcel ...
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Management of failures in **wireless** field **devices**
www.google.com/patents/WO2009054847A1?cl=en
App. - Filed Oct 23, 2007 - Published Apr 30, 2009 - Hanumantha Rao Pathuri - Qualcomm Inc
A fault remediation system for fielded **wireless** mobile **devices** addresses field failure **data collection**, consolidation of field failure data, and an ...
Overview - Related - Discuss

Public **wireless** network performance management system with mobil...
www.google.com/patents/US20120282933
App. - Filed Jul 15, 2012 - Published Nov 8, 2012 - Christian E. Hofstaedter - Netmotion Wireless, Inc
Within the last two decades, **wireless** networks and the surrounding ...
Therefore, a need exists for enterprises to **collect data** about **devices** ...
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Public **wireless** network performance management system with mobil...
www.google.com/patents/US20120284399
App. - Filed Jul 13, 2012 - Published Nov 8, 2012 - Christian E. Hofstaedter - Netmotion Wireless, Inc.
Data collection agent associated with a mobile **device** movable within a mobile communications environment that includes at least one ...
Overview - Related - Discuss

Portable **data** terminal for **collecting** vehicle performance **data**
www.google.com/patents/EP2413293A1?cl=en
App. - Filed Jul 8, 2011 - Published Feb 1, 2012 - Gregory Payne - Hand Held Products, Inc.
at least one vehicle **data collection device**,, a global positioning system (GPS),, a **wireless** communications module,, a memory **device**;.
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Data collection and traffic control using multiple **wireless** receivers
www.google.com/patents/US8566011
Grant - Filed Sep 14, 2011 - Issued Oct 22, 2013 - Nazif Cihan Tas - Siemens Corporation
Methods, systems, and **devices** for monitoring roadway traffic. A method includes transmitting **wireless** signals from a plurality of roadside ...
Overview - Related - Discuss

Method to perform a **wireless** communication in a **data collection** sy...
www.google.com/patents/WO2010131060A1?cl=en
App. - Filed May 12, 2009 - Published Nov 18, 2010 - Pier Giorgio Peruzzi - Datalogic Scanning Group S.R.L.
A method for performing **wireless** communication in a **data- collection** system, which system comprises a plurality of **devices** (2) communicating ...
Overview - Related - Discuss

Public **wireless** network performance management system with mobil...
www.google.com/patents/US20120284376
App. - Filed Jul 18, 2012 - Published Nov 8, 2012 - Christian E. Hofstaedter - Netmotion Wireless, Inc.
Within the last two decades, **wireless** networks and the surrounding ...
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Navigation system, method and **database** using **mobile devices**
www.google.com/patents/US8494768
Grant - Filed Jul 31, 2009 - Issued Jul 23, 2013 - Renske Elizabeth SCLKESZ - Samsung Electronics Co., Ltd
Provided is a navigation system for guiding a user of a **mobile device** to a plurality of locations including a storage means adapted to store a ...
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Ip network information **database** in **mobile devices** for use with ...
www.google.com/patents/WO2007022301A2?cl=en
App. - Filed Aug 18, 2006 - Published Feb 22, 2007 - Sunil Madhani - Sunil Madhani
A **mobile device** receives wireless network information from a MIIS (Media Independent Information Server), and builds its own **database** of ...
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Ip network information **database** in **mobile devices** for use with ...
www.google.com/patents/CA2619305A1?cl=en
App. - Filed Aug 18, 2006 - Published Feb 22, 2007 - Sunil Madhani - Kabushiki Kaisha Toshiba
A **mobile device** receives wireless network information from a MIIS (Media Independent Information Server), and builds its own **database** of ...
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Ip network information **database** in **mobile devices** for use with ...
www.google.com/patents/EP1934757A2?cl=en
App. - Filed Aug 18, 2006 - Published Jun 25, 2008 - Sunil Madhani - Telcordia Technologies, Inc.
A **mobile device** receives wireless network information from a ...
Overview - Related - Discuss

Appending **database** update information to voice calls from **mobile** ...
www.google.com/patents/EP1448665A1?cl=en
App. - Filed Nov 20, 2002 - Published Aug 18, 2004 - Louis Robert Litwin - Thomson Licensing S.A
According to an aspect of the present invention, a method for providing non-voice data to a **mobile device** (Fig. 2A) includes the step of ...
Overview - Related - Discuss

Appending **database** update information to voice calls from **mobile** ...
www.google.com/patents/WO2003045086A1?cl=en
App. - Filed Nov 20, 2002 - Published May 30, 2003 - Louis Robert Litwin - Louis Robert Litwin
According to an aspect of the present invention, a method for providing non-voice data to a **mobile device** (Fig. 2A) includes the step of ...
Overview - Related - Discuss

Method and apparatus for synchronizing a **database** in portable ...
www.google.com/patents/WO2001003409A1?cl=en
App. - Filed Jul 3, 2000 - Published Jan 11, 2001 - Lars Novak - Ericsson Telefon Ab L M
It will be appreciated by those skilled in the art that while a PC and **mobile phone** are used as exemples of two devices between which **database** synchronization ...
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Automatic access control for **mobile devices**
www.google.com/patents/WO2009114039A2?cl=en
App. - Filed Mar 9, 2009 - Published Sep 17, 2009 - Thanh Khai Ong - Novatel Wireless, Inc
A **mobile** data **device** includes a **database** of identifiers and an authorization module. The identifiers are associated with one or more ...
Overview - Related - Discuss

Determining the position of a **mobile device** using the ...
www.google.com/patents/US8314736
Grant - Filed Aug 6, 2010 - Issued Nov 20, 2012 - Mehran Moshfeghi - Golba Llc
A **mobile device** characterizes signals it receives at a certain ... retrieving, from a **database**, a second set of parameters computed from a ...
Overview - Related - Discuss

Determining the Position of a **Mobile Device** Using the ...

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Google mobile devices databases

Web Images Maps Shopping Patents More Search tools

Page 1 of about 2,160,000 results (0.32 seconds)

Managing advertising services for **mobile devices** and users
www.google.com/patents/US8478641
Grant - Filed Sep 22, 2008 - Issued Jul 2, 2013 - Michael L. Bishop - AT&T Intellectual Property I, L.P.
storing a contact list within the **mobile** communications **device**, the ... may provide methods that include establishing advertising **databases** for ...
Overview - Related - Discuss

Estimating locations of cells and **mobile devices**
www.google.com/patents/EP2369360A2?cl=en
App. - Filed Mar 26, 2009 - Published Sep 28, 2011 - Matthew Bells - Research In Motion Limited
Mobile devices generate location reports (220) that include locations ... a **database** (118) to store a radio frequency source profile (900) for a ...
Overview - Related - Discuss

Rapid navigation system for **mobile devices**
www.google.com/patents/WO2011116381A1?cl=en
App. - Filed Mar 21, 2011 - Published Sep 22, 2011 - Douglass Armentrout - Paxfire, Inc.
a **database** stored on hardware, which contains a correlation of the indicator ... The configuration of keys on **mobile devices** results in increased ...
Overview - Related - Discuss

Systems and methods for automatically searching a **database** to tune ...
www.google.com/patents/US8478238
Grant - Filed Dec 21, 2007 - Issued Jul 2, 2013 - Houman Haghighi - Qualcomm Incorporated
A method for automatically tuning a frequency modulator in a **mobile device** is described. The geographical location of the **mobile device** is ...
Overview - Related - Discuss

Contextual advertising techniques implemented at **mobile devices**
www.google.com/patents/WO2007123798A2?cl=en
App. - Filed Apr 2, 2007 - Published Nov 1, 2007 - Itai Brickner - Itai Brickner
Contextual advertising techniques implemented at **mobile devices** .... Tier component 108d, a **database** 108e, a Taxonomy component 108f, ...
Overview - Related - Discuss

Efficient establishment of **wireless** connections
www.google.com/patents/US8346908
Grant - Filed Sep 26, 2006 - Issued Jan 1, 2013 - Scott Allen Caddes - Hewlett-Packard Development Company, L.P.
A method for storing information in a **database** pertaining to which **wireless devices** an application initiates and accepts communications from.
Overview - Related - Discuss

Method of detecting transportation network **database** errors and ...
www.google.com/patents/US20130254707
App. - Filed Jun 15, 2010 - Published Oct 4, 2012 - Donald Cooke - Donald Cooke
2 is a schematic illustration of the manner in which a navigation **device** may receive or transmit information over a **wireless** communication ...
Overview - Related - Discuss

Methods for tracking **database** changes and **devices** thereof
www.google.com/patents/US20130084422
App. - Filed Jul 6, 2012 - Published Jan 24, 2013 - Ananth Prasad Kondapalli Suresh - Infosys Limited
adding, by a **database** change tracking computing device, to a ... The method of claim 7, wherein the **database** is utilized on a **mobile device**. 9
Overview - Related - Discuss

Exchange of Information Via WIFI Infrastructure Using **Wireless Devi**...
www.google.com/patents/US20130084869
App. - Filed Jun 4, 2012 - Published Apr 4, 2013 - Sanjar Azar - Sanjar Azar
A system is provided for transmitting information to a user of a **mobile** communications **device**. The system includes a **database** for storing ...
Overview - Related - Discuss

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SEARCH RESULTS

You searched for: mobile devices quality services

554 Results returned

< First | 1 | 2 | 3 | 4 | 5 >> Last >

Mobile Agent Middleware for Multimedia Services

Raza, M.H. ; Sibbil, M.A.
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Publication Year: 2007 , Page(s): 1109 - 1114
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Tayal, M.
Personal Wireless Communications, 2005. ICPWC 2005. 2005 IEEE International Conference on
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Towards High Quality Mobile Services for Senior Citizens in Smart Living Environments

Xiaosong Zhang ; Pohl, P.
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Digital Object Identifier: 10.1109/MUE.2007.208
Publication Year: 2007 , Page(s): 164 - 170
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A Grid Service Infrastructure for Mobile Devices

Tao Guan ; Zaluska, E. ; De Roure, D.
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Volume: 2
Digital Object Identifier: 10.1109/MELCON.2004.1347018
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You searched for: mobile network performance

17,268 Results returned

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Yan Zhang ; Soon-Hee Soong
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You searched for: mobile devices location updates

142 Results returned

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APPLAUS: A Privacy-Preserving Location Proof Updating System for location-based services

Zhichao Zhu , Guohong Cao
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A Quantitative Analysis of Power Consumption for Location-Aware Applications on Smart Phones

Anand, A. ; Manikopoulos, C. ; Jones, Q. ; Borcea, C.
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Enhancing the Accuracy of Position Information through Superposition of Location Server Data

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Volume: 5 , Issue: 7
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Publication Year: 2006 , Page(s): 931 - 942
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Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12815165	RAPPAPORT, THEODORE S.
	Examiner	**Art Unit**
	SRIRAMA CHANNAVAJJALA	2157

CPC						
Symbol					**Type**	**Version**
G06F		17	/	00	F	20130101
G06F		17	/	30	I	20130101
G06F		15	/	16	I	20130101
G06F		15	/	177	I	20130101
H04W		24	/	00	I	20130101
H04W		4	/	00	I	20130101
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CPC Combination Sets							
Symbol					**Type**	**Set**	**Ranking**	**Version**
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NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	16	
/SRIRAMA CHANNAVAJJALA/ Primary Examiner.Art Unit 2157	12/6/2013	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	4 and 5

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	Examiner	**Art Unit**
	SRIRAMA CHANNAVAJJALA	2157

US ORIGINAL CLASSIFICATION	
CLASS	SUBCLASS
707	688

CROSS REFERENCE(S)					
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)				
707	694	758	803		
709	203	206	220		
455	423	426.1	426.2		

INTERNATIONAL CLASSIFICATION														
CLAIMED					NON-CLAIMED									
G	0	6	F	17 / 00 (2006.01.01)										
G	0	6	F	17 / 30 (2006.01.01)										
G	0	6	F	15 / 16 (2006.01.01)										
G	0	6	F	15 / 177 (2006.01.01)										
H	0	4	W	24 / 00 (2009.01.01)										
H	0	4	W	4 / 00 (2009.01.01)										

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	16	
/SRIRAMA CHANNAVAJJALA/ Primary Examiner.Art Unit 2157	12/6/2013	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	4 and 5

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	SRIRAMA CHANNAVAJJALA	2157

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Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
1	8														
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NONE (Assistant Examiner)	(Date)	**Total Claims Allowed:** 16	
/SRIRAMA CHANNAVAJJALA/ Primary Examiner.Art Unit 2157 (Primary Examiner)	12/6/2013 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 4 and 5

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
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✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
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CLAIM		DATE								
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	36	✓	✓	-						

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CLAIM		DATE								
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	96		✓	-						
	97		✓	-						
	98		✓	-						
	99		✓	-						
	100		✓	-						
	101		✓	-						
	102		✓	-						
	103			-						
9	104			=						
16	105			=						

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12815165	RAPPAPORT, THEODORE S.
	Examiner	Art Unit
	SRIRAMA CHANNAVAJJALA	2157

CPC- SEARCHED

Symbol	Date	Examiner
GO6F17/00;G06F17/30	12/6/2013	SC
G06F15/16; G06F15/177	12/6/2013	SC
H04W24/00 ;H04W4/00	12/6/2013	SC

CPC COMBINATION SETS - SEARCHED

Symbol	Date	Examiner

US CLASSIFICATION SEARCHED

Class	Subclass	Date	Examiner
707	608-609,688,705,748,825,827	3/28/2012	sc
455	406,408,417,445,560	3/28/2012	sc
379	1.01,9.04,32.01,88.09,114.08	3/28/2012	sc
705	14.33,14.1,14.11,39	3/28/2012	sc
709	203,218-220	3/28/2012	sc
707	694,688,758,803-805	12/6/2013	sc
709	203,206,219-220	12/6/2013	sc
455	423,424,426.1-426.2	12/6/2013	sc

SEARCH NOTES

Search Notes	Date	Examiner
Inventor searched	3/28/2012	sc
PLUS search	3/28/2012	sc
goole serch attached	3/28/2012	sc
WEST search attached	3/28/2012	sc
Inventor searched	10/4/2012	sc
google search attached	10/4/2012	sc
WEST search attached	10/4/2012	sc
NPL search attached	10/4/2012	sc
Inventor searched	12/6/2013	sc
PLUS search	12/6/2013	sc

	/SRIRAMA CHANNAVAJJALA/ Primary Examiner, Art Unit 2157

SEARCH NOTES		
Search Notes	**Date**	**Examiner**
NPL search attached	12/6/2013	sc
google search attached	12/6/2013	sc
WEST Interference search attached	12/6/2013	sc
WEST search attached	12/6/2013	sc

INTERFERENCE SEARCH			
US Class/ CPC Symbol	**US Subclass / CPC Group**	**Date**	**Examiner**
707	694,688,758,803-805	12/6/2013	sc
709	203,206,219-220	12/6/2013	sc
455	423,424,426.1-426.2	12/6/2013	sc

	/SRIRAMA CHANNAVAJJALA/ Primary Examiner, Art Unit 2157

WEST Search History

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DATE: Friday, December 06, 2013

Hide?	Set Name	Query	Hit Count
		Prior Art	
		DB=PGPB,USPT,USOC,EPAB,JPAB,DWPI,TDBD; PLUR=YES; OP=OR	
☐	L162	L161 and ((H04W16/10 |H04W16/14 |H04W16/18 |H04W24/00 |H04W24/02 |H04W24/08 |H04W28/14 |H04W40/02 |H04W40/14 |H04W40/18 |H04W72/085 |H04W8/245 |H04W80/06 |H04W84/12 |H04W84/18 |H04W88/02 |H04W88/06 |H04W88/16 |H04W92/02 |H04W92/18 |G06F1/32 |G06F9/44526 |H04L12/56 |H04L29/06 |H04L29/12311 |H04L29/12367 |H04L41/5003 |H04L41/5009 |H04L41/5035 |H04L41/5067 |H04L43/0829 |H04L45/00 |H04L61/2084 |H04L61/2514 |H04L63/02 |H04L63/0272 |H04L63/08 |H04L69/28 |H04L69/329 |H04L69/40 |H04M1/7253 |H04M2250/02).CPC. or (370/252 |370/328 |370/338 |370/349 |370/448 |713/300 |713/320 |455/423 |455/454 |709/203 |709/224 |709/225 |714/749).CCLS. and (H04Q7/00 |H04Q7/20 |G06F1/26 |G06F1/32 |H04L12/28 |H04L12/56 |H04L29/06 |H04L29/08 |H04B1/00 |H04B1/06).IPCR.) and (service near5 provider$1)	3
☐	L161	L160 and (mobile near5 device$1)	12
☐	L160	L159 and (wireless near5 performance)	35
☐	L159	(wireless and network$3 and statistic$1).ab. and @py<=2007	289
☐	L158	L157 and (wireless near5 access$3)	7
☐	L157	L156 and ((G06Q10/06 |G06Q10/067 |G06Q10/087 |G06Q10/10 |G06Q30/02 |G06Q30/0261 |G06Q30/06 |G06Q30/0603 |G06Q50/16 |H04L12/2602 |H04L2012/6416 |H04L2012/6424 |H04L41/06 |H04L41/12 |H04L41/145 |H04L41/147 |H04L41/22 |H04L41/5003 |H04L43/00 |H04L43/0823 |H04L43/0847 |H04L43/0852 |H04L43/0864 |H04L43/087 |H04L63/0428 |H04L63/20 |H04L67/141 |H04L67/303 |H04L69/14 |H04L69/18 |G06F11/00 |G06F11/3409 |G06F11/3466 |G06F15/177 |G06F17/00 |G06F17/509 |G06F19/322 |G06F19/323 |G06F19/3418 |G06F2201/865 |G06F2217/04 |G06F2217/06 |H04W12/12 |H04W16/18 |H04W16/20 |H04W24/00 |H04W28/18 |H04M1/725 |H04M1/72522 |H04H20/82 |H04H60/06 |H04N21/25841 |H04N21/25891 |H04N21/26208 |H04N21/47202 |H04N21/4755 |H04N21/6581 |H04N21/8113 |H04Q3/0083 |Y04S40/164 |Y10S715/964).CPC. (G06F11/00 |G06F15/16 |G06F15/173 |G06F15/177 |G06F17/00 |G06F17/30 |G06F21/00 |G06F3/00 |G06F9/44 |G08B13/14 |H04J3/26 |H04L5/00 |H04L5/22 |H04L9/32 |H04Q7/36 |H04W4/00).IPCR.) and (network near5 performance)	8
☐	L156	L155 and (statistics same capabilit$3)	16
☐	L155	L127 and (quality same coverage)	531
		L152 and ((G06F17/5022 |G06F17/5045 |G06F8/10 |H04B1/406 |H04B1/69 |H04B1/692 |H04B1/707 |H04B15/00 |H04B2201/7071 |H04B7/18508 |H04B7/2628 |H04M2215/32 |H04W16/06 |H04W28/10 |H04W28/18 |H04W36/18 |H04W4/24 |H04W48/16 |H04W48/18 |H04W8/12 |H04W8/183	

	L154	|H04W8/205 |H04W8/26 |H04W88/02 |H04W88/06 |H04W88/08).CPC. or (375/130 |375/135 |375/136 |375/222 |375/E1.001 |375/E1.002 |340/12.32 |340/12.34 |340/12.37 |340/310.11 |340/310.13 |340/310.16 |370/209 |370/277 |370/281 |370/331 |370/335 |370/342 |381/71.3 |381/71.6 |455/419 |455/431 |455/432.1 |455/432.3 |455/433 |455/437 |455/443 |455/452.2 |455/453 |455/525 |455/62).CCLS. and (H04Q7/20 |H04Q7/30 |H04Q7/32 |H04Q7/36 |H04Q7/38 |H04B1/40 |H04B1/69 |H04B1/707 |H04B15/00 |H04B7/26 |G06F17/50 |G06F9/44).IPCR.) and (location same device$1)	3
	L153	L152 and ((G06F17/5022 |G06F17/5045 |G06F8/10 |H04B1/406 |H04B1/69 |H04B1/692 |H04B1/707 |H04B15/00 |H04B2201/7071 |H04B7/18508 |H04B7/2628 |H04M2215/32 |H04W16/06 |H04W28/10 |H04W28/18 |H04W36/18 |H04W4/24 |H04W48/16 |H04W48/18 |H04W8/12 |H04W8/183 |H04W8/205 |H04W8/26 |H04W88/02 |H04W88/06 |H04W88/08).CPC. or (375/130 |375/135 |375/136 |375/222 |375/E1.001 |375/E1.002 |340/12.32 |340/12.34 |340/12.37 |340/310.11 |340/310.13 |340/310.16 |370/209 |370/277 |370/281 |370/331 |370/335 |370/342 |381/71.3 |381/71.6 |455/419 |455/431 |455/432.1 |455/432.3 |455/433 |455/437 |455/443 |455/452.2 |455/453 |455/525 |455/62).CCLS. and (H04Q7/20 |H04Q7/30 |H04Q7/32 |H04Q7/36 |H04Q7/38 |H04B1/40 |H04B1/69 |H04B1/707 |H04B15/00 |H04B7/26 |G06F17/50 |G06F9/44).IPCR.) and (report$3 same quality)	0
	L152	L147 and (radio same frequenc$2)	9
	L150	L147 and (bandwidth same quality)	1
	L149	L147 and (performance same database$1)	4
	L147	L121 and (wireless same network$3) and @py<=2007	56
	L146	L145 and ((G06Q10/10 |G06Q10/107 |G06Q20/10 |G06Q20/102 |G06Q20/105 |G06Q20/20 |G06Q20/204 |G06Q20/32 |G06Q20/322 |G06Q20/327 |G06Q20/382 |G06Q20/40 |G06Q30/018 |G06Q30/02 |G06Q30/0203 |G06Q30/0207 |G06Q30/0222 |G06Q30/0238 |G06Q30/0239 |G06Q30/0253 |G06Q30/0267 |G06Q30/0268 |G06Q30/0272 |G06Q30/0277 |G06Q30/06 |G06Q30/0601 |G06Q30/0607 |G06Q30/0609 |G06Q30/0635 |G06Q30/0641 |G06Q40/025 |G06Q99/00 |G07F11/002 |G07F5/18 |G07F9/026 |H04L12/14 |H04L12/1428 |H04L12/2602 |H04L12/58 |H04L29/06 |H04L29/06027 |H04L41/0213 |H04L41/0233 |H04L41/024 |H04L41/0253 |H04L41/06 |H04L41/0681 |H04L41/08 |H04L41/0803 |H04L41/0879 |H04L41/142 |H04L41/18 |H04L41/22 |H04L41/28 |H04L41/5003 |H04L41/5009 |H04L41/5022 |H04L41/5029 |H04L41/5032 |H04L41/5035 |H04L41/5061 |H04L41/5064 |H04L41/5067 |H04L41/5074 |H04L41/5083 |H04L41/5096 |H04L43/00 |H04L43/024 |H04L43/045 |H04L43/06 |H04L43/062 |H04L43/065 |H04L43/067 |H04L43/0805 |H04L43/0811 |H04L43/0817 |H04L43/0829 |H04L43/0847 |H04L43/0852 |H04L43/0876 |H04L43/0888 |H04L43/0894 |H04L43/10 |H04L43/106 |H04L43/16 |H04L63/02 |H04L63/0209 |H04L63/0218 |H04L63/0236 |H04L63/0272 |H04L63/0281 |H04L63/0428 |H04L63/0442 |H04L63/0464 |H04L63/08 |H04L63/0807 |H04L63/0815 |H04L63/0823 |H04L63/083 |H04L63/162 |H04L63/166 |H04L63/168 |H04L63/18 |H04L65/4007 |H04L65/80 |H04L67/02 |H04L67/025 |H04L67/1002 |H04L67/1008 |H04L67/1014 |H04L67/1017 |H04L67/1023 |H04L67/1029 |H04L67/1031 |H04L67/1038 |H04L67/1095 |H04L67/142 |H04L67/22 |H04L67/26 |H04L67/2842 |H04L67/306 |H04L67/322 |H04L67/325 |H04L67/327 |H04L69/08 |H04L69/16 |H04L69/162 |H04L69/329 |G06F11/0709	2

|G06F11/0757 |G06F11/0769 |G06F11/0775 |G06F11/0781 |G06F11/0784 |G06F11/202 |G06F11/32 |G06F11/324 |G06F11/327 |G06F11/328 |G06F11/3495 |G06F17/30893 |G06F21/00 |G06F21/41 |G06F21/552 |G06F2201/81 |G06F2201/86 |G06F2201/875 |G06F2221/2137 |G06F2221/2149 |H04M15/00 |H04M15/41 |H04M15/43 |H04M15/44 |H04M15/49 |H04M15/51 |H04M15/58 |H04M15/705 |H04M15/721 |H04M15/745 |H04M15/80 |H04M15/8044 |H04M15/83 |H04M15/8351 |H04M15/84 |H04M2215/0104 |H04M2215/0108 |H04M2215/0152 |H04M2215/0164 |H04M2215/0168 |H04M2215/0176 |H04M2215/018 |H04M2215/0188 |H04M2215/42 |H04M2215/46 |H04M2215/54 |H04M2215/7009 |H04M2215/7045 |H04M2215/745 |H04M2215/81 |H04M2215/8108 |H04M2215/8129 |H04M2215/82 |H04M3/5175 |H04M3/5191 |H04W36/00 |H04W48/08 |H04W72/02 |H04W76/02 |H04W84/042 |H04W88/06 |Y10S379/90 |Y10S707/99931 |Y10S707/99937 |Y10S707/99938 |Y10S707/99939 |Y10S707/99944 |Y10S715/969).CPC. (G06Q10/00 |G06Q20/00 |G06Q30/00 |G07F5/00 |G07F5/18 |H04L12/14 |H04L12/24 |H04L12/26 |H04L12/46 |H04L12/58 |H04L29/06 |H04L29/08 |G06F1/00 |G06F11/00 |G06F11/07 |G06F11/32 |G06F11/34 |G06F17/30 |H04M15/00 |H04Q7/32 |H04Q7/38).IPCR.) and (mobile near5 device$1)

☐	L145	L144 and (web near5 page$1)	17
☐	L144	L143 and (communication near5 network$3)	31
☐	L143	L30 and (location near5 data)	36
☐	L142	L141 and (subscriber$1 same carrier$1)	4
☐	L141	L140 and (location near5 specific)	4
☐	L140	L139 and (report$3 same quality)	4
☐	L139	L138 and (availability near5 profil$3)	4
☐	L138	L137 and performance	6
☐	L137	L20 and ((G06Q10/00 |G06Q10/067 |G06Q30/02 |G06Q30/0261 |G06Q30/06 |G06Q50/16 |G06F11/00 |G06F15/177 |G06F17/00 |G06F17/22 |H04M15/00 |H04M15/08 |H04M15/09 |H04M15/10 |H04M15/49 |H04M15/50 |H04M15/55 |H04M15/745 |H04M15/8005 |H04M15/8038 |H04M15/90 |H04M17/00 |H04M17/106 |H04M2017/14 |H04M2215/0108 |H04M2215/016 |H04M2215/2026 |H04M2215/32 |H04M2215/34 |H04M2215/44 |H04M2215/46 |H04M2215/52 |H04M2215/66 |H04M2215/68 |H04M2215/7442 |H04W4/02 |H04W4/18 |H04W4/24 |H04W8/12 |H04W8/26 |H04L12/14 |H04L12/58 |H04L63/10 |H04L67/04 |H04L67/18 |H04L67/20 |H04L67/24 |H04L67/306).CPC. (G06F17/00 |G06F17/22 |G06F17/30 |G06F7/00 |G06Q10/00 |G06Q30/00 |G06Q50/00 |H04M1/66 |H04M11/00 |H04M15/00 |H04M15/08 |H04M17/00 |H04Q7/20 |H04Q7/38 |H04L12/14 |H04L12/56 |H04W16/18 |H04W84/00).IPCR.) and (quality same service$1)	6

L96 and ((G06F12/1408 |G06F12/1483 |G06F21/00 |G06F21/10 |G06F21/31 |G06F21/33 |G06F21/6209 |G06F21/71 |G06F21/86 |G06F2211/007 |G06F2221/0737 |G06F2221/0797 |G06F2221/2101 |G06F2221/2113 |G06F2221/2115 |G06F2221/2135 |G06F2221/2137 |G06F2221/2151 |G06Q10/00 |G06Q10/06 |G06Q10/063 |G06Q10/0631 |G06Q10/06315 |G06Q10/06375 |G06Q10/087 |G06Q20/02 |G06Q20/023 |G06Q20/04 |G06Q20/085 |G06Q20/10 |G06Q20/102 |G06Q20/12 |G06Q20/123

	L135	|G06Q20/1235 |G06Q20/14 |G06Q20/203 |G06Q20/24 |G06Q30/00 |G06Q30/0202 |G06Q30/0225 |G06Q30/0273 |G06Q30/0283 |G06Q30/06 |G06Q30/0601 |G06Q30/0609 |G06Q40/00 |G06Q40/02 |G06Q40/04 |G06Q40/10 |G06Q50/188 |G06T1/0021 |G07F9/026 |H04L12/40104 |H04L12/40117 |H04L2209/56 |H04L2209/60 |H04L2209/603 |H04L2209/84 |H04L2463/101 |H04L2463/102 |H04L2463/103 |H04L63/02 |H04L63/04 |H04L63/0428 |H04L63/0435 |H04L63/0442 |H04L63/068 |H04L63/08 |H04L63/0823 |H04L63/083 |H04L63/10 |H04L63/123 |H04L63/16 |H04L63/168 |H04L63/20 |H04L9/006 |H04L9/0819 |H04L9/0838 |H04L9/0861 |H04L9/321 |H04L9/3218 |H04L9/3247 |H04L9/3263 |H04N2005/91364 |H04N21/2347 |H04N21/23476 |H04N21/235 |H04N21/2362 |H04N21/2541 |H04N21/2543 |H04N21/2547 |H04N21/25875 |H04N21/4143 |H04N21/42646 |H04N21/4325 |H04N21/4345 |H04N21/435 |H04N21/4405 |H04N21/44204 |H04N21/443 |H04N21/4627 |H04N21/4753 |H04N21/6581 |H04N21/8166 |H04N21/835 |H04N21/8355 |H04N21/83555 |H04N21/8358 |H04N5/913 |H04N7/162 |H04N7/163 |H04N7/17309 |G11B20/00086 |G11B20/00159 |G11B20/00188 |G11B20/00557 |G11B20/0071 |G11B20/00768 |G11B2220/216 |G11B2220/218 |G11B2220/2562 |G11B2220/2575 |G11B27/031 |G11B27/329 |Y10S707/99939).CPC.) and (network$3 near5 performance)	12
	L134	L117 and ((H04W4/00 |H04W4/02 |H04W4/028 |H04W4/06 |H04W4/12 |H04W4/18 |H04W4/20 |H04W48/08 |H04W48/16 |H04W64/00 |H04W8/18 |H04W8/26 |H04W88/08 |H04L12/5865 |H04L29/08657 |H04L29/08936 |H04L51/20 |G06Q10/107 |G06Q10/109 |G06Q30/02 |G06Q30/0251 |G06Q30/0254 |G06Q30/0255 |G06Q30/0267 |G06Q30/0277 |G06Q30/0283 |G01S5/02 |H04M15/8033 |H04M2215/7435).CPC.) and (wireless near5 access$3)	1
	L133	L132 and (location near5 information)	1
	L132	L131 and ((G06F1/00 |G06F1/16 |G06F1/26 |G06F11/07 |G06F11/30 |G06F12/00 |G06F13/00 |G06F13/372 |G06F15/00 |G06F15/16 |G06F15/173 |G06F17/00 |G06F17/30 |G06F17/40 |G06F19/00 |G06F3/01 |G06F3/048 |G06F3/16 |G06F5/06 |G06F9/445 |H04L1/00 |H04L1/20 |H04L12/12 |H04L12/18 |H04L12/20 |H04L12/24 |H04L12/26 |H04L12/28 |H04L12/54 |H04L12/56 |H04L12/66 |H04L12/861 |H04L13/08 |H04L27/26 |H04L29/00 |H04L29/02 |H04L29/06 |H04L29/08 |H04L5/00 |H04B1/08 |H04B1/38 |H04B17/00 |H04B7/00 |H04B7/15 |H04B7/26 |H04W16/22 |H04W24/00 |H04W24/06 |H04W24/08 |H04W24/10 |H04W28/06 |H04W28/10 |H04W28/26 |H04W4/00 |H04W4/02 |H04W4/06 |H04W48/14 |H04W56/00 |H04W64/00 |H04W72/04 |H04W74/08 |H04W76/02 |H04W80/02 |H04W84/02 |H04W84/10 |H04W84/12 |H04W84/18 |A63B24/00 |A63B69/00 |A63B69/16 |A63B71/00 |A63B71/06 |H04N1/00 |H04N21/238 |H04N7/15 |H04N7/24 |H04N7/42 |A61B5/02 |G06K17/00 |G06K7/10 |G06K7/14 |G06K9/00 |G06K9/36 |G06K9/72 |H03M7/30 |H04J11/00 |H04J3/00 |H04J3/24 |H04J3/26 |H04M1/60 |H04M11/00 |H04M3/00 |H04M3/26 |H04M3/36 |A45F5/00 |G01C21/00 |G01C21/34 |G01C21/36 |G01S19/14 |G06Q10/00 |G06Q50/00 |G06Q50/10 |G09G5/00 |G10L15/00 |H04H20/71 |H04Q7/00 |H04Q7/24 |H04Q7/34 |H04Q7/38).IPCR.) and (mobile near5 device$1)	10
	L131	L128 and L129	37
	L130	(wireless and network$3 and device$1 and performance).ti. and @py<=2007	31
	L129	(wireless and network$3 and device$1 and performance).ab. and @py<=2007	1417

▨	L128	L127 or L126 or L125 or L124	313543
▨	L127	709/$.ccls.	167074
▨	L126	707/$.ccls.	161674
▨	L125	(G06F17/30).cpc.	6819
▨	L124	(G06F17/00).cpc.	3444
▨	L123	6847824.uref.	13
▨	L122	L121 and L115	3
▨	L121	(8224794 20090070379 20100250268 20100250269 20100299274 20120244835 20120246142 6397055 6405028 6546238 6556818 7328042 7359726 7359731 7702346 8150437 20060052126 20060052130 20060058007 20060058008 20060063549 20080070550 6754833 6359923 20030165223 20050060317 6259914 20110099037 20110099037 20030002639 6035289 7653586 7657833 7698204 7711629 7783557 7900138 7900138 20040249699 20040249742 20040254807 20080162304 20100153522 20110125666 6058312 6307877 7957718 7957718 20070174887 20080034396 20090291665 20120143592 7519362 8170004 20060079280 20070030856 5546467 5973642 6167125 4586177 5302914 5550915 5553129 5581554 5745846 5796722 5903638 5907550 6005840 6032132 6069871 6078796 6081731 6091715 6137874 6144726 6175550 6298123 6308067 6388518 6393283 6397064 6658260 6839562 6947723 6985748 7072664 7181538 7242931 7302265 7430425 7483674 7495608 7519654 7542559 7555300 RE41006 7636333 7644038 7747945).pn.	199
▨	L120	L119 and telecommunication$1	3
▨	L119	L118 and (device$1 near5 location$1)	15
▨	L118	L116 and (service near5 provider$1) and (mobile near5 device$1)	16
▨	L117	(mobile and device$1 and location and service$1 and user$1).ti. and @py<=2007	28
▨	L116	(mobile and device$1 and location and service$1).ti. and @py<=2007	113
▨	L115	(mobile and device$1 and location and service$1).ab. and @py<=2007	2277
▨	L113	20040023670.pn.	2
▨	L112	L110 and propert$3	1
▨	L110	L109 and communication$1	5
▨	L109	L108 and wireless	5
▨	L108	L105 and (data near5 field$1)	5
▨	L107	L106 and customer$1 and contact$3	11
▨	L106	L105 and quality and preference$1	16
▨	L105	L101 and database$1	54
▨	L102	L101 and L93	1
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		20110099037 20030002639 6035289 7653586 7657833 7698204 7711629 7783557 7900138 20040249699 20040249742 20040254807).pn.	
	L100	L99 and (public near5 record$1)	3
	L99	L98 and interfac$3 and computer$1	63
	L98	L79 and (base near5 station$1)	64
	L96	L95 and (communication near5 permit$1)	29
	L95	L94 and (digital near5 record$3)	184
	L94	L93 and clearinghouse	937
	L93	L39 and (business near5 rule$1)	17513
	L92	L39 and (business neear5 rule$1)	268991
	L91	L90 and voip	3
	L90	L89 and (voice near5 mail$3)	5
	L89	L88 and database$1	22
	L88	L86 and preference$1 and infrastructure$1	22
	L86	L85 and (business near5 rule$1)	26
	L85	L84 and L77	99
	L84	(telecommunication$1 near5 equipment$1) and user$1 and @py<=2007	6834
	L83	L82 and user$1	4
	L82	L80 and (telecommunication$1 near5 device$1)	4
	L81	L80 and (telecommunication$1 near5 equipment$1)	0
	L80	L79 and (propert$3 same asset$1)	16
	L79	L78 and customer$1 and contact$3 and database$1	415
	L78	L77 and (market$3 and sale$1 and business)	545
	L77	L76 and (geographic near5 location$1)	1661
	L76	database$1 and telecommunication$1 and wireless and performance and @py<=2007	10166
	L75	L74 and L73	3
	L74	L73 and telecommunication$1 and performance and monitor$3 and @py<=2007	3
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	L72	L69 and brows$3	5
	L69	(telecommunicat$4 and tower$1).clm. and @py<=2007	76
	L66	L65 and clearinghouse	3

☐	L65	L64 and (telecommunication$1 and wireless)	54
☐	L64	L63 and (performance and monitor$3)	61
☐	L63	telecommunication$1 and network$3 and carrier$1 and billboard$1 and tower$1 and @py<=2007	70
☐	L60	L52 and (bill$3 near5 database$1)	119
☐	L59	L58 and geographic	15
☐	L58	L55 and (service$1 near5 catalog$3)	15
☐	L55	L54 and (database$1 near5 record$1)	63
☐	L54	L52 and (telecommunication$1 near5 carrier$1)	64
☐	L52	(clearinghouse and equipment and performance) and @py<=2007	875
☐	L48	L46 and tenants and user$1	13
☐	L46	L45 and asset$1 and propert$2	13
☐	L45	L44 and (business near5 rule$1)	13
☐	L44	L43 and (telecommunication$1 near5 carrier$1)	37
☐	L43	L42 and geographic and location$1	131
☐	L42	L41 and (quality and performance and monitor$3)	170
☐	L41	L40 and clearinghouse and @py<=2007	377
☐	L40	L39 and (wireless and telecommunication and network$3)	44512
☐	L39	L38 or L37 or L36 or L35 or L34	581691
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☐	L37	(455/406 |455/408 |455/417 |455/445 |455/560).ccls.	10076
☐	L36	709/$.ccls.	167074
☐	L35	707/$.ccls.	161674
☐	L34	705/$.ccls.	153708
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☐	L31	L30 and infrastructure	31
☐	L30	L29 and (equipment$1 and carrier$1)	73
☐	L29	(telecommunicat$4 and business).ab. and @py<=2007	1266
☐	L27	L26 and location$1	5
☐	L26	L22 and database$1	12
☐	L22	(telecommunicat$4 and performance and carrier$1).ab. and @py<=2008	190
☐	L21	L20 and geographic and location$1	8
☐	L20	L19 and telecommunication$1 and carrier$1	15
☐	L19	L18 and (clearinghouse and database$1)	26
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☐	L17	L15 and (carriers near5 service$1)	7
☐	L15	L14 and (wireless near5 network$3)	20
☐	L14	(clearinghouse near5 database$1) and (telecommunication$1 near5 provider$1)	135
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☐	L10	6542588.pn.	2
☐	L9	L7 and (business near5 rule$1)	6
☐	L8	L7 and (business neaer5 rule$1)	17
☐	L7	(clearinghouse and telecommunicat$4).clm. and @py<=2008	25
☐	L3	(clearing$house and database$1).ti. and @py<=2008	5

END OF SEARCH HISTORY

WEST Search History

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DATE: Friday, December 06, 2013

Hide?	Set Name	Query	Hit Count
Interference			
		DB=PGPB; PLUR=YES; OP=OR	
☐	L31	(location and specific and communication and device $ 1 and cost and service $ 1 and radio and frequency and application and performance and wireless and network $ 3 and quality and capacity and bandwidth).clm.	0
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☐	L29	(cost and service $ 1 and radio and frequency and application and performance and wireless and network $ 3 and quality and capacity and bandwidth).clm.	1
☐	L28	(radio and frequency and application and performance and wireless and network $ 3 and quality and capacity and bandwidth).clm.	3
☐	L27	(statistics and outage and reliability and wireless and network $ 3 and quality and capacity and bandwidth).clm.	0
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☐	L21	(spectrum and availability and third and parties and performance and information and network $ 3 and memory and database $ 1 and updat $ 3 and action $ 1 and location and information and end and user $ 1 and communication and device $ 1).clm.	0
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☐	L15	(performance and information and network $ 3 and memory and database $ 1 and updat $ 3 and action $ 1 and location and information and end and user $ 1 and communication and device $ 1).clm.	6
☐	L11	(mobile and device11 and availability and performance and information).clm.	0
☐	L10	(collect $ 3 and provid $ 3 and accesss $ 3 and quality and service $ 1 and information and wireless and communication $ 1 and network $ 3).clm.	0
☐	L9	(third and parties and mobile and device $ 1 and travel $ 1 and location and quality and service and informaiton).clm.	0
☐	L8	(third and parties and more and carrier $ 1 and mobile and device $ 1 and communication and device $ 1 and provid $ 3 and access $ 3 and quality and service and information and stor $ 3 and memory and database $ 1).clm.	0
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☐	L6	(more and carrier $ 1 and mobile and device $ 1 and communication and device $ 1 and provid $ 3 and access $ 3 and quality and service and information and stor $ 3 and memory and database $ 1).clm.	3
☐	L2	(wireless and acess $ 3 and characteristic $ 1 and measur $ 3).clm.	0
☐	L1	(wireless and acess $ 3 and characteristic $ 1 and measur $ 3 and radio and reception and quality).clm.	0

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Sheet 1 of 3

Complete if Known	
Application Number	12/815,165
Filing Date	06-14-2010
First Named Inventor	Rappaport
Art Unit	2157
Examiner Name	Channavajjala
Attorney Docket Number	08610004C3

U. S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	1	US- 8306208	11-06-2012	Montemer	
	2	US- 8095437	01-10-2012	Holmes et al.	
	3	US- 5978236	11-02-1999	Faberman et al.	
	4	US- 7782848	08-24-2010	Kalavade et al.	
	5	US- 8107956	01-31-2012	Vakil et al.	
	6	US- 8224794	07-17-2012	Rappaport, Theodore S.	
	7	US- 6023699	02-08-2000	Knoblock et al.	
	8	US- 6381465	04-30-2002	Chern et al.	
	9	US- 6202023	03-13-2001	Hancock et al.	
	10	US- 8254939	08-28-2012	Xia et al.	
	11	US- 20100250269	09-30-2010	Rappaport	
	12	US- 20120239498	09-20-2012	Ramer et al.	
	13	US- 20120253997	10-04-2012	Kovalev	
	14	US- 20120329455	12-27-2012	Norp et al.	
	15	US- 20120275359	11-01-2012	Knaggs et al.	
	16	US- 20020023010	02-21-2002	Rittmaster et al.	
	17	US- 20060015375	01-19-2006	Lee et al.	
	18	US- 20060031082	02-09-2006	Amaitis et al.	
	19	US- 20060178918	08-10-2006	Mikurak, Michael G.	

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	1	WO2008115992	09-25-2008	Bajuja et al.		
	2	WO2011095618	08-11-2011	Norp et al.		
	3	WO0231706	04-18-2002	Brown, Terrance et al.		
	4	WO9843197	10-01-1998	Hughes, Craig et al.		
	5	WO2007144568	12-21-2007	Ghanea Hercock, Robert A		

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Examiner Name	Channavajjala
Attorney Docket Number	08610004C3

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	20	US- 20100165862	07-01-2010	Nylander et al.	
	21	US- 20010034204	10-25-2001	Pentikainen	
	22	US- 20060143111	06-29-2006	Mylet	
	23	US- 20080031211	02-07-2008	Kalavade et al.	
	24	US- 20090089399	04-02-2009	Beck et al.	
	25	US- 20100167732	07-01-2010	Vakil et al.	
	26	US- 20110058657	03-10-2011	Alegret et al.	
	27	US- 20110257986	10-20-2011	Deanne et al.	
	28	US- 20020155843	10-24-2002	Bahl et al.	
	29	US- 20030026231	02-06-2003	Lazaridis et al.	
	30	US- 20060203738	09-14-2006	Fok et al.	
	31	US- 20030072425	04-17-2003	Hurst, Michael	
	32	US- 20070155411	07-05-2007	Morrison, James	
	33	US- 20040088333	05-06-2004	Sidman, David	
	34	US- 20030200296	10-23-2003	Lindsey, Terry P.	
	35	US- 20050130667	06-16-2005	Boiero et al.	
	36	US- 20110002242	09-16-2004	Perlow et al.	
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		US-			

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Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3]-Number[4]-Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages Or Relevant Figures Appear	T[6]

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First Named Inventor	Rappaport
Art Unit	2157
Examiner Name	Channavajjala
Attorney Docket Number	08610004C3

NON PATENT LITERATURE DOCUMENTS

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	1	Tony H. Grubesic et al., "Geographies of imperfection in telecommunication analysis," Telecommunications Policy 29 (2005) 69-94	
	2	PCT INTERNATIONAL SEARCH REPORT ISSUED 11/18/08. PCT/US08/75847	
	3	Juha, Kalliokulju, "Quality of service management functions in 3rd generation mobile telecommunication networks", IEEE 1999, pp 1283-1287	

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re patent application of

Theodore Rappaport	Confirmation No. 1819
Serial No. 12/815,165	Group Art Unit 2157
Filed June 14, 2010	Examiner Srirama Channavajjala

For CLEARINGHOUSE SYSTEM AND METHOD FOR DETERMINING AVAILABILITY OF CARRIER-BASED SERVICES AND ENHANCING THE QUALITY, OPERATION AND ACCESSABILITY OF CARRIER-BASED NETWORKS

Commissioner for Patents
PO Box 1450
Alexandria, Virginia 22313-1450

SUPPLEMENTAL AMENDMENT

Sir:

This amendment is supplemental to the amendment submitted concurrently with the request for continued examination (RCE) filed February 6, 2013.

Applicant respectfully requests entry of the following amendment.

Amendments to the Specification: begin on page 2.

Remarks: begin on page 3.

Samsung Ex. 1004, page 176 of 974

Amendments to the Specification:

Please amend the title on page 1 lines 3-5 and page 2 lines 1-3 as follows:

Clearinghouse Systems and Methods for Collecting or Providing Quality or Performance Data for Enhanced Availability of Wireless Communications

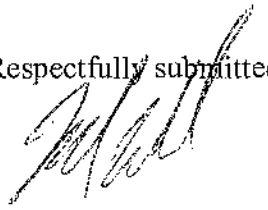
~~Clearinghouse System and Method for Determining Availability of Carrier-Based Services and Enhancing the Quality, Operation and Accessibility of Carrier-Based Networks~~

REMARKS

Only the title has been changed by this amendment. As no amendments have been made to the claims, a Listing of the Claims has not been included herein. It is respectfully requested that the Examiner proceed to continued examination on the merits.

Please charge any deficiencies in fees and credit any overpayment of fees to Attorney's deposit account number 50-2041 (Whitham, Curtis, Christofferson & Cook).

Respectfully submitted,



Michael E. Whitham
Reg. No. 32,635

Whitham, Curtis, Christofferson & Cook, P.C.
11491 Sunset Hills Road, Suite 340
Reston, VA 20190

Tel. (703) 787-9400
Fax. (703) 787-7557

Customer No.: 30743

Electronic Acknowledgement Receipt

EFS ID:	15897059
Application Number:	12815165
International Application Number:	
Confirmation Number:	1819
Title of Invention:	Clearinghouse System and Method for Determining Availability of Carrier-Based Services and Enhancing the Quality, Operation and Accessibility of Carrier-Based Networks
First Named Inventor/Applicant Name:	Theodore S. Rappaport
Customer Number:	30743
Filer:	Michael E. Whitham/Bryce Miller
Filer Authorized By:	Michael E. Whitham
Attorney Docket Number:	08610004c3
Receipt Date:	29-MAY-2013
Filing Date:	14-JUN-2010
Time Stamp:	16:00:56
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		08610004c3_sup.PDF	30209 72ac8916c92f01b61057dc0cd78ee0fb5fd9504	yes	3

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Supplemental Response or Supplemental Amendment	1	1
	Specification	2	2
	Applicant Arguments/Remarks Made in an Amendment	3	3
Warnings:			
Information:			
	Total Files Size (in bytes):	30209	

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

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

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

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

PTO/SB/08a (07-09)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Substitute for form 1449/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 3

Complete if Known	
Application Number	12/815,165
Filing Date	06-14-2010
First Named Inventor	Rappaport
Art Unit	2157
Examiner Name	Channavajjala
Attorney Docket Number	08610004C3

U. S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] *(if known)*	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	1	US- 8306208	11-06-2012	Montemer	
	2	US- 8095437	01-10-2012	Holmes et al.	
	3	US- 5978236	11-02-1999	Faberman et al.	
	4	US- 7782848	08-24-2010	Kalavade et al.	
	5	US- 8107956	01-31-2012	Vakil et al.	
	6	US- 8224794	07-17-2012	Rappaport, Theodore S.	
	7	US- 6023699	02-08-2000	Knoblock et al.	
	8	US- 6381465	04-30-2002	Chern et al.	
	9	US- 6202023	03-13-2001	Hancock et al.	
	10	US- 8254939	08-28-2012	Xia et al.	
	11	US- 20100250269	09-30-2010	Rappaport	
	12	US- 20120239498	09-20-2012	Ramer et al.	
	13	US- 20120253997	10-04-2012	Kovalev	
	14	US- 20120329455	12-27-2012	Norp et al.	
	15	US- 20120275359	11-01-2012	Knaggs et al.	
	16	US- 20020023010	02-21-2002	Rittmaster et al.	
	17	US- 20060015375	01-19-2006	Lee et al.	
	18	US- 20060031082	02-09-2006	Amaitis et al.	
	19	US- 20060178918	08-10-2006	Mikurak, Michael G.	

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3]-Number[4]-Kind Code[5] *(if known)*	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages Or Relevant Figures Appear	T[6]
	1	WO2008115992	09-25-2008	Bajuja et al.		
	2	WO2011095618	08-11-2011	Norp et al.		
	3	WO0231706	04-18-2002	Brown, Terrance et al.		
	4	WO9843197	10-01-1998	Hughes, Craig et al.		
	5	WO2007144568	12-21-2007	Ghanea Hercock, Robert A		

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. [1] Applicant's unique citation designation number (optional). [2] See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [3] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [6] Applicant is to place a check mark here if English language Translation is attached.

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours 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, 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 (1-800-786-9199) and select option 2.

PTO/SB/08a (07-09)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 2 of 3

Complete if Known	
Application Number	12/815,165
Filing Date	06-14-2010
First Named Inventor	Rappaport
Art Unit	2157
Examiner Name	Channavajjala
Attorney Docket Number	08610004C3

U. S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] *(if known)*	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	20	US- 20100165862	07-01-2010	Nylander et al.	
	21	US- 20010034204	10-25-2001	Pentikainen	
	22	US- 20060143111	06-29-2006	Mylet	
	23	US- 20080031211	02-07-2008	Kalavade et al.	
	24	US- 20090089399	04-02-2009	Beck et al.	
	25	US- 20100167732	07-01-2010	Vakil et al.	
	26	US- 20110058657	03-10-2011	Alegret et al.	
	27	US- 20110257986	10-20-2011	Deanne et al.	
	28	US- 20020155843	10-24-2002	Bahl et al.	
	29	US- 20030026231	02-06-2003	Lazaridis et al.	
	30	US- 20060203738	09-14-2006	Fok et al.	
	31	US- 20030072425	04-17-2003	Hurst, Michael	
	32	US- 20070155411	07-05-2007	Morrison, James	
	33	US- 20040088333	05-06-2004	Sidman, David	
	34	US- 20030200296	10-23-2003	Lindsey, Terry P.	
	35	US- 20050130667	06-16-2005	Boiero et al.	
	36	US- 20110002242	09-16-2004	Perlow et al.	
	37	US- 20040143529	07-22-2004	Frattalone, Nicholas	
		US-			

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3]-Number[4]-Kind Code[5] *(if known)*	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages Or Relevant Figures Appear	T[6]

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. [1] Applicant's unique citation designation number (optional). [2] See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [3] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [6] Applicant is to place a check mark here if English language Translation is attached.

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours 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, 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 (1-800-786-9199) and select option 2.

PTO/SB/08b (07-09)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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Substitute for form 1449/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 3 of 3

Complete if Known	
Application Number	12/815,165
Filing Date	06-14-2010
First Named Inventor	Rappaport
Art Unit	2157
Examiner Name	Channavajjala
Attorney Docket Number	08610004C3

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
	1	Tony H. Grubesic et al., "Geographies of imperfection in telecommunication analysis," Telecommunications Policy 29 (2005) 69-94	
	2	PCT INTERNATIONAL SEARCH REPORT ISSUED 11/18/08. PCT/US08/75847	
	3	Juha, Kalliokulju, "Quality of service management functions in 3rd generation mobile telecommunication networks", IEEE 1999, pp 1283-1287	

Examiner Signature		Date Considered	

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

1 Applicant's unique citation designation number (optional). 2 Applicant is to place a check mark here if English language Translation is attached.

This collection of information is required by 37 CFR 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours 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, 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 (1-800-786-9199) and select option 2.

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

To:
MICHAEL E. WHITMAN
11491 SUNSET HILLS ROAD
SUITE 340
RESTON, VA 20190

PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT AND THE WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

Applicant's or agent's file reference 08610004TA	Date of mailing *(day/month/year)* 18 NOV 2008 **FOR FURTHER ACTION** See paragraphs 1 and 4 below
International application No. PCT/US 08/75847	International filing date *(day/month/year)* 10 September 2008 (10.09.2008)
Applicant RAPPAPORT, THEODORE R.	

1. ☒ The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

   Filing of amendments and statement under Article 19:
   The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):

   When? The time limit for filing such amendments is normally two months from the date of transmittal of the international search report.

   Where? Directly to the International Bureau of WIPO, 34 chemin des Colombettes 1211 Geneva 20, Switzerland, Facsimile No.: +41 22 740 14 35

   For more detailed instructions, see the notes on the accompanying sheet.

2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3. ☐ **With regard to the protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

   ☐ the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.

   ☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Reminders**

   Shortly after the expiration of **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in Rules 90*bis*.1 and 90*bis*.3, respectively, before the completion of the technical preparations for international publication.

   The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. These comments would also be made available to the public but not before the expiration of 30 months from the priority date.

   Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

   In respect of other designated Offices, the time limit of 30 **months** (or later) will apply even if no demand is filed within 19 months.

   See the Annex to Form PCT/IB/301 and, for details about the applicable time limits, Office by Office, see the *PCT Applicant's Guide*, Volume II, National Chapters and the WIPO Internet site.

Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201	Authorized officer: Lee W. Young PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

Form PCT/ISA/220 (January 2004) *(See notes on accompanying sheet)*

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 08610004TA	**FOR FURTHER ACTION**	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
International application No. PCT/US 08/75847	International filing date *(day/month/year)* 10 September 2008 (10.09.2008)	(Earliest) Priority Date *(day/month/year)* 10 September 2007 (10.09.2007)
Applicant RAPPAPORT, THEODORE R.		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 2 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

   a. With regard to the **language**, the international search was carried out on the basis of:

   ☒ the international application in the language in which it was filed.

   ☐ a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

   b. ☐ This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6*bis*(a)).

   c. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. ☐ **Certain claims were found unsearchable** (see Box No. II).

3. ☐ **Unity of invention is lacking** (see Box No. III).

4. With regard to the **title**,

   ☐ the text is approved as submitted by the applicant.

   ☒ the text has been established by this Authority to read as follows:

   CLEARINGHOUSE SYSTEM FOR DETERMINING AVAILABLE NETWORK EQUIPMENT

5. With regard to the **abstract**,

   ☒ the text is approved as submitted by the applicant.

   ☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regard to the **drawings**,

   a. the figure of the **drawings** to be published with the abstract is Figure No. 1

   ☒ as suggested by the applicant.

   ☐ as selected by this Authority, because the applicant failed to suggest a figure.

   ☐ as selected by this Authority, because this figure better characterizes the invention.

   b. ☐ none of the figures is to be published with the abstract.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 08/75847

A. CLASSIFICATION OF SUBJECT MATTER
IPC(8) - H04Q 7/20 (2008.04)
USPC - 455/425
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
USPC: 455/425

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
USPC: 455/425 (keyword limited - see search terms)

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
PubWEST (USPT, PGPB, EPAB, JPAB); Google Patents; Google
Search Terms Used: clearinghouse; database; communications; infrastructure; end-user; base station; tower; frequency; bandwidth; advertising; business terms; geographical location

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2003/0134648 A1 (REED et al.) 17 July 2003 (17.07.2003), entire document, especially; para [0036], [0038], [0043], [0045], [0049], [0051], [0052], [0055]-[0058], [0098], [0100], [0115], [0118], [0125], [0151], [0275], [0283], [0368], [0393], [0482], [0656], [0664], [0665], [0706], [0720], [0737], [0738], [0751], [0754], [0798], [0806], [0841], [0918], [0976], [1176], [1256], [1392]	1 - 32
Y	US 2004/0236547 A1 (RAPPAPORT et al.) 25 November 2004 (25.11.2004), entire document, especially; para [0046], [0066], [0086], [0088], [0103], [0106], [0115], [0117], [0118], [0125], [0126], [0131], [0147], [0182], [0192], [0193]	1 - 32

☐ Further documents are listed in the continuation of Box C. ☐

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
12 November 2008 (12.11.2008)	18 NOV 2008
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201	Authorized officer: Lee W. Young PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

Form PCT/ISA/210 (second sheet) (April 2007)

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

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
25 September 2008 (25.09.2008)

PCT

(10) International Publication Number
WO 2008/115992 A2

(51) International Patent Classification:
H04Q 7/38 (2006.01)

(21) International Application Number:
PCT/US2008/057507

(22) International Filing Date: 19 March 2008 (19.03.2008)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
11/688,145 19 March 2007 (19.03.2007) US

(71) Applicant *(for all designated States except US)*: **GOOGLE INC.** [US/US]; 1600 Amphitheatre Parkway, Mountain View, California 94043 (US).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **BALUJA, Shumeet** [US/US]; 18922 Canoe Landing Court, Leesburg, Virginia 20176 (US). **CHU, Michael** [US/US]; 13050 Cumbra Vista Court, Los Altos Hills, California 94022 (US). **MATSUNO, Mayumi** [US/US]; 1127 Green St., San Francisco, California 94109 (US).

(74) Agent: **DRAGSETH, John A.**; Fish & Richardson P.C., P.O. Box 1022, Minneapolis, Minnesota 55440-1022 (US).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

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(54) Title: FLEXIBLE COMMUNICATION SYSTEMS AND METHODS

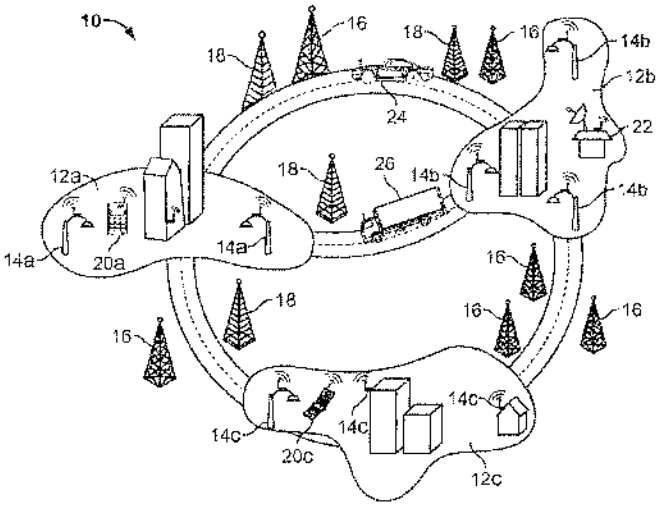

FIG. 1A

(57) Abstract: A method of initiating a telecommunication session for a communication device include submitting to one or more telecommunication carriers a proposal for a telecommunication session, receiving from at least one of the one or more of telecommunication carriers a bid to carry the telecommunications session, and automatically selecting one of the telecommunications carriers from the carriers submitting a bid, and initiating the telecommunication session through the selected telecommunication carrier.

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Flexible Communication Systems and Methods

TECHNICAL FIELD

[0001] This document relates to voice and data communications, and more particularly to devices, systems, and methods for providing various forms of communication in a variety of manners.

BACKGROUND

[0002] Telecommunications are extremely important to businesses and individuals. People need to communicate with others at a distance for a variety of reasons and in a variety of ways. For example, people need to talk to each other, whether for personal reasons or business, and many people are wedded to their telephones—their connections to the world. At other times, people need to see each other, and can use videoconferencing to connect over a distance. People also sometimes need to contact emergency services, such as through 911 calls. Written communication may also occur, such as via e-mail or text messaging. People also need access to information apart from their communications with other people. For example, many people depend on the World Wide Web to access all kinds of important (and less-than-important) information.

[0003] As each new communication technology matures, and as more technologies are developed, users begin to see each technology as simply another application. And they depend less-and-less on the mode in which the communication is carried. For example, voice melds into data, as users desire to send and receive files and other materials during a discussion—or to work on a virtual whiteboard during a meeting. Also, with the ability to digitize voice, telephone calls become simply another form of data—albeit with a relatively high quality of service (QoS) requirement.

[0004] However, users still struggle to unify their communications. For example, a user may have a wired voice telephone connection at home, with the addition of a wired (e.g., DSL or cable) data connection. They may also use a

cellular telephone for voice access, and an additional device such as a personal digital assistant (PDA) for data access. And they may have a different provider for each of these services, even though, to the user, they are just communications applications and not much more.

[0005] Some attempts have been made to simplify communications. For example, applications have been developed by which a telephone works as a cordless device on a landline connection when within range of a base station in the home, but as a wireless cellular telephone when out of range. Generally, however, such a system is limited in the services it may provide and the way in which it can provide them. For example, a user may be restricted to a particular plan or particular provider of telecommunication access. The user may be indifferent to the mode of access, however, as long as the access meets a certain minimal level of quality. The user may instead be more interested in having access to numerous and superior applications, and may desire the freedom to use a variety of communication modes.

SUMMARY

[0006] This document describes devices, systems, and methods for providing telecommunication access and applications to users in a flexible manner. Devices may operate on multiple networks, and may in certain circumstances seek out bids from telecommunication service providers. For example, a device such as a mobile telephone may have the capability to operate over multiple different networks, including a home network when in the home, to transition to a metropolitan network when outside the home but in a higher-density area (urban/suburban), and transition to a more traditional cellular network when outside such a higher density area. The connections may, in appropriate circumstances, be provided by different telecommunications providers, and may involve hand-offs of a particular communication session from one provider to another.

[0007] In addition, to help provide the user with a level of service that best meets the user's needs (whether the need is based on cost, quality of service,

bandwidth requirements, or some other criteria), a device may seek out potential service providers and obtain certain terms of service from them. The device may also select a particular provider to handle a session, and may cause the session to be carried out. Such actions may occur at various times, for example, at the onset of a session or in the middle of a session as a device moves from a high-density area to an area of lower density.

[0008] Such approaches may advantageously provide one or more features. For example, a device may be configured to operate using a least expensive option for communication at all times, and may start auctions with telecommunications providers to connect to the provider bidding with the lowest cost. As one example, when in a home, the device may use a broadband communication method for which the user already pays a fixed monthly rate. When the user leaves the house, they may be transferred to a metropolitan network, which may be part of the same plan as the home plan, with monthly pricing, with use-based pricing, or with free use supported by advertising. When the user exits the metropolitan area, where free or low-rate pricing may not be possible, the system and methods may permit the user to transfer to a pay-for-use network. In addition to cost as a factor in selecting appropriate telecommunications providers, users may opt for alternative auction models based on maximal bandwidth offered, best coverage/reliability, or some combination of options.

[0009] In addition, the user's device may operate as a data device—treating voice and data communications similarly as transmissions of packet data. In this way, the device takes on a greater role for the user—translating the user's needs into data that can be transmitted. Because the user controls the device, the user receives greater flexibility in deciding what applications they need or want. In addition, such generalizing of the communication channel permits more open development of devices and applications to be run on devices, because the transmissions are standardized, and any device that can format communications according to the standard will work. Thus, for example,

such an approach permits more readily for the development of an open-source telephone or other communication device.

[0010] In one implementation described here, a method of initiating a telecommunication session for a communication device is described. The method comprises submitting to a plurality of telecommunication carriers a proposal to commence a telecommunication session, receiving from each of the plurality of telecommunication carriers a bid to carry the telecommunication session, and then selecting one of the telecommunications carriers and initiating the session over the selected telecommunication carrier. The proposal for a telecommunication session may be submitted by a portable communication device, or possibly, a central service that will negotiate with the telecommunication carriers on behalf of the portable device. Also the availability of the plurality of telecommunication carriers to the portable communication device may be determined. In some aspects, the telecommunication session may comprise a voice call. The session may also comprise a non-voice data transmission.

[0011] In some aspects, the automatic selection of one of the telecommunication carriers may comprise evaluation by the device of bid prices and quality indicators. The selection of one of the telecommunication carriers may also comprise selecting a carrier that submits a lowest bid. The method may additionally include submitting to a plurality of telecommunication carriers a proposal for a second telecommunication session, receiving from each of the plurality of telecommunication carriers a bid to carry the second telecommunications session, and automatically selecting one of the telecommunications carriers and initiating the second telecommunication session through the selected telecommunication carrier. The selection of the telecommunication carrier to use can be a user-determined process or can be selected automatically based on a user's preference criteria.

[0012] In addition, the method may include, before submitting or during submission of the proposal for a telecommunication session, determining whether the device can access alternative networks, and initiating a call over a

non-carrier network if the device is within a non-carrier network. The non-carrier network may be an IP-based network, and the device may access the IP-based network through an access point. The access point may include, but is not limited to, an IEEE 802.16-compliant device or an IEEE 802.11-compliant device. The method may further include transferring the device to a second public access point during the telecommunication session. Moreover, the method may include transferring the device to a carrier during the telecommunication session.

[0013] In another implementation, a device for initiating a telecommunication session is disclosed. The device comprises an interface to wirelessly connect the device to a plurality of data communication providers, a processor configured to execute a plurality of applications stored in memory on the device, and a connection module in communication with the processor to obtain carrier pricing information and select a carrier for carrying at least a portion of a telecommunication session using the carrier pricing information. The connection module may obtain the carrier pricing information after receiving a request from a user of the device for the initiation of the telecommunication session. Also, the interface may be configured to perform data communication using any combination of wireless communication standards including GSM, CDMA, TDMA, IEEE 802.11, IEEE 802.16, and Bluetooth. The connection module may also include a signal monitor to determine the relative quality of different service providers around the device. The signal monitor may also be used to determine when a device is moving in or out of a particular area of service. In addition, GPS-like location technology may also be included in the device to provide precise location coordinates when requesting bids from service providers.

[0014] In some aspects, the device may include a voice module in communication with the processor for enabling voice communication on the device. The device may also include a bid confirmer to verify to a telecommunication connection coordinator parameters of a completed telecommunication session.

[0015] In yet another implementation, a computer program product for use in conjunction with a computerized communication device is disclosed. The product may comprise a computer readable storage medium and a computer program mechanism embedded therein with instructions for submitting to a plurality of telecommunication carriers a proposal for a first telecommunication session, receiving from each of the plurality of telecommunication carriers a bid to carry the first telecommunications session, and automatically selecting one of the telecommunications carriers and initiating the first telecommunication session through the selected telecommunication carrier.

[0016] The mechanism may also include instructions for determining the availability of the plurality of telecommunication carriers to the portable communication device. The telecommunication session may comprise a voice call, and the automatic selection of one of the telecommunication carriers may comprise evaluation by the device of bid prices and quality indicators. The computer program mechanism may further comprise instructions for submitting to a plurality of telecommunication carriers a proposal for a second telecommunication session, receiving from each of the plurality of telecommunication carriers a bid to carry the second telecommunications session, and automatically selecting one of the telecommunications carriers and initiating the second telecommunication session through the selected telecommunication carrier.

[0017] In addition, the computer program mechanism may comprise instructions for determining, before submitting the proposal for a first telecommunication session, whether the device can access a non-carrier network, and initiating a call over the non-carrier network if the device is within a non-carrier network. The mechanism may further comprise instructions for transferring the device to a second public access point during the telecommunication session. Moreover, the acts performed by the instructions may be performed as part of transferring the device to a carrier during the telecommunication session.

[0018] In yet another implementation, a method of coordinating telecommunications sessions from a plurality of carriers for a single device is disclosed. The method comprises receiving a first billing notice representing a communication session carrier by a first carrier for the device, and relating to an amount bid by the first carrier for a telecommunication session, receiving a second billing notice representing a communication session carrier by a first carrier for the device, and relating to an amount bid by the second carrier for a telecommunication session, and transmitting a signal indicative of an amount to be deducted from an account associated with the device, which amount corresponds to amounts associated with the first billing notice and the second billing notice. The method may further comprise transmitting signals indicative of amounts to be added to accounts associated with the first and second carriers, which amounts correspond to amounts associated with the first billing notice and the second billing notice, respectively.

[0019] The details of one or more embodiments of the invention are set forth in the accompanying drawings and the description below. Other features, objects, and advantages of the invention will be apparent from the description and drawings, and from the claims.

DESCRIPTION OF DRAWINGS

[0020] Figure 1A is a diagram of a regional telecommunication system.

[0021] Figure 1B is a diagram showing a mobile device communicating over multiple networks.

[0022] Figure 2 is a system diagram showing the components of a telecommunications system.

[0023] Figure 3 is a flow chart showing actions by a communication device in instigating a voice telephone call.

[0024] Figure 4A is a swimlane diagram showing actions surrounding the provision of a data communication, such as a telephone call, from a communication device.

[0025] Figure 4B is a swimlane diagram showing actions surrounding the provision of a data communication, such as a telephone call, from a communication device.

[0026] Figure 5 is a block diagram showing the components of a wireless communication device and a system for coordinating communication session with the device.

[0027] FIG. 6 is a block diagram of computing devices that may be used to implement the systems and methods described in this document.

[0028] Like reference symbols in the various drawings indicate like elements.

DETAILED DESCRIPTION

[0029] Figure 1A is a diagram of a regional telecommunication system 10. The system spans across multiple urban communities, and across the rural areas between and among them. In general, within the system 10, telecommunication services may be provided by different subnets in the larger telecommunications network. For example, in urban areas where population is dense, services may be provided by cellular carriers in addition to alternative data networks such as WiFi or WiMAX and the like. Outside the urban areas, service will be more typically provided by cellular telephone providers. The systems may provide for "hand offs" within and between networks so as to permit constant or near-constant data or voice communications. Also, some or all of the communications may be treated as straight data communications, with voice being encoded and packetized at end user devices so as to be essentially indistinguishable from regular data on the network.

[0030] As shown, system 10 covers three communities that are provided with subnets 12a, 12b, 12c. These subnets 12a, 12b, 12c may include community-wide wireless data networks, such as WiFi, WiMAX, or other similarly configured networks. Within each subnet, there may be a number of wireless access points that connect to the subnet with a wire (e.g., a coaxial cable, optical fiber, etc.) and serve to permit users to access the subnet wirelessly (though

ultimately through a wired connection). In addition, portions of a subnet may also be wired directly to a user.

[0031] The various subnets 12a, 12b, 12c may be public, private, or semi-private networks. For example, a public network may be a wireless network established for a city that may connect to the internet at a single point or multiple points, as is appropriate. The public network may be operated by a public agency such as a city, or may be operated by a private organization in cooperation with a public entity.

[0032] Also, a private network may be similar to the public network, and may be connected locally to the internet, but operated separately from any public organization (e.g., by a private internet service provider (ISP)). Such a network may also be connected to a more broad-based network, such as a regional network or a national network, such as by so-called peering points. For example, the private network may use dedicated communication channels purchased or leased by the private party, and/or may use communication channels for which the private party pays bulk usage fees. For communications between users of the private network, the general internet or other networks would not need to be used. Such an implementation may have the advantage of greater performance and less cost for the private network operator.

[0033] Various components may appear in each of the subnets 12a, 12b, 12c. For example, wireless devices such as personal digital assistant 20a and cellular telephone 20c may serve as communication endpoints. Also, wireless transceivers 14a, 14b, 14c may be placed on buildings or light poles to provide wireless connections for users near the transceivers. For example, transceivers on light poles may serve as simple repeaters that draw electrical power from the light poles or, for example, from solar collectors and related batteries. Other transceivers may be switches or routers that are wireless and wired, and thereby route data to and from the subnet's main connections to the internet or other central network(s). Cellular networks also have a similar topology whereby base stations provide a geographic footprint and connect into a larger network infrastructure.

[0034] The subnets 12a, 12b, 12c, as shown, presume that certain areas, such as urban areas, will be particularly amenable to full-coverage wireless data networks, while other rural areas will not. However, various areas may be joined in a variety of ways such that subnets may overlap and extend across multiple areas. The subnets may also be broken up as necessary, such that certain wireless access points are routed through a particular main line, while others are routed through another. In addition, the connections of the access points may be varied, such as automatically, to help balance the loads in a network or group of networks. For example, if data traffic is particularly heavy in one subnet, some of its access points may be alternatively connected via another subnet so as to ensure high quality service to each of subnets 12a, 12b, 12c.

[0035] Subnet 12b additionally includes a node 22 that may communicate with devices outside the subnet. For example, node 22 may be a satellite communication structure. In such an implementation, the satellite communication channel may be part of a private network, so that communications in the subnet are routed through node 22 for access to the rest of the private network or to other networks, including the internet.

[0036] Between the subnets 12a, 12b, 12c, are areas not covered by one of the subnets 12a, 12b, 12c, such as a rural area. Such areas may nonetheless be served by a cellular provider. Such service may be voice-based and/or data-based. As shown in the figure, there are two cellular communication providers, as shown by cell towers 16, 18 marked in different forms (e.g., one with crossed support girders and one with only horizontal girders). In some inter-subnet areas, both communication providers provide service, while in others, only one communication provider has service (as indicated by the presence of only one form of tower in the area). For example, in the middle of the figure, only the provider corresponding to tower 18 provides service. As such, users in this area will have to use that provider if they want to make a connection.

[0037] Likewise, along the top of the figure, both providers have multiple towers. Thus, for example, car 24 has two possible avenues available for telecommunications. Of course, where the providers have proprietary closed

networks, the user may not be able to access the information through anything other than the provider network associated with a user's device or device identification. In such a situation, the closed network provider would lose out on the opportunity to carry the user's session. In any event, the operation of the cellular networks may follow any of a number of well-known modes of operation for connecting and billing calls.

[0038] In operation, in one example, a truck 26 travels from one subnet, 12b, to another, 12a. The area between these subnets is sparsely populated, and served only by a carrier associated with tower 18. If the user in the truck 26 starts a call inside subnet 12b, the call will be initiated by the subnet 12b and carried by the main line for the subnet 12b. As the user travels through the subnet 12b and moves out of the coverage of one access point, the handling of the call may be transferred to another access point. The hand-off may occur using known methods and methods described more completely below. Where the call is treated simply as a series of data transmissions containing digitized voice signals, each transmission may be treated independently, and the network simply needs to ensure that a particular group or packet of material is not sent through the network multiple times unnecessarily.

[0039] A different form of hand off can occur when the user exits subnet 12b. In this situation, the user may enter a network such as a cellular telephone network, operated by a different entity than the entity that operates subnet 12b, and/or a network that uses a different standard for communication than does the subnet 12b. For example, subnet 12b may use an IEEE-compliant wireless communication protocol, such as one of the variants of 802.11 or 802.16, while tower 18 may be part of a different network such as a GSM, UTMS, or CDMA network, among others. The hand-off between such networks may involve passing of identification information for billing or other usage tracking purposes. When the truck 26 reaches subnet 12a, a hand-off is performed from tower 18 to an access point in subnet 12a. Subnet 12a and subnet 12b may be operated by a single organization and be part of a single private network, or may alternatively

be operated by various organizations and/or be parts of different networks, either connected through private networks or public networks such as the internet.

[0040] In another example, automobile 24 is traveling from subnet 12b to subnet 12a along a path served by multiple cellular carriers. The driver may have started in his or her home making a VoIP call with his or her home network, such as a WiFi or WiMAX network. The driver's device may be a multi-modal communication device capable of using multiple transmission protocols and transitioning transparently from one mode to another. For example, a call that is started in a home may occur using Unlicensed Mobile Access (UMA) technology, using, for example, Bluetooth or IEEE 802.11 standards.

[0041] When the driver leaves his or her home, the call may be picked up by subnet 12b, which itself may use UMA technology, but may be part of the same or a different subnet from what the user employs in his or her home. Where the phone call is digitized and treated like other data for transmission (perhaps with some preferential treatment to ensure QoS), each network may simply handle the packets as they are sent, and need not be concerned about what the packets are for, and what they will be when they are reassembled at the other end of the communication.

[0042] Once the driver in car 24 leaves subnet 12b, the job of handling data from the phone may shift to towers 16 or 18. Here, multiple cellular telephone carriers are available to handle the call, and such service may be provided based on an auction system. Specifically, and as described in more detail below, the user's device may identify itself to such carriers when it is within their range or in a certain area (e.g., as determined by GPS in the device and using data about coverage areas downloaded to the device). The device may also identify the communication session it is currently having, such as by providing identification of the device at the other end of the communication.

[0043] With this information, each carrier corresponding to towers 16 and 18, respectively, may offer a price for which it is willing to carry the communication session. Where the session is a telephone call, the bid may be in terms of a price per minute or other time period. Where the session is focused

on data transmission, the bids may be in terms of bits or bytes of information, or a similar measure. Of course, voice transmission may, in appropriate circumstances, be treated as data transmission. A device may also obtain other information and make a decision on which carrier to accept based in whole or in part on such information. This information may include the expected quality of service, the broadest coverage (e.g., if the communication session is expected to take a long time and the user is moving), or the best trade-off as selected in a predetermined manner (such as a linear combination of two factors). A user may select a combination, such as by being provided with a graphical icon of a slider (or triangle or square) set out for two features (or three or four), and may position the slider between the two features in a manner showing a relative preference for one feature over the other.

[0044] The price bid by a carrier may be based in part on any fees the carrier may have to pay to another carrier. For example, when the user is calling another person who is on a landline, the wireless carrier may have to route the call through another carrier and pay that carrier a fee. In contrast, when the other person is on a network operated by the same company that operates subnet 12b (and the carrier has an agreement with that company), the carrier may be able to bid less for the communication session. Thus, a caller may be able to get a better deal based on who the "callee" has for a carrier—if that carrier also serves the area in which the caller is located. The quality of the session may likely be better in such an event also, because the call could stay within a single carrier's network.

[0045] The price may also be based on current network capacity or other factors relevant to the carrier. For example, if a carrier is approaching saturation for a particular part of a network, the carrier may produce very high bids or no bids at all so as to ensure better service on the network. The bid may also include various capabilities that the carrier has; for instance, one carrier may only be able to carry a voice call or a limited amount of data, while another carrier may be able to support a richer communication session such as a teleconference. In such a situation, the carrier capabilities may be made known

in the bidding process so that the user or the user's device may make a more informed selection of carriers.

[0046] The carrier may also set a time limit for the bid, such that a user may send or receive data during the period set by the time limit, but then has to re-bid after that. For example, where a device initiates a bid during a low usage period, the carrier may make its bid "good" for one hour, after which the device will be set to re-bid. In this manner, carriers can better manage their loads and can also avoid providing low cost service during high demand periods. The time frame for bidding may be set dynamically by the carriers and made part of the bid, or may be set by prior agreement, e.g., with bids to expire at the top of each hour. Alternatively, bids may only apply to the existing request/session which would allow for an even more dynamic pricing.

[0047] Such sessions may be established by various appropriate approaches, including Session Initiation Protocol (SIP) for IP-based sessions and traditional approaches commonly associated with cellular based schemes. Such communication may employ a series of messages by which a caller device seeks to establish a session, and communicates that intent through intermediary devices such as servers, to a callee device. The callee device may likewise respond using messages, so that a session may be initiated and maintained. These messages, though sent independently, are related as part of a transaction in a transaction protocol.

[0048] For example, user devices may be treated as agents, and may rely upon various network components to establish and carry on a communication session. In one example, an agent may initiate a call with the help of a proxy server. With such an approach, an intermediate device—a proxy server—may receive a message from a device and forward it across the network toward its intended target for the initiating user. For example, a device that wishes to initiate a session may send an INVITE message to a proxy server that includes a uniform resource identifier (URI) of a device with which communication is sought. The proxy server, after winning a bid for the session, may determine the location of the callee and forward the message. The callee device may respond, and the

response may be forwarded by the proxy server to the caller. Such communications may occur, for example, using real-time transfer protocol (RTP) or other appropriate mechanisms. The servers may provide additional services, such as authentication and accounting.

[0049] In another example, an agent may initiate a call with the help of a redirect server. In such an example, a caller device may send an INVITE request to the redirect server, and the redirect server may contact a location server to determine the path to a callee. When this information is obtained, the redirect server may return the information to the caller device, the caller device may acknowledge that it has received the information, and it may send the request where the redirect server has indicated. This redirected location might indicate the callee device, or it might indicate another server that will forward the request. The callee may then respond and the caller may acknowledge the response.

[0050] A registrar server may track the location of various devices and provide such location information to other components in the network so that data intended for a particular device can be routed to the network and the location at which the device currently resides can be determined. The location of a device may be dynamically registered as the device moves, and may use location technologies such as AGPS, TDOA, cell-id and other known mechanisms, in concert with directory services such as finger, rwhois, and LDAP and other known mechanisms. In addition, device capabilities and handshaking to produce connections that match capabilities may be executed, for example, using SDP.

[0051] These descriptions of connections and communication mechanisms are intended to be exemplary only; other mechanisms and protocols may also be used as appropriate. For example, the H.323 standard or another standard may be used for communications, either as part of a SIP approach or otherwise. Also, sessions or portions of sessions may be organized and/or carried through the SS7 protocol, for call set-up, routing, control, management, and tear down. For the SIP example, the use of SIP is consistent with other features described below, which are end-to-end oriented, and place responsibility (and thus flexibility) on the end user devices.

[0052] Figure 1B is a diagram showing a mobile device 32 communicating over multiple networks 42, 44, 46, 48. In general, the figure shows how the device 32 may adjust its mode of communication depending on its location, so that its user may obtain the most effective communication at the lowest cost. The device 32 may initiate and end a communication session on a single network. In some implementations, the device 32 may initiate a communication session on one network, or using one access point for a network, and then may shift during the session to other access points or other networks.

[0053] As shown, device 32 may be any appropriate type of mobile device such as a cellular telephone, a smartphone, or a personal digital assistant. The device is capable of transmitting and receiving radio frequency (RF) signals in various modes or by various protocols. For example, the device 32 may communicate with a WiFi or similar switch 34 in a user's home. The switch 34 may in turn be connected, such as by standard broadband connection, to private network 46. The private network may be, for example, a network owned and operated by a single company or group of companies, for which access is restricted to users who have been qualified with the company or group of companies. Access to the network may be controlled, for example by user authentication (e.g., user name and password), or broader public access to the network may be provided.

[0054] Device 32 may also communicate with private network 46 via router 36 which may be a WiMAX-enabled network device that is part of a metropolitan-area network. Device 32 may be multi-modal, in that it may hand off from switch 34 to router 36 as the user moves, switching from 802.11 modes to 802.16 modes. The ultimate wired connection for either access point, however, will be to network 46. In addition, multiple access points may be provided in either the WiFi or the WiMax networks, and the device 32 may move from one access point to the next without changing modes also.

[0055] In addition, the device 32 may communicate with one or more cellular networks 42, 44, such as through access points 38, 40 at cellular towers. Cellular network 42 may be operated by a different carrier than is cellular network

44. The cellular networks 42,44 may also operate using different standards, or protocols. As shown by arrows 50a, 50b, the device 32 may enter exchange messages with access points 38, 40, such as when the device 32 enters the coverage zones of access points 38, 40, or when the device 32 senses that it is leaving the coverage zone of router 36, such as using a signal strength sensor.

[0056] The device 32 may, for example, transmit control signals at the frequency of one or more control channels for carriers known to be or suspected to be in a particular area. The frequencies may simply be a superset of all available frequencies and protocols. In addition, the device may be programmed to only attempt contact with networks known to be in a certain area (e.g., by comparing GPS location data obtained by the device 32 to a known map of carrier coverage). Arrows 50a, 50b represent requests from the device 32 and corresponding responses to the device in negotiating a connection.

[0057] Networks 42, 44 and network 46 may all be connected to public network 48, such as the internet and/or the public switched telephone network (PSTN). In this manner, a communication session may be maintained with another party connected to the network even as the device 32 moves geographically from one coverage area to the next. As shown, the hand offs as the device 32 moves may simply be from one access point to another on a single network, or may be from network to network

[0058] Figure 2 is a system diagram showing the components of a telecommunications system 40. The components may include or be similar to many of the components shown in Figures 1A and 1B. In general, the system 40 centers around two networks—the internet 42 and the public switched telephone network (PSTN) 44. In general, data communications may occur over the internet 42, while voice communications may occur over the PSTN 44. However, the PSTN 44 is also equipped to carry digital communications and could thus carry various forms of data, while the internet 42 may carry digitized voice communications, such as using various VoIP protocols or other mechanisms.

[0059] Various networks that provide a variety of services are shown connected to the internet 42 and PSTN 44. For example, a traditional wired

provider 54, such as a competitive local exchange carrier (CLEC) may provide voice and data services through a switched network. The devices on the network may include traditional telephones 54a, 54b, 54d, and computer 54c. The computer 54c may communicate through traditional dial-up service or through DSL or other similar broadband services.

[0060] Information provider 46 may in turn provide access to internet 42. Information provider 46 may be, for example, a cable television company providing internet access through cable modems. As shown, computer 62 is connected to information provider 46 by a broadband cable connection and includes a microphone and speaker for carrying out telephone calls, such as by using VoIP. Likewise, computer 64 includes a monitor-mounted video camera for carrying video conferencing in a similar manner. Information provider 46 may also include other types of internet service providers, such as those who connect to users through wired provider 54 or other networks.

[0061] Traditional wireless network 50 may comprise a typical legacy cellular telephone transmission system having a number of towers 18, which may connect together via a commonly managed switching system. As shown, wireless network 50 is capable only of carrying voice communications between subscribers to the network, or with other users through PSTN 44.

[0062] Wireless network 52 is a more modern cellular network and includes both a voice channel and a distinct data channel (in addition to the basic control channel). Data transmissions are routed to, or received from, internet 42, while voice transmissions are routed to, or received from, PSTN 44.

[0063] Wireless network 48 is nominally an all-data network. Specifically, all data is packetized at clients and treated as data by the network. Prioritization may be provided for certain forms of continuous data, such as voice communications, however, to help ensure quality of service (QoS). Likewise, other data, such as HTTP-related data may also be packetized in a similar manner and routed similarly by the network, with assembly at the recipient or other appropriate point. In this way, wireless network 48 may provide full data services to its subscribers or other users.

[0064] In the figure, geographically separated portions of the network, in the form of transceiver 60, are shown separate from the wireless network 48. For example, the wireless network may have nodes in various population centers that may then be centrally connected to each other, such as by various broadband connections schemes, including fiber optic, dedicated fiber optic, microwave, and satellite connections. In this manner, device 48a and device 48b may conduct a data communication session, such as a VoIP telephone call in a single wireless network or LAN. Also, one or more (e.g., for a teleconference) of the devices may communicate with another device on wireless network 48 through transceiver 60, such as device 48c or device 48d.

[0065] Each communication through wireless network 48 may be a non-billed session so that users of the devices do not pay for the sessions, aside from what they would pay for a (monthly) subscription fee if wireless network 48 requires subscriptions. The communications may also be wholly free if wireless network 48 does not require any fees. Alternatively, wireless network 48 may be a hybrid network, in that various levels of service may be offered for various payment plans. For example, for higher fees, greater bandwidth or greater services may be provided. For example, at a lowest level, simple text messaging may be provided, while at a higher level, videoconferencing may be provided. Also, service may be made free or at a reduced rate where a user is willing to view promotional material while using wireless network 48.

[0066] Where communications occur in part outside wireless network 48, wireless network 48 may make connections with other networks in a standard fashion. For example, if a communication is a VoIP telephone call with computer 62, wireless network 48 may simply send the relevant packets to Internet 42, which will route them appropriately.

[0067] Likewise, wireless network 48 may connect directly to PSTN 44 if a call is with a user of wired provider 54. In such a situation, wireless network 48 may transform the communication into one applicable to the PSTN 44, and may also follow other appropriate protocols for the PSTN 44, including billing and other protocols. For example, where the call is over a long distance, wireless

provider 48 may have to pay connection and carrying fees to other providers that assist in making the connection. Wireless network 48 may reduce such fees, for example, by using identifying information about the out-of-network user to determine where the user is located, and then may use a private network or the internet 42 to route the information as close to that point as possible before passing it to PSTN 44. Wireless network 48 may also use other routing logic so as to minimize fees that it may have to pay to other providers.

[0068] Though termed a "wireless" network, wireless network 48 may have various wired components. For example, users may have wired, in addition to wireless, connections to the main network 48, and various subnets in the network 48 may be connected by wire.

[0069] As described more fully above and below, devices 48a-d may communicate within wireless network 48 as pure data devices such as using a VoIP protocol. Devices 48a-d may also travel outside wireless network 48 and gain access to other networks and providers, such as through an auction system. For example, device 48a may be carried to a network connected to information provider 46 and may connect itself as a data transmission device to communicate with the remainder of the networks. Device 48a may use a public VoIP provider such as Skype or Vonage to reach non-VoIP devices for voice communications. Likewise, device 48a may move out of the area of wireless network 48, and into the area of wireless network 52. Device 48a may then continue a communication or form a communication session through wireless network 52, as described more fully below.

[0070] Figure 3 is a flow chart showing actions by a communication device in instigating a voice telephone call. This flowchart is generally for outgoing communications from a device. In general, a multi-modal device may be programmed to seek various modes of completing a communication session. As shown in the flowchart, the device starts with lowest cost options, and moves to higher cost options if the lower costs options are either unavailable or become unavailable.

[0071] At act 70, the device receives a call command, such as the entry by a user of a telephone number or similar destination identifier (e.g., a Gmail account identifier) and activation of a "send" or "call" command. The call command may also simply be part of a communication, such as a packet or group of packets of information. The device may initially check for availability of a first network (act 72), and if that network is available, the device may place the call or otherwise send data through the first network (act 74). The device may also have previously verified the availability of the first network, such as by periodically checking all available networks in the area. The first network may be, for example, a LAN in the user's home that connects through a wired broadband connection. Such a connection may provide high QoS at a negligible cost for the user.

[0072] If the first network is not available, such as when the user is outside their home, the device may then check for the availability of a second network (act 76), such as wireless network 48. If that network is available, the device may then complete the call or otherwise transmit the information (act 78). Other known networks may also be checked or otherwise determined to be available or unavailable.

[0073] The networks for which a device checks may be programmed into the device, such as when the device is purchased or through a training program for the device. For example, the second network may be programmed into the device by a vendor, whereas the first network may be "sniffed" out by the device when the user sets up their account, such as by operating the device in a particular mode in the user's home or office, where the user expects to most use the device, and knows that a wireless data network is available. The networks may also be "found" by the device in other manners, such as by dynamically updating the networks to use based on available networks currently around the device.

[0074] If no such data network is available to the device, it may then seek out out-of-network networks for which the user may have to pay a per-use fee (or may be shown promotional material in order to obtain access). As described in

more detail with respect to Figures 4A and 4B, the device may ping any carriers within range (act 80) to indicate that it is in need of service. Before needing to ping the carriers, the device may have already determined which carriers are within range. The pinging process may involve transmitting identifying information and other information about a communication session, such as the type of data, amount of data, and expected bandwidth needed. Other information may also be provided.

[0075] Each carrier may then respond with a bid to carry the communication session. As noted above, the bid may follow a set form, such as a price for a predetermined and set time period (e.g., 20 minutes or to the top of the hour). Such restricted bidding may make comparison of the bids easier to complete, as the comparison may simply be price vs. price. The bidding may also be more open-ended, with each carrier having multiple variables (such as time or data volume, price, and level of service) that can be varied. The device may then evaluate any competing bids (act 82) and select the preferred bid for continuing the communication session. The device may take into account non-bid information such as the likely quality of service from a particular carrier or the bandwidth available from the carrier.

[0076] A user may set the rules for evaluating bids, such as by setting particular rules or by identifying a profile that is associated with particular rules. For example, a "power user" profile may choose the best connection available regardless of cost. As another example, a "student" profile may select lower quality or slower connections, and may also place a cap on offered prices. If all bids exceed such a cap, then the device may warn the user that he or she will not be able to continue a communication session if the user continues moving out-of-network. Profiles may allow a person to assign their account multiple different rules with a single selection or a limited number of selections.

[0077] Once a bid has been selected, the device may instigate the call or other communication session (act 84). This may involve starting a handoff process from one mode to another mode, such as by simultaneously communicating in both modes and removing redundant data during the overlap,

such as through standard soft or softer handover techniques. The handover may also be a hard handover, if necessary. Another implementation may have a central platform that helps transition the service between two different networks. As described more fully below, the call may then continue at the negotiated rates until the user returns to an in-network area for a sufficiently long time so that the communication session may be handed back. The negotiation and handoff may be transparent to a user of the device. They may also be semi-transparent, so that the device provides some indication (such as audio or a visual display) that a communication session is moving out-of-network, and potentially starting to run a fee.

[0078] Figure 4A is a swimlane diagram showing actions surrounding the provision of a data communication session, such as a telephone call, from a communication device. The chart shows in more detail the roles played by various players in the process. Here, the players are the client device, two carriers (e.g., carriers associated with towers 16 and 18 in Figure 1), and a coordinator. The flowchart generally shows the instigation of a communication session, in the form of a telephone call.

[0079] As explained with respect to Figure 3, a user's device will initially place a call over the service with which the device is primarily registered (act 86) if the device can do so. If the call is in-network for the entirety of the call, the coordinator may track and record use data (act 88). For example, the coordinator may track the start and end time of the call, along with the destination identifier (e.g., telephone number, gMail account, etc.). The information tracked may be the same as information currently tracked for traditional telephone calls using protocols such as SIP and SS7, and may also include different or additional information.

[0080] For example, where the communication is primarily data-based, the information may include a total file size of the communication session. The tracking of information may occur directly by the coordinator, such as by observing information passed onto the coordinator's network, where the coordinator operates the primary network for the user. The observation may also

be indirect, such as by having the device track information about the communication session and then report it to the coordinator at the end of the session. Such an approach may be appropriate for an all-data device, as the coordinator may not be able to determine by simple observation when a communication session begins and ends—particularly if a device is simultaneously conducting two communication sessions (e.g., file transfer and telephone call). In addition, tracking may occur via third-parties which report information to a carrier associated with the caller and/or callee, such as by agreed-upon protocols.

[0081] If the primary network is not available, i.e., if the user is out-of-network, the device may then ping the available carriers as an invitation to bid (act 90). Carrier 1 may then take appropriate actions upon receiving the invitation, such as by verifying its current excess capacity, and may then compute a bid (act 92). Carrier 2 may take the same or similar actions (act 94). The device may then receive each of the bids and evaluate them using a predetermined rule or ruleset, and may select one of the carriers (act 96). The device may then instigate the call (act 98), such as by sending the information in a mode (e.g., appropriate frequency and appropriate protocol) for the selected bidder, and the selected bidder may carry the communication session, such as by routing the data and also making a connection to the destination device (act 100). Connecting the session may include traditional telephone switching through the PSTN network and/or providing information to a third party to carry out all or some of such switching.

[0082] When the call is over, the client device may end the call (act 102), such as when a user presses an end button on a telephone. Such an action may then cause the selected carrier to generate billing information for the call or other communication session (act 104). The generation of billing information may include interaction with the client device. For example, the device may track a parameter relevant to the billing, such as the length of a telephone call or the total number of bits or bytes transmitted and received, and may report such parameters to the selected carrier. The client device could even compute a price

for the communication session, and simply report that price to the carrier. The carrier itself may also track information about the call, such as for billing purposes.

[0083] The selected carrier may then submit billing information to the coordinator (act 106) which may receive that information (act 108) and match it to an account for the client. The submission of billing information may occur as soon as the session is over, or may occur periodically (e.g., once each day or once each month). The billing information may include the date and time of the communication session, along with its length or the amount of data transferred, and the cost of the session.

[0084] In appropriate circumstances, and to "close the loop" on the transaction, the coordinator may reconcile (act 110) the transaction with the client, such as by locating the device when it is back in-network, so as to check that the client has matching information. In this manner, the system can ensure that inappropriate billing information is not submitted. If there is a match, the coordinator may post the billing information (act 114).

[0085] At an appropriate time, such as immediately after receiving billing information or monthly, the coordinator may institute a payment transaction (act 116) by which funds are obtained from the client (act 120) and funds are provided to the carrier (act 118). The transfers may occur simultaneously or one may occur before the other. The coordinator may also retain certain funds to cover transaction costs of carrying out the coordination of the communication session and its payment. In addition, various payment terms may be negotiated with carriers, e.g., payments may be reduced slightly if carriers are guaranteed payment and are paid immediately, before the users pay (e.g., the coordinator covers the "float").

[0086] In this example, the coordinator is a system or service with which the user of the client device has subscribed. The coordinator generally gathers all billing information for the client, combines it, handles the collection of payments from the client, and provides corresponding payments to various carriers. Payment may occur in traditional manners, such as by electronic

banking, by credit card number, or by check. Payment may also occur via other electronic methods, such as micropayment methods in which the user maintains an electronically-accessible fund balance, and the system automatically accesses funds held by the user.

[0087] The coordinator may simply be a service or system that serves to organize transactions with carriers and take on the burden of locating users, and conduct billing and collecting from users. The coordinator may also be the same organization that provides a primary network for the user, such as a network using UMA technology. In addition, the coordinator may make and sell wireless devices for users, or may define a specification to which devices can be manufactured, including under license. Thus, the coordinator may provide a user with wired and wireless telecommunication access in particular areas, such as major urban and suburban areas, as a straight data service. Pricing for such a service may be provided for a low monthly rate, and may allow the user to perform any data-based activity with their device, such as e-mail, messaging, and voice communication.

[0088] The coordinator may allow the user to extend access out-of-network also. Data transmission may occur in particular out-of-network areas, and voice communication may also occur, either as a packetized data transfer or via typical cellular telephone communications (e.g., where the client device is capable from switching from one mode to another).

[0089] Figure 4B is a swimlane diagram showing actions surrounding the provision of a data communication, such as a telephone call, from a communication device. This diagram is similar to that in Figure 4A, except that the coordinator takes on a larger role in the bidding process. As with the prior example, the client device places a call with its primary network if it is in-network (act 130), and the coordinator may track and record use data for the communication session (act 132). If the device is out-of-network, the coordinator may receive a request by other means, such as through another network that agrees to forward such requests (act 134). Such a request may also be made when a device is moving from in-network to out-of-network, but before the device

leaves the network. Such a determination may be made, for example, using signal strength data and the trend of signal strength, or by using location and vector data to determine that the device is leaving the network. The location determination may be made by the coordinator, by the device, or by a third party, and when it is made by the device, information about the network coverage may be periodically provided to the device so that it has an up-to-date network map.

[0090] When the coordinator has received the request (act 136), it may carry out an auction process by pinging various carriers which it knows have coverage for the area into which the client device is moving (act 138). The carriers may in turn respond with bids (acts 142, 142) and the coordinator may evaluate the bids (act 144). The evaluation may take into consideration a rule or ruleset specific to the client device or the user of the client device.

[0091] The coordinator may then identify the selected carrier to the client device (act 146) so that the client device may make a connection with that carrier and instigate the call (act 148). In this manner, the coordinator may serve as a redirect server. In return, the selected carrier may complete the call, as described above, until it is finished (acts 150, 152). Upon call completion (or other completion of a communication session), the selected carrier may generate billing information (act 154) and submit that information to the coordinator (act 158). As described above, the coordinator may then reconcile the transaction (act 160) by checking back with the client device, which may verify that the communication session occurred and that the submitted information about the session (e.g., length and/or cost) is correct (act 162). The coordinator may then post the billing information to accounts associated with the carrier and with the client device (act 164). Finally, at an appropriate time, the coordinator may pay the carrier (acts 166, 168) and may charge the user of the client device (acts 166, 170). The collection and payment may be simultaneous or separated in time.

[0092] Figure 5 is a block diagram showing the components of a wireless communication device 240 and a system for coordinating communication sessions with the device 240. The device 240 is designed as a modular and open communication device. All data transmitted by the device 240 is converted

to the appropriate interface based on the current transmission mode of the device. Various applications may be arranged above the communication layer, so that their data is transformed to the common format before being transmitted. For example, for a voice call, an A/D converter may convert the voice signal to a digital representation, and another layer may convert that digital signal to a packetized signal that may be transmitted wirelessly, such as by an IEEE 802.11 standard.

[0093] The device 240 centers around a programmable processor 264, that may receive input from a user through, for example, a keypad 258 and input processor 262 or other input mechanism such as a voice recognition module. The processor 264 may deliver output through display driver 260 to a display 256, such as a standard TFT color flat graphical LCD display, OLED display, or other output mechanism such as an audio speaker.

[0094] The processor 264 may also draw on and store various forms of data. As one example, the device 240 may be provided with application storage 266, where data for an operating system and applications that run on top of the operating system may be stored. For example, a user of the device 240 may load a number of communication and/or productivity programs on the device 240. The operating system may be flexible and open-source so as to permit more ready development of applications. In addition, data storage 268 may be provided to maintain data needed by the operating system and the applications. For example, data storage 268 may contain contacts information for an organizer application, web data for an internet browser application, and other similar data. Storage 266, 268 may be in any appropriate form, including ROM, RAM, Flash memory, disk-based storage, or a combination of these or other storage mechanisms as described more fully below. The application data and other data may be stored in a common storage or split across multiple storage structures.

[0095] An internal interface 270 provides a basis on which various modules, which may be in the form of executable or other applications, can run. The internal interface 270 may be a part of an operating system to run on the device, and may include various components such as a kernel, video controller,

memory manager, networking, file management, etc. Examples of such parts include Windows Mobile, Linux, Java, Symbian, and simple real-time operating systems for phones.

[0096] A voice module 272 may be one of the applications operating on device 240. The voice module 272 may provide for telephony functionality in a generally known manner. The module 272, for example, may provide for interaction with an organizer application so as to retrieve telephone identification information, and may then generate appropriate signals for creating a telephone call. The module 272 may also instigate telephone calls based on a click-to-call link in a displayed document, such as a web page.

[0097] The voice application may be implemented as a traditional voice service, whether analog or digital, or a VoIP service. In addition, device 240 may have a voice module 272 equipped for both modes of providing voice service, such as for use when the device 240 is in-network and is out-of-network. The voice application may be operated wholly in software, and may also in appropriate circumstances use hardware in addition to that shown, such as A/D and D/A converters.

[0098] A browser module 274 may permit for the display of information sent and received over the internet using Hypertext Transfer Protocol (HTTP) or other similar technologies. The browser module 274 may provide for basic and advanced World Wide Web activity, as is well known in the art. For example, the browser may display web pages authored in HTML, WML, xHTML, iMode, and other formats. Certain features in web documents, such as click-to-call links, may cause browser module 274 to interact with voice module 272.

[0099] A connection module 276 may also be provided, and may be at the same logical level as the other modules, or at a lower level of the system. The connection module 276 may generally be programmed and configured to manage external communications for the device, including by the processes discussed above and below. Among other things, the connection module 276 may have a signal monitor 276a which may identify the available signals in a particular area at particular frequencies or bands of frequencies, and the potential

quality of those signals, such as for determine which carrier to select for a communication session. The connection module 276 may also be configured to determine the approximate strength of those signals. For example, the signal monitor 276a that may be part of connection module 276 may identify the presence of a WiFi network in the vicinity, along with a WiMax and GSM network. The signal monitor 276a may also identify the provider of the particular signal, such as through a predetermined identification protocol.

[0100] Handoff manager 276c may work with signal monitor 276a to help coordinate a handoff from one access point, or cell, to another, from one network to another, and/or from one mode to another. For example, as signal monitor 276a senses signal strength and senses that the signal strength of its currently locked-in access point is weakening, while signal strength from other access points is strong, the device 240 may begin a handoff process or may send information to one or more of the access points so that they begin a handoff process.

[0101] The handoff manager 276c may be configured to switch between modes of communication for the device, and to do so in a soft manner. For example, the handoff manager 276c may simultaneously receive data over both channels and may select only one channel to pass to, for example, the voice module 272. When the strength of a second mode is high enough as measured by the signal monitor 276a, the device 240 may switch over entirely to that mode. Where soft handoffs are not possible, such as where the two modes use different networks that cannot simultaneously carry the same signal, a hard hand off may be used. In addition, buffering of data may also be used to make a hard handoff more transparent.

[0102] In particular circumstances, connection module 276 may include a bid evaluator 276b and a bid confirmer 276c. The bid evaluator 276b may receive bids submitted by potential carriers, and may be programmed with rules or other logic for selecting a carrier based at least in part on the bids. The bid confirmer 276c may receive a carrier selection from the bid evaluator 276b and may carry out the necessary steps to ensure that a communication session is

established with that carrier. The bid confirmer 276c may also help to confirm the existence of a communication session after-the-fact, such as when a coordinator attempts to verify the session.

[0103] Another module may be a custom module 278, which may include, for example, third-party programs loaded by a user onto device 240. The device 240 may be configured in such a way so as to have an API with which various programs or applications may communicate. As a result, many different programs or applications may be made available for the device 240, so as to provide a user of device 240 with maximum flexibility at a reasonable cost. For example, just as applications may be written easily to operate with a web browser, applications may also be written easily to work with device 240. These applications could include unique or custom messaging systems.

[0104] One or more of the modules or other components of device 240 may be loaded onto device 240, such as through an on-line download. Also, one or more modules or other components may be loaded on a removable media that is coupled to the device, such as a Subscriber Identity Module (SIM) card, or by other mechanism, such as a removable flash module. Such downloaded programs or applications or removable devices may be provided with appropriate security mechanisms to help ensure that inappropriate users of a device cannot easily use the device, or change the identity of a device.

[0105] As thus described, device 240 may provide its user with a number of advantages. For example, device 240 may be used as a universal communicator because all communications are treated similarly as simple packetized data communications. Also, device 240 may be provided essentially as an open-source device for which various developers can provide customized solutions. For example, if there is demand for a particular type of communication device, a company may provide it and need only worry about making the packets of data that come out of the device conform to a common standard. Particular operations of the device may be irrelevant to the network itself, as the system may follow standard layered abstraction techniques.

[0106] In addition, users may segment their use of device 240 more efficiently—using pay-for-service only when necessary, and matching the price and level of service to their particular needs. For example, if a user does not need to use a device far away from their home very often, they need not pay for such use. Finally, the device 240 may allow more ready convergence of functions in a single device. Specifically, by treating all communications as data communications, device 240 may contain a single common communications engine, with a number of applications layered on top of that engine.

[0107] Device 240 may communicate with various networks via external interface 252, which may be a multi-modal wireless interface. Separately, a telecommunications coordinator 244 is shown, and may communicate with a wireless transmission system 250 and other similar systems via internet 246 and PSTN 258. The wireless transmission system 250 may comprise a private network, such as one owned and controlled by the owner of coordinator 244. The system 250 may also be a traditional cellular telephone system or a more advanced system such as a 3G system.

[0108] The coordinator 244 may include a switching system 244b so that communication sessions within the network served by the coordinator 244 may be properly routed. The switching system 244b may also be distributed out through the network, and managed by the coordinator 244. The coordinator 244 may also contain a connection management module 244a that helps provide connections for users seeking to have a communication session, as described more fully above, and also helps to track and permit billing for such sessions.

[0109] The connection management module 244a may communicate with the switching system 244b to help make appropriate connections or produce appropriate routing of messages. In addition, the connection management module 244a may draw upon a contact index 244c, which contains connection information for subscribers of coordinator 244. such information may include identification information such as user names, telephone numbers, and IP addresses. In addition, connection management module 244a may store information about the costs of communication sessions in a billing database

244d. This information may be used, as described above to update account balances and carry out payments for the carrying of communication sessions.

[0110] Figure 6 is a block diagram of computing devices 800, 850 that may be used to implement the systems and methods described in this document, as either a client or as a server or plurality of servers. Computing device 800 is intended to represent various forms of digital computers, such as laptops, desktops, workstations, personal digital assistants, servers, blade servers, mainframes, and other appropriate computers. Computing device 850 is intended to represent various forms of mobile devices, such as personal digital assistants, cellular telephones, smartphones, and other similar computing devices. The components shown here, their connections and relationships, and their functions, are meant to be exemplary only, and are not meant to limit implementations of the inventions described and/or claimed in this document.

[0111] Computing device 800 includes a processor 802, memory 804, a storage device 806, a high-speed interface 808 connecting to memory 804 and high-speed expansion ports 810, and a low speed interface 812 connecting to low speed bus 814 and storage device 806. Each of the components 802, 804, 806, 808, 810, and 812, are interconnected using various busses, and may be mounted on a common motherboard or in other manners as appropriate. The processor 802 can process instructions for execution within the computing device 800, including instructions stored in the memory 804 or on the storage device 806 to display graphical information for a GUI on an external input/output device, such as display 816 coupled to high speed interface 808. In other implementations, multiple processors and/or multiple buses may be used, as appropriate, along with multiple memories and types of memory. Also, multiple computing devices 800 may be connected, with each device providing portions of the necessary operations (e.g., as a server bank, a group of blade servers, or a multi-processor system).

[0112] The memory 804 stores information within the computing device 800. In one implementation, the memory 804 is a computer-readable medium.

In one implementation, the memory 804 is a volatile memory unit or units. In another implementation, the memory 804 is a non-volatile memory unit or units.

[0113] The storage device 806 is capable of providing mass storage for the computing device 800. In one implementation, the storage device 806 is a computer-readable medium. In various different implementations, the storage device 806 may be a floppy disk device, a hard disk device, an optical disk device, or a tape device, a flash memory or other similar solid state memory device, or an array of devices, including devices in a storage area network or other configurations. In one implementation, a computer program product is tangibly embodied in an information carrier. The computer program product contains instructions that, when executed, perform one or more methods, such as those described above. The information carrier is a computer- or machine-readable medium, such as the memory 804, the storage device 806, memory on processor 802, or a propagated signal.

[0114] The high speed controller 808 manages bandwidth-intensive operations for the computing device 800, while the low speed controller 812 manages lower bandwidth-intensive operations. Such allocation of duties is exemplary only. In one implementation, the high-speed controller 808 is coupled to memory 804, display 816 (e.g., through a graphics processor or accelerator), and to high-speed expansion ports 810, which may accept various expansion cards (not shown). In the implementation, low-speed controller 812 is coupled to storage device 806 and low-speed expansion port 814. The low-speed expansion port, which may include various communication ports (e.g., USB, Bluetooth, Ethernet, wireless Ethernet) may be coupled to one or more input/output devices, such as a keyboard, a pointing device, a scanner, or a networking device such as a switch or router, e.g., through a network adapter.

[0115] The computing device 800 may be implemented in a number of different forms, as shown in the figure. For example, it may be implemented as a standard server 820, or multiple times in a group of such servers. It may also be implemented as part of a rack server system 824. In addition, it may be

implemented in a personal computer such as a laptop computer 822. Alternatively, components from computing device 800 may be combined with other components in a mobile device (not shown), such as device 850. Each of such devices may contain one or more of computing device 800, 850, and an entire system may be made up of multiple computing devices 800, 850 communicating with each other.

[0116] Computing device 850 includes a processor 852, memory 864, an input/output device such as a display 854, a communication interface 866, and a transceiver 868, among other components. The device 850 may also be provided with a storage device, such as a microdrive or other device, to provide additional storage. Each of the components 850, 852, 864, 854, 866, and 868, are interconnected using various buses, and several of the components may be mounted on a common motherboard or in other manners as appropriate.

[0117] The processor 852 can process instructions for execution within the computing device 850, including instructions stored in the memory 864. The processor may also include separate analog and digital processors. The processor may provide, for example, for coordination of the other components of the device 850, such as control of user interfaces, applications run by device 850, and wireless communication by device 850.

[0118] Processor 852 may communicate with a user through control interface 858 and display interface 856 coupled to a display 854. The display 854 may be, for example, a TFT LCD display or an OLED display, or other appropriate display technology. The display interface 856 may comprise appropriate circuitry for driving the display 854 to present graphical and other information to a user. The control interface 858 may receive commands from a user and convert them for submission to the processor 852. In addition, an external interface 862 may be provide in communication with processor 852, so as to enable near area communication of device 850 with other devices. External interface 862 may provide, for example, for wired communication (e.g., via a docking procedure) or for wireless communication (e.g., via Bluetooth or other such technologies).

[0119] The memory 864 stores information within the computing device 850. In one implementation, the memory 864 is a computer-readable medium. In one implementation, the memory 864 is a volatile memory unit or units. In another implementation, the memory 864 is a non-volatile memory unit or units. Expansion memory 874 may also be provided and connected to device 850 through expansion interface 872, which may include, for example, a SIMM card interface. Such expansion memory 874 may provide extra storage space for device 850, or may also store applications or other information for device 850. Specifically, expansion memory 874 may include instructions to carry out or supplement the processes described above, and may include secure information also. Thus, for example, expansion memory 874 may be provide as a security module for device 850, and may be programmed with instructions that permit secure use of device 850. In addition, secure applications may be provided via the SIMM cards, along with additional information, such as placing identifying information on the SIMM card in a non-hackable manner.

[0120] The memory may include for example, flash memory and/or MRAM memory, as discussed below. In one implementation, a computer program product is tangibly embodied in an information carrier. The computer program product contains instructions that, when executed, perform one or more methods, such as those described above. The information carrier is a computer- or machine-readable medium, such as the memory 864, expansion memory 874, memory on processor 852, or a propagated signal.

[0121] Device 850 may communicate wirelessly through communication interface 866, which may include digital signal processing circuitry where necessary. Communication interface 866 may provide for communications under various modes or protocols, such as GSM voice calls, SMS, EMS, or MMS messaging, CDMA, TDMA, PDC, WCDMA, CDMA2000, or GPRS, among others. Such communication may occur, for example, through radio-frequency transceiver 868. In addition, short-range communication may occur, such as using a Bluetooth, WiFi, or other such transceiver (not shown). In addition, GPS

receiver module 870 may provide additional wireless data to device 850, which may be used as appropriate by applications running on device 850.

[0122] Device 850 may also communication audibly using audio codec 860, which may receive spoken information from a user and convert it to usable digital information. Audio codex 860 may likewise generate audible sound for a user, such as through a speaker, e.g., in a handset of device 850. Such sound may include sound from voice telephone calls, may include recorded sound (e.g., voice messages, music files, etc.) and may also include sound generated by applications operating on device 850.

[0123] The computing device 850 may be implemented in a number of different forms, as shown in the figure. For example, it may be implemented as a cellular telephone 880. It may also be implemented as part of a smartphone 882, personal digital assistant, or other similar mobile device.

[0124] Where appropriate, the systems and the functional operations described in this specification can be implemented in digital electronic circuitry, or in computer software, firmware, or hardware, including the structural means disclosed in this specification and structural equivalents thereof, or in combinations of them. The techniques can be implemented as one or more computer program products, i.e., one or more computer programs tangibly embodied in an information carrier, e.g., in a machine readable storage device or in a propagated signal, for execution by, or to control the operation of, data processing apparatus, e.g., a programmable processor, a computer, or multiple computers. A computer program (also known as a program, software, software application, or code) can be written in any form of programming language, including compiled or interpreted languages, and it can be deployed in any form, including as a stand alone program or as a module, component, subroutine, or other unit suitable for use in a computing environment. A computer program does not necessarily correspond to a file. A program can be stored in a portion of a file that holds other programs or data, in a single file dedicated to the program in question, or in multiple coordinated files (e.g., files that store one or

more modules, sub programs, or portions of code). A computer program can be deployed to be executed on one computer or on multiple computers at one site or distributed across multiple sites and interconnected by a communication network.

[0125] The processes and logic flows described in this specification can be performed by one or more programmable processors executing one or more computer programs to perform the described functions by operating on input data and generating output. The processes and logic flows can also be performed by, and apparatus can be implemented as, special purpose logic circuitry, e.g., an FPGA (field programmable gate array) or an ASIC (application specific integrated circuit).

[0126] Processors suitable for the execution of a computer program include, by way of example, both general and special purpose microprocessors, and any one or more processors of any kind of digital computer. Generally, the processor will receive instructions and data from a read only memory or a random access memory or both. The essential elements of a computer are a processor for executing instructions and one or more memory devices for storing instructions and data. Generally, a computer will also include, or be operatively coupled to receive data from or transfer data to, or both, one or more mass storage devices for storing data, e.g., magnetic, magneto optical disks, or optical disks. Information carriers suitable for embodying computer program instructions and data include all forms of non volatile memory, including by way of example semiconductor memory devices, e.g., EPROM, EEPROM, and flash memory devices; magnetic disks, e.g., internal hard disks or removable disks; magneto optical disks; and CD ROM and DVD-ROM disks. The processor and the memory can be supplemented by, or incorporated in, special purpose logic circuitry.

[0127] To provide for interaction with a user, aspects of the described techniques can be implemented on a computer having a display device, e.g., a CRT (cathode ray tube) or LCD (liquid crystal display) monitor, for displaying information to the user and a keyboard and a pointing device, e.g., a mouse or a trackball, by which the user can provide input to the computer. Other kinds of

devices can be used to provide for interaction with a user as well; for example, feedback provided to the user can be any form of sensory feedback, e.g., visual feedback, auditory feedback, or tactile feedback; and input from the user can be received in any form, including acoustic, speech, or tactile input.

[0128] The techniques can be implemented in a computing system that includes a back-end component, e.g., as a data server, or that includes a middleware component, e.g., an application server, or that includes a front-end component, e.g., a client computer having a graphical user interface or a Web browser through which a user can interact with an implementation, or any combination of such back-end, middleware, or front-end components. The components of the system can be interconnected by any form or medium of digital data communication, e.g., a communication network. Examples of communication networks include a local area network ("LAN") and a wide area network ("WAN"), e.g., the Internet.

[0129] A number of embodiments have been described. Nevertheless, it will be understood that various modifications may be made without departing from the spirit and scope of the described embodiments. Accordingly, other embodiments are within the scope of the following claims.

WHAT IS CLAIMED IS:

1. A method of initiating a telecommunication session for a communication device, comprising:

(a) submitting to one or more telecommunication carriers a proposal for a telecommunication session;

(b) receiving from at least one of the one or more of telecommunication carriers a bid to carry the telecommunications session; and

(c) automatically selecting one of the telecommunications carriers from the carriers submitting a bid, and initiating the telecommunication session through the selected telecommunication carrier.

2. The method of claim 1, wherein the proposal for a telecommunication session is submitted by a portable communication device.

3. The method of claim 2, further comprising determining the availability of the one or more of telecommunication carriers to the portable communication device.

4. The method of claim 1, wherein the selection process is manual.

5. The method of claim 1, wherein the telecommunication session comprises a voice call.

6. The method of claim 1, wherein the telecommunication session comprises a non-voice data transmission.

7. The method of claim 1, wherein the automatic selection of one of the telecommunication carriers comprises evaluation by the device of bid prices and quality indicators.

8. The method of claim 1, wherein the automatic selection of one of the telecommunication carriers comprises selecting a carrier that submits a lowest bid.

9. The method of claim 1, further comprising:

(a) submitting to one or more telecommunication carriers a proposal for a second telecommunication session;

(b) receiving from at least one of the one or more of telecommunication carriers a bid to carry the second telecommunications session; and

(c) automatically selecting one of the telecommunications carriers from the carriers submitting a bid, and initiating the second telecommunication through the selected telecommunication carrier.

10. The method of claim 9, further comprising, before submitting the proposal for a first telecommunication session, determining whether the device can access a non-carrier network, and initiating a call over the non-carrier network if the device is within a non-carrier network.

11. The method of claim 9, wherein the non-carrier network is an IP-based network.

12. The method of claim 11, wherein the device accesses the IP-based network through a public access point.

13. The method of claim 12, wherein the public access point includes an IEEE 802.16-compliant device.

14. The method of claim 12, wherein the public access point includes an IEEE 802.11-compliant device.

15. The method of claim 12, further comprising transferring the device to a second public access point during the telecommunication session.

16. The method of claim 9, further comprising transferring the device to a carrier during the telecommunication session.

17. The method of claim 16, wherein acts (a), (b), and (c) are performed as part of transferring the device to a carrier during the telecommunication session.

18. A device for initiating a telecommunication session, comprising:

an interface to wirelessly connect the device to a plurality of data communication providers;

a processor configured to execute a plurality of applications stored in memory on the device; and

a connection module in communication with the processor to obtain carrier pricing information and select a carrier for carrying at least a portion of a telecommunication session using the carrier pricing information.

19. The device of claim 18, wherein the connection module obtains the carrier pricing information after receiving a request from a user of the device for an initiation of the telecommunication session.

20. The device of claim 18, wherein the interface is configured to perform data communication using three or more formats selected from the group consisting of GSM, CDMA, TDMA, IEEE 802.11, IEEE 802.16, and Bluetooth.

21. The device of claim 18, wherein the connection module includes a signal monitor to determine the identity of available carriers in a region around the device.

22. The device of claim 18, further comprising a voice module in communication with the processor for enabling voice communication on the device.

23. The device of claim 18, further comprising a bid confirmer to verify to a telecommunication connection coordinator parameters of a completed telecommunication session.

24. A computer program product for use in conjunction with a computerized communication device, the computer program product comprising a computer readable storage medium and a computer program mechanism embedded therein, the computer program mechanism comprising instructions for:

(a) submitting to one or more telecommunication carriers a proposal for a first telecommunication session;

(b) receiving from at least one of the one or more of telecommunication carriers a bid to carry the first telecommunications session; and

(c) automatically selecting one of the telecommunications carriers from the carriers submitting a bid, and initiating the telecommunication session through the selected telecommunication carrier

25. The computer program product of claim 24, wherein the computer program mechanism further comprises instructions for determining the availability of the one or more telecommunication carriers to the portable communication device.

26. The computer program product of claim 24, wherein the telecommunication session comprises a voice call.

27. The computer program product of claim 24, wherein the automatic selection of one of the telecommunication carriers comprises evaluation by the device of bid prices and quality indicators.

28. The computer program product of claim 24, wherein the computer program mechanism further comprises instructions for:

submitting to one or more telecommunication carriers a proposal for a second telecommunication session;

receiving from at least one of the plurality of telecommunication carriers a bid to carry the second telecommunications session; and

automatically selecting one of the telecommunications carriers from the carriers submitting a bid, and initiating the second telecommunication session through the selected telecommunication carrier.

29. The computer program product of claim 28, wherein the computer program mechanism further comprises instructions for determining, before submitting the proposal for a first telecommunication session, whether the device can access a non-carrier network, and initiating a call over the non-carrier network if the device is within a non-carrier network.

30. The computer program product of claim 28, wherein the computer program mechanism further comprises instructions for transferring the device to a second public access point during the telecommunication session.

31. The computer program product of claim 24, wherein acts (a), (b), and (c) are performed as part of transferring the device to a carrier during the telecommunication session.

32. A method of completing a telecommunication connection, comprising:

receiving a signal indicating the presence of an incoming telecommunication request from a carrier directed to a telecommunication device;

converting a first identifier of the telecommunication device in the signal to a second identifier of the telecommunication device;

polling a plurality of telecommunication carriers to determine if the telecommunication device is accessible by the carriers; and

causing the completion of the telecommunication connection through a telecommunication carrier that has access to the telecommunication device.

33. The method of claim 32, wherein the first identifier of the telecommunication device is a telephone number and the second identifier of the telecommunication device is an electronic mail address.

34. The method of claim 32, wherein the act of causing the completion of the telecommunication connection comprises connecting a call from the carrier through an IP network to the telecommunication device.

35. The method of claim 32, wherein the act of causing the completion of the telecommunication connection comprises transmitting a signal to redirect the carrier to second carrier.

36. The method of claim 32, wherein the act of causing the completion of the telecommunication connection comprises connecting a call from the carrier through an IP network to the telecommunication device if the device is determined to be accessible from the IP network, and otherwise transmitting a signal to redirect the carrier to a second carrier.

37. A method of coordinating telecommunications sessions from a plurality of carriers for a single device, comprising:

receiving a first billing notice representing a communication session carried by a first carrier for the device, and relating to an amount bid by the first carrier for a telecommunication session;

receiving a second billing notice representing a communication session carried by a first carrier for the device, and relating to an amount bid by the second carrier for a telecommunication session; and

transmitting a signal indicative of an amount to be deducted from an account associated with the device, which amount corresponds to amounts associated with the first billing notice and the second billing notice.

38. The method of claim 37, further comprising transmitting signals indicative of amounts to be added to accounts associated with the first and second

carriers, which amounts correspond to amounts associated with the first billing notice and the second billing notice, respectively.

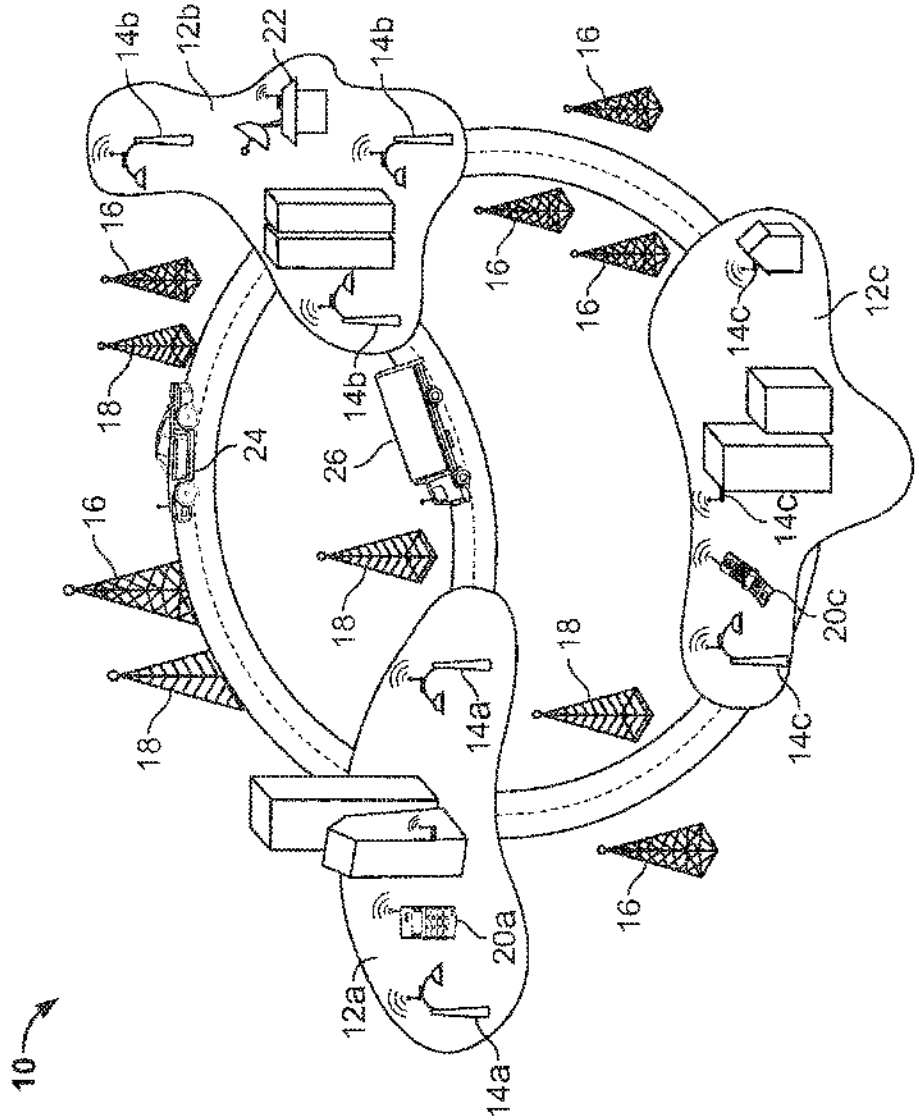

FIG. 1A

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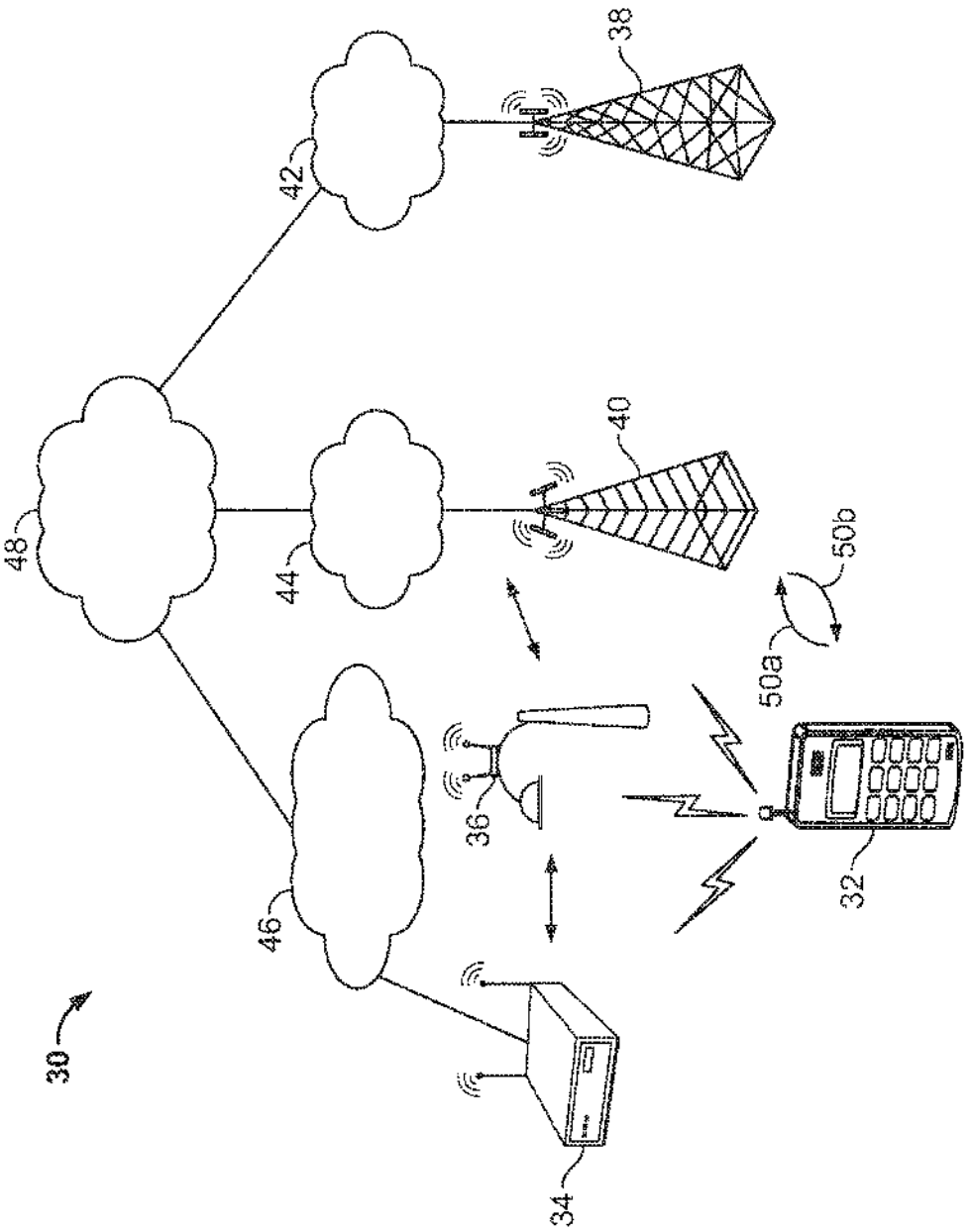

FIG. 1B

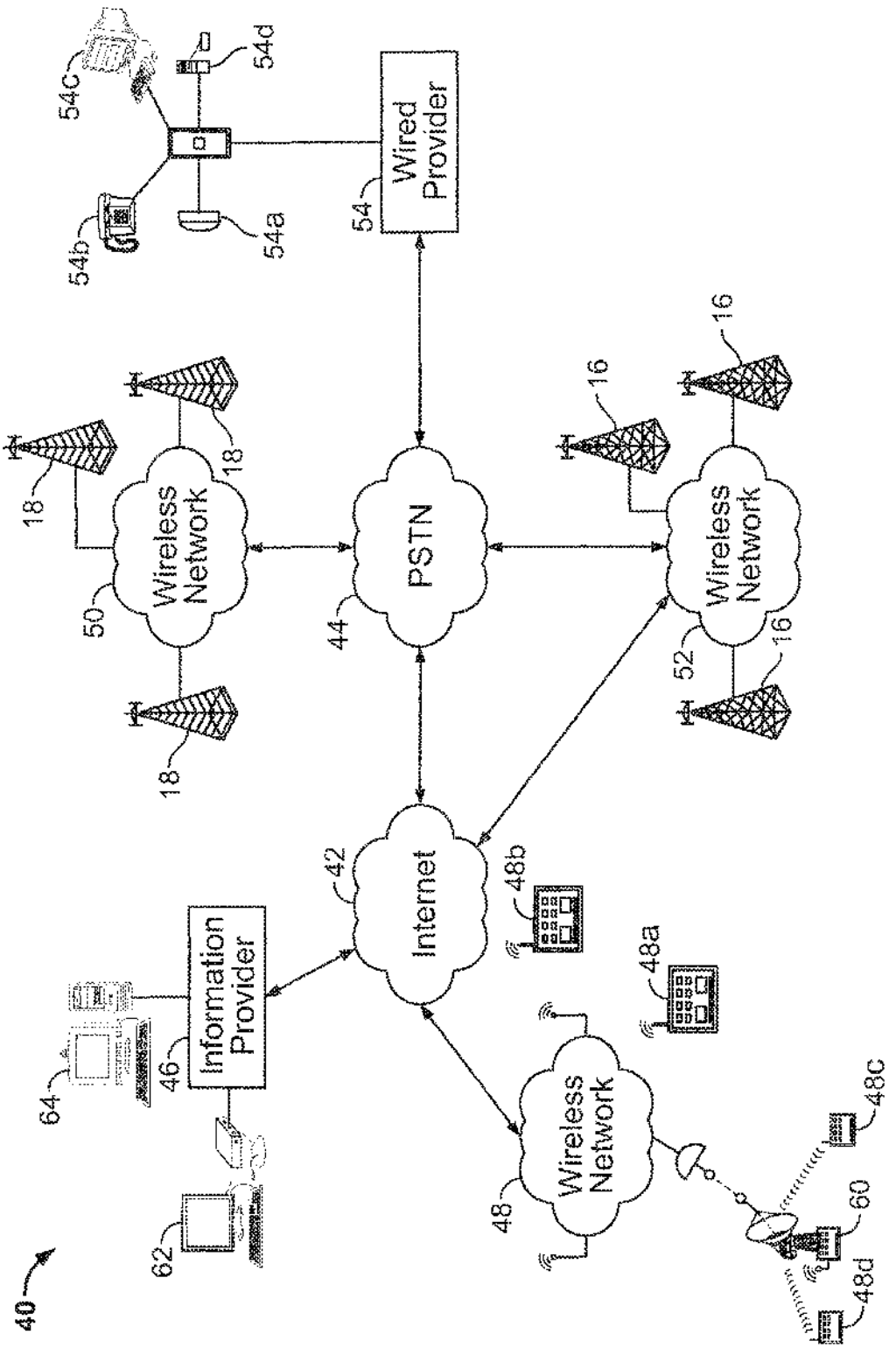

FIG. 2

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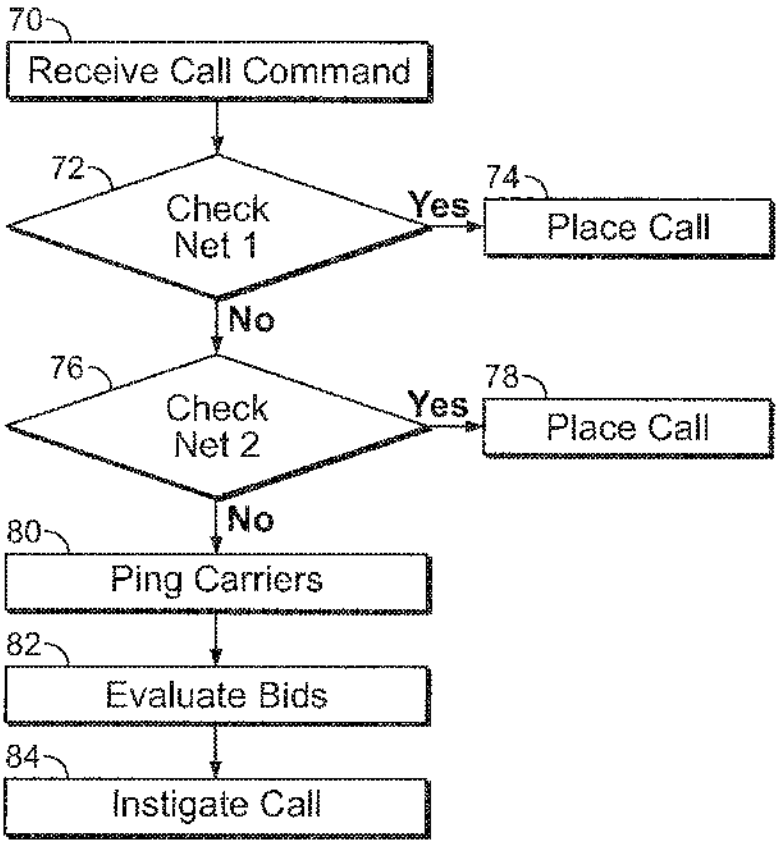

70
Receive Call Command
72
Check Net 1
Yes
74
Place Call
No
76
Check Net 2
Yes
78
Place Call
No
80
Ping Carriers
82
Evaluate Bids
84
Instigate Call

FIG. 3

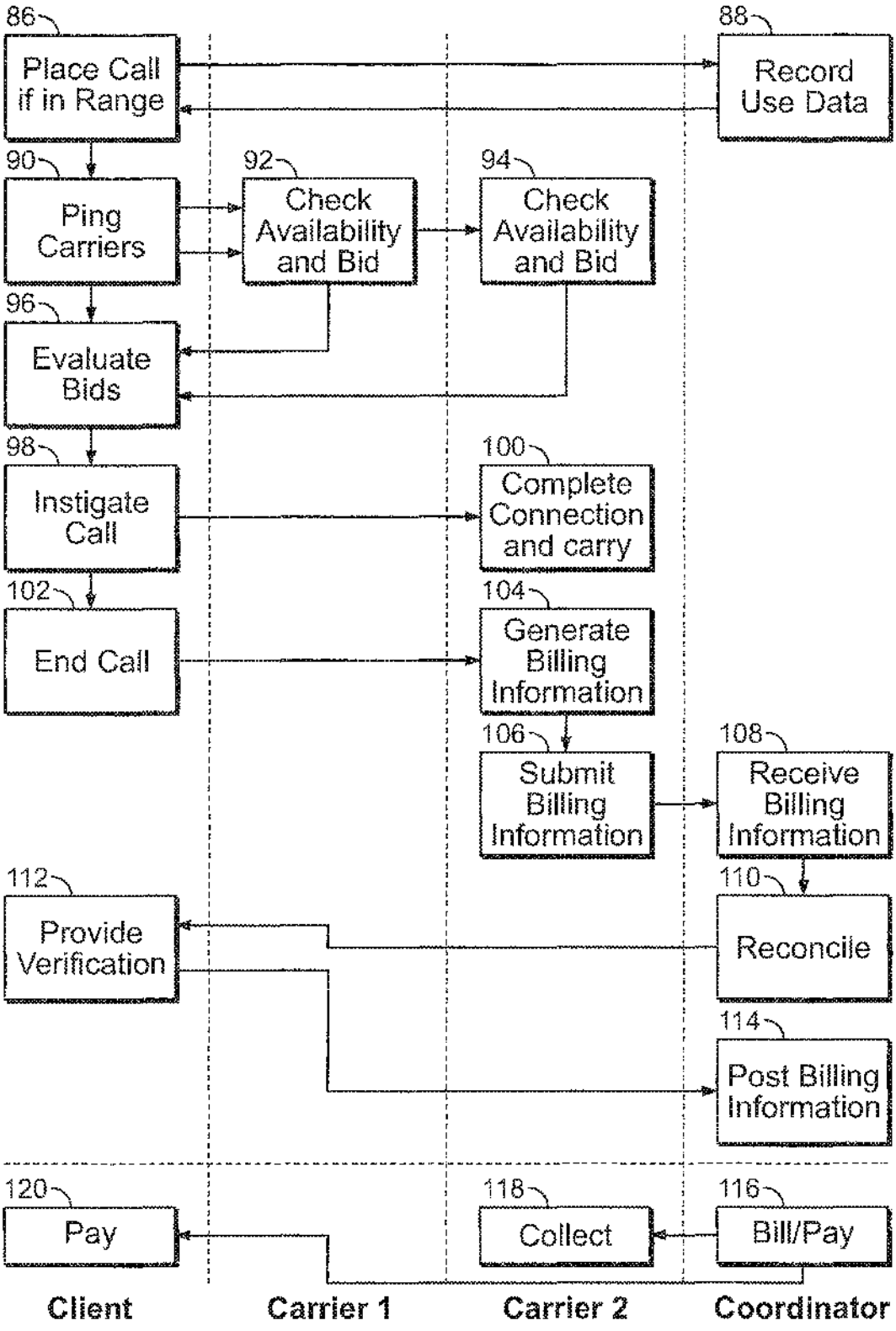
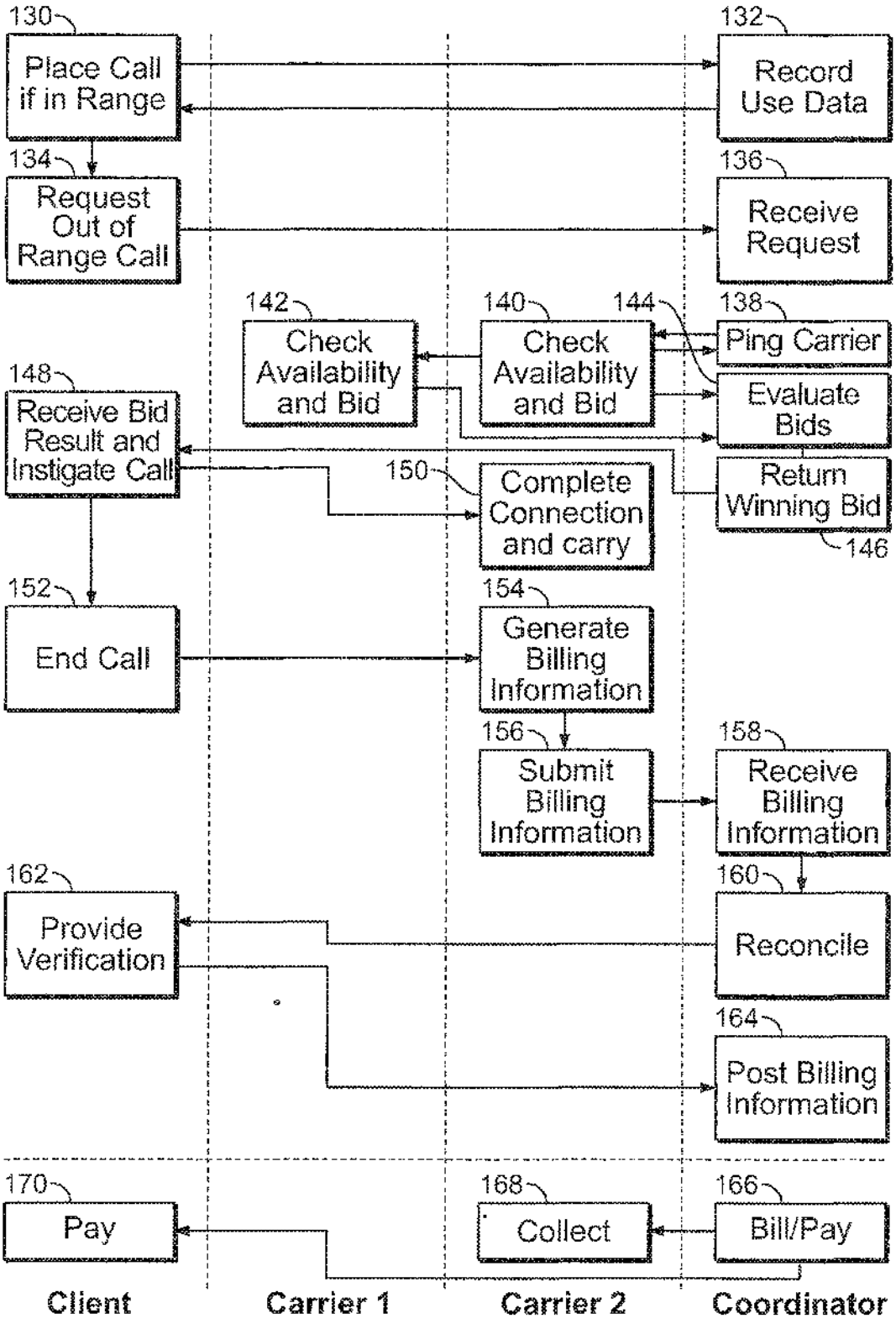

86
Place Call if in Range
88
Record Use Data
90
Ping Carriers
92
Check Availability and Bid
94
Check Availability and Bid
96
Evaluate Bids
98
Instigate Call
100
Complete Connection and carry
102
End Call
104
Generate Billing Information
106
Submit Billing Information
108
Receive Billing Information
110
Reconcile
112
Provide Verification
114
Post Billing Information
120
Pay
118
Collect
116
Bill/Pay
Client
Carrier 1
Carrier 2
Coordinator

FIG. 4A


130
Place Call if in Range
132
Record Use Data
134
Request Out of Range Call
136
Receive Request
142
Check Availability and Bid
140
Check Availability and Bid
144
138
Ping Carrier
148
Receive Bid Result and Instigate Call
Evaluate Bids
150
Complete Connection and carry
Return Winning Bid
146
152
End Call
154
Generate Billing Information
156
Submit Billing Information
158
Receive Billing Information
162
Provide Verification
160
Reconcile
164
Post Billing Information
170
Pay
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Collect
166
Bill/Pay
Client
Carrier 1
Carrier 2
Coordinator

FIG. 4B

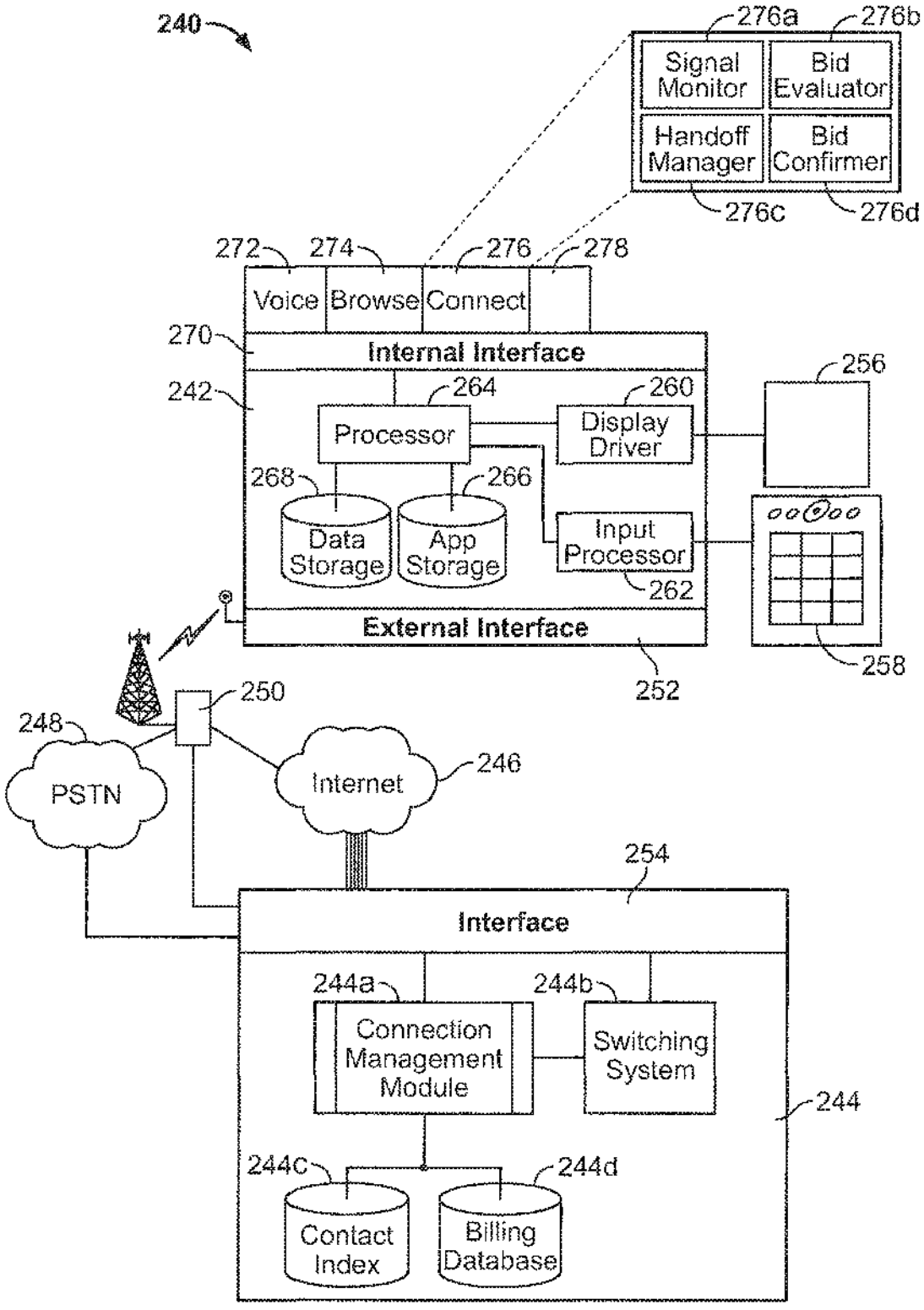
240
276a
276b
Signal Monitor
Bid Evaluator
Handoff Manager
Bid Confirmer
276c
276d
272
274
276
278
Voice
Browse
Connect
270
Internal Interface
242
264
260
Processor
Display Driver
256
268
266
Data Storage
App Storage
Input Processor
262
External Interface
252
258
250
248
PSTN
Internet
246
254
Interface
244a
244b
Connection Management Module
Switching System
244
244c
244d
Contact Index
Billing Database

FIG. 5

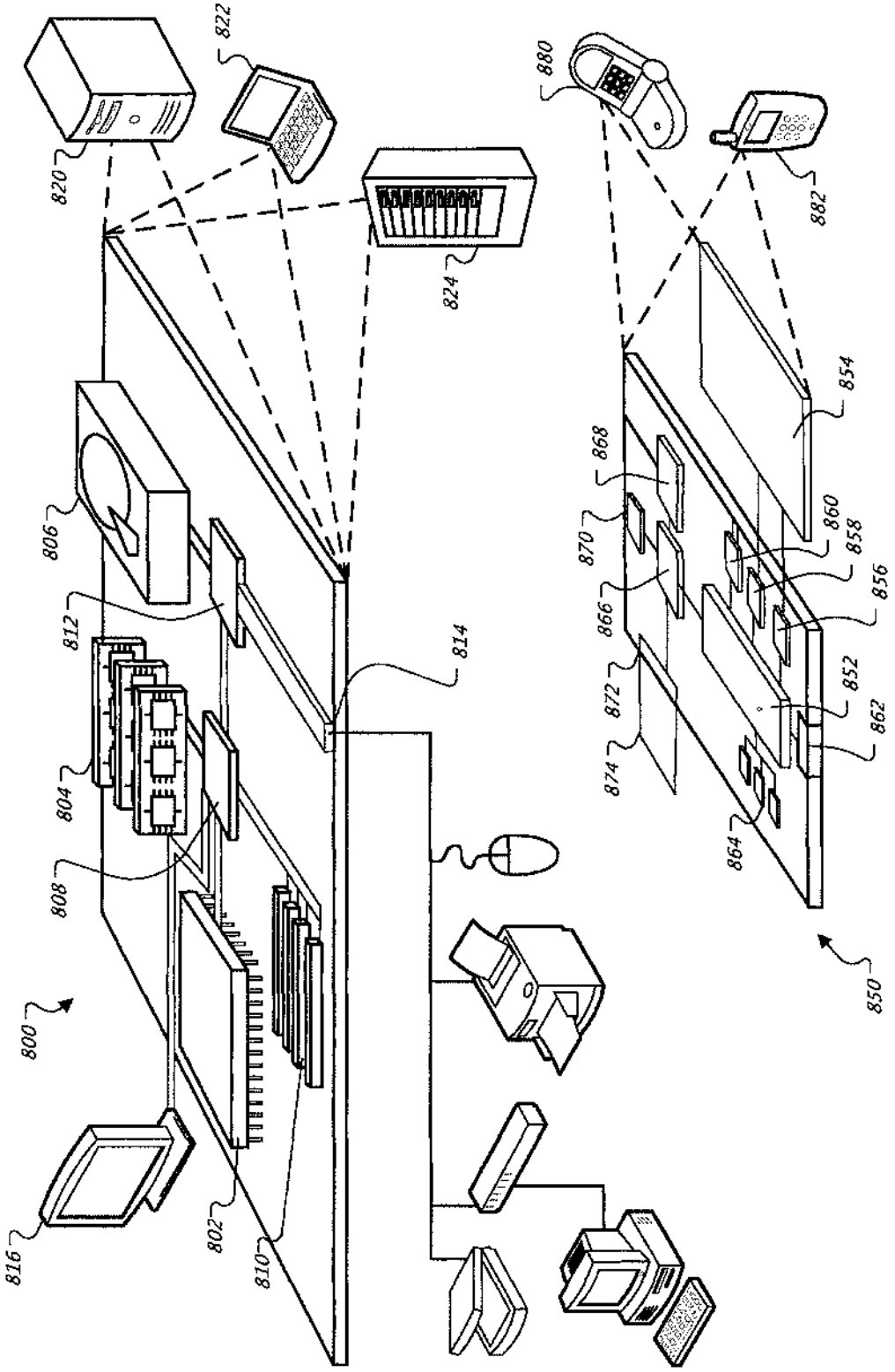
820
822
824
880
882
806
812
814
804
808
800
816
802
810
854
868
870
860
858
856
866
872
852
862
874
864
850

FIG. 6

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(54) Title: METHOD AND TELECOMMUNICATIONS INFRASTRUCTURE ENABLING LOCALIZED TIME CONTROLLED ACCESS FOR A DEVICE

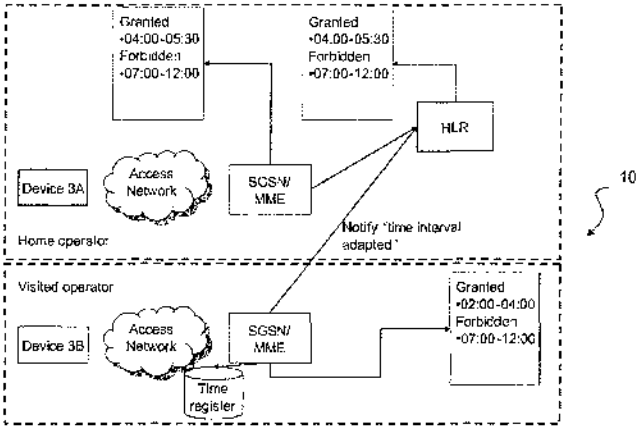

FIG. 2

(57) Abstract: An infrastructure and method is disclosed for controlling wireless access to a telecommunications infrastructure for a device. A first access grant time interval applicable for granting access for the device to the telecommunications infrastructure is stored in a device register system. The first access grant time interval is applied when the device requests access to the telecommunications infrastructure via a first network node of the telecommunications infrastructure. However, a second access grant time interval is applied in a second network node of the telecommunications infrastructure when the device requests access via the second network node. The second access grant time interval is applicable for granting access for the device to the telecommunications infrastructure and is different from the first access grant time interval.

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Method and telecommunications infrastructure enabling localized time controlled access for a device.

FIELD OF THE INVENTION

The invention relates to the field of telecommunications. More specifically, the invention relates to the field of controlling access for a device to a telecommunications infrastructure.

BACKGROUND OF THE INVENTION

Telecommunications networks that provide wireless access (e.g. GSM, UMTS, WiMax, LTE, WLAN) have developed tremendously over the past years. In such networks, voice and data services can be provided to communication devices having a high mobility, i.e. the communication devices are not bound to a particular location and are freely movable through the area covered by the network or the networks of roaming partner operators. A gateway node of the telecommunications network enables connection to a further network, for example a network based on IP, such as the internet.

The availability of such a telecommunications network connected to the further network has resulted in demands for further services, including services that relate to so-called machine-to-machine (M2M) communications, also referred to as machine-type communications (MTC). M2M is currently being standardized in 3GPP (see e.g. TS 22.368). MTC applications typically involve hundreds, thousands or millions of communication devices which each act as a communication device to the telecommunication network. Such communication devices may be stationary or non-stationary. An example involves the electronic reading of e.g. 'smart' electricity meters at the homes of a large customer base over the telecommunications network from a server connected to the further network. Other examples include sensors, meters, vending or coffee machines, car meters for route pricing applications, navigation equipment, etc. that can be equipped with communication modules that allow exchanging in-

formation with other equipment such as a data processing centre over the telecommunications network. Such devices may also be monitored by the server. The data processing centre may e.g. store the data and/or provide a schedule for maintenance people to repair or refill a machine, meter or sensor or may update information in the device. Also, the data processing centre may be configured for processing data received from mobile communications devices, e.g. for road pricing applications.

Many M2M applications are not time critical. A device may need to send/receive data regularly to/from a server, for instance every 24 hours, but has no further requirements about a specific time. In such cases a network operator may decide to schedule network access for these devices in a non-busy time period, as was e.g. disclosed in EP 2 096 884, which is incorporated by reference in the present application in its entirety. This leads to a situation wherein groups of devices are assigned a specific group time interval in which they will be granted access and outside that group time interval, they will be denied access. Granting and denying access can pertain to network attaches as well as connection setups and allows the network operator to control the use of network resources.

However, the group time interval may not be a suitable period in all parts of a telecommunications network or for visited networks in case of moving devices, such as navigation systems or road pricing devices in vehicles. As an example, the non-busy period of the home operator is not necessarily a non-busy period for the visited operator, wherein the telecommunications network of the home operator and the telecommunications network of the visited operator form a telecommunications infrastructure. This could be because the visited and home operators are in different time zones, or because the visited operator has already scheduled devices for other M2M applications in the group time interval assigned by the home operator.

On the other hand, the devices may still need to send information to or retrieve information from the server, e.g. map updates for a navigation device.

Similar considerations may also apply outside the context of M2M applications.

SUMMARY OF THE INVENTION

A method is disclosed for controlling wireless access to a telecommunications infrastructure for a device. A first access grant time interval applicable for granting access for the device to the telecommunications infrastructure is stored in a device register system. The device register system may e.g. register information about the subscription of the device and/or information on the device itself. The first access grant time interval is applied when the device requests access to the telecommunications infrastructure via a first network node of the telecommunications infrastructure. However, a second access grant time interval is applied in a second network node of the telecommunications infrastructure when the device requests access via the second network node. The second access grant time interval is applicable for granting access for the device to the telecommunications infrastructure and is different from the first access grant time interval.

Furthermore, a telecommunications infrastructure comprising a device register system, a first network node and a second network node is disclosed. The device register system is configured for storing a first access grant time interval applicable for granting access for the device to the telecommunications infrastructure. The device register system may e.g. register information about the subscription of the device and/or information on the device itself. The first network node is configured for granting access during the first access grant time interval when the device requests access via the first network node. The second network node comprises or is configured to exchange information with an access controlling system configured for applying a second access grant time interval to control access to the telecommunications infrastructure when the device requests access via the second network node. The second access grant time interval is applicable for granting access for the device to the telecommunications infrastructure and is different from the first access grant time interval.

Moreover, a visiting network for the device comprising the second network node of the telecommunications infrastructure is disclosed.

Finally, an access controlling system provided in one or more network nodes of the telecommunications network is disclosed.

The disclosed method and system enable the (first) access grant time interval that is applicable for the device to (temporarily) be adapted to a different (second) access grant time interval for that same device in a different part of the telecommunications infrastructure. In other words, the method and system provide flexibility in the access grant time interval in different parts of the network. Accordingly, local circumstances in the different parts of the telecommunications infrastructure may be taken into account when deciding on the access of the device to the telecommunications infrastructure.

Examples of such local circumstances include a telecommunication network covering multiple time zones, wherein the time zone for the first network node differs from the time zone for the second network node. It also enables operators of visited networks employing a second network node to adapt the access grant time interval of the first network node of the home network of the device according to the needs or requirements of the visited network, as defined in claims 2 and 9. In other words the visited network operator has the ability to adapt the access grant time interval in which access is granted to a grant access time interval that is better suited to serve its own needs or requirements regarding e.g. network traffic load or contractual obligations to third parties.

The adaptation of the first access grant time interval may comprise shifting the entire time interval, or modifying at least one of the start time and the end time of the first access grant time interval or to split the time interval into multiple intervals.

The access grant time interval may be the time interval assigned to a single device or to a group of devices.

It should be appreciated that, except for special circumstances such as the application of a forbidden time interval

described below, access to the telecommunications infrastructure via the second network node may be granted outside the first and/or second access grant time interval. Whereas, apart from the different access time intervals, access to the telecommunications network is obtainable under the same conditions, access outside the first and/or second access grant time interval may be granted under different conditions, such as higher prices, lower quality of service etc. The conditions may depend on one or more network parameters at the second network node, e.g. the traffic load. The conditions may be communicated to the device with either an accept message or a reject access message. If an accept message is used, the device is responsible for not establishing the connection if it does not want to accept the conditions. If a reject message is used, the device may repeat a request for the connection setup in the case that it wants to accept the conditions, the second network, being aware that this is a re-request can immediately grant access. The device may also beforehand communicate acceptable conditions to the second network node with the request for access to the telecommunications infrastructure. A device configured for performing this functionality is also disclosed in the present application.

It should be appreciated that the term "telecommunications infrastructure" may either include a single telecommunications network (e.g. covering multiple time zones) or multiple telecommunications networks (e.g. located in two or more operator domains between which the device may roam).

Examples of the device register system include a Home Location Register (HLR) of a 2G/3G network, a Home Subscriber Server (HSS) of an LTE network or an AAA database of a WLAN network. Examples of first and second network nodes include SGSNs of a telecommunications infrastructure comprising a 2G/3G network, MMEs of a telecommunications infrastructure comprising an LTE network or AAA proxies or Wireless Access Points of a telecommunications infrastructure comprising a WLAN network.

In an embodiment of the invention, the second network node is informed of the first access grant time interval, e.g. by transferring information regarding this time interval to the second network node. Accordingly, the second network node is in-

formed about the preference and/or contractual obligations for the device when accessing the telecommunications infrastructure via the first network node and can adapt the first access grant time interval to the second access grant time interval as far as necessary.

As defined in the embodiments of claims 4 and 11, and different from existing roaming behaviour, the difference between the first and second access grant time interval may result in an approval of access by a device register system in a first part of the network for access to the telecommunications infrastructure, whereas the device is denied access to the telecommunications infrastructure at the second network node.

The reverse situation applies as well. A request to the device register system occurring outside the first access grant time interval and inside the second access grant time interval would normally be denied, but should now be allowed.

In order to inform the device register system of this deviant behaviour, the second network node may send an information message to the device register system informing it that the an acceptable access request of the device was nevertheless rejected. In WLAN networks, accounting messages may be used for this purpose, informing the device register system (or other accounting system in the home network) of a "null session". Also, the second network node preferably informs the device register system of the fact that it wants to locally apply the second access grant time interval such that the device register system refrains from applying the first access grant time interval.

It should be appreciated that the device may be informed about the applicable second access grant time interval, e.g. with the reject access message.

The device register system may also be informed about the applicable second access grant time interval as defined in claims 5 and 12. This provides information to the operator of a home network when traffic can be expected and enables the operator of the devices to obtain information on their devices from the device register system for e.g. troubleshooting or data arrival prediction purposes.

In an embodiment of the invention, a forbidden time interval may apply during which the home network of the device will not accept access by the device to the telecommunications infrastructure. The device register system may store the first access grant time interval and the forbidden time interval. The forbidden time interval is taken into account by the second network node when applying or selecting the second access grant time interval. The forbidden time interval, e.g. stored in the HLR or HSS of the home network, should be obeyed and cannot be adapted by further nodes or visited network operators. In an embodiment of the invention, the forbidden time interval is determined based on the expected and/or observed load in the home network, service windows and agreements with M2M application owners. The forbidden time interval can be adapted based on the information received from one or more of the second network nodes.

The second network node (e.g. the SGSN or MME of the visited network) may, in an embodiment of the invention, retrieve at least the access grant time interval and possibly also the forbidden time interval from the device register system storing the first access grant time interval and/or the forbidden time interval (e.g. from the HLR (in the home network)).

The second network node may then, in an embodiment of the invention, adapt the access grant time interval to a time interval that is more suitable. The adaptation of the time interval may be a shift of the time interval. The adaptation can be determined by the second network node itself, e.g. based on expected and/or observed load for this network node or on information from a time register. The time register may contain service windows, agreements with other M2M application customers and expected and/or observed network load.

Hereinafter, embodiments of the invention will be described in further detail. It should be appreciated, however, that these embodiments may not be construed as limiting the scope of protection for the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

FIG. 1 is a schematic illustration of a telecommunications network connecting communication devices to an application server;

FIG. 2 is a schematic illustration of a telecommunications infrastructure according to a first embodiment of the invention;

FIG. 3 is a schematic illustration of a telecommunications infrastructure according to a second embodiment of the invention;

FIGS. 4A and 4B are schematic illustrations of various options of applicable time intervals;

FIG. 5 provides a diagram showing an implementation example of applying a local access grant time interval in the telecommunications infrastructure of FIG. 2 or 3;

FIG. 6 is a schematic illustration of a telecommunications infrastructure according to a third embodiment of the invention;

FIG. 7 provides a diagram showing an implementation example of applying a local access grant time interval in the telecommunications infrastructure of FIG. 6; and

FIG. 8 is a schematic illustration of a second network node containing an access control system.

DETAILED DESCRIPTION OF THE DRAWINGS

FIG. 1 shows a schematic illustration of a telecommunications network 1. The telecommunications network 1 enables data sessions between an application server 2 and a communication device 3 over a data network 4, wherein access of the communication device 3 to the telecommunications network 1 is wireless.

In the telecommunications network of FIG. 1, three generations of telecommunications networks are schematically depicted together for purposes of brevity. A more detailed description of the architecture and overview can be found in 3GPP TS 23.002 which is included in the present application by reference in its entirety.

The lower branch of FIG. 1 represents a GPRS or UMTS telecommunications network comprising a Gateway GPRS Support

Node (GGSN), a Serving GPRS Support Node (SGSN) and a Radio Access Network (GERAN or UTRAN). For a GSM/EDGE radio access network (GERAN), the access network comprises a Base Station Controller (BSC) connected to a plurality of Base Station Transceivers (BTSs), both not shown. For a UMTS radio access network (UTRAN), the access network comprises a Radio Network Controller (RNC) connected to a plurality of NodeBs), also not shown. The GGSN and the SGSN are conventionally connected to a Home Location Register (HLR) that contains subscription information of the communication devices 3. In the figure, the HLR is combined with an authentication centre (AuC) for authenticating communication devices 3 in the network.

The upper branch in FIG. 1 represents a next generation telecommunications network, commonly indicated as Long Term Evolution (LTE) or Evolved Packet System (EPS). Such a network comprises a PDN Gateway (P-GW) and a Serving Gateway (S-GW). The E-UTRAN of the EPS comprises evolved NodeBs (eNodeBs or eNBs), not shown, providing wireless access for a communication device 3 that is connected to the S-GW via a packet network. The S-GW is connected to a Home Subscriber Server HSS and a Mobility Management Entity MME for signalling purposes. The HSS includes a subscription profile repository and an authentication centre (AuC).

Further information of the general architecture of an EPS network can be found in 3GPP TS 23.401.

The operator of application server 2 may have access to the HLR/HSS of the telecommunications network.

FIG. 2 is a telecommunications infrastructure 10 having two operator domains according to an embodiment of the invention. FIG. 2 also shows two mobile communications devices 3A and 3B. Device 3A is within coverage of the home operator, device 3B is within coverage of a visited network of a visited operator. Both devices 3A, 3B are M2M devices and make use of a subscription that allows them to access the network of the home operator within a specific access grant time interval, in this case common to both devices. The time interval for this group of devices 3A, 3B is registered in the HLR (in the home network).

When device 3A accesses the infrastructure 10, the SGSN (in case of UMTS) or MME (in case of LTE) within the domain of the home operator, will request information about the device's subscription from the HLR. Part of this information is an access grant time interval (marked 'granted 04:00-05:30' in the figure) as well as a forbidden time interval (however, that last piece of information is not used). If the device 3A accesses the network within the access grant time interval (and all other conditions are met, such as properly passing authentication) the SGSN/MME will allow device 3A to access the network. When the current time is outside the access grant time interval the SGSN/MME will normally deny device 3A to access the network. Optionally the SGSN/MME may inform device 1 about the applicable access grant time interval, so device 3A will know the earliest possible time that it can attempt to successfully access the network. Optionally, device 3A may still access the network, albeit under amended conditions e.g. at a higher charge and/or at a lower quality of service.

When device 3B accesses the telecommunications infrastructure 10, its request for access is received by the SGSN/MME in the domain of the visited network operator. This SGSN/MME will also request information from the HLR (located with the home operator) and may indicate that it intends to apply a local time interval for controlling access. The information from the HLR may again include the access grant time interval and may also include the forbidden time interval from the HLR. The SGSN/MME checks whether this access grant time interval is a suitable time interval for the visited network. The visited network may have a "time register" that contains conditions and time intervals, which register the SGSN/MME can consult to decide on a proper access grant time interval (this time register may be located in the foreign HLR or elsewhere).

If the visited SGSN/MME decides to adapt the time interval (marked 'granted 02:00-04:00' in the figure) it will have to ensure that the adapted time interval is not within the forbidden time interval that is specified by the home operator. A further adjustment may be needed to resolve a conflict with the forbidden time interval. In the example of FIG. 2, the SGSN/MME

decides to adapt it to 02:00-04:00, which does not conflict with 'forbidden 07:00-12:00' specified by the home operator. The SGSN/MME will then allow device 3B to access the infrastructure 10 if the time is within the adapted time interval (and provided that all other conditions are met). When the current time is outside the adapted time interval, the SGSN/MME will deny device 3B to access the infrastructure. Optionally the SGSN/MME may inform device 3B about the adapted time interval, so device 3B will know the earliest possible time that it can attempt to successfully access the network.

When the visited SGSN/MME has adapted the time interval, the M2M device 3B may optionally store this adapted time interval for later use.

When the visited SGSN/MME has decided to adapt the time interval, it may optionally inform the home operator, e.g. the HLR, about this adaptation.

The forbidden time interval stored in the home HLR is defined by the home operator. It can be based on parameters such as: expected and/or observed network load, agreements with other M2M applications, service windows, and agreements with the owner of the M2M server for the specific applications (e.g. the M2M server has a specific service window, or has other reasons for not being able to serve the M2M devices during the forbidden period).

It should be appreciated that the invention is not limited to a single time interval and that adapting a time interval may also comprise splitting a time interval into multiple time intervals or joining multiple time intervals.

The information with regard to time intervals can be formulated absolute, e.g. "between 16.00 and 17.00" or relative, e.g. "between one and two hours from now", "within 3 hours".

It should be appreciated that, preferably, all information regarding time intervals is exchanged in a uniform time code (e.g. UTC) to cope with regional time differences.

FIG. 3 depicts another embodiment of the invention applicable in a single operator domain, wherein the SGSN can adapt the time interval on a local or regional basis. That would distribute the burden on the centralized GGSN/PDN-GW and HLR. This

is especially advantageous when a dedicated HLR and GGSN/PDN-GW are used to handle M2M traffic or when a single operator network spans multiple time zones.

It should be appreciated that, typically, the (first) access grant time interval and the forbidden time interval as well as the adapted (second) access grant time interval and the forbidden time intervals are not complementary to each other, i.e. that these do not cover an entire reference period (e.g. a 24-hour period). This is indicated in FIGS. 4A and 4B. In FIG. 4B, the adapted time interval is smaller than the group time interval (marked 'access grant time') interval and partly overlaps that interval. The reference period may e.g. be one day, one week or one month.

FIG. 5 provides a flow chart showing an implementation example of applying a local access grant time interval in the telecommunications infrastructure 10 of FIG. 2 or 3. The flow chart depicts a packet switched (PS) attach request by device 3A formerly connected to an old SGSN and now connected to a new SGSN (e.g. resulting from a hand-over involving switching SGSN areas) for which a locally defined access grant time interval applies. In FIG. 5, the old SGSN functions as a first network node and the new SGSN functions as a second network node. The HLR is the device register system.

In step 1, device 3A initiates a PS Attach procedure by generating an Attach Request message to the new SGSN. The message contains the IMSI of device 3A and possibly indicates an Access Condition. It should be noted that for security reasons 3GPP has specified that after the initial exchange of the IMSI the device's subscription may further be identified by the (Packet-Temporary Mobile Subscriber Identity) P-TMSI, which is a temporary identifier associated with the IMSI for a short time. In this embodiment only IMSI is mentioned but P-TMSI would be applicable as well. The parameter(s) reflecting the Access Condition may contain information about the ability of the device 3A to access the infrastructure 10 outside the applicable access grant time interval, e.g. the price or acceptable quality of service.

In step 2, since the actual serving network node has changed from an old SGSN to a new SGSN and if the device 3A has identified itself by IMSI, the new SGSN performs an Identity Check to the old SGSN. If the device 3A is unknown in both the old and the new SGSN, the new SGSN performs an Identity Check with the device 3A wherein device 3A responds with the IMSI (step 3). Step 4 involves authentication. IMEI checking may also be performed (not shown).

Since the SGSN is new (this may also result from a very first attach request by the device 3A), the new SGSN informs the HLR by sending an Update Location message in step 5. The Update Location message contains the IMSI of the device 3A and the address of the new SGSN. The Update Location message also contains an indicating field LTI indicating that the new SGSN applies a local access grant time interval. The LTI indication may be used by the HLR to ignore the access grant time interval defined in the HLR and applicable when requesting access via the old SGSN. In step 6, the HLR sends a Cancel Location message to the old SGSN, which message is acknowledged by the old SGSN.

In step 7, the HLR sends an Insert Subscriber Data message to the new SGSN. The parameters contained in this message may include the IMSI of device 3A, the access grant time interval as stored in the HLR, the forbidden time interval and, possibly, the access conditions. Upon receipt of the Insert Subscriber Data message, the new SGSN validates whether the device 3A is still within reach of the SGSN and may adapt the access grant time interval according to local requirements or needs. The forbidden time interval may not be adjusted and the adaptation of the access grant time interval should be such that an overlap with the specified forbidden time interval is avoided.

In step 9, if all checks are successful, the new SGSN returns an Insert Subscriber Data Acknowledgement message to the HLR. The message includes the locally adapted access grant time interval that is temporarily stored in the HLR.

In step 10, the HLR acknowledges the Update Location message of step 5 by sending an Update Location Acknowledgement message to the new SGSN.

In step 11, the new SGSN now checks if the Attach Request from the device 3A falls within the adapted access grant time interval as explained previously with reference to FIG. 2. When outside the adapted access grant time interval and the forbidden time interval, access may still be granted when the Access Conditions received from device 3A in step 1 match the Access Conditions received from the HLR/HSS in step 7.

If the Attach Request of step 1 falls within the adapted access grant time interval or if the Access Conditions are fulfilled an Attach Accept is sent to the device 3A as illustrated by step 12a. This Attach Accept message contains the IMSI, the applicable access time interval and, possibly, the forbidden time interval. The device 3A is now aware when it is allowed to send Attach Requests, at least until handover to a further new SGSN.

If the Attach Request does not fall within the Local Access Grant Time interval or the Access Conditions are not fulfilled, an Attach Reject is sent to the device 3A as illustrate by step 12b. This Attach Reject message contains the IMSI, the applicable access time interval and, possibly, the forbidden time interval. The device 3A is now aware when it is allowed to send Attach Requests, at least until handover to a further new SGSN.

When not attached, device 3A may repeat an Attach Request to the new SGSN at a later time within the communicated access grant time interval or when it meets the Access Conditions when outside the local access grant time interval and forbidden time interval.

FIG. 6 provides a schematic illustration of a telecommunications infrastructure 20 according to a third embodiment of the invention. The telecommunications infrastructure 20 involves a WLAN network comprising a user database DB in a combination with an AAA server of a wireless internet provider WISP as a device register system and a AAAn proxy as a second network node. For access to public WiFi hotspots a roaming mechanism is implemented based on RADIUS roaming using the RADIUS AAA protocol. RADIUS AAA is defined in RFC 2138 and RFC 2139. The end-user has a subscription with the WISP. The WISP hands out credentials

(e.g. username/password) to the end-user. Whenever a user is within reach of a public WiFi hotspot, the user can login with his device 3 and use the hotspot if the hotspot owner and WISP belong to the same "alliance" (i.e. having roaming agreements in place, either direct or via an intermediate party).To provide the end-user access to a hotspot, several specifications exist that are all based on the same RADIUS mechanism as shown in FIG. 6. In ETSI TS 183.019 the relevant network elements are AAA Proxy, AAA Server and Access Controller and Access Point. In FIG. 6, the Access Controller and Access Point are combined into the Public WiFi Access Point. In 3GPP TS 23.234, the AAA Proxy is referred to as 3GPP AAA Proxy, the AAA Server is called 3GPP AAA Server. The Access Controller is called Wireless Access Gateway, which in FIG. 6 is combined into the Public WiFi Access Point.

It should be noted that more AAA proxies may be present in the infrastructure 20.

In the infrastructure 20 of FIG. 6, the WISP can control whenever a device 3 is allowed access to the infrastructure 20 by defining a (first) access grant time interval in the user database. AAA server receives incoming access requests, checks the user credentials and, possibly, applies the first access grant time interval, to decide whether or not a particular device 3 may access the infrastructure.

FIG. 7 provides a diagram showing an implementation example of applying a local access grant time interval in the telecommunications infrastructure of FIG. 6. In this case, a device 3 connects to a WiFi hotspot outside its access grant time interval as defined by the global WISP. The local hotspot provider decides to adapt the access grant time interval.

In step 1, the device 3 requests access to the public WiFi Access Point (AP) providing user credentials. The WiFi AP forwards a RADIUS Access Request to the AAA Proxy in step 2 that forwards the RADIUS AAA Request to the AAA Server in step 3. In forwarding the request of step 3, the AAA Proxy includes a RADIUS parameter, e.g. an indicating field LTI indicating that the AAA Proxy applies a local access grant time interval, in the forwarded message. The LTI indication may be used by the AAA

Server to ignore the access grant time interval defined in the user database. The LTI indication may also be provided by the WiFi AP.

In step 4, the AAA Sever verifies the user credentials and profile. In this step, it will appear if a time-based subscription applies for device 3A

In step 5, if the AAA Server has positively verified the credentials, it is observed that the access request is received outside the first access grant time interval and outside a forbidden time interval. The LTI indicator may be used to disregard application of the first access grant time interval stored in the user database.

In step 6, the AAA Server sends an Access Accept message as the credentials are positively verified and the first access grant time interval is disregarded. The Access Accept message includes the first access grant time interval and the forbidden time interval.

In step 7, the AAA Proxy adapts the access grant time interval received from the AAA Server. As the Access Request from step 1 is outside this adapted time interval, the AAA Proxy changes the Access Accept message from step 6 in an Access Reject message in steps 8 and 9, even though the credentials have been positively verified and, possibly, the Access Request in step 1 was received within the first access grant time interval. Steps 7 and 8 may alternatively be performed by the WiFi AP.

The Access Reject message of step 8 contains the adapted access grant time interval and, optionally, the forbidden time interval, to inform device 3 when it may access. As RADIUS AAA is a stateless protocol, the AAA server and user database is preferably informed of the Access Reject message. This is advantageously performed by making use of the existing Accounting messages as indicated in FIG. 7.

In steps 10a and 10b, the AAA Proxy sends an Accounting Start message to AAA Server (step 10a) which is stored in Accounting DB (step 10b). In order to indicate that the Access Request has been rejected, these steps are immediately succeeded by the AAA Proxy sending Accounting Stop message indicating this is a null session to AAA Server (step 11a) which is stored in

Accounting DB (step 11b). In this manner, the accounting database always reflects Accounting Start and Stop messages for all session wherein the AAA Server has sent an Access Accept message as in step 6. It should be appreciated that the order of steps 10b and 11a may be reversed depending on how fast the AAA Server processes accounting messages.

It should be appreciated that various modifications have been envisaged for the above-described methods.

Hitherto, it was assumed that only two classes of end-user subscriptions exist, either with the possibility of time-based access control or without. However, in practice, several classes of time-based subscriptions exist. As an example, the most expensive subscription always gets access and there is a range of other subscriptions that each match to several classes of timeslots or situations of traffic load.

Furthermore, as previously mentioned, there may be a possibility that for a certain time-based subscriptions, access is still granted outside the adapted access grant time interval but at a higher price. To implement this in the process of FIG. 7, the AAA Sever may identify that for a particular device 3 a time-based subscription for which higher prices can be charged in certain time periods is enabled. Then, either the AAA Proxy or the Access Point will determine that at the current local time and the given subscription type the end-user is only allowed access at a higher price. It will allow the device 3 to access the infrastructure and will optionally inform the device 3 of the higher price. The user (or an automated procedure at the device 3) can optionally disconnect immediately if it does not want to accept the higher price. If the user does not disconnect, the Access Point starts sending Accounting Start/Intermediate/Stop messages as it would in the regular case and these are forwarded to the AAA Server that stores it in the WISP accounting database. However, either the Access Point or AAA Proxy will add pricing information to these accounting messages so the WISP will know that the end-user accessed the network at a higher price and can bill the end-user accordingly. Pricing information can either be a fixed tariff but can also be an indication of a tariff class.

Furthermore, the time-based subscription of device 3 may be of such a type that the device 3 is allowed to use the network outside the applicable access grant time interval (except for the forbidden time interval but that during specific time periods it will be provided with a lower quality of service. For instance the bandwidth generated by the device 3 may be limited or its traffic will be labelled with a low priority. Implementing this scenario may be completely up to the discretion of either the Access Point or the AAA Proxy. It could optionally inform the device 3 that a lower quality of service is available and the user (or automated procedure at the device 3) may decide to disconnect from the network.

Combinations of the above modifications have been envisaged. For instance the device 3 may be given a choice in steps 8/9 (e.g. either accept the higher price, the lower quality of service or disconnect and wait for a regular time slot).

Finally, FIG. 8 is a schematic illustration of a second network node 30, such as an SGSN/MME or an AAA proxy. The second network node 30 comprises an access control system 31. The access control system has an input or interface 32 for receiving information (such as the information indicated in FIGS. 5 and 7 received by the new SGSN and the AAA Proxy respectively). The access control system 31 also contains a processor 33 for applying the second access grant time interval, possibly by adapting the first access grant time interval.

Furthermore, the time interval could also be used in such a way that access is granted but at other conditions (e.g. lower QoS, higher price).

One embodiment of the invention may be implemented as a program product for use with a computer system. The program(s) of the program product define functions of the embodiments (including the methods described herein) and can be contained on a variety of computer-readable storage media. Illustrative computer-readable storage media include, but are not limited to: (i) non-writable storage media (e.g., read-only memory devices within a computer such as CD-ROM disks readable by a CD-ROM drive, ROM chips or any type of solid-state non-volatile semiconductor memory) on which information is permanently stored;

and (ii) writable storage media (e.g., floppy disks within a diskette drive or hard-disk drive or any type of solid-state random-access semiconductor memory, flash memory) on which alterable information is stored.

CLAIMS

1. A method for controlling wireless access to a telecommunications infrastructure for a device, the method comprising the steps of:

- storing a first access grant time interval applicable for granting access for the device to the telecommunications infrastructure in a device register system;

- applying the first access grant time interval when the device requests access to the telecommunications infrastructure via a first network node of the telecommunications infrastructure;

- applying a second access grant time interval in a second network node of the telecommunications infrastructure when the device requests access via the second network node, the second access grant time interval being applicable for granting access for the device to the telecommunications infrastructure and being different from the first access grant time interval.

2. The method according to claim 1, wherein the first network node and the device register system are located in a home network of the device and the second network node is located in a visiting network of the device.

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

- transferring the first access grant time interval from the device register system to the second network node;

- obtaining the second access grant time interval in the second network node by adapting the first access grant time interval.

4. The method according to one or more of the preceding claims, comprising the steps of:

- receiving an access request from the device at the second network node during the first access grant time interval and outside the second access grant time interval;

- forwarding the access request from the second network node to the device register system ;

- receiving an access grant message from the device register system at the second network node;

- rejecting the access request from the device by applying the second access grant time interval at the second network node, and

- optionally, transmitting a reject information message from the second network node to the device register system.

5. The method according to one or more of the preceding claims, further comprising the step of transmitting to the device register system an information message regarding the second access grant time interval applied by the second network node.

6. The method according to one or more of the preceding claims, further comprising the steps of:

- storing a forbidden time interval in the device register system;

- selecting the applicable second access grant time interval for the second network node such as to avoid an overlap with the forbidden time interval in the device register system.

7. The method according to claim 6, further comprising the step of transferring the forbidden time interval to the second network node.

8. A telecommunications infrastructure comprising a device register system, a first network node and a second network node, wherein

- the device register system is configured for storing a first access grant time interval applicable for granting access for the device to the telecommunications infrastructure;

- the first network node is configured for granting access during the first access grant time interval when the device requests access via the first network node; and

- the second network node comprises an access controlling system configured for applying a second access grant time interval to control access to the telecommunications infrastructure when the device requests access via the second network node, the second access grant time interval being applicable for granting access for the device to the telecommunications infrastructure and being different from the first access grant time interval.

9. The telecommunications infrastructure according to claim 8, wherein the device register system and first network node are located in a home network of the device and the second network node is located in a visiting network of the device.

10. The telecommunications infrastructure according to claim 8 or 9, wherein the access controlling system of the second network node comprises:

- an interface configured for receiving the first access grant time interval from the device register system;
- a processor configured for obtaining the second access grant time interval in the second network node by adapting the first access grant time interval.

11. The telecommunications infrastructure according to one or more of the claims 8-10, wherein the access controlling system is configured for:

- receiving an access request from the device during the first access grant time interval and outside the second access grant time interval;
- forwarding the access request to the device register system;
- receiving an access grant message from the device register system;
- rejecting the access request from the device by applying the second access grant time interval at the second network node, and
- optionally, transmitting a reject information message to the device register system.

12. The telecommunications infrastructure according to one or more of the claims 8-11, wherein the access controlling system is further configured for transmitting to the device register system an information message regarding the second access grant time interval applied by the second network node.

13. The telecommunications infrastructure according to one or more of the claims 8-12, wherein the access controlling system is further configured for selecting the second access grant time interval such as to avoid an overlap with a forbidden time interval defined in the device register system, optionally including receiving the forbidden time interval from the device register system.

14. A visiting network for the device comprising the second network node of the telecommunications infrastructure according to one or more of the claims 8-13.

15. An access controlling system provided in one or more network nodes of the telecommunications network according to one or more of the claims 8-13.

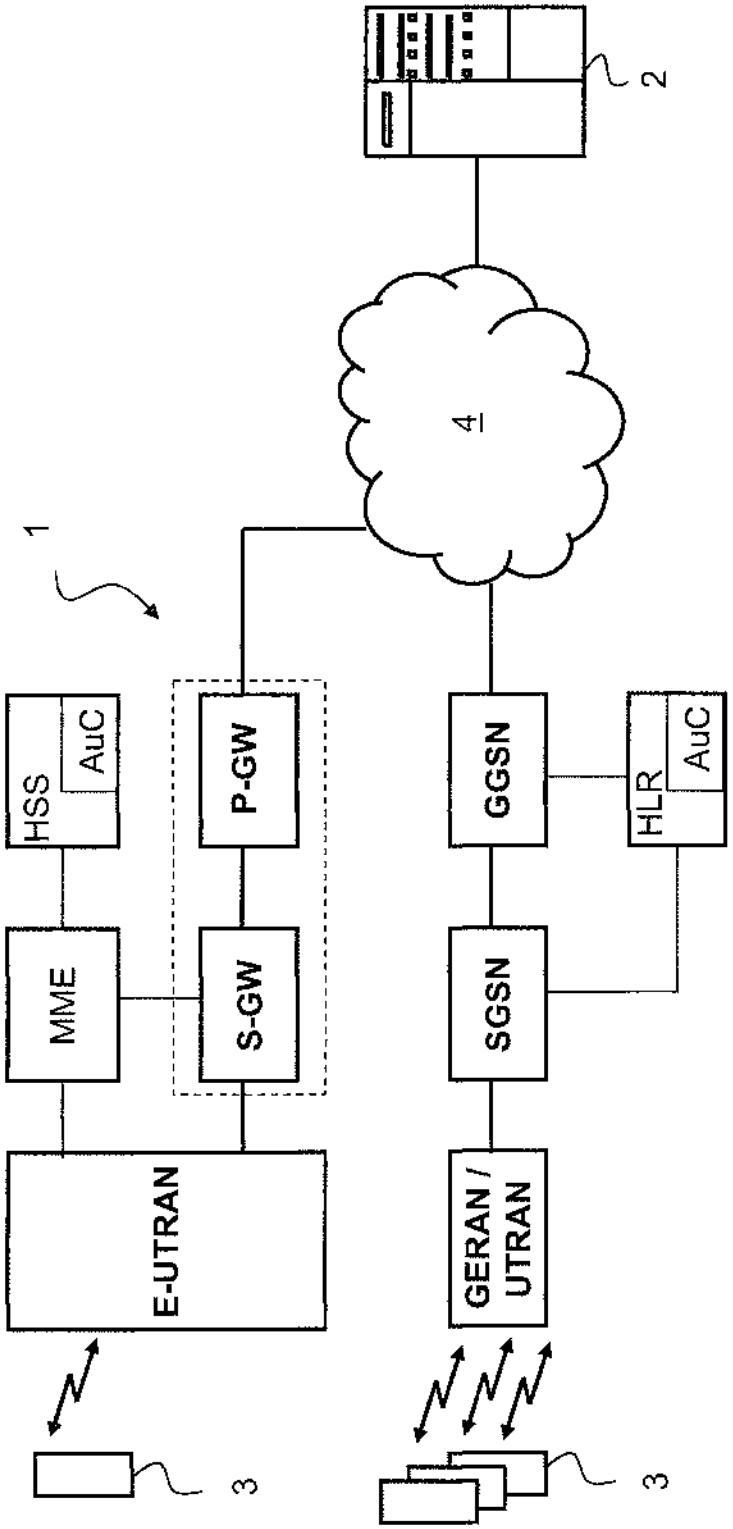
2
4
1
HSS
AuC
P-GW
GGSN
HLR
AuC
MME
S-GW
SGSN
E-UTRAN
GERAN / UTRAN
3
3

FIG. 1

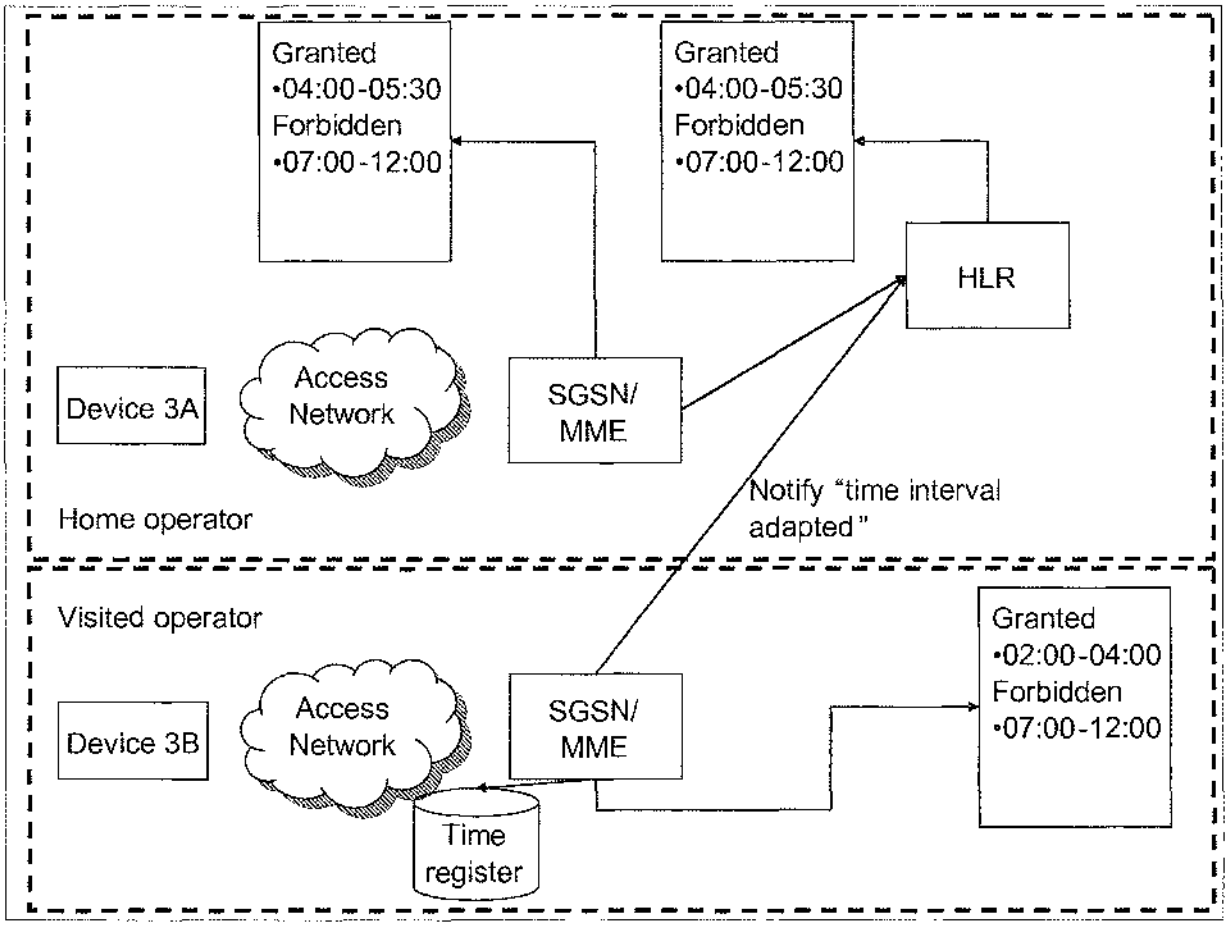
Granted
•04:00-05:30
Forbidden
•07:00-12:00
Granted
•04:00-05:30
Forbidden
•07:00-12:00
HLR
Device 3A
Access Network
SGSN/ MME
Notify "time interval adapted"
Home operator
Visited operator
Granted
•02:00-04:00
Forbidden
•07:00-12:00
Device 3B
Access Network
SGSN/ MME
Time register
10

FIG. 2

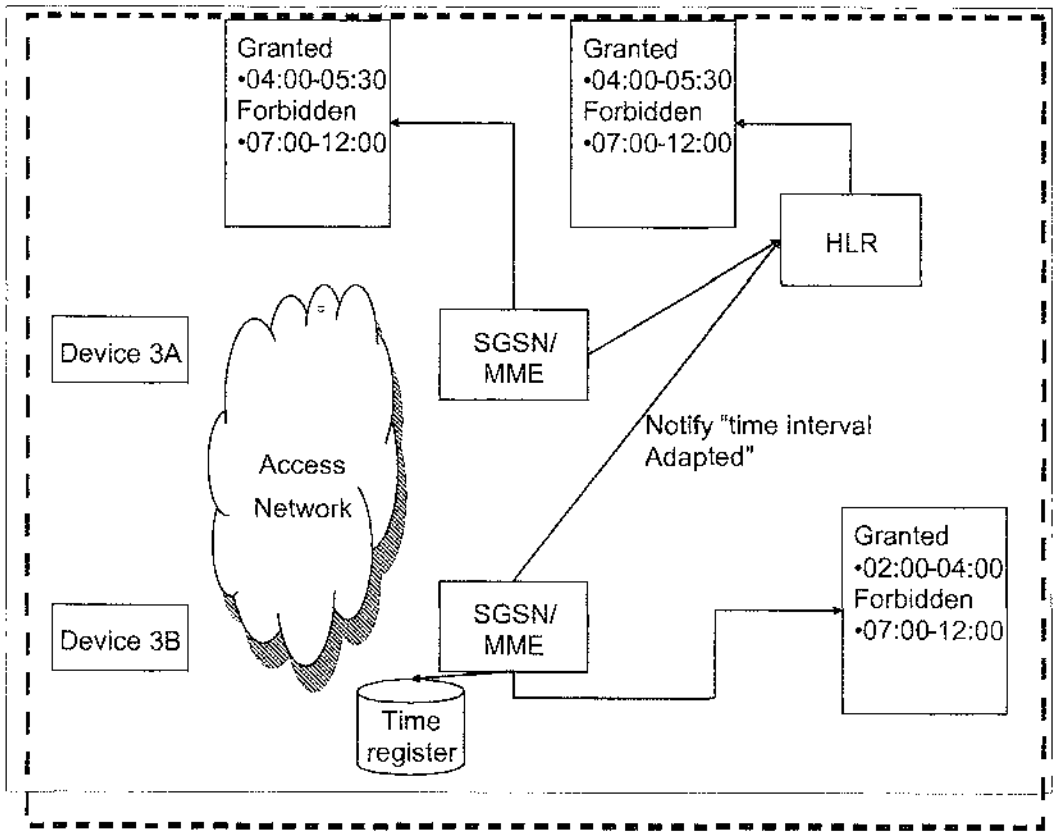
Granted
•04:00-05:30
Forbidden
•07:00-12:00
Granted
•04:00-05:30
Forbidden
•07:00-12:00
HLR
Device 3A
SGSN/
MME
Notify "time interval
Adapted"
Access
Network
10
Granted
•02:00-04:00
Forbidden
•07:00-12:00
Device 3B
SGSN/
MME
Time
register

FIG. 3

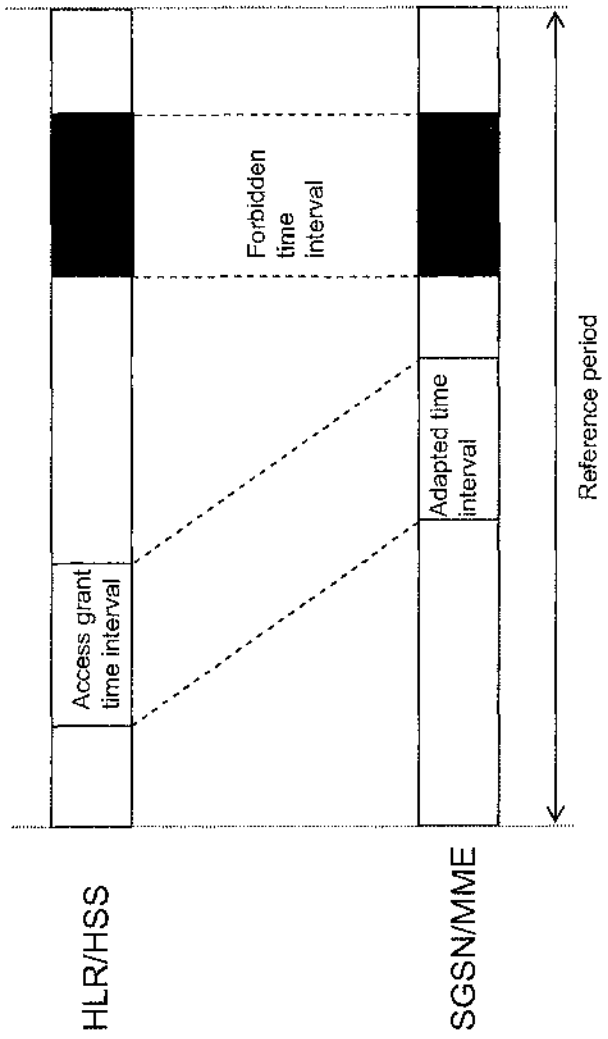
HLR/HSS
SGSN/MME
Access grant time interval
Forbidden time interval
Adapted time interval
Reference period

FIG. 4A

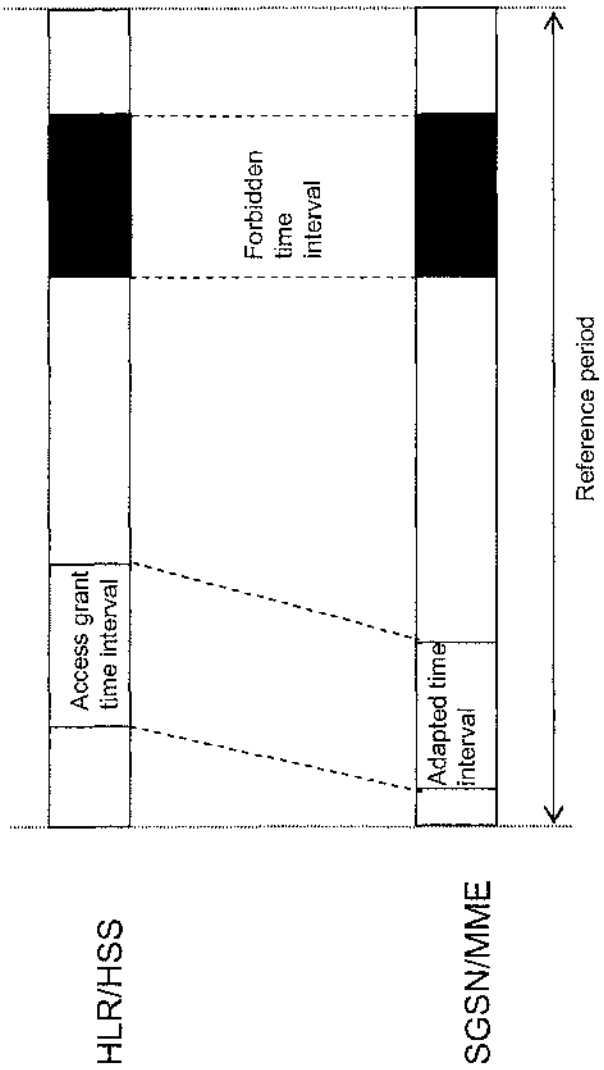
HLR/HSS
SGSN/MME
Access grant time interval
Forbidden time interval
Adapted time interval
Reference period

FIG. 4B

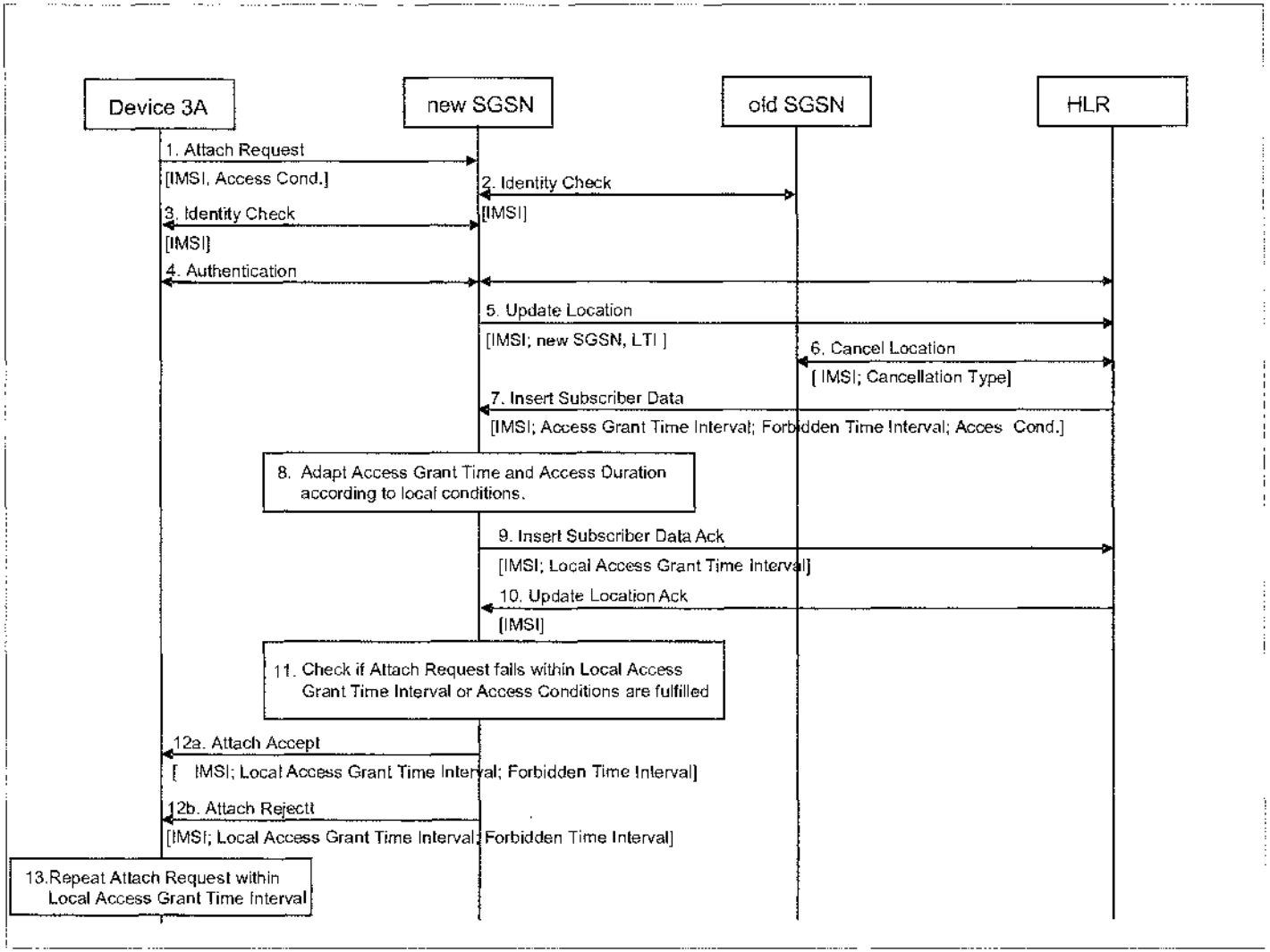
Device 3A
new SGSN
old SGSN
HLR
1. Attach Request
[IMSI, Access Cond.]
2. Identity Check
[IMSI]
3. Identity Check
[IMSI]
4. Authentication
5. Update Location
[IMSI; new SGSN, LTI]
6. Cancel Location
[IMSI; Cancellation Type]
7. Insert Subscriber Data
[IMSI; Access Grant Time Interval; Forbidden Time Interval; Acces Cond.]
8. Adapt Access Grant Time and Access Duration according to local conditions.
9. Insert Subscriber Data Ack
[IMSI; Local Access Grant Time Interval]
10. Update Location Ack
[IMSI]
11. Check if Attach Request falls within Local Access Grant Time Interval or Access Conditions are fulfilled
12a. Attach Accept
[IMSI; Local Access Grant Time Interval; Forbidden Time Interval]
12b. Attach Rejectt
[IMSI; Local Access Grant Time Interval; Forbidden Time Interval]
13.Repeat Attach Request within Local Access Grant Time Interval

FIG. 5

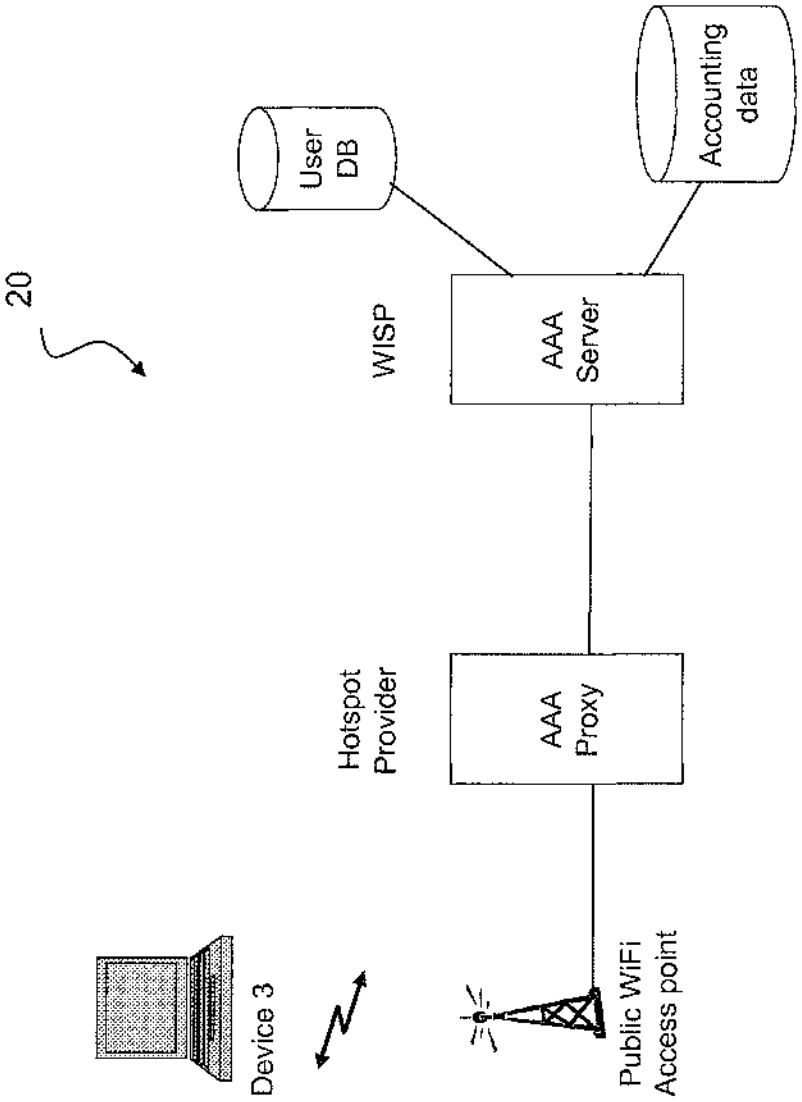
20
WISP
User DB
Accounting data
AAA Server
Hotspot Provider
AAA Proxy
Device 3
Public WiFi Access point

FIG. 6

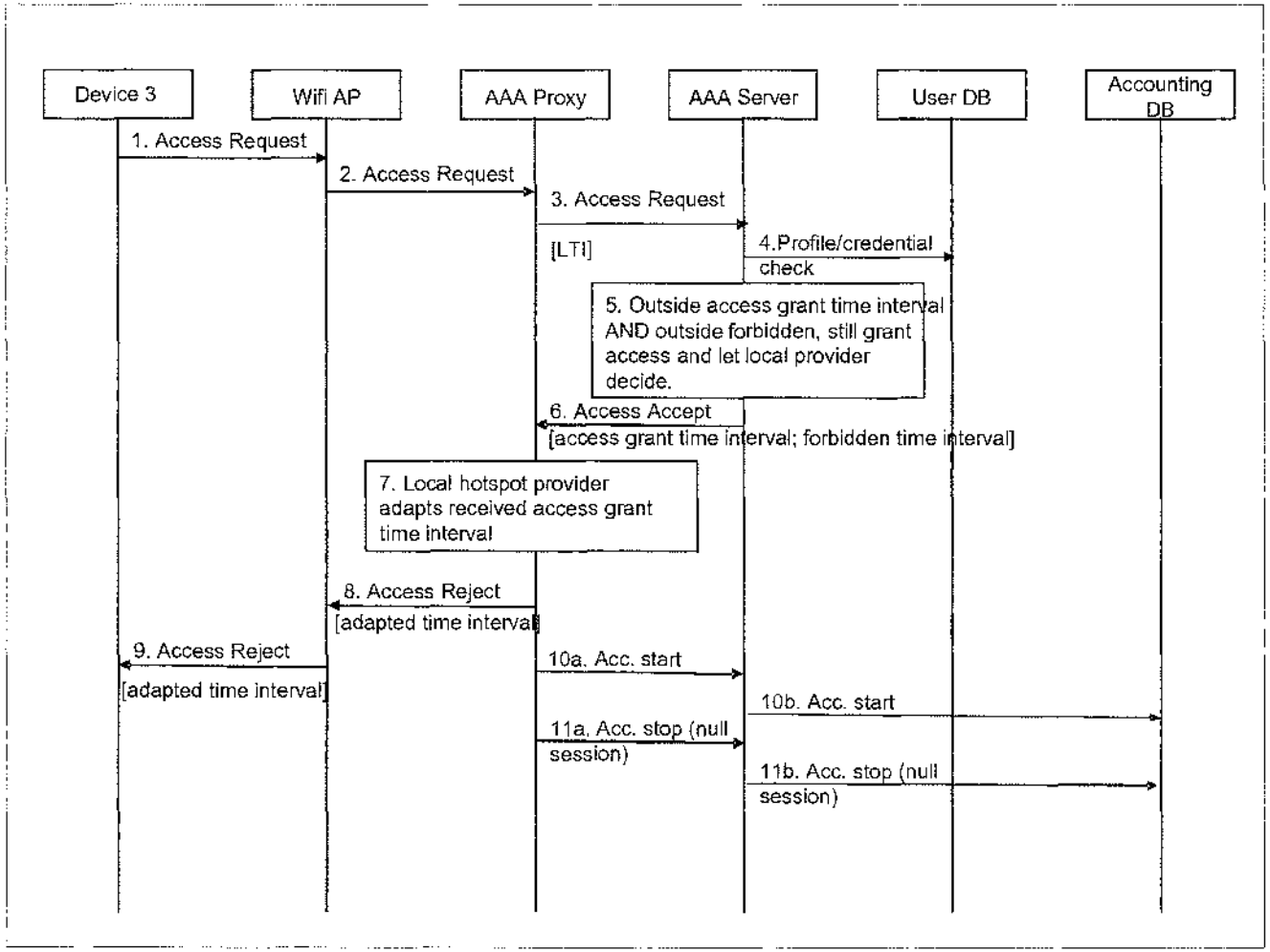
Device 3
Wifi AP
AAA Proxy
AAA Server
User DB
Accounting DB
1. Access Request
2. Access Request
3. Access Request
[LTI]
4.Profile/credential check
5. Outside access grant time interval AND outside forbidden, still grant access and let local provider decide.
6. Access Accept
[access grant time interval; forbidden time interval]
7. Local hotspot provider adapts received access grant time interval
8. Access Reject
[adapted time interval]
9. Access Reject
[adapted time interval]
10a. Acc. start
10b. Acc. start
11a. Acc. stop (null session)
11b. Acc. stop (null session)

FIG. 7

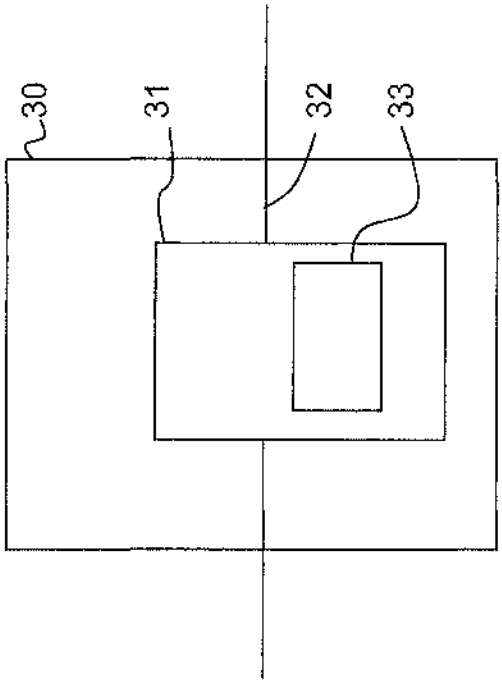

FIG. 8

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2011/051713

A. CLASSIFICATION OF SUBJECT MATTER
INV. H04W48/02
ADD.

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)
H04W

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6 230 017 B1 (ANDERSSON MIKAEL [SE] ET AL) 8 May 2001 (2001-05-08)	1,2,4,8, 9,11,14, 15
Y	column 2, line 26 - column 2, line 67 column 3, line 58 - column 7, line 51	3,6,7, 10,13
A	figure 2b	5,12
Y	EP 2 096 884 A1 (KONINKL KPN NV [NL]; TNO [NL]) 2 September 2009 (2009-09-02) cited in the application the whole document	3,6,7, 10,13
A	US 6 275 695 B1 (OBHAN PREM A [US]) 14 August 2001 (2001-08-14) column 7, line 6 - line 50	1-15

-/--

[X] Further documents are listed in the continuation of Box C. [X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier document but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
18 March 2011	28/03/2011

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, Fax: (+31-70) 340-3016	Goedhart, André

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Form PCT/ISA/210 (second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2011/051713

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2004/192306 A1 (ELKARAT SHANY [IL] ET AL ELKARAT SHANY [IL] ET AL) 30 September 2004 (2004-09-30) paragraphs [0168], [0169]	1-15
A	ALCATEL-LUCENT: "Time Controlled MTC feature", 3GPP DRAFT; S2-100123, 3RD GENERATION PARTNERSHIP PROJECT (3GPP), MOBILE COMPETENCE CENTRE ; 650, ROUTE DES LUCIOLES ; F-06921 SOPHIA-ANTIPOLIS CEDEX ; FRANCE, vol. SA WG2, no. Shenzhen; 20100118, 10 January 2010 (2010-01-10), XP050432669, [retrieved on 2010-01-10] the whole document	1-15

2

Form PCT/ISA/210 (continuation of second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2011/051713

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 6230017 B1	08-05-2001	AU 740937 B2	15-11-2001
		AU 8470598 A	22-02-1999
		BR 9811114 A	18-07-2000
		CA 2297893 A1	11-02-1999
		CN 1273010 A	08-11-2000
		EP 1000514 A1	17-05-2000
		JP 2001512938 T	28-08-2001
		WO 9907167 A1	11-02-1999
EP 2096884 A1	02-09-2009	CN 101960886 A	26-01-2011
		EP 2250835 A1	17-11-2010
		EP 2291032 A2	02-03-2011
		EP 2291033 A2	02-03-2011
		WO 2009106265 A1	03-09-2009
		KR 20100113583 A	21-10-2010
US 6275695 B1	14-08-2001	NONE	
US 2004192306 A1	30-09-2004	US 2007054665 A1	08-03-2007
		US 2007049269 A1	01-03-2007

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(25) Filing Language: English

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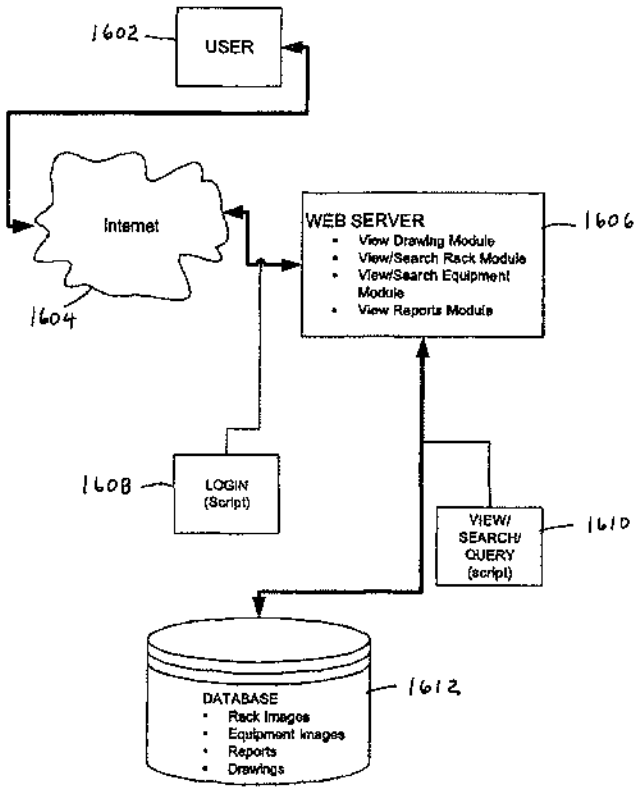
(81) Designated States *(national)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PH, PL, PT, RO,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

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

Published:
— *with international search report*

[Continued on next page]

(54) Title: SYSTEM AND METHODS FOR TRACKING CENTRAL OFFICE EQUIPMENT AND INVENTORY RECORDS



(57) Abstract: A system and methods for tracking central office equipment and inventory records comprised of a series of modules (1606) to provide access to link drawings, racks and equipment across an entire network infrastructure (1604). The system and methods provide a user (1602) the ability to view equipment, group equipment, and search for equipment (1610) and available rack space. Additionally, the central office equipment and inventory records (1612) can be compiled into reports for engineering, planning and analysis.

WO 02/31706 A1

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

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

SYSTEM AND METHODS FOR TRACKING CENTRAL OFFICE EQUIPMENT AND INVENTORY RECORDS

[0001] This application is related to and claims the benefit of provisional application 60/238,522 filed October 10, 2000, the teachings of which are hereby incorporated herein in their entirety, including all appendices. This application includes a microfiche appendix having 1 fiche of 39 frames each. The teachings contained on the fiche are incorporated herein by reference in their entirety.

BACKGROUND OF THE INVENTION

Field of the Invention

[0002] The invention relates to the field of telecommunications, and more specifically, to a system and methods for tracking central office equipment and inventory records.

Background

[0003] Various patents disclose methods for detecting feature interaction in telecommunication networks. U.S. patent 6,198,811 B1 issued March 6, 2001 to Klose et al. discloses a system and method for downloading data from purchases of telephone services. This data can then be associated automatically with the purchaser for billing purposes. U.S. patent 6,185,519 B1 issued February 6, 2001 to Lin et al. discloses a method and system for feature interaction detection in a telecommunication network to disclose potential problems between various types of telecommunications equipment. The teachings of these patents are herein incorporated by reference.

[0004] None of the two listed patents monitor the overall management of the central office. This would include all equipment residing in the central office, whether it's a diesel engine, telephone switch, or a distributing frame. In addition, these shortcomings address primarily the management of the network, but not the equipment that runs the network. Furthermore, these patents all provide support involving accessing the central office, in order to update the snapshot of the current network equipment infrastructure or engineering drawings.

[0005] There exists a need wherein a central processing unit (CPU) can be accessed by a database program for the purposes of inventory, asset management and financial accounting of central office telecommunications equipment. It is desirable to view, track and analyze central office equipment and the racks residing across an entire telecommunications infrastructure via the Internet, eliminating the need to visit the central offices which are often a large distance from the engineers, planners and accountants. A need also exists to track the life cycle of all central office equipment. To save space within current central office buildings and meet the demand for colocation space for competitors resulting from the Telecommunications Act of 1996, accurate information regarding telecommunications equipment is needed.

Objects of the Invention

[0006] Accordingly, several objects of the present invention for a system and methods for tracking central office equipment and inventory records are:

a) A primary object of the invention is to provide a method to involve a graphical user interface (GUI) for a user to interact and access a database, allowing the user

to view the central office equipment and inventory records, central office drawings and equipment details, including asset and financial information.

b) Another object of the invention is to provide a method to track central office equipment and inventory records within a central processing unit (CPU) that can be accessed by a database program for the purposes of accessing inventory, asset management and financial accounting of central office equipment.

c) Another object of the invention is to provide a method to conduct network planning at the central office, based upon the ability to know exactly what resides within each central office, via the Internet.

d) A further object of the invention is to provide a method to track the equipment, providing various types and levels of equipment details.

e) Yet another object of the invention is to provide a method to track the life cycle of central office equipment and inventory records, whether it is new, retired or moved, throughout the central office.

f) Still yet another object of the invention is to provide a method to group central office equipment, by equipment type.

g) Another object of the invention is to provide a method to integrate central office equipment and drawings together, thereby eliminating the need to travel to the central office to view equipment.

h) Another object of the invention is to provide a method to view all racks within a central office via the Internet.

i) A further object of the invention is to provide a system that can restrict access between users, departments, or companies.

j) Yet another object of the invention is to provide a system to provide asset placement within an network infrastructure by central offices (or data centers), rows (or aisles), racks (or data cabinets), and equipment (or assets).

k) Still yet another object of the invention is to provide a system to be updated and revised to generate reports for asset management, depreciation and other accounting procedures for financial purposes.

l) Another object of the invention is to provide a system to search (or query) within a database program for user-friendly access to rack and equipment placement for specific central office equipment and inventory records via the Internet.

m) Another object of the invention is to provide a system to track central office equipment and inventory records within a central processing unit (CPU) that can be accessed by a database program for the purposes of inventory, asset management and financial accounting of central office equipment.

[0007] Other objects and features of the present invention will become apparent from the following descriptions, taken in connection with the accompanying drawings, wherein, by way of illustration and example, an embodiment of the present invention is disclosed.

Advantages of the Invention

[0008] Accordingly, the system and methods for tracking telecommunications central office equipment and inventory records can be used to easily access and view equipment records without requiring the need to travel to these rural or remote central offices. In addition, the system and methods have additional advantages in that they:

- provide for the ability to search (or query) the database for the purposes of finding various record data for maintenance purposes;
- provide for the ability to view, save and conduct light markup of central office drawings off-line;
- provide for the ability for multiple users to view drawings at the same time for engineering and planning purposes;
- provide for the ability to move laterally from a "drawing to racks" and "racks to drawing" interchangeably;
- provide for the ability to easily update the database via forms seamlessly transferring data directly into the database;
- provide for the ability to be accessed by wireless application protocols (WAP) via a cellular phone and/or personal digital assistant.

[0009] Although the description above contains many specificities, these should not be construed as limiting the scope of the invention but merely providing illustrations of some of the presently preferred embodiments of this invention. Thus, the scope of the invention should be determined by the appended claims, rather than by the examples given.

Summary of the Invention

[00010] A system and method for tracking telecommunications central office equipment and inventory records comprising a series of modules to provide access to link, view, group, search, and report central office information (drawings, racks, equipment) across an entire network infrastructure.

[00011] A system for tracking telecommunications central office equipment information includes a database of telecommunications equipment information for a central office, a management report generator for extracting and providing reports on the equipment contained in a central office, a search engine for responding to queries of the entire database of telecommunication equipment information, a graphical user interface for providing visual representations of equipment within a central office, and a drawing system interfacing with the graphical user interface and the database for viewing, printing and editing drawings depicting central office equipment.

Brief Description of the Drawings

[00012] The accompanying drawings, which are included to provide a further understanding of the invention and are incorporated in and constitute a part of this specification, illustrate an embodiment of the invention and together with the description serve to explain the principles of the invention.

[00013] Figure 1 is a screenshot illustrating the home and log in page.

[00014] Figure 2 is a screenshot illustrating the "About Cenotrack" page.

[00015] Figure 3 is a screenshot illustrating the Main Menu page.

[00016] Figure 4 is a screenshot illustrating the Drawing Search page.

[00017] Figure 5 is a screenshot illustrating the Rack Search page.

[00018] Figure 6 is a screenshot illustrating the Equipment Search page.

[00019] Figure 7 is a screenshot illustrating the Reports Search page.

[00020] Figure 8 is a screenshot illustrating the Search Results page.

[00021] Figure 9 is a screenshot illustrating the Search Results detail page.

[00022] Figure 10 is a screenshot illustrating the Drawing page.

[00023] Figure 11 is a screenshot illustrating the frontal view of a rack.

[00024] Figure 12 is a screenshot illustrating the Rack Details page.

[00025] Figure 13 is a screenshot illustrating the Log Out page.

[00026] Figure 14 is a diagram illustrating the detailed rack configuration

[00027] Figure 15 is a block diagram illustrating the flow of the present invention.

[00028] Figure 16 is a high-level flow chart of the operation of the present invention.

Detailed Description of the Preferred Embodiments

[00029] Detailed descriptions of the preferred embodiment are provided herein. It is to be understood, however, that the present invention may be embodied in various forms. Therefore, specific details disclosed herein are not to be interpreted as limiting, but rather as a basis for the claims and as a representative basis for teaching one skilled in the art to employ the present invention in virtually any appropriately detailed system, structure or manner.

[00030] A preferred embodiment of the system and methods for tracking central office equipment and inventory is illustrated in Figure 1 as the home / login screen. Figure 1 shows the start of the computer program which provides a login 10, username 12 and password protection 14 for entering the Cenotrack web site. If the login, username and password information is incorrect, the user is sent to the Figure 13 log out screen. Additionally, as shown in Figure 1, the user may find out information about CenoTrack 16 or about Advanced Engineering Design, Inc. 18 by clicking on the appropriate buttons.

[00031] Figure 2 discloses information about the present invention including reports, searching, rack information, and drawings changes that can be made in using the present invention. Information can be gained without having Internet access to the CenoTrack web site.

[00032] If the login is successful, the user is brought to the main menu screen shown in Figure 3 containing four application modules. CenoDraw 30 enables users to view, print or plot a web format of a central office drawing. This visual representation contains multiple views, layers and other important central office data. CenoRack 32 provides an accurate, visual representation of each central office rack, frame or piece of equipment. In addition, the software provides a comprehensive view of all central office equipment details, including model numbers, serial numbers, nodes, heat load, etc. CenoSearch 34 enables users to query or search the entire database of central office locations to a specific piece of equipment, which is used for identifying spare parts, maintenance records or determining depreciation value. CenoReport 36 provides management reports of central office data needed to facilitate decision-making. Some report examples, which can be developed are Cable Report, Power Report, Grounding Report, Open Rack Space Report, Colocation Report, etc. From the Figure 3 screenshot, the user has the ability to retrieve central office equipment and inventory reports in a format that is user friendly. The method increases the productivity of the user by simplifying engineering work flow and financial and accounting functions.

[00029] In an example, the user has the ability to retrieve central office drawings by clicking on CenoDraw 30. This sends the user to the Figure 4 drawing search screen for input of data. The user is required to input a base number 40 or any other information such as floor 42, letter 44, along with building name 46 or common language location identifier (CLLI) 48. Upon entry to known information, the user can then query the database and retrieve a multitude of central office drawings and floors. The information can be narrowed by specific letters or CLLI codes to pinpoint the desired data.

[00030] A drawing search according to Figure 4 results in a select number of drawings presented on the search results screen illustrated in Figure 8. By clicking on the search

results 80, the drawing can be viewed with a free downloadable program, such as Autodesk Voloview Express 2, as shown in Figure 10. Once within the screen illustrated in Figure 10, the drawing of the central office showing the racks and isles can be panned. The user may scroll on the drawing and zoom in and out for greater detail.

[00031] By clicking on a portion of Figure 10, an individual piece of equipment such as a rack, may be retrieved such as that shown in Figure 11. Figure 11 shows a two-dimensional view of a rack including filled and unfilled positions. As a matter of convention, the lowest position is the one closest to the bottom of the rack. An important feature of the present invention is the ability to link racks to the drawing 1000 by the user. By clicking within the rack drawing, the user is presented with a view of the two-dimensional representation of the rack as illustrated in Figure 14.

[00032] In another example of the operation of the invention, the user has the ability to retrieve central office equipment rack information by clicking CenoRack 32 as shown in Figure 3. This brings up the screen illustrated in Figure 5. Once the user inputs base number 50, floor number 52 or letter 54, the database is queried to produce one or more drawings as shown in Figure 9. From the drawings retrieved during the search, a detail of the rack is uncovered as shown in Figure 12.

[00033] Figure 3 provides the user the ability to retrieve specific central office equipment information, including equipment details bypassing the drawing of Figure10 and the rack shown in Figure 11. By clicking on CenoSearch 34, the user is sent to Figure 6 to input data. The user is requested to input either the serial number 60, barcode 62 or the equipment type 64. This sends the user to the equipment details of the central office equipment shown in Figure 12, bypassing the search results screen Figure 8.

[00034] Figure 3 provides the user the ability to retrieve predefined reports of central office equipment inventory, including transport, power, colocation, and open

space, allowing the user to view reports based upon an entire central office inventory records. By clicking on CenoReport 36, the user is sent to Figure 7 to retrieve the desired reports. Predefined reports may include aisle rack, telephone equipment, cable, empty space and Internet equipment reports.

[00035] Throughout every figure screen, (Figure 1 to Figure 13), the user can click the log out button 1300, in order to log out from the CenoTrack site.

[00036] Illustrated in Figure 16 is the overall architecture of the present invention. A user 1602 logs in through Internet 1604 to a web server 1606. If the login script 1608 is verified, the user may use the web server to view drawing modules, to search rack modules, to search for equipment or to generate reports. The web server 1606 interfaces with a database 1612 through search query script 1610. The database contains rack images, equipment images, reports and drawings.

[00037] The process flow of the present invention is illustrated in block diagram form in Figure 15. From the login screen 1502, the user can obtain information about CenoTrack in box 1504 or log onto the CenoTrack main menu 1506. From the main menu, a user may choose CenoDraw 1508 to perform a drawing search step1510, which can be obtained from entry of a base number, floor number, letter, building name, or CLLI code. The drawing search results 1512 lead to the actual drawing 1514. The actual drawing can be panned, scrolled or zoomed to the desired location.

[00038] By selecting a portion of the drawing shown in Figure 10, a link to the corresponding rack is made in step 1516 and which is displayed in Figure 11. Rack details 1518 can then be displayed as shown in Figure 12.

[00039] If CenoRack 1520 is chosen from the main menu, the rack search page 1522 is presented. By entering base number, floor number or letter as shown in Figure 5, the rack

search results 1524 are presented as shown in Figure 9. More detailed information can be obtained from rack page 1516 and rack details 1518.

[00040] When choosing CenoSearch 1530 from the main menu, a search for equipment can be made. In step 1532 the equipment search page is presented for user input of serial number, barcode and equipment type. The query results in the rack search or in the rack detail page depending upon the input information.

[00041] Selection of CenoReport 1540 from the main menu brings up a view report module. A report search page 1542 illustrated in Figure 7 contains predefined reports 1544 which may be chosen as desired.

[00042] At any time throughout the use CenoTrack, the log out feature 1550 may be chosen to end the session.

[00043] Appendix -- A Source Code Listing of the Operation of the invention Comprising 1 Fiche of 39 Frames

[00044] While the invention has been described in connection with a preferred embodiment, it is not intended to limit the scope of the invention to the particular form set forth, but on the contrary, it is intended to cover such alternatives, modifications, and equivalents as may be included within the spirit and scope of the invention as defined by the appended claims.

Claims

What is claimed is:

[c0001] A system for tracking central office telecommunications equipment information, comprising:

a database of telecommunications equipment information for a central office;

a graphical user interface for providing access to the database and visual representations of equipment information within a central office;

a search engine for responding to user queries of the database of telecommunication equipment information;

a management report generator for extracting and providing reports on the equipment contained in a central office based on the results of a search engine query;

and

a drawing system interfacing with the graphical user interface and the database for viewing, printing and editing drawings depicting central office equipment.

[c0002] The system of Claim 1 wherein the access to the database is through the Internet.

[c0003] The system of Claim 1 wherein the visual representation allows a drawing to be panned, zoomed and scrolled.

[c0004 The system of Claim 3 wherein a link is established between the visual representation of the drawing and the equipment including rack details.

[c0005] The system of Claim 1 wherein types of equipment and inventory records contained in the database are accessed and reported as a group.

[c0006] The system of Claim 1 wherein position number is used to organize display of racks and equipment in a visual representation.

[c0007] The system of Claim 1 wherein access to the central office telecommunications equipment information is restricted by security controls on users.

[c0008] The system of Claim 1 wherein access to the database is through a wireless application protocol.

[c0009] A method of tracking central office telecommunications equipment information, comprising the steps of:

storing telecommunications equipment information for a central office in a database;

providing access to the database and visual representations of equipment information within a central office through a graphical user interface;

searching the database of telecommunication equipment information in response to a user query;

extracting and providing management reports on the equipment information contained in a central office based on the query search results; and

interfacing with the graphical user interface and the database for viewing, printing and editing drawings depicting central office equipment.

[c00010] The method of Claim 9 wherein access to the database is through the Internet.

[c00011] The method of Claim 9 wherein a drawing may be manipulated by panning, zooming and scrolling.

[c00012] The method of Claim 9 wherein a link is established between the visual representation of a drawing and the equipment including rack details.

[c00013] The method of Claim 9 wherein the types of equipment and inventory records contained in the database are accessed and reported as a group.

[c00014] The method of Claim 9 wherein position number is used to organize display of racks and equipment in a visual representation.

[c00015] The method of Claim 9 wherein access to the central office telecommunications equipment information is restricted by security controls on users.

[c00016] The method of Claim 9 wherein access to the database is through a wireless application protocol.

[c00017] A computer program product for tracking central office telecommunications equipment information comprising:

a computer useable medium having a computer readable program code means embodied in the computer usable medium for causing an application program to execute on a computer system, the computer readable program code means comprising:

computer readable program code for storing a database containing telecommunications equipment information for a central office;

computer readable program code for providing access to the database and visual representations of equipment information within a central office.

computer readable program code for querying the database for information based on a user request;

computer readable program code for visually presenting the results of the query in the form of reports; and

computer readable program code for allowing the viewing, printing and editing of drawings depicting central office equipment.

[c00018] The computer program product of Claim 17 wherein the database is accessed through the Internet.

[c00019] The computer program product of Claim 17 wherein the database is accessed through a wireless application protocol.

[c00020] The computer program product of Claim 17 wherein access to the central office telecommunications equipment information is restricted by security controls on users.

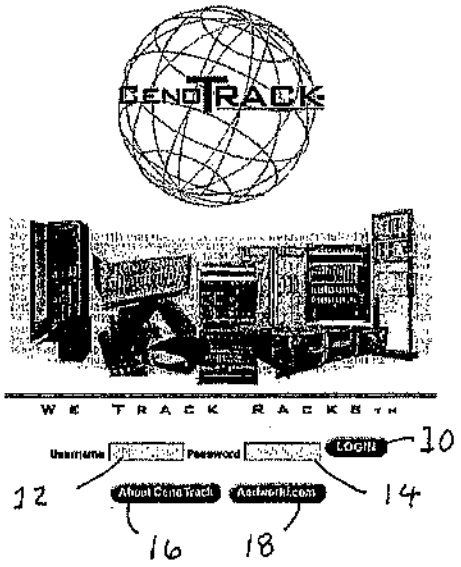

CENOTRACK
WE TRACK RACKS TH
Username
Password
LOGIN
10
12
14
16
18

Figure 1

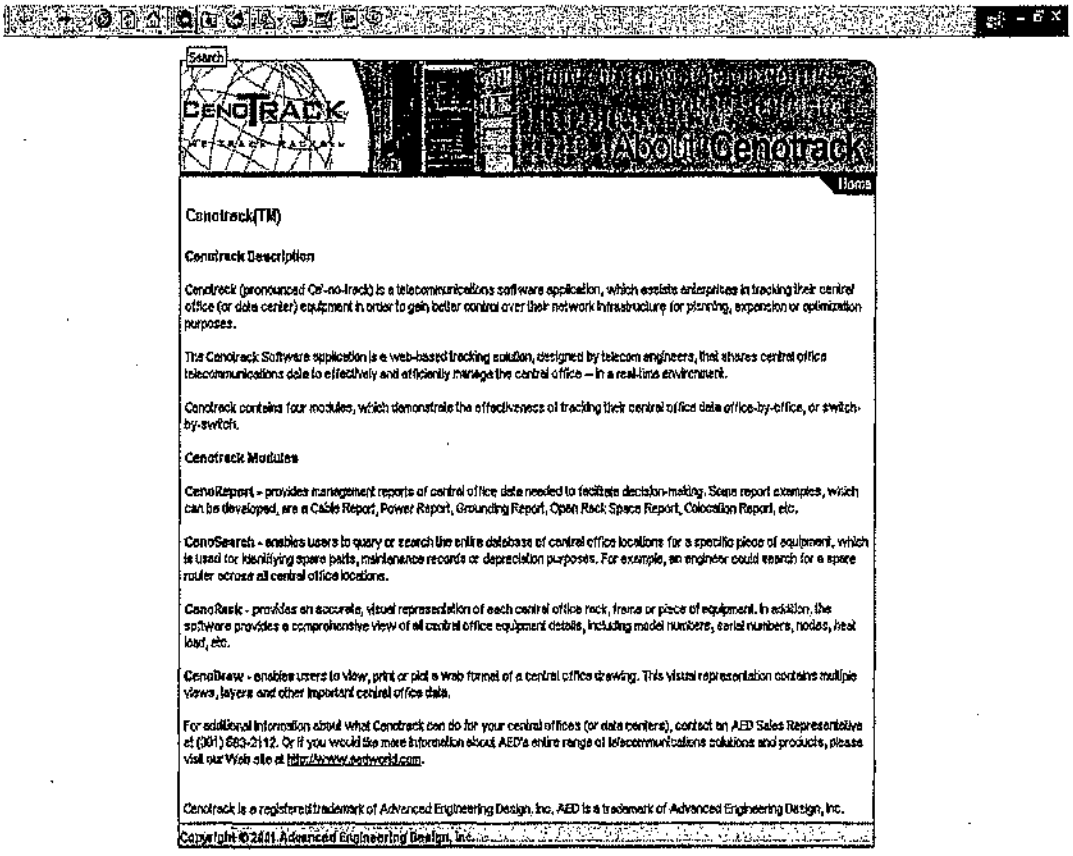

Search
CENOTRACK
About Cenotrack
Home
Cenotrack(TM)
Cenotrack Description
Cenotrack (pronounced Ce-no-track) is a telecommunications software application, which assists enterprises in tracking their central office (or data center) equipment in order to gain better control over their network infrastructure for planning, expansion or optimization purposes.
The Cenotrack Software application is a web-based tracking solution, designed by telecom engineers, that shares central office telecommunications data to effectively and efficiently manage the central office – in a real-time environment.
Cenotrack contains four modules, which demonstrate the effectiveness of tracking their central office data office-by-office, or switch-by-switch.
Cenotrack Modules
CenoReport - provides management reports of central office data needed to facilitate decision-making. Some report examples, which can be developed, are a Cable Report, Power Report, Grounding Report, Open Rack Space Report, Colocation Report, etc.
CenoSearch - enables users to query or search the entire database of central office locations for a specific piece of equipment, which is used for identifying spare parts, maintenance records or depreciation purposes. For example, an engineer could search for a spare router across all central office locations.
CenoRack - provides an accurate, visual representation of each central office rack, frame or piece of equipment. In addition, the software provides a comprehensive view of all central office equipment details, including model numbers, serial numbers, nodes, heat load, etc.
CenoDraw - enables users to view, print or plot a web format of a central office drawing. This visual representation contains multiple views, layers and other important central office data.
For additional information about what Cenotrack can do for your central offices (or data centers), contact an AED Sales Representative at (301) 560-2112. Or if you would like more information about AED's entire range of telecommunications solutions and products, please visit our Web site at http://www.aedworld.com.
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Figure 2

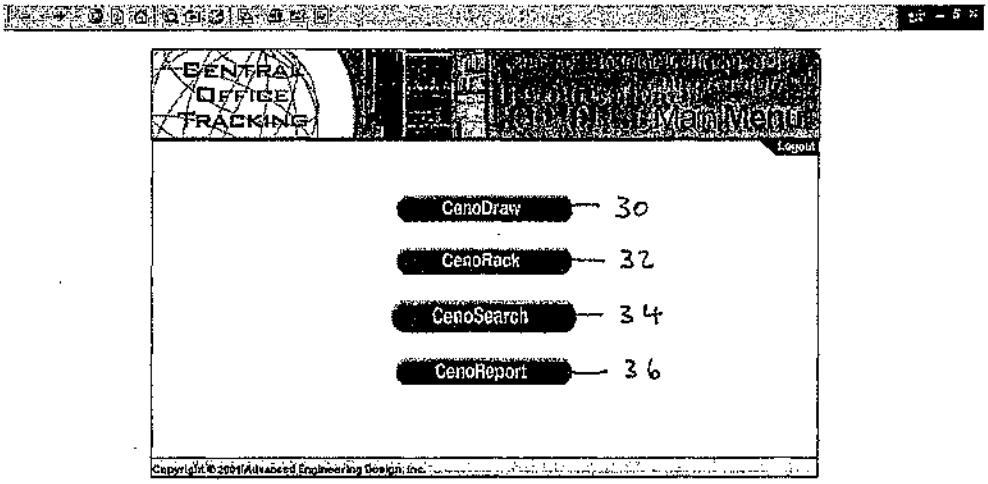
CENTRAL OFFICE TRACKING
Logout
CenoDraw
30
CenoRack
32
CenoSearch
34
CenoReport
36
Copyright © 2001 Advanced Engineering Design, Inc.

Figure 3

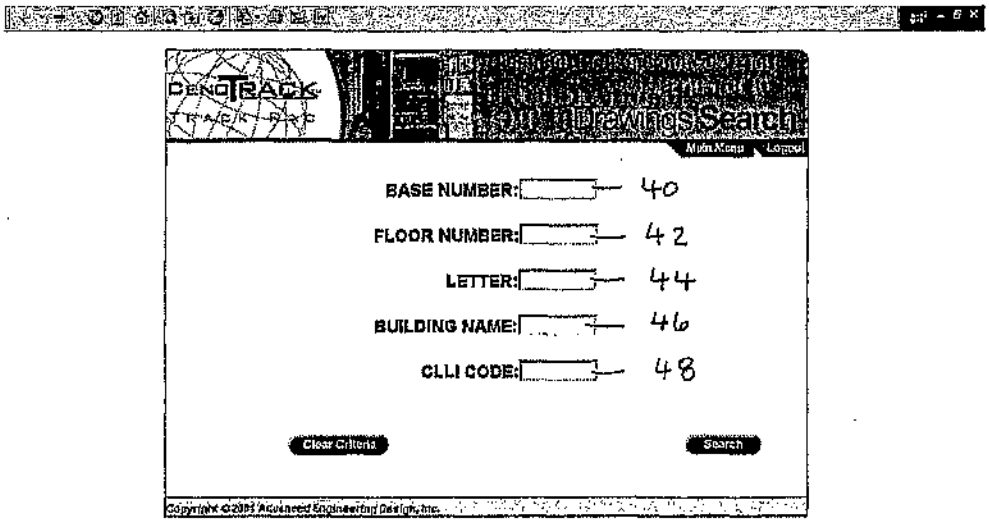
DENOTRACK
Drawings Search
Main Menu
Logout
BASE NUMBER:
40
FLOOR NUMBER:
42
LETTER:
44
BUILDING NAME:
46
CLLI CODE:
48
Clear Criteria
Search

Figure 4

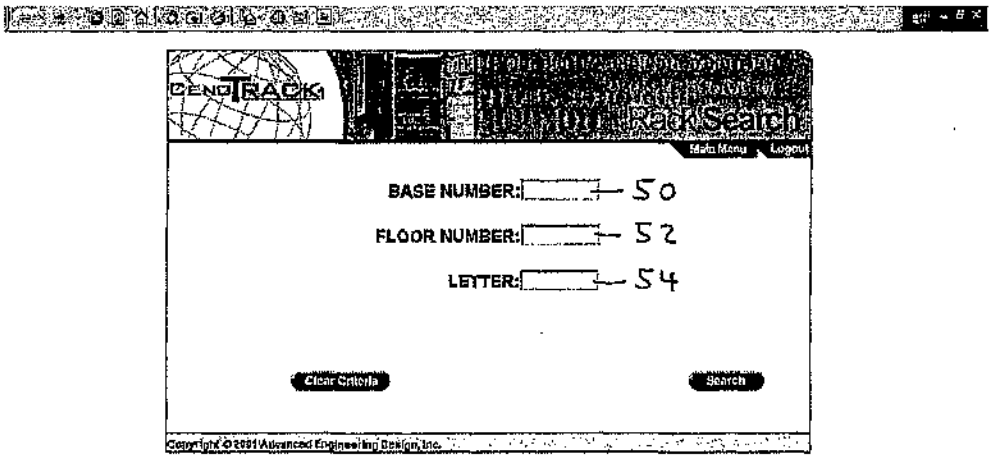
CENOTRACK
Rack Search
Main Menu
Logout
BASE NUMBER:
FLOOR NUMBER:
LETTER:
50
52
54
Clear Criteria
Search
Copyright © 2001 Advanced Engineering Design, Inc.

Figure 5

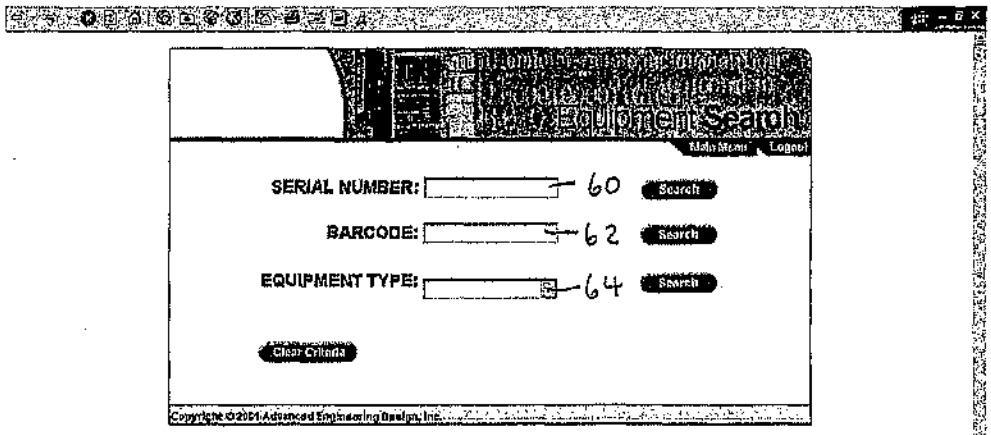
Equipment Search
Main Menu
Logout
SERIAL NUMBER:
60
Search
BARCODE:
62
Search
EQUIPMENT TYPE:
64
Search
Clear Criteria
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Figure 6

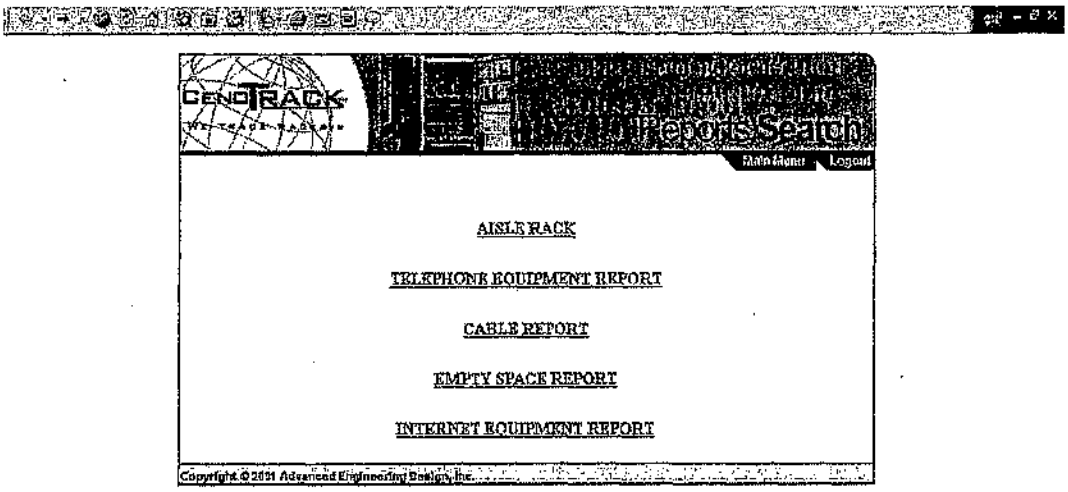
CENOTRACK
Reports Search
Main Menu
Logout
AISLE RACK
TELEPHONE EQUIPMENT REPORT
CABLE REPORT
EMPTY SPACE REPORT
INTERNET EQUIPMENT REPORT
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Figure 7

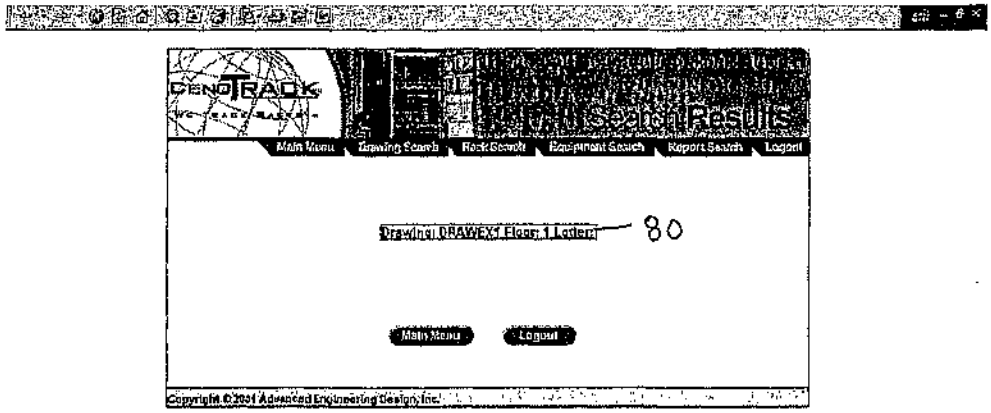
DENOTRACK
Main Menu
Drawing Search
Rock Search
Equipment Search
Report Search
Logout
Drawing DRAWEXT Floor 1 Loaded
80
Main Menu
Logout
Copyright © 2001 Advanced Engineering Design, Inc.

Figure 8

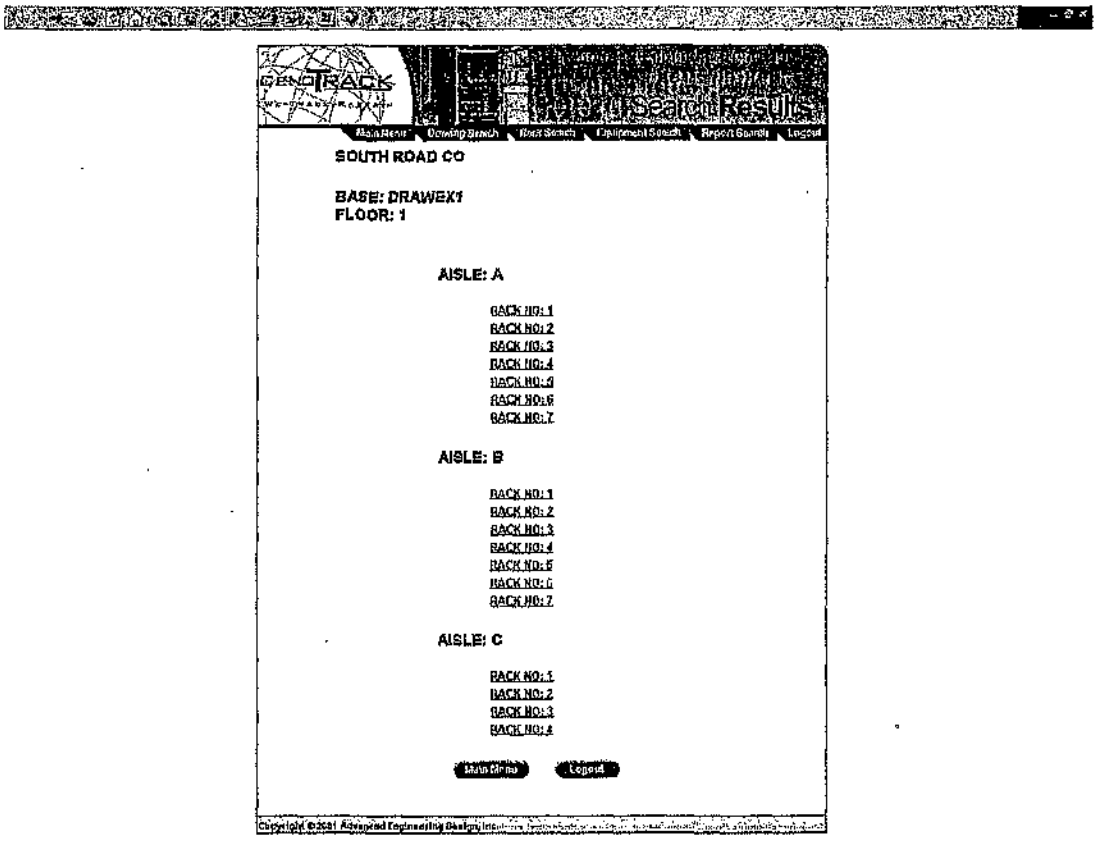
GeoTRACK
Main Menu
Drawing Search
Rack Search
Equipment Search
Report Search
Logout
SOUTH ROAD CO
BASE: DRAWEX1
FLOOR: 1
AISLE: A
RACK NO: 1
RACK NO: 2
RACK NO: 3
RACK NO: 4
RACK NO: 5
RACK NO: 6
RACK NO: 7
AISLE: B
RACK NO: 1
RACK NO: 2
RACK NO: 3
RACK NO: 4
RACK NO: 5
RACK NO: 6
RACK NO: 7
AISLE: C
RACK NO: 1
RACK NO: 2
RACK NO: 3
RACK NO: 4
Main Menu
Logout

Figure 9

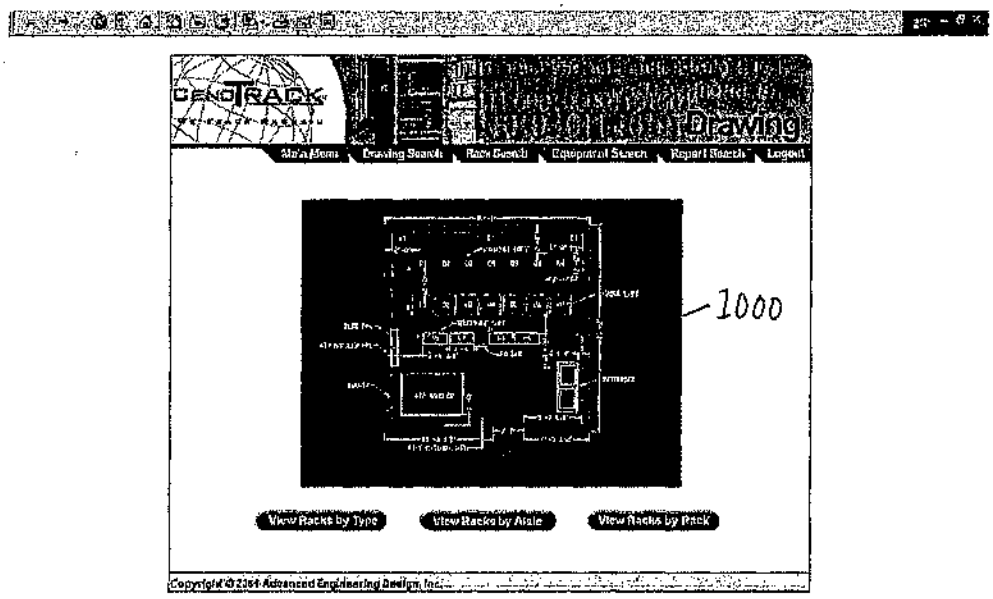
CENTRAK
Drawing
1000
View Racks by Type
View Racks by Aisle
View Racks by Rack

Figure 10

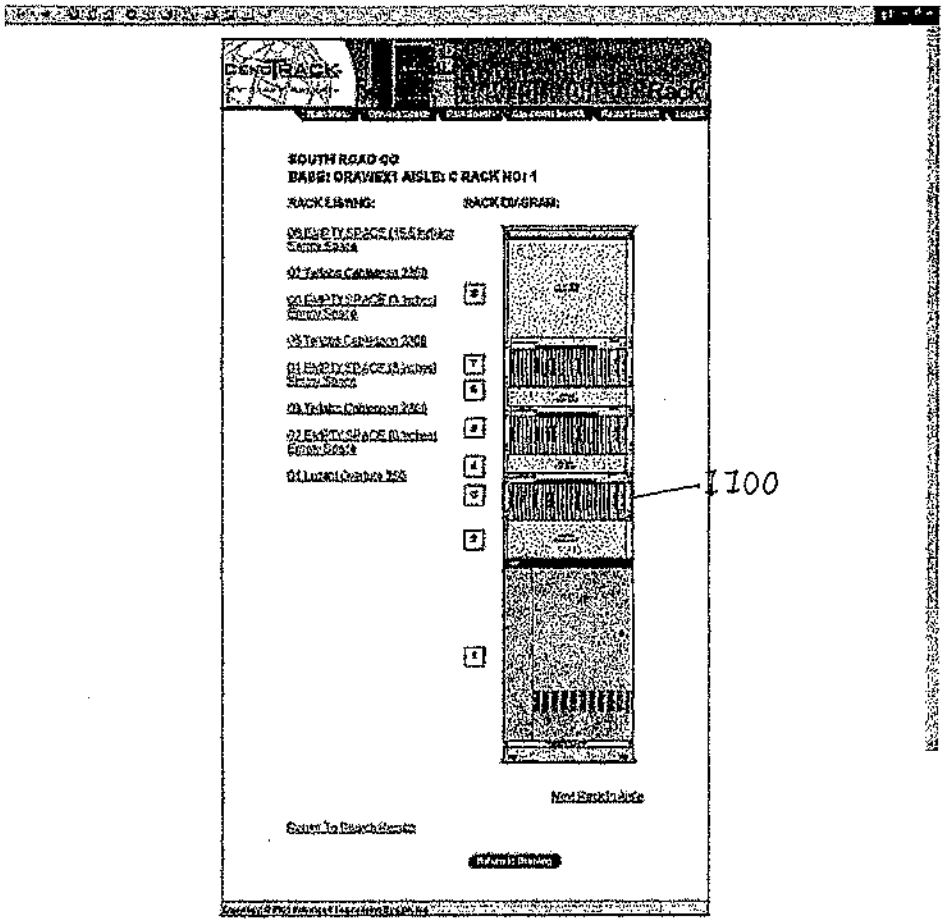

Figure 11

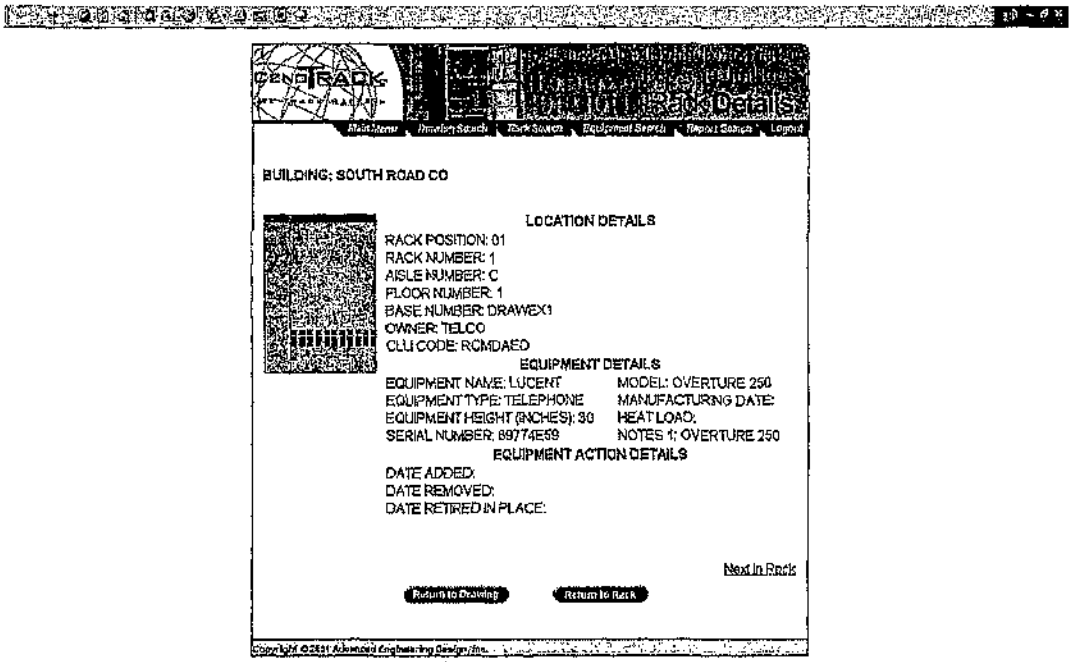
CENDTRACK
Rack Details
Main Menu
Division Search
Rack Search
Equipment Search
Report Search
Logout
BUILDING: SOUTH ROAD CO
LOCATION DETAILS
RACK POSITION: 01
RACK NUMBER: 1
AISLE NUMBER: C
FLOOR NUMBER: 1
BASE NUMBER: DRAWEX1
OWNER: TELCO
CLLI CODE: RCMDAED
EQUIPMENT DETAILS
EQUIPMENT NAME: LUCENT
MODEL: OVERTURE 250
EQUIPMENT TYPE: TELEPHONE
MANUFACTURING DATE:
EQUIPMENT HEIGHT (INCHES): 30
HEAT LOAD:
SERIAL NUMBER: 89774E59
NOTES 1: OVERTURE 250
EQUIPMENT ACTION DETAILS
DATE ADDED:
DATE REMOVED:
DATE RETIRED IN PLACE:
Next In Rack
Return to Drawing
Return to Rack
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Figure 12

CENOTRACK
Logout
1300
You have signed off your session.
Please visit Cenotrack again.

Figure 13

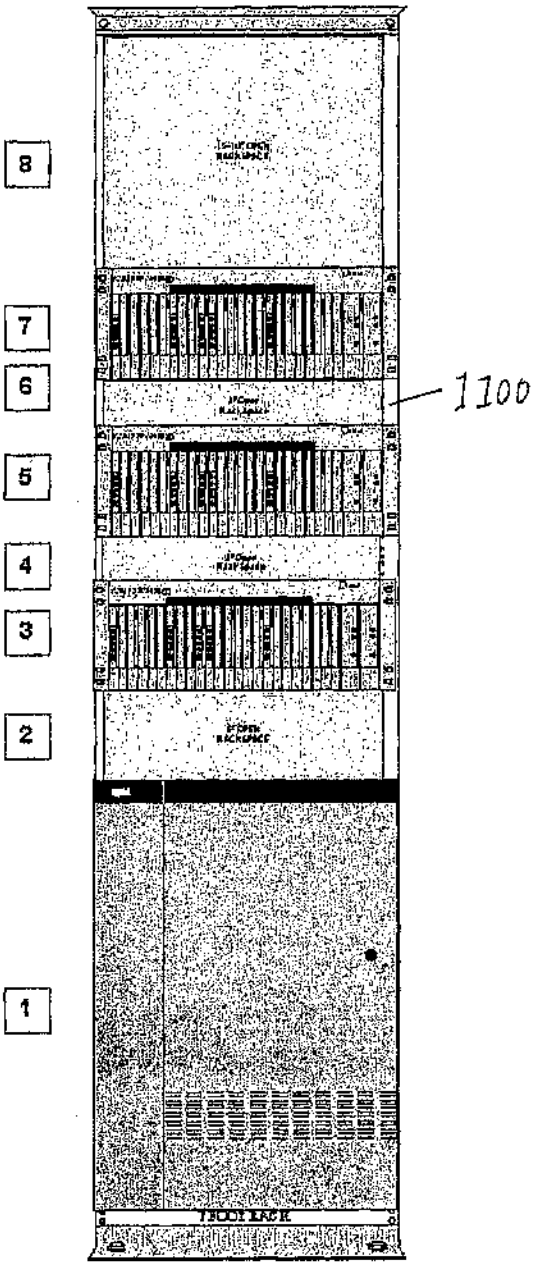

Figure 14

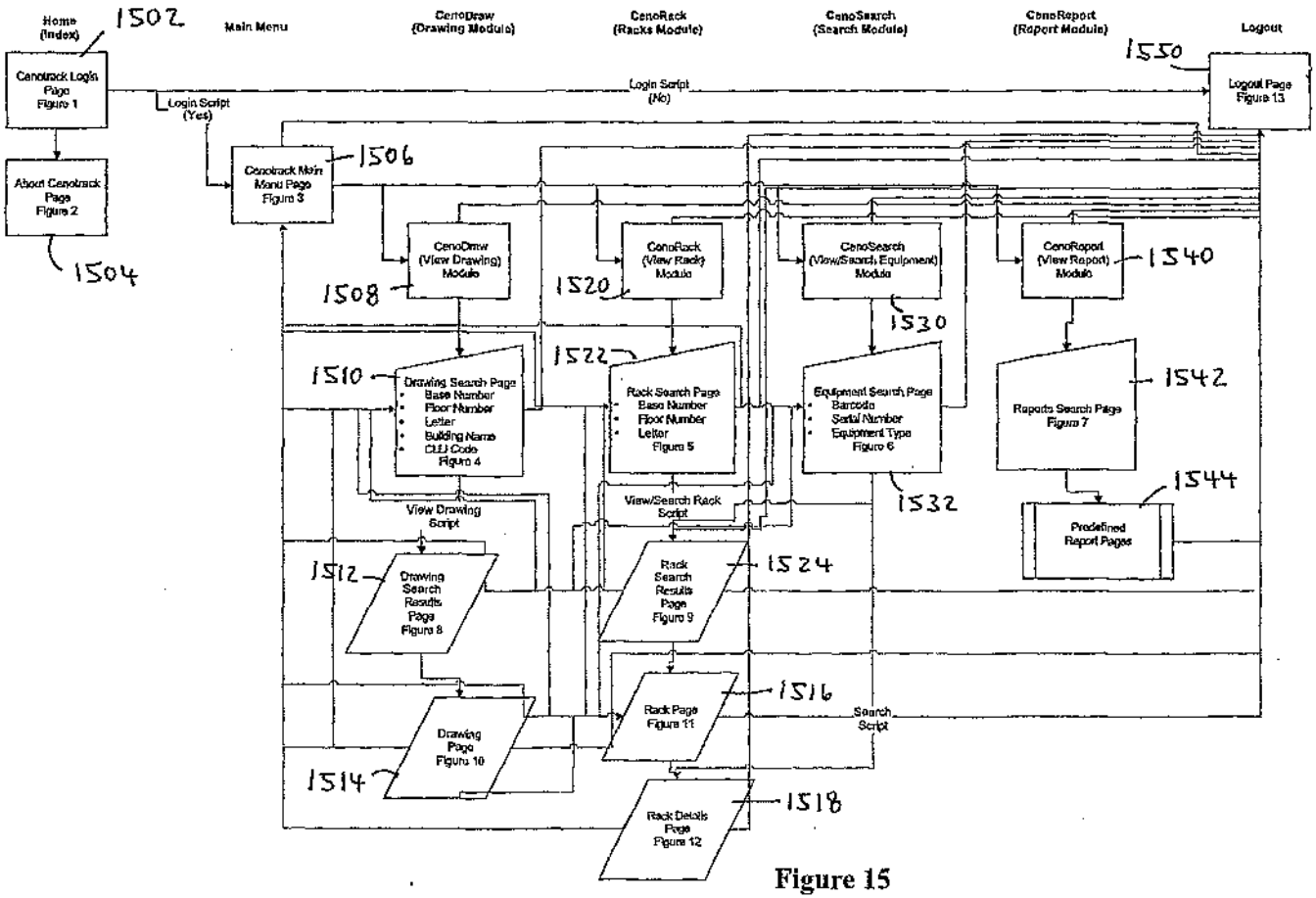
Home (Index)
1502
Main Menu
CenoDraw (Drawing Module)
CenoRack (Racks Module)
CenoSearch (Search Module)
CenoReport (Report Module)
Logout
1550
Cenotrack Login Page Figure 1
Login Script (No)
Logout Page Figure 13
Login Script (Yes)
About Cenotrack Page Figure 2
1504
Cenotrack Main Menu Page Figure 3
1506
CenoDraw (View Drawing) Module
1508
CenoRack (View Rack) Module
1520
CenoSearch (View/Search Equipment) Module
1530
CenoReport (View Report) Module
1540
1510
Drawing Search Page
Base Number
Floor Number
Letter
Building Name
CLLI Code
Figure 4
1522
Rack Search Page
Base Number
Floor Number
Letter
Figure 5
Equipment Search Page
Barcode
Serial Number
Equipment Type
Figure 6
1532
Reports Search Page Figure 7
1542
1544
Predefined Report Pages
View Drawing Script
View/Search Rack Script
1512
Drawing Search Results Page Figure 8
Rack Search Results Page Figure 9
1524
Rack Page Figure 11
1516
Search Script
Drawing Page Figure 10
1514
Rack Details Page Figure 12
1518

Figure 15

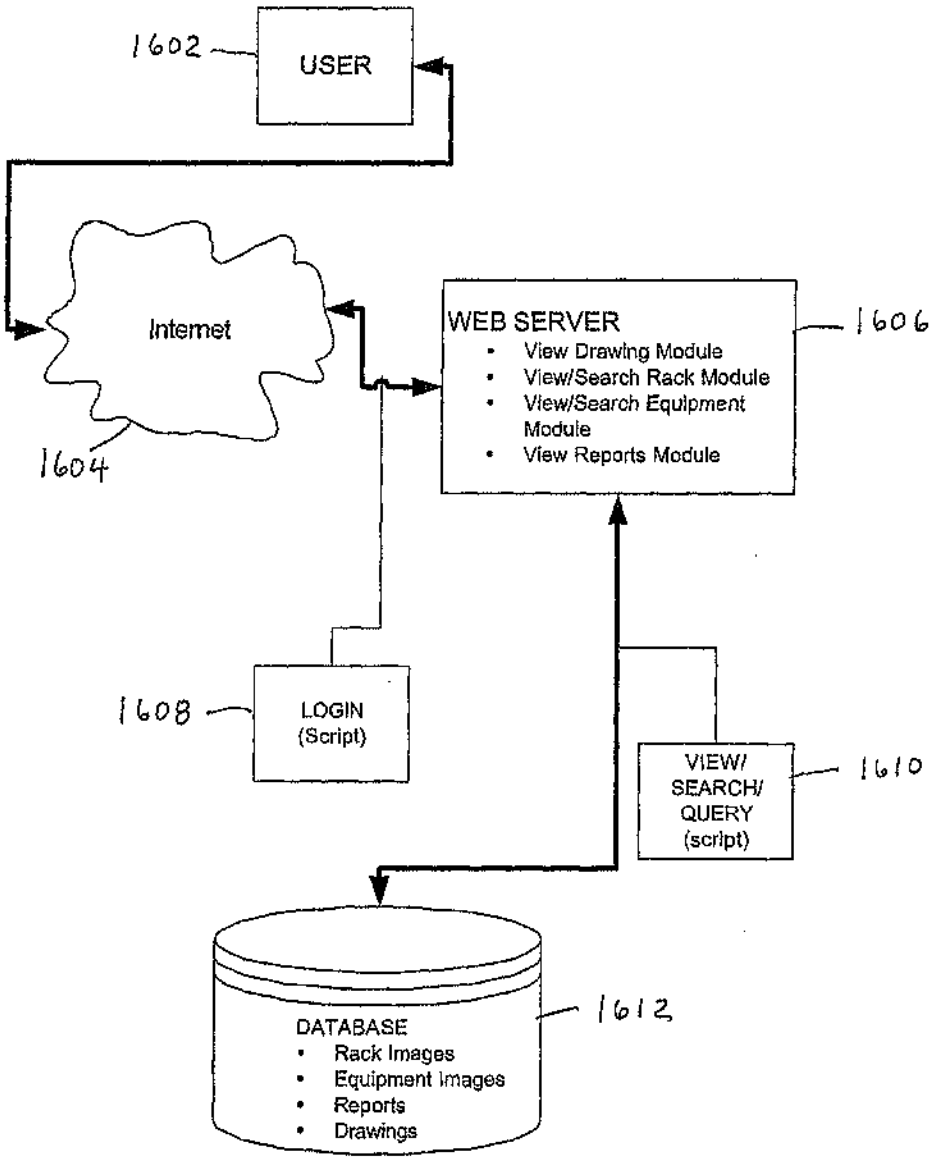
1602
USER
Internet
1604
WEB SERVER
• View Drawing Module
• View/Search Rack Module
• View/Search Equipment Module
• View Reports Module
1606
1608
LOGIN (Script)
VIEW/ SEARCH/ QUERY (script)
1610
DATABASE
• Rack Images
• Equipment Images
• Reports
• Drawings
1612

Figure 16

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US01/42630

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : G06F 17 / 30
US CL : 707/203; 705/54; 709/228; 370/254; 370/352; 379/201.04

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
U.S. : 707/203; 705/54; 709/228; 370/254; 370/352; 379/201.04

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
Please See Continuation Sheet

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5,875,242 A (Glaser et al) 23 February 1999 (23.02.1999), columns 1-42 and Abstract.	1-7, 9-15 and 17
Y	US 6,038,301 A (Nightingale) 14 March 2000 (14.03.2000), columns 1-26.	1-7, 9-15 and 17
X	US 5,915,008 A (Dulman) 22 June 1999 (22.06.1999), see entier patent	8, 16, and 18-20

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
05 February 2002 (05.02.2002)	26 MAR 2002
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703)305-3230	Authorized officer Haythim J. Alaubaidi Telephone No. (703) 305-1950

Form PCT/ISA/210 (second sheet) (July 1998)

Continuation of B. FIELDS SEARCHED Item 3:
WEST (database, GUI, graphic user interface, query, telecom, drawing, report, wireless, log, password, authentication, network, internet)

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International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 :
G06K 5/00, 7/01, 17/00, G08B 13/14, 13/00, G01S 13/00

A1

(11) International Publication Number: **WO 98/43197**

(43) International Publication Date: 1 October 1998 (01.10.98)

(21) International Application Number: PCT/US98/05592

(22) International Filing Date: 24 March 1998 (24.03.98)

(30) Priority Data:
08/823,942 25 March 1997 (25.03.97) US

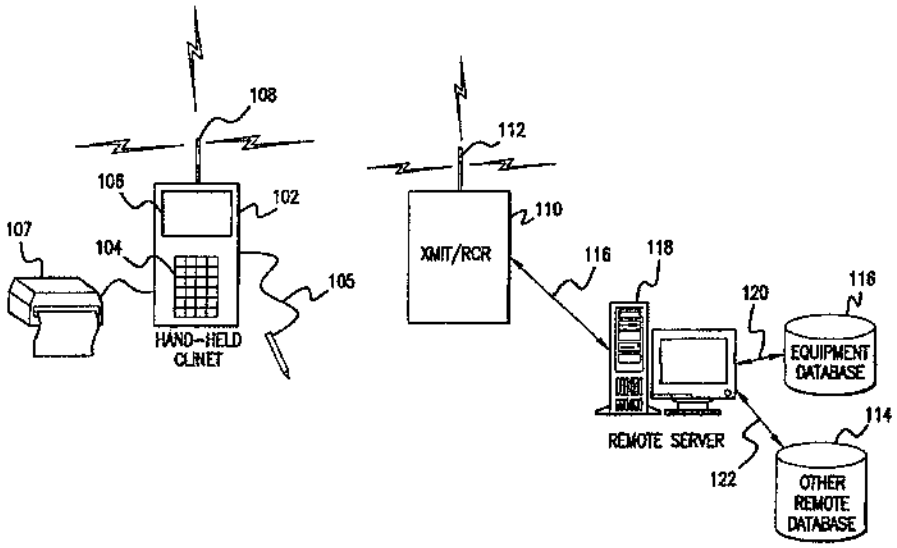
(71) Applicant: MCI COMMUNICATIONS CORPORATION [US/US]; Law and Public Technology Dept., 1133 19th Street, N.W., Washington, DC 20036 (US).

(72) Inventors: HUGHES, Craig, T.; 1604 S. Chilton, Tyler, TX 75710 (US). STOKES, Darel, R.; 4616 Timber Run Drive, Arlington, TX 76001 (US).

(81) Designated States: AU, CA, JP, MX, European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).

Published
With international search report.

(54) Title: SYSTEM AND METHOD FOR REGISTERING AND MAINTAINING FIELD EQUIPMENT INVENTORY BASED ON INDIVIDUALIZED EQUIPMENT AND LOCATION INFORMATION



(57) Abstract

A system and method for registering and tracking network equipments at the circuit card level. A computer network server is coupled with an equipment database (114) that contains location for telecommunication network assets. A hand–held client (102) comprising a display (106), keyboard (104), bar code scanner (105) and printer (107) is coupled, via a radio link, to the computer network server (118). The hand–held client is used to register network assets and to query the equipment database for information relating to network assets. Users visit remote sites and register network assets in real–time, while walking through the equipment bays.

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CM	Cameroon	KR	Republic of Korea	PT	Portugal		
CN	China	KZ	Kazakstan	RO	Romania		
CU	Cuba	LC	Saint Lucia	RU	Russian Federation		
CZ	Czech Republic	LI	Liechtenstein	SD	Sudan		
DE	Germany	LK	Sri Lanka	SE	Sweden		
DK	Denmark	LR	Liberia	SG	Singapore		
EE	Estonia						

System And Method For Registering And Maintaining Field Equipment Inventory Based On Individualized Equipment And Location Information

Background of the Invention

Field of the Invention

The present invention relates generally to telecommunication equipment tracking, and more specifically to a system and method for registering and maintaining location and other data for telecommunication field equipment at the circuit card level.

Related Art

A long distance telecommunications service provider (hereinafter "service provider"), typically maintains billions of dollars worth of network assets. The majority of such network assets are typically installed in numerous field sites throughout a vast geographical area that encompasses a long distance telephone network. For example, MCI maintains billions of dollars worth of network equipment located throughout North America in various field sites.

Generally, once network assets are shipped from distribution centers to the field, the service provider loses a degree of control and visibility over the assets. This is particularly true for network assets at the card level. Typically, network assets can be broken down into a plurality of circuit cards. For much of the network equipment, such circuit cards are typically mounted in generic-type equipment bays. Such equipment bays are typically organized as a plurality of side-by-side racks, each having a plurality of top-to-bottom shelves, wherein each shelf contains a plurality of vertically mounted slots. Circuit cards are installed in the vertically mounted slots.

Each circuit card is generally identified by a unique serial number. In addition, each slot can be identified by specifying a unique location hierarchy. For example a particular slot can be distinguished by specifying predetermined identifiers that represent the particular site, floor, row, equipment bay, rack,

shelf and slot. Thus, individual cards can be completely identified by their serial number and their slot location hierarchy. Individual circuit card identification is necessary so that engineering changes, software updates, and other maintenance procedures can be performed at the card level.

However, the problem is that once a field site receives a piece of network equipment, the service provider looses visibility of individual circuit cards. It is common practice that such circuit cards are moved around within the remote site. For example, circuit cards that break down are taken out of service and replaced by spare circuit cards. In addition, circuit cards from one equipment bay may be placed in other equipment bays as needs arise. Thus, many difficulties occur when particular circuit cards need to be retrieved by the service provider.

For example, field modification bulletins are sent by equipment manufactures to notify customers about defective equipment. The manufacturer typically provides corrective measures designed to repair the defect. For example, replacement chips or replacement circuit cards may be provided. Thus, the service provider must be able to locate all of the circuit cards within the network that are subject to the defect noted in the field modification bulletin.

However, because of the low visibility of the network assets at the circuit card level, this can be a very difficult task. Service providers typically respond to field bulletins by sending out hundreds of notices, via courier, E-Mail and the like, to telecommunication personnel nationwide. The personnel are typically asked to report the numbers and locations of affected circuit cards within their jurisdiction. In order to comply with such requests, service personnel are typically dispatched into the field for manual inspections. Generally, this involves sending hundreds of personal to various field sites to search for the affected circuit cards. The searches are performed manually by inspecting each slot location in equipment bays where such cards are expected to be located. This can be an extremely expensive and time consuming process.

Another problem that occurs due to low visibility of network assets at

the card level, is that service providers have no way of knowing which circuit cards are in-service and which circuit cards are being used as spares. Network assets that are being used as spares, need not be depreciated for tax purposes until they are put into service. However, since the service provider does not typically maintain this level of visibility, all network assets are generally depreciated as soon as they are sent into the field. Consequently, using the conventional method, tax records do not accurately reflect the actual use of telecommunication assets.

In addition, many circuit cards are warranted against defects. However, without a proper tracking mechanism in place, it is difficult or impossible to claim warranty rights when necessary. For example, suppose a circuit card has a five year warranty. Without proper tracking, a service provider can not determine which cards are under warranty and which cards are not.

What is needed therefore, is an efficient system and method for tracking network assets at the card level.

Summary of the Invention

Accordingly, the present invention provides a means for registering and tracking network equipment at the card level. A computer network server is coupled with an equipment database that contains the identification, status and location of telecommunication network assets. A hand-held client, comprising a display, keyboard, bar code scanner and printer is coupled, via a radio link, to the computer network server.

The hand-held client is used to register network assets. In addition, the hand-held client is used to query the equipment database for information relating to network assets. A desktop client can also be used with the present invention. One advantage of using a hand-held unit to implement an embodiment of the present invention, is that such units are very convenient to use in the field. Users can visit remote sites and register network assets in real-time, while walking through the equipment bays. In one embodiment, bar codes are used to display part numbers and serial numbers on circuit cards. In

addition, bar codes are used to identify circuit card locations in terms of predefined identification numbers for the site, equipment bay, rack, shelf and slot. In other embodiments, some or all of the preceding information is entered into the keyboard of the hand-held client. Accordingly, service provider personnel (hereinafter "user(s)"), can register network assets by walking through remote sites and entering data collected from equipment bays into the hand-held client.

The hand-held clients are driven by specialized software that resides within the the hand-held client and the remote network server. The software provides users with menu-driven screen prompts that takes them through a registration process in a step-by-step fashion. The user begins the registration process by entering a starting location into the hand-held client. For example the user specifies a particular site, floor, row, bay, shelf and slot. This information can be specified by entering the information into the keyboard or by scanning bar codes that represent each location. Next, beginning at the starting point specified by the user, each circuit card is registered by scanning the part and/or serial number(s) into the hand-held client. After such numbers are entered, the equipment database is updated in real time with the new information. Additional information, such as a description, the revision level and the like can be entered for each circuit card. Typically, users enter data in sequence according to slot positions. After data for one slot position is entered, the display screen on the hand-held client is automatically updated with location information for the next slot position. However, the user can alter the location information at any time by editing the location information that is presented on the screen of the hand-held client.

An additional feature of the present invention is that the user can access the equipment database to determine information related to assets that have already been registered. For example, a user can query the equipment database to determine what type of circuit card is registered for a particular slot. In this fashion, users can determine information about cards that are currently in service. For example, if a service provider specific part number (SPN), is not

indicated on a circuit card, a user can query the equipment database with the manufactures part number (MPN). This will cause the equipment database to send back information to the hand-held client that will enable it to print out a bar code that reflects the SPN for immediate placement on the circuit card. In one embodiment, bar codes representing location data can be printed for immediate placement in the field.

An additional feature of the present invention is that it can be used during shipping and receiving network equipment. In one embodiment, the hand-held client is used to generate the appropriate shipping documents and database records needed to transfer equipment from one site to another. Upon receipt of such shipped items, a user at the receiving end of the shipment, uses the hand-held client to indicate receipt by scanning barcodes associated with the received equipment.

Yet another feature of the present invention is that it can be used in the field to swap replacement cards from equipment bays with cards from the spares inventory. Further, in one embodiment, a means is provided to effortlessly record the movement of circuit cards from one slot to another within a remote site. Still further, in a preferred embodiment, the present invention provides a means to copy the configuration of an entire equipment bay to facilitate the registration process under certain circumstances.

Further, the present invention can be used in combination with a system for viewing the configuration and placement of equipment at remote field sites. Specifically, the present invention can be used a means to input data into such as system. An example of such a system can be found in the above referenced U.S. Patent application entitled "System and Method for Recording, Maintaining and Viewing Configuration and Placement of Equipment in Field Sites".

Brief Description of the Figures

The present invention will be described with reference to the accompanying figures, wherein:

FIG. 1 is a block diagram depicting an operational environment of the present invention;

FIG. 2 is a block diagram of an equipment bay that is useful for describing the field registration process of the present invention;

FIG. 3 is a flowchart that depicts a process that can be used to register network assets according to a preferred embodiment of the present invention;

FIG. 4 is an example of a main menu screen according to a preferred embodiment of the present invention;

FIG. 5 is an example of a start location screen according to a preferred embodiment of the present invention;

FIG. 6 is an example of a data entry screen according to a preferred embodiment of the present invention;

FIG. 7 is an example of an equipment database inquiry screen according to a preferred embodiment of the present invention; and

FIG. 8 is a block diagram of a computer useful for implementing components of the present invention;

In the figures, like reference numbers generally indicate identical, functionally similar, and/or structurally similar elements. The figure in which an element first appears is indicated by the leftmost digit(s) in the reference number.

Detailed Description of the Preferred Embodiments

FIG. 1 is a block diagram depicting an operational environment of the present invention. A hand-held client 102 is coupled with a portable printing unit 107. The hand-held client 102 comprises a bar-code scanning unit 105, a display screen 106, a keyboard 104 and an antenna 108. The hand-held client 102 also includes a wireless transmitter/receiver (not shown). In one embodiment, the hand-held client 102 is a Spread Spectrum Band Mult-Purpose Terminal manufactured by Epic Data, Inc.

The hand-held client 102 is coupled with a transmitter/receiver unit 110, via wireless transmission links, such as spread spectrum radio frequency links.

Other types of wireless links, such as microwave or satellite links can be used without departing from the scope and breadth of the present invention. The transmitter/receiver unit 110 is coupled with a remote server 118 via a bidirectional transmission line 116. One or more remote databases, such as the remote databases 114 and the equipment database 116, are coupled with the remote server 118, via bidirectional transmission lines 122 and 120, respectively.

FIG. 2 is a block diagram of an equipment bay that is useful for describing the field registration process of the present invention. As stated, network assets are typically classified down to the circuit card level. For much of the network equipment, such circuit cards are mounted in equipment bays that are organized as a plurality of side-by-side racks, each having a plurality of top-to-bottom shelves, each shelf containing a plurality of vertically positioned slots. Circuit cards are installed in the vertically positioned slots. An example of a typical equipment bay is the equipment bay 202 shown in FIG. 2.

The equipment bay 202 comprises a plurality of side-by-side racks. In this example, the equipment bay 202 has 5 racks 206a-206e (generally 206). Each rack 206 comprises a plurality of shelves. In this example, each rack 206 has 6 shelves 204a-204f (generally 204). Further, each shelf 204 comprises a plurality of vertically positioned slots. For simplicity, only the slots within the rack 206e, shelf 204a (upper right corner of the equipment bay 202) is depicted. In this example, each shelf 204 comprises 15 slots 208a-208o (generally 208). Circuit cards, such as the circuit card 214, are installed in the vertical slots 208.

FIG. 3 is a flowchart that depicts a process that can be used to register network assets according to a preferred embodiment of the present invention. The registration process begins with step 302. In step 302, the hand-held client 102 displays a start location screen on the display 106. An example of a start location screen is described below with reference to FIG. 5. In step 302, the user enters location information that identifies the starting position of the

registration process. Typically the location information includes predefined reference numbers that uniquely identify the remote site, the floor within the remote site, and the row in which the first bay is located. In addition, the location information includes the bay, rack, shelf and slot identifiers as previously described. The user enters the preceding information by manually typing in the data via the keyboard 104 or by scanning-in bar codes which represent the appropriate location data, via the scanning device 105.

Note that it is contemplated that bar codes are used wherever possible to increase the efficiency of the registration process. Referring back to FIG. 2, in a preferred embodiment, a single unique bar code 210 is installed on the equipment bay 202 to uniquely identify the equipment bay within the particular remote site. Likewise unique bar codes 218a-218e are installed on each rack 206a-206e. Similarly, unique bar codes 216a-216f are installed on each shelf 204a-204f within each rack 206a-206e. Note that for simplicity, only the shelves 204a-204f in the rack 206a are depicted with bar codes. Finally, unique bar codes 212 representing part numbers and/or serial numbers are installed on each circuit card 214.

Referring back to FIG. 3, after the initial location information has been entered into the hand-held client 102 in step 302, control passes to step 303. In step 303, the hand-held client displays the data entry screen. An example of a data entry screen that can be used to implement and embodiment of the present invention is described below with reference to FIG. 6. Note that the hand-held client 102 is preferably programmed to "walk" through the equipment bays in order to assist the user with the registration process. That is, the hand-held client is preferably programmed to automatically alter location information on behalf of the user during the registration process to increase the efficiency of the process. This feature of the present invention can be implemented using a variety of methods. Generally, the walk through feature anticipates the next location to be registered and automatically provides the appropriate location information on the display screen 106 of hand-held client 102. After reading the present disclosure, various methods that can be used to

implement the walk through feature of the present invention will be apparent to those skilled in the relevant art(s).

In this example, the walk through feature functions as follows. The first time step 303 is performed, the location information displayed on the data entry screen is identical to that entered on the start location screen in step 302. However, the next time step 303 is performed (i.e. after registration of the first network asset), the location information will reflect the anticipated next location. For example, the location information will be altered such that the site, row, bay, rack and shelf identifiers remain the same, but the slot identifier is incremented by 1 location. Thus, if the user is registering network assets in sequential order, the user need not enter additional location information into the hand-held terminal 102.

In addition, the user can 'hot key' to the start location screen (step 302) at any time. From there, the user can alter the location information by changing one or more fields on the start location screen (See FIG. 5). This allows the user to skip locations and perform the registration process in any order. In addition, this allows the user to make adjustments to the next anticipated location provided by the hand-held client 102, as necessary. For example, when a user reaches the last slot 208 in a particular shelf 204, the start location screen is used to alter the location information so that it reflects the first slot 208 on the next shelf 204. As stated, this information can be entered via the keyboard 104 or the scanner 105.

In one embodiment, the hand-held client 102 receives information from the equipment database 116 so that the walk through accurately reflects the actual layout of the equipment bay 210. In this manner, manual adjustments will not typically be necessary. The hand-held client will automatically present sequential location information in a predetermined sequence. Thus, for example, when a user reaches the last slot 208 on a shelf 204, the display screen 106 will automatically be updated to reflect the location of the first slot 208 on the next shelf 204. Similarly, when a user reaches the last slot 208 on the last shelf 204 of a particular rack 206, the display screen will automatically

be updated to reflect the first slot 208 on the first shelf 204 in the next rack 206. Likewise, if a bay 204 is completed, the display screen will automatically be updated to reflect the first slot location 208 in the next bay 202.

As stated, the next anticipated location feature can be implemented using a variety of methods. One factor that should be considered when determining the manner in which to implement this feature is the amount of floor plan and layout information available from the remote database 116. This will vary with each implementation of the present invention.

In one embodiment, additional layout information is provided by the remote database 116 only after a particular equipment bay 202 has been previously registered according to the principles described herein. In this manner, the layout and floor plan information that was collected during the first registration process is used to assist the user during subsequent registration processes. In addition, whenever a particular location has previously been registered, the registration information will be depicted on the display screen 106. This feature can be used to inform the user about what is expected in a particular slot, as well as alert the user to potential registration errors.

Next in step 304, the hand-held client displays a data entry screen. An example of such a data entry screen is depicted in FIG. 6 and subsequently described below. In step 304, the user scans or keys in the manufacture part number (MPN) or the service provider part number (SPN) into the hand-held client 102. In addition, the user can enter additional information such as a description, a serial number and a revision level. Note that is typically not necessary to register both the MPN and the SPN. The equipment database 116 is used to cross-reference such part numbers. Thus, if either the SPN or the MPN is supplied, the other part number is automatically supplied by the equipment database. This feature is further described below with reference to FIG. 6.

In this example embodiment, the MPN is the manufacturers part number and is used to order the component from the manufacturer. The SPN, is the service provider part number and is used internally by the service provider.

SPNs are typically shared among similar network assets, such as circuit cards, that share the same form, fit, and function. Thus, a single SPN may be shared among assets having multiple MPNs. Thus, both MPNs and SPNs designate the type of part. The serial number, on the other hand, uniquely identifies individual components.

Note that the data fields such as MPN, SPN, etc. that are used in the example embodiment of the present invention are used for exemplary purposes only. Other data fields will be used in different implementations. Accordingly, the use of such data fields should not be construed to limit the scope and breadth of the present invention.

Next, in step 306, once the user has completed entering the data on the data entry screen, the enter key is depressed. In step 308, the data entered on the data entry screen is transmitted to the remote server 118. As stated, the hand-held client 102 is preferably linked to the remote server 118 via radio links, such as a spread spectrum radio frequency link. Thus, upon depressing the enter key in step 306, the data on the data entry screen is transmitted to the remote server 118 via the radio link. In step 310 the remote server 118 matches the incoming data with the proper record on the equipment database 116. The process continues with step 312.

In step 312, the process determines if either an MPN was entered (manually or scanned) or an SPN was entered manually rather than scanned. If either of these conditions are true, step 314 causes the printer 107 to print out an SPN bar code 316 for immediate placement on the circuit card 214. In this example, it is assumed that the service provider desires to display the SPN bar code on each circuit card 214 (in addition to a serial number bar code, which is a typical requirement). Thus, if the SPN was manually entered by the user in step 312, the process assumes that the SPN bar code is not present on the circuit card. Likewise, if a MPN was entered in step 312, it is assumed that the SPN bar code is not present on the circuit card 214. Thus, in both cases, the SPN bar code is printed out for immediate placement on the circuit card 214. In addition to this example, other bar codes can be requested by the user to be

printed at any time, as described below. It should be noted that this is one example of a preferred embodiment of the present invention. In other embodiments, either the SPN the MPN or other bar codes can be printed, depending on the needs and desires of the service provider. As such, the use of the preceding examples, should not be construed to limit the scope and breadth of the present invention.

Continuing with step 318, the equipment database 116 is updated with the new network asset information as was entered in steps 302-304. If a record already exists for a particular slot 208, the record is updated with the new information. If a record does not exist, a new record is created. In addition, if one or more circuit card slots 208 are skipped, skeleton records are created to act as place holders for the skipped slots 208.

FIG. 4 is an example of a main menu screen that is displayed on the hand-held client 102, according to a preferred embodiment of the present invention. The main menu screen 401 comprises a number of menu items that can be selected by a user. In this example, the following menu items are provided: Specify Start 402, Collect Data 404, Equipment Database Inquiry 406, and Sign Off 408. Selecting the Specify Start 402 menu item, causes the start location screen to be displayed on the hand-held client 102. The start location screen is described below with reference to FIG. 5. Selecting the Collect Data 404 menu item causes the data entry screen to be displayed on the hand-held client 102. The data entry screen is described below with reference to FIG. 6. Selecting the Equipment Database Inquiry 406 menu item causes the equipment database inquiry screen to be displayed on the hand-held client 102. The equipment database inquiry screen is described below with reference to FIG. 7. Finally, selecting the Sign Off 406 menu item allows the user to sign off from the remote server 118.

FIG. 5 is an example of a start location screen that is displayed on the hand-held client 102, according to a preferred embodiment of the present invention. As stated, the start location screen can reached from the main menu 401. In addition, this screen can be reached from the data entry screen or the

equipment database inquiry screen, as described below. The start location screen 501 comprises a number of fields that are used to identify the starting location of the network asset registration process, such as the one described with reference to FIG. 3. The start location screen 501 includes the following fields: Site 502, Floor 504, Row 506, Bay 508, Shelf 510, and Slot 512. Typically, a user inputs location information by highlighting a field, such as Bay 508. Once a field is highlighted, a user can input information pertaining to the highlighted field by using the keyboard 104 or the scanner 105, as previously described.

In addition, the user can hot key to the main menu by pressing F1 at any time, as indicated by the text 514 at the bottom of the start location screen 501. In addition, the user can hot key directly to the data entry screen (described below), by pressing F2, as indicated by the text 516. The user can also hot key directly to the equipment database inquiry screen (described below) by pressing F3, as indicated by the text 518. In one embodiment, if a user chooses to go to the database inquiry screen and then return directly to the start location screen 501, the location fields pertaining to the last network asset inquired about will be automatically transferred to the start location screen 501. Typically, once data is entered into the start location screen 501, the user presses F2 516 to hot key into the data entry screen.

FIG. 6 is an example of a data entry screen that is displayed on the hand-held client 102, according to a preferred embodiment of the present invention. This screen is used to collect data, and can be reached from the main menu 401, the start location screen 501, or the equipment database inquiry screen (described below). The data entry screen 602 comprises the following input fields: Location 608, SPN 610, MPN 612, Description 614, Serial Number 616 and revision 618.

In this example, the location filed 608 contains location information in the following format: "FFRRBBSSLLA". This indicates character fields for the floor (FF), row (RR), bay (BB), shelf (SS), slot (LL) and A/B indicator (A). The A/B indicator in this example indicates whether the circuit card is a

primary card ("A") or a daughter card ("B"). Note that in one implementation, the Location field 608 is a read only field. In this case, location data can be edited by returning to the start location screen 501, and entering data in each location field, as previously described. In another embodiment location information can be altered by directly editing the contents of the location field 608 via the keyboard 104.

The SPN field 610 contains the service providers part number as previously described. The MPN 612 field contains the manufacture part number as previously described. The DSC field 614 contains a description of the network asset. The serial number field 616 contains the serial number of the circuit card. Finally, the revision field 628 contains the revision number of the circuit card.

Field specific instructions 604 are provided for the user for the currently highlighted field. In addition, the user can press the F1 key as indicated by the text 620 to execute a print function. From there the user has can print out bar code labels for any of the location or identification data previously described. As indicated by the text 622, the user can press the F4 key to have the equipment database 116 supply either the SPN or the MPN to the remote terminal 102. Accordingly, if the user enters the SPN and presses the F4 key, the MPN is automatically supplied. Likewise if the user enters the MPN and presses the F4 key, the SPN is automatically supplied. Finally, the user can press the F5 key as indicated by the text 628 to return to the start location screen 501.

FIG. 7 is an example of an Equipment Database Inquiry screen that is displayed on the hand-held client 102, according to a preferred embodiment of the present invention. This screen is used to display data from the equipment database 116 about a particular network asset. As stated, this screen can be reached from the main menu screen 401, the start location screen 501 or the data entry screen 602. In this example, the equipment database inquiry screen 701 comprises the following fields: location field 702, SPN field 704 and MPN field 706.

In this example, location information is displayed in the location field 702 in the same manner as previously described with reference to the data entry screen 602. Accordingly, this information is typically supplied by the user via the start location screen 501. Alternatively, a user can use the keyboard 104 to directly enter the location information into the location field 702. Once the location information is entered, the user submits the inquiry by pressing the F3 key, as indicated by the text 714. Once a inquiry has been submitted, the remote server 118 queries to the equipment database 116 and sends the results back to the hand-client 102. The hand-client then displays the results in the result window 708. In addition, the SPN 704 and the MPN 706 fields are filled-in, if such information is present in the equipment database 116.

In addition, the user can press the F1 key as indicated by the text 710 to go the main menu 401. As indicated by the text 712, the user can press the F2 key to return to the data entry screen 604. Finally, as indicated by the text 716, the user can press the F5 key to go to the start location screen 501.

The present invention may be implemented using hardware, software or a combination thereof and may be implemented in a computer system or other processing system. In fact, in one embodiment, the invention is directed toward a computer system capable of carrying out the functionality described herein. An example computer system 801 is shown in FIG. 8. The computer system 801 includes one or more processors, such as processor 804. The processor 804 is connected to a communication bus 802. Various software embodiments are described in terms of this example computer system. After reading this description, it will become apparent to a person skilled in the relevant art how to implement the invention using other computer systems and/or computer architectures.

Computer system 802 also includes a main memory 806, preferably random access memory (RAM), and can also include a secondary memory 808. The secondary memory 808 can include, for example, a hard disk drive 810 and/or a removable storage drive 812, representing a floppy disk drive, a magnetic tape drive, an optical disk drive, etc. The removable storage drive

812 reads from and/or writes to a removable storage unit 814 in a well known manner. Removable storage unit 814, represents a floppy disk, magnetic tape, optical disk, etc. which is read by and written to by removable storage drive 812. As will be appreciated, the removable storage unit 814 includes a computer usable storage medium having stored therein computer software and/or data.

In alternative embodiments, secondary memory 808 may include other similar means for allowing computer programs or other instructions to be loaded into computer system 801. Such means can include, for example, a removable storage unit 822 and an interface 820. Examples of such can include a program cartridge and cartridge interface (such as that found in video game devices), a removable memory chip (such as an EPROM, or PROM) and associated socket, and other removable storage units 822 and interfaces 820 which allow software and data to be transferred from the removable storage unit 822 to computer system 801.

Computer system 801 can also include a communications interface 824. Communications interface 824 allows software and data to be transferred between computer system 801 and external devices. Examples of communications interface 824 can include a modem, a network interface (such as an Ethernet card), a communications port, a PCMCIA slot and card, etc. Software and data transferred via communications interface 824 are in the form of signals which can be electronic, electromagnetic, optical or other signals capable of being received by communications interface 824. These signals 826 are provided to communications interface via a channel 828. This channel 828 carries signals 826 and can be implemented using wire or cable, fiber optics, a phone line, a cellular phone link, an RF link and other communications channels.

In this document, the terms "computer program medium" and "computer usable medium" are used to generally refer to media such as removable storage device 812, a hard disk installed in hard disk drive 810, and signals 826. These

computer program products are means for providing software to computer system 801.

Computer programs (also called computer control logic) are stored in main memory and/or secondary memory 808. Computer programs can also be received via communications interface 824. Such computer programs, when executed, enable the computer system 801 to perform the features of the present invention as discussed herein. In particular, the computer programs, when executed, enable the processor 804 to perform the features of the present invention. Accordingly, such computer programs represent controllers of the computer system 801.

In an embodiment where the invention is implemented using software, the software may be stored in a computer program product and loaded into computer system 801 using removable storage drive 812, hard drive 810 or communications interface 824. The control logic (software), when executed by the processor 804, causes the processor 804 to perform the functions of the invention as described herein.

In another embodiment, the invention is implemented primarily in hardware using, for example, hardware components such as application specific integrated circuits (ASICs). Implementation of the hardware state machine so as to perform the functions described herein will be apparent to persons skilled in the relevant art(s).

In yet another embodiment, the invention is implemented using a combination of both hardware and software.

While various embodiments of the present invention have been described above, it should be understood that they have been presented by way of example only, and not limitation. Thus, the breadth and scope of the present invention should not be limited by any of the above-described exemplary embodiments, but should be defined only in accordance with the following claims and their equivalents.

What Is Claimed Is:

1. A method for registering and tracking a plurality of network assets at the circuit card level, said network assets being installed in equipment bays located within field sites, said method comprising the steps of:

entering location data into a hand-held client, that uniquely identifies a particular starting registration location;

entering identification data into said hand-held client, that identifies a particular network asset positioned at said starting registration location;

transmitting said location and identification data from said hand-held client to a remote server; and

storing said location and identification data in a remote equipment database.

2. The method of claim 1, wherein said step of transmitting said location and identification data is accomplished via a wireless data communication means.

3. The method of claim 1, further, comprising the steps of:

anticipating a next registration location; and

displaying said next registration location on a display device.

4. The method of claim 1, further comprising the step of:

printing a representation of said identification data or said location data for immediate placement within said field sites.

5. The method of claim 1, further comprising the steps of:

querying said remote equipment database for equipment data related to one or more particular network assets; and

receiving from said remote equipment database said equipment data including said location and identification data related to said one or more particular network assets.

6. The method of claim 1, wherein said step of entering location data comprises the step of scanning a bar code, wherein said bar code represents said location data.

7. The method of claim 1, wherein said entering identification data step comprises scanning a bar code, wherein said bar code represents said identification data.

8. The method of claim 1, wherein said location data comprises a predefined location hierarchy.

9. The method of claim 8, wherein said predefined location hierarchy includes specifications for a site, row, bay, rack, shelf, and slot.

10. The method of claim 1, wherein said identification data comprises at least one from the group of: a serial number, a manufactures part number and an internal part number.

11. A computer program-product storage device readable by a computer system, tangibly embodying a computer program-product comprising instructions executable by the computer system to enable the computer system to perform method steps for registering and tracking a plurality of network assets at the circuit card level, said network assets being installed in equipment bays located within field sites, said method steps comprising the steps of:

receiving location data that uniquely identifies a particular starting registration location;

receiving identification data that identifies a particular network asset positioned at said starting registration location;

transmitting said location data and identification data to a remote server via wireless data communication means; and

storing said location and identification data in a remote equipment database.

12. The computer-program product of claim 11, further comprising instructions executable by the computer system to enable the computer system to perform the steps of:

anticipating a next registration location; and

displaying said next registration location on a display device.

13. The computer-program product of claim 11, further comprising instructions executable by the computer system to enable the computer system to perform the step of:

printing a representation of said identification data or said location data for immediate placement within said field sites.

14. The computer-program product of claim 11, further comprising instructions executable by the computer system to enable the computer system to perform the step of:

querying said remote equipment database for equipment data related to one or more particular network assets; and

receiving from said remote equipment database said equipment data including said location and identification data related to said one or more particular network assets.

15. The computer-program product of claim 11, wherein said step of inputting location data further comprises instructions executable by the computer system to enable the computer system to perform the step of:

accepting said location data from a bar code scanning device, wherein said bar code scanning device is used to scan a bar code that represents said location data.

16. The computer-program product of claim 11, wherein said step of inputting identification data further comprises instructions executable by the computer system to enable the computer system to:

accepting said identification data from a bar code scanning device, wherein said bar code scanning device is used to scan a bar code that represents said identification data.

17. The computer-program product of claim 11, wherein said location data comprises a predefined location hierarchy.

18. The computer-program product of claim 17 wherein said predefined location hierarchy includes specifications for a site, row, bay, rack, shelf, and slot.

19. computer-program product of claim 11, wherein said identification data comprises at least one from the group of: a serial number, a manufactures part number and an internal part number.

20. A system for registering and tracking a plurality of network assets at the circuit card level, said network assets being installed in equipment bays located within field sites, said system comprising:

an equipment database comprising identification and location data for network assets at a circuit card level;

a network server coupled with said database;

a hand-held client in data communications with said network server via a wireless data communications link, wherein said hand-held client is used

within the field site for sending and receiving said location and identification data between said hand-held client and said equipment database.

21. The system of claim 20, wherein said hand-held client further comprises a bar code scanner capable of scanning bar codes representing said location and identification data.

22. The system of claim 20, wherein said wireless data communication link is a spread spectrum radio link.

23. The system of claim 20, wherein said location data includes data pertaining to a site, row, bay, rack, shelf and slot.

24. The system of claim 20 wherein said identification data includes at least one from the group of: a serial number, a manufactures part number and an internal part number.

25. A system for registering and tracking a plurality of network assets at the circuit card level, said network assets being installed in equipment bays located within field sites, said system comprising:

a storage means for storing identification and location data for network assets at a circuit card level; and

a portable registration means in data communications with said storage means, for sending said identification and location data to said storage means and further including:

a query means for requesting said identification and location data from said storage means;

a display means for displaying said identification and location data; and

a printing means for printing said location and identification data for immediate placement in said field sites.

26. The system of claim 25, wherein said registration means further comprises a scanning means for inputting said location and identification data by scanning symbolic representations of said location and identification data.

27. The system of claim 26, wherein said data communication means comprises wireless data communication link.

28. The system of claim 26, wherein said location data includes data pertaining to a site, row, bay, rack, shelf and slot.

29. The system of claim 26, wherein said identification data includes at least one from the group of: a serial number, a manufactures part number and an internal part number.

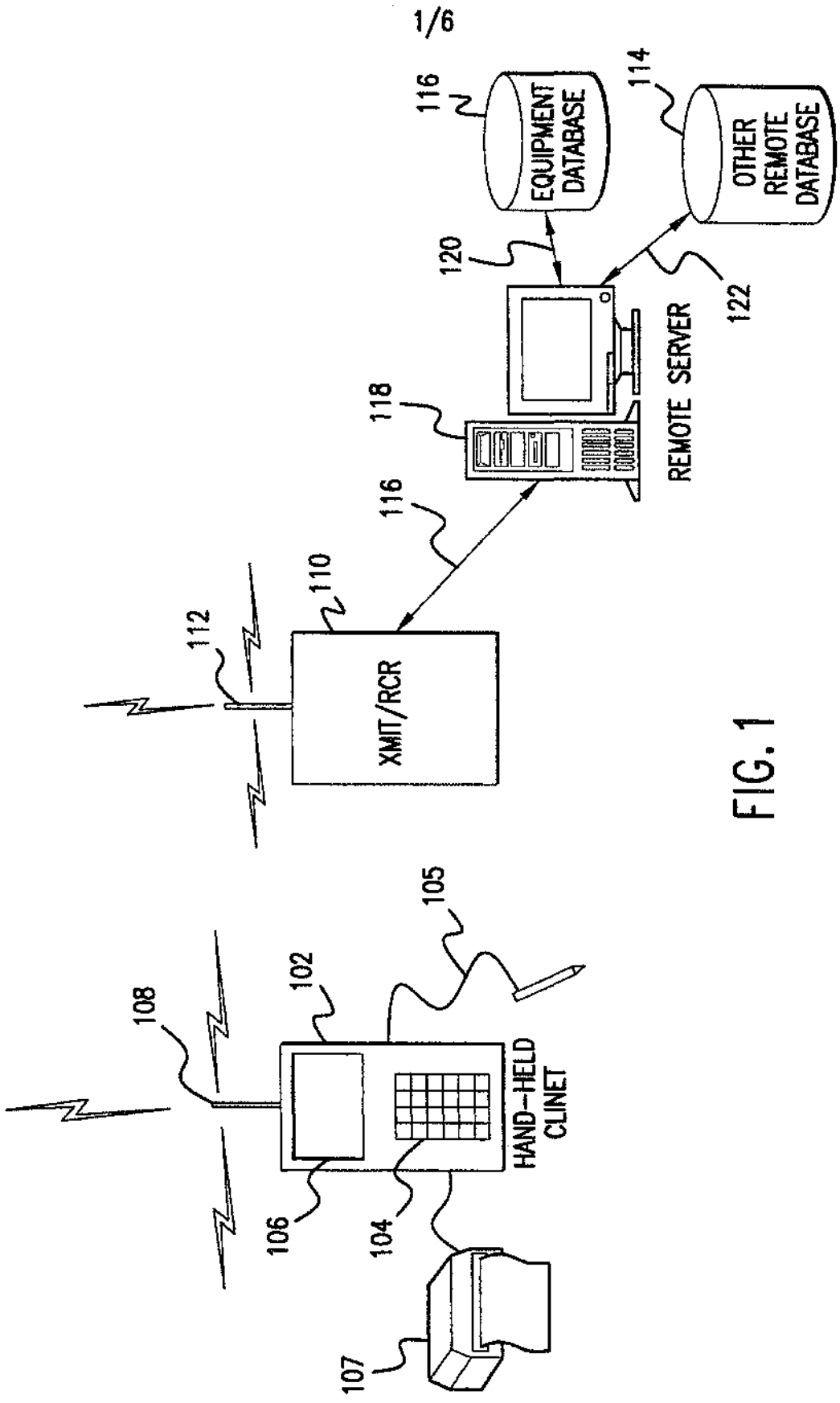

FIG. 1

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SUBSTITUTE SHEET (RULE 26)

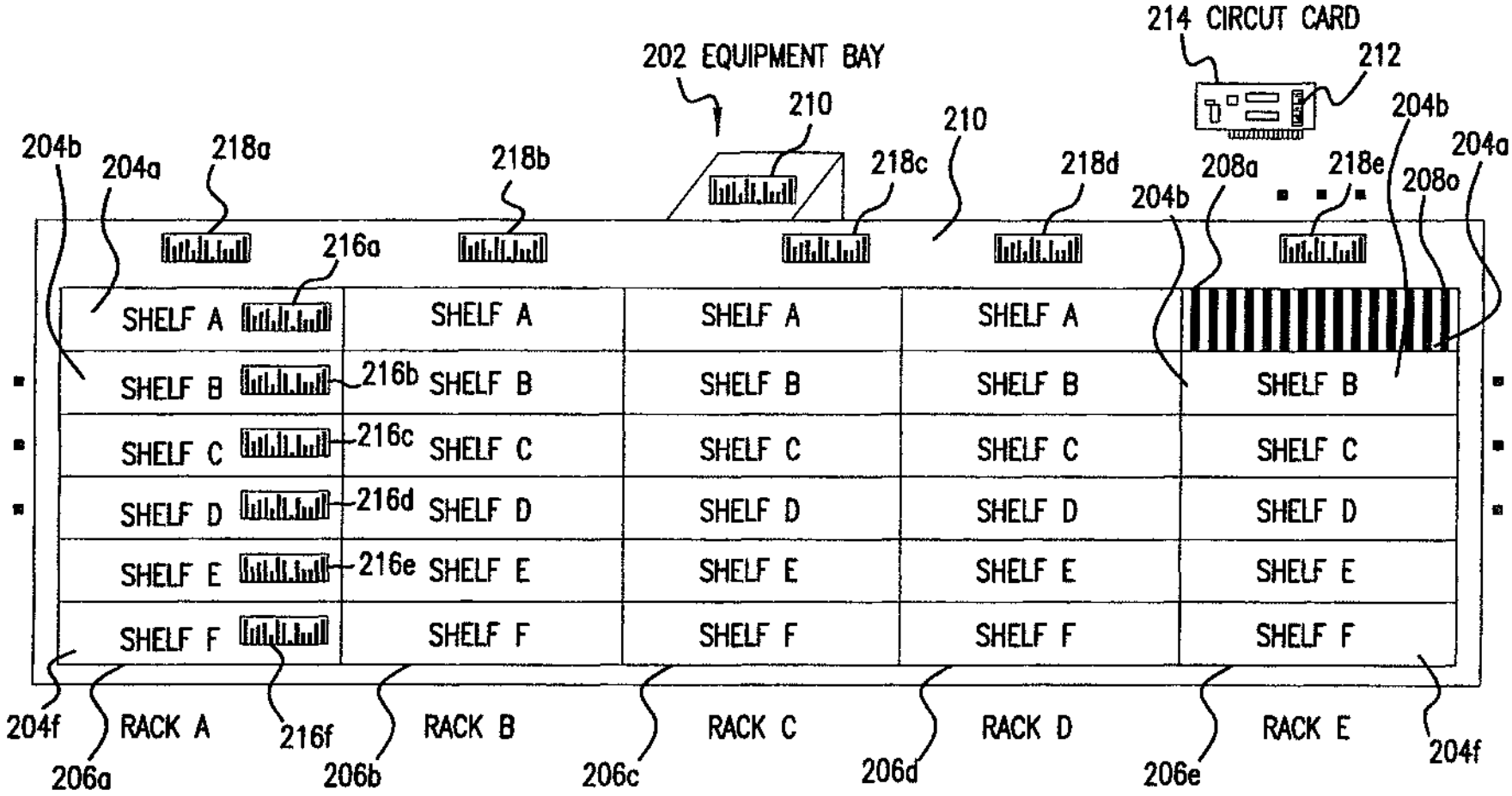

FIG. 2

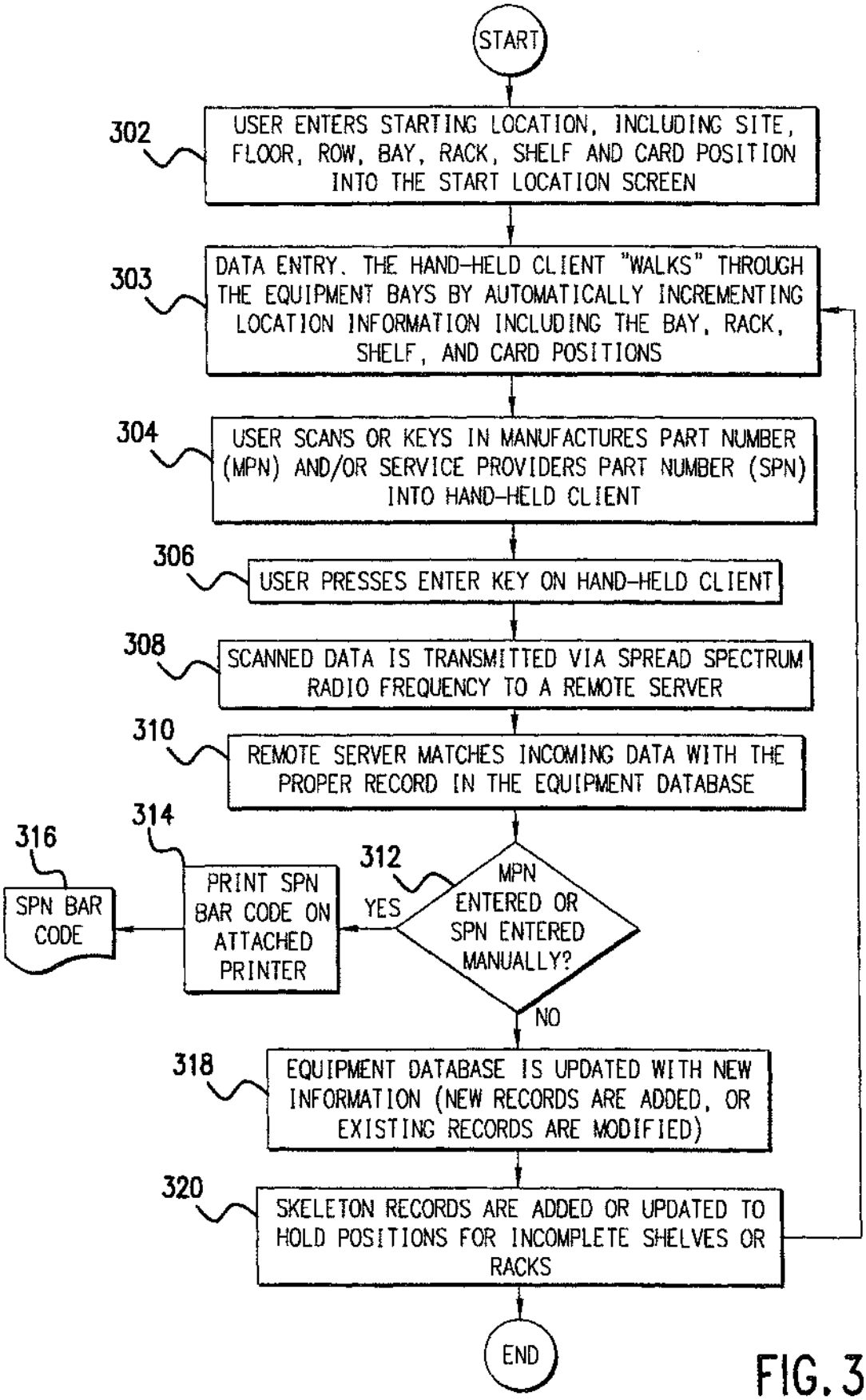

FIG. 3

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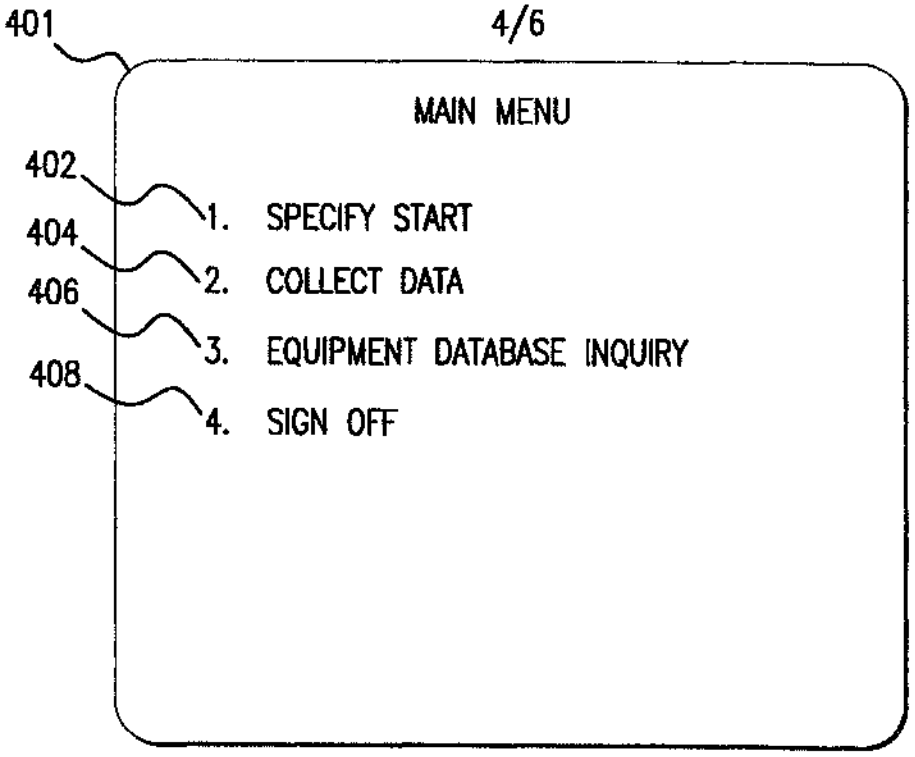

FIG. 4

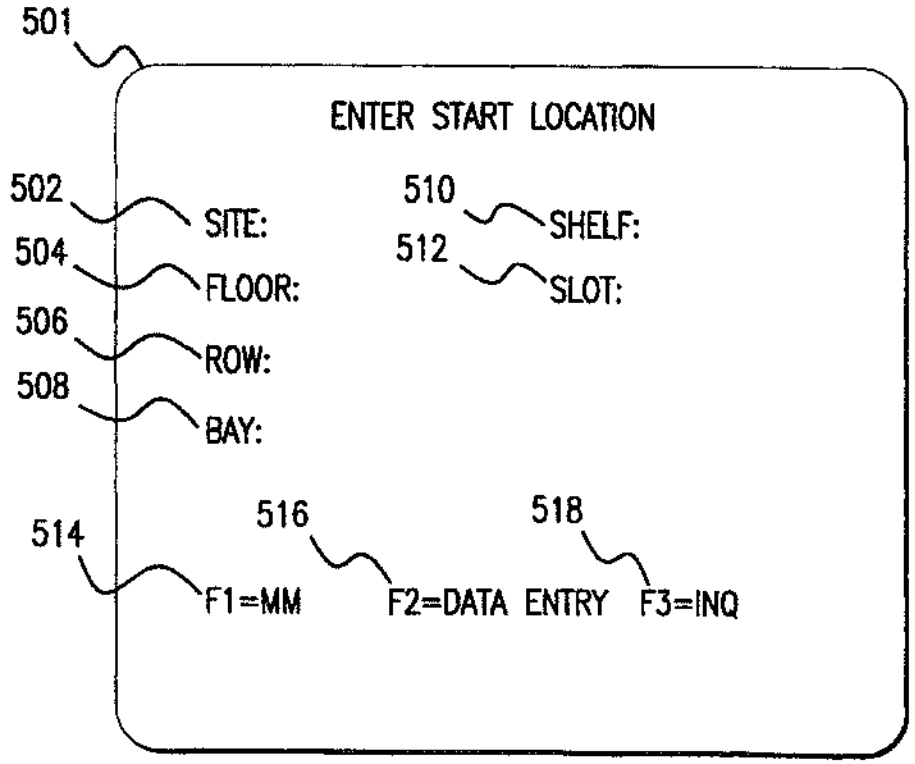

FIG. 5

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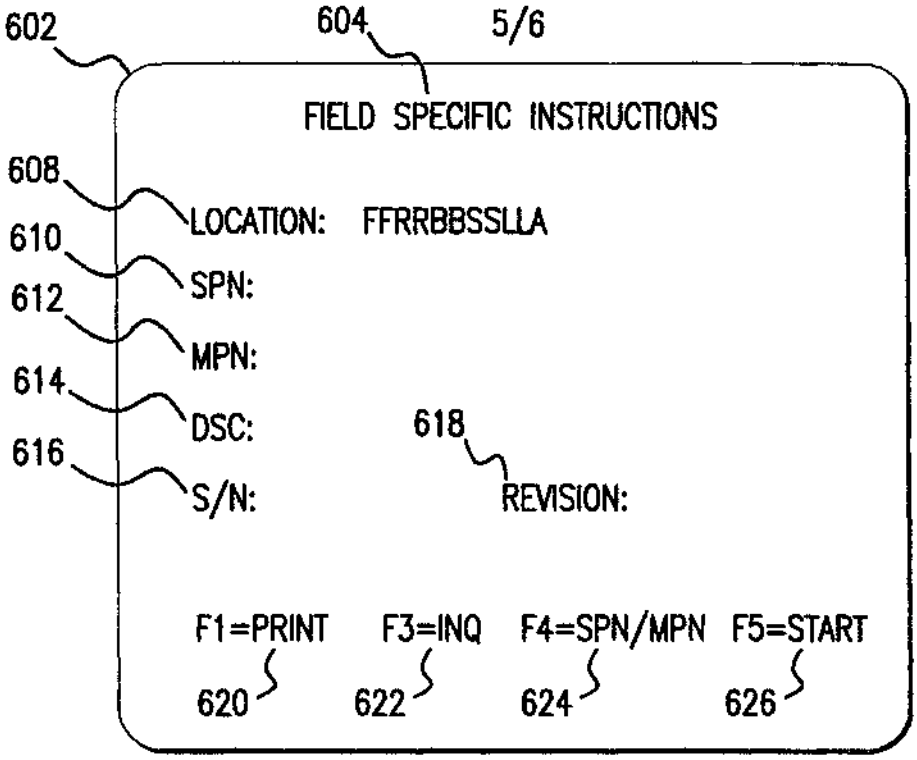

FIG. 6

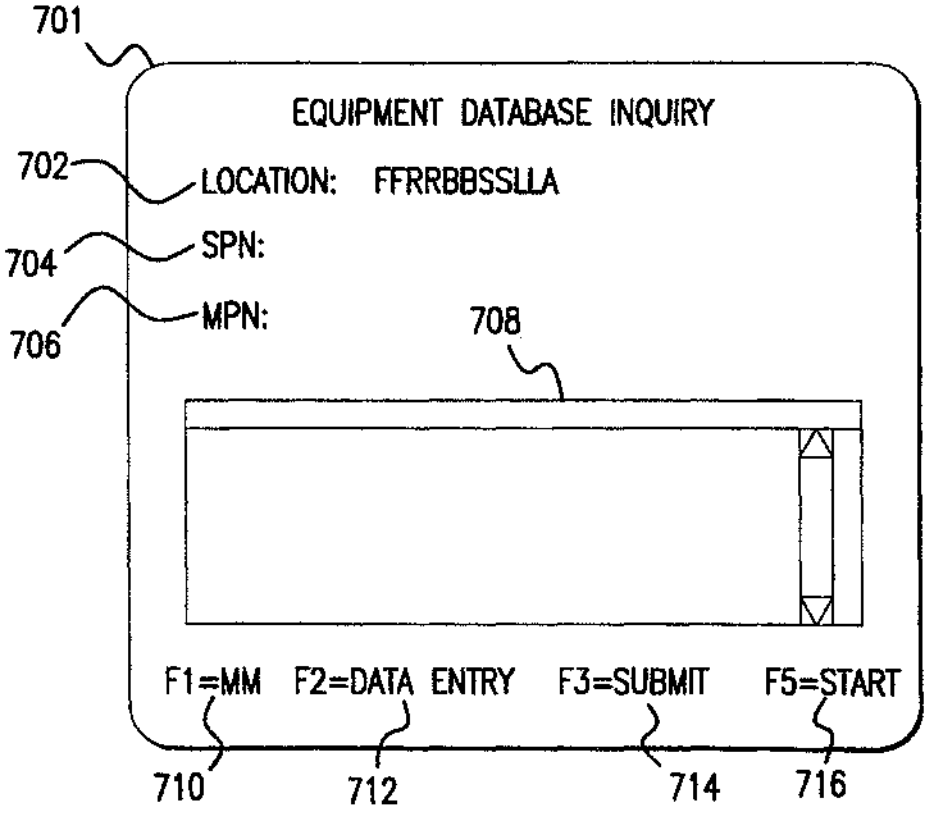

FIG. 7

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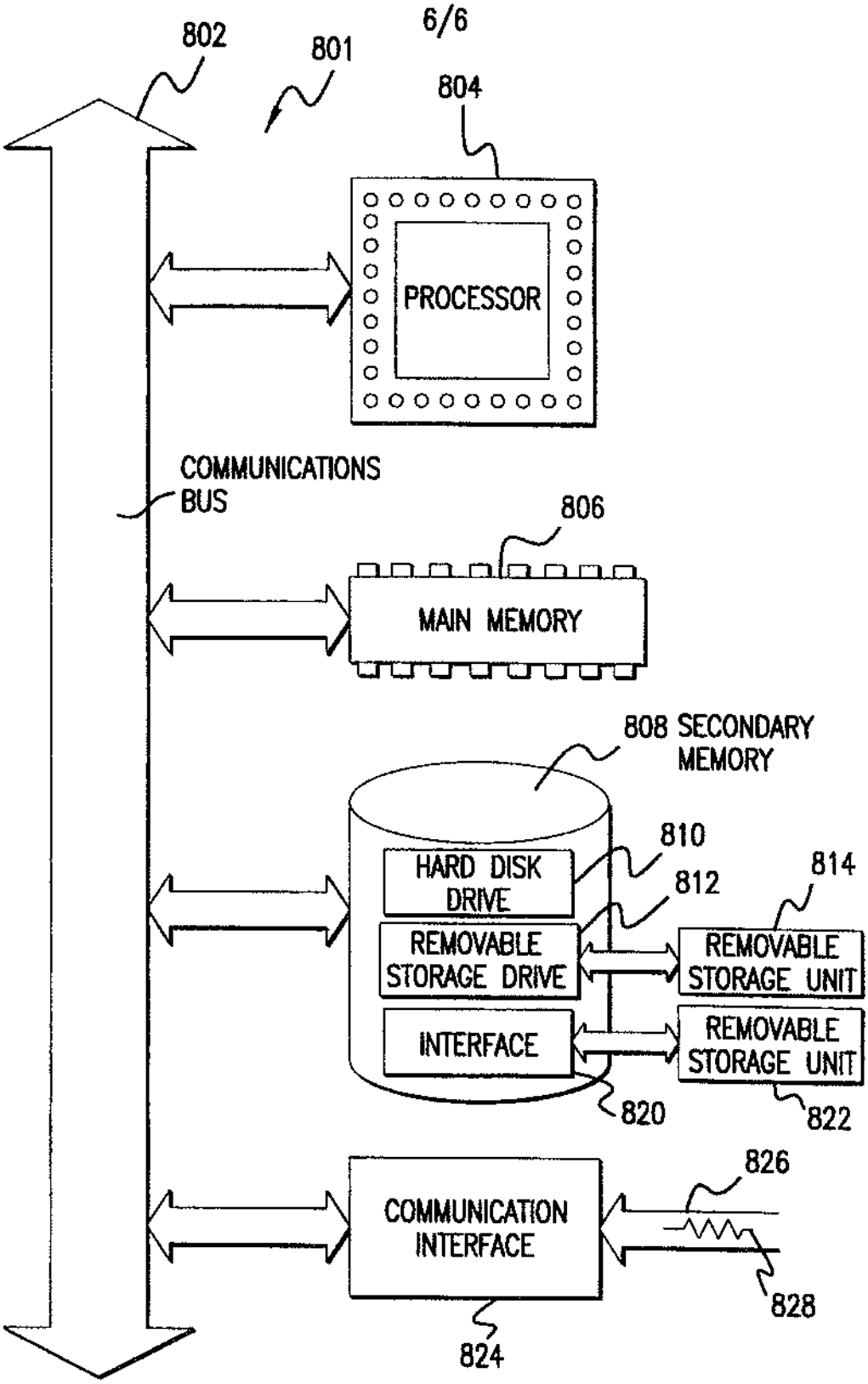

FIG. 8

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INTERNATIONAL SEARCH REPORT

International application No.
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A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) :G06K 05/00, 07/01, 17/00; G08B 13/14, 13/00; G01S 13/00
US CL :235/382, 382.5, 375; 340/572, 574; 364/516, 517; 342/51, 417

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 235/382, 382.5, 375; 340/572, 574; 364/516, 517; 342/51, 417

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

NONE

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

NONE

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y, P	US 5,745,036 A (CLARE) 28 April 1998 (28/04/98), the entire reference	1-29
Y, P	US 5,686,892 A (SMITH) 11 November 1997 (11/11/97), the entire reference	1-29
Y	US 5,285,383 A (LINSEY ET AL.) 08 February 1994 (08/02/94), the entire reference	1-29

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

*	Special categories of cited documents:	"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
"A"	document defining the general state of the art which is not considered to be of particular relevance	"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
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"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		

Date of the actual completion of the international search	Date of mailing of the international search report
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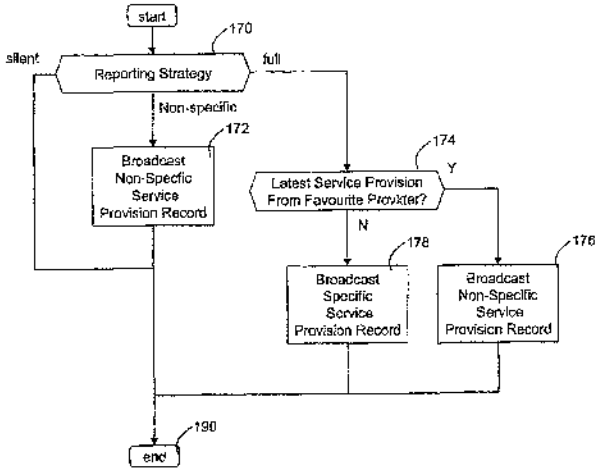
(54) Title: PEER TO PEER REPORTING SYSTEM ON REPUTATION OF QUALITY FOR SERVICE



(57) Abstract: A peer-to-peer network operating in accordance with a service-oriented architecture is disclosed. The peers in the network request services from one another and each keeps a record of the quality of service they receive from the other peers. The peers share quality of service information with one another in order to take advantage of the improvement in the overall efficiency of the use of resources in the network offered by such information sharing. However, the invention provides a further improvement in that peers do not report the quality of service offered by the peers they have received the best quality of service from. This is found to increase the overall level of service still further since it prevents the peers converging on a favourite service provider and thereby overloading it. The invention finds particular application in distributed applications which dynamically select a Web Service to perform a function at run-time.

WO 2007/144568 A1

PEER TO PEER REPORTING SYSTEM ON REPUTATION OF QUALITY FOR SERVICE

The present invention relates to a method of operating a computer network. It has particular utility in relation to peer-to-peer networks in which peers provide services to one another.

Until recently, the World-Wide Web has largely been used for providing information or content to users. However, the proportion of web-servers offering processing in addition to information is growing. The services offered in this way to the developers of distributed application programs must have defined interfaces so that the developers can program the computer they are programming to call upon the web server to execute a process remotely. This sort of remote execution is well known and was first developed in the form of remote procedure calls (RPC), a more flexible framework then being provided by the Common Object Request Broker Architecture (CORBA), and an even more flexible framework then being provided in the form of Web Services.

The selection of a web-service to form part of a distributed application program is often made by the programmer at design-time (i.e. the programmer hard codes the identity of the service provider in the code he generates). However, in scenarios where the network or the services providers are unstable, this is inflexible. Hence, it is known to provide code which causes the computer requesting the service to decide upon a service provider at run-time. Indeed, 'late-binding' like this is seen in Birrell and Nelson's seminal paper 'Implementing Remote Procedure Calls', ACM Transactions on Computer Systems, Vol. 2, No. 1, February 1984, Pages 39-59.

One type of such dynamic service selection utilises clients' past experiences of the quality of service provided by different servers. In many implementations, data representing past experiences are shared by each client with other clients. Often, this sharing is achieved by having each client post data representing its experience to a shared database accessible to other clients.

J. Day and R. Deters' paper "Selecting the Best Web Service" presented at the 14th Annual IBM Centers for Advanced Studies Conference, 2004 presents two methods by which a client may 'reason' about which service provider to select. One is a rule-based expert system, the other a naïve Bayes reasoner. The downside of deterministic service selection based on shared rankings – namely that the highest ranked service provider tends to be overloaded is recognised. The problem is said to be better dealt with by service selection using the naïve Bayes reasoner, since this classifies services into groups, one member from the group being chosen at random – this introducing a more probabilistic service selection which avoids overloading the highest-ranked provider. The possibility of distributing the performance data in a peer-to-peer like system is mentioned towards the end of the paper. Le-Hung Vu et al in "QoS-based Service Selection and Ranking with Trust and Reputation Management", suggest that distributing performance data is 'a bit unrealistic as each service consumer would have to take the heavy processing role of a discovery and reputation system'.

A similar problem is found in peer-to-peer networks which rely on reputation management to overcome the detrimental influence of malign peers. S. Kamvar, M. Schlosser, and H. Garcia-Molina's paper "*Eigenrep: Reputation management in p2p networks*", Twelfth International World Wide Web Conference, 2003 proposes a two-fold approach to the problem:

i) with a one-in-ten probability, to try, at random, a peer which has not yet been tried; and, in the other nine-out-of-ten cases

ii) to make the service provider selection of each client probabilistic rather than deterministic – though the probability of selection is still higher the higher the ranking of the provider.

In both cases, the solution can be seen to be to move from a deterministic service selection to a more probabilistic selection. For obvious reasons, neither proposes truly random selection since this would obviate the advantage of sharing quality-of-service (QoS) information in the first place.

The present inventors have realised that this problem of resource-overloading can be tackled in a different way which tends to provide a better average quality of service in the operation of the peer-to-peer network.

According to the present invention, there is provided a computer network comprising a plurality of devices interconnected via communication links, each of said devices storing a quality of service register containing information on the quality of service provided by other devices in said network, each of said devices being arranged in operation to respond to a service request by:

selecting one of said other devices to provide the requested service;

requesting the selected device to provide said service;

monitoring the quality of service provided in response to said request;

updating said quality of service register in response to said monitored quality of service; and

updating the quality of service register in other devices by reporting at least some of said quality of service experiences to them;

wherein said provider selection whilst being made in dependence on said quality of service register has a probabilistic element resulting in the occasional selection of a service provider other than the highest-ranked service provider in said quality of service register; said method further comprising:

for each service request, comparing said monitored quality of service with said quality of service records, and reporting quality of service experiences relating to the higher-ranked service providers according to said quality of service records less thoroughly than those quality of service experiences relating to lower-ranked service providers.

In a peer-to-peer network in which each peer maintains a model of the quality-of-service provided by other peers in the network, and selects other peers to provide a service in dependence on that model, arranging each peer to report less thoroughly service experiences which relate to the service provider which the requesting peer would itself select if making a fully-deterministic choice of service provider, has the advantage of making it less likely that all peers will converge on a single peer for service provision thereby adversely affecting the quality of service that peer can provide, and thereby lowering the overall level of service in the peer-to-peer network. Having a probabilistic element in service selection is in any case beneficial in allowing the network to adapt to changes in the peer-to-peer network.

Less thorough reporting can take the form of sending less reports (i.e. reporting only a subset of quality-of-service experiences) or sending less informative reports (e.g. not providing the identity of the service provider).

There now follows a description, given by way of example only, of specific embodiments of the present invention, which refers to the accompanying drawings in which:

Figure 1 shows a service-oriented computer network overlaid on the Internet;

Figure 2 shows an example of a data structure stored in nodes of the service-oriented computer network;

Figure 3 illustrates parameters which characterise instances of service provision by computers in said service-oriented computer network;

Figure 4 illustrates how those characteristic parameters can be organised into clusters;

Figures 5A and 5B illustrate the format of QoS report sent by each client computer in the network;

Figure 6 is a flow-chart illustrating the operation of client computers which select, request and appraise one or more services provider by server computers in the network;

Figure 7 illustrates the interaction of client computers and server computers;

Figure 8 illustrates the service selection procedure in more detail;

Figure 9 illustrates selection data used in one type of service selection procedure;

Figure 10 is a flow-chart illustrating the method client computers use to inform other computers in the network of the level of service they have experienced; and

Figure 11 is a flow-chart illustrating processing carried out by client computers on receiving a QoS report.

A computer network (Figure 1) comprises a plurality of devices (A - L) which able to communicate via links (1-17). The devices are of different types including desktop computers (B, E, H, I, J, K, and L), laptop computers (C and F), and server computers (A, D and G). Each of these computers is supplied with conventional hardware and operating system software which enables them to run application programs and communicate with each other via the Internet. Also installed on each of the computers is middleware which enables the computers both to overlay an application-level network on the Internet, to provide services to other computers on the network and to find and execute services on other computers in the network. An example of suitable middleware is NEXUS middleware as described in the paper 'NEXUS – resilient intelligent middleware' by Nima Kaveh and Robert Ghanea-Hercock published in BT Technology Journal, vol. 22 no. 3, July 2004 pp209-215 – the entire contents of which are hereby incorporated by reference.

Alternatively, commercially available middleware such as IBM's WebSphere or BEA's WebLogic could be used.

Each of the server computers (A, D and G) has a hard disk or disk array which stores a plurality of video files, together with software for advertising the video service available to client computers in the network using the middleware. In addition each server computer has a multi-rate video file playout program which, in response to a request from a client computer, can stream a video file to that client computer at one of a plurality of advertised playout rates (lower rates being consequent on the server playing out a more highly-compressed file). This programs are loaded into the server computers (A, D, and G) from CD-ROM 30.

Each of the client computers (C and F) has client software installed upon it which is executable to select a server computer to provide it with a streamed video file, and thereafter to cause the server computer to stream the video file to the client computer. The selection software takes the form of a selector agent program which maintains data structures which record the quality of service received from various server computers in the network and sends QoS reports to other client computers in the network. The software for the client computers is loaded from CD-ROM 32.

The desktop computers (B, E, H, I, J, K, and L) are provided with both the client software and the server software and hence are able to display streamed video to their users and also able to stream video files to other computers in the network. Both sets of software are installed on the desktop computers from CD-ROM 34.

A data structure created and updated by the client software is illustrated in Figure 2. The data structure is referred to as a 'quality register' and records information about the quality of the service experienced from server computers in the network. As will be explained below, a single service selector agent might create and update a plurality of quality registers which all relate to the same service.

Hence, each quality register (Figure 2) has both a 'Name' field 40 and a 'Service Name' field 42.

These two fields are followed by one or more service parameter fields 44 which indicate parameters which specify to the server computer the task to be carried out. In the present example, the service parameters include the playout rate, a parameter which, in effect, tells the server computer the degree of compression applied to the video. As will be understood by those skilled in the art, this service parameter and other service parameters will be written in an agreed interface language (should Web Services middleware be used, then the interface language would be Web Services Description Language (WSDL)).

The next field(s) in the quality register are one or more context parameters 46. These parameters relate to external conditions which might affect the quality of the service being delivered. In the present example, the context parameters include network utilisation. The selector agent is able to obtain this context parameter from a Web Service which reports the level of utilisation of the Internet in the region of the overlay network (Figure 1).

The next two fields 48, 50 hold different values in each of the quality registers relating to the same service. The two fields give specific values for the one or more service parameters 44 and one or more context parameters 46 which define a 'master problem' – that is to say a specific set of parameters which define a particular service provision problem. In the present case, for example, the master problem relates to provision of the video streaming service where the requested playout rate is 2000 $kbits^{-1}$, at a time when the network utilisation is 40%.

As was mentioned above, the selector agent keeps track of the quality of video streaming service (and other services, not described here – but the principle of operation is the same) experienced by its host. For any given service, a plurality of quality registers like those shown in Figure 2 might be created and maintained. Separate quality registers are created where necessary to reflect differences in the

relationship between parameters and quality-of-service which occur for different ranges of parameters.

The next two fields in the quality register are average local exploration QoS 52 and average remote exploration QoS 54. Both are initialised to zero. The first of these gives an indication of the level of service experienced when the device storing the quality register, having been faced with a task similar to the quality register's master problem, has selected a service provider speculatively – i.e. has selected a service provider in a way not determined by its prior experience of quality of service received from available service providers. The second field is a similar measure but is built up from the experiences of speculative selection reported by other service providers.

The data structure then ends with a list of provider-specific summary quality of service records 56, one for each service provider that has previously provided service to the node. Each includes an indication of the service provider to which it relates (first column), a summary measure of the QoS experienced from that provider (second column) and a weight (third column) to be applied to the summary measure. As will be explained with reference to Figures 6 and 11 below the weight attached to the QoS value depends on the number of experiences on which the QoS value is based and the recency of those experiences.

The service parameters (just playout rate in this case) and context parameters (just network utilisation in this case) can be thought of as the two co-ordinate axes of a two-dimensional 'problem space'. Each instance of service provision, and each quality register's master problem can be seen as a point in that two-dimensional problem space. Hence, for the illustrative examples given in Figure 2, the master problem can be seen to be located at position VS1 in the problem space illustrated in Figure 3.

In the present embodiment, each quality register takes account of and summarises examples of instances of service provision which are sufficiently similar to the master problem which characterises the quality register. The required degree of

similarity is defined in this case as within a threshold Euclidean distance of the master problem. That Euclidean distance is calculated in the present case as:

Distance = sqrt((80 * (network utilisation – 40))^2 + (playout rate – 2000) ^ 2)).

It will be realised that the 80 factor is required to make the area of the problem space covered by the quality register VS1 appear as a circle in Figure 3. It will also be realised that 2000 and 40 are the co-ordinates of the master problem in the problem space. In practice the relative importance of each dimension could be made different by changing the factor – thereby emphasising parameters which are particularly significant in determining how 'similar' one instance of service provision is to another.

Similarly, the Euclidean distance S between service provision instances A and B could be calculated as:

$$S = \text{sqrt}\ (\ (80\ (A_N - B_N))^2 + (A_P - B_P)^2\ )$$

where A_P, A_N and B_P, B_N are the co-ordinates of the service provision instances A and B in the problem space – in other words, A_P is the network ultilisation of the network at the time of service provision instance A etc.

In this preferred embodiment, three master problems, VS1, VS2 and VS3 are defined in the problem space (Figure 4). Each encompasses one or more service provision instances. The use of a plurality of quality registers allows regions in the problem space where the relationship between QoS, playout rate and network utilisation differs to be dealt with separately and therefore enables better usage of the resources of the network than might be achieved should a single list of all service experiences be maintained by each node. To give an example, some providers might deliver highly-compressed streams while others focus on image quality and use correspondingly lower compression. When network bandwidth is limited and required playback rate is high, high-compression providers will deliver higher QoS

And vice versa, when bandwidth is abundant, quality-oriented providers running quality-optimized algorithms (e.g. MPEG2) would deliver better QoS. So depending on network conditions and required playback rate, ordering of providers with respect to the QoS differs. If only a single quality register was used, the selection function could not reflect the specialization of providers, their quality records would "average out" and the average QoS delivered would be lower than if specialization is captured and exploited.

As will be explained more fully with reference to Figure 11, a provider-specific service provision record (Figure 5A) may be generated by a selection agent in response to receiving a service from a service provider. This record will be included in a QoS report broadcast to other computers in the overlay network.

The provider-specific service provision record lists the provider of the service 80, the playout rate and congestion level (which locate the instance of the service in the problem space), a level of service or QoS parameter 86 which is a quantitative measure of the quality of the service provided, and a flag indicating whether the client in this specific service instance was operating in an exploitative or exploratory mode (something which will be explained with reference to Figure 8 below).

A non-specific service provision record (Figure 5B) is sent in some cases – this contains the same fields as those seen in the full service provision record, save for lacking an indication of the provider of the service.

In response to receiving a request from its user for the provision of a streamed video, each client computer carries out the steps shown in Figure 6. The request will specify one or more service parameters (playout rate has been explicitly described, but the request will obviously also have to identify the video to be streamed to the client), as well as one or more context parameters.

In the present video-streaming example, the context parameter is network utilisation. The client program begins by interrogating 96 a web service 98 to find a current value of network utilisation.

It then utilises that context parameter and the service parameter (playout rate) in selecting 100 a video streaming service provider. This selection will be described in more detail below with reference to Figures 7 and 8.

Having obtained details of the selected service provider, the client then processes 104 the task by invoking the video streaming service 106 on the selected service provider. More details concerning this step will be given below with reference to Figure 7.

The video is then streamed and the client program calculates 108 a measure of the received quality of service. For a streaming video, the measure of quality might, for example, be a perception-based quality measure or a more basic measure such as response time, throughput, or accuracy.

The output of the evaluation step 108 will be a provider-specific service provision record (Figure 5A) which is a single illustration of the relationship between QoS, one or more service parameters, and one or more context parameters.

This provider-specific service provision record will be used to update 110 the summary QoS record relating to that provider in the quality register created or selected in the service selection step 100 (this selection and creation of a quality register will be explained in relation to Figure 8 below).

The provider-specific summary QoS record is be updated as follows:

Firstly, the weight of the record is incremented by 1

$$w^{(i+1)} = w^{(i)} + 1$$

where $w^{(i)}$ is the existing weight.

This counters a decay function which reduces the weight associated with each record over time in order to maintain the ability of the selection system to adapt to changes in the system. An exponential decay is used in the current implementation of the system.

$$w^{(t+1)} = \alpha\, w^{(t)}$$

α is given a value between 0 and 1 to control the rate at which the weight decays.

The QoS experienced value of the record is updated in accordance with the formula

$$q^{(t+1)} = (1-\mu)q^{(t)} + \mu q$$

where $q^{(t)}$ is the current QoS experienced value for the service, q the value received in the cycle and μ is the adaptability calculated as the inverse of record's weight, i.e.

$$\mu = \frac{1}{w}$$

The inverse relationship between adaptability and weight ensures that quality records that are not based on a high number of service invocations and/or are not recent enough (i.e. subject to weight decay as explained above) are easier to modify than the ones based on a number of recent invocations. It addresses three needs that arise with the adaptive selection mechanism, and that cannot be addressed using a fixed adaptability update:

Firstly, the selection mechanism needs different update speeds at different times. High adaptability is required in the initial, explorative stages of a system's operation, when new information should have strong impact on existing quality records. Later, however, low adaptability is preferable as it maintains the stability of the acquired service selection function. The use of a fixed adaptability would instead result in slow convergence in the exploration phase (due to the adaptability being too low) or lead to oscillations in the exploitation phase (due to adaptability being too high).

Secondly, the amount of experience aggregated for each provider is different, and consequently each record needs a different adaptability.

Thirdly, the adaptive adaptability mechanism is very important in the case of provider overloading as it allows the selection function to converge into a stable configuration. This is because the selector that uses a particular provider most, has the highest weight for the associated record, and consequently the lowest adaptability. When another selector attempts to use the provider and thereby overloads the provider, the (temporarily) low QoS received by both providers has much higher impact on the

record held by the "intruding" selector, hence discouraging it from using the provider in the near future. Thus, once a client-supplier relationship has formed, it will tend to persist.

Having updated the relevant quality register with the result of the QoS evaluation 108, a test 112 is carried out to find whether the service selection in step 100 was made using an exploration strategy. If not, then the process moves onto QoS reporting as will be described below. However, if it is found that an exploration strategy was used, then one further update to the relevant quality register is made.

The average local exploration QoS value, $Q_{\text{explore}}^{local}$ in the relevant quality register (Figure 2; 52), is updated 114 in response to each exploratory service invocation which takes place. The updating is done in accordance with the formula:

$$Q_{\text{explore}}^{local(t+1)} = (1-\alpha)\left(Q_{\text{explore}}^{local(t)}\right) + \alpha\left(q_{\text{explore}}^{local}\right)$$

Where $Q_{\text{explore}}^{local}$ represents the average local exploration QoS value and $q_{\text{explore}}^{local}$ represents the QoS value in the exploration report just received.

Figure 7 shows how the processing seen in Figure 6 is divided between different devices and the two software modules on the client device (the retrieval of the context parameters is not shown, but it is to be understood that the values are retrieved from a context parameter provision service located on the client device which provides the context parameters to the consumer component). It will be seen that the client has a selector agent which maintains the quality registers and exploration QoS values and the like. The Consumer component on the client device sends the task request to the selector agent which then obtains a list of candidate services from a service discovery module (provided as part of the above mentioned middleware). The selector agent then makes its choice from amongst

as will be explained below. Having made the selection, a call is made to the selected service to provide the video stream. The quality of the response is evaluated by the consumer, and used to update the quality register and possibly also the exploration QoS values maintained by the selector agent.

Figure 8 shows the service selection step 100 of Figure 6 in more detail. In response to being passed the task (an object which includes the values of the service parameters for the particular invocation), and one or more context parameters, a first test 150 finds whether a relevant quality register exists by:

i) finding the nearest quality register VS1, VS2, VS3 to the task (i.e. the quality register whose master problem is closest in problem space (Figure 4) to the provided service and context parameters); and
ii) comparing the distance between that quality register's master problem and the task to the similarity threshold.

If the distance exceeds the threshold, the a new quality register is created 151. A service provider is then selected 153 at random from the candidate service provider list generated by the service discovery mechanism. In that case, each candidate service provider is equally likely to be chosen.

If a relevant quality register is found, however, then it follows that the records in the quality register selected in step 150 are likely to be relevant to the task at hand. The process then decides whether to use:

a) a service provider which already has a QoS record 56 in the closest quality register (thereby adopting the strategy of exploiting existing QoS information); or

b) a service provider chosen in a way not determined by the QoS records 56 (thereby adopting the strategy of exploring other potential service providers).

An aggregate estimate of exploration QoS used in making the decision is then calculated 152 by combining the average local exploration QoS (Figure 2; 52) and

average remote exploration QoS (Figure 2; 54) – both found in the relevant quality register - as follows:

$$Q_{explore} = (1-\beta)\left(Q_{explore}^{local}\right) + \beta\left(Q_{explore}^{remote}\right)$$

It will be remembered that the average local exploration QoS value, $Q_{explore}^{local}$ is updated following each local exploration instance (Figure 6; 112). The average remote exploration QoS value, $Q_{explore}^{remote}$ is updated as described below in relation to Figure 11. β is the *report acceptance coefficient*, reflecting how much weight the device's own experience is given in comparison to exploration reports received other devices in the network. This might, for example be set to 0.5.

This decision 154 then involves finding whether the above-calculated average exploration QoS is greater than the highest QoS value in the provider-specific QoS records 56 included in the selected quality register. If that condition is met then the process moves onto a directed exploration service selection 156. If the condition is not met, then the process adopts an exploitation strategy which simply selects 158 the service provider identified in the QoS record 56 having the highest QoS value.

Although a deterministic decision 154 was described above, in a preferred embodiment, a probabilistic choice between record-based selection (referred to as exploitation) and directed exploration is performed. The probabilistic choice is made using an *adaptive exploration probability*.

The exploration probability is calculated using the difference between the register's highest provider-specific summary QoS value and the estimated exploration QoS, i.e., the *difference between the mean QoS expected when exploitation is pursued vs. the mean QoS expected when exploration is pursued.*

Specifically, the exploration probability is calculated as follows. Firstly, expected relative (QoS) improvement is calculated as

$$s_{rel} = \frac{\hat{q}_{explore} - s_{top}}{s_{top}}$$

where s_{top} is the highest QoS found in the provider-specific summary QoS records 56 included in the selected quality register, and $\hat{q}_{explore}$ is the estimated average exploration QoS (the derivation of which is explained in relation to Figure 11 below).

The exploration probability is calculated as

$$p_{explore} = \frac{1}{(1+e^{-\beta s_{rel}})}$$

where β is so called *exploration sensitivity.* Exploitation probability is then simply

$$p_{exploit} = 1 - p_{explore}$$

The decision in the second test in this alternative embodiment is then made randomly based on the probability $p_{explore}$ thus calculated.

Whatever form the second test 152 takes, a decision to adopt the exploration strategy results in a service selection process which uses directed exploitation 156. A decision to adopt the exploitation strategy results in the best service provider according to the selected quality register being selected 158.

Directed exploration is arranged such that the likelihood of a candidate service provider being selected is lower for those candidate service providers about which the quality register has most reliable QoS information.

This is achieved by calculating a priority value – here denoted r_i - for each service provider (it is possible that any service provider might be chosen including those which already have QoS values in the quality register) as follows.

$$r_i = \frac{1}{(1+w_i)^\gamma}$$

where w_i is the weight of the register's record corresponding to service i, and γ is the *exploration novelty preference*. The weight w_i is set to zero if the service does not have a corresponding record in the register.

The probability p_i that service i will be selected for exploration is then calculated as:

$$p_i = \frac{r_i}{\sum r_i}$$

Figure 9 shows the probabilities of selection calculated in this way for the quality register values seen in Figure 2. It will be seen that it is considerably more likely that an untried service provider will be selected. Of the already tried service providers, A is the most likely to be selected since the QoS record associated with A has a low weight associated with it.

The QoS Reporting process (Figure 6, 116) will now be described in more detail with reference to Figure 10.

Reporting enables faster convergence and consequently results in a higher average QoS in the network, particularly in situations when the availability of services or their performance varies.

Selectors share experience of providers by exchanging QoS reports containing one (or in alternative embodiments more than one) service provision records (Figures 5A and 5B).

Each client can adopt one of three reporting strategies – which strategy is adopted is configurable by the device user or a network administrator. In preferred embodiments all the devices in the network adopt a full reporting strategy.

- **silent**: no QoS reports are sent by the device

- **non-specific reporting**: non-specific service records (Figure 5B) are sent. These enable selectors which receive the reports to estimate the QoS provided by services in the network in general.

- **full reporting**: for some QoS experiences a provider-specific service record (Figure 5A) is sent – for the others a non-specific service record (Figure 5A) is sent. Selectors receiving not only non-specific service records but also specific service records are able to learn the distribution of QoS amongst providers as well as the QoS in the network in general.

The reporting step 116 begins with a test 170 to find the reporting strategy with which the device has been configured. If the strategy is one of not reporting QoS experiences, then the process simply ends 190. If the strategy is the non-specific reporting of QoS experiences, then the device broadcasts 172 a non-specific service record (Figure 5B) to all other devices in the network.

If the reporting strategy is found to be a full reporting strategy, then a further test 174 is carried out to find whether the latest service provision (i.e. the one just processed – Figure 6, 104) was by the device's current favourite provider (that is the one having the provider-specific summary QoS record with the highest QoS value). If it was, then the device broadcasts 176 a non-specific service provision record (Figure 5B). If it was not, then the device broadcasts 178 a specific service provision record (Figure 5A).

In general, it is found that the sharing of QoS experiences improves the overall quality of service provided in the network. Surprisingly, the avoidance of advertising the performance of a device's favourite provider is found to improve the overall quality of service in the network still further. Selective reporting – i.e. not sharing the information about the top performing providers - prevents all selectors from converging on a single provider as a target for their tasks. Such convergence would overload the respective provider, thus decreasing its QoS and decreasing the overall system average QoS.

At the same time, however, clients can communicate in full about the many providers other than the top one. Full reporting is important as it allows clients to benefit from the information gathered about providers by other clients. This significantly speeds up the exploration phase as it

- prevents redundant effort by focusing further exploration on the providers about which limited or no information is available

- avoids submitting tasks to providers that have been already identified as providing low QoS

Selective reporting largely maintains these advantages, but does so without undermining each selector's relationship with its top performing provider.

Once the reporting step finishes, the task processing procedure ends (Figure 6, 120).

The way in which a selector responds to the receipt of a QoS report from another selector will now be described with reference to Figure 11.

The process begins with a test 200 to find whether the exploration flag is set in the exploration record contained within the report. If the flag is set, then an attempt 202 to find a relevant quality register is made (note that this attempt is similar to the one carried out at the start of the service provider selection step 100 – and discussed in relation to Figure 8 step 150). If a relevant quality register is found, then the running average of previously received remote exploration QoS values (Figure 2; 54) is updated 202. The average is updated in accordance with the following equation:

$$Q_{\text{explore}}^{remote(t+1)} = (1-\alpha)\left(Q_{\text{explore}}^{remote(t)}\right) + \alpha\left(q_{\text{explore}}^{remote}\right)$$

Where $Q_{\text{explore}}^{remote}$ represents the average remote exploration QoS value and $q_{\text{explore}}^{remote}$ represents the QoS value in the exploration report just received.

Whether the received QoS report contains an exploration record or not, a further test 206 is then carried out to find whether the QoS report contains a provider-specific QoS record. If there is no such record, then the report handling process ends 220.

If the report does contain a provider-specific QoS record, then a test 208 is carried out to find whether a relevant QoS register exists (this test is identical to that described in relation to step 150 of Figure 8 above). If no relevant QoS register exists, then a new register is created 210 in which the service and context parameters included in the received record provide the master problem (the processing carried out is similar to that described in relation to step 151 of Figure 8 above).

Having established that a relevant quality register was either already available or has now been created, the QoS value from the record is then used to update 212 the relevant provider-specific summary QoS record in the quality register. The update process is identical to that described in relation to step 110 of Figure 6 above.

The report handling procedure (Figure 11) then ends 220.

Full reports are equivalent in their information content to task processing records obtained by selectors themselves. They are consequently used to update a selector's register in exactly the same way as described in relation to the selection model update step 110 above.

In summary, a peer-to-peer network operating in accordance with a service-oriented architecture is disclosed. The peers in the network request services from one another and each keeps a record of the quality of service they receive from the other peers. The peers share quality of service information with one another in order to take advantage of the improvement in the overall efficiency of the use of resources in the network offered by such information sharing. However, the invention provides a further improvement in that peers do not report the quality of service offered by the peers they have received the best quality of service from. This is found to increase the overall level of service still further since it prevents the peers converging on a favourite service provider and thereby overloading it. The invention finds particular application in distributed applications which dynamically select a Web Service to perform a function at run-time.

CLAIMS

1. A computer network comprising a plurality of devices interconnected via communication links, each of said devices storing a quality of service register containing information on the quality of service provided by other devices in said network, each of said devices being arranged in operation to respond to a service request by:

selecting one of said other devices to provide the requested service;

requesting the selected device to provide said service;

monitoring the quality of service provided in response to said request;

updating said quality of service register in response to said monitored quality of service; and

updating the quality of service register in other devices by reporting at least some of said quality of service experiences to them;

wherein said provider selection whilst being made in dependence on said quality of service register has a probabilistic element resulting in the occasional selection of a service provider other than the highest-ranked service provider in said quality of service register; each of said devices being further arranged in operation to:

for each service request, compare said monitored quality of service with said quality of service records, and report quality of service experiences relating to the higher-ranked service providers according to said quality of service records less thoroughly than those quality of service experiences relating to lower-ranked service providers.

2. A computer network according to claim 1 in which each device is arranged to be less likely to report a quality of service report in the event that the

quality of service report relates to a higher-ranked service provider according to its quality of service register.

3. A computer network according to claim 1 in which each device is arranged to generate quality of service reports which do not identify the service provider in the event that the service provider is a higher-ranked service provider according to the quality of service register in said device.

4. A method of operating a computer network, said network comprising a plurality of devices interconnected via communication links, each of said devices storing a quality of service register containing information on the quality of service provided by other devices in said network, said method comprising operating each of said devices being arranged in operation to respond to a service request by:

selecting one of said other devices to provide the requested service;

requesting the selected device to provide said service;

monitoring the quality of service provided in response to said request;

updating said quality of service register in response to said monitored quality of service; and

updating the quality of service register in other devices by reporting at least some of said quality of service experiences to them;

wherein said provider selection whilst being made in dependence on said quality of service register has a probabilistic element resulting in the occasional selection of a service provider other than the highest-ranked service provider in said quality of service register; said method further comprising:

operating for each service request, comparing said monitored quality of service with said quality of service records, and reporting quality of service experiences

relating to the higher-ranked service providers according to said quality of service records less thoroughly than those quality of service experiences relating to lower-ranked service providers.

5. A computing device in a computer network comprising a plurality of devices interconnected via communication links, said device:

storing a quality of service register containing information on the quality of service provided by other devices in said network; and being arranged in operation to respond to a service request by:

i) selecting one of said other devices to provide the requested service;

ii) requesting the selected device to provide said service;

iii) monitoring the quality of service provided in response to said request;

iv) updating said quality of service register in response to said monitored quality of service; and

v) updating the quality of service register in other devices by reporting at least some of said quality of service experiences to them;

wherein said device is arranged to select one of said other devices to provide the requested service by probabilistically selecting a service provider in dependence on said quality of service register resulting in the occasional selection of a service provider other than the highest-ranked service provider in said quality of service register; said device being further arranged in operation to:

for each service request, compare said monitored quality of service with said quality of service records, and report quality of service experiences relating to the higher-ranked service providers according to said quality of service records less

thoroughly than those quality of service experiences relating to lower-ranked service providers.

6. A computing device according to claim 5, in which said device is arranged to be less likely to report a quality of service report in the event that the quality of service report relates to a higher-ranked service provider according to its quality of service register.

7. A computing device according to claim 5 in which said device is arranged to generate quality of service reports which do not identify the service provider in the event that the service provider is a higher-ranked service provider according to the quality of service register in said device.

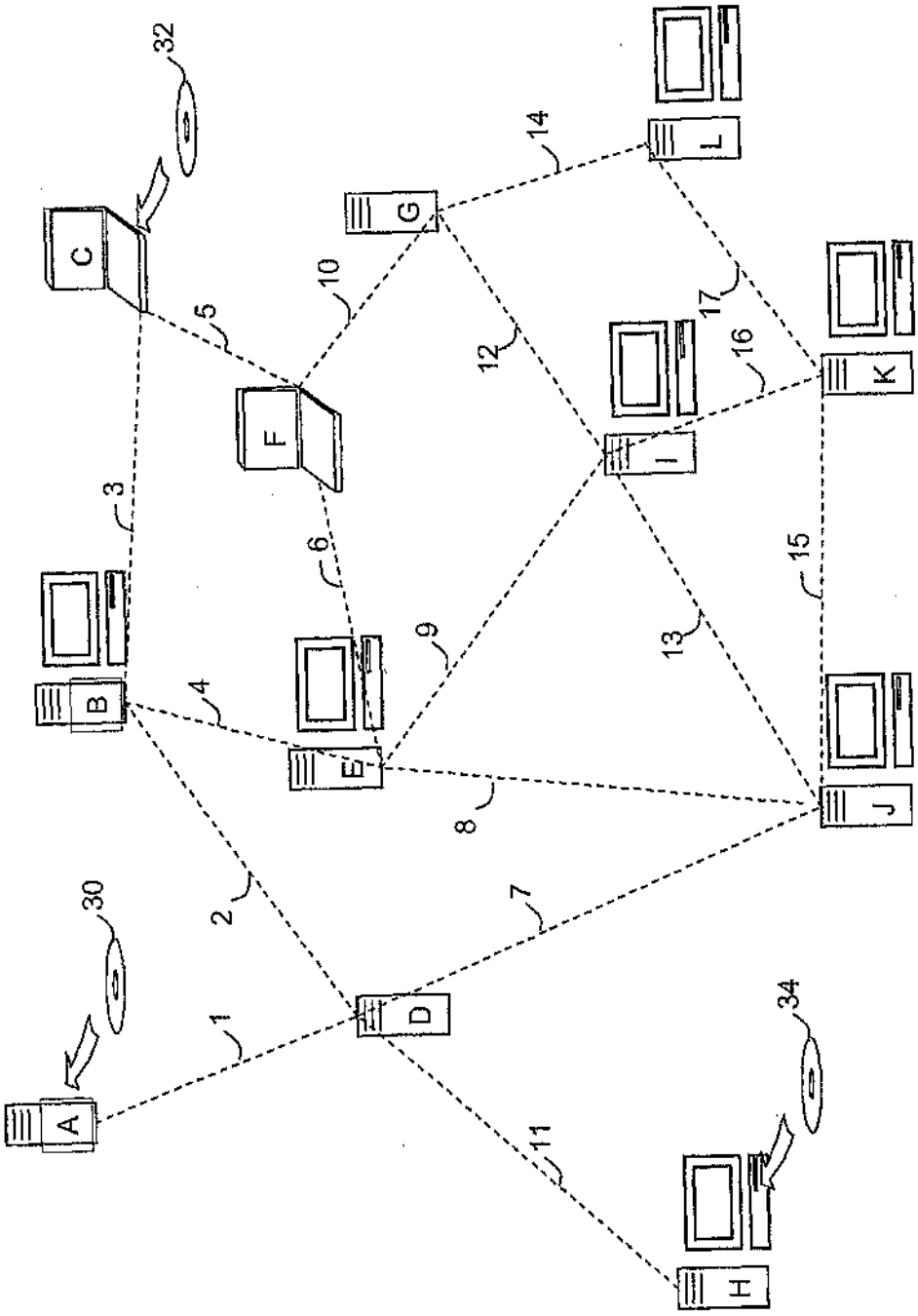


Figure 1

Quality Register Name	VS1	40
Service Name	Video Streaming	42
Service Parameter 1	Playout Rate (kbits-1)	44
Context Parameter 1	Network Utilisation (0 – 100%)	46
Master Problem : Service Parameter 1 Value	2000	48
Master Problem : Context Parameter 1 Value	40	50
Average Local Exploration QoS	6.8	52
Average Remote Exploration QoS	7.0	54
Provider-Specific Summary Quality of Service Records		

Provider ID	QoS Experienced	Weight	
A	7.2	1.2	56
B	6.1	8.5	
D	8.0	7.3	

Figure 2
(as stored in host F, for example)

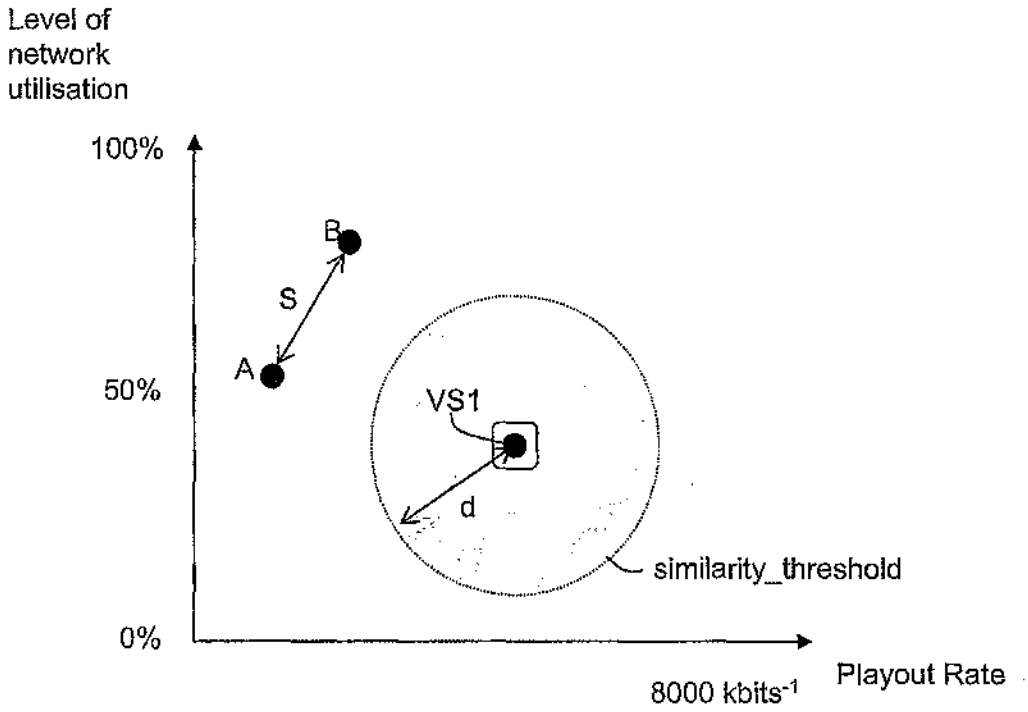

Level of network utilisation
100%
50%
0%
A
B
S
VS1
d
similarity_threshold
8000 kbits-1
Playout Rate

Figure 3

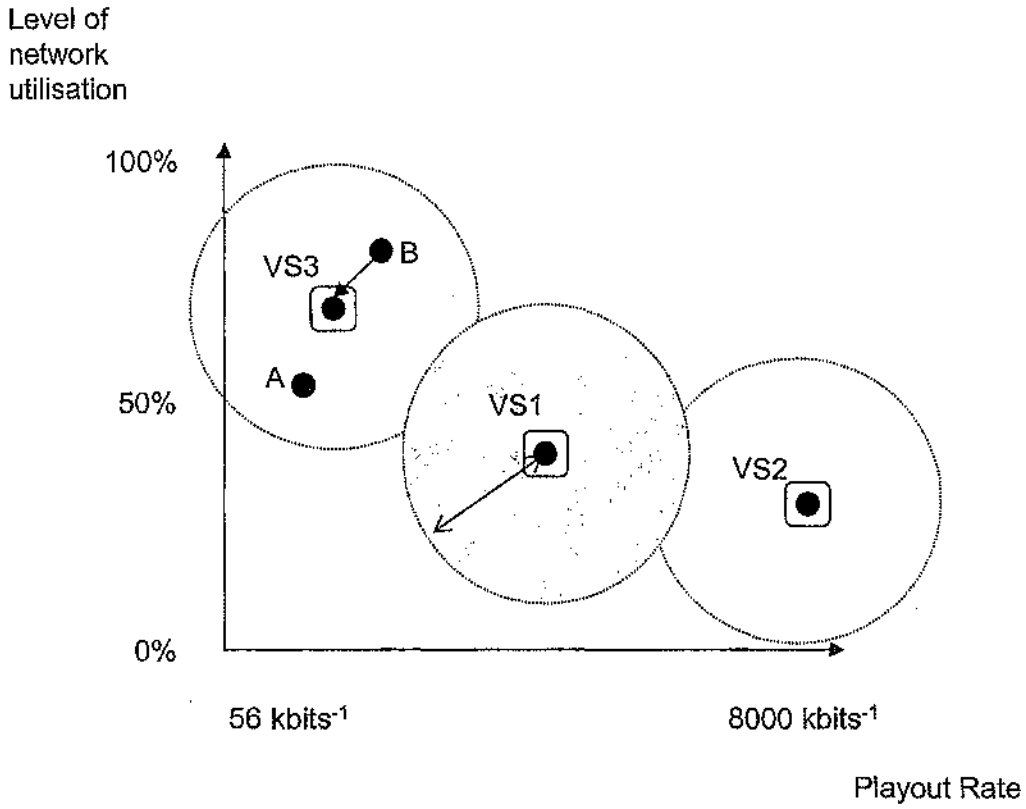

Level of network utilisation
100%
50%
0%
VS3
B
A
VS1
VS2
56 kbits-1
8000 kbits-1
Playout Rate

Figure 4

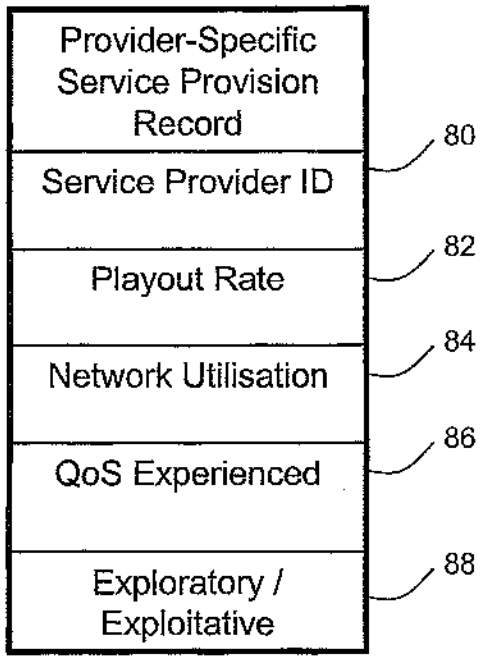


Figure 5A

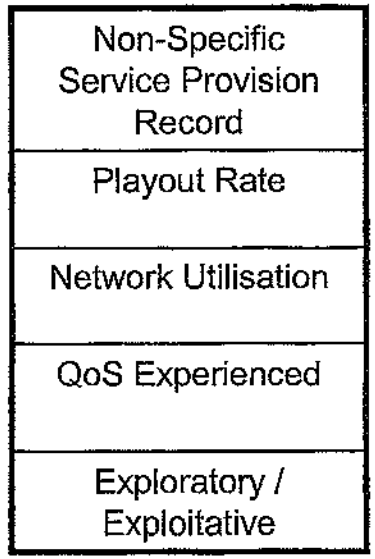


Figure 5B

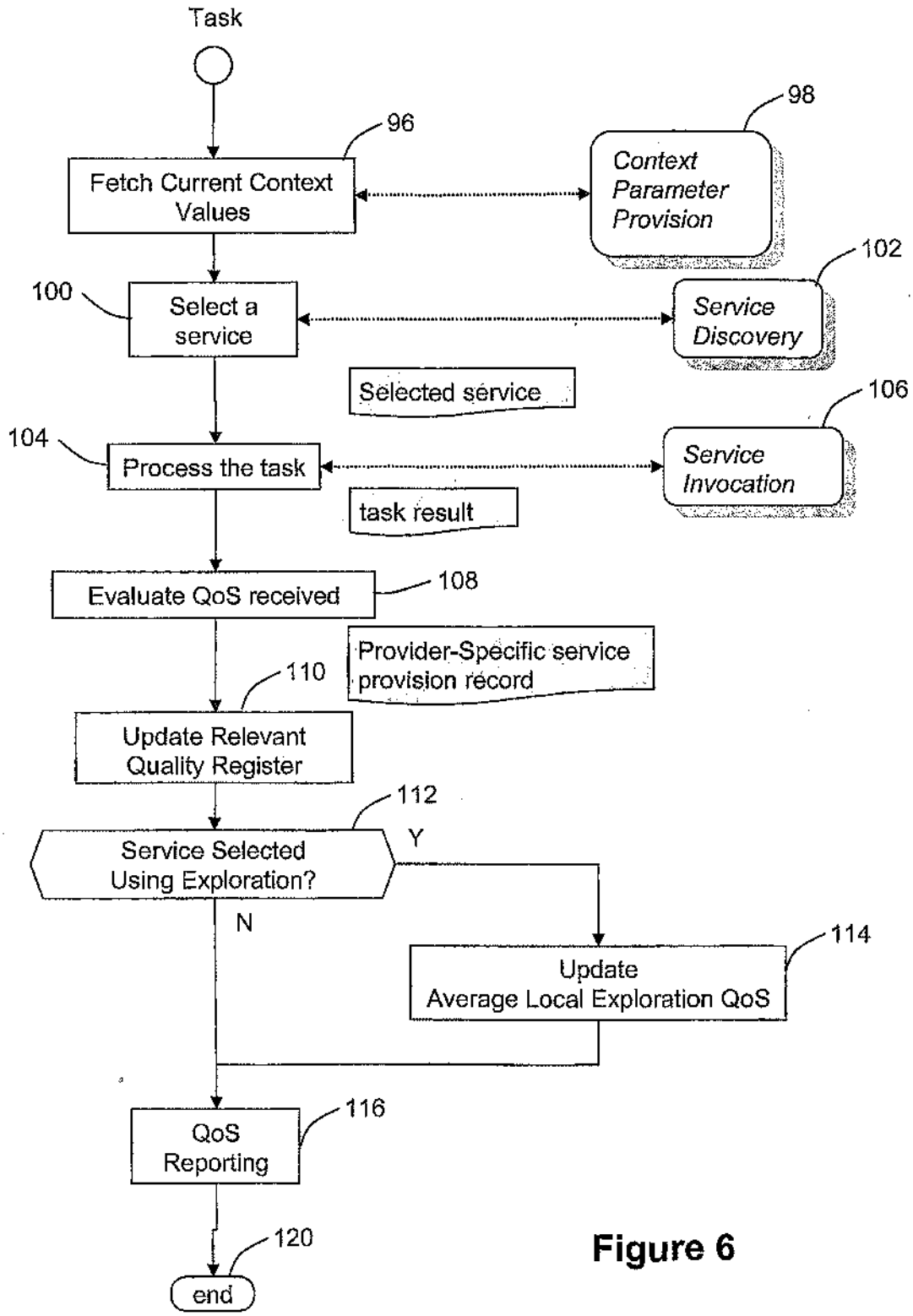

Task
96
Fetch Current Context Values
98
Context Parameter Provision
100
Select a service
102
Service Discovery
Selected service
104
Process the task
106
Service Invocation
task result
Evaluate QoS received
108
Provider-Specific service provision record
110
Update Relevant Quality Register
112
Service Selected Using Exploration?
Y
N
114
Update Average Local Exploration QoS
QoS Reporting
116
120
end

Figure 6

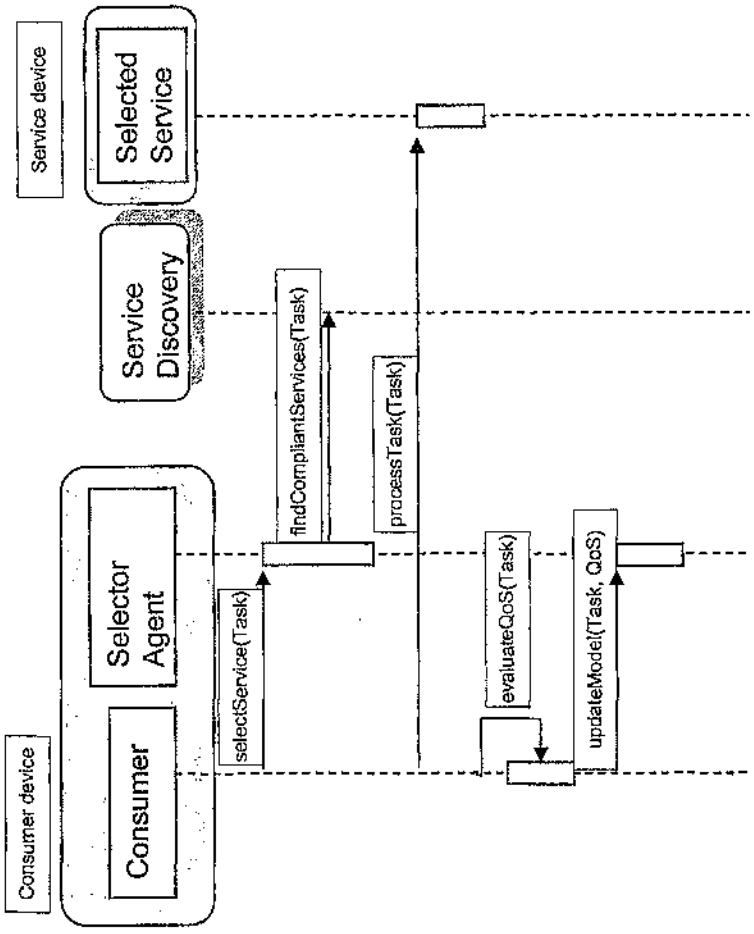


Figure 7

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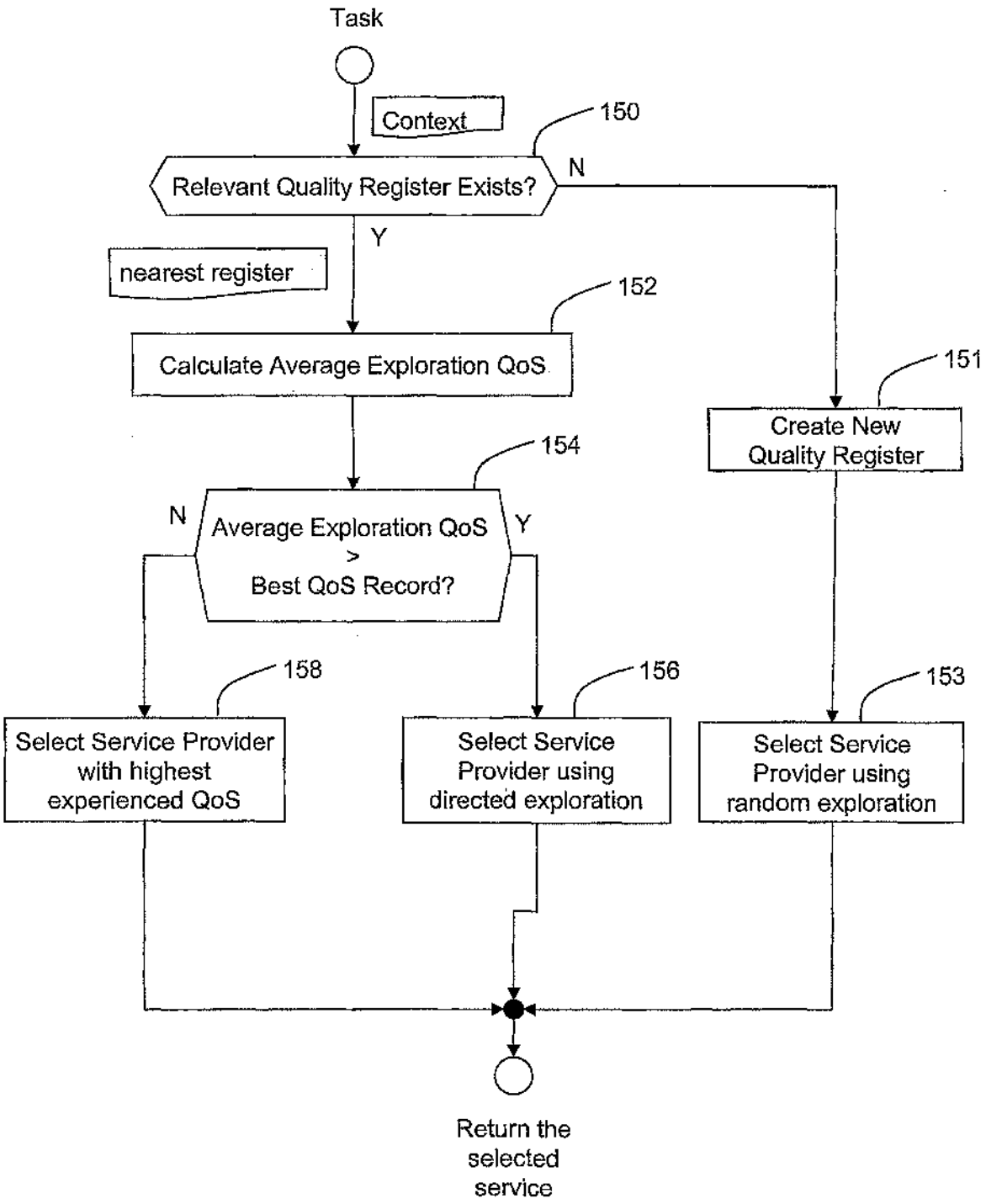

Task
Context
150
Relevant Quality Register Exists?
N
Y
nearest register
152
Calculate Average Exploration QoS
151
Create New Quality Register
154
N
Average Exploration QoS > Best QoS Record?
Y
158
156
153
Select Service Provider with highest experienced QoS
Select Service Provider using directed exploration
Select Service Provider using random exploration
Return the selected service

Figure 8

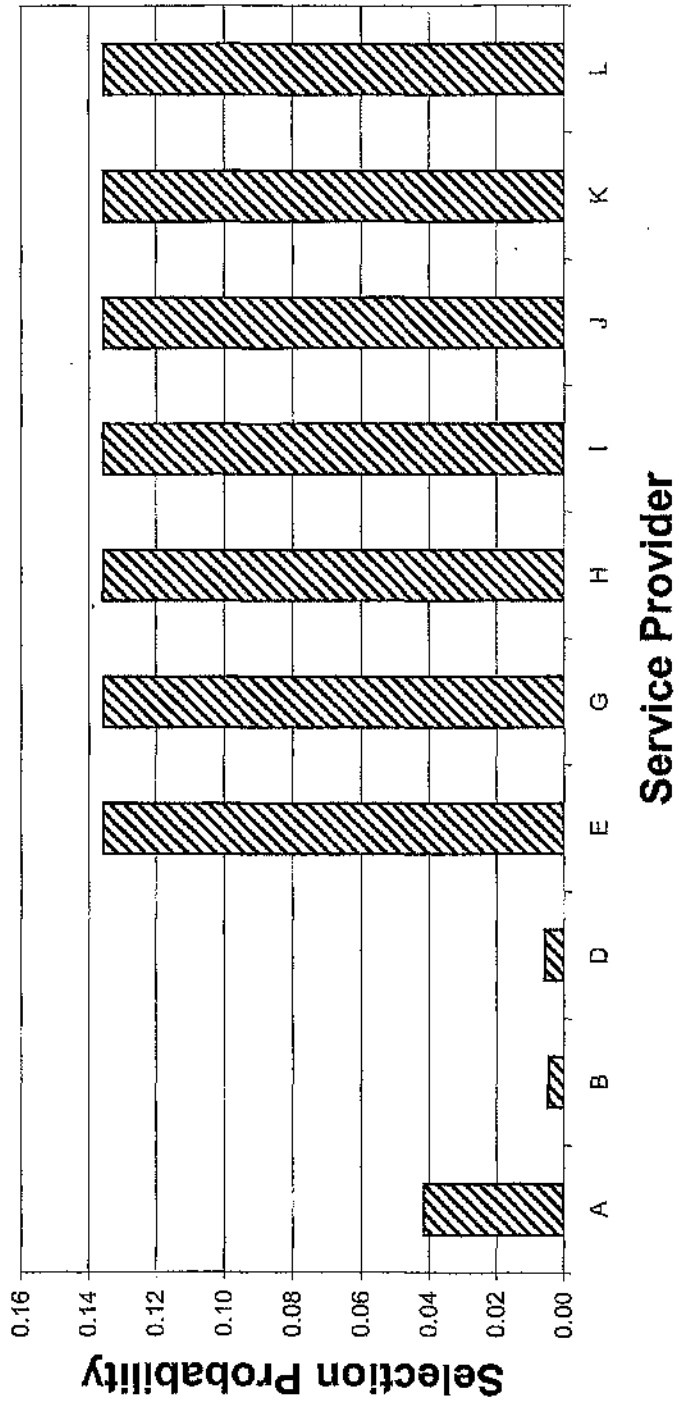

Selection Probability
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
A
B
D
E
G
H
I
J
K
L
Service Provider

Figure 9

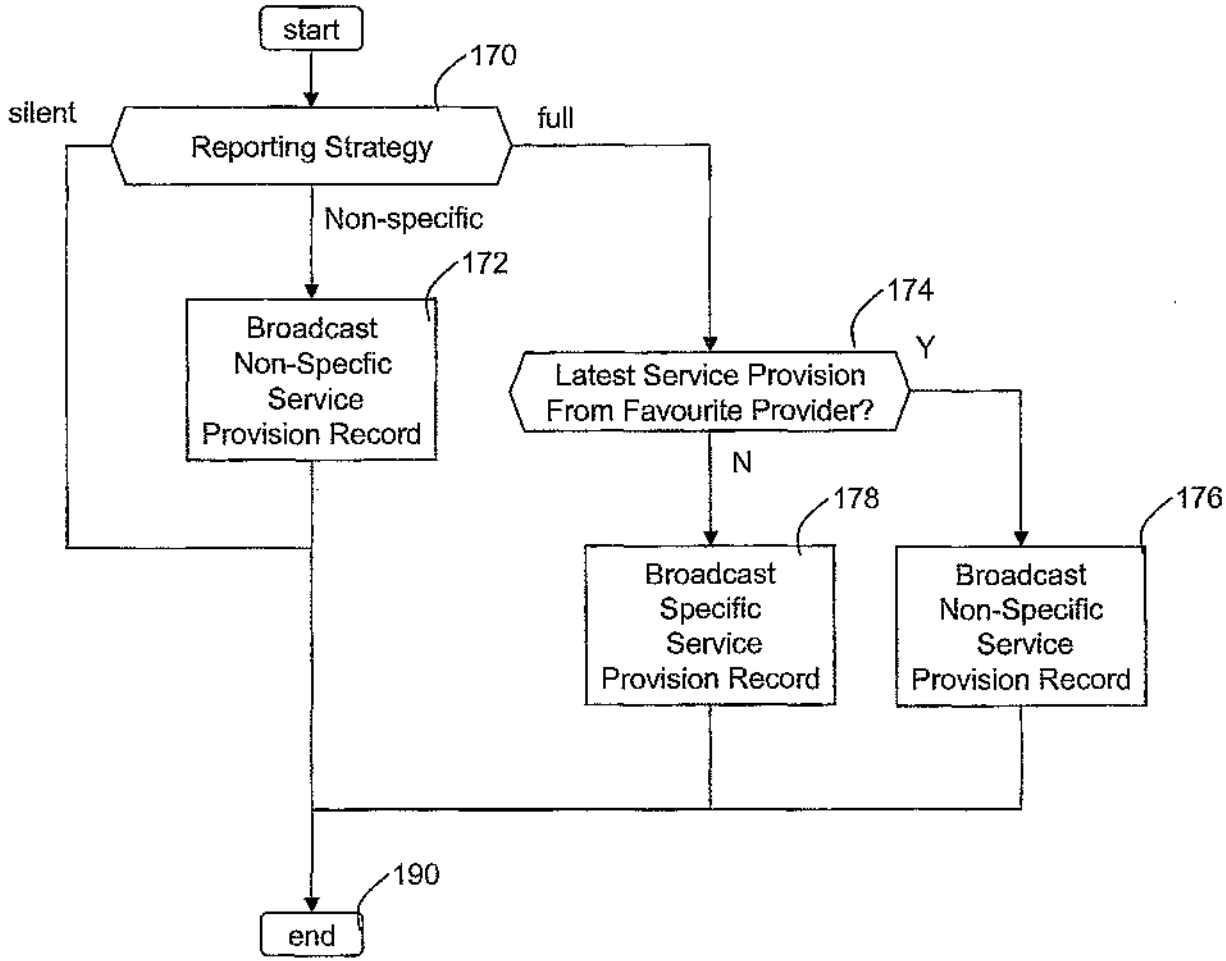

start
170
silent
Reporting Strategy
full
Non-specific
172
Broadcast Non-Specfic Service Provision Record
174
Y
Latest Service Provision From Favourite Provider?
N
178
Broadcast Specific Service Provision Record
176
Broadcast Non-Specific Service Provision Record
190
end

Figure 10

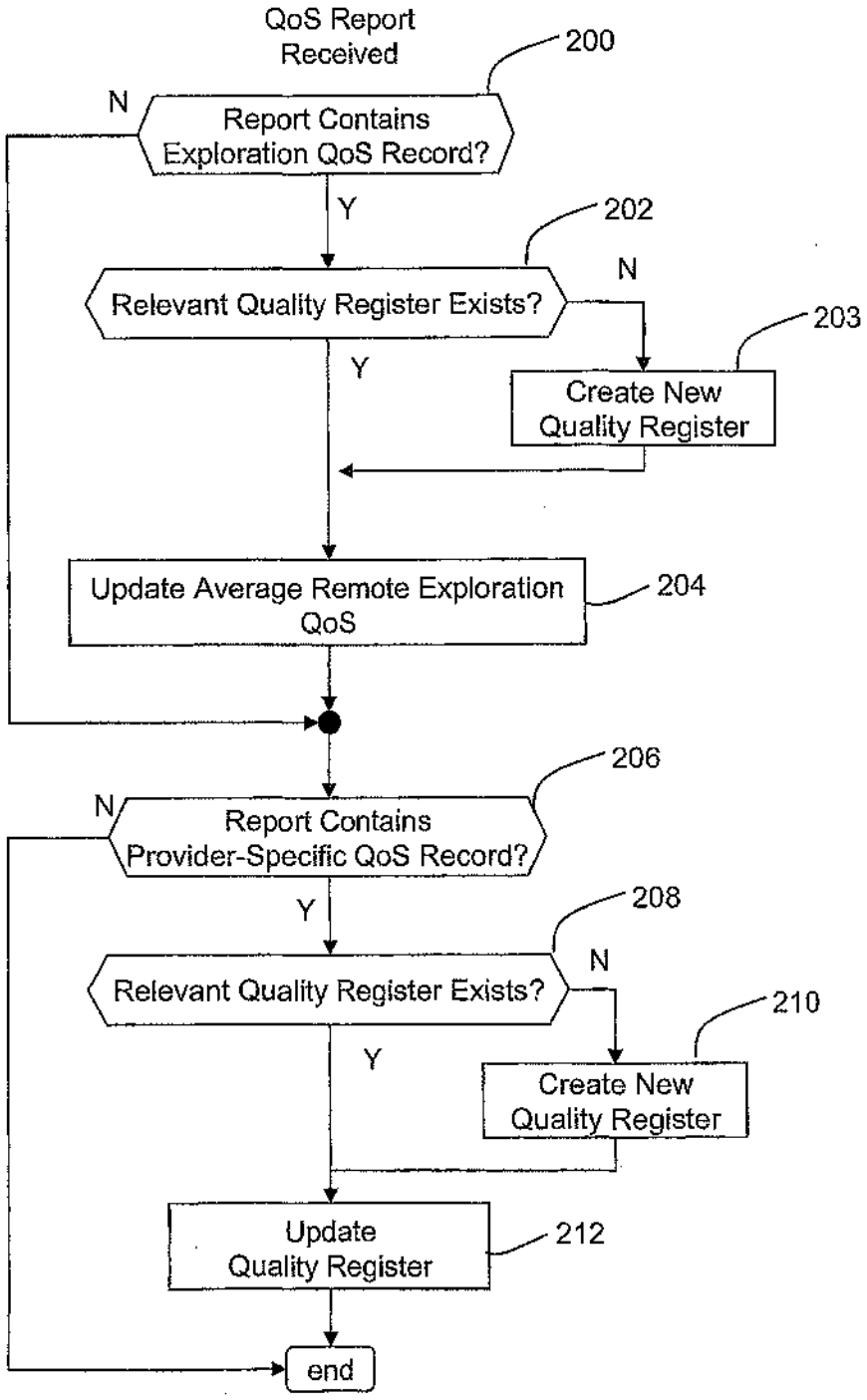

QoS Report Received
200
Report Contains Exploration QoS Record?
N
Y
202
Relevant Quality Register Exists?
N
203
Y
Create New Quality Register
Update Average Remote Exploration QoS
204
206
Report Contains Provider-Specific QoS Record?
N
Y
208
Relevant Quality Register Exists?
N
210
Y
Create New Quality Register
Update Quality Register
212
end

Figure 11

INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2007/002038

A. CLASSIFICATION OF SUBJECT MATTER
INV. G06F9/44 H04L29/08

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
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)
EPO-Internal, INSPEC, COMPENDEX, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	SEPANDAR D. KAMVAR, MARIO T. SCHLOSSER, HECTOR GARCIA-MOLINA: "The Eigentrust Algorithm for Reputation Management in P2P Networks" 12TH INTERNATIONAL WORLD WIDE WEB CONFERENCE, [Online] 20 May 2003 (2003-05-20), - 24 May 2003 (2003-05-24) XP002407852 Budapest, Hungary Retrieved from the Internet: URL:http://citeseer.ist.psu.edu/cache/papers/cs/27444/http:zSzzSzwww.stanford.eduzSz{sdkamvarzSzpaperszSzeigentrust.pdf/kamvar03eigentrust.pdf> [retrieved on 2006-11-17] cited in the application page 6, right-hand column, paragraph 5 - page 7, right-hand column, last paragraph	1-7

-/--

[X] Further documents are listed in the continuation of Box C. [ ] See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier document but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
28 August 2007	24/09/2007

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	Huber, Oliver

Form PCT/ISA/210 (second sheet) (April 2005)

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JULIAN DAY: "Selecting the Best Web Service" 14TH ANNUAL IBM CENTERS OF FOR ADVANCED STUDIES CONFERENCE, [Online] 2004, XP002407853 Retrieved from the Internet: URL:http://citeseer.ist.psu.edu/708012.html> [retrieved on 2006-11-17] cited in the application page 2, left-hand column, paragraph 2 - page 3, left-hand column, paragraph 2 page 6, left-hand column, paragraph 3 page 9, left-hand column, paragraph 2	1-7
A	XIAOLING WANG ET AL: "Service selection in dynamic demand-driven web services" WEB SERVICES, 2004. PROCEEDINGS. IEEE INTERNATIONAL CONFERENCE ON SAN DIEGO, CA, USA 6-9 JULY 2004, PISCATAWAY, NJ, USA,IEEE, 6 July 2004 (2004-07-06), pages 376-384, XP010708869 ISBN: 0-7695-2167-3 page 3 - page 6	1-7
A	MAKRIS ET AL: "Efficient and adaptive discovery techniques of Web Services handling large data sets" JOURNAL OF SYSTEMS & SOFTWARE, ELSEVIER NORTH HOLLAND, NEW YORK, NY, US, vol. 79, no. 4, April 2006 (2006-04), pages 480-495, XP005411719 ISSN: 0164-1212 page 5, right-hand column - page 10, left-hand column	1-7

Electronic Acknowledgement Receipt

EFS ID:	15575495
Application Number:	12815165
International Application Number:	
Confirmation Number:	1819
Title of Invention:	Clearinghouse System and Method for Determining Availability of Carrier-Based Services and Enhancing the Quality, Operation and Accessibility of Carrier-Based Networks
First Named Inventor/Applicant Name:	Theodore S. Rappaport
Customer Number:	30743
Filer:	Michael E. Whitham/Bryce Miller
Filer Authorized By:	Michael E. Whitham
Attorney Docket Number:	08610004c3
Receipt Date:	22-APR-2013
Filing Date:	14-JUN-2010
Time Stamp:	13:31:41
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		08610004c3_ids.PDF	127917 ee3972a588d206f138ef87d79159ffee712e7//ba	yes	5

	Multipart Description/PDF files in .zip description				
	Document Description		**Start**	**End**	
	Transmittal Letter		1	2	
	Information Disclosure Statement (IDS) Form (SB08)		3	5	
Warnings:					
Information:					
2	Non Patent Literature	08610004c3_ids_npl1.PDF	770396 0e81eefc5edb5b3c8293255e8be5cdd6792da1ef	no	26
Warnings:					
Information:					
3	Non Patent Literature	08610004c3_ids_npl2.PDF	118318 1bfc211130b867182265e8f2685c11f42dfb320d	no	3
Warnings:					
Information:					
4	Non Patent Literature	08610004c3_ids_npl3.PDF	525893 1fbf1b1984a2dda3a7391d17709c9f5274bd5c6c	no	5
Warnings:					
Information:					
5	Foreign Reference	08610004c3_ids_wo1.PDF	806916 a7afc1419defba8b97990f1b621b3f615f765760	no	56
Warnings:					
Information:					
6	Foreign Reference	08610004c3_ids_wo2.PDF	415724 11ec66643b7111aff9d5624d2b4d739d4bfc0550	no	36
Warnings:					
Information:					
7	Foreign Reference	08610004c3_ids_wo3.PDF	779715 0abf17e956f216beeefc049d360c94ab8aea7a3f	no	35
Warnings:					
Information:					
8	Foreign Reference	08610004c3_ids_wo4.PDF	631735 b036ad73a4f5740f18c368ada4d88d13842aee05	no	32
Warnings:					
Information:					

9	Foreign Reference	08610004c3_ids_wo5.PDF	623247 c62a2ebd2556a9bfdfa08ab2554424cd45e0d9316	no	38

Warnings:	
Information:	
Total Files Size (in bytes):	4799861

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.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re patent application of

Theodore S. Rappaport

Serial No. 12/815,165

Filed June 14, 2010

Confirmation No. 1819

Group Art Unit 2157

Examiner Srirama Channavajjala

For CLEARINGHOUSE SYSTEM AND METHOD FOR DETERMINING AVAILABILITY OF CARRIER-BASED SERVICES AND ENHANCING THE QUALITY, OPERATION AND ACCESSIBILITY OF CARRIER-BASED NETWORKS

Commissioner for Patents
PO Box 1450
Alexandria, Virginia 22313-1450

INFORMATION DISCLOSURE STATEMENT

Sir:

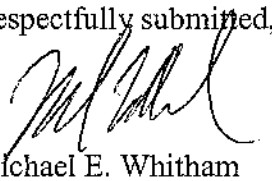
Under the provisions of 37 CFR 1.97 through 1.99 and pursuant to applicant's duty of disclosure under 37 CFR 1.56, applicant respectfully brings the following documents, listed on the attached forms PTO/SB/08a and PTO/SB/08b, to the attention of the Examiner in charge of the above-identified application. Copies of the references cited in the attached forms (3 pages) which are foreign patent documents or non patent literature documents are attached hereto.

These citations do not constitute an admission that the references are relevant or material to the claims. They are only cited as constituting related art of which the applicant is aware.

It is respectfully requested that the listed references be considered by the Examiner and formally made of record in this application.

Please charge any deficiencies in fees which would prevent consideration of the information disclosure statement and credit any overpayment of fees to Attorney's Deposit Account No. 50-2041.

Respectfully submitted,



Michael E. Whitham
Reg. No. 32,635

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UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
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Alexandria, VA 22313-1450
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MAILED
FEB 19 2013
OFFICE OF PETITIONS

WHITHAM CURTIS & CHRISTOFFERSON & COOK, P.C.
11491 SUNSET HILLS ROAD
SUITE 340
RESTON VA 20190

In re Application of :
Theodore S. Rappaport :
Application No. 12/815,165 : DECISION ON PETITION
Filed: June 14, 2010 : TO WITHDRAW
Attorney Docket No. 08610004C3 : FROM RECORD
:

This is a decision on the Request to Withdraw as attorney or agent under 37 C.F.R. § 1.36(b) or 37 C.F.R. § 10.40 filed January 15, 2013.

The request is **APPROVED**.

A review of the file record indicates that William E. Winters (1) does not have power of attorney in this patent application; and (2) has been employed or otherwise engaged in the proceedings in this patent application. In view of the present decision, William E. Winters has been withdrawn from the present application and may not prepare or submit papers under 37 C.F.R. § 1.34, or correspond in any manner in this application unless appointed in an acceptable power of attorney under 37 C.F.R. § 1.32(b).

Telephone inquires concerning this decision should be directed to Irvin Dingle at 571-272-3210.

Irvin Dingle
Petitions Examiner
Office of Petitions

cc: William E. Winters
P.O. Box 612407
San Jose, CA 95161

UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
12/815,165	06/14/2010	Theodore S. Rappaport	08610004c3

CONFIRMATION NO. 1819

POA ACCEPTANCE LETTER

30743
WHITHAM, CURTIS & CHRISTOFFERSON & COOK, P.C.
11491 SUNSET HILLS ROAD
SUITE 340
RESTON, VA 20190

OC00000005930761 1

Date Mailed: 02/15/2013

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 02/06/2013.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

/hchristian/

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

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
12/815,165	06/14/2010	Theodore S. Rappaport	110-009US

CONFIRMATION NO. 1819

63409
PATENT LAW PROFESSIONALS
P.O. BOX 612407
SAN JOSE, CA 95161

POWER OF ATTORNEY NOTICE

OC000000059307446

Date Mailed: 02/15/2013

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 02/06/2013.

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

/hchristian/

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

PTO/SB/30 (07-09)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Request For Continued Examination (RCE) Transmittal

Address to:
Mail Stop RCE
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Application Number	12/815,165
Filing Date	June 14, 2010
First Named Inventor	Rappaport
Art Unit	2157
Examiner Name	Channavajjala
Attorney Docket Number	68610004c3

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. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.
      i. ☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____
      ii. ☐ Other _____
   b. ☒ Enclosed
      i. ☒ Amendment/Reply
      ii. ☐ Affidavit(s)/Declaration(s)
      iii. ☐ Information Disclosure Statement (IDS)
      iv. ☒ Other petition for extension of time
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. ☒ The Director is hereby authorized to charge the following fees, any underpayment of fees, or credit any overpayments to Deposit Account No. 50-2041 .
      i. ☒ RCE fee required under 37 CFR 1.17(e)
      ii. ☒ Extension of time fee (37 CFR 1.136 and 1.17)
      iii. ☐ Other _____
   b. ☐ Check in the amount of $ _____ enclosed
   c. ☐ Payment by credit card (Form PTO-2038 enclosed)

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

Signature		Date	January 21, 2013
Name (Print / Type)	Michael K. Whitham	Registration No.	32,635

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			
Name (Print / Type)		Date	

This collection of information is required by 37 CFR 1.114. 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 the 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: Mail Stop RCE, 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.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re patent application of

Theodore Rappaport | Confirmation No. 1819

Serial No. 12/815,165 | Group Art Unit 2157

Filed June 14, 2010 | Examiner Srirama Channavajjala

For CLEARINGHOUSE SYSTEM AND METHOD FOR DETERMINING AVAILABILITY OF CARRIER-BASED SERVICES AND ENHANCING THE QUALITY, OPERATION AND ACCESSABILITY OF CARRIER-BASED NETWORKS

Commissioner for Patents
PO Box 1450
Alexandria, Virginia 22313-1450

PETITION FOR A ONE MONTH EXTENSION OF TIME AND AMENDMENT UNDER 37 C.F.R. §1.114

Sir:

The applicant hereby petitions for a one month extension of time to respond to the office action mailed October 15, 2012. This amendment is being concurrently filed with a request for continued examination (RCE). The Examiner is authorized to charge attorney's deposit account 50-2041 (Whitham, Curtis, Christofferson & Cook) for the extension of time fee, the RCE fee, and for any other fee required to gain entry of the amendment. This amendment is also being concurrently filed with a revocation of power of attorney and change of correspondence address paper.

The undersigned thanks the Examiner for the in-person interview which took place January 15, 2012. This amendment makes the substance of the interview of record in the application.

In response to the office action mailed October 15, 2012, the applicant requests reconsideration and requests entry of the following amendment.

Amendments to Specification: begin on page 2

Listing of the Claims: begins on page 3

Remarks: begin on page 12

Amendments to Specification:

Please amend the paragraph beginning at the bottom of page 44 and ending at the top of page 45 as follows:

This database can also be contributed to by users who wish to add/record their own experiences, either autonomously or manually through a public website offered by the Clearinghouse. Carriers could enter their own database into the web clearinghouse, or the clearinghouse could use bots or automated web crawlers to find websites from FCC, Chinese government, private or public company websites ~~wesbsites~~, Comsearch, etc. to build a large database of spectrum availability and tower locations and bandwidths/services with a common website. Note that this Clearinghouse could also have users provide inputs as to their perceived or experiential views of radio coverage or phone/web quality at step 1114 when they were in a particular location. Note that the entry of this "performance" data could be added by users based on their own experience, and could also be provided by carriers based on their known infrastructure locations. Alternatively, phones of the future, equipped with GPS or any other type of location capability, could automatically, without any human interaction, upload to the website, on a periodic, one-time, infrequent, or regular basis, the perceived/measured radio reception quality, bit rate, capacity, availability, average use profile, average availability ~~available~~ profile, statistics on outage or reliability or coverage or capacity carrying capabilities, or an evaluation of the RF or end-user application performance, and this information may be loaded to the Clearinghouse for inclusion in the database that is available. The database is updated at step 1116 at various intervals that make sense for the implementation of the Clearinghouse (daily, hourly, by minute, by week, and this may be done on a global or on a specific location basis across the clearinghouse database, that itself may be distributed or located centrally). The updated information is made available to users on an ongoing basis, for further utility and enjoyment.

Listing of the Claims:

The following is complete listing of all the claims in the application, with an indication of the status of each:

1. (currently amended) A system for collecting and providing access to quality or service information associated with one or more wireless communications networks, mobile devices, or end users, comprising:

means for receiving mobile device location information of a plurality of mobile devices or end users that are associated with one or more wireless communications networks;

means for receiving quality or service information ~~of one or more wireless communications networks~~ pertaining to wireless access characteristics for one or more mobile devices of said plurality of mobile devices or end users, and said quality or service information comprising coverage, availability, ~~outage~~ or performance information of said one or more wireless communications networks or said one or more mobile devices;

means for storing said mobile device location information and said quality or service information;

means for updating said mobile device location information and said quality or service information stored by said means for storing when one or more mobile devices of said plurality of mobile devices or end users travel from one location to another; ~~and~~

means for providing access to quality or service information stored by said means for storing to one or more wireless carriers, or one or more third parties.; and

wherein said wireless access characteristics comprise one or more of perceived or measured:

radio reception quality,

network performance,

quality of service,

data rate,

spectrum availability or suitability,

capacity or bandwidth,

Samsung Ex. 1004, page 395 of 974

availability or quality of coverage,

availability or quality of capacity,

availability or quality of one or more services or carriers,

availability or quality of air interfaces,

average use profile,

average availability profile,

statistics on outage or reliability or coverage or capacity carrying capabilities for one or more service providers,

frequencies,

radio frequency or quality of service or coverage or service map or addresses for one or more service providers,

radio frequency or end-user application performance, and

cost of service.

2. (previously presented) The system of Claim 1, further comprising means for providing access to quality or service information stored by said means for storing to one or more end users or to one or more end user communications devices.

3. (currently amended) The system of Claim 1, further comprising means for generating one or more of a recommended operating band, operating mode, communications network or carrier for an end user ~~users~~ or an end user communications device, depending on mobile device location information.

4. (currently amended) The system of Claim 3 wherein said means for generating one or more of a recommended operating band, operating mode, communication network or carrier is further based on quality or service information stored by said means for storing.

5. (Canceled).

Samsung Ex. 1004, page 396 of 974

6. (previously presented) The system of Claim 1 wherein said means for providing access comprises means for reporting quality or service information to one or more end users or one or more end user communications devices.

7. (previously presented) The system of Claim 1, further comprising means for providing access to quality or service information stored by said means for storing to a party or parties other than end subscribers and carriers of said one or more wireless communications networks.

8. (currently amended) A method of collecting and providing access to quality or service information associated with one or more wireless communications networks, mobile devices, or end users, comprising:

using a computer, receiving mobile device location information of a plurality of mobile devices or end users that are associated with one or more wireless communications networks and quality or service information pertaining to wireless access characteristics for one or more mobile devices of said plurality of mobile devices or end users, and said quality or service information comprising coverage, availability ~~outage~~ or performance information of one or more wireless communications networks or said one or more mobile devices,

storing, by action of said computer, said mobile device location information and said quality or service information in a memory or database;

updating, by action of said computer, said mobile device location information stored in said memory or database when a mobile device of said plurality of mobile devices travels from one location to another; ~~and~~

providing access to quality or service information stored in said memory or database to one or more carriers or third parties that provide services to said one or more carriers or to said one or more wireless communications networks.; and

wherein said wireless access characteristics comprise one or more of perceived or measured:

radio reception quality,

network performance,

Samsung Ex. 1004, page 397 of 974

quality of service,

data rate,

spectrum availability or suitability,

capacity or bandwidth,

availability or quality of coverage,

availability or quality of capacity,

availability or quality of one or more services or carriers,

availability or quality of air interfaces,

average use profile,

average availability profile,

statistics on outage or reliability or coverage or capacity carrying capabilities for one or more service providers,

frequencies,

radio frequency or quality of service or coverage or service map or addresses for one or more service providers,

radio frequency or end-user application performance, and

cost of service.

9. (Canceled).

10. (previously presented) The method of Claim 8, further comprising providing access to quality or service information stored in said memory or database to one or more end users or one or more end user communications devices.

11. (previously presented) The method of Claim 10 wherein providing access to said one or more end users or one or more end user communications devices comprises reporting quality or service information to said one or more end users or said one or more end user communications devices.

12. (previously presented) The method of Claim 8, further comprising, by action of said computer:

processing said quality or service information; and

generating quality or availability-of-service information of services offered by said one or more carriers.

13. (Canceled).

14. (previously presented) The method of Claim 12 wherein said quality or availability-of-service information is location specific.

15. (previously presented) The method of Claim 8, further comprising serving data based on mobile device location information and quality or service information stored in said memory or database.

16. (currently amended) The method of Claim 15 wherein said data comprises one or more of a recommended operating band, operating mode, communications network and/or carrier for end users or end user communications devices.

17. (previously presented) The method of Claim 16 wherein said data is formatted and served to end users or end user communications devices as one or more web pages.

18. (previously presented) The method of Claim 8, further comprising serving data based on mobile device location information or quality or service information stored in said memory or database to one or more carriers.

19. (previously presented) The method of Claim 8, further comprising providing access to quality or service information stored in said memory or database to a party or parties other than subscribers and carriers of said one or more wireless communications networks.

20. (currently amended) A system for collecting and providing access to quality or service information associated with ~~of~~ one or more wireless communications networks,

Samsung Ex. 1004, page 399 of 974

mobile devices, or end users, comprising:

a computer configured to receive mobile device location information of a plurality of mobile devices or end users that are associated with one or more wireless communications networks and quality or service information pertaining to wireless access characteristics for one or more mobile devices of said plurality of mobile devices or end users, and said quality or service information comprising coverage, availability ~~outage~~ or performance information of one or more wireless communications networks or said one or more mobile devices;

a memory or database configured to store the received mobile device location information and quality or service information; ~~and~~

an interface through which one or more carriers or one or more third parties may access quality or service information or mobile device location information stored in said memory or database ~~.~~; and

wherein said wireless access characteristics comprise one or more of perceived or measured:

radio reception quality,

network performance,

quality of service,

data rate,

spectrum availability or suitability,

capacity or bandwidth,

availability or quality of coverage,

availability or quality of capacity,

availability or quality of one or more services or carriers,

availability or quality of air interfaces,

average use profile,

average availability profile,

statistics on outage or reliability or coverage or capacity carrying capabilities for one or more service providers,

frequencies,

radio frequency or quality of service or coverage or service map or addresses for one or more service providers,

radio frequency or end-user application performance, and

cost of service.

21. (Canceled).

22. (previously presented) The system of Claim 20, further comprising an interface through which one or more end users or one or more end user communications devices may access quality or service information stored in said memory or database.

23. (previously presented) The system of Claim 20, further comprising a server configured to serve quality or service information stored in said memory or database to one or more carriers.

24. (Original) The system of Claim 22 wherein said computer is further configured to:

process said quality or service information; and

generate quality or availability-of-service information of services offered by said one or more carriers.

25. (Canceled).

26. (previously presented) The system of Claim 20, further comprising a server configured to generate and serve data based on mobile device location information and quality or service information stored in said memory or database to one or more end users or one or more end user communications devices.

27. (currently amended) The system of Claim 26 wherein said data comprises one or more of a recommended operating band, operating mode, communications network and/or carrier for said one or more end users or one or more of said end user communications devices.

28. (previously presented) The system of Claim 27 wherein said server comprises a web server and said data is formatted as one or more web pages served to said one or more end users or one or more of said end user communications devices.

29. (Canceled).

30. (previously presented) The system of Claim 20 wherein said computer is configured to provide access to quality or service information stored in said memory or database to a party or parties other than subscribers and carriers of said one or more wireless communications networks.

31-102. (Canceled.)

103. (new) The system of Claim 1 further comprising means for providing rank ordering or preferred preferences for one or more of ranked or preferred:

wireless performance,
telecommunication services,
service providers,
carriers,
frequencies,
spectrum allocations,
wireless connection options,
power levels,
data rates,
modulation types,
air interface specifications, and
bandwidths.

104. (new) The method of Claim 8 further comprising the step of providing rank ordering or preferred preferences for one or more of ranked or preferred:

Samsung Ex. 1004, page 402 of 974

wireless performance,
telecommunication services,
service providers,
carriers,
frequencies,
spectrum allocations,
wireless connection options,
power levels,
data rates,
modulation types,
air interface specifications, and
bandwidths.

105. (new) The system of Claim 20 wherein said computer is configured to provide rank ordering or preferred preferences for one or more of ranked or preferred:

wireless performance,
telecommunication services,
service providers,
carriers,
frequencies,
spectrum allocations,
wireless connection options,
power levels,
data rates,
modulation types,
air interface specifications, and
bandwidths.

REMARKS

By entry of this Amendment, Claims 1, 8, and 20 have been amended. Claims 31-102 have been canceled. Claims 3, 4, 16, and 27 have been amended for purposes of clarity. New Claims 103-105 have been added. Claims 1-4, 6-8, 10-12, 14-20, 22-24, 26-28, 30, and 103-105 remain pending in the present application. Applicant respectfully requests reconsideration of the claims in view of the remarks presented below.

The specification has been amended to correct typographical errors. No new matter has been added.

Pursuant to the interview, the application has been simplified to present only 3 independent claims and to reference wireless access characteristics with specificity.

Claims 1-4, 6-8, 10-12, 14-16, 18-20, 22-24, 26-27, 30 were rejected under 35 USC 102(b) as being allegedly anticipated by Lewis Allan et al., [hereafter Lewis] WO 2005/101878 published Oct 2005. These rejections are traversed in view of the remarks below.

Lewis describes a system and a method comprising a data service provider infrastructure, carrier network, and mobile device. Lewis is a patent focused on network performance testing and evaluation using a 3rd party data provider, and specifically strives to not interfere or require modification of the carrier's or mobile device's standard protocol (p. 6:5-9 ; p. 11:24-30). In the preferred embodiment, data packets are simply transmitted (with very small modification during transmission) from data service provider infrastructure to carrier network to mobile device and then in the reverse order given (Figure 2). Information collected in Lewis is strictly limited to the collecting and counting of acknowledgment packets and location information based on the location of the carrier infrastructure, such as base station location, and not the mobile devices themselves (Figure 6; p. 14:15-25). Lewis intentionally does not require the location of the mobile device, as the only location information it uses is that which is provided by the carrier infrastructure through standard identification flags that identify the carrier infrastructure location (p. 12:23-31; p. 13:1-7).

Contrary to Lewis, Claims 1, 8, and 20 indicate receiving quality or service information for mobile devices, including coverage, availability, or performance

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information. Lewis is simply unable to provide such information. As described in Lewis, mobile devices in Lewis can send only acknowledgement data packets with basic location data as provided initially by the carrier in the request packet (Figure 6). The mobile devices and carrier infrastructure taught in Lewis are unable to assess the wireless connectivity or access characteristics experienced by a mobile device, and there is no way for such information to be communicated in Lewis. Lewis simply focuses on the exchange of packets initiated by a 3rd party server, appended with carrier infrastructure location, and then repeated back by the mobile device over the carrier network to the 3rd party server (p.9:15-20).

As pointed out during the interview, Lewis demonstrates his inability to reliably understand or track the performance for one or more specific mobile devices when discussing limitations of his invention (see p. 14:19-22, where not all mobile devices will always send reports, see p. 14:26-29 where send-only devices will never receive messages and thus never send location information, and therefore never be able to participate). Lewis intentionally does *not* require the carrier infrastructure or the mobile device to expend any additional bandwidth or computing power (p.11:24-30). No where does Lewis teach the ability of the mobile device or the carrier to use its own sensing methods to gain access to the experiences observed for the mobile device or the end user, as is done in the current invention (see, for example, Figure 7:714; Figures 8, 10 ; Figure 11:1110-1112 ; bottom of page 39 to top of page 40). As discussed during the interview, the claimed invention as amended is focused on reports or experiences for the mobile devices or end users, while Lewis is focused on the infrastructure (e.g. base stations).

As discussed during the interview, in Lewis location information is provided exclusively by the carrier, and is defined as being the location of the carrier's infrastructure which inserted the required bits (and *not* the location of the mobile device). See Figure 6 of Lewis. Lewis teaches that "location information" might include information such as NPC, country code, network code, location area, routing area, base, area, channel, and TrafNum (p.12:23-31; p.13:1-11). **In short, as discussed at the interview, location information in Lewis is *not* taught as defining where the mobile device is located, and Lewis has no ability to report the perceived wireless access characteristics experienced by the end user or the end user device.** Lewis is very

clear that neither the mobile device nor the carrier provides the mobile device location (for example, see Lewis p.14:19-20 where location is limited to a base station). Thus, Lewis could never anticipate or make obvious the current invention, as he not only fails to be able to measure the wireless access characteristics from one or more devices or carriers, but furthermore is unable to identify the location of or radio performance experienced by a mobile device.

Furthermore, unlike in Lewis, the claimed invention contemplates but is not limited to an application that may be installed on the end user device, so that the end user may manually log or report his/her own experiences as she uses the mobile device during travel in addition to automated end-user device reporting of its observations. These unique aspects are taught throughout the specification, particular instances being the top paragraph of p. 43 and final paragraph of p. 39. As discussed during the interview, never does Lewis teach the ability to determine wireless access performance down to the individual mobile device or end user level, as all metrics defined and taught in Lewis have to do with statistical performance measures from a base station (see for example p. 7:7-11).

It would not be obvious in view of Lewis to one of ordinary skill in the art to conceive of collecting and storing location information in the way used in the present invention because the subject matter of Lewis is fundamentally based on a request packet-acknowledgement packet data collection approach that sources location information from carrier infrastructure, and does not concern itself with the experience of the mobile device or end user, itself, or what the end user experiences as she uses her cell phone in an ongoing manner, or travels from one location to another. That is to say, Lewis never teaches or contemplates the experiences of an end user or an end user's device being made available to the carrier or third party (or to itself or other end users), such that the end user, end user's device, the carrier, or a third party could know from the end-user's perspective (or end user's device perspective) where coverage is poor or good, where there is no communication service whatsoever, where service or download performance is poor or unreliable, or what the observed capacity or spectrum is like as individual end users use their devices in an ongoing manner. Nor does Lewis allow the end user or a carrier or clearinghouse to preset or rank order and end users preferred

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settings for communication. Lewis simply does not allow for the reporting or utilization of wireless access characteristics as taught in the claimed invention of the present application. Furthermore, it would not be obvious to one skilled in the art after reading Lewis, that a mobile device, either alone or in conjunction with the cellular carrier infrastructure, could be used to gain knowledge of the radio link quality so that end user devices or carriers could make better decisions about where their spectrum or service is better or worse as compared to other carriers, other frequencies, at other locations.

As agreed at the interview the base claims have been amended to include a listing of specific wireless access characteristics. These are taken from the specification on the page numbers recited below for each item. Claims 1, 8, 20 as amended above now indicate that "wireless access characteristics" comprises "perceived or measured:

radio reception quality (p.45),

network performance (p.16),

quality of service (p.38),

data rate (p.45),

spectrum availability or suitability (p.19),

capacity or bandwidth (p.38),

availability or quality of coverage (p.40),

availability or quality of capacity (p.38),

availability or quality of one or more services or carriers (p.38),

availability or quality of air interfaces (p.46),

average use profile (p.45),

average availability profile (p.45),

statistics on outage or reliability or coverage or capacity carrying capabilities for one or more service providers (p.45),

frequencies (p.39),

RF or QoS or coverage or service map for one or more service providers (p.43),

RF or end-user application performance (p.45), and

cost of service (p.43)."

The Applicant notes that the page references provided for the items in this list serve as just a few of the possible supporting citations, and that many if not all of these

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items appear and are discussed in multiple parts of the Specification, and would be understood by one of ordinary skill to be contained in the Specification.

Claims 17, 28 were rejected under 35 USC 103(a) as being allegedly unpatentable over Lewis in view of Shen et al., [hereafter Shen], US Pub No 20070198339 filed Feb 2006. These rejections are obviated in view of the fact Claims 17, 28 depend from base Claims 8 and 20, respectively, which as amended above are now in condition for allowance. Shen does not make up for any of the deficiencies of Lewis.

New Claims 103-105 point to a feature of the invention involving rank ordering or preferred preferences for a particular list of telecommunication characteristics. Each item listed is supported by the specification as indicated below (and elsewhere). Claims 103-105 recite providing rank ordering or preferred preferences for one or more of ranked or preferred:

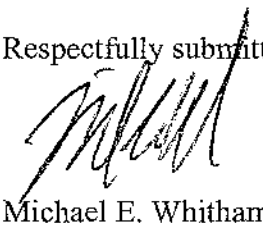
wireless performance (p.16),
telecommunication services (p.10, 16, 43),
service providers (p.46),
carriers (p.42),
frequencies (p.42, 43),
spectrum allocations (p.46),
wireless connection options (p.19),
power levels (p.41),
data rates (p.42),
modulation types (p.41, 42),
air interface specifications (p.46),
and bandwidths (p.42,43).

In addition, to accelerate this case to grant all other claims are canceled. The Applicant reserves the right to pursue the canceled claims or other claims supported by the patent specification in one or more continuation applications.

In view of the foregoing, it is respectfully requested that the application be reconsidered, that claims 1-4, 6-8, 10-12,14-20, 22-24, 26-28, 30, and 103-105 be allowed, and that the application be passed to issue.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary in a telephonic or personal interview.

Respectfully submitted,



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Samsung Ex. 1004, page 409 of 974

Electronic Patent Application Fee Transmittal

Application Number:	12815165
Filing Date:	14-Jun-2010
Title of Invention:	Clearinghouse System and Method for Determining Availability of Carrier-Based Services and Enhancing the Quality, Operation and Accessibility of Carrier-Based Networks
First Named Inventor/Applicant Name:	Theodore S. Rappaport
Filer:	Michael E. Whitham
Attorney Docket Number:	110-009US

Filed as Small Entity

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Extension - 1 month with $0 paid	2251	1	75	75

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
Request for continued examination	2801	1	465	465
		Total in USD ($)		**540**

Electronic Acknowledgement Receipt

EFS ID:	14885632
Application Number:	12815165
International Application Number:	
Confirmation Number:	1819
Title of Invention:	Clearinghouse System and Method for Determining Availability of Carrier-Based Services and Enhancing the Quality, Operation and Accessibility of Carrier-Based Networks
First Named Inventor/Applicant Name:	Theodore S. Rappaport
Customer Number:	63409
Filer:	Michael E. Whitham
Filer Authorized By:	
Attorney Docket Number:	110-009US
Receipt Date:	06-FEB-2013
Filing Date:	14-JUN-2010
Time Stamp:	07:28:42
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	$540
RAM confirmation Number	7407
Deposit Account	502041
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

Charge any Additional Fees required under 37 C.F.R. Section 1.16 (National application filing, search, and examination fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.19 (Document supply fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.20 (Post Issuance fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		08610004c3resrce.pdf	364415 38da59988e193de8f57c4cd7230a08d5df298dc1	yes	19

Multipart Description/PDF files in .zip description

Document Description	Start	End
Change of Address	1	1
Request for Continued Examination (RCE)	2	2
Amendment Submitted/Entered with Filing of CPA/RCE	3	3
Specification	4	4
Claims	5	13
Applicant Arguments/Remarks Made in an Amendment	14	19

Warnings:

Information:

2	Fee Worksheet (SB06)	fee-info.pdf	32515 faf6b60e2d3f75971b8c0b61e5df87242ecad3cc	no	2

Warnings:

Information:

Total Files Size (in bytes):	396930

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.

Doc Code:

PTO/SB/82 (01-06)
Approved for use through 12/31/2006. OMB 0651-0035
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REVOCATION OF POWER OF ATTORNEY WITH NEW POWER OF ATTORNEY AND CHANGE OF CORRESPONDENCE ADDRESS

Application Number	12/815,165
Filing Date	June 14, 2010
First Named Inventor	Rappaport
Art Unit	2157
Examiner Name	Channavajjala
Attorney Docket Number	08610004c3

I hereby revoke all previous powers of attorney given in the above-identified application:

☐ A Power of Attorney is submitted herewith.

OR

☑ I hereby appoint the practitioners associated with the Customer Number: 30743

☑ Please change the correspondence address for the above-identified application to:

☑ The address associated with Customer Number: 30743

OR

☐ Firm or Individual Name					
Address					
City		State		ZIP	
Country					
Telephone		Email			

I am the:

☑ Applicant/Inventor.

☐ Assignee of record of the entire interest. See 37 CFR 3.71
Statement under 37CFR 3.73(b) is enclosed. (Form PTO/SB/96)

SIGNATURE of Applicant or Assignee of Record

Signature			
Name	Theodore S. Rappaport		
Date		Telephone	540-818-2276

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below*.

☑ *Total of 1 forms are submitted.

This collection of information is required by 37 CFR 1.36. 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 on 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/SB/06 (07-06)
Approved for use through 1/31/2007. OMB 0651-0032
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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
12/815,165	06/14/2010	

APPLICATION AS FILED – PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY ☒ RATE ($)	SMALL ENTITY ☒ FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	OTHER THAN SMALL ENTITY FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), 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 02/06/2013	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE ($)	SMALL ENTITY ADDITIONAL FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	* 27	Minus	** 82	= 0	X $31 =	0	OR	X $ =	
Independent (37 CFR 1.16(h))	* 3	Minus	***7	= 0	X $125 =	0	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	0	OR	TOTAL ADD'L FEE	

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

* 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:
/SHEILA CHAPMAN/

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.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

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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.
12/815,165	06/14/2010	Theodore S. Rappaport	110-009US	1819

63409 7590 01/17/2013

PATENT LAW PROFESSIONALS
P.O. BOX 612407
SAN JOSE, CA 95161

EXAMINER	
CHANNAVAJJALA, SRIRAMA T	

ART UNIT	PAPER NUMBER
2157	

MAIL DATE	DELIVERY MODE
01/17/2013	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.

Applicant-Initiated Interview Summary	**Application No.**	**Applicant(s)**	
	12/815,165	RAPPAPORT, THEODORE S.	
	Examiner	**Art Unit**	
	SRIRAMA CHANNAVAJJALA	2157	

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

(1) *SRIRAMA CHANNAVAJJALA*.

(2) *Michael E. Whitham* .

(3) *Theodore S. Rappaport [Inventor]*.

(4) *Bryce Miller*.

Date of Interview: *15 January 2013*.

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

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

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

Claim(s) discussed: *1,8,20,31,43,56 and 69*.

Identification of prior art discussed: *WO 2005/101878 & US Pub. No. 20070198339*.

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

Discussed proposed amendment to claim 1,8,20 particularly "from reports of wireless access characteristics for one or more…….quality or service information, also discussed claim 31 [page 25 of 29], 43,56,69, also discussed prior art of reference WO 2005/101878 & US Pub. No. 20070198339, applicant arguments at page 20-21,24. Further discussed instant specification drawing fig 1 and 7, page 38-44. Applicant may further clarify independent claim language No agreement reached.

Applicant recordation instructions: 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 a non-extendable period of the longer of one month or thirty days 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

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

☒ Attachment

/Srirama Channavajjala/ Primary Examiner, Art Unit 2157	

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.

PTO/SB/83 (11-08)
Approved for use through 11/30/2011. 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.

REQUEST FOR WITHDRAWAL AS ATTORNEY OR AGENT AND CHANGE OF CORRESPONDENCE ADDRESS

Application Number	12/815,165
Filing Date	June 14, 2010
First Named Inventor	Theodore S. Rappaport
Art Unit	2157
Examiner Name	Srirama T. Channavajjala
Attorney Docket Number	110-009US

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

Please withdraw me as attorney or agent for the above identified patent application, and

- ☐ all the practitioners of record;
- ☐ the practitioners (with registration numbers) of record listed on the attached paper(s); or
- ☑ the practitioners of record associated with Customer Number: 63409

NOTE: The immediately preceding box should only be marked when the practitioners were appointed using the listed Customer Number.

The reason(s) for this request are those described in 37 CFR :

☐ 10.40(b)(1)	☐ 10.40(b)(2)	☐ 10.40(b)(3)	☐ 10.40(b)(4)
☐ 10.40(c)(1)(i)	☐ 10.40(c)(1)(ii)	☐ 10.40(c)(1)(iii)	☐ 10.40(c)(1)(iv)
☐ 10.40(c)(1)(v)	☐ 10.40(c)(1)(vi)	☐ 10.40(c)(2)	☐ 10.40(c)(3)
☐ 10.40(c)(4)	☑ 10.40(c)(5)	☐ 10.40(c)(6) Please explain below:	

Certifications

Check each box below that is factually correct. WARNING: If a box is left unchecked, the request will likely not be approved.

1. ☑ I/We have given reasonable notice to the client, prior to the expiration of the response period, that the practitioner(s) intend to withdraw from employment.

2. ☑ I/We have delivered to the client or a duly authorized representative of the client all papers and property (including funds) to which the client is entitled.

3. ☑ I/We have notified the client of any responses that may be due and the time frame within which the client must respond.

Please provide an explanation, if necessary:

This collection of information is required by 37 CFR 1.36. 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/SB/83 (11-08)
Approved for use through 11/30/2011. 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.

REQUEST FOR WITHDRAWAL AS ATTORNEY OR AGENT AND CHANGE OF CORRESPONDENCE ADDRESS

Complete the following section only when the correspondence address will change. *Changes of address will only be accepted to an inventor or an assignee that has properly made itself of record pursuant to 37 CFR 3.71.*

Change the correspondence address and direct all future correspondence to:

A. ☐ The address of the inventor or assignee associated with Customer Number: _____

OR

B. ☑ Inventor or Assignee name	Theodore S. Rappaport

Address	c/o Whitham, Curtis, Christofferson & Cook, P.C., 11491 Sunset Hills Rd, Ste. 340		
City Reston	State VA	Zip 20190	Country USA
Telephone	(703) 787-9400	Email	

I am authorized to sign on behalf of myself and all withdrawing practitioners.

Signature	/William E. Winters/		
Name	William E. Winters	Registration No.	42,232
Address	P.O. Box 612407		
City San Jose	State CA	Zip 95161	Country USA
Date	January 15, 2013	Telephone No.	(408) 453-2144

NOTE: ***Withdrawal is effective when approved rather than when received.***

This collection of information is required by 37 CFR 1.36. 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.

Electronic Acknowledgement Receipt

EFS ID:	14703276
Application Number:	12815165
International Application Number:	
Confirmation Number:	1819
Title of Invention:	Clearinghouse System and Method for Determining Availability of Carrier-Based Services and Enhancing the Quality, Operation and Accessibility of Carrier-Based Networks
First Named Inventor/Applicant Name:	Theodore S. Rappaport
Customer Number:	63409
Filer:	William E. Winters
Filer Authorized By:	
Attorney Docket Number:	110-009US
Receipt Date:	15-JAN-2013
Filing Date:	14-JUN-2010
Time Stamp:	14:33:36
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	Petition to withdraw attorney or agent (SB83)	110-009US_Request_for_Withdrawal.pdf	203664 5eb2a1112f7d30eccefd799a96f83694f0dc98632	no	2

Warnings:	
Information:	

Total Files Size (in bytes):	203664

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.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/815,165	06/14/2010	Theodore S. Rappaport	110-009US	1819

63409 7590 10/15/2012

PATENT LAW PROFESSIONALS
P.O. BOX 612407
SAN JOSE, CA 95161

EXAMINER	
CHANNAVAJJALA, SRIRAMA T	

ART UNIT	PAPER NUMBER
2157	

MAIL DATE	DELIVERY MODE
10/15/2012	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)	
	12/815,165	RAPPAPORT, THEODORE S.	
	Examiner	Art Unit	
	SRIRAMA CHANNAVAJJALA	2157	

-- 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 *06 August 2012*.

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

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ 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

5)☒ Claim(s) *1-4,6-8,10-12,14-20,22-24,26-28,30-40,43,46-56,59-69 and 72-102* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) *1-4,6-8,10-12,14-20,22-24,26-28,30-40,43,46-56,59-69 and 72-102* is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

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

Application Papers

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

11)☐ 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).

12)☐ 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

13)☐ 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 *9/24/12 & 4/30/2012*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. Claims 1-4,6-8,10-12,14-20,22-24,26-28,30-40,43,46-56,59-69,72-102 are pending in this application.

Drawings

2. The Drawings filed on 6/14/2010 are acceptable for examination purpose

Information Disclosure Statement

3. The information disclosure statement filed on 9/24/2012 & 4/4/2012 .is in compliance with the provisions of 37 CFR 1.97, and has been considered and a copy is enclosed with this Office Action

4. The information disclosure statement filed on 3/22/2012;1/9/2012;1/27/2011; and 6/14/2010.is in compliance with the provisions of 37 CFR 1.97, and has been considered and a copy was enclosed with the previous Office Action

Priority

5. Acknowledgment is made of applicant's claim for domestic priority under 35 U.S.C. 119(e) based on provisional application 60/971,175 filed on 9/10/2007;60/977,582 filed on 10/4/2007, 61/028,261 filed on 2/13/2008.

Double Patenting

6. In view of applicant submitted "terminal disclaimer" [8/6/12] and approved [8/9/2012], the rejection under "double patent" as set forth in the previous office action is hereby withdrawn.

35 USC § 112

7. In view of applicant's "REMARKS" page 25-26, the rejection under ***35 USC § 112*** as set forth in the previous office action is hereby withdrawn.

35 USC § 101

8. In view of applicant's "REMARKS" page 36-39, the rejection under ***35 USC § 101*** as set forth in the previous office action is hereby withdrawn.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

9. Claim 72,97,98 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

10. Regarding claim 72 *depends from cancelled claim 71*, for compact prosecution, examiner assumed, and treated claim 72 depend from independent claim 69 in the present office action.

11. Regarding claim 97, "further comprising....."***may"*** be submitted.....

12. Regarding claim 98, "further comprising an .....organizations "***may"*** ...

Appropriate correction required.

Claim Rejections - 35 USC § 102

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 –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

13. ***Claims 1-4,6-8,10-12,14-16,18-20,22-24,26-27,30,36-38,83-86 are rejected under 35 U.S.C. 102(b) as being anticipated by Lewis Allan et al., [hereafter LEWIS] WO 2005/101878 published Oct 2005.***

14. As to Claim 1, 8, 20,Lewis teaches a system which including "means for receiving mobile device location information of a plurality of mobile devices" [page 4, line 1-10, page 7, line 16-19, fig 1, fig 6, element 108], Lewis specifically teaches mobile device[s] connected to wireless network extracting "location information";

"means for receiving quality or service information of one or more wireless communications networks said quality or service information comprising coverage, outage or performance information of said one or more wireless communications network [fig 1, element 12A-12C, page 6, line 22-30], Lewis specifically teaches multiple wireless communication network carriers for example as detailed in fig 1, further allows to analyze overall telecommunications system's health";

"means for storing said mobile device location information and said quality or service information" [page 8, line 3-14, fig 3], Lewis specifically teaches data service provide infrastructure having "database" storing data including location information;

"means for updating said mobile device location information stored by means for storing when one or more mobile devices of said plurality of mobile devices travel from one location to another" [page 4, line 22-30], Lewis specifically teaches inserting location information in overall location information to analysis of the network and stored in the database.

"means for providing access to quality or service information stored by said means for storing to one or more wireless carriers" [page 7, line 1-6, fig 1-2], Lewis specifically teaches carrier network's traffic data analysis particularly with respect to location information and position to determine quality and health

15. Claim 8,20, are rejected in the analysis of claim 1 above, and claims 8,20, are rejected on that basis.

16. As to Claim 2, Lewis disclosed "means for providing access to quality or service information stored by said means for storing to one or more end users or to one or more end user communications" [page 7, line 1-6, line 15-19].

17. As to Claim 3, Lewis disclosed "means for generating a recommended operating band, operating mode, communications network or carrier for an end user or an end user communication device, depending on mobile device location information" [page 6, line 27-30, page 7, line 7-11, page 8, line 15-18].

18. As to claim 4, Lewis disclosed " wherein said means for generating a recommended operating band, operating mode, communication network or carrier is further based on quality of service information stored by said means for storing" [page 11, line 5-9, line 20-23,line 28-30].

19. Claim 5 (cancelled)

20. As to Claim 6, Lewis disclosed "means for providing access comprises means for reporting quality or service information to one or more end users or one or more end user communications devices" [page 10, line 1-15].

21. As to Claim 7, Lewis disclosed "means for providing access to quality or service information stored by said means for storing to a party or parties other than subscribers and carriers of said one or more wireless communications networks" [page 10, line 29-31,page 11, line 1-9].

22. Claim 9 (cancelled)

23. As to Claims 10,22 Lewis disclosed "further comprising providing access to quality or service information stored in said memory or database to one or more end users or one or more end user communications device" [page 7, line 1-6, page 8, line 11-18,fig 1-2].

24. As to Claims 11,23, Lewis disclosed "wherein providing access to said one or more end users or one or more end user communications devices [page 8, line 15-18] comprises reporting quality or service information to said one or more end users or said one or more end user communications devices" [page 8, line 1-18].

25. As to claim 12,24, Lewis disclosed "wherein providing access to said one or more end users or one or more end user communications devices [fig 1-2]comprises reporting quality or service information to said one or more end users or said one or more end user communications devices" [fig 1-2,page 4, line 21-30].

26. Claim 13 (cancelled)

27. As to claim 14, Lewis disclosed "wherein said quality or availability-of-service information is location specific" [page 4, line 25-30].

28. As to Claim 15,26, Lewis disclosed "further comprising serving based on mobile device location information [page 4, line 5-8], and quality or service information stored in said memory or database" [page 6, line 27-30].

29. As to claim 16,27, Lewis disclosed "wherein said data comprises a recommended operating band, operating mode, communication s network and/or carrier

for end users or end user communications devices" [page 11, line 5-9, line 20-23,line 28-30].

30. As to Claim 18, Lewis disclosed "further comprising serving data based on mobile device location information or quality or service information stored in said memory or database [fig 3, element 44, fig 4, page 4, line 22-30].

31. As to Claims 19,30 Lewis disclosed "further comprising providing access to quality or service information stored in said memory or database [fig 3, element 44, fig 4] to a party or parties other than subscribers and carrier of said one or more wiles communication networks" [page 14, line 8-10].

32. Claim 21 (cancelled)

33. Claim 25 (cancelled)

34. Claim 29 (cancelled)

35. As to Claim 36, Lewis disclosed "wherein carrier information comprises information concerning availability of services provided by said one or more carriers" [page 9, line 15-22].

36. As to Claim 37, Lewis disclosed "wherein said carrier information comprises information concerning quality or services provided by said one or more carriers" [page 10, line 29-31,page 11, line 1-9].

37. As to claim 38, Lewis disclosed "Lewis disclosed "wherein said carrier information comprises infrastructure information relating to infrastructure used by said one or more carriers" [page 9, line 23-30,page 11, line 24-30].

38. As to Claim 83,85 (new), Lewis disclosed "wherein said means for updating said mobile device location information comprises means for automatically updating said mobile device location information" [page 12, line 7-10, line 23-31].

39. As to Claim 84,86 (new), Lewis disclosed "wherein said means for updating said mobile device location information comprises means for manually updating said mobile device location information" [page 9, line 4-8].

Claim Rejections - 35 USC § 103

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.

The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

40. ***Claims 17,28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lewis Allan et al., [hereafter LEWIS]WO 2005/101878 published Oct 2005 in view of Shen et al. [hereafter Shen], US Pub. No. 20070198339 filed Feb 2006***

41. As to Claim 17,28, Lewis does not disclose "wherein said server comprises a web server and said data is formatted as one or more web pages served to said end users", although Lewis strongly supports mobile devices having graphical user interface allows to select menu options for example file, options, and saving data in a particular format [page 7, line 16-19,page 9, line 5-6]. On the other hand, Shen disclosed "server

comprises a web server and said data is formatted as one or more web pages served to said end users" [fig 2, fig 4A, fig 6A-6B].

It would have been obvious to one of the ordinary skill in the art at the time of applicant's invention to incorporate wireless devices access to the internet in order to acceding to the content provider capable of search information of Shen et al. into telecommunication carriers [fig 1] providing serving to the customer's mobile device locations including managing resources of Lewis because that would have allowed users of Lewis carrier network fig 1 linking web page information to the calling number[s] of the telecommunication carriers particularly communication with the web page advertisement providing the selection features [Shen: page 1, 0009-0010], further filter the content through filter module that identifies IP address associated [page 2, 0011].

42. ***Claims 31-34, 41-42,87-90,95-96 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lewis Allan et al., [hereafter LEWIS] WO 2005/101878 published Oct 2005 in view of Egan, US Pub. No. 2004/0076283 published Apr 2004***.

43. As to Claim 31, Lewis teaches a system which including "A method of building and providing access to a database for extending the use of carrier-based networks [fig 1-2, fig 3, element 44],

"collecting, using a computer, available for possible use by one or more carriers" [fig 1-2, fig 3, page 6, line 11-17,page 7, line 3-6], Lewis specifically teaches multiple carrier's network connected to database accessing information both from the database and carrier's network providers as detailed in fig 3;

"storing in a database, by action of said computer" [fig 3, element 44];

"providing an interface through which one or more carriers can access information stored in said database" [fig 3,page 8, line 3-14], Lewis specifically teaches multiple carrier network providers are connected to the database for receiving/sending data and/or control data to and from the various carrier networks as detailed in fig 3.

It is however, noted that Lewis does not disclose "property information of properties that are owned by members of the public and available possible use by one or more carriers, although Lewis specifically disclosed multiple telecommunication carriers providing telecommunication services to the mobile device users [fig 1-2]. On the other hand, Egan disclosed property information of properties that are owned by members of the public and available possible use by one or more carriers" [Abstract, page 2, 0010-0011, fig 1-2], Egan specifically teaches telecommunication carrier required infrastructure including defining residential, business uses defining legally binding permissions to provide telecommunication services to the communities.

It would have been obvious to one of the ordinary skill in the art at the time of applicant's invention to incorporate various telecommunication based services particularly defining telecommunication infrastructure" legally binding permission on real-estate properties in the communities of Egan into telecommunication carriers

[fig 1] providing serving to the customer's mobile device locations including managing resources of Lewis because both Lewis, Egan specifically supporting "telecommunication infrastructure" to the customers [Lewis: abstract, fig 1-2; Egan: abstract, fig 1-2], and both Lewis, Egan supporting "telecommunication-based services".

Because both Lewis, Egan prior art supports telecommunication based services, it would have been obvious to one of the ordinary skill in the art at the time of applicant's invention to substitute and/or modify one method for the other to achieve the predictable result of identifying various real-estate properties located in a community both pre-existing, new locations including residential, business, further acquiring "legally binding permissions", i.e. right-of-the way ownership data stored in a database, further allows users of Lewis to identify, analyze and provide current telecommunication infrastructure such as digital telecommunication services to the community [Egan: page 2, 0011-0013], thus improving overall quality, reliability of the telecommunication carrier infrastructure for future needs.

44. As to Claim 32, Lewis disclosed "using said computer and property information store in said database forming a business [fig 3, page 8, line 3-6, page 12, line 23-31, page 13, line 1-7]. On the other hand, Egan disclosed "property information forming a business contract between a carrier and an end user [page 2, 0019-0020].

45. As to claim 33, Egan disclosed "further comprising providing an interface through which one or more parties other than carriers and property owners can access property information stored in said database" [page 3, 0023-0024].

46. As to claim 34, Lewis disclosed "wherein said one or more parties comprises one or more content providers" [fig 1-3,page 7, line 1-6].

47. As to claim 87(new), Egan disclosed "further comprising providing an interface through which members of the public can submit property information of properties available for possible use by one or more carriers" [page 3, oo23-0024].

48. As to Claim 88-89 (new), Lewis disclosed "further comprising collecting and storing in said database carrier information of one or more carriers" [fig 1-3].

49. As to Claim 90 (new), Egan disclosed "further comprising, using said computer, property information and carrier information stored in said database, forming a business contract between a carrier and a property owner" [page 3, 0025, 0031].

50. As to Claim 95-96 (new), Egan disclosed "wherein said collecting and storing further includes collecting and storing property information of properties owned or controlled by business, trusts, non-profit entities, or community organizations, and available for possible use by one or more carriers" [page 1, 0003,page 2, 0011].

51. ***Claims 35,39-40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lewis Allan et al., [hereafter LEWIS] WO 2005/101878 published Oct 2005, Egan, US Pub. No. 2004/0076283 published Apr 2004 as applied to claim 31 above, further in view of Shen et al. [hereafter Shen], US Pub. No. 20070198339 filed Feb 2006***

52. As to Claim 35, It is noted that both Lewis, Egan do not disclose "one or more parties comprises one or more advertisers". On the other hand, Shen disclosed one or more parties comprise one or more advertisers" [fig 2, fig 4, fig 6].

It would have been obvious to one of the ordinary skill in the art at the time of applicant's invention to incorporate targeted mobile advertisements of Shen into the users of Lewis, Egan because all the prior art of references are strongly supports multiple telecommunication carriers [Lewis: Abstract, fig 1-2; Egan: Abstract, fig 1-2 and Shen: fig 2], furthermore, allowed users of Lewis,Egan to deliver relevant advertisements to the users' mobile devices that benefit the provider as well as users of the system and promise al its users better and more related advertisements where users are capable of viewing the related advertisements and their responses [Shen: page 4, 0045-0046], thus improving overall quality of information and reliability of the system.

53. As to Claim 39, Shen disclosed "wherein said interface comprises a human viewable web-page" [fig 6A-6B]].

54. As to Claim 40, Shen disclosed " wherein said interface comprises internet addressing without a visible web page interface" [page 4, 0047-0048].

55. Claim 41 (cancelled)

56. Claim 42 (cancelled)

57. ***Claims 43,46-55,56,59-68,69,72-82,97-102 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bell, US Patent No. 6766322 published Jly 2004 in view of Lewis Allan et al., [hereafter LEWIS] WO 2005/101878 published Oct 2005***

58. As to Claims 43,56,69, Bell teaches a system which including "A clearinghouse system" [Abstract, fig 1, element 100];

"a clearinghouse database [fig 1] configured to store property information of properties owned by members of the public [fig 2-3,col 6, line 11-30], Bell specifically teaches database creating information related to property information and member of the public;

"a computer configured to manage and update said clearinghouse database [col 6, line 35-52], Bell specifically teaches entering and managing updated data records;

"an interface through which members of the public may submit property information for storage in said clearinghouse database" [1A-1B, 3A-3B], Bell specifically

teaches filling required details for example as detailed in the form is part of the creating database record[s];

An interface through which one or more access and evaluate property information stored in said clearinghouse database" [fig 4A-4B, 11D,col 7, line 28-62], Bell specifically teaches gathering property information and accessing the same.

It is however, noted that Bell does not disclose "available for possible use by carriers of carrier", although Bell strongly teaches various internet databases related to property information [fig 11C-11D]. On the other hand, Lewis disclosed "available for possible use by carriers of carrier" [Abstract, fig 1-2].

It would have been obvious to one of the ordinary skill in the art at the time of applicant's invention to incorporate wireless telecommunication network providers particularly data service provider infrastructure of Lewis et al. into real-estate reporting method of Bell because that would have allowed users of Bell to substitute and/or modify one method for the other to achieve the predictable result of identifying various real-estate properties located in a community specific and able to analyze to determine right choice[s] for the network carriers, further able to classify records in future requirements [Bell: col 1, line 49-65].

59. The limitations of claims 56,69 are rejected in the analysis of above, and claims 56,69 are rejected on that basis.

60. Claim 44 (cancelled)

61. Claim 45 (cancelled)

62. As to Claims 46,59,72, Bell disclosed "wherein said clearinghouse database is further configured to store information of properties that are subject to contractual, legal, government or zoning restrictions [fig 11A is directed to government records, fig 6, col 9, line 1-26].

63. As to Claim 47,60,73-74, Bell disclosed "wherein said computer is configured to match a property needs or property specifications with one or more property records in said clearinghouse database" [col 10, line 35-60]. On the other hand, Lewis disclosed 'carriers" particularly location data and service provider's infrastructure [Lewis: Abstract].

64. As to Claim 48,61,75, Bell disclosed "wherein said computer is configured to receive and store in said clearinghouse database coverage [Abstract, fig 1-2]. On the other hand, Lewis disclosed "reception quality information of mobile devices operating one or more wireless communications networks" [page 7, line 1-11].

65. As to claim 49,62,76, Bell disclosed "computer is further configured to serve information stored in said clearinghouse database" [Abstract, fig 1-2]. On the other hand, Lewis disclosed "reception quality data using coverage " [page 7, line 1-11].

66. As to claim 50,63,77, Bell disclosed "wherein said computer is configured to receive and store in said clearinghouse database information" [Abstract, fig 1-2]. On the

other hand, Lewis disclosed "plurality of different services provided by one or more carriers over one or more networks" [fgi 1-2, fig 5].

67. As to Claim 51,64,78, Bell disclosed "wherein said computer is further configured to serve data using stored in said clearinghouse database" [Abstract, fig 1-3]. On the other hand, Lewis disclosed "server service information" [fig 1-2, fig 5].

68. As to claim 52,65,79, Bell disclosed "wherein said computer is configured to receive and stored in said clearinghouse database" [Abstract, fig 1-2]. On the other hand, Lewis disclosed "bandwidth and capacity information of one or more communications networks" [fig 1-2, fig 5, page 11, line 24-30].

69. Claims 53,66,80, are rejected in the analysis of claims 52,65,79 above, and claims are rejected on that basis.

70. As to claims 54,67,81, Bell disclosed "wherein said computer is configured to receive and stored in said clearinghouse database" [Abstract, fig 1-2]. On the other hand, Lewis disclosed "coverage or caption quality information of one or more communications networks" [page 11, line 5-9, line 20-23,line 28-30].

71. Claims 55,68,82, are rejected in the analysis of claims 54,67,81 above, and claims are rejected on that basis.

72. Claims 57 (cancelled)

73. Claims 58 (Cancelled)

74. Claims 70 (cancelled)

75. Claims 71 (cancelled)

76. As to claim 91(new), Bell disclosed "further comprising an interface through which , for storage in said clearinghouse database, [abstract, fig 1-2], attached to dwellings or premises of property owners" [fig 10G-10H]. On the other hand, Lewis disclosed "carrier infrastructure information of carrier infrastructure" [page 7, line 28-31, page 8, line 1-14].

77. Claim 92 (new)is rejected in the analysis of claim 91 above, and claim 92 is rejected on that basis.

78. As to Claim 93 (new), Bell disclosed "collecting, using said computer, attached to dwellings or premises of property owners" [fig 10G-10H]. On the other hand, Lewis disclosed "carrier infrastructure information of carrier infrastructure in memory or database" [fig 1-2, Abstract, page 6, line 22-26].

79. As to Claim 94 (new), Bell disclosed "further comprising providing an interface through which members of the public can submit property information, for storage in said memory or database" [11A, 11D, col 11, line 30-52]. On the other hand, Lewis disclosed "one or more carriers" [Abstract, fig 1-2].

80. As to Claim 97 (new), Bell disclosed "further comprising an interface through which zoning regulation or zoning restriction information of properties may be submitted for storage in said clearinghouse database" [fig 10E, 11A].

81. As to Claim 98, 100, 102 (new), Bell disclosed "further comprising an interface through which business, trusts, non-profit entties, or community organizations may submit property information, for storage in said clearinghouse database, of properties available" [col 9, line 66-67, col 10, line 1-32]. On the other hand, Lewis disclosed "possible use by one or more carriers" [fig 1-3].

82. As to claim 99, 101 (new), Bell disclosed "further comprising means for receiving and storing zoning regulation or zoning restriction information" [fig 10E, 11A].

Response to Arguments

1. Applicant's arguments filed 8/6/2012 have been fully considered but they are not persuasive :

a) Applicant arguments at page 39-42, claims 1-16,18-27,30 have been considered, but moot in view of applicant amendment to the claims, and

Claims 1-4,6-8,10-12,14-16,18-20,22-24,26-27,30,36-38,83-86 are rejected under 35 U.S.C. 102(b) as being anticipated by Lewis Allan et al., [hereafter LEWIS] WO 2005/101878, as detailed above.

b) Applicant arguments at page 42-45, claims 43-82 have been considered but are moot in view of applicant amendment to the claims, and

Claims 43,46-55,56,59-68,69,72-82,97-102 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bell, US Patent No. 6766322 in view of Lewis Allan et al., [hereafter LEWIS] WO 2005/101878, including newly added claims as detailed above.

c) Applicant's argument at page 45-49, claims 31-33,36-38,41,42 have been considered, but moot in view of applicant amendment to claims.

Claims 31-34, 41-42,87-90,95-96 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lewis Allan et al., [hereafter LEWIS] WO 2005/101878 in view of Egan, US Pub. No. 2004/0076283, including newly added claims.

d) Applicant arguments at page 49-50, claims 17,28 considered, however, claims 17,28 are rejected under 103(a) Lewis in view of Shen as detailed above.

e) Applicant arguments at page 50-51, claims 34,35,39,40 have been considered, Claim 35,39-40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lewis Allan et al., [hereafter LEWIS] WO 2005/101878, Egan, US Pub. No. 2004/0076283 as applied to claim 31 above, further in view of Shen et al. [hereafter Shen], US Pub. No. 20070198339 filed Feb 2006 as detailed above.

Note: claim 34 is rejected under Lewis in view of Egan .

Conclusion

The prior art made of record

a.	PCT.	WO 2005/101878
b.	US Pub. No.	**2004/0076283**
c.	US Pub. No.	**20070198339**
d.	***US Patent No.***	***6766322***

Examiner's Note: Examiner has cited particular columns and line numbers in the references applied to the claims above for the convenience of the applicant. Although the specified citations are representative of the teachings of the art and are applied to specific limitations within the individual claim, other passages and figures may apply as well. It is respectfully requested from the applicant in preparing responses, to fully consider the references in entirety as potentially teaching all or part of the claimed invention, as well as the context of the passage as taught by the prior art or disclosed by the Examiner.

SEE MPEP 2141.02 [R-5] VI. PRIOR ART MUST BE CONSIDERED IN ITS ENTIRETY, INCLUDING DISCLOSURES THAT TEACH AWAY FROM THE CLAIMS: A prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention. W.L. Gore & Associates, Inc. v. Garlock, Inc., 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983), cert. denied, 469 U.S. 851 (1984) In re Fulton, 391 F.3d 1195, 1201,73 USPQ2d 1141, 1146 (Fed. Cir. 2004). >See also MPEP §2123.

In the case of amending the Claimed invention, Applicant is respectfully requested to indicate the portion(s) of the specification which dictate(s) the structure relied on for proper interpretation and also to verify and ascertain the metes and bounds of the claimed invention.

The prior art made of record, listed on form PTO-892, and not relied upon, if any, is considered pertinent to applicant's disclosure.

2. **THIS ACTION IS MADE FINAL.** 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 mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Srirama Channavajjala whose telephone number is 571-272-4108. The examiner can normally be reached on Monday-Friday from 8:00 AM to 5:30 PM Eastern Time.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kim, Charles, can be reached on (571) 272-7421. The fax phone numbers for the organization where the 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)

/Srirama Channavajjala/
Primary Examiner, Art Unit 2157.

Notice of References Cited	Application/Control No. 12/815,165	Applicant(s)/Patent Under Reexamination RAPPAPORT, THEODORE S.	
	Examiner SRIRAMA CHANNAVAJJALA	Art Unit 2157	Page 1 of 1

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*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-6,766,322	07-2004	Bell, G. Randall	1/1
*	B	US-2004/0076283	04-2004	Egan, Thomas A.	379/325
*	C	US-2007/0198339	08-2007	Shen et al.	705/014
*	D	US-6,108,557	08-2000	Wax et al.	455/456.2
*	E	US-6,996,610	02-2006	Bantz et al.	709/220
	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	WO 2005/101878	10-2005	PCT	Lewis,Allan et al.	
	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.

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predictive methods for location services in mobile ad hoc networks

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Alexandria, VA
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[PDF] **PREDICTIVE METHODS FOR LOCATION SERVICES IN MOBI...**
pdf.aminer.org/.../predictive_methods_for_location_services_in_mo...
File Format: PDF/Adobe Acrobat - Quick View
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1 2 Existing **Location Services in Mobile Ad Hoc Networks** . 2 ..... DRM is a **predictive** mobility tracking **method** where every MN predicts or tracks the ...

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Predictive Methods for Location Services in Mobile Ad Hoc Netw...
dl.acm.org/citation.cfm?id=1054708
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In recent years, many **location service** protocols have been developed for **ad hoc networks**, including the Grid **Location Service** (GLS), the Simple Location ...

A Grid-Based Predictive Location Service in Mobile Ad Hoc Netwo...
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[PDF] **Performance of Dead Reckoning-Based Location Service for M...**
www.cs.sunysb.edu/~samir/Pubs/drm-wcmc-rep.pdf
File Format: PDF/Adobe Acrobat - Quick View
by V Kumar - Cited by 45 - Related articles
Abstract: A **predictive** model-based mobility tracking **method**, called dead reckoning, is developed for **mobile ad hoc networks**. It disseminates both **location** and ...

Predictive methods for location services in mobile ad hoc networ...
ieeexplore.ieee.org/xpl/abs_all.jsp?arnumber=1420140
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Apr 8, 2005 – In recent years, many **location service** protocols have been developed for **ad hoc networks**, including the grid **location service** (GLS), the simple ...

Predictive Methods for Location Services in Mobile Ad Hoc Netw...
books.google.com/.../Predictive_Methods_for_Location_Services.ht
Title: **Predictive Methods for Location Services in Mobile Ad Hoc Networks**. Author, Xinwei Luo. Publisher, Colorado School of Mines, 2004. Length, 69 pages ...

[PDF] **Fuzzy Location Service for Mobile Ad Hoc Networks**
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by Y Xia - Related articles
Keywords-**mobile ad hoc networks** (MANETs); **location ser**- vice; hexagon cell. ...
The fuzzy location service in [14] used the **predictive method** to evaluate the ...

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That's No Phone, That's My Tracker - ProPublica
www.propublica.org/article/that-s-no-phone-that-s-my-tracker
Jul 13, 2012 -- The **device** in your purse or jeans that you think is a cellphone --- guess again. ... Much of that **data** is shared with **companies** that use it to offer us **services** ... The **phones** transmit **location information** to the **cell carrier** and keep ...

Mobile phone tracking - Wikipedia, the free encyclopedia
en.wikipedia.org/wiki/Mobile_phone_tracking
Mobile positioning, which includes **location** based **service** that discloses the ... **cell phone companies** are actually the ones who determine what **information** they take ... Both types of **data** are thus used by the telephone to make the **location** more .... **mobile phones** - Smartphone market share - Comparison of Android **devices** ...
Technology - Operational purpose - Bearer interest - Privacy

Cell Carriers See Rise in Requests to Aid Surveillance - NYTimes.com
www.nytimes.com/.../cell-carriers-see-uptick-in-requests-to-aid-surve...
Jul 8, 2012 -- The **information** represents the first time **data** have been collected nationally on ... to get **data** --- particularly the use of GPS systems to identify the **location** of **phones**. ... "At every crime scene, there's some type of **mobile device**," said Peter ... At TracFone, another small **carrier** providing prepaid **service**, an ...

Understanding Mobile Apps | OnGuard Online
www.onguardonline.gov/articles/0018-understanding-mobile-apps
If you have a smart **phone** or other **mobile device**, you probably use apps -- to play games ... You can access the Internet using a **data** plan tied to your **phone service**. ... **Phone companies** generally charge a monthly fee for a **data** plan that can ... **data** about the **device's location**; the **device's** unique IDs; **information** about how ...

Verizon | About You - Privacy Policy - Full Privacy Policy
www22.verizon.com/about/privacy/policy/
We collect **information** about your use of our products and **services**. ... Verizon obtains **information** from outside **companies** that collect consumer **information** ... Verizon Wireless collects and uses mobile **device location data** for a variety of ... does not publish directories of our customers' **wireless phone** numbers, and we do ...

Government Location Tracking: Cell Phones, GPS Devices, and ...
www.aclu.org/government-location-tracking-cell-phones-gps-devices
As long as it is turned on, your **mobile phone** registers its position with cell towers ... the phone is being used or not -- and mobile **carriers** are retaining **location data** ... Law enforcement can get months' worth of this **information** without you ever ...

[PDF] Collective Models of Disaster - University of Colorado at Boulder
www.colorado.edu/hazards/awards/paper-competition/best.pdf
File Format: PDF/Adobe Acrobat - Quick View
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Collection and analysis of **mobile phone location** data are exciting new tools for ... **device** makers and other third parties track user **locations**. ... merging anonymous collections of **information** generated by phones to monetize **data**. **Carriers** ..... (e.g., power and water companies) could determine how to prioritize **service** fixes ...

Mobile Devices
https://www.eff.org/issues/mobile-devices
This article discusses privacy implications of **cell phones** and other **devices** that ... **cell phone** calls on many cell networks without the cooperation of the **carrier**, and ... using wireless **data services**; **information** revealing your physical **location** at ...

FYI: How Can I Protect My Cell Phone Data Records From Law ...
www.pcworld.com/.../fyi-how-can-i-stop-my-wireless-carrier-spying-...
Jul 11, 2012 -- Our **wireless carriers** hand over **data** from millions of users per year, ... with law enforcement includes **data** such as geolocation **information**. ... So encryption is really more important here than which **service** you use. ... The problem is that both Android and iOS keep your **location** cached on your **device**, ...

WEST Search History

Hide Items | Restore | Clear | Close

DATE: Thursday, October 04, 2012

Hide?	Set Name	Query	Hit Count
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	L122	L121 and l115	3
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	L115	(mobile and device$1 and location and service$1).ab. and @py<=2007	2257
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	L106	L105 and quality and preference$1	16
	L105	L101 and database$1	54
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▨	L100	L99 and (public near5 record$1)	3
▨	L99	L98 and interfac$3 and computer$1	63
▨	L98	L79 and (base near5 station$1)	64
▨	L96	L95 and (communication near5 permit$1)	26
▨	L95	L94 and (digital near5 record$3)	167
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▨	L93	L39 and (business near5 rule$1)	14625
▨	L92	L39 and (business neear5 rule$1)	224684
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▨	L83	L82 and user$1	4
▨	L82	L80 and (telecommunication$1 near5 device$1)	4
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▨	L77	L76 and (geographic near5 location$1)	1661
▨	L76	database$1 and telecommunication$1 and wireless and performance and @py<=2007	10166
▨	L75	L74 and L73	3
▨	L74	L73 and telecommunication$1 and performance and monitor$3 and @py<=2007	3
▨	L73	(20090070379 20100250268 20100250269 20100299274 20090059822 20090061924 20030050070 20060160543 20090131014 6397055 6405028 6546238 6556818 7328042 7359726 7359731 7702346 20060052126 20060052130 20060058007 20060058008 20060063549 20080070550 6754833 6359923 20030165223 6381315 6411825 7072666 7907966 7956817 20040076127 20080112383 20080254790 20090102743 20090117941 20090224998 20100315309 20110143741 7542559 20100069100 20050009499 7720050 20070002837 20090209233 7328001 7454191 20060030291 20060040641 20060172721).pn.	105
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☐	L59	L58 and geographic	15
☐	L58	L55 and (service$1 near5 catalog$3)	15
☐	L55	L54 and (database$1 near5 record$1)	63
☐	L54	L52 and (telecommunication$1 near5 carrier$1)	64
☐	L52	(clearinghouse and equipment and performance) and @py<=2007	875
☐	L48	L46 and tenants and user$1	13
☐	L46	L45 and asset$1 and propert$2	13
☐	L45	L44 and (business near5 rule$1)	13
☐	L44	L43 and (telecommunication$1 near5 carrier$1)	37
☐	L43	L42 and geographic and location$1	131
☐	L42	L41 and (quality and performance and monitor$3)	170
☐	L41	L40 and clearinghouse and @py<=2007	377
☐	L40	L39 and (wireless and telecommunication and network$3)	36200
☐	L39	L38 or L37 or L36 or L35 or L34	472393
☐	L38	379/$.ccls.	124061
☐	L37	(455/406 |455/408 |455/417 |455/445 |455/560).ccls.	7655
☐	L36	709/$.ccls.	127576
☐	L35	707/$.ccls.	132063
☐	L34	705/$.ccls.	115029
☐	L33	L32 and (geographic near5 location$1)	4
☐	L32	L31 and database$1 and record$1	25
☐	L31	L30 and infrastructure	31
☐	L30	L29 and (equipment$1 and carrier$1)	73
☐	L29	(telecommunicat$4 and business).ab. and @py<=2007	1249
☐	L27	L26 and location$1	5
☐	L26	L22 and database$1	12
☐	L22	(telecommunicat$4 and performance and carrier$1).ab. and @py<=2008	186
☐	L21	L20 and geographic and location$1	8
☐	L20	L19 and telecommunication$1 and carrier$1	15
☐	L19	L18 and (clearinghouse and database$1)	26

(20090070379 20100250268 20100250269 20100299274 20090059822

☐	L18	20090061924 20030050070 20060160543 20090131014 20090117941 6397055 6405028 6546238 6556818 7328042 7359726 7359731 7702346 20060052126 20060052130 20060058007 20060058008 20060063549 20080070550 6754833 6359923 20030165223 6381315 6411825 7072666 20040076127 20080112383 20080254790 20090102743 20090224998 20100315309 7542559 20100069100 20050009499 5953400 6078796 5319672 5606595 5926761 6061450 6061450 6148182 7305354 7720050 7832052 20040181591 20050289047 20060093051 20060187887 20070002837 20080181327 20080289778 20090180559 20090209233 20050060317 7328001 7454191 20060030291 20060040641 20060172721 20080207164 20080311885 5548813 6421543 6901717 7050786 7050787 7076237 7389106 20020109623 20020170261 20070161383 20070287414 20080188198 20090125409 20090224554 6259914 6659263 20010014270 4462314 4820415 5453184 5486363 5528219 5974314 5974315 6050277 6072985 6173537 6316397 6395695 6725674 6939098 20040013504 5454465).pn.	200
☐	L17	L15 and (carriers near5 service$1)	7
☐	L15	L14 and (wireless near5 network$3)	20
☐	L14	(clearinghouse near5 database$1) and (telecommunication$1 near5 provider$1)	123
☐	L11	6542588.uref.	18
☐	L10	6542588.pn.	2
☐	L9	L7 and (business near5 rule$1)	6
☐	L8	L7 and (business neaer5 rule$1)	17
☐	L7	(clearinghouse and telecommunicat$4).clm. and @py<=2008	25
☐	L3	(clearing$house and database$1).ti. and @py<=2008	5

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U.S.PATENTS

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
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NON-PATENT LITERATURE DOCUMENTS

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

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

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	SRIRAMA CHANNAVAJJALA	2157

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Class	Subclass	Date	Examiner
707	608-609,688,705,748,825,827	3/28/2012	sc
455	406,408,417,445,560	3/28/2012	sc
379	1.01,9.04,32.01,88.09,114.08	3/28/2012	sc
705	14.33,14.1,14.11,39	3/28/2012	sc
709	203,218-220	3/28/2012	sc

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WEST search attached	3/28/2012	sc
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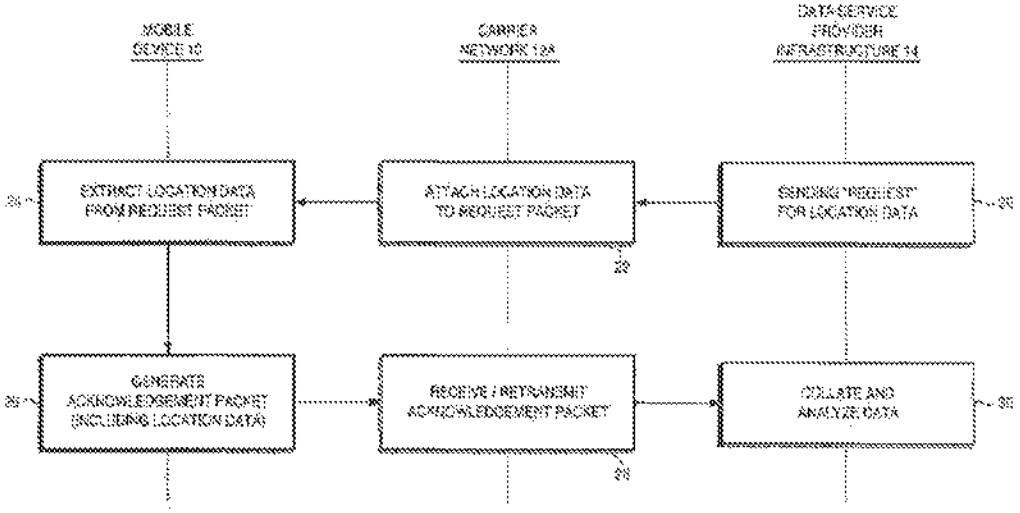

(57) Abstract: A method and system for monitoring the health of a wireless telecommunication network. Network health is monitored without placing an administrative burden on the carrier network itself; instead, this burden is placed on components that lie outside the carrier network and pass communications through it. The data service provider infrastructure sends a request to a mobile device, asking that it return data regarding its location. The carrier network handling the request inserts location information into the packet that is sent to the mobile device, but this information is not sent to the data service provider infrastructure itself. The mobile device harvests this location information from the packets it receives and inserts it in a response packet that finds its way back to the data service provider infrastructure. The data service provider infrastructure is able to collate this location data and to analyze it, determining the carrier network's health.

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Method and System For Monitoring the Health of Wireless Telecommunication Networks

Field of the Invention

This invention relates to communication networks, and more specifically, to a method and system for monitoring the health of wireless telecommunication networks.

Background of the Invention

Over the last decade, digital communication networks employing personal computers (PCs), the Internet and other components, have increased levels of communication and access to information by an incredible degree. In the beginning, most of these networks were effected using hard-wired technology, but today, wireless digital services over GPRS (general packet radio service), CDMA (code division multiple access), Mobitex, DataTAC and similar systems are expanding the digital communications and data access revolution in a mobile environment. Wireless email, digital paging and Internet browsing via portable devices, for example, are now widely used.

Users of wireless telecommunication systems demand the very high levels of reliability that they have became accustomed to from hard-wired telephone networks (often referred to as "five-9s" reliability - less than one failure in 99,999 calls). However, administering a reliable wireless data service is much more difficult than hard-wired communications, not only because wireless transmissions are more prone to noise and interference, but also because many of the communications travel over a number of disparate communication networks between the service provider and the end user, often including packet-switched networks such as the Internet, circuit-switched networks and wireless telecommunication networks. While communications can move smoothly from one network to another, the protocols necessary for more complex operability such as monitoring network health are not standardized across such diverse networks.

The monitoring and analysis of network health information is critical to implementing reliable wireless data networks. As will be explained, existing systems do not facilitate effective network health monitoring and analysis.

An exemplary wireless data service network is presented in the simple block diagram of Figure 1. In this example, a mobile node 10 is currently being served by a carrier network 12A, which will include at least one, and probably multiple wireless base stations which are organized into "cells"; each cell covering a certain geographical area. The carrier network 12A may use both hard-wired and wireless communications to connect these base stations and other infrastructure components together. This carrier network 12A may even use frame relay networks, optical networks, the public switched telephone network (PSTN) and the Internet as part of its network.

The carrier network 12A generally serves as a conduit between the mobile node 10 and the wireless data service provider infrastructure 14, simply passing digital packets back and forth between these two parties, without considering the content of the packets themselves.

Because the mobile node 10 is mobile, it may pass from the region served by one carrier network 12A, to another, such as carrier network 12B or carrier network 12C. Methods are known in the art for "handing off" communications from one base station to another within a given carrier's region, or even handing communication off from one carrier to another. However, handoff situations make the health monitoring task far more complex as there is no standard for the collection and communication of performance data. The network of Figure 1 is intended simply to present a context for the problems in the art to be described. The details of a complete implementation of the network would be clear to a skilled technician.

In addition to offering reliable systems, the stakeholders of these wireless data networks want to optimize the use of their resources, offer cost effective services to their customers, and obtain some insight into where future infrastructure investments can best be made. This can only be done if they have a detailed understanding of the traffic flow and the performance of their network and network components.

Unfortunately, carrier networks are not designed to perform the collection, collation and analysis of real time data that would be necessary to do this network health analysis. Even if special hardware and software were added to the carrier networks 12A, 12B, 12C to perform the data analysis (in the form of servers, for example), the core

network nodes do not have the functionality to perform the collection and collation tasks, for at least the following reasons:

1. Many of the nodes in these networks are designed to simply route digital packets, so major software (and possibly hardware) changes would be needed to provide the collection functionality;

2. Many of these nodes are optimized to perform their tasks as quickly as possible, so that real time operation can be maintained. Providing the extra functionality of analyzing network health may slow down their operation to an unacceptable level;

3. In some carrier networks, changing the functionality of the network nodes would require updating, testing and trouble shooting to be performed on each node individually - an expensive and time consuming exercise; and

4. While some nodes in one carrier's network may be adaptable to performing such functionality, it is unlikely that the whole network will. If the carrier uses a variety of networks and components including wireless, hard-wired, fiber optic, PSTN, Internet, frame relay and packet switched technologies, it may be impossible to obtain the necessary data uniformly throughout the entire network to obtain meaningful and useful data.

In other words, carrier networks are not in a position to obtain the network health data that they desire.

There is therefore a need for an effective method and system of collecting network health information in wireless telecommunication networks which avoids or addresses the problems outlined above.

Summary of the Invention

It is an object of the invention to provide a method and system which obviates or mitigates at least one of the disadvantages described above.

In accordance with an aspect of the present invention, a system is provided for monitoring the health of a wireless telecommunication network, comprising: a mobile device; a data service provider infrastructure; and a carrier network having a wireless connection to said mobile device and a connection to said data service provider infrastructure; said data service provider infrastructure being operable to: generate a digital

packet including a request for location information; and transmit said request packet to said mobile device via said carrier network; said carrier network being operable to: receive said request packet from said data service provider infrastructure; attach location information for said mobile device, to said request packet; and transmit said request packet including said location information, to said mobile device; and said mobile device being operable to: receive said request packet; extract said location information from said request packet; insert said location information into a field of an acknowledgement packet that said carrier network will pass to said data service provider infrastructure; and return said acknowledgement packet to said data service provider infrastructure, via said carrier network; said carrier network also being operable to: receive said acknowledgement packet from said mobile device; and pass said acknowledgement packet to said data service provider infrastructure; whereby said data service provider infrastructure may use said location information to analysis the health of said telecommunication network.

In accordance with another aspect of the invention, a method of monitoring the health of a wireless telecommunication network is provided, said telecommunication network including at least one mobile device, a data service provider infrastructure and a carrier network facilitating communication between said mobile device and said data service provider infrastructure, said method comprising the steps of: at said data service provider infrastructure: generating a digital packet including a request for location information; and transmitting said request packet to said mobile device via said carrier network; at said carrier network: receiving said request packet from said data service provider infrastructure; attaching location information for said mobile device, to said request packet; and transmitting said request packet including said location information, to said mobile device; and at said mobile device: receiving said request packet; extracting said location information from said request packet; inserting said location information into a field of an acknowledgement packet that said carrier network will pass to said data service provider infrastructure; and returning said acknowledgement packet to said data service provider infrastructure, via said carrier network; whereby said data service provider infrastructure may use said location information to analysis the health of said telecommunication network.

In accordance with a further aspect of the present invention, a server is provided comprising: means for generating a packet requesting location information; means for transmitting the request packet to a mobile device via a carrier network; means for receiving an acknowledgement packet from the mobile device; and means for extracting location information inserted into the acknowledgement packet by the mobile device.

In accordance with an additional aspect of the invention, there is provided a mobile device comprising: means for receiving a request packet, initiated by a data service provider infrastructure; means for extracting location information from the request packet, the location information having been added to the request packet by a carrier network; means for inserting the location information into a field of an acknowledgement packet that the carrier network will pass to the data service provider infrastructure; and means for returning the acknowledgement packet to the data service provider infrastructure, via the carrier network.

Other aspects and features of the present invention will be readily apparent to those skilled in the art from the following detailed description of preferred embodiments in conjunction with the accompanying drawings.

Brief Description of the Drawings

These and other features of the invention will become more apparent from the following description in which reference is made to the appended drawings in which:

Figure 1 presents a block diagram of an exemplary network architecture to which the invention may be applied;

Figure 2 presents a flow diagram of a method of monitoring network health, in an embodiment of the invention;

Figure 3 presents a block diagram of an exemplary server architecture in an embodiment of the invention;

Figure 4 presents a block diagram of an exemplary mobile device, in an embodiment of the invention;

Figure 5 presents a block diagram of an exemplary network architecture, in an embodiment of the invention; and

Figure 6 presents a flow diagram of a method of monitoring network health, in an embodiment of the invention.

Description of the Invention

The invention allows network health to be monitored without placing an administrative burden on the carrier network itself. This is done by placing this burden on components that lie outside the carrier network, passing communications through it. The invention is suited for many network architectures and can be, for example, applied to that of Figure 1.

Broadly speaking, the method of the invention is effected as shown in the flow diagram of Figure 2. This process begins at step 20, by having the data service provider infrastructure 14 send a request to the mobile device 10 of the end user, via one of the carrier networks 12A, 12B, 12C asking that it return data regarding its location. The carrier networks 12A, 12B, 12C cannot distinguish these instructions from any other digital packet transmitted by the data service provider infrastructure 14, so they simply pass the request packet to the mobile device 10 at step 22 (techniques for performing basic communications are known in the art and will not be described herein).

However, in passing the request packet, the carrier networks 12A, 12B, 12C will add location data to the packet. This is a standard procedure in wireless communications as the location data is generally inserted into the header of each packet at step 22, for identification and book-keeping purposes.

The mobile device 10 receives the request packet and extracts the data regarding its location at step 24. The location data is entered into a field of an acknowledgement packet at step 26 and is sent to the carrier network 12A, 12B, 12C. The carrier network 12A, 12B, 12C will simply pass any packets that it receives, back to the data service provider infrastructure 14 at step 28.

Receiving location data from all mobile devices, the data service provider infrastructure 14 is able to collate the data and analyze it at step 30 to obtain an overall picture of the telecommunication system's health including the operability of the various carrier networks 12A, 12B, 12C.

The nature of the location data is described in greater detail hereinafter with respect to the preferred embodiment of the invention, but could include, for example, the identity of the carrier network's base station serving the mobile device 10. This data alone would provide a great deal of information as it would locate each end user's position within several kilometers. The routing of the communication through the resources of the carrier's network 12A, 12B, 12C could then be determined.

This location data could, for example, be used to calculate peak demand levels per base station, the variance of traffic levels with respect to the hour of the day, or average levels of traffic by geographic area. Other analyses known in the art of telecommunication resources and traffic management could also be performed, some of which are described hereinafter.

As noted above, the digital data may be communicated using many systems known in the art, including: GPRS, CDMA, Mobitex and DataTAC systems. As time passes, surely other wireless data protocols and technologies will also evolve; the invention is equally applicable to such protocols and technologies as it operates independently of features of the carrier's network. Also, the mobile devices used by the end user could be one of many known in the art, including digital cellular telephones, personal digital assistants (PDAs), wireless laptop computers, wearable computers or two-way pagers. The invention is not limited by the nature of the mobile device to which it is applied.

The invention is also not limited by the nature of the digital packets being employed. That is, while Figure 2 suggests that specific pairings of location "request" packets and "acknowledgment" packets will be employed, requests for location data and the location data itself will generally be combined with other packets. In the preferred embodiment described hereinafter, for example, requests for location data are made simply by setting a single bit in a generic digital packet. Similarly, location data is returned by piggy-backing it on another packet that would be sent as part of the existing protocol. Hence, any control or data packet could be used to carry location requests or location data.

The data service provider's system may be quite complex, including, for example, a number of nodes or servers, geographically distributed and interconnected via some communication network such as the Internet. At the other extreme, the data service provider infrastructure 14 may comprise just a single server - in such a case, the

functionality of the server could be implemented, for example, in the hardware format shown in Figure 3.

As shown in the block diagram of Figure 3, the data service provide infrastructure 14 may be embodied as a server consisting of three main components: a receiver/transmitter 40 that receives and transmits data and/or control packets to and from various carrier networks, in the manner known in the art; a data processor 42 that is operable to perform a large number of tasks, including the following: generating packets or modifying packets to ask the mobile device to forward location data (the "request packets"); extracting location data from received packets; and collating and/or analyzing the collected location data (note that this task could also be deferred to another device); and a database 44 for storing location data as it is received. Note that this component could be internal to the server, or external. The storage technology used could take on any form, limited only by the access speed and storage capacity that is required for a particular application.

As noted above, the mobile device 10 of the invention takes on any of many forms, including cellular telephones, personal digital assistants (PDAs), wireless laptop computers, wearable computers or two-way pagers. A generic mobile device 10 is presented in the block diagram of Figure 4.

At the heart of this device lies a central controller 62 which may, for example, be a digital signal processor (DSP), microprocessor, microcontroller or ASIC (application specific integrated circuit). This controller 62 performs the basic functionality of the invention for the mobile device 10.

The interface components of the mobile device 10 will vary with the application. For example, in cellular telephone applications, an audio input and output 60 may be included, as well as signal processing components such as analogue to digital and digital to analogue converters, to pass voice signals to and from the central controller 62. As well, a cellular telephone may include a manual input interface 64 in the form of a mechanical keypad, and a display 66 consisting of a simple liquid crystal display (LCD) with a single line of alphanumeric characters to present dialed numbers and other information.

A wireless PDA, on the other hand may not have an audio interface 60, but may have much more comprehensive manual and visual interfaces. The display 66, for example, could comprise an LCD pixel matrix which could display graphics as well as alphanumerics. Rather than a traditional telephone keypad, the manual input interface 64 could comprise a mouse and pushbutton which drives a cursor on the display 66, allowing the user to select icons in a graphic user interface (GUI) to execute desired functions.

All of these mobile devices 10 will also include some manner of wireless transmission and reception components 68, as known in the art.

The controller 62 will also generally have access to off-processor memory 70, though it is possible that all necessary memory could be included on chip with the controller 62. Such memory could be a non-volatile memory such as an electrically erasable programmable read only memory (EEPROM) or FlashROM, but may also be a volatile memory such as a random access memory (RAM). This memory 70 may be used to store user data, operating data or operating algorithms.

The controller 62 will execute some form of communication algorithm, and in the context of the invention, also have the functionality to perform the following tasks: receiving request packets; extracting location information from received packets; generating acknowledgement packets and inserting location information into such acknowledgement packets; and returning acknowledgement packets to the data service provider infrastructure 14, via a carrier network 12A, 12B, 12C. This functionality could easily be added to existing mobile devices 10, with simple alterations to their existing software code.

The implementation of the invention provides many advantages to the operators of the various networks. For example, it allows the carrier network 12A, 12B, 12C to: determine how heavy the loading is on its resources, and what the traffic patterns are; identify heavy load areas, which allows it to concentrate its upgrade efforts in areas that will provide the best return on investment; detect performance problems, for example, if a certain base station can be found to be operating at less than expected capacity (or not at all); and the invention can be implemented without carriers having to change any hardware or software on their systems.

The invention also provides many benefits to the digital service provider 14, for example: it can determine whether a service problem lies with the data service provider infrastructure 14 or with a carrier's network 12A, 12B, 12C, so end user complaints can be directed to the particular party responsible for the problem. This reduces help desk costs and increases user satisfaction; it can determine how quickly messages are circulating through the network. This may assist in determining whether a carrier 12A, 12B, 12C is handling messages as quickly as it is supposed to. The data is collected by time stamping "request" packets as they depart from the digital service provider infrastructure 14, and comparing that with the time at which a corresponding "acknowledgement" packet is returned; and it gives the digital service provider 14 an additional service which can be offered to the carriers 12A, 12B, 12C. This might become a market differentiator between different digital service providers. Also, because of where the new functionality is located (at the mobile devices 10 and at the data service provider infrastructure 14), it is easy to upgrade software as required. Additional advantages of the invention are described hereinafter with respect to the preferred embodiments of the invention.

Preferred Embodiments of the Invention

One of the parameters that drives the preferred embodiment of the invention is that of privacy. Regulations regarding the privacy of end users vary from one legal jurisdiction to another, and in fact, desired privacy levels may vary from one customer to another (some companies, for example, may demand higher levels of security than the levels required by law). Accordingly, it is generally necessary to implement the invention with the following limitation: requiring that location information and end user's equipment identifiers never be stored together in a permanent database. However, this restriction means that mobile devices cannot be tracked as they move, and as a result one cannot maintain mobile device population and density statistics for network base stations.

There are also a number of other restrictions that it is desirable to satisfy. For example: it is preferable that mobile devices and servers implementing the invention be backwards compatible with earlier versions of these components. This is desirable from a business standpoint as it would allow the same infrastructure to support both versions of the equipment; power consumption of mobile devices is very important. Thus, it is

preferable to minimize the number of additional data transmissions that will have to be performed, and to minimize the number of additional bits required in those transmissions.

The system architecture of the preferred embodiment is much like that of Figure 1, except that as shown in Figure 5, the data service provider infrastructure 14 preferably consists of a server 80 connected to various carrier networks 12A, 12B, 12C via an Internet network 82 and a gateway 84. This allows a single server 80 (or cluster of servers) to manage many end users and carrier networks 12A, 12B, 12C over a broad geographic area. The architecture of Figure 5 also explicitly shows a base station 86 that provides the wireless link to the mobile device 10.

The message flow diagram of Figure 6 presents the preferred method of the invention. In fact, Figure 6 presents only part of a regular communication, focusing on the communications that deal with the transfer of location data specifically.

To begin with, a communication link is established between the server 80 and the mobile device 10, via the intermediate components (specifically, the Internet network 82, gateway 84, carrier network 12A and base station 86). The manner in which this communication is established is well known in the art, and will vary with the particular communication system and protocol being employed.

At some point after this communication link has been established, the algorithm on the server 80 will decide that location information is needed, and a control or data packet will issue, including a request for location information. This packet will be transmitted to the mobile device 10 at step 100. In the preferred embodiment of the invention any control of data packet may be used, with a single bit set as a flag, which indicates to the mobile device 10 that location information is desired.

In the preferred embodiment, the request packet that is being sent, is a packet that would be sent in the usual course of communication between the enterprise server 50 and the mobile device 10. Thus, the implementation of the invention does not increase the number of messages being sent between the enterprise server 50 and the mobile device 10. As well, by using only a single bit as the flag to indicate that location information is desired, there is only a very small increase in the amount of bandwidth and power needed to transmit this packet.

The bit that is set is not used in regular communications, thus the implementation of the invention is backwards compatible to mobile devices that are not equipped to handle the invention. Older versions of mobile devices will simply ignore the setting of this unused bit.

This request packet is then routed through the rest of the data service provider's infrastructure (Internet network 82 and gateway 84), in the manner know in the art.

The carrier network 12A then receives the request packet at step 102, and attaches location data to it at step 104, passing it on to the mobile device 10. As noted above, this location data is used by the carrier network 12A and mobile device 10 for book keeping purposes.

Ultimately, this request packet is received by the mobile device 10, and is examined at step 106 for the presence of the bit which indicates that location data is required. As noted above, mobile devices that are not compatible with the invention, will ignore the setting of this bit as it is unused. Such non-compatible mobile devices will then prepare a standard acknowledgement packet, and return that packet to the server 80. This allows the invention to be backward compatible with older systems.

Mobile devices 10 that are compatible with the invention will also prepare an acknowledgement packet in response, but will extract the location data from the received request packet at step 108, store it locally, and then insert it into the acknowledgement packet at step 110. As in the case of the request packet above, no additional packets have been added to the standard communication flow, minimizing the impact of the invention on power consumption and bandwidth.

The location data that is inserted into the acknowledgement packet will vary with the application, but may include one or more of the following parameters. Note that this location information is formatted in the acknowledgement packet as a sequence of tag/length/value. In the value field, the data related to the value on the tag field is entered, while the length filed is used for entering the length of the data. The tags may be defined as follows:

Tag = 1 (NPC -1, 4 or 8 bytes)

Tag = 2 (Country code), a standard telecommunications code that identifies the country is which the mobile device 10 is being used;

Tag = 3 (Network code);

Tag = 4 (Location area);

Tag = 5 (Routing area);

Tag = 6 (Base);

Tag = 7 (Area);

Tag = 8 (Channel);

Tag = 9 (TrafNum);

This location data is simply inserted into a field of the acknowledgement packet that the carrier network 12A will regard as data rather than instructions to it; thus, the carrier network 12A will simply pass this location information back to the server 80 at step 112.

When the server 80 receives the acknowledgement packet at step 114, it determines whether location data has been included, by virtue of whether one or more location data fields have been filled. If so, the location data is stored, collated and/or analyzed at step 116.

This process of sending requests and receiving acknowledgements including location data, can be executed on a continuous basis, so that the system's understanding of network health stays current. That is, the mobile device 10 could return location data in response to any packet received from the server 80.

As noted above, many traffic management and network analysis techniques are known in the art. These would include the following: determining average and peak packet delivery times and related those times to particular base stations or carrier networks; determining base station traffic patterns such as packet delivery rates, packets/minute/base, and delivery round-trip/base; predicting traffic problems due to statistical increases in demands on certain network nodes; and determining the number of mobile devices connected to a particular carrier or base station with respect to time of day.

Other Privacy Issues

As noted above, regulatory requirements regarding the privacy of end users may vary from one legal jurisdiction to another, and may even vary from one customer to

another. In general, however, they do not allow location information and the end user's equipment identifiers to be stored together in a permanent database.

As well, it may be desirable to implement the invention with the following functionality, in the interest of privacy: mobile devices may implement an option whereby the end user can disable the reporting of location information. This is easily done by having mobile devices ignore the request for information; IT Policy may be extended to allow an IT department to disable the reporting of location information for any of its end users; and licensing agreements may be amended to include a paragraph informing the customer that the data service provider may collect mobile device location. All of these options are easily implemented in view of the description of the invention above.

Other Considerations

The details of how the invention could be applied to different environments will vary. However, a number of other important considerations include the following:

1. *Device Presence Reports*: While avoiding privacy information, it still may be desirable to monitor the approximate number of mobile devices and their ability to communicate with the network. If ping packets (for example, the GCMP ping sent in the case of GPRS and CDMA, every 15 minutes), were replaced with packets that include location information, then one could maintain a count of device reports per minute per base. Note that ping packets are not generally sent if there is regular communication with a mobile device, so replacing ping packets with a location report does not guarantee that all mobile devices will always send the reports. However, when the location reports are combined with delivery acknowledgements containing location information, there will be sufficient information to determine network performance trends, and to make a better determination of base station health;

2. *Use of Send-only Devices*: If a device only sends messages, and never receives messages, then it will never send location information. If too many such devices are present then the statistical information gathered through the location reports will be inaccurate. It is assumed, though, that the percentage of devices which only send messages will be very small, and thus have little impact; and

3. *Opt-out Devices*: Since it is desirable to provide methods which allow mobile

devices to opt out of reporting their locations, the statistical information will be inaccurate according to the percentage of devices which opt out of these reports.

Conclusions

Numerous modifications, validations and adaptations may be made to the particular embodiments of the invention described herein, without departing from the scope of the invention, which is defined in the claims.

While particular embodiments of the present invention have been shown and described, it is clear that changes and modifications may be made to such embodiments without departing from the true scope and spirit of the invention. For example, the invention could be applied to digital or analogue communications, or voice or data, using wireless, fiber optic or hardwired technologies.

The method steps of the invention may be embodiment in sets of executable machine code stored in a variety of formats such as object code or source code. Such code is described generically herein as programming code, or a computer program for simplification. Clearly, the executable machine code may be integrated with the code of other programs, implemented as subroutines, by external program calls or by other techniques as known in the art.

The embodiments of the invention may be executed by a computer processor or similar device programmed in the manner of method steps, or may be executed by an electronic system which is provided with means for executing these steps. Similarly, an electronic memory medium such computer diskettes, CD-ROMs, Random Access Memory (RAM), Read Only Memory (ROM) or similar computer software storage media known in the art, may be programmed to execute such method steps. As well, electronic signals representing these method steps may also be transmitted via a communication network.

CLAIMS:

1. A system for monitoring the health of a wireless telecommunication network, comprising:

a mobile device;

a data service provider infrastructure; and

a carrier network having a wireless connection to said mobile device and a connection to said data service provider infrastructure;

said data service provider infrastructure being operable to:

generate a digital packet including a request for location information; and

transmit said request packet to said mobile device via said carrier network;

said carrier network being operable to:

receive said request packet from said data service provider infrastructure;

attach location information for said mobile device, to said request packet; and

transmit said request packet including said location information, to said mobile device; and

said mobile device being operable to:

receive said request packet;

extract said location information from said request packet;

insert said location information into a field of an acknowledgement packet that said carrier network will pass to said data service provider infrastructure; and

return said acknowledgement packet to said data service provider infrastructure, via said carrier network;

said carrier network also being operable to:

receive said acknowledgement packet from said mobile device; and

pass said acknowledgement packet to said data service provider infrastructure;

wherein said data service provider infrastructure may use said location information to analysis the health of said telecommunication network.

2. The system as claimed in claim 1, wherein said mobile device is further operable to determine whether said location information has been requested by said server.

3. The system as claimed in claim 1, wherein said location data includes identification of said base station.

4. The system as claimed in claim 1, wherein said carrier network further comprises a wireless base station for communicating with said mobile device via a wireless connection.

5. The system as claimed in claim 1, wherein said data service provider prevents storage of location data and end user equipment identifiers together.

6. The system as claimed in claim 1, wherein said wireless device is operable to insert said location information into a field of said acknowledgement packet that said carrier network interprets as data intended for said data service provider infrastructure.

7. The system as claimed in claim 6, wherein said request and acknowledgement packets are standard packets, used in the course of regular communication, and modified.

8. The system as claimed in claim 6, wherein said data service provider infrastructure is operable to generate a digital packet having a single bit to indicate that location information is required.

9. The system as claimed in claim 8, wherein said single bit is in a location whereby said single bit will be disregarded by said older equipment to be detectable by first equipment id said wireless telecommunication network and disregarded by second equipment in said wireless communication network.

10. The system as claimed in claim 8, wherein said mobile device is operable to selectively disregard said single bit, such that, when disregarded, said mobile device blocks the return of location data.

11. The system as claimed in claim 8, wherein said server includes a data processor for extracting said location information.

12. The system as claimed in claim 8, wherein said server includes a database for storing data.

13. The system as claimed in claim 8, wherein said database stores differential timing data regarding the time difference between the issuance of a given request packet and the receipt of a corresponding acknowledgement packet.

14. The system as claimed in claim 8, wherein said data service provider infrastructure comprises a server.

15. The system as claimed in claim 14, wherein said data service provider infrastructure comprises a server connected to said carrier network via an Internet and a gateway.

16. A method of monitoring the health of a wireless telecommunication network, said telecommunication network including at least one mobile device, a data service provider infrastructure and a carrier network facilitating communication between said mobile device and said data service provider infrastructure, said method comprising the steps of:

at said data service provider infrastructure:

generating a digital packet including a request for location information; and

transmitting said request packet to said mobile device via said carrier network;

at said carrier network:

receiving said request packet from said data service provider infrastructure;

attaching location information for said mobile device, to said request packet; and

transmitting said request packet including said location information, to said mobile device; and

at said mobile device:

receiving said request packet;

extracting said location information from said request packet;

inserting said location information into a field of an acknowledgement packet that said carrier network will pass to said data service provider infrastructure; and

returning said acknowledgement packet to said data service provider infrastructure, via said carrier network;

said location information thereafter available at said data service provider to analyze the health of said telecommunication network.

17. The method as claimed in claim 16, wherein said request and acknowledgement packets comprise standard packets, and modified.

18. The method as claimed in claim 16, further comprising the step at said mobile device of determining whether said location information has been requested by said data service provider infrastructure.

19. The method as claimed in claim 18, wherein said step of determining comprises the step of determining whether a single bit has been set in said request message.

20. The method as claimed in claim 16, further comprising the steps of:

at said data service provider infrastructure:

receiving said acknowledgement packet;

extracting said location information; and

analyzing said location information.

21. The method as claimed in claim 16 wherein said location information comprises data selected from the group consisting of: NPC, Country code, network code, location area, routing area, base, area, channel and TrafNum.

22. The method as claimed in claim 16 wherein said data service provider infrastructure is operable to generate a digital packet using a single bit to indicate that location information is required.

23. A server comprising:

means for generating a digital packet requesting location information;

means for transmitting said request packet to a mobile device via a carrier network;

means for receiving an acknowledgement packet from said mobile device; and

means for extracting location information inserted into said acknowledgement packet by said mobile device.

24. A mobile device comprising:

means for receiving a request packet, initiated by a data service provider infrastructure;

means for extracting location information from said request packet, said location information having been added to said request packet by a carrier network;

means for inserting said location information into a field of an acknowledgement packet that said carrier network will pass to said data service provider infrastructure; and

means for returning said acknowledgement packet to said data service provider infrastructure, via said carrier network.

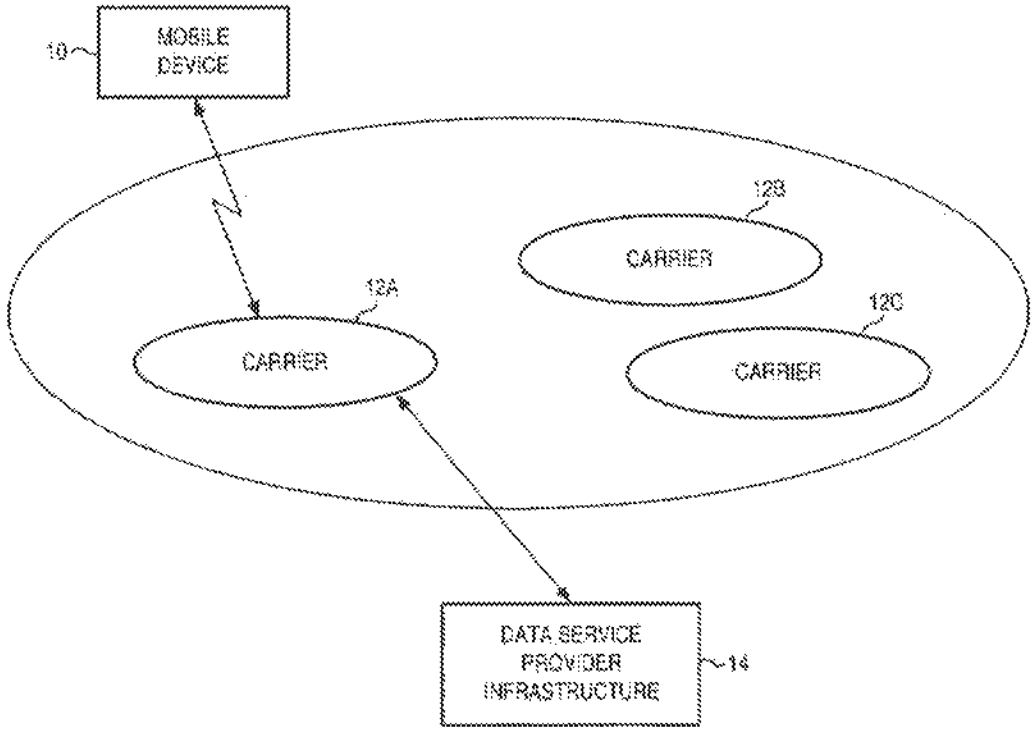
10
MOBILE DEVICE
12B
CARRIER
12A
CARRIER
12C
CARRIER
DATA SERVICE PROVIDER INFRASTRUCTURE
14

FIG. 1

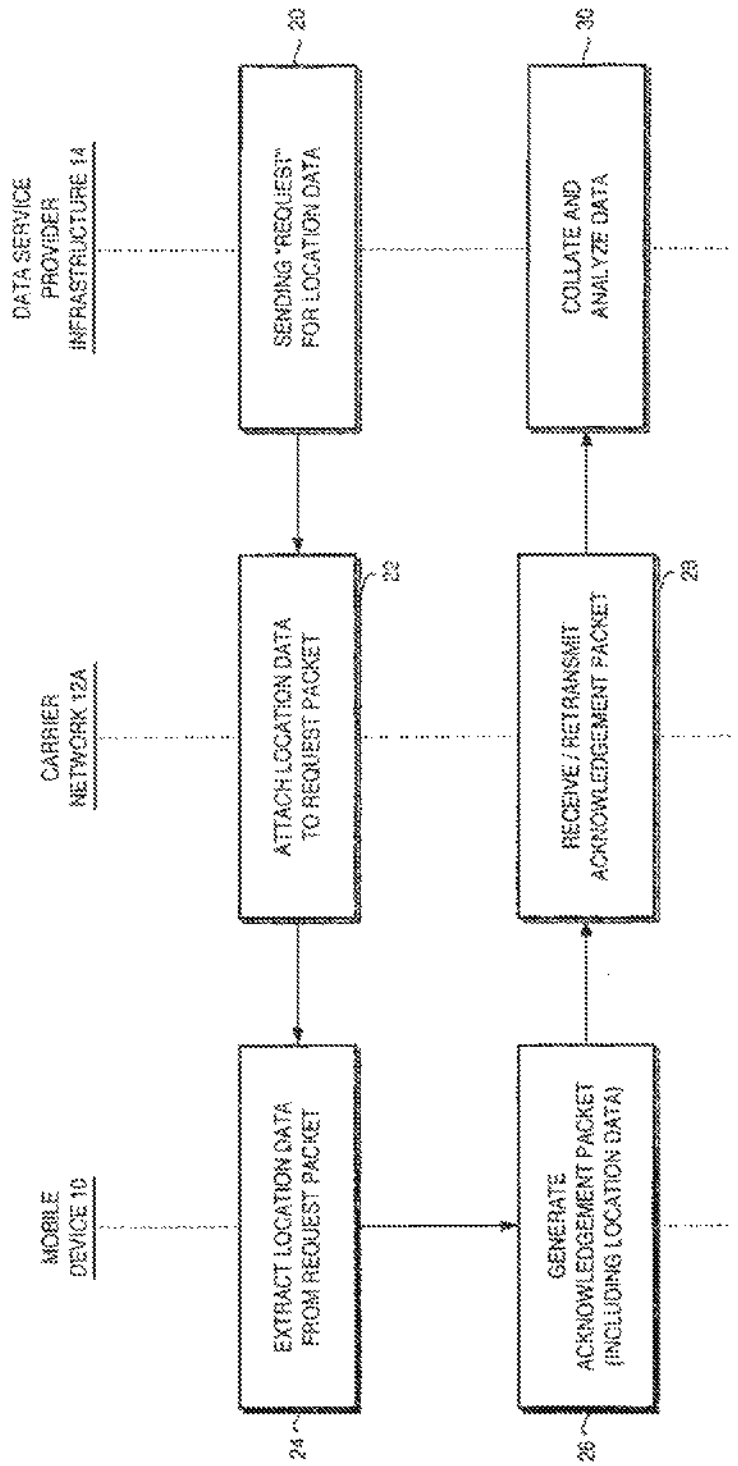

FIG. 2

Samsung Ex. 1004, page 484 of 974

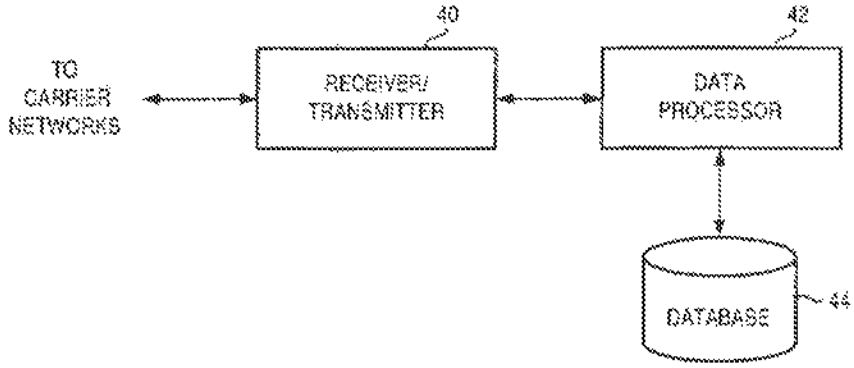
40
42
TO CARRIER NETWORKS
RECEIVER/ TRANSMITTER
DATA PROCESSOR
DATABASE
44

FIG. 3

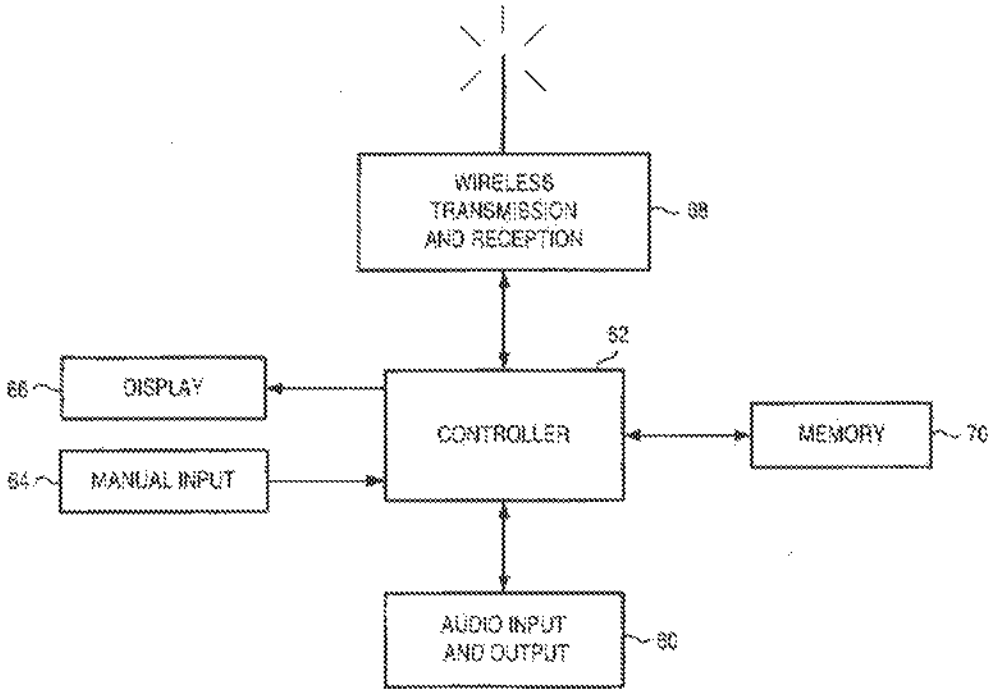
WIRELESS TRANSMISSION AND RECEPTION
88
82
68
DISPLAY
64
MANUAL INPUT
CONTROLLER
MEMORY
70
AUDIO INPUT AND OUTPUT
80

FIG. 4

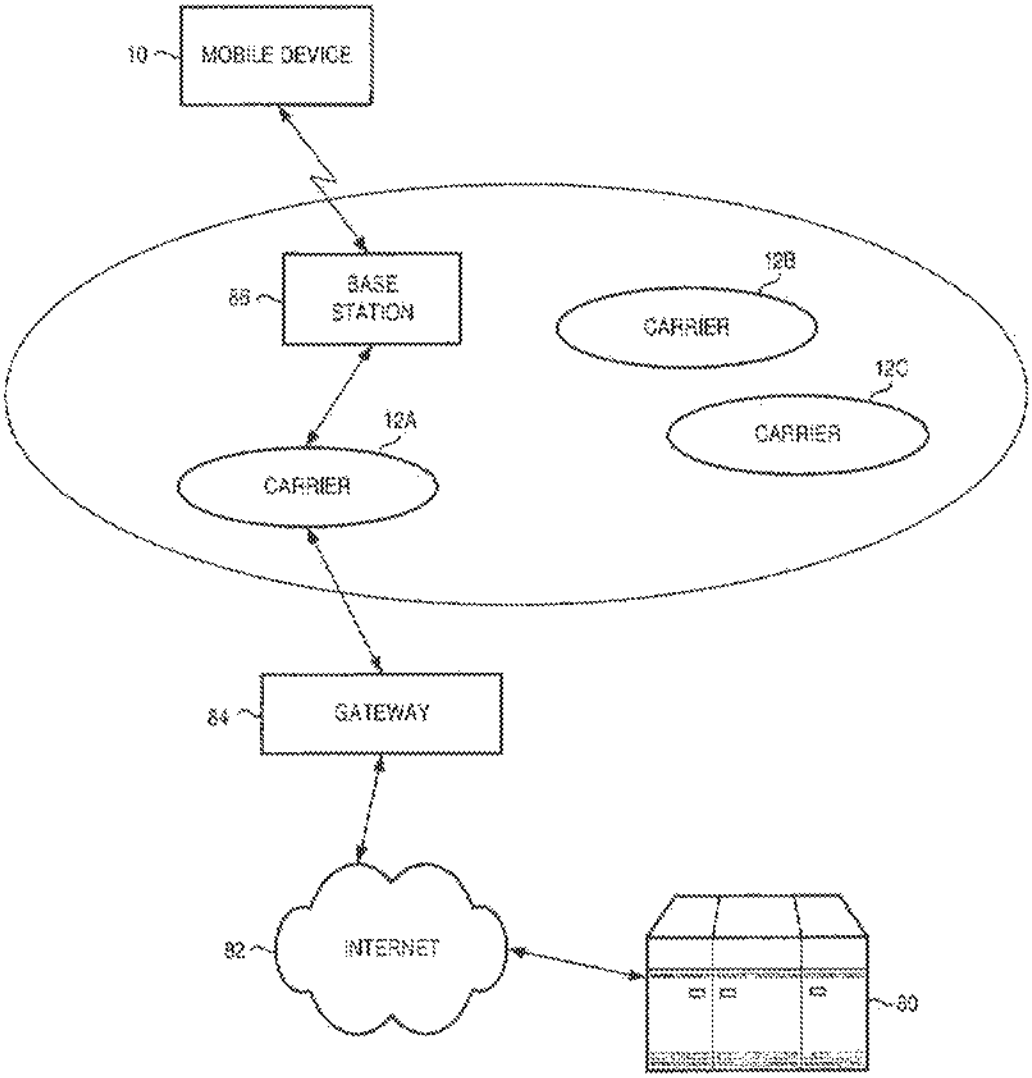
10
MOBILE DEVICE
88
BASE STATION
12A
CARRIER
12B
CARRIER
12C
CARRIER
84
GATEWAY
82
INTERNET
80

FIG. 5

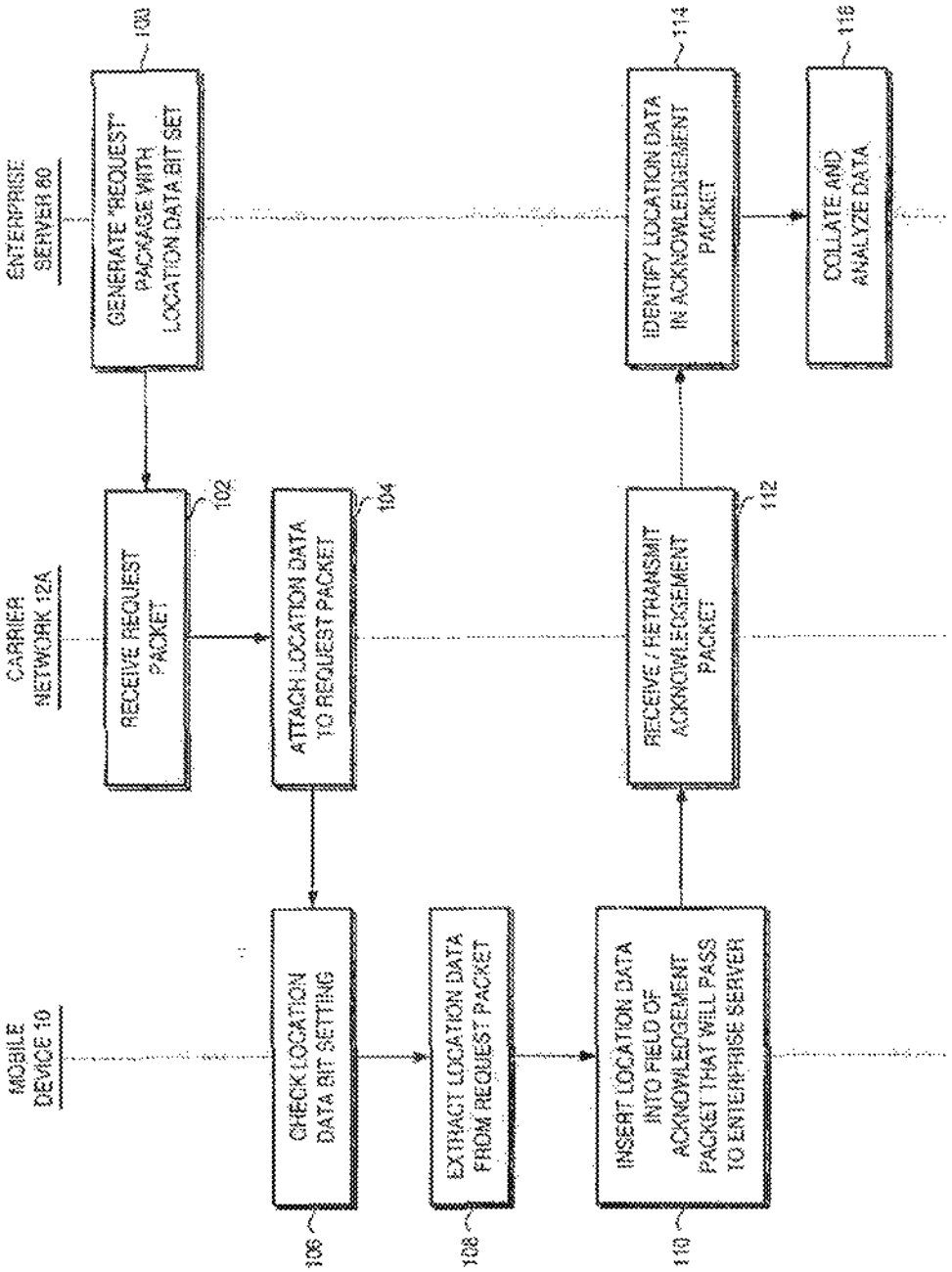
MOBILE DEVICE 10
CARRIER NETWORK 12A
ENTERPRISE SERVER 60
GENERATE "REQUEST" PACKAGE WITH LOCATION DATA BIT SET
100
RECEIVE REQUEST PACKET
102
CHECK LOCATION DATA BIT SETTING
106
ATTACH LOCATION DATA TO REQUEST PACKET
104
EXTRACT LOCATION DATA FROM REQUEST PACKET
108
INSERT LOCATION DATA INTO FIELD OF ACKNOWLEDGEMENT PACKET THAT WILL PASS TO ENTERPRISE SERVER
110
RECEIVE / RETRANSMIT ACKNOWLEDGEMENT PACKET
112
IDENTIFY LOCATION DATA IN ACKNOWLEDGEMENT PACKET
114
COLLATE AND ANALYZE DATA
116

FIG. 6

INTERNATIONAL SEARCH REPORT

International application No.

A. CLASSIFICATION OF SUBJECT MATTER

IPC⁷: IPC7: H04Q-7/34, H04Q-7/32, H04Q-7/36, H04L-12/26

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC⁷ : H04Q , H04L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields

Electronic database(s) consulted during the international search (name of database(s) and, where practicable, search terms

Delphion, Canadian database, IEEExplore: (network, packet, mobile), (test, monitor, measure), (performance, quality, speed, loading, health), (location, position, geographic), ping, traceroute, etc.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant	Relevant to claim No(s).
Y	WO03/051076 19 June 2003 (19-06-2003) Krishnamurthi et al. *abstract *paragraphs [1008], [1035], [1055], [1071] *claim 29	1-24
A	US5477531 19 December 1995 (19-12-1995) McKee et al. *whole document	1-24

[ ] Further documents are listed in the continuation of Box [ ] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
28 February 2005 (28-02-2005)	16 March 2005 (16-03-2005)
Name and mailing address of the ISA/CA *Canadian Intellectual Property Office* *Place du Portage I, C114 - 1st Floor, Box PCT* *50 Victoria Street* *Gatineau, Quebec K1A 0C9* Facsimile No: 001(819)953-2476	Authorized officer Andrew Strong (819) 994-8691

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

Patent Document Cited in Search Report	Publication Date	Patent Family Member(s)	Publication Date
US5477531	19-12-1995	DE69116685D D1	07-03-1996
		DE69116685T T2	30-05-1996
		EP0522211 A1	13-01-1993
		JP6508008T T	08-09-1994
		US5477531 A	19-12-1995
		WO9222967 A1	23-12-1992
WO03051076	19-06-2003	AU2002351303 A1	23-06-2003
		BR0214831 A	04-01-2005
		CA2469707 A1	19-06-2003
		EP1452048 A1	01-09-2004
		US2003142629 A1	31-07-2003
		WO03051076 A1	19-06-2003

Receipt date: 04/30/2012
Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

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

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	12815165
Filing Date	2010-06-14
First Named Inventor	Theodore S. Rappaport
Art Unit	2157
Examiner Name	
Attorney Docket Number	110-009US

U.S.PATENTS Remove

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

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

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

Receipt date: 04/30/2012	Application Number	12815165 12815165 - GAU: 2157
INFORMATION DISCLOSURE STATEMENT BY APPLICANT	Filing Date	2010-06-14
(Not for submission under 37 CFR 1.99)	First Named Inventor	Theodore S. Rappaport
	Art Unit	2157
	Examiner Name	
	Attorney Docket Number	110-009US

	1	4/19/2012 Office Action from related U.S. Patent Appl. No. 12/814,974, including Notice of References cited by examiner	☐

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EXAMINER SIGNATURE

Examiner Signature	/Srirama Channavajjala/	Date Considered	10/04/2012

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

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

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

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12815165	RAPPAPORT, THEODORE S.
	Examiner	**Art Unit**
	SRIRAMA CHANNAVAJJALA	2157

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

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

CLAIM		DATE								
Final	Original	04/02/2012	10/04/2012							
	1	✓	✓							
	2	✓	✓							
	3	✓	✓							
	4	✓	✓							
	5	✓	-							
	6	✓	✓							
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	34	✓	✓							
	35	✓	✓							
	36	✓	✓							

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12815165	RAPPAPORT, THEODORE S.
	Examiner	**Art Unit**
	SRIRAMA CHANNAVAJJALA	2157

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
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☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	04/02/2012	10/04/2012							
	37	✓	✓							
	38	✓	✓							
	39	✓	✓							
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	67	✓	✓							
	68	✓	✓							
	69	✓	✓							
	70	✓	-							
	71	✓	-							
	72	✓	✓							

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12815165	RAPPAPORT, THEODORE S.
	Examiner	**Art Unit**
	SRIRAMA CHANNAVAJJALA	2157

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

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

CLAIM		DATE								
Final	Original	04/02/2012	10/04/2012							
	73	✓	✓							
	74	✓	✓							
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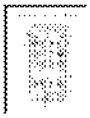
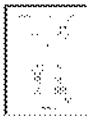


SYNCHRONIZING MOBILE AND VEHICLE DEVICES
www.google.com/patents/US20090005070
App. - Filed Feb 22, 2008 - Scott Forstall - APPLE INC.
Location information is received at a **mobile device** from the memory of a vehicle device. The **mobile device** is updated based on the **location information**. Sensor ...
Overview - Abstract - Drawing - Description - Claims - Related

System and method for effectively performing enhanced ...
www.google.com/patents/US7616157
Grant - Filed Mar 30, 2007 - Issued Nov 10, 2009 - Yi Zhou - Sony Corporation, Sony Electronics Inc.
A **location** detector of the **mobile device** coordinates a device **location** procedure by ... The **location** detector analyzes the satellite **information**, the base station ...
Overview - Abstract - Drawing - Description - Claims - Related

Real-time location information from mobile devices including ...
www.google.com/patents/US8285935
Grant - Filed May 27, 2008 - Issued Aug 7, 2012 - Wen-hsiung Chen - Cisco Technology, Inc.
One embodiment includes a method in a **mobile device**, including accepting real - time **location information** on the **location** of the **mobile device**, and ascertaining ...
Overview - Abstract - Drawing - Description - Claims - Related

Location-based caching for mobile devices
www.google.com/patents/US7519470
Grant - Filed Mar 15, 2006 - Issued Apr 14, 2009 - Goetz P Brasche - Microsoft Corporation
The system tracks a present **location** of the **mobile device** and predicts a future **location** of ... user preferences, movement **information**, and device state **information**.
Overview - Abstract - Drawing - Description - Claims - Related



Location-based operations and messaging
www.google.com/patents/US7746365
Grant - Filed Dec 1, 2006 - Issued Aug 3, 2010 - Trevor Fiatal - SEVEN Networks, Inc.
The user's **mobile device** provides **location information** to in intermediate computing device. That **location information** is accessed and used to determine, from ...
Overview - Abstract - Drawing - Description - Claims - Related

Mobile Device Management System
www.google.com/patents/US20100274614
App. - Filed May 3, 2010 - James J. Fraley - PLUTO TECHNOLOGIES, INC.
Location information, such as from a locator network or a satellite-based global positioning system, is used to provide real time updates to a **mobile device** ...
Overview - Abstract - Drawing - Description - Claims - Related

System and method for mobile-based location information
www.google.com/patents/US20050085256
App. - Filed Oct 21, 2003 - Mats Cedervall - Openwave Systems Inc.
A system and method is disclosed for providing **location information** to a **location** application directly from a **mobile device**. In an embodiment of the invention, ...
Overview - Abstract - Drawing - Description - Claims - Related

TWO STAGE MOBILE DEVICE GEOGRAPHIC LOCATION DETERMINATION

Samsung Ex. 1004, page 495 of 974

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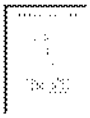
Personalized location information for mobile devices



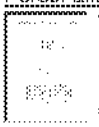
www.google.com/patents/US7860162

Grant - Filed Oct 13, 2009 - Issued Feb 15, 2011 - Jennifer Granito - ADL Inc.

Providing **location information** on a **mobile device** includes ...

Overview - Abstract - Drawing - Description - Claims - Related

Personalized location information for mobile devices



www.google.com/patents/US7916680

Grant - Filed Sep 23, 2005 - Issued Oct 20, 2006 - Jennifer Granito - ADL LLC

Providing **location information** on a **mobile device** includes receiving signals from external devices. Each signal includes **information** that ...

Overview - Abstract - Drawing - Description - Claims - Related

SYSTEM AND METHOD FOR DETERMINING MOBILE DEVICE POSITION INFORMATION

www.google.com/patents/US20080285787

App. - Filed Apr 6, 2007 - Tyler M. Kratz

wherein the first **mobile device** is further configured to broadcast **information** indicative of the **location** of the first **mobile device** directly to a second **mobile device**, ...

Overview - Abstract - Drawing - Description - Claims - Related

Method for providing location information from a mobile device to ...

www.google.com/patents/US20030023970

App. - Filed Jul 29, 2002 - Patrick Merheb - ALCATEL

1/ Method for providing **location information** from a **mobile device** to a group of **mobile devices**, said method comprising the steps of generating a message ...

Overview - Abstract - Drawing - Description - Claims - Related

Real-time smart mobile device for location information processing

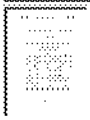
www.google.com/patents/US7065446

Grant - Filed Dec 31, 2001 - Issued Jun 20, 2006 - Yue-Hong Chou - GeoSpatial Technologies, Inc

The **device** processes the **location information** and activates responsive functions ... Messages are transmitted through one of multiple **wireless** communication ...

Overview - Abstract - Drawing - Description - Claims - Related

Methods and apparatus for providing media on mobile devices



www.google.com/patents/US8165593

Grant - Filed Sep 21, 2007 - Issued Apr 24, 2012 - Monica Tran - MobiTV, Inc.

Techniques and mechanisms are provided for sending targeted content and data to **mobile devices** **Location information** associated with a device is determined ...

Overview - Abstract - Drawing - Description - Claims - Related

Method and apparatus for mobile device location via a network ...

www.google.com/patents/US7126527

Grant - Filed Jun 23, 2004 - Issued Oct 24, 2006 - Sundeep Bajikar - Intel Corporation

Methods and apparatuses for **mobile device location** via a network based local ... includes a positioning receiver to generate base station **location information** ...

Overview - Abstract - Drawing - Description - Claims - Related

DEVICE LOCATION PREDICTION FOR MOBILE SERVICE OPTIMIZATION

www.google.com/patents/US20100323716

App. - Filed Jun 18, 2009 - JACK H. WINTERS

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Business card presentation via **mobile phone**
www.google.com/patents/US6873881
Grant - Filed Apr 12, 2001 - Issued Mar 29, 2005 - Faisal M. Awada - International Business Machines Corporation
The business card data is stored locally on the **cellular phone** or in a **service provider database**. When the **user** is in communication via **cellular phone** with ...
Overview - Abstract - Drawing - Description - Claims - Related

Rapid system access and registration in **mobile phone** systems
www.google.com/patents/US5974326
Grant - Filed Sep 17, 1997 - Issued Oct 26, 1999 - William Chien-Yeh Lee - AirTouch Communications, Inc.
A preferred **mobile phone** system for a **mobile phone** is identified before the **mobile** ... the **mobile phone** and selecting the preferred system from a **database** stored in the ... or automatically by the **mobile phone**, the **user**, or the **service provider**.
Overview - Abstract - Drawing - Description - Claims - Related

Method of determining a PHS **mobile phone user**'s exact position
www.google.com/patents/US20060089158
App. - Filed Jul 6, 2005 - Cheng-Shing Lai - Inventec Appliances Corp.
... of the positioning **database** chosen by the PHS **mobile phone user**; searching for a ... **phone** without having to pay any additional fee to PHS **service provider**.
Overview - Abstract - Drawing - Description - Claims - Related

Method for providing number portability of **mobile phone**
www.google.com/patents/US6738633
Grant - Filed Dec 12, 2000 - Issued May 18, 2004 - Jin Yeon Kim - Korea Telecommunication Authority
... the **mobile phone service providers** in which the **mobile phone subscribers** use ... if all **service providers** co-use the number portability **database** of the **mobile** ...
Overview - Abstract - Drawing - Description - Claims - Related

Coupon delivery via **mobile phone** based on location
www.google.com/patents/US20020065718
App. - Filed Nov 29, 2000 - Faisal M. Awada
Users can then access the **database** by means of **mobile phone**, laptop ... to claim 1, wherein the **database** is maintained by a **telephone service provider**. 3.
Overview - Abstract - Drawing - Description - Claims - Related

End **user** to **mobile service provider** message exchange system based ...
www.google.com/patents/US20030067646
App. - Filed Nov 6, 2002 - Alex Naum Mezhvinsky
End **user** to **mobile service provider** message exchange system based on proximity .... A system according to claim 12 wherein said one or more **databases** also ... 12 or 13 wherein said end **user** interface is an SMS **mobile phone** connected to ...
Overview - Abstract - Drawing - Description - Claims - Related

Mobile telephone system and method for carrying out financial ...
www.google.com/patents/US6169890
Grant - Filed Oct 12, 1995 - Issued Jan 2, 2001 - Harri Tapani Vatanen - Sonera Smarttrust Oy
A method and apparatus for effecting **user**-initiated communications, such as ... **mobile telephone** exchange and at least one **service provider**, wherein each **user** or ... **service provider** are determined in a **database** at the **service provider** end of ...
Overview - Abstract - Drawing - Description - Claims - Related

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service providers database mobile users phones

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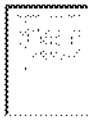
Method and apparatus for delivering advertisements to mobile users

www.google.com/patents/US7747644
Grant - Filed Sep 28, 2006 - Issued Jun 29, 2010 - Nicolas Fiorini - Myriad Group AG
For example, the **mobile user** may be operating a **cell phone** and using that **cell phone** to ... In a next step 406, the **service provider** sends a reply message to the USSD server. ... 8 is a pictorial image of the **database** 708 referenced in FIG 7.
Overview - Abstract - Drawing - Description - Claims - Related

User interface method and system for cellular phone

www.google.com/patents/US20080076433
App. - Filed Oct 11, 2005 - Jing Liu - Mino Holdings, Inc.
The method includes providing a **mobile** hand set comprising a **user** interface ... The method includes entering a predetermined **phone** number through the **user** ... provider from one of a plurality of different **service providers** in the **database** ...
Overview - Abstract - Drawing - Description - Claims - Related

Download of user interface elements into a mobile phone



www.google.com/patents/US20020137505
App. - Filed Feb 7, 2002 - Michael Dorsin - Agere Systems Guardian Corp.
In one embodiment, the **mobile phone** includes a receiver and a transmitter for ... the location of a re-seller, and: a **database** of an internet data **service provider**.
Overview - Abstract - Drawing - Description - Claims - Related

Enhanced directory assistance system and method including location ...

www.google.com/patents/US20070072581
App. - Filed Sep 28, 2005 - Faith McGary
A method for sending a targeted advertising campaign to a plurality of **mobile phone** ... information relating to geographic location of **mobile phone** devices, wherein the information is collected from a plurality of corresponding **mobile service providers**. The method includes the step of maintaining a subscriber **database** that ...
Overview - Abstract - Drawing - Description - Claims - Related

Media distribution method for mobile communication device

www.google.com/patents/US8027684
Grant - Filed Nov 1, 2007 - Issued Sep 27, 2011 - Kevin Peichih Wang
A media distribution system includes a **service provider** and at least a **mobile** ... for wirelessly communicating with a **mobile phone** of a registered **user** through a ... an information **database** storing said media information and a **user** info of said ...
Overview - Abstract - Drawing - Description - Claims - Related

Security cellular telecommunications system

www.google.com/patents/US5722067
Grant - Filed Dec 29, 1994 - Issued Feb 24, 1998 - Douglas V. Fougnies - Freedom Wireless, Inc.
The pre-selected **telephone** number is reserved to the pre-paid **cellular** ... switch, which contacts a host computer for call validation the pre-paid **service provider**. ... feature which allows only pre-authorized **users** to complete **cellular telephone** calls. ... Method for restoring lost **databases** by comparing existing **database** and ...
Overview - Abstract - Drawing - Description - Claims - Related

Mobile device notification with options

www.google.com/patents/US7853017
Grant - Filed Sep 6, 2007 - Issued Jan 16, 2010 - Steve Clayton - AT&T Mobility II LLC

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Method and system for enhanced security using location-based ...

www.google.com/patents/US7221949

Grant - Filed Feb 25, 2005 - Issued May 22, 2007 - Ian Clough - Research In Motion Limited

... using location-based wireless authentication for a **mobile device**, the method ... with the **mobile device**; appending, at the base station, a **location identifier** to said ... Seamless user mobility in a short-range **wireless networking** environment ... The system of claim 1, wherein the recipient is a financial services **provider** 6.

Overview - Abstract - Drawing - Description - Claims - Related

Method for handling roaming of mobile device to restricted area

www.google.com/patents/US20080305666

App. - Filed Jun 10, 2005 - Lu Tian

[0005] **Wireless networks** divide coverage areas into multiple smaller ... The **mobile device** stores the **location identifier** for the last location area in which the ...

Overview - Abstract - Drawing - Description - Claims - Related

Method of querying for device location in a heterogeneous network

www.google.com/patents/US20060106930

App. - Filed Nov 15, 2005 - James D. Shaffer

The system determines a **network** type and a **network identifier** from a ... **device location provider** based on the **network** type and the **network identifier** ... The system of claim 2, wherein the **device location provider** is a **wireless location provider**. ... **providers** for providing **location** information for **mobile** and stationary **devices**, ...

Overview - Abstract - Drawing - Description - Claims - Related

Anonymous positioning of a wireless unit for data network ...

www.google.com/patents/US7062279

Grant - Filed Dec 18, 2002 - Issued Jun 13, 2006 - Mats Cedervall - Openwave Systems Inc

In this regard, a subscriber's **identification** number may be hidden from the ... and a system for providing **location** information for a wireless unit in a **wireless network** to ... 1996, Telemac Cellular Corporation, **Mobile phone** with internal accounting ... receiving a first **identifier** from a **location**-based service **provider** that is not ...

Overview - Abstract - Drawing - Description - Claims - Related

Anonymous positioning of a wireless unit for data network ...

www.google.com/patents/US8112022

Grant - Filed Apr 24, 2006 - Issued Feb 7, 2012 - Mats Cedervall - Openwave Systems, Inc.

In this regard, a subscriber's **identification** number may be hidden from the ... The subscriber's number may further be concealed from the service **provider** via a process ... Anonymous positioning of a **wireless** unit for data **network location** - based ... 1996, Telemac Cellular Corporation, **Mobile phone** with internal accounting ...

Overview - Abstract - Drawing - Description - Claims - Related

System and method for addressing a mobile device in an IP-based ...

www.google.com/patents/US7769100

Grant - Filed Aug 28, 2002 - Issued Aug 03, 2010 - Craig A. Dunk - Research In Motion Limited

Push service **providers** prepare data for transmission to the **mobile device** using a ... **identifier** that is permanently associated with the **wireless mobile device** using ... The **network identifier** is then used by the push proxy to obtain a second IP ...

Overview - Abstract - Drawing - Description - Claims - Related

Method and apparatus for providing precise location information ...

www.google.com/patents/US6522888

Grant - Filed Dec 23, 1999 - Issued Feb 18, 2003 - Ari Aarnio - Nokia Corporation

... between a **mobile** station (MS) and a computer network such as the Internet, and ... along with a general **location identifier** of the MS to geographic data stored in a ... Remote control unit with previewing **device** for an image-capturing

device ... Wireless network architechture and protocol for location services in GPRS ...

Overview - Abstract - Drawing - Description - Claims - Related

System and method for addressing a **mobile device** in an IP-based ...

www.google.com/patents/US7934015

Grant - Filed Aug 11, 2006 - Issued Apr 26, 2011 - Craig A. Dunk - Research In Motion Limited

Push service **providers** prepare data for transmission to the **mobile device** using a ... **identifier** that is permanently associated with the **wireless mobile device** using ... The **network identifier** is then used by the push proxy to obtain a second IP ...

Overview - Abstract - Drawing - Description - Claims - Related

Conditional data delivery to remote devices

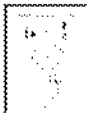
www.google.com/patents/US8156542

Grant - Filed Apr 4, 2006 - Issued Apr 10, 2012 - Allen J. Huotari - Cisco Technology, Inc.

... area **network** by setting a variable to a **mobile device identifier** and authenticating ... **mobile device** and the data is delivered from a service **provider** to the **mobile device**. ... system for secured **wireless** data transmission to and from a remote device ... Inc. SYSTEM FOR AND METHOD OF **LOCATION** AWARE MARKETING ...

Overview - Abstract - Drawing - Description - Claims - Related

Position-based information access **device** and method of searching



www.google.com/patents/US7072685

Grant - Filed Jan 31, 2001 - Issued Jul 4, 2006 - Brad W. Blumberg

Each **location identifier** has related location-centric information that can be viewed by the user of the **wireless device**. ... Nov 8, 1996. Aug 31, 1999. Zip2 Corporation, Interactive **network** directory service with integrated maps and directions ... system that provides location-based information delivery to a **wireless mobile** unit ...

Overview - Abstract - Drawing - Description - Claims - Related

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	12815165
Filing Date	2010-06-14
First Named Inventor	Theodore S. Rappaport
Art Unit	2157
Examiner Name	Srirama T. Channavajjala
Attorney Docket Number	110-009US

U.S.PATENTS

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	12815165
	Filing Date	2010-06-14
	First Named Inventor	Theodore S. Rappaport
	Art Unit	2157
	Examiner Name	Srirama T. Channavajjala
	Attorney Docket Number	110-009US

	1	08/21/12 Office Action from related U.S. Patent Appl. No. 12/815,076, including Notice of References cited by examiner	☐

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EXAMINER SIGNATURE

Examiner Signature		Date Considered	

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

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

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	12815165
Filing Date	2010-06-14
First Named Inventor	Theodore S. Rappaport
Art Unit	2157
Examiner Name	Srirama T. Channavajjala
Attorney Docket Number	110-009US

CERTIFICATION STATEMENT

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

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

OR

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

☐ See attached certification statement.

☒ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☐ A certification statement is not submitted herewith.

SIGNATURE

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

Signature	/William E. Winters/	Date (YYYY-MM-DD)	2012-09-24
Name/Print	William E. Winters	Registration Number	42,232

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

Electronic Patent Application Fee Transmittal

Application Number:	12815165
Filing Date:	14-Jun-2010
Title of Invention:	Clearinghouse System and Method for Determining Availability of Carrier-Based Services and Enhancing the Quality, Operation and Accessibility of Carrier-Based Networks
First Named Inventor/Applicant Name:	Theodore S. Rappaport
Filer:	William E. Winters
Attorney Docket Number:	110-009US

Filed as Small Entity

Utility under 35 USC 111(a) Filing Fees

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

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
Submission- Information Disclosure Stmt	1806	1	180	180
		Total in USD ($)		**180**

Electronic Acknowledgement Receipt

EFS ID:	13817075
Application Number:	12815165
International Application Number:	
Confirmation Number:	1819
Title of Invention:	Clearinghouse System and Method for Determining Availability of Carrier-Based Services and Enhancing the Quality, Operation and Accessibility of Carrier-Based Networks
First Named Inventor/Applicant Name:	Theodore S. Rappaport
Customer Number:	63409
Filer:	William E. Winters
Filer Authorized By:	
Attorney Docket Number:	110-009US
Receipt Date:	24-SEP-2012
Filing Date:	14-JUN-2010
Time Stamp:	12:30:53
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$180
RAM confirmation Number	12904
Deposit Account	
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)

1	Information Disclosure Statement (IDS) Form (SB08)	110-009US_IDS.pdf	62404 4f4b3efba92e5bb72ee78d1cccfd57db8a915901	no	3
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
2	Other Reference-Patent or Application Document	12815076_08_21_12_Office_Action.pdf	350699 1f10d5349294b27db0f4c2e4282fb6244d27c423	no	12
Warnings:					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	30671 ebf3388c989f2654b193d36a8e8ad5ba25a91e5d	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	443774		

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<u>New Applications Under 35 U.S.C. 111</u>
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.

<u>National Stage of an International Application under 35 U.S.C. 371</u>
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.

<u>New International Application Filed with the USPTO as a Receiving Office</u>
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.

Application Number	Application/Control No.	Applicant(s)/Patent under Reexamination	
	12/815,165	RAPPAPORT, THEODORE S.	

Document Code - DISQ	Internal Document – DO NOT MAIL

TERMINAL DISCLAIMER	☒ APPROVED	☐ DISAPPROVED
Date Filed : 8/6/12	This patent is subject to a Terminal Disclaimer	

Approved/Disapproved by:

Felicia D. Roberts - 3 TDs approved with this filing date:

1. 12/815,076
2. 12/814,974
3. 8,224,794

U.S. Patent and Trademark Office

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.:	12/815,165
INVENTOR:	Theodore S. Rappaport
FILING DATE:	June 14, 2010
TITLE:	CLEARINGHOUSE SYSTEM AND METHOD FOR DETERMINING AVAILABILITY OF CARRIER-BASED SERVICES AND ENHANCING THE QUALITY, OPERATION AND ACCESSIBILITY OF CARRIER-BASED NETWORKS
EXAMINER:	Srirama T. Channavajjala
ART UNIT:	2157
CONFIRMATION NO.:	1819
CUSTOMER NO.:	63409

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

AMENDMENT

In response to the Office Action of April 4, 2012, please amend the above-identified application as follows.

Amendments to the Claims are reflected in the listing of claims, which begins on page 2 of this paper.

Remarks/Arguments begin on page 24 of this paper.

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A system, comprising:

means for receiving mobile device ~~end user~~ location information of a plurality of mobile devices;

means for receiving ~~and~~ quality or service information of one or more wireless communications networks ~~for end users of said one or more communications networks~~, said quality or service information comprising coverage, outage or performance information of said one or more wireless communications networks;

means for storing said mobile device ~~end user~~ location information and said quality or service information;

means for ~~managing, controlling and~~ updating said ~~means for storing~~ mobile device location information stored by said means for storing when one or more mobile devices of said plurality of mobile devices travel from one location to another; and

means for providing access to quality or service information stored by said means for storing to one or more wireless carriers.

2. (Currently Amended) The system of Claim 1, further comprising ~~wherein said~~ means for providing access to quality or service information stored by said means for storing to one or more end users or to one or more end user communications

devicescomprises means for reporting quality or service information to one or more carriers.

3. (Currently Amended) The system of Claim 1, further comprising means for generating a recommended operating band, operating mode, communications network or carrier for an end users or an end user communications device, depending on and mobile device end user communications device based on end user location informationreceived by said means for receiving.

4. (Currently Amended) The system of Claim 3 wherein said means for generating a recommended operating band, operating mode, communication network or carrier is further based on quality or service information stored by said means for storingreceived by said means for receiving.

5. (Canceled).

6. (Currently Amended) The system of Claim [[5]]1 wherein said means for providing end user access comprises means for reporting quality or service information to said one or more end users or one or more end user communications devices.

7. (Currently Amended) The system of Claim 1, further comprising means for providing access to quality or service information stored by said means for storing to a

party or parties other than ~~end users~~subscribers and carriers of said one or more wireless communications networks.

8. (Currently Amended) A method of collecting and providing access to quality or service information associated with one or more wireless communications networks, comprising:

using a computer, receiving ~~for end users~~ mobile device location information of a plurality of mobile devices ~~one or more communications networks end user location information~~ and quality or service information ~~of said one or more communications networks, said quality or service information~~ comprising coverage, outage or performance information of ~~said~~ one or more wireless communications networks;

storing, by action of said computer, said ~~end user~~mobile device location information and said quality or service information in a memory or database;

~~managing, controlling and~~ updating, by action of said computer, said mobile device location information stored in said memory or database when a mobile device of said plurality of mobile devices travels from one location to another; and

providing access to quality or service information stored in said memory or database to one or more ~~users through a communications interface coupled to said computer~~carriers or third parties that provide services to said one or more carriers or to said one or more wireless communications networks.

9. (Canceled).

10. (Currently Amended) The method of Claim 8, ~~wherein said one or more users comprises one or more carriers~~further comprising providing access to quality or service information stored in said memory or database to one or more end users or one or more end user communications devices.

11. (Currently Amended) The method of Claim 10 wherein providing access ~~to quality or service information stored in said memory or database includes reporting quality or service information to said one or more carriers~~ to said one or more end users or one or more end user communications devices comprises reporting quality or service information to said one or more end users or said one or more ~~of said plurality of~~ end user communications devices.

12. (Currently Amended) The method of Claim [[10]]8, further comprising, by action of said computer:

processing said quality or service information; and

generating quality or availability-of-service information of services offered by said one or more carriers.

13. (Canceled).

14. (Currently Amended) The method of Claim [[13]]12 wherein said quality or availability-of-service information is location specific.

15. (Currently Amended) The method of Claim 8, further comprising ~~wherein said computer comprises a~~ serv[[er]]ing ~~configured to generate and serve~~ data ~~from~~based on ~~end user~~mobile device location information and quality or service information stored in said memory or database.

16. (Currently Amended) The method of Claim 15 wherein said data comprises a recommended operating band, operating mode, communications network and/or carrier for end users or end user communications devices.

17. (Currently Amended) The method of Claim 16 wherein said ~~server comprises a web server and said~~ data is formatted and served to end users or end user communications devices as one or more web pages ~~served to said end users~~.

18. (Currently Amended) The method of Claim [[15]]8, further comprising serving ~~wherein said computer~~data based on mobile device location information or quality or service information stored in said memory or database ~~is configured to serve said data~~ to one or more carriers.

19. (Currently Amended) The method of Claim 8, further comprising ~~wherein~~ providing access to quality or service information stored in said memory or database ~~comprises providing access~~ to a party or parties other than ~~end users~~subscribers and carriers of said one or more wireless communications networks.

20. (Currently Amended) A system for collecting and providing access to quality or service information of one or more wireless communications networks, comprising:

a computer configured to receive mobile device location information ~~for end users~~ of a plurality of mobile devices ~~one or more communications networks end user location information~~ and quality or service information ~~of said one or more communications networks, said quality or service information~~ comprising coverage, outage or performance information of ~~said~~ one or more wireless communications networks;

a memory or database configured to store the received ~~end user~~mobile device location information and quality or service information; and

an interface through which one or more ~~users~~carriers may access quality or service information or mobile device location information stored in said memory or database.

21. (Canceled).

22. (Currently Amended) The system of Claim 20, ~~wherein said one or more users comprises one or more carriers~~ further comprising an interface through which one or more end users or one or more end user communications devices may access quality or service information stored in said memory or database.

23. (Currently Amended) The system of Claim [[22]]20, further comprising a server ~~wherein said computer is~~ configured to ~~report~~serve quality o[[f]]r service information stored in said memory or database to ~~said~~ one or more carriers.

24. (Original) The system of Claim 22 wherein said computer is further configured to:

process said quality or service information; and

generate quality or availability-of-service information of services offered by said one or more carriers.

25. (Canceled).

26. (Currently Amended) The system of Claim 20, further comprising ~~wherein said computer comprises~~ a server configured to generate and serve data ~~from~~based on ~~end user~~mobile device location information and quality or service information stored in said memory or database to one or more end users or one or more end user communications devices.

27. (Currently Amended) The system of Claim 26 wherein said data comprises a recommended operating band, operating mode, communications network and/or carrier for said one or more end users or one or more of said end user communications devices.

28. (Currently Amended) The system of Claim 27 wherein said server comprises a web server and said data is formatted as one or more web pages served to said one or more end users or one or more of said end user communications devices.

29. (Canceled).

30. (Currently Amended) The system of Claim 20 wherein said computer is configured to provide access to quality or service information stored in said memory or database~~, via said interface,~~ to a party or parties other than ~~end users~~subscribers and carriers of said one or more wireless communications networks.

31. (Currently Amended) A method of building and providing access to a database for extending the use of~~, or improving the operation of,~~ carrier-based networks, comprising:

collecting, using a computer, ~~carrier information of one or more carriers and~~ property information of properties that are owned by members of the public and ~~associated with property~~ available for possible use by ~~said~~ one or more carriers;

storing in a database, by action of said computer, ~~said carrier information and~~ said property information; and

providing an interface through which one or more carriers can access ~~to carrier information and~~ property information stored in said database ~~through an electronic interface coupled between said computer and the Internet~~.

32. (Currently Amended) The method of Claim 31, further comprising, using said computer and property information store in said database, ~~negotiating~~ forming a business ~~transaction~~contract between a carrier and an end user ~~of a service provided by said carrier using property information stored in said database~~.

33. (Currently Amended) The method of Claim 31, further comprising providing an interface through which ~~wherein providing access to carrier information and property information stored in said database comprises granting access to~~ one or more parties other than said ~~one or more~~ carriers and property owners can access property information stored in said database~~end users of carrier-based services provided by said one or more carriers~~.

34. (Original) The method of Claim 33 wherein said one or more parties comprises one or more content providers.

35. (Original) The method of Claim 33 wherein said one or more parties comprises one or more advertisers.

36. (Currently Amended) The method of Claim [[31]]84 wherein ~~collecting~~said carrier information comprises information concerning availability of services provided by said one or more carriers.

37. (Currently Amended) The method of Claim [[31]]84 wherein ~~collecting~~ said carrier information comprises ~~collecting~~ information concerning quality or services provided by said one or more carriers.

38. (Currently Amended) The method of Claim [[31]]84 wherein ~~collecting~~ said carrier information comprises ~~collecting~~ infrastructure information relating to infrastructure used by said one or more carriers.

39. (Currently Amended) The method of Claim 31 wherein said ~~electronic~~ interface comprises a human viewable web-page.

40. (Currently Amended) The method of Claim 31 wherein said ~~electronic~~ interface comprises internet addressing without a visible web page interface.

41. (Canceled).

42. (Canceled).

43. (Currently Amended) A clearinghouse system, comprising:

a clearinghouse database configured to store property information of properties owned by members of the public and available for possible use by carriers of carrier-based services~~and carrier infrastructure information of carrier infrastructure dispersed over a geographical region, said carrier infrastructure information including information of carrier infrastructure installed or attached to dwellings or premises of property owners in said geographical region~~;

a computer configured to manage and update said clearinghouse database, said computer having a server configured to serve data relating to property~~based on carrier infrastructure~~ information stored in said clearinghouse database to carriers; ~~and~~

an interface through which members of the public may submit property information ~~is received by said computer and stored~~ for storage in said clearinghouse database; and

an interface through which one or more carriers can access and evaluate property information stored in said clearinghouse database.

44. (Canceled).

45. (Canceled).

46. (Currently Amended) The clearinghouse system of Claim [[45]]43 wherein said clearinghouse database is further configured to store ~~property information further includes~~ information of propert[[y]]ies that [[is]]are subject to contractual, legal, government or zoning restrictions.

47. (Original) The clearinghouse system of Claim 43 wherein said computer is configured to match a property need or property specification of a carrier with one or more property records stored in said clearinghouse database.

48. (Currently Amended) The clearinghouse system of Claim 43 wherein said computer is configured to receive and store in said clearinghouse database coverage or reception quality information of mobile devices operating in ~~end users of~~ one or more wireless communications networks.

49. (Original) The clearinghouse system of Claim 48 wherein said computer is further configured to serve coverage or reception quality data using coverage or reception information stored in said clearinghouse database.

50. (Original) The clearinghouse system of Claim 43 wherein said computer is configured to receive and store in said clearinghouse database service information of a plurality of different services provided by one or more carriers over one or more networks.

51. (Original) The clearinghouse system of Claim 50 wherein said computer is further configured to serve service data using service information stored in said clearinghouse database.

52. (Original) The clearinghouse system of Claim 43 wherein said computer is configured to receive and store in said clearinghouse database bandwidth and capacity information of one or more communications networks.

53. (Original) The clearinghouse system of Claim 52 wherein said computer is further configured to serve bandwidth and capacity data using bandwidth and capacity information stored in said clearinghouse database.

54. (Original) The clearinghouse system of Claim 43 wherein said computer is configured to receive and store in said clearinghouse database coverage or reception quality information of one or more communications networks.

55. (Original) The clearinghouse system of Claim 54 wherein said computer is further configured to serve coverage or reception quality data using coverage or reception quality information stored in said database.

56. (Currently Amended) A clearinghouse system, comprising:

means for receiving property information of properties owned by members of the public and available for possible use by carriers of carrier-based services;

means for storing said property information ~~and carrier infrastructure information of carrier infrastructure dispersed over a geographical region, said carrier infrastructure information including information of carrier infrastructure installed or attached to dwellings or premises of property owners in said geographical region~~;

means for processing said property ~~and carrier infrastructure~~ information;

~~means for receiving property information for processing by said means for processing and storing by said means for storing~~; and

means for serving data based on ~~carrier~~property ~~infrastructure~~ information stored by said means for storing to one or more carriers who may have an interest in using one or more of said properties available for possible use.

57. (Canceled).

58. (Canceled).

59. (Currently Amended) The clearinghouse system of Claim [[58]]56 wherein said property information further includes information of propert[[y]]ies that [[is]]are subject to contractual, legal, government or zoning restrictions.

60. (Currently Amended) The clearinghouse system of Claim 56, further comprising means for matching a property need or property specification of a carrier with one or more property records stored ~~in~~by said means for storing~~clearinghouse database~~.

61. (Currently Amended) The clearinghouse system of Claim 56, further comprising means for receiving and storing coverage or reception quality information of mobile devices operating in~~end users of~~ one or more wireless communications networks.

62. (Original) The clearinghouse system of Claim 61, further comprising means for serving coverage or reception quality data using coverage or reception information

received and stored by said means for receiving and storing coverage or reception quality information.

63. (Original) The clearinghouse system of Claim 56, further comprising means for receiving and storing service information of a plurality of different services provided by one or more carriers over one or more networks.

64. (Original) The clearinghouse system of Claim 63, further comprising means for serving service data using service information received and stored by said means for receiving and storing service information.

65. (Original) The clearinghouse system of Claim 56, further comprising means for receiving and storing bandwidth and capacity information of one or more communications networks.

66. (Original) The clearinghouse system of Claim 65, further comprising means for serving bandwidth and capacity data using bandwidth and capacity information received and stored by said means for receiving and storing bandwidth and capacity information.

67. (Original) The clearinghouse system of Claim 56, further comprising means for receiving and storing coverage or reception quality information of one or more communications networks.

68. (Original) The clearinghouse system of Claim 67, further comprising means for serving coverage or reception quality data using coverage or reception quality information received and stored by said means for receiving and storing coverage or reception quality information.

69. (Currently Amended) A method of collecting and providing access to property and network information, comprising:

collecting, using a computer, property information of properties owned by members of the public and available for possible use by carriers of carrier-based services~~and carrier infrastructure information of carrier infrastructure dispersed over a geographical region, said carrier infrastructure information including information of carrier infrastructure installed or attached to dwellings or premises of property owners in said geographical region~~;

storing, by action of said computer, said property information ~~and carrier infrastructure information~~ in a memory or database;

managing, controlling and updating, by action of said computer, property information stored in said memory or database; and

providing access to property information stored in said memory or database to one or more carriers.

70. (Canceled).

71. (Canceled).

72. (Currently Amended) The method of Claim 71 wherein said property information further includes information of propert[[y]]ies that [[is]]are subject to contractual, legal, government or zoning restrictions.

73. (Original) The method of Claim 69, further comprising, by action of said computer, matching a property need or property specification of a carrier with one or more property records stored in said memory or database.

74. (Original) The method of Claim 73, further comprising serving matched property need or matched property specification data to one or more carriers.

75. (Currently Amended) The method of Claim 69, further comprising, by action of said computer, receiving and storing in said memory or database coverage or reception quality information of mobile devices operating in~~end users of~~ one or more wireless communications networks.

76. (Original) The method of Claim 75, further comprising serving coverage or reception quality data using coverage or reception information stored in said memory or database.

77. (Original) The method of Claim 69, further comprising, by action of said computer, receiving and storing in said memory or database service information of a plurality of different services provided by one or more carriers over one or more networks.

78. (Original) The method of Claim 77, further comprising serving service data using service information stored in said memory or database.

79. (Original) The method of Claim 69, further comprising, by action of said computer, receiving and storing is said memory or database bandwidth and capacity information of one or more communications networks.

80. (Original) The method of Claim 79, further comprising serving bandwidth and capacity data using bandwidth and capacity information stored in said memory or database.

81. (Original) The method of Claim 69, further comprising, by action of said computer, receiving and storing in said memory or database coverage or reception quality information of one or more communications networks.

82. (Original) The method of Claim 81, further comprising serving coverage or reception quality data using coverage or reception quality information stored in said memory or database.

83. (New) The system of Claim 1 wherein said means for updating said mobile device location information comprises means for automatically updating said mobile device location information.

84. (New) The system of Claim 1 wherein said means for updating said mobile device location information comprises means for manually updating said mobile device location information.

85. (New) The method of Claim 8 wherein updating said mobile device location information comprises automatically updating said mobile device location information.

86. (New) The method of Claim 8 wherein updating said mobile device location information comprises manually updating said mobile device location information.

87. (New) The method of Claim 31, further comprising providing an interface through which members of the public can submit property information of properties available for possible use by one or more carriers.

88. (New) The method of Claim 31, further comprising collecting and storing in said database carrier information of one or more carriers.

89. (New) The method of Claim 88, further comprising providing an interface through which carriers can submit carrier information for storage in said database.

90. (New) The method of Claim 88, further comprising, using said computer, property information and carrier information stored in said database, forming a business contract between a carrier and a property owner.

91. (New) The clearinghouse system of Claim 43, further comprising an interface through which carriers can submit, for storage in said clearinghouse database, carrier infrastructure information of carrier infrastructure installed on or attached to dwellings or premises of property owners.

92. (New) The clearinghouse system of Claim 56, further comprising means for storing carrier infrastructure information of carrier infrastructure installed on or attached to dwellings or premises of property owners.

93. (New) The method of Claim 69, further comprising:

collecting, using said computer, carrier infrastructure information of carrier infrastructure installed on or attached to dwellings or premises of property owners; and

storing, by action of said computer, said carrier infrastructure information in a memory or database.

94. (New) The method of Claim 69, further comprising providing an interface through which members of the public can submit property information, for storage in said memory or database, of properties available for possible use by one or more carriers.

95. (New) The method of Claim 31 wherein said collecting and storing further includes collecting and storing zoning restriction or regulation information from civic or governmental entities.

96. (New) The method of Claim 31 wherein said collecting and storing further includes collecting and storing property information of properties owned or controlled by businesses, trusts, non-profit entities, or community organizations and available for possible use by one or more carriers.

97. (New) The clearinghouse system of Claim 43, further comprising an interface through which zoning regulation or zoning restriction information of properties may be submitted for storage in said clearinghouse database.

98. (New) The clearinghouse system of Claim 43, further comprising an interface through which businesses, trusts, non-profit entities, or community organizations may submit property information, for storage in said clearinghouse database, of properties available for possible use by one or more carriers.

99. (New) The clearinghouse system of Claim 56, further comprising means for receiving and storing zoning regulation or zoning restriction information.

100. (New) The clearinghouse system of Claim 56, further comprising means for receiving and storing property information of properties owned or controlled by businesses, trusts, non-profit entities, or community organizations and available for possible use by one or more carriers.

101. (New) The method of Claim 69 wherein said collecting and storing further includes collecting and storing zoning restriction or zoning regulation information.

102. (New) The method of Claim 69 wherein said collecting and storing further includes collecting and storing property information of properties owned or controlled by businesses, trusts, non-profit entities, or community organizations.

REMARKS/ARGUMENTS

By entry of this Amendment, Claims 1-4, 6-8, 10-12, 14-20, 22, 23, 26-28, 30-33, 36-40, 43, 46, 48, 56, 59-61, 69, 72 and 75 have been amended. Claims 5, 9, 13, 21, 25, 29, 41, 42, 44, 45, 57, 58, 70 and 71 have been canceled. Claims 83-102 have been added. Therefore, Claims 1-4, 6-8, 10-12, 14-20, 22-24, 26-28, 30-40, 43, 46-56, 59-69 and 72-102 are now pending in the present application.

In the April 4, 2012 Office Action, Claims 1, 8, 20, 31, 43, 56 and 69 were rejected for alleged nonstatutory double patenting. Claims 1, 2, 6, 8, 11-14, 20, 23-27, 37, 40, 43, 47, 56, 60, 69, 73 and 74 were rejected under 35 U.S.C. § 112, second paragraph, for allegedly being indefinite. Claims 1, 8, 20, 31, 43, 56 and 69 were rejected under 35 U.S.C. § 101 for allegedly being directed to unpatentable subject matter. Claims 1-16, 18-27, 29 and 30 were rejected under 35 U.S.C. § 102(b) for allegedly being anticipated by U.S. Patent No. 6,169,791 to Pokress (hereinafter referred to as "Pokress"). Claims 43-82 were rejected under 35 U.S.C. § 102(b) for allegedly being anticipated by WO2000/036815 to Mashinsky et al. (hereinafter referred to as "Mashinsky et al."). Claims 17 and 28 were rejected under 35 U.S.C. § 103(a) for allegedly being obvious over Pokress in view of U.S. Patent Application Publication No. 2007/0198339 to Shen et al. (hereinafter referred to as "Shen et al."). Claims 31-33, 36-38, 41, and 42 were rejected under 35 U.S.C. § 103(a) for allegedly being obvious over Pokress in view of U.S. Patent Application Publication No. 2004/00776283 to Egan (hereinafter referred to as "Egan"). Finally, Claims 34, 35, 39 and 40 were rejected under 35 U.S.C. § 103(a) for allegedly being obvious over Pokress in view of Egan and Shen et al.

Applicant respectfully requests reconsideration of the claims in view of the amendments made herein and the remarks/arguments presented below.

Double Patenting Rejections

On page 2-5 of the Office Action, Claims 1, 8, 20, 31, 43, 56 and 69 were rejected on the ground of nonstatutory double patenting. Specifically, the aforementioned claims were rejected for allegedly not being patentably distinct over claims in co-owned and co-pending U.S. Patent Application Nos. 12/814,974 and 12/815,076 and co-owned and co-pending parent U.S. Patent Application No. 12/208,007 (now U.S. Patent No. 8,224,794). In response, Applicant submits herewith three terminal disclaimers to obviate the double patenting rejections.

Claim Rejections – 35 U.S.C. § 112, Second Paragraph

On pages 5-6 of the April 4, 2012 Office Action, Claims 1, 2, 6, 8, 11-14, 20, 23-27, 37, 40, 43, 47, 56, 60, 69, 73 and 74 were rejected under 35 U.S.C. § 112, second paragraph, for allegedly being indefinite. Each of the numerous § 112, second paragraph, rejections is addressed below.

1. "***quality or service information***" (Claims 1, 2, 6, 8, 11-14, 20, 23, 27 and 37)

The Examiner asserts in the Office Action that "it is unclear what is meant" by this term. For the following reasons, Applicant respectfully disagrees.

For a claim to satisfy the definiteness requirement of § 112, second paragraph, the claim must "have a meaning discernible to one of ordinary skill in the art...." *Metabolite Labs., Inc. v. Lab. Corp. of Am. Holdings*, 370 F.3d 1354, 1366, 71 USPQ2d 1081, 1089 (Fed. Cir. 2004). When considering making a § 112, second paragraph, rejection, the M.P.E.P. also advises Examiners to allow "[s]ome latitude in the manner of expression and the aptness of terms should be permitted even though the claim language is not as precise as the examiner might desire." M.P.E.P. § 2173.02. "Only when a claim remains insolubly ambiguous without a discernible

meaning after all reasonable attempts at construction" must the claim be declared indefinite. *Metabolite Labs* at 1089.

Here, one of ordinary skill in the art would have no difficulty discerning the meaning of "quality or service information." Not only is the term not insolubly ambiguous it has a readily discernible meaning to those of ordinary skill in the art. When considering each of the claims as a whole, those of ordinary skill in the art will understand, without any doubt or uncertainty, that "quality" information refers to the quality of a service (such as, for example, the signal strength, bandwidth, data rate, etc.) provided by a carrier and that "service" information refers to information about a service, such as a service's availability or features, for example. In fact, the term "quality or service information" is clear on its face, and is readily discernible to those even of not ordinary skill in the art. The patent application specification is also replete with examples of what quality information and service information may comprise. See, for example, p. 38, line 1 through p. 47, line 14, which provides a plethora of examples of what may comprise quality and service information. The specification includes clarity elsewhere, as well. Accordingly, one of ordinary skill in the art would have no difficulty discerning the meaning of "quality or service information" or understanding its scope.

Although the term is clear and unambiguous, the Examiner has not provided *any* reasoning supporting his contention that one of ordinary skill in the art would find the term "quality or service information" indefinite. Instead, only a conclusory statement that the term is "unclear" is provided. However, conclusory statements are not sufficient to support indefiniteness rejections. *See* M.P.E.P. § 2173.02, which requires examiners asserting indefiniteness rejections to provide "an analysis as to why the phrase(s) used in the claim

is(are)…indefinite" in the Office Action. Here, no analysis whatsoever is provided in the Office Action.

In view of the foregoing, Applicant believes that the § 112, second paragraph rejections of Claims 1, 2, 6, 8, 11-14, 20, 23, 27 and 37, for using the term "quality or service information," are unwarranted and cannot be properly maintained. Applicant respectfully requests, therefore, that the rejections be withdrawn.

2. "***improving the operation of…***" (Claim 31)

Claim 31 was rejected for allegedly being indefinite for using the phrase "improving the operation of…". Following the amendment made to Claim 31 in this Amendment, that phrase no longer appears in Claim 31. Applicant respectfully requests, therefore, that the rejection be withdrawn.

3. "***carrier information***" and "***property information***" (Claim 31)

Claim 31 was also rejected for allegedly being indefinite for using the terms "carrier information" and "property information." Following the amendment to Claim 31 in this Amendment, the term "carrier information" is no longer present in Claim 31. Regarding use of the term "property information," Applicant respectfully believes that this term is clear and unambiguous.

Clearly, "property information" means information about property. There is nothing ambiguous about the term and the term has a meaning that is clear on its face. If there were to be any doubt, the patent application specification includes many examples of what may comprise "property information." For example, the first paragraph of the DETAILED DESCRIPTION explains how "property information" may comprise information about a property owner's real estate and/or its location. The second paragraph on page 21 also provides a long list of types of

properties, including dwelling or premises, which may include a "any property, building, outbuilding, structure, tower, vegetation, or land, or anything on or in or over or under a property occupied or used or controlled by an end user for which the end user may wish to make available for use by others." Clearly, one of ordinary skill in the art would have no trouble in understanding that information pertaining to these properties is "property information." Figure 3 and the accompanying description in the specification also show and describe a form that end users can fill out when submitting property information to the clearinghouse database. The end user side of the form lists tower, rooftop, outbuilding, church steeple etc., all of which those of ordinary skill in the art would readily discern as being "property information." Moreover, Claim 31, as amended, recites that "property information" comprises information "of properties that are owned by members of the public." Hence, the specification (note the passages above, for example), along with the language of Claim 31 itself, clearly and unambiguously apprise those of ordinary skill in the art as to both the meaning and scope of the term "property information."

In the Office Action, the only reason provided to support the contention that "property information" is indefinite is that the term "is unclear." As explained above, those of ordinary skill in the art would not find the term to be unclear. That fact aside, unsubstantiated statements by an examiner that a claim term is indefinite are insufficient to support indefiniteness rejections. *See* M.P.E.P. § 2173.02, which requires examiners asserting indefiniteness rejections to provide "an analysis as to why the phrase(s) used in the claim is(are)…indefinite" in the Office Action. Here, no analysis whatsoever is provided in the Office Action to support the rejection of Claim 31 for use of the term "property information." Moreover, the Examiner should be reminded that the test for determining whether the definiteness requirement of § 112, second paragraph has been satisfied does not turn on whether the examiner believes a term to be unclear but whether

one of ordinary skill in the art would. Even in circumstances where an examiner is uncomfortable with a claim term, the M.P.E.P. directs that "[s]ome latitude in the manner of expression and the aptness of [the] term[s] should be permitted even though the claim language is not as precise as the examiner might desire." M.P.E.P. § 2173.02. Applicant requests, therefore, that the Examiner respect this directive of the M.P.E.P. and allow Applicant some latitude in the manner of expression. If the Examiner will not provide any latitude and remain adamant that use of the term renders Claim 31 indefinite, Applicant requests that the Examiner then provide an analysis as to why he believes the term renders Claim 31 indefinite, including, if possible, a suggestion for an alternative term (as recommended by M.P.E.P.§ 2173.02).

4. "***negotiating a business transaction between a carrier and an end user...***" (Claim 32)

Claim 32 was rejected for allegedly being indefinite for using the phrase "negotiating a business transaction between a carrier and an end user of a service provided...." Claim 32 has been amended in this Amendment such that this phrase no longer appears in Claim 32. Applicant respectfully requests, therefore, that the rejection be withdrawn.

5. "***storing to a party or parties***" (Claims 7, 19 and 30)

Claims 7, 19 and 30 were rejected for allegedly being indefinite for using the phrase "storing to a party or parties…." Applicant respectfully disagrees.

Section 2173.02 of the M.P.E.P. directs that "in reviewing a claim for compliance with 35 U.S.C. 112, second paragraph, the examiner must consider the claim as a whole…." Here, the Examiner appears to not be following this directive. In particular, the Examiner has parsed claim terms in a manner inconsistent with English grammar. For example, with regard to Claim 7, the Examiner inexplicably excises the last word from the "means for storing" term and attaches it to the "a party or parties" term, thereby rendering Claim 7 incoherent. Those of

ordinary skill in the art would not read Claim 7 in that manner. Instead, they would understand that the word "storing" is actually part of the "means for storing" term -- not a component of the "a party or parties" term. The Examiner makes the same mistake in construing Claim 19 and 30. Clearly, the § 112, second paragraph rejections of Claims 7, 19 and 30 cannot be properly maintained. Applicant respectfully requests, therefore, that the rejections be withdrawn.

6. "***without a visible web page interface***" (Claim 40)

Claim 40 depends directly from independent Claim 31 and claims that the interface through which one or more carriers can access property information in Claim 31 comprises "internet addressing without a visible web page interface." In the Office Action, Claim 40 was rejected for allegedly being indefinite for using the phrase "without a visible web page interface." Applicant respectfully disagrees.

It is unclear on what basis the rejection is grounded, since the Examiner's argument is tenuous and difficult to understand. The Examiner refers to Claim 28, which claims that data is formatted as "one or more web pages" and Claim 39, which claims that the interface in Claim 31 comprises a "human viewable web-page." Apparently, the Examiner is objecting to the fact that the interface claimed in Claims 28 and 39 involves use of web pages whereas the subject matter claimed in Claim 40 is "without a visible web page interface." As best understood, the Examiner believes these differences render Claim 40 indefinite. For the following reasons, Applicant respectfully disagrees.

First, Claim 28 depends from dependent Claim 20 and has no relation at all to Claim 40. Accordingly, the fact that Claim 28 involves an interface that serves data in the form of web pages has no bearing on whether Claim 40 is definite. Second, Claim 39, although sharing the same independent claim as Claim 40 (i.e., independent Claim 31), is not a claim from which

Claim 40 depends. In other words, Claims 39 and 40 are mutually exclusive. For this reason, the human viewable web-page interface in Claim 39 does not having any bearing on the definiteness of Claim 40 either. Because Claims 39 and 40 are mutually exclusive, it is entirely permissible to have one claim (Claim 39) that claims an interface that comprises a human viewable web page and another claim (Claim 40) having an interface without a visible web page interface.

From the foregoing discussion, it is clear that the§ 112, second paragraph rejection of Claim 40 cannot be properly maintained. The specification is clear on the capability of the invention to use a human viewable webpage or any other known methods that may or may not use a human viewable web page. See lines 17-22 on page 30 of the specification, for example. Applicant respectfully requests, therefore, that the rejection be withdrawn.

7. "***property information***" *and* "***carrier infrastructure information***" (Claims 43, 56, 69)

Claims 43, 56 and 69 were rejected for allegedly being indefinite for using the terms "property information" "carrier infrastructure information." For the following reasons, Applicant respectfully disagrees.

First, there is nothing ambiguous with use of the term "property information." Not only is the term clear and unambiguous on its face, as explained above, the patent application specification clearly describes what "property information" may comprise, thereby apprising those of ordinary skill in the art as to the term's meaning and scope. As pointed out in responding to the indefiniteness rejection of Claim 31 above, the patent application specification includes many examples of what may comprise "property information." For example, the first paragraph of the DETAILED DESCRIPTION explains how "property information" may comprise information about a property owner's real estate and/or its location. The second

paragraph on page 21 also provides a long list of types of properties, including dwelling or premises, which may include a "any property, building, outbuilding, structure, tower, vegetation, or land, or anything on or in or over or under a property occupied or used or controlled by an end user for which the end user may wish to make available for use by others." There are other examples in the specification, as well. Clearly, one of ordinary skill in the art would have no trouble in understanding that information pertaining to these properties is "property information." Figure 3 and the accompanying description in the specification also show and describe a form that end users can fill out when submitting property information to the clearinghouse database. The end user side of the form lists tower, rooftop, outbuilding, church steeple etc., all of which those of ordinary skill in the art would readily discern as being "property information." Claims 43, 56 and 69, as amended, also all recite that "property information" comprises information "of properties that are owned by members of the public." Hence, the specification along with the language of Claim 43, 56 and 69 themselves clearly and unambiguously apprise those of ordinary skill in the art as to both the meaning and scope of the term "property information."

Second, there is nothing ambiguous with use of the term "carrier infrastructure information."[1] Not only is the term clear and unambiguous on its face, the patent application specification clearly describes what "carrier infrastructure information" may comprise. "Carrier infrastructure information" is simply information pertaining to carrier infrastructure. For example, beginning at line 1 on p. 10 of the specification, the specification explains how, in the case of a wireless carrier, carrier infrastructure may comprise network gear, antennas and

[1] Following amendments made to Claims 43, 56 and 69 in this Amendment, the term "carrier infrastructure information" is no longer present in Claims 43, 56 and 69. However, the term is in new dependent Claims 91, 92 and 93, respectively.

towers. The specification also explains that information pertaining to carrier infrastructure may include asset or location information of carrier infrastructure, such as land, tower locations, buildings, rooftops, etc. (line 6, etc., p. 12); infrastructure that is needed or desired by a carrier and physical locations (see, for example, lines 1-15, p. 14); or properties and assets leased or purchased from members of the public that make up part of the carrier's infrastructure (see, for example, line 16 etc., p. 14). While these are only examples and not limitations of what "carrier infrastructure information" may comprise, the examples are more than sufficient to allow one of ordinary skill in the art the ability to discern the meaning of "carrier infrastructure information." Moreover, Claims 87 and 88 and 89 (see n.1 above) recite that the "carrier infrastructure information" pertains to carrier infrastructure that is "installed on or attached to dwellings or premises of property owners." Clearly, therefore, the term "carrier infrastructure information" is not only unambiguous but it is a term that can be easily and quickly discerned by a simple reading of the patent application claims and specification. There is simply no ambiguity as to the terms meaning and no uncertainty as to its scope.

Despite the fact that "property information" and "carrier infrastructure information" are terms that are clear in both meaning and scope, the Examiner contends, nevertheless, that the terms are indefinite. The only reasoning provided to support such contentions, however, is that the terms are "unclear." Such a conclusory statement is clearly insufficient grounds for supporting the indefiniteness rejections. The M.P.E.P. § 2173.02 requires examiners to provide "an analysis as to why the phrase(s) used in the claim is(are)…indefinite" in the Office Action when asserting indefiniteness rejections. A single, unsubstantiated word that the "property information" and "carrier infrastructure information" terms are "unclear" is not an analysis by any measure and is clearly not sufficient to support indefiniteness rejections in any circumstance.

Applicant requests therefore, that the Examiner either withdraw the rejections or provide an analysis as to why he believes those of ordinary skill in the art would find the "property information" and "carrier infrastructure information" terms to be indefinite.

8. "***configured to match a property need or property specification***" (Claims 47, 60, 73, 74)

Claims 47, 60, 73, 74 were also rejected for allegedly being indefinite for using the phrase configured to "match a property need or property specification" with stored property records or property information. Applicant respectfully disagrees.

For a claim to satisfy the definiteness requirement of § 112, second paragraph, the claim "must have a meaning discernible to one of ordinary skill in the art...." *Metabolite Labs., Inc. v. Lab. Corp. of Am. Holdings*, 370 F.3d 1354, 1366, 71 USPQ2d 1081, 1089 (Fed. Cir. 2004). Only when a claim "remains insolubly ambiguous without a discernible meaning after all reasonable attempts at construction must [the claim be declared] indefinite." *Metabolite Labs* at 1089. Finally, indefiniteness rejections under § 112, second paragraph rejections should be applied sparingly, and should be asserted "[o]nly when a claim remains insolubly ambiguous without a discernible meaning after all reasonable attempts at construction" have been made. *Id.*

Here, one of ordinary skill in the art will understand that one of the novel features of the present invention is to match a property need or property specification of a carrier with a property record of a property available for possible use by the carrier. The patent application specification discloses an exemplary manner in which this novel aspect of the invention is consummated. For example, beginning on line 25 of the specification, it is explained how end users (e.g., members of the public) can submit data descriptive of their properties to the clearinghouse database 510 and how carriers can submit data describing a property need or specification (e.g., a "wish list") to the clearinghouse database 510. Figure 3 also shows an

exemplary form that end users and carriers can complete to present property information and property needs and/or property specifications to the clearinghouse. Finally, Figure 4 and accompanying and related description show and describe how the clearinghouse system performs a process of matching property records to a carrier's expressed property need or property specification. When a match if found, a "hit list" is generated. While the referred-to drawings and description are merely exemplary embodiments of the invention, one of ordinary skill in the art would be able to readily discern, without any difficulty or uncertainty, what it means to "match a property need or property specification of a carrier with one or more property records stored in said clearinghouse database" in Claim 47. There simply is no ambiguity and therefore no grounds for the Examiner to assert that this phrase (and similar phrasing in the other rejected claims) renders the claims indefinite. Indeed, the § 112, second paragraph rejections of Claims 47, 60, 73, 74 appear to be completely unfounded. Applicant respectfully requests, therefore, that the rejections be withdrawn.

9. "***database coverage or reception quality information***" (Claims 48, 54, 61, 67, 75 and 81)

Finally, Claims 48, 54, 61, 67, 75 and 81 were rejected for allegedly being indefinite for using the phrase configured to "database coverage or reception quality information." Applicant respectfully disagrees.

Section 2173.02 of the M.P.E.P. directs that "in reviewing a claim for compliance with 35 U.S.C. 112, second paragraph, the examiner must consider the claim as a whole…." Here, the Examiner appears not to be following this directive. Similar to the Examiner's improper reading and construction of Claims 7, 19, and 30 (discussed above in responding to the § 112, second paragraph rejections of those claims), the Examiner again parses the claim terms in Claims 48, 54, 61, 67, 75 and 81 in a manner that is inconsistent with English grammar. For

example, in reading and construing Claim 48, the Examiner inexplicably excises the word "database" from the "clearinghouse database" term and attaches it to the "coverage or reception quality information" term, thereby rendering the claim incoherent. Those of ordinary skill in the art would not make this mistake. Instead, in reading and construing Claim 48, they would understand that the "computer" is configured to receive and store "coverage or reception quality information" in the "clearinghouse database," just as the claim recites. The Examiner makes similar mistakes in reading and construing Claims 54, 61, 67, 75 and 81. Clearly, the Examiner's grounds in support of the § 112, second paragraph rejections of Claims 48, 54, 61, 67, 75 and 81 are in error and cannot be properly maintained. Applicant requests, therefore, that the rejections be withdrawn.

Claim Rejections – 35 U.S.C. § 101 – Claims 1, 8, 20, 31, 43, 56 and 69

On pages 8-9 of the Office Action, Claims 1, 8, 20, 31, 43, 56 and 69 were rejected under 35 U.S.C. § 101 for allegedly being directed to nonstatutory subject matter. Specifically, Claims 1, 8, 20, 31, 43, 56 and 69 were rejected for claiming methods that are ineligible for patent protection under 35 U.S.C. § 101. For the following reasons, Applicant respectfully disagrees.

35 U.S.C. § 101 of the Patent Act sets forth four categories of inventions or discoveries that are eligible for patent protection::

> 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.

As explained by the U.S. Supreme Court in *Bilski v. Kappos*, 130 S. Ct. 3218, 561 U.S. ___ (2010), "[in] choosing such expansive terms…modified by the comprehensive 'any,' Congress plainly contemplated that the patent laws would be give wide scope." (quoting *Diamond v.*

Chakrabarty, 447 U.S. 303, 308 (1980)). Congress took this permissive approach to patent eligibility to ensure that "'ingenuity should receive a liberal encouragement.'" *Id.* (quoting 5 Writings of Thomas Jefferson 75–76 (H. Washington ed. 1871)). Indeed, as explained by the Court in *Chakrabarty* "The Committee Reports accompanying the 1952 [Patent] Act inform us that Congress intended statutory subject matter to 'include anything under the sun that is made by man.' S. Rep. No. 1979, 82d Cong., 2d Sess., 5 (1952); H. R. Rep. No. 1923, 82d Cong., 2d Sess., 6 (1952)." *Chakrabarty*. at 308-09.

Although the four patent-eligible categories of § 101 are wide in scope, there are a few exceptions. Specifically, laws of nature, physical phenomena and abstract ideas are not patentable. Most recently, in *Bilski v. Kappos* (citation provided above), the U.S. Supreme Court addressed the issue of whether the so-called "machine-or-transformation test" was the sole test in determining whether a claimed business method was a "process" worthy of patent protection under § 101 or an abstract idea not entitled to patent protection.[2] The Court held that, although the "machine-or-transformation test" was a useful tool for determining whether some claimed inventions are processes under § 101, it is not the sole test.

In the present application, it is important to observe that Claims 1, 20, 43 and 56 are not method claims. They are "system" claims having subject matter that falls within the "machine" category of § 101. Rejecting Claims 1, 20, 43 and 56 based on the *Bilski v. Kappos* decision is therefore erroneous. In other words, the Examiner's reliance on *Bilski v. Kappos* to formulate § 101 rejections of Claims 1, 20, 43 and 56 is misplaced since whether Claims 1, 20, 43 and 56 fall

[2] The machine-or-transformation test, as formulated by the Court of Appeals for the Federal Circuit (CAFC), asserted that an invention is a "process" eligible for patent protection only if: (1) it is tied to a particular machine or apparatus, or (2) it transforms a particular article into a different state or thing." *In re Bilski*, 545 F. 3d 943, 954 (Fed. Cir. 2008) (en banc).

within the "process" category of § 101 is simply not at issue. It should be pointed out, however, that even if Claims 1, 20, 43 and 56 were method claims, the claims would still be undeniably directed to statutory subject matter. Despite what is asserted in the Office Action, each of these claims contains hardware. The means-plus-function claim elements in Claims 1 and 56 comprise hardware components, simply by virtue of how they are construed. (*See* 35 U.S.C. § 112, Paragraph Six.) Claims 20 and 43 also both contain hardware components. Specifically, Claim 20 includes a "computer," a "memory or database," and an "interface through which one or more carriers may access quality or service information or mobile device location information stored in said memory or database," and Claim 43 includes a "clearinghouse database," a "computer," an "interface through which members of the public may submit property information," and an "interface through which one or more carriers can access and evaluate property information stored in [the] clearinghouse database." All of these elements comprise hardware. Accordingly, the § 101 rejections of Claims 1, 20, 43 and 56 cannot be properly maintained and Applicant requests that they be withdrawn.

The Examiner is correct in his assertion that Claims 8, 31 and 69 are method claims. However, these method claims claim subject matter that falls within the "process" category of § 101. In the Office Action the Examiner contends that Claims 8, 31 and 69 are not eligible for patent protection because "they neither involve any particular machine or apparatus nor transform a particular article into a different state or thing." In other words, the Examiner rejects Claims 8, 31 and 69 for allegedly not satisfying the machine-or-transformation test. This analysis is flawed, however, since the U.S. Supreme Court held in *Bilski v. Kappos* that the "machine-or-transformation" test is *not* the sole test for determining whether method claims fall

within the "process" category of § 101. Yet that is the sole test applied by the Examiner in assessing whether Claims 8, 31 and 69 are directed at patentable subject matter.

Despite what is asserted in the Office Action, each of Claims 8, 31, and 69 does in fact have hardware components for performing the various steps of the claimed methods. Claim 8 includes a "computer," and a "memory or database." Similarly, Claims 31 and 69 include one or more of a "computer," a "memory," a "database," and an "interface." Moreover, all of these hardware components are tied to the method steps in Claims 8, 31 and 69. Therefore, Claims 8, 31 and 69 do, contrary to what is asserted in the Office Action, satisfy the machine-or-transformation test. It should be noted that, although the *Bilski* court held that the machine-transformation test is not the exclusive test for determining patent eligibility of a method claim, it did indicate that the test can serve as an "important …investigative tool" for determining whether an invention is a patent eligible process. (*Bilski*, Slip. Op. at 8 (U.S. June 28, 2010)). Here, Claims 8, 31 and 69 all satisfy the "machine" prong of the machine-or-transformation test, since all of the method steps in the claims are tied to a machine (i.e., a computer" and associated "memory," "database" and/or "interface."). Clearly, therefore, Claims 8, 31 and 69 are directed to a patent-eligible process, within the meaning of § 101. The § 101 rejections of method Claims 8, 31 and 69 can therefore not be properly maintained and Applicant respectfully requests that they be withdrawn.

Claim Rejections – 35 U.S.C. § 102(b) – Claims 1-16, 18-27, 29 and 30

On pages 10-16 of the Office Action, Claims 1-16, 18-27, 29 and 30 were rejected under 35 U.S.C. § 102(b) for allegedly being anticipated by Pokress.

Pokress discloses a landline-based call routing system that provides least cost telephone call routing using a selected one of a number of commercial telecommunications carriers. A central server of the call routing system generates a customized database of telecommunications carriers and associated billing rates for each user in response to the location in which the user resides. The customized database is stored on the user's personal computer (PC) and used to route calls on a least cost route.

According to well-established law, a claim is anticipated by a prior art reference "only if each and every element" of the claim is found in the prior art reference. *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). Further, in order for a prior art reference to be used as a § 102 reference, "[t]he identical invention must be shown in as complete detail as is contained in the…claim." *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

Independent Claim 1, as amended in the present Amendment, claims:

> 1. (Currently Amended) A system, comprising:
> means for receiving mobile device location information of a plurality of mobile devices;
> means for receiving quality or service information of one or more wireless communications networks, said quality or service information comprising coverage, outage or performance information of said one or more wireless communications networks;
> means for storing said mobile device location information and said quality or service information;
> means for updating said mobile device location information stored by said means for storing when one or more mobile devices of said plurality of mobile devices travel from one location to another; and
> means for providing access to quality or service information stored by said means for storing to one or more wireless carriers.

As discussed below, because Pokress fails to teach each and every element of Claim 1, the § 102(b) rejection of Claim 1, as allegedly being anticipated by Pokress, cannot be maintained.

First, Pokress does not disclose a system having a "means for receiving mobile device location information of a plurality of mobile devices." The Pokress system is a landline-based call routing system and does not relate in any way to mobile devices.[3]

Second, Pokress does not disclose a "means for receiving quality or service information of one or more wireless communications networks." Pokress discloses a system only having structure for receiving information about landline-based telecommunications carriers.

Third, Pokress does not disclose a "means for storing" either "mobile device location information" or "quality or service information" of wireless networks. Pokress discloses structure (i.e., a means) for storing information about the location of a user's PC (e.g., the user's residence address) and structure for storing information about landline-based telecommunications carriers (e.g., the customized database). However, it does not disclose any structure for "mobile device location information" or "quality or service information" of wireless communications carriers.

Finally, Pokress does not disclose any means for providing carriers of one or more wireless communications networks the ability to access quality or service information pertaining to one or more wireless communications networks. The Pokress system is a landline-based call routing system. It does not relate in any way to mobile devices.

[3] It should be noted that the Pokress system could not be simply modified to receive and store mobile device location information and quality or service information of wireless communications networks, in order to support an obviousness rejection. Such a modification would not only require a substantial reconstruction and redesign of the Pokress system, it would also necessarily alter the principle of operation of the Pokress system, in violation of M.P.E.P. § 2143.01. *See* ¶ VI of M.P.E.P. § 2143.01.

For at least the foregoing reasons, Applicant respectfully believes that independent Claim 1 of the present application is not anticipated by Pokress. Substantially the same reasons why independent Claim 1 is not anticipated by Pokress apply to independent Claims 8 and 20, which were also rejected for allegedly being anticipated by Pokress. Applicant respectfully requests, therefore, that the § 102 rejections of independent Claim 1, 8 and 20 be withdrawn.

Claims 2-7, 9-16, 18, 19, 21-27, 29 and 30 were also rejected for allegedly being anticipated by Pokress. These claims, except for Claims 5, 9, 13, 21, 25 and 29, which have been canceled in this Amendment, all depend from independent Claims 1, 8 and 20. Accordingly, they derive patentability by virtue of their dependence to what appear to be allowable base claims.

Claim Rejections – 35 U.S.C. § 102(b) – Claims 43-82

On pages 24-27 of the Office Action, Claims 43-82 were rejected under 35 U.S.C. § 102(b) for allegedly being anticipated by Mashinsky et al. For the following reasons, Applicant respectfully disagrees.

Mashinsky discloses a system for routing international telephone calls using resources that are traded in a market. Service providers submit service offers to a server node, which evaluates the offers and generates a rate-table database. The rate-table database contains carrier prices and efficient routing paths for connecting two or more locations in a telecommunications network and parameters (e.g., quality, bandwidth, etc.) related to the routing paths. Service requesters submit service requests to the server node in which service providers have submitted service offers. The server node identifies the most efficient routes that meet the service requesters' requirements and then brokers sales of telecommunications resources (e.g., a

telecommunications path with specified parameters such as bandwidth and call-termination services) for use by the service requester.

Independent Claim 43, as amended in the present Amendment, claims:

> 43. A clearinghouse system, comprising:
> a clearinghouse database configured to store property information of properties owned by members of the public and available for possible use by carriers of carrier-based services;
> a computer configured to manage and update said clearinghouse database, said computer having a server configured to serve data relating to property information stored in said clearinghouse database to carriers;
> an interface through which members of the public may submit property information for storage in said clearinghouse database; and
> an interface through which one or more carriers can access and evaluate property information stored in said clearinghouse database.

Comparing Mashinsky to the clearinghouse system claimed in Claim 43 of the present application reveals a number of crucial and fundamental distinctions.

First, the rate-table database on the server node in Mashinsky is not configured to store property information of "properties owned by members of the public," let alone of "properties owned by members of the public" that are "available for possible use by carriers."

Second, the computer in Claim 43 is configured to "manage and update" a database containing property information of properties owned by members of the public and serve data relating to such property information. The server node in Mashinsky is not. The Mashinsky server node is configured only to manage service offers and service requests presented and requested by carriers, which are not members of the public. Further, the information stored in the data-rate database of the server node in the Mashinsky system is not "property information of properties owned by members of the public." It is limited to service information relating to carriers (i.e., is carrier information) and their rates.

Third, the Mashinsky system does not provide an interface through which carriers can access and evaluate property information of properties owned by members of the public, as independent Claim 43 does. The service information stored in Mashinsky includes servicer offer information about services provided by service providers. In no way does that service offer information correspond to or include property information of properties owned by members of the public. In other words, the Mashinsky system only provides a carrier interface that allows carriers to evaluate service offer information submitted by other carriers.

Finally, the Mashinsky system does not provide an interface through which members of the public can submit property information of properties they own and are available for possible use by carriers. Mashinsky only provides an interface through which carriers can submit service offers. Carriers are not "members of the public." Moreover, there is no teaching that service offers made by carriers include property information of properties owned by members of the public. It is important to recognize and understand that the service offer form in Figure 3A is a form used by a carrier (not a member of the public) when making a service offer. It is only submitted by carriers and does not contain any property information fields of properties owned by members of the public.

From the foregoing remarks it is clear that Mashinsky does not teach each and every element of Claim 43. Therefore, the § 102(b) rejection of Claim 43 cannot be maintained and Applicant requests that it be withdrawn.

Independent Claims 56 and 69 were also rejected for allegedly being anticipated by Mashinsky. However, considering the amendments made to those claims in this Amendment and the remarks presented above, it is clear that Mashinsky does not anticipate those claims either. Applicant respectfully requests, therefore, that the § 102(b) rejection of Claims 56 and 69

also be withdrawn.

Claims 44-55, 57-68 and 70-82 were also rejected for allegedly being anticipated by Mashinsky. These claims, except for Claims 44, 45, 57, 58, 70 and 71, which have been canceled in the Amendment, all depend from independent Claims 43, 56 and 69. Accordingly, they derive patentability by virtue of their dependence to what appear to be allowable base claims.

Claim Rejections – 35 U.S.C. § 103(a) – Claims 31-33, 36-38, 41 and 42

On pages 18-22 of the Office Action, Claims 31-33, 36-38, 41 and 42 were rejected under 35 U.S.C. § 103(a) for allegedly being obvious over Pokress in view of Egan. For the following reasons, Applicant respectfully believes that these rejections cannot be maintained, especially in view of the amendments made to independent Claim 31.

As explained above in responding to the § 102(b) rejections of Claims 1-16, 18-27, 29 and 30, Pokress discloses a landline-based call routing system that provides least cost telephone call routing using a selected one of a number of commercial telecommunications carriers. A central server of the call routing system generates a customized database of telecommunications carriers and associated billing rates for each user in response to the location in which the user resides. The customized database is stored on the user's personal computer (PC) and used to route calls on a least cost route.

Egan addresses a problem non-utility service providers often encounter when attempting to extend or provide new service to end users. As explained by Egan, builders or developers are generally required by law to grant easements (i.e., rights-of-way) to utility providers (e.g., electric, gas, phone, water) when a new subdivision is being constructed or developed.

However, they are not required to provide rights-of-way to non-utility providers, such as cable television providers. This anomaly prevents cable television providers from being able to route cable to new end users, or requires them to pay infrastructure owners (e.g., phone company or local municipality) fees for rights-of-way. To overcome this problem, Egan proposes the idea of what is referred to as a "Local Infrastructure Provider (LIP)." An LIP is an entity that is knowledgeable in telecommunications, and which has easement, right-of-way, or fee interest rights in real estate, including the wires or other telecommunications infrastructure built on or within it. During construction of a new subdivision, LIP infrastructure is used to electrically connect end users (e.g., homes, offices, buildings) of the subdivision to an access point, which is further connected to external telecommunication infrastructure, in order to provide end users access to external telecommunications services. Each LIP is "independent," i.e., is not owned by a service provider. Therefore, the competition, access and cost problems cable television and other non-utility service providers would encounter when attempting to gain access to infrastructure owned by non-independent infrastructure owners, e.g., competing service providers that are also infrastructure owners, are avoided. Further, because LIPs install cables at the time of construction, the cost and damage end users could otherwise experience when installing cable service post-construction are avoided.

Section 103 of the Patent Code directs states that an invention is not patentable if it would have been obvious to a person of ordinary skill at the time of the invention. In *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), the U.S. Supreme Court ruled that the §103 condition for patentability should involve three basic factual inquiries:

1. the scope and content of the prior art;

2. the differences between the claimed invention and the prior art; and

3. the level of ordinary skill in the prior art.

In determining the scope and content of the prior art, "[o]ffice personnel must first obtain a thorough understanding of the invention disclosed and claimed in the application under examination by reading the specification, including the claims, to understand what the applicant has invented." M.P.E.P. § 2141. Ascertaining the differences between the claimed invention and the prior art "requires interpreting the claim language…and considering both the invention and the prior art as a whole." *Id.* Finally, any obviousness rejection "should include, either explicitly or implicitly in view of the prior art applied, an indication of the level of ordinary skill." *Id.*

Claim 31 of the present application, as amended in the present Amendment, claims:

> 31. A method of building and providing access to a database for extending the use of carrier-based networks, comprising:
> collecting, using a computer, property information of properties that are owned by members of the public and available for possible use by one or more carriers;
> storing in a database, by action of said computer, said property information; and
> providing an interface through which one or more carriers can access property information stored in said database.

Applying the *Graham v. John Deere* factual inquiries to Claim 31 reveals the following important differences between Claim 31 and the cited prior art. First, as acknowledged by the Examiner on p. 19 of the Office Action, Pokress does not disclose collecting property information "of properties that are owned by members of the public and available for possible use by one or more carriers," storing such information in a database, or making such information available to one or more carriers. Egan also fails to disclose collecting, storing, or providing access to property information of "owned by members of the public" to one or more carriers. Despite this, in the Office Action, the Examiner contends that the Abstract, ¶¶ [0010]-[0011], and Figures 1 and 2 of Egan teach such subject matter. Applicant respectfully disagrees. The

Abstract of Egan merely describes how infrastructure owned by a local infrastructure provider (LIP) is used to convey telecommunications services to end users of the Egan system; Figure 1 merely shows a simplified drawing of a subdivision; and Figure 2 and ¶¶ [0010]-[0011] only illustrate and describe how infrastructure of an LIP is used to connect end user properties to an AP that in turn is connected to external infrastructure. Nowhere in Egan is there any description of collecting "property information of properties that are owned by members of the public…." or storing such information in a database for perusal by carriers for possible use. Consequently, one of ordinary skill in the art would not understand Egan to involve such subject matter and would have no reason to attempt to combine Egan with Pokress in a manner that would result in the method claimed in Claim 31 of the present application.

Applicant also respectfully believes that the Examiner has failed to provide any sufficient reasoning to support his conclusion of obviousness. As explained on p. 57528 of "Examination Guidelines for Determining Obviousness Under 35 U.S.C. 103 in View of the Supreme Court Decision in *KSR International v. Teleflex, Inc.*," Fed. Reg. vol. 72, no. 195, Oct. 10, 2007, "[t]he key to supporting any rejection under 35. U.S.C. 103 is the clear articulation of the reason(s) why the claimed invention would have been obvious." In *KSR International Co. v. Teleflex Inc. (KSR)*, 550 U.S. 398, 82 USPQ2d 1385 (2007), the U.S. Supreme Court reaffirmed the framework for determining obviousness set forth the *Graham v. John Deere Co.* (see above). Quoting *In re Kahn* 441.F.3d 977, 988, 78 USPAS2d 1329, 1336 (Fed. Cir. 2006), where the Court stated that "'[R]ejections on obviousness cannot be sustained by mere conclusory statements; instead there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.'" *Id.* at 57528-57529. The only reasoning articulated in the present Office Action to support the obviousness rejection of independent

Claim 31 is a recognition that Egan discloses that "legally binding permissions" are often involved in the use and maintenance of telecommunications infrastructure and that Pokress and Egan both support "telecommunications-based services." Applicant has no objection to these observations, as they do not appear to be inaccurate. However, not only are they mere observations of inconsequential characteristics of the prior art, they provide no impetus whatsoever for anyone of ordinary skill in the art to modify Pokress with Egan in the manner claimed in Claim 31.

Therefore, because Pokress in view of Egan clearly does not teach the subject matter in independent Claim 31, and because the Examiner has not articulated any sufficient reason as to why one of ordinary skill in the art would find Claim 31 obvious in view of the teachings of Pokress and Egan, the § 103 rejection of independent Claim 31 cannot be properly maintained. Applicant requests, therefore, that the § 103 rejection of independent Claim 31 for being obvious over Pokress in view of Egan be withdrawn.

Claims 32, 33, 36-38, 41 and 42 were also rejected for allegedly being obvious over Pokress in view of Egan. These claims, except for Claims 41 and 42, which have been canceled in this Amendment, all depend from independent Claim 31. Accordingly, they derive patentability by virtue of their dependence to what appears to be an allowable base claim.[4]

Claim Rejections – 35 U.S.C. § 103(a) – Claims 17 and 28

On pages 17-18 of the Office Action, Claims 17 and 28 were rejected under 35 U.S.C. § 103(a) for allegedly being obvious over Pokress in view of Shen et al.

[4] See M.P.E.P. § 2143.03, reminding that: "If an independent claim is nonobvious under 35 U.S.C. 103, then any claim depending therefrom is nonobvious. *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988).

Claims 17 and 28 depend from independent Claims 8 and 20, respectively. Accordingly, they derive patentability for at least the same reasons Claim 8 and 20 do. Modifying Pokress by Shen does nothing to alter this fact.

It should also be pointed out that dependent Claim 17 also depends on intermediate, dependent Claims 15 and 16, and Claim 28 depends on intermediate, dependent Claims 26 and 27. Thus, in addition to containing all of the limitations of dependent Claim 8, dependent Claim 17 further incorporates by reference all of the limitations of dependent Claims 15 and 16, and, in addition to containing all of the limitations of dependent Claim 20, dependent Claim 28 further incorporates by reference all of the limitations of dependent Claims 26 and 27. Applicant respectfully believes that the subject matter incorporated by reference to these intermediate, dependent claims is also not taught or even suggested by Pokress in view of Shen.

In view of the foregoing, Applicant respectfully requests that the § 103 rejections of dependent Claims 17 and 28 also be withdrawn.

Claim Rejections – 35 U.S.C. § 103(a) – Claims 34, 35, 39 and 40

On pages 22-23 of the Office Action, Claims 34, 35, 39 and 40 were rejected under 35 U.S.C. § 103(a) for allegedly being obvious over Pokress and Egan and further in view of Shen et al. For the following reasons, Applicant respectfully disagrees.

Claims 34, 35, 39 and 40 all depend from independent Claim 31. Accordingly, they derive patentability for at least the same reasons independent Claim 31 does. Modifying Pokress by Egan and/or Shen does nothing to alter this fact. Applicant respectfully requests, therefore, that the § 103 rejections of dependent Claims 34, 35, 39 and 40 also be withdrawn.

CONCLUSION

Applicant believes all claims now pending in this Application are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is therefore respectfully requested.

If the Examiner has any questions or comments concerning this Amendment, he is encouraged to telephone the undersigned at (408) 453-2144.

Respectfully submitted,

Date: August 6, 2012

/William E. Winters/
Reg. No. 42,232

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PTO/SB/22 (09-11)
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PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a)	Docket Number (Optional) 110-009US
Application Number 12/815,165	Filed June 14, 2010
For Clearinghouse System and Method for Determining Availability of Carrier-Based Services and...	
Art Unit 2157	Examiner S.T. Channavajjala

This is a request under the provisions of 37 CFR 1.136(a) to extend the period for filing a reply in the above identified application.

The requested extension and fee are as follows (check time period desired and enter the appropriate fee below):

		Fee	Small Entity Fee	
☑	One month (37 CFR 1.17(a)(1))	$150	$75	$ 75
☐	Two months (37 CFR 1.17(a)(2))	$560	$280	$
☐	Three months (37 CFR 1.17(a)(3))	$1270	$635	$
☐	Four months (37 CFR 1.17(a)(4))	$1980	$990	$
☐	Five months (37 CFR 1.17(a)(5))	$2690	$1345	$

☑ Applicant claims small entity status. See 37 CFR 1.27.

☐ A check in the amount of the fee is enclosed.

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

☐ The Director has already been authorized to charge fees in this application to a Deposit Account.

☐ The Director is hereby authorized to charge any fees which may be required, or credit any overpayment, to Deposit Account Number _____.

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I am the

☐ applicant/inventor.

☐ assignee of record of the entire interest. See 37 CFR 3.71.
Statement under 37 CFR 3.73(b) is enclosed (Form PTO/SB/96).

☑ attorney or agent of record. Registration Number 42,232

☐ attorney or agent under 37 CFR 1.34.
Registration number if acting under 37 CFR 1.34 _____

/William E. Winters/	August 6, 2012
Signature	Date
William E. Winters	(408) 453-2144
Typed or printed name	Telephone Number

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below.

☑ Total of 1 forms are submitted.

This collection of information is required by 37 CFR 1.136(a). 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 6 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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TERMINAL DISCLAIMER TO OBVIATE A PROVISIONAL DOUBLE PATENTING REJECTION OVER A PENDING "REFERENCE" APPLICATION

Docket Number (Optional): 110-009US

In re Application of: Theodore S. Rappaport

Application No.: 12/815,165

Filed: June 14, 2010

For: CLEARINGHOUSE SYSTEM AND METHODS FOR DETERMINING AVAILABILITY OF CARRIER-BASED SERVICES AND ENHANCING THE QUALITY, OPERATION AND ACCESSIBILITY OF CARRIER-BASED NETWORKS

The owner*, Theodore S. Rappaport, of 100 percent interest in the instant application hereby disclaims, except as provided below, the terminal part of the statutory term of any patent granted on the instant application which would extend beyond the expiration date of the full statutory term of any patent granted on pending **reference** Application Number 12/815,076, filed June 14, 2010, as the term of any patent granted on said **reference** application may be shortened by any terminal disclaimer filed prior to the grant of any patent on the pending **reference** application. The owner hereby agrees that any patent so granted on the instant application shall be enforceable only for and during such period that it and any patent granted on the **reference** application are commonly owned. This agreement runs with any patent granted on the instant application and is binding upon the grantee, its successors or assigns.

In making the above disclaimer, the owner does not disclaim the terminal part of any patent granted on the instant application that would extend to the expiration date of the full statutory term of any patent granted on said **reference** application, "as the term of any patent granted on said **reference** application may be shortened by any terminal disclaimer filed prior to the grant of any patent on the pending **reference** application," in the event that: any such patent: granted on the pending **reference** application: expires for failure to pay a maintenance fee, is held unenforceable, is found invalid by a court of competent jurisdiction, is statutorily disclaimed in whole or terminally disclaimed under 37 CFR 1.321, has all claims canceled by a reexamination certificate, is reissued, or is in any manner terminated prior to the expiration of its full statutory term as shortened by any terminal disclaimer filed prior to its grant.

Check either box 1 or 2 below, if appropriate.

1. ☐ For submissions on behalf of a business/organization (e.g., corporation, partnership, university, government agency, etc.), the undersigned is empowered to act on behalf of the business/organization.

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.

2. ☑ The undersigned is an attorney or agent of record. Reg. No. 42,232

/William E. Winters/ — Signature
July 17, 2012 — Date

William E. Winters — Typed or printed name

(408) 453-2144 — Telephone Number

☑ Terminal disclaimer fee under 37 CFR 1.20(d) is included.

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The owner*, Theodore S. Rappaport, of 100 percent interest in the instant application hereby disclaims, except as provided below, the terminal part of the statutory term of any patent granted on the instant application which would extend beyond the expiration date of the full statutory term of any patent granted on pending **reference** Application Number 12/814,974, filed June 14, 2010, as the term of any patent granted on said **reference** application may be shortened by any terminal disclaimer filed prior to the grant of any patent on the pending **reference** application. The owner hereby agrees that any patent so granted on the instant application shall be enforceable only for and during such period that it and any patent granted on the **reference** application are commonly owned. This agreement runs with any patent granted on the instant application and is binding upon the grantee, its successors or assigns.

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Check either box 1 or 2 below, if appropriate.

1. ☐ For submissions on behalf of a business/organization (e.g., corporation, partnership, university, government agency, etc.), the undersigned is empowered to act on behalf of the business/organization.

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.

2. ☑ The undersigned is an attorney or agent of record. Reg. No. 42,232

/William E. Winters/ — Signature
July 17, 2012 — Date

William E. Winters — Typed or printed name

(408) 453-2144 — Telephone Number

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TERMINAL DISCLAIMER TO OBVIATE A DOUBLE PATENTING REJECTION OVER A "PRIOR" PATENT	Docket Number (Optional) 110-009US

In re Application of: Theodore S. Rappaport

Application No.: 12/815,165

Filed: June 14, 2010

For: CLEARINGHOUSE SYSTEM AND METHODS FOR DETERMINING AVAILABILITY OF CARRIER-BASED SERVICES AND ENHANCING THE QUALITY, OPERATION AND ACCESSIBILITY OF CARRIER-BASED NETWORKS

The owner*, Theodore S. Rappaport, of 100 percent interest in the instant application hereby disclaims, except as provided below, the terminal part of the statutory term of any patent granted on the instant application which would extend beyond the expiration date of the full statutory term of **prior patent** No. 8,224,794 as the term of said **prior patent** is presently shortened by any terminal disclaimer. The owner hereby agrees that any patent so granted on the instant application shall be enforceable only for and during such period that it and the **prior patent** are commonly owned. This agreement runs with any patent granted on the instant application and is binding upon the grantee, its successors or assigns.

In making the above disclaimer, the owner does not disclaim the terminal part of the term of any patent granted on the instant application that would extend to the expiration date of the full statutory term of the **prior patent**, "as the term of said **prior patent** is presently shortened by any terminal disclaimer," in the event that said **prior patent** later:

expires for failure to pay a maintenance fee;
is held unenforceable;
is found invalid by a court of competent jurisdiction;
is statutorily disclaimed in whole or terminally disclaimed under 37 CFR 1.321;
has all claims canceled by a reexamination certificate;
is reissued; or
is in any manner terminated prior to the expiration of its full statutory term as presently shortened by any terminal disclaimer.

Check either box 1 or 2 below, if appropriate.

1. ☐ For submissions on behalf of a business/organization (e.g., corporation, partnership, university, government agency, etc.), the undersigned is empowered to act on behalf of the business/organization.

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.

2. ☑ The undersigned is an attorney or agent of record. Reg. No. 42,232

/William E. Winters/ — July 17, 2012
Signature — Date

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Form PTO/SB/96 may be used for making this certification. See MPEP § 324.

This collection of information is required by 37 CFR 1.321. 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.**

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Electronic Patent Application Fee Transmittal

Application Number:	12815165
Filing Date:	14-Jun-2010
Title of Invention:	Clearinghouse System and Method for Determining Availability of Carrier-Based Services and Enhancing the Quality, Operation and Accessibility of Carrier-Based Networks
First Named Inventor/Applicant Name:	Theodore S. Rappaport
Filer:	William E. Winters
Attorney Docket Number:	110-009US

Filed as Small Entity

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Extension - 1 month with $0 paid	2251	1	75	75

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
Statutory or terminal disclaimer	2814	3	80	240
		Total in USD ($)		**315**

Electronic Acknowledgement Receipt

EFS ID:	13422322
Application Number:	12815165
International Application Number:	
Confirmation Number:	1819
Title of Invention:	Clearinghouse System and Method for Determining Availability of Carrier-Based Services and Enhancing the Quality, Operation and Accessibility of Carrier-Based Networks
First Named Inventor/Applicant Name:	Theodore S. Rappaport
Customer Number:	63409
Filer:	William E. Winters
Filer Authorized By:	
Attorney Docket Number:	110-009US
Receipt Date:	06-AUG-2012
Filing Date:	14-JUN-2010
Time Stamp:	11:35:08
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$315
RAM confirmation Number	9350
Deposit Account	503936
Authorized User	WINTERS,WILLIAM E.

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Miscellaneous Incoming Letter	110-009US_Transmittal.pdf	476666 14ca4d55a145e2be74ee3c1922fa06a727d2524	no	1
Warnings:					
Information:					
2	Amendment/Req. Reconsideration-After Non-Final Reject	110-009US_Amdt_Resp_to_04_04_12_OA.pdf	296859 cc243bea2c26ee687575a6bb96e82c9e386/d4b6	no	51
Warnings:					
Information:					
3	Extension of Time	110-009US_Ext_of_Time.pdf	516503 94c8e08be2965dd7becab435f780d840bfecJ7JJ	no	1
Warnings:					
Information:					
4	Terminal Disclaimer Filed	Terminal_Disclaimer_1.pdf	184918 aa3bb4477477f75f94ca648a294ac5dc9c2b7c267	no	1
Warnings:					
Information:					
5	Terminal Disclaimer Filed	Terminal_Disclaimer_2.pdf	184920 34ba16deabcbaff060eb89edb50dc0c6308401J8a	no	1
Warnings:					
Information:					
6	Terminal Disclaimer Filed	Terminal_Disclaimer_3.pdf	103330 e24752789422 8c6bd686bffa34bc4d46ab2f2J9	no	1
Warnings:					
Information:					
7	Fee Worksheet (SB06)	fee-info.pdf	32398 5fcc658c4cf2f802fa9ea8d510b35df18b4bbcd6	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	1795594		

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.

Doc Code: TRAN.LET

Document Description: Transmittal Letter

PTO/SB/21 (07-09)
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TRANSMITTAL FORM

(to be used for all correspondence after initial filing)

Application Number	12/815,165
Filing Date	June 14, 2010
First Named Inventor	Theodore S. Rappaport
Art Unit	2157
Examiner Name	Srirama T. Channavajjala
Total Number of Pages in This Submission: 56	Attorney Docket Number: 110-009US

ENCLOSURES *(Check all that apply)*

- ☐ Fee Transmittal Form
  - ☐ Fee Attached
- ☑ Amendment/Reply
  - ☐ After Final
  - ☐ Affidavits/declaration(s)
- ☑ Extension of Time Request
- ☐ Express Abandonment Request
- ☐ Information Disclosure Statement
- ☐ Certified Copy of Priority Document(s)
- ☐ Reply to Missing Parts/ Incomplete Application
  - ☐ Reply to Missing Parts under 37 CFR 1.52 or 1.53
- ☐ Drawing(s)
- ☐ Licensing-related Papers
- ☐ Petition
- ☐ Petition to Convert to a Provisional Application
- ☐ Power of Attorney, Revocation Change of Correspondence Address
- ☑ Terminal Disclaimer
- ☐ Request for Refund
- ☐ CD, Number of CD(s) _____
  - ☐ Landscape Table on CD
- ☐ After Allowance Communication to TC
- ☐ Appeal Communication to Board of Appeals and Interferences
- ☐ Appeal Communication to TC **(Appeal Notice, Brief, Reply Brief)**
- ☐ Proprietary Information
- ☐ Status Letter
- ☐ Other Enclosure(s) (please Identify below):

Remarks

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm Name	Patent Law Professionals P.C.		
Signature	/William E. Winters/		
Printed name	William E. Winters		
Date	August 6, 2012	Reg. No.	

CERTIFICATE OF TRANSMISSION/MAILING

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Signature			
Typed or printed name		Date	

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PTO/SB/06 (07-06)
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PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number	Filing Date	☐ To be Mailed
12/815,165	06/14/2010	

APPLICATION AS FILED – PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY ☒ RATE ($)	SMALL ENTITY ☒ FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	OTHER THAN SMALL ENTITY FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), 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))							
			TOTAL			TOTAL	

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

APPLICATION AS AMENDED – PART II

AMENDMENT 08/06/2012

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE ($)	SMALL ENTITY ADDITIONAL FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	* 87	Minus	** 82	= 5	X $30 =	150	OR	X $ =	
Independent (37 CFR 1.16(h))	* 6	Minus	*** 7	= 0	X $125 =	0	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	150	OR	TOTAL ADD'L FEE	

AMENDMENT

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

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

Legal Instrument Examiner:
/NICOLE C. LAWRENCE/

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Document code: WFEE

United States Patent and Trademark Office
Sales Receipt for Accounting Date: 08/08/2012

NLAWRENC	SALE	#00000001	Mailroom Dt:	08/06/2012	503936	12815165	
	01	FC : 2202		150.00	DA		

PTO/SB/08a (01-10)
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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	12815165
Filing Date	2010-06-14
First Named Inventor	Theodore S. Rappaport
Art Unit	2157
Examiner Name	
Attorney Docket Number	110-009US

U.S.PATENTS Remove

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

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

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NON-PATENT LITERATURE DOCUMENTS Remove

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

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	12815165
	Filing Date	2010-06-14
	First Named Inventor	Theodore S. Rappaport
	Art Unit	2157
	Examiner Name	
	Attorney Docket Number	110-009US

	1	4/19/2012 Office Action from related U.S. Patent Appl. No. 12/814,974, including Notice of References cited by examiner	☐

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

EXAMINER SIGNATURE

Examiner Signature		Date Considered	

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

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

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	12815165
	Filing Date	2010-06-14
	First Named Inventor	Theodore S. Rappaport
	Art Unit	2157
	Examiner Name	
	Attorney Docket Number	110-009US

CERTIFICATION STATEMENT

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

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

OR

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

☐ See attached certification statement.

☒ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☐ A certification statement is not submitted herewith.

SIGNATURE

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

Signature	/William E. Winters/	Date (YYYY-MM-DD)	2012-04-30
Name/Print	William E. Winters	Registration Number	42,232

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

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

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

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

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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.

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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.

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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.

Electronic Patent Application Fee Transmittal

Application Number:	12815165
Filing Date:	14-Jun-2010
Title of Invention:	Clearinghouse System and Method for Determining Availability of Carrier-Based Services and Enhancing the Quality, Operation and Accessibility of Carrier-Based Networks
First Named Inventor/Applicant Name:	Theodore S. Rappaport
Filer:	William E. Winters
Attorney Docket Number:	110-009US

Filed as Small Entity

Utility under 35 USC 111(a) Filing Fees

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

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
Submission- Information Disclosure Stmt	1806	1	180	180
		Total in USD ($)		**180**

Electronic Acknowledgement Receipt

EFS ID:	12662164
Application Number:	12815165
International Application Number:	
Confirmation Number:	1819
Title of Invention:	Clearinghouse System and Method for Determining Availability of Carrier-Based Services and Enhancing the Quality, Operation and Accessibility of Carrier-Based Networks
First Named Inventor/Applicant Name:	Theodore S. Rappaport
Customer Number:	63409
Filer:	William E. Winters
Filer Authorized By:	
Attorney Docket Number:	110-009US
Receipt Date:	30-APR-2012
Filing Date:	14-JUN-2010
Time Stamp:	14:54:22
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$180
RAM confirmation Number	1508
Deposit Account	
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)

1	Information Disclosure Statement (IDS) Form (SB08)	110-009US_IDS_04_30_12.pdf	612388 177021a2d06ea31e0cfd49f2e4b121a710de79a2	no	4
Warnings:					
Information:					
A U.S. Patent Number Citation or a U.S. Publication Number Citation is required in the Information Disclosure Statement (IDS) form for autoloading of data into USPTO systems. You may remove the form to add the required data in order to correct the Informational Message if you are citing U.S. References. If you chose not to include U.S. References, the image of the form will be processed and be made available within the Image File Wrapper (IFW) system. However, no data will be extracted from this form. Any additional data such as Foreign Patent Documents or Non Patent Literature will be manually reviewed and keyed into USPTO systems.					
2	Non Patent Literature	110-007US_04_19_12_OA.pdf	609717 22e0e3ea4667d6cf4a23c878c54028c9ba6aa537	no	23
Warnings:					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	30671 bec35aa84fc0d499f46eta26f7352eed85491ef4	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	1252776		

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<u>New Applications Under 35 U.S.C. 111</u>
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<u>National Stage of an International Application under 35 U.S.C. 371</u>
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<u>New International Application Filed with the USPTO as a Receiving Office</u>
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United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
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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)	
	12/815,165	RAPPAPORT, THEODORE S.	
	Examiner	Art Unit	
	SRIRAMA CHANNAVAJJALA	2157	

-- 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 *14 June 2010*.

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

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ 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

5)☒ Claim(s) *1-82* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) *1-82* is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

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

Application Papers

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

11)☒ The drawing(s) filed on *14 June 2010* 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).

12)☐ 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

13)☐ 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 *3/22/12;1/9/12;1/27/11;6/14/10*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1-82 are pending in this application.

Drawings

2. The Drawings filed on 6/14/2010 are acceptable for examination purpose

Information Disclosure Statement

3. The information disclosure statement filed on 3/22/2012;1/9/2012;1/27/2011; and 6/14/2010.is in compliance with the provisions of 37 CFR 1.97, and has been considered and a copy is enclosed with this Office Action

Priority

4. Acknowledgment is made of applicant's claim for domestic priority under 35 U.S.C. 119(e) based on provisional application 60/971,175 filed on 9/10/2007;60/977,582 filed on 10/4/2007, 61/028,261 filed on 2/13/2008.

Double Patenting

5. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical,~ but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g.,/n re Berg, 140 F.3d

1428, 46 USPQ2d 1226 (Fed. Cir. 1998);/n re Goodman, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993);/n re Longi, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); In re Van Omum, 686 F.2d 937, 214 USPQ 761 (CCPA 1982);/n re Vogel 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and /n re Thorington, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

6. Claim 1,8,20,31,43,56, and 69 is rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 1,7,21,27,33 of US Application No. 12/814,974 is now US Pub. No. 2010/0299274; Claims 1,17,27,39,50,60 of US Application # 12/815,076 is now US Pub. No. 2010/0250268; claims 1,27 [as mended 2/24/2012] of US Application # 12/208,007. Although the conflicting claims are not identical, they are not patentably distinct from each other because of following reasons:

Claims 1,7,21,27,33 of US Application No. 12/814,974 is now US Pub. No. 2010/0299274; Claims 1,17,27,39,50,60 of US Application # 12/815,076 is now

US Pub. No. 2010/0250268; claims 1,27 [as mended 2/24/2012] of US Application # 12/208,007 contain(s) every element of Claim 1,8,20,31,43,56, and 69 of the instant application and thus anticipate the claim(s) of the instant application. Claims of the instant application therefore are not patently distinct from the earlier patent claims and as such are unpatentable over obvious-type double patenting. A later patent/application claim is not patentably distinct from an earlier claim if the later claim is anticipated by the earlier claim.

A later patent claim is not patentably distinct from an earlier patent claim if the later claim is obvious over, or anticipated by, the earlier claim. In re Longi, 759 F.2d at 896, 225 USPQ at 651 (affirming a holding of obviousness-type double patenting because the claims at issue were obvious over claims in four prior art patents); In re Berg, 140 F.3d at 1437, 46 USPQ2d at 1233 (Fed. Cir. 1998) (affirming a holding of obviousness-type double patenting where a patent application claim to a genus is anticipated by a 35 patent claim to a species within that genus). " ELI LILLY AND COMPANY v BARR LABORATORIES, INC., United States Court of Appeals for the Federal Circuit, ON PETITION F£)R REHEARING EN BANC (DECIDED: May 30, 2001).

"Claim 12 and Claim ! 3 are generic to the species of invention covered by claim 3 of the patent. Thus, the generic invention is "anticipated" by the species of the patented invention. Cf., Titanium Metals Corp. v. Banner, 778 F.2d 775,227 USPQ 773 (Fed. Cir. 1985) (holding that an earlier species disclosure in the prior art defeats any generic claim) 4. This court's predecessor has held that, without a terminal disclaimer,

the species claims preclude issuance of the generic application. In re Van Ornum, 686 F.2d 937, 944, 214 USPQ 761,767 (CCPA 1982); Schneller, 397 F.2d at 354. Accordingly, absent a terminal disclaimer, claims 12 and 13 were properly rejected under the doctrine of obviousness-type double patenting." (In re Goodman (CA FC) 29 USPQ2d 2010 (12/3/1993).

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 1-2, 6,8,11,12-14,20,23-27,37,40,43,47,56,60,69,73-74 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

8. In the claims 1-2,6,8,11,12-14,20,23-27,37, it is unclear what is meant by the term "quality or service information" .....

9. In claim 31, it is unclear what is meant by The term "improving the operation" ...."carrier information and property information"

10. In the claim 32, limitation "negotiating a business transaction between a carrier ....., it is unclear what is meant by "business transaction between a carrier and an end user of service provided....."

11. In the claims 7, 19,30,it is unclear what is meant by "storing to a party or parties....."

12. In the claim 40, it is unclear what is meant by "without a visible web page interface", while claim 28 and 39 specifically directed to one or more web pages .....users.

13. In the claims 43,56,69, it is unclear what is meant by "property information and carrier infrastructure information....."

14. In the claim 47,60,73-74, it is unclear what is meant by "configured to match a property need or property specification.....

15. In the claim 48,54,61,67,75, 81, it is unclear what is meant by "database coverage or reception quality information.....

The specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention for example quality or service information" in claim 1 "improving the operation...." In claim 31; etc.

Statement Regarding 112 6th Paragraph

16. Referring to claim 1, which is an system claim, the term(s), user location information and quality or service information.....coverage, outage or performance information, quality or service information.....in claim 1;

In claim 56, "property information and carrier infrastructure information.....property owners.....property information for processing.....data based on carrier infrastructure information....., are construed to invoke 35 U.S.C. 112, sixth

paragraph, because each term lacks sufficient structure for performing the corresponding function recited in the claim. In these instances, the term is simply a substitute for "means for" and thus, 35 U.S.C. 112, sixth paragraph, is invoked.

35 U.S.C. 112, sixth paragraph, states that a claim limitation expressed in means-plus- function language "shall be construed to cover the corresponding structure...described in the specification and equivalents thereof." For claims directed to system and/or computer-implemented functions, the corresponding structure is the particular algorithm disclosed in the specification. Harris Corp. v. Ericsson Inc., 417 F.3d 1241, 1249 (Fed. Cir. 2005). As such, the term(s), user location information and quality or service information.....coverage, outage or performance information, quality or service information.....in claim 1;

In claim 56, "property information and carrier infrastructure information.....property owners.....property information for processing.....data based on carrier infrastructure information.....,, will be interpreted to cover the corresponding structure disclosed in the specification and equivalents thereof.

It is further noted that claims 58-59,68 are NOT related to" means for" dependent from independent claim 56 respectively.

Claim Rejections - 35 USC § 101

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.

17. ***Claims 1,8, 20,31,43,56,69 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.***

18. Regarding Claims 1,20,43,56 recite a "system" without the proper "hardware" or memory to perform the steps. In particular, in a system claim there must be a hardware component such as a processor or memory that the software routines or modules are stored in or run on,.

A claimed process is eligible for patent protection under 35 U.S.C. § 101 if:

> "(1) it is tied to a particular machine or apparatus, or (2) it transforms a particular article into a different state or thing. See Benson, 409 U.S. at 70 ('Transformation and reduction of an article 'to a different state or thing' is the clue to the patentability of a process claim that does not include particular machines.'); Diehr, 450 U.S. at 192 (holding that use of mathematical formula in process 'transforming or reducing an article to a different state or thing' constitutes patent-eligible subject matter); see also Flook, 437 U.S. at 589 n.9 ('An argument can be made [that the Supreme] Court has only recognized a process as within the statutory definition when it either was tied to a particular apparatus or operated to change materials to a 'different state or thing' '); Cochrane v. Deener, 94 U.S. 780, 788 (1876) ('A process is...an act, or a series of acts, performed upon the subject-matter to be transformed and reduced to a different state or thing.').7 A claimed process involving a fundamental principle that uses a particular machine or apparatus would not pre-empt uses of the principle that do not also use the specified machine or apparatus in the manner claimed. And a claimed process that transforms a particular article to a specified different state or thing by applying a fundamental principle would not pre-empt the use of the principle to transform any other article, to transform the same article but in a manner not covered by the claim, or to do anything other than transform the specified article." (In re Bilski, 88 USPQ2d 1385, 1391 (Fed. Cir. 2008))

Also noted in Bilski is the statement, "Process claim that recites fundamental principle, and that otherwise fails 'machine-or-transformation' test for whether such claim is drawn to patentable subject matter under 35 U.S.C. §101, is not rendered patent eligible by

mere field-of-use limitations; another corollary to machine-or-transformation test is that recitation of specific machine or particular transformation of specific article does not transform unpatentable principle into patentable process if recited machine or transformation constitutes mere 'insignificant post- solution activity.'" (In re Bilski, 88 USPQ2d 1385, 1385 (Fed. Cir. 2008)) Examples of insignificant post-solution activity include data gathering and outputting. Furthermore, the machine or transformation must impose meaningful limits on the scope of the method claims in order to pass the machine-or-transformation test. Please refer to the USPTO's "Guidance for Examining Process Claims in view of In re Bilsk memorandum dated January 7, 2009, http://www.uspto..gov/web/offices/pac/dapp/opla/documents/bilski_guidance_memo.pdf

19. In the method Claim 8,31,69, they neither involve any particular machine or apparatus nor transform a particular article into a different state or thing. They lack any hardware means or machine (e.g. processor and memory, or the like) to indicate the method in or by the machine or apparatus

Claim Rejections - 35 USC § 102

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 –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

20. ***Claims 1-16,18-27,29-30 are rejected under 35 U.S.C. 102(b) as being anticipated by Pokress, US Patent No. 6169791 published Jan 2001.***

21. As to Claim 1, Pokress teaches a system which including "A system, comprising: means for receiving end user location information [col 4, line 1-3, fig 2, col 5, line 57-60, col 9, line 9-15], user location information corresponds to user information related to the user i.e. customer ID particularly, determines user location and respective telecommunication carrier's availability and or services as detailed in col 5, line 57-60; and quality or service information of one or more communications networks for end users of said one or more communications networks [fig 1, element 18 a-18c,fig 6-Carriers], Pokress specifically teaches multiple telecommunication carriers for example carrier name, carrier information stored in a database as detailed in fig 6, "said quality or service information comprising coverage, outage or performance information of said one or more communications networks" [col 2, line 19-36,col 4, line 66-67,col 5, line 1-2, col 6, line 16-32, fig 12], Pokress specifically teaches multiple telecommunications carriers, user options to select required services that including local, long distance calls, outgoing calls, updates and like corresponds to coverage, or performance information;

"means for storing said end user location information and said quality or service information" [col 5, line 55-67, col 6, line 1-15, fig 2, fig 4], Pokress specifically teaches customized database stores both telecommunication carrier's information, user profile including user's location information as detailed in fig 2; fig 4;

"means for managing, controlling and updating said means for storing" [col 8, line 56-67, fig 8], Pokress specifically teaches updating the user information including telecommunications carrier information; and

"means for providing access to quality or service information stored by said means for storing" [col 8, line 5-21,col 9, line 28-38], Pokress specifically teaches multiple telecommunication carrier information customized in the database including customer account

22. As to Claim 2, Pokress disclosed " wherein said means for providing access to quality or service information comprises means for reporting quality or service information to one or more carriers" [fig 1, fig 6,col 8, line 5-31], service information typically including telecommunications carrier, user information related to to calling plan stored in customized database.

23. As to Claim 3, Pokress disclosed " further comprising means for generating a recommended operating band, operating mode, communications network or carrier for an end user communications device based on end user location information received by said means for receiving" [col 6, line 16-32,col 7, line 45-67], Pokress specifically

teaches telecommunication carriers their availability with respect to user location providing services including local and long distance call plans highlighting the desired area.

24. As to Claim 4, Pokress disclosed "wherein said means for generating a recommended operating band, operating mode, communication network or carrier is further based on quality or service information received by said means for receiving" [col 10, line 41-51, col 12, line 43-67].

25. As to Claim 5, Pokress disclosed further comprising means for providing end user access to quality or service information stored by said means for storing to end users of said one or more communications networks" [col 8, line 22-42]..

26. As to Claim 6, Pokress disclosed " wherein said means for providing end user access comprises means for reporting quality or service information to said end users" [fig 4-6,col 5, line 47-67, col 6, line 1-15].

27. As to the Claim 7, Pokress disclosed "further comprising means for providing access to quality or service information stored by said means for storing to a party or parties other than end users and carriers of said one or more communications networks" [col 9, line 48-67, col 10, line 1-15].

28. As to Claim 8,20, Pokress teaches a system which including "A method of collecting and providing access to quality or service information associated with one or more communications networks, [fig 1, fig 3-6,col 1, line 66-67, col 2, line 1-18], Pokress specifically teaches database storing information about users and telecommunication carrier available services to the user comprising:

using a computer [fig 1], receiving for end users of one or more communications networks end user location information col 4, line 1-3, fig 2, col 5, line 57-60, col 9, line 9-15], user location information corresponds to user information related to the user i.e. customer ID particularly, determines user location and respective telecommunication carrier's availability and or services as detailed in col 5, line 57-60; "and quality or service information of said one or more communications networks" [fig 1, element 18 a-18c,fig 6-Carriers], Pokress specifically teaches multiple telecommunication carriers for example carrier name, carrier information stored in a database as detailed in fig 6; said quality or service information comprising coverage, outage or performance information of said one or more communications networks" [fig 1, col 2, line 19-36,col 4, line 66-67,col 5, line 1-2, col 6, line 16-32, fig 12], Pokress specifically teaches multiple telecommunications carriers, user options to select required services that including local, long distance calls, outgoing calls, updates and like corresponds to coverage, or performance information; telecommunication carrier or commercial carrier connected to the telecommunication network [fig 1]

"storing, by action of said computer, said end user location information and said quality or service information in a memory or database" [col 5, line 55-67, col 6,

line 1-15, fig 2, fig 4], Pokress specifically teaches customized database stores both telecommunication carrier's information, user profile including user's location information as detailed in fig 2, fig 4;

"managing, controlling and updating by action of said computer said memory or database" [col 8, line 31-42, line 56-67, fig 3-4, fig 8], Pokress specifically teaches updating the user information including telecommunications carrier information; database corresponds to customized database and

providing access to quality or service information stored in said memory or database to one or more users through a communications interface coupled to said computer" [Abstract, fig 1, col 8, line 5-21,col 9, line 28-38], Pokress specifically teaches multiple telecommunication carrier information customized in the database including customer account

29. As to Claim 9,21, Pokress disclosed " wherein said one or more users comprises one or more end users of said one or more communication networks" [fig 1, abstract].

30. As to Claim 10,22, Pokress disclosed wherein said one or more users comprises one or more carriers [fig 1, element 18a-18c, col 5, line 57-60].

31. As to claim 11,23, Pokress disclosed "wherein providing access to quality or service information stored in said memory or database includes reporting quality or service information to said one or more carriers[fig 1, fig 6,col 8, line 5-31], service

information typically including telecommunications carrier, user information related to calling plan stored in customized database.

32. As to claim 12,24, Pokress disclosed "further comprising by action of said computer: processing said quality or service information" [fig 4], selecting local calling plan, with specific local area is part of the processing quality or service information; and

"generating quality or availability-of-service information of services offered by said one or more carriers" [fig 6], Pokress specifically disclosed user interface allows to select atleast one telecommunication carrier for example as detailed in fig 6, element 140.

33. As to Claim 13,25, Pokress disclosed "wherein said quality or availability-of-service information comprises quality or availability-of-service information of services offered by a plurality of carriers" [fig 6,col 8, line 5-21].

34. As to claim 14, Pokress disclosed wherein said quality or availability-of-service information is location specific" [col line 27-49].

35. As to Claim 15,26, Pokress disclosed wherein said computer comprises a server configured to generate and serve data from end user location information and quality or service information stored in said memory or database" [col 6, line 16-32].

36. As to Claim 16,27, Pokress disclosed "wherein said data comprises a recommended operating band, operating mode, communications network and/or carrier for end users" [col 6, line 16-32,col 7, line 45-67], Pokress specifically teaches telecommunication carriers their availability with respect to user location providing services including local and long distance call plans highlighting the desired area.

37. As to Claim 18,29, Pokress disclosed "wherein said computer is configured to serve said data to one or more carriers" [col 10, line 38-51].

38. As to Claim 19,30, Pokress disclosed wherein providing access to quality or service information stored in said memory or database comprises providing access to a party or parties other than end users and carriers of said one or more communications networks col 9, line 48-67, col 10, line 1-15].

Claim Rejections - 35 USC § 103

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.

The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

39. ***Claims 17,28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pokress, US Patent No. 6169791 published Jan 2001 in view of Shen et al. [hereafter Shen], US Pub. No. 20070198339 filed Feb 2006***

40. As to Claim 17,28, Pokress does not disclose "wherein said server comprises a web server and said data is formatted as one or more web pages served to said end users", although Pokress strongly supports graphical user interface allows to select menu options for example file, options, and saving data in a particular format [fig 4-6, fig 12]. On the other hand, Shen disclosed "server comprises a web server and said data

is formatted as one or more web pages served to said end users" [fig 2, fig 4A, fig 6A-6B].

It would have been obvious to one of the ordinary skill in the art at the time of applicant's invention to incorporate wireless devices access to the internet in order to acceding to the content provider capable of search information of Shen et al. into telecommunication carriers providing serving to the customer locations including billing information of Pokress because that would have allowed users of Pokress linking web page information to the calling number[s] of the telecommunication carriers particularly communication with the web page advertisement providing the selection features [Shen: page 1, 0009-0010], further filter the content through filter module that identifies IP address associated [page 2, 0011].

41. ***Claims 31-33, 36-38,41-42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pokress, US Patent No. 6169791 published Jan 2001 in view of Egan, US Pub. No. 2004/0076283 published Apr 2004***.

42. As to Claim 31, Pokress teaches a system which including "A method of building and providing access to a database for extending the use of, or improving the operation of, carrier-based networks, comprising: [fig 1, fig 3-6,col 1, line 66-67, col 2, line 1-18], Pokress specifically teaches generating, storing information related to the telecommunication carrier services availability, generating customized data to suite to subscriber's requirement providing quality services;

collecting, using a computer, carrier information of one or more carriers [fig 6,

col 8, line 5-21], Pokress specifically teaches supporting multiple telecommunication carrier's information, their services availability to the customers data stored in a database particularly user interface allows to select required service related parameters particularly each telecommunication carrier is identified with carrier identification code or CIC for example as detailed in fig 6;

storing in a database, by action of said computer, said carrier information [col 8, line 38-42], Pokress specifically teaches user accounts, telecommunication carrier information are stored in a customized database is access from the central server; and

providing access to carrier information [fig 1, fig 2, element 60,92, fig 6], Pokress specifically teaches storing telecommunication carrier information in a database accessed from the central server; and through an electronic interface coupled between said computer and the Internet [fig 1, col 6, line 42-50], 'property information stored in said database' [fig 4-6], Pokress specifically teaches telecommunication infrastructure information including various area codes, towns within local calling area for example as detailed in fig 4-6

It is however, noted that Pokress does not disclose "property information associated with property available for possible use by said one or more carriers, property information stored in said database, although Pokress specifically disclosed multiple telecommunication carriers providing telecommunication services to the customers [fig 1]. On the other hand, Egan disclosed "property information associated with property available for possible use by said one or more carriers" [Abstract, page 2, 0010-0011, fig 1-2], Egan specifically teaches telecommunication carrier required

infrastructure including defining residential, business uses defining legally binding permissions to provide telecommunication services to the communities.

It would have been obvious to one of the ordinary skill in the art at the time of applicant's invention to incorporate various telecommunication based services particularly defining telecommunication infrastructure" legally binding permission on real-estate properties in the communities of Egan into telecommunication carriers providing serving to the customer locations including billing information of Pokress because both Pokress, Egan specifically supporting "telecommunication infrastructure" to the customers [Pokress: abstract, fig 1; Egan: abstract, fig 1-2], and both Pokress, Egan supporting "telecommunication-based services".

Because both Pokress, Egan prior art supports telecommunication based services, it would have been obvious to one of the ordinary skill in the art at the time of applicant's invention to substitute and/or modify one method for the other to achieve the predictable result of identifying various real-estate properties located in a community both pre-existing, new locations including residential, business, further acquiring "legally binding permissions", i.e. right-of-the way ownership data stored in a database, further allows users of Pokress to identify, analyze and provide current telecommunication infrastructure such as digital telecommunication services to the community [Egan: page 2, 0011-0013], thus improving overall quality, reliability of the telecommunication carrier infrastructure for future needs.

43. As to claim 32, Pokress disclosed , further comprising, using said computer, negotiating a business transaction between a carrier and an end user of a service provided by said carrier using property information stored in said database" [fig 4-6, col 5, line 55-67].

44. As to claim 33, Pokress disclosed " wherein providing access to carrier information and property information stored in said database fig 4-6], Pokress specifically teaches telecommunication infrastructure information including various area codes, towns within local calling area for example as detailed in fig 4-6; comprises granting access to one or more parties other than said one or more carriers and end users of carrier-based services provided by said one or more carriers [col 6, line 42-61].

45. As to Claim 36, Pokress disclosed " wherein collecting said carrier information comprises collecting information concerning availability of services provided by said one or more carriers" [col 5, line 57-60].

46. As to Claim 37, Pokress disclosed " wherein collecting said carrier information comprises collecting information concerning quality or services provided by said one or more carriers"[fig 1, fig 6,col 8, line 5-31].

47. As to Claim 38, Pokress disclosed "wherein collecting said carrier information comprises collecting infrastructure information relating to infrastructure used by said one or more carriers" [col 2, line 19-36,col 4, line 66-67,col 5, line 1-2, col 6, line 16-32, fig 12]

48. As to Claim 41-42, wherein providing access to carrier information and information stored in said database comprises granting access to said one or more carriers [fig 1, fig 2, element 60,92, fig 6], Pokress specifically teaches storing telecommunication carrier information in a database accessed from the central server. On the other hand, Egan disclosed "property information" [Abstract, page 2, 0010-0011, fig 1-2],

49. ***Claims 34-35,39-40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pokress, US Patent No. 6169791 published Jan 2001, Egan, US Pub. No. 2004/0076283 published Apr 2004 as applied to claim 31 above, further in view of Shen et al. [hereafter Shen], US Pub. No. 20070198339 filed Feb 2006***

50. As to Claim 34, it is noted that both Pokress,Egan do not disclose " wherein said one or more parties comprises one or more content providers", although Pokress, Egan specifically supporting "telecommunication infrastructure" to the customers [Pokress: abstract, fig 1; Egan: abstract, fig 1-2], and both Pokress, Egan supporting "telecommunication-based services". On the other hand, Shen disclosed " wherein said

one or more parties comprises one or more content providers" [page 4, 0041, page 5, 0057, fig 2, fig 6A]., Shen specifically teaches content providers in a telecommunication network environment.

It would have been obvious to one of the ordinary skill in the art at the time of applicant's invention to incorporate targeted mobile advertisements of Shen et al. into the users of Pokress, Egan because, all the prior art of references are strongly supports multiple telecommunication carriers [Pokress: fig 1; Egan: Abstract, fig 1-2 and Shen: fig 2], further allowed users of Pokress, Egan to deliver required advertisements to the users' devices benefit the provider of the content delivery system which is able to promise all its users better and more related advertisements where users are capable of viewing the related advertisements and their responses [Shen: page 4, 0045-0046], thus improving overall quality of information and reliability of the system.

51. As to Claim 35, Shen disclosed "wherein said one or more parties comprises one or more advertisers" [fig 2, fig 4, fig 6].

52. As to Claim 39, Shen disclosed " wherein said electronic interface comprises a human viewable web-page" [fig 6A-6B].

53. As to Claim 40, Shen disclosed " wherein said electronic interface comprises internet addressing without a visible web page interface" [page 4, 0047-0048].

Claim Rejections - 35 USC § 102

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 –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

54. ***Claims 43-82 are rejected under 35 U.S.C. 102(b) as being anticipated by Mashinsky,Alexander [hereafter Mashinsky], WO 00/36815 published June 2000***.

55. As to Claim 43,56,69, Mashinsky teaches a system which including " A clearinghouse system, comprising: a clearinghouse database configured to store property information and carrier infrastructure information of carrier infrastructure dispersed over a geographical region, [page 3, line 21-36,] said carrier infrastructure information including information of carrier infrastructure installed or attached to dwellings or premises of property owners in said geographical region [page 4, para 2-3], Mashinsky is directed to multiple telecommunications carriers severing global network operations, particularly defining telecommunication carrier infrastructure parameters such as equipment, matching service requests, risk management, contract management, tracking the physical links connecting different portions of the global network including administering telecommunications nodes;

"a computer configured to manage and update said clearinghouse database, said computer having a server configured to serve data based on carrier infrastructure

information stored in said clearinghouse database" [page 11-12], Mashinsky specifically teaches data structure defining data fields of database 96 including template particularly related to telecommunications nodes as detailed in 1-3;; and

"an interface through which property information is received by said computer and stored in said clearinghouse database" [page 12, para 2, page 13-15,], Mashinsky specifically teaches defining database template fields including equipment type, payment terms, legal restrictions and like.

56. As to Claim 44,57,70, Mashinsky disclosed "further comprising a carrier interface through which one or more carriers access property information stored in said clearinghouse database" [page 10, fig 1-2].

57. As to Claims 45,58,71, Mashinsky disclosed "wherein said property information includes information about property available for possible use by a carrier of a carrier-based service" [page 12, last para, database template fields, fig 3A].

58. As to Claim 46,59,72, Mashinsky wherein said property information further includes information of property that is subject to contractual, legal, government or zoning restrictions [page 39, para 2-4, fig 6-7].

59. As to Claim 47,60,73-74, Mashinsky disclosed " wherein said computer is configured to match a property need or property specification of a carrier with one or

more property records stored in said clearinghouse database" [page 12-13, telecommunications nodes, and template fields].

60. As to Claim 48,61,75, Mashinsky disclosed " wherein said computer is configured to receive and store in said clearinghouse database coverage or reception quality information of end users of one or more communications networks" [page 18, last para, page 19, fig 3-4].

61. As to Claim 49, 62,76, Mashinsky disclosed " wherein said computer is further configured to serve coverage or reception quality data using coverage or reception information stored in said clearinghouse database" [fig 3-4].

62. As to Claim 50,63,77, Mashinsky disclosed " wherein said computer is configured to receive and store in said clearinghouse database service information of a plurality of different services provided by one or more carriers over one or more networks" [page 9, last para, page 10, para 1, fig 1-2].

63. As to Claim 51, 64,78, Mashinsky disclosed " wherein said computer is further configured to serve service data using service information stored in said clearinghouse database" [fig 1-2,page 11].

64. As to Claim 52,65,79, "wherein said computer is configured to receive and store in said clearinghouse database bandwidth and capacity information of one or more communications networks" [page 11, para 4].

65. As to Claim 53,66,80, Mashinsky "wherein said computer is further configured to serve bandwidth and capacity data using bandwidth and capacity information stored in said clearinghouse database" [page 11, para 4-5, fig 2].

66. As to Claim 54,67,81, Mashinsky disclosed " wherein said computer is configured to receive and store in said clearinghouse database coverage or reception quality information of one or more communications networks" [page 19, para 1-2].

67. As to Claim 55,68,82, Mashinsky disclosed " wherein said computer is further configured to serve coverage or reception quality data using coverage or reception quality information stored in said database" [page 25-27, page 28, para 1].

Conclusion

The prior art made of record

a.	US Patent No.	6169791
b.	US Pub. No.	2004/0076283
c.	US Pub. No.	20070198339
d.	WO 00/36815	

Examiner's Note: Examiner has cited particular columns and line numbers in the references applied to the claims above for the convenience of the applicant. Although the specified citations are representative of the teachings of the art and are applied to specific limitations within the individual claim, other passages and figures may apply as well. It is respectfully requested from the applicant in preparing responses, to fully consider the references in entirety as potentially teaching all or part of the claimed invention, as well as the context of the passage as taught by the prior art or disclosed by the Examiner.

SEE MPEP 2141.02 [R-5] VI. PRIOR ART MUST BE CONSIDERED IN ITS ENTIRETY, INCLUDING DISCLOSURES THAT TEACH AWAY FROM THE CLAIMS: A prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention. W.L. Gore & Associates, Inc. v. Garlock, Inc., 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983), cert. denied, 469 U.S. 851 (1984) In re Fulton, 391 F.3d 1195, 1201,73 USPQ2d 1141, 1146 (Fed. Cir. 2004). >See also MPEP §2123.

In the case of amending the Claimed invention, Applicant is respectfully requested to indicate the portion(s) of the specification which dictate(s) the structure relied on for proper interpretation and also to verify and ascertain the metes and bounds of the claimed invention.

The prior art made of record, listed on form PTO-892, and not relied upon, if any, is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Srirama Channavajjala whose telephone number is 571-272-4108. The examiner can normally be reached on Monday-Friday from 8:00 AM to 5:30 PM Eastern Time.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kim, Charles, can be reached on (571) 272-7421. The fax phone numbers for the organization where the 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)

/Srirama Channavajjala/
Primary Examiner, Art Unit 2157.

Notice of References Cited	Application/Control No. 12/815,165	Applicant(s)/Patent Under Reexamination RAPPAPORT, THEODORE S.	
	Examiner SRIRAMA CHANNAVAJJALA	Art Unit 2157	Page 1 of 1

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*	C	US-2004/0076283	04-2004	Egan, Thomas A.	379/325
*	D	US-2007/0165805	07-2007	ALTBERG et al.	379/114.13
*	E	US-2002/0136391	09-2002	Armstrong, Bruce	379/242
*	F	US-2005/0201525	09-2005	Hudson, Douglas	379/001.01
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	J	US-			
	K	US-			
	L	US-			
	M	US-			

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	O	WO 03/039119	05-2003	PCT	Birgerson,Joakim et al	
	P					
	Q					
	R					
	S					
	T					

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*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
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12/815,165	06/14/2010 RULE	707	2157	110-009US

APPLICANTS

Theodore S. Rappaport, Residence Not Provided;

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

This application is a CON of 12/208,007 09/10/2008
which claims benefit of 60/971,175 09/10/2007
and claims benefit of 60/977,582 10/04/2007
and claims benefit of 61/028,261 02/13/2008

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

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Foreign Priority claimed	35 USC 119(a-d) conditions met	Verified and Acknowledged	Met after Allowance	STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
☐ Yes ☑ No	☐ Yes ☑ No	/SRIRAMA T CHANNAVAJJALA/ Examiner's Signature	☐ Initials		15	82	7

ADDRESS

PATENT LAW PROFESSIONALS
P.O. BOX 612407
SAN JOSE, CA 95161
UNITED STATES

TITLE

Clearinghouse System and Method for Determining Availability of Carrier-Based Services and Enhancing the Quality, Operation and Accessibility of Carrier-Based Networks

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	12815165
Filing Date	2010-06-14
First Named Inventor	Theodore S. Rappaport
Art Unit	2617
Examiner Name	
Attorney Docket Number	110-009US

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT **(Not for submission under 37 CFR 1.99)**	Application Number	12815165 12815165 - GAU: 2157
	Filing Date	2010-06-14
	First Named Inventor	Theodore S. Rappaport
	Art Unit	2617
	Examiner Name	
	Attorney Docket Number	110-009US

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Examiner Name	Abel Jalil Neveen
Attorney Docket Number	110-009US

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First Named Inventor	Theodore S. Rappaport
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	Examiner Name	
	Attorney Docket Number	110-009US

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	1	Infrastructure Audit for the campus center port, Prepared by: Tech knowledge consulting corporation March 2003	☐

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Examiner Name	
Attorney Docket Number	110-009US

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	First Named Inventor	Theodore S. Rappaport
	Art Unit	
	Examiner Name	
	Attorney Docket Number	110-009US

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	Attorney Docket Number	110-009US

	20	7164883		2007-01-16	Rappaport et al.	
	21	7171208		2007-01-16	Rappaport et al.	
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	1	The Wireless Clearinghouse - Request for Proposals: Planning, Data Gathering, Database development, and Website creation, Plattsburgh State University of New York, 2008. (http://www.cbnconnect.org/pdf/RFP-Wireless-Clearinghouse.pdf)	☐

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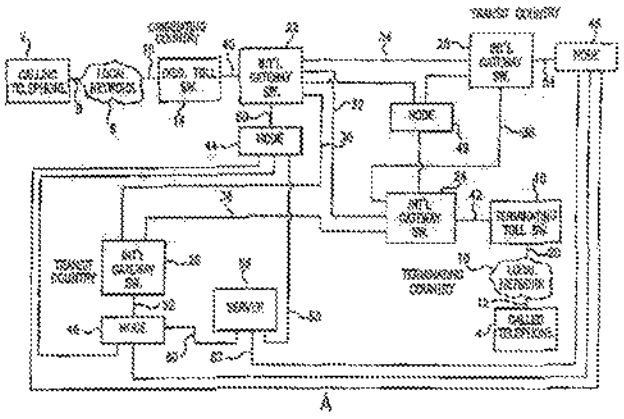
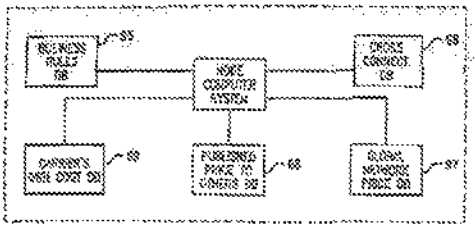
(54) Title: METHOD AND SYSTEM FOR GLOBAL TELECOMMUNICATIONS NETWORK MANAGEMENT AND DISPLAY OF MARKET-PRICE INFORMATION

(57) Abstract

A telecommunications system and method for flexibly routing telecommunications in an efficient manner using resources that are traded in a market. The system basically comprises at least one calling and called telephones (2 and 4), respectively. Telephone (2) is connected to a local telephone network (6), in turn, connected to an originating toll switch (14) via telecommunications medium (16) by local loop (8). As the same configuration to called telephone (4), terminating local network (10), and terminating toll switch (18) via communications links (12 and 20). International gateway switches (22–26) each connects to respective toll switch and service node (44–49) for transceiving data messages among other gateway switches having variable of signaling protocols of different telecommunication providers. The system further comprises a server node (36) operates as a distributed network of servers. Server node (36) determines cost-efficient routing paths for calls connected via the international gateway network.





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METHOD AND SYSTEM FOR GLOBAL TELECOMMUNICATIONS NETWORK MANAGEMENT AND DISPLAY OF MARKET-PRICE INFORMATION

This application is a continuation-in-part of U.S. Serial No. 09/129,413 filed August 5, 1998, U.S. Serial No. 08/927,443 filed September 11, 1997, and U.S. Serial No. 08/920,567 filed August 29, 1997, all of which are hereby incorporated by reference.

Background of the Invention

The cost of a long distance telephone call is usually paid by the calling party rather than by the called party. Payment for the call is typically collected from the calling party by the carrier that originated the service, either directly or through the agency of the caller's local telephone service provider. Consequently, when a call is placed from a first location served by an originating carrier to a second location served by a different terminating carrier, provision must be made to share with the terminating carrier some of the revenue collected by the originating carrier from the calling party.

For international telephone calls, this revenue sharing has traditionally been accomplished through the use of settlement agreements. Settlement agreements typically establish an accounting rate related to the cost of connecting the call between the countries, and specify how the accounting rate will be split between the two carriers. This split is typically 50-50.

For example, assume that a United States carrier and an overseas carrier negotiate a settlement agreement with a one dollar per minute accounting rate and a 50-50 revenue split. In accordance with the agreement, the U.S. carrier must pay 50 cents for every minute of connect time to called locations serviced by the overseas carrier. Conversely, the overseas carrier must pay 50 cents for every minute of connect time on calls terminated by the U.S. carrier.

As has been recognized, however, the negotiated

accounting rate is frequently significantly higher than the actual cost of completing the international call. See, e.g., Frieden, Accounting Rates: The Business of International Telecommunications and the Incentive to Cheat, 43 Federal Communications Law Journal 111, 117, which is hereby incorporated by reference. For this reason, and because outbound calling volumes from the United States are significantly greater than inbound calling volumes from many foreign countries, U.S. carriers make large outbound payments to overseas carriers. In large measure, these charges are ultimately passed on to rate payers.

This payment imbalance is exacerbated when overseas carriers route inbound U.S. traffic under their control via private telephone lines into the United States. In this way, the overseas carriers are able to avoid paying high accounting rate settlements for calls to the United States from their countries, while receiving high accounting rate settlements from U.S. carriers who are forced to route outbound U.S. traffic through the overseas carrier because the overseas carrier is a monopolist in its home country. Moreover, overseas carriers often employ these alternative less-expensive routings for inbound U.S. traffic despite express contractual provisions in settlement agreements prohibiting such behavior. These developments are occurring against a backdrop of increasing data communications. From a bandwidth use viewpoint, data communications today comprise the majority of all international telecommunication. Many of the activities of routing voice communications so as to bypass international settlements occur via voice over data networks, often in the form of voice over Internet Protocol (IP).

To date, U.S. carriers have been forced to suffer such payment imbalances and have no immediate way to respond to breaches of contract by overseas carriers because of the significant time and expense required to reconfigure the telecommunications network to reroute calling traffic. The cumbersome reconfiguration process gives foreign carriers the opportunity to route inbound U.S. traffic via private lines,

and otherwise run up settlement balances, without fear of retaliation from U.S. carriers.

More generally, this inflexible routing structure precludes telephone service providers from taking advantage of fluctuations in world-wide telephone rates. It would be desirable to provide a way (e.g., through dynamic routing) to respond to rate changes so as to increase the efficiency of the telecommunications infrastructure and pass the savings on to the consumer. There is also a need to provide telecommunications carriers and others (e.g., investors) with means to dynamically purchase and sell blocks of telephone connection time and bandwidth.

The need for flexible allocation of connection routes and for an ability to trade connection bandwidth accordingly exists not only in the international arena but also in any national market that allows competition in the field of telecommunications.

Summary of the Invention

The present invention provides a system and method for flexibly routing telecommunications in an efficient manner using resources that are traded in a market. In a preferred embodiment, service providers (typically telecommunications carriers) submit information to a server node, which is a component of a global network. This information constitutes a service offer, which contains cost and service parameter data for routing a communication from a first location to a second location. The server node receives all of the submitted service offers, evaluates them, and generates a rate-table database. The database contains prices and associated efficient routing paths for connecting any two or more (e.g., for conferencing) locations in a telecommunications network and the parameters (e.g., quality, bandwidth, etc.) related to these routing paths. The server node may be programmed to substantially optimize the rate-table database with respect to one or more parameters, such as price, telecommunications network utilization, return traffic volumes, and others.

Service requesters (typically also telecommunications carriers) submit service requests to the server node, which identifies efficient routes that meet the requesters' requirements, and brokers sales of telecommunications resources (or connect time) from service providers to service requesters. Connect time may be purchased on a transaction-by-transaction (e.g., call-by-call) basis or in larger blocks. Purchasing a block of connect time is akin to reserving a block of telecommunications resources (e.g., a telecommunications path with specified parameters such as bandwidth and call-termination services) for the use of the service requester. Bulk-reservation requests may be submitted manually by a systems manager at the service requester (typically through the use of a terminal or other device equipped to submit such requests), or automatically by a telecommunications node associated with the service requester. Often, a service requester will also be a service provider. The telecommunications node may be programmed to dynamically monitor current volume and sell or buy telecommunication time or bandwidth on the basis of the actual and predicted demand.

The server node administers all aspects of the trades and the resulting changes in global network operations, billing, and settlements. The functions of the server node may include authentication of carriers, matching service requests with service offers, risk management, financial transactions, settlement, contract management, tracking the physical links connecting different portions of the global network, administering telecommunications nodes, updating the rate-table database, and ensuring the synchronization of all instances of that database.

When a carrier wishes to establish telecommunications (for example, a voice call) via a route it had purchased (bulk-reserved) through the global network, the carrier (service requester) passes supervision to a local telecommunications node of the global network, which establishes transmission via the bulk-reserved routing path. Alternatively, the service requester may choose to have the

global network use the rate-table database to route its calls (subject to parameters established by the service requester) on a call-by-call basis over telecommunication resources offered by service providers through the server node. The local telecommunications node can compare the cost of providing service through the carrier's own network with the cost of providing it via the server node of the global network. If internal costs are within acceptable margins of the cost available in the global network, the telecommunications node may hand control of the call back to the carrier's international gateway switch. If all internal resources are occupied or if the price advantage available through the network exceeds a pre-established threshold value, the server node may continue to process the request. When the request for service reaches the server node, it evaluates the availability of matching resources based on criteria pre-established by the requester or included in the request. If a match is found, the server node acts to clear the transaction as described herein. If a match is not found, the server node signals the telecommunication node that the request is rejected. The telecommunication node may then attempt to complete the call using other means available to the carrier. The global network will permit carriers who reserved blocks of specific route capacities from service providers to resell that reserved capacity or portions thereof either as reservable bulk capacity or on a call-by-call basis. In this case, the service requester also plays the role of a service provider.

When necessary, the global network employs particular SS7 codes, C7 codes, C5 codes, IN codes, or other data messages (or combinations of the above based on the technological capability of various switches / gateways in the routing path) to inform a switch in the routing path that an incoming telecommunication transaction is in transit to a different location, and is not for termination at the location of the switch. In this way, switches can distinguish terminating traffic from transit traffic and set rates for transit traffic

without invoking settlement agreement accounting rates.

In a preferred embodiment the global network is capable of displaying market-price information related to the supported telecommunications routes to prospective sellers (service providers) and buyers (service requesters) of connection time. This display is preferably in the form of a streaming banner generated by a Java applet running on the customer's PC. Buyers and sellers can, by clicking on a specific displayed component, initiate an offer to provide or request services in the context of the clicked component.

While the preferred embodiments are described in terms of a calling telephone and a called telephone, it will be understood that the invention may be practiced using all manner of user equipment. By way of example, but not limitation, this user equipment may include answering machines, fax machines, video conferencing equipment, local switches (such as in hotels or offices), voice synthesis/recognition equipment, dialers, answering services, routers, bridges, access devices, and computers.

Moreover, while some of the preferred embodiments are primarily described in terms of a voice telephone call from a calling telephone to a called telephone, it will be understood that the global network of the present invention may embrace all classes of connectivity, including by way of example, but without limitation, data transmissions, voice over IP, PSTN transmissions, ATM, FR, packet network transmissions, and virtual networks. Furthermore, transmissions may be routed via paths composed of calling-legs which employ different transmission technologies, both wired and wireless.

Brief Description of the Drawings

The above summary of the invention will be better understood when taken in conjunction with the following detailed description and accompanying drawings, in which:

Fig. 1A is a block diagram of a telephone system architecture suitable for implementing the global network of the present invention;

Fig. 1B is a block diagram of a telecommunications node and associated databases;

Fig. 2 is a flowchart depicting the steps performed in determining a rate-table of cost-efficient routing paths;

Fig. 3A is a schematic representation of a template for placing a service offer;

Fig. 3B is a schematic representation of a template for placing a bulk-reservation request;

Fig. 4 is a schematic representation of a rate-table database;

Fig. 5 is a flowchart depicting the steps performed in brokering a sale of telephone connect time;

Figs. 6A-C schematically represent illustrative states of rate-table database 400 at various points in a telephone connect time transaction;

Fig. 7 is a flowchart depicting a call-routing operation of the global network of the present invention;

Fig. 8 is a flowchart depicting in greater detail a first portion of the call-routing operation depicted in Fig. 7;

Figs. 9A-B are a flowchart depicting in greater detail a second portion of the call-routing operation depicted in Fig. 7;

Fig. 10 is a flowchart depicting in greater detail a third portion of the call-routing operation depicted in Fig. 7;

Figs. 11A-B are a flowchart of a protocol for purchasing connect time on a transaction-by-transaction basis;

Fig. 12 is a flowchart depicting dynamic control of available telecommunication capacity by a telecommunications node;

Fig. 13 is a block diagram of a telephone system architecture comprising a market-price monitoring subsystem;

Fig. 14 is a block diagram of a preferred embodiment of the market-price monitoring subsystem;

Fig. 15 is a schematic representation of a preferred embodiment of a market-price database;

Fig. 16 is a schematic representation of a preferred

embodiment of a customer database;

Figs. 17A-B are a flowchart depicting an aspect of the operation of the market-price monitoring subsystem; and

Fig. 18 is an example of a webpage suitable for displaying market-price information to a customer.

Detailed Description of the Preferred Embodiments

Fig. 1A shows a telecommunications system architecture, which may for example be a telephone system architecture, suitable for implementing the global network of the present invention. As shown in Fig. 1A, the architecture preferably comprises a calling telephone 2 from which a calling party may place a telephone call to a called telephone 4. Calling telephone 2 is connected to a local telephone network 6 by a local loop or another connection, such as an ISDN line, represented schematically by line 8. Local telephone network 6 and line 8 are both typically owned and maintained by the caller's local telephone service provider. Called telephone 4 is similarly connected to a local telephone network 10 via a local loop or another connection, schematically represented by line 12. Local telephone network 10 and line 12 are typically owned and maintained by the called party's local telephone service provider.

Also shown in Fig. 1A is an originating toll switch 14 typically maintained by a long distance carrier. Originating toll switch 14 is connected to local telephone network 6 preferably via both signaling and transmission lines, which are jointly schematically represented by line 16. The signaling lines may, for example, form part of the SS7 network. The transmission lines carry voice and data transmissions between local telephone network 6 and originating toll switch 14.

Fig. 1A also shows a terminating toll switch 18 typically maintained by the called party's long distance provider. Terminating toll switch 18 is connected to local telephone network 10 via both signaling and transmission lines, which are jointly schematically represented by line 20. The

signaling lines may, for example, form part of the SS7 network. The transmission lines carry voice and data transmissions between local telephone network 10 and terminating toll switch 18.

The system architecture also comprises an originating international gateway switch 22 which routes and carries calls placed from calling telephone 2. Originating international gateway switch 22 forms part of a global network of international gateway switches which includes terminating international gateway switch 24, as well as transit country international gateway switches 26,28. Each pair of gateway switches in the international gateway network is preferably linked by signaling and transmission lines, represented schematically by lines 30-38.

As will be recognized, the international gateway switch, toll switch (terminating or originating), and local network in a particular location may be owned and maintained by the same or different business entities, depending on the location's regulatory environment.

Originating international gateway switch 22 is preferably connected to originating toll switch 14 via signaling and transmission lines, schematically represented by line 40. Similarly, terminating international gateway switch 24 is preferably connected to terminating toll switch 18 via signaling and transmission lines, schematically represented by line 42. The signaling lines may, for example, form part of the SS7 network. The transmission lines carry voice and data transmissions between the two international gateway switches and their respective toll switches.

Although Fig. 1A shows only four international gateway switches (22-28), a person skilled in the art will understand the architecture presented here may be generalized for any number of such gateway switches. Also, a person skilled in the art will understand that the status of a gateway switch as originating, terminating, or transit will be determined by the SS7 signaling network or other data message such as a data message transmitted in accordance with a proprietary signaling

protocol. One skilled in the art will understand the structure of an analogous network architecture in a domestic market having different telecommunication providers.

The system architecture further comprises a network of telecommunications nodes 44-49. Each node in the network may be associated with one of the international gateway switches 22-28 and may be connected to its respective international gateway switch via data lines 50-54. Alternatively, a telecommunications node may be associated with multiple international gateway switches, e.g., telecommunications node 49. As described in further detail below, telecommunications nodes 44-49 comprise an overlay network which co-exists with the gateway network and manages the routing of certain calls carried via the gateway network. Nodes 44-49 may be owned by the same entity as the one that owns the switch or switches with which each is associated, or by a different entity. The location of telecommunications nodes 44-49 may be chosen as a function of economic considerations. In a preferred embodiment, nodes may be distributed so as to minimize the cost of interconnection of carriers to the network.

As shown in Fig. 1B, each node 44-49 is preferably provided with:

a carrier's-own-cost database 99 (one for each carrier associated with the node), which stores information regarding the internal cost to a carrier to connect a call from potential originating locations to potential terminating locations;

a published-price-to-others database 98 (one for each service requester associated with the node), which stores the price published by a service requester offering to connect potential originating locations to potential terminating locations;

a global-network-cost database 97, which stores information regarding the cost of various routes for connecting potential originating locations with potential terminating locations. As described in more detail below, this information is received from server node 56 in Fig. 1A,

and represents the portion of the rate table database that is relevant to the carrier(s) served by this telecommunications node.

In addition, telecommunications nodes 44-49 may further preferably provided with:

a cross-connect database 96 (one for each carrier associated with the node), which stores information regarding the physical transmission facilities maintained by a service provider, the technologies the facilities support (e.g., circuit-switched voice, ATM, internet, etc.), and the names and locations of other carriers with which the carrier's facilities interconnect. This information is used to map the available physical interconnections of the global network;

A business-rules database 95 (one for each service provider and service requester associated with the node), the purpose of which are described below.

The telecommunications node network further comprises a server node 56. Although shown in Fig. 1A as a single node, server node 56 may instead be implemented as a distributed network of servers. Components of the distributed network may be incorporated in nodes 44-46. Each telecommunications node 44-48 in the telecommunications node network is connected to server node 56 by data lines 58-62 respectively. Each data line preferably has a bandwidth of at least 64 Kb/s. As described in more detail below, server node 56 stores rate and possible routing information and determines cost-efficient routing paths for calls transmitted via the network. Server node 56 also clears transactions and coordinates the routing of all calls managed by the overlay telecommunications node network. Server node 56 may be owned by the same entity that owns one or more of telecommunication nodes 44-49, or by a different entity.

As shown in Fig. 2, server node 56 determines cost-efficient routing paths for calls connected via the international gateway network in three stages: (1) collecting information; (2) evaluating the collected information; and (3) generating from the collected information and a network

topology map, a rate-table comprising cost-efficient routings for every pair of switches in the international gateway network. The network topology map may include both circuit-switched and packet-switched networks as well as gateway platforms disposed as part of telecommunications nodes 44-49.

In stage (1), the system collects information from international carriers (service providers) around the world who have submitted service offers to the server node. Each record of rate information includes the price charged by a service provider to route a call from a first location to a second location as well as call-volume capacity and service related parameters. These parameters may include quality, reliability, security of the transmission, legal restrictions (e.g., termination restrictions), post dial delay (PDD), type of service (e.g., circuit-switched voice, fax, data, video, messaging services, voice mail, e-mail, paging, universal mailbox), the transmission technology employed on the link (e.g., ISDN, ATM), the coding technology used (e.g., voice codecs, data compression techniques), and the signaling method necessary to control the resources offered (e.g., SS7, H.323).

Preferably, carriers (service requesters) placing a service offer will enter information via a template 300 which may be accessed at a world-wide-web secure site connected to server node 56. Alternatively, carriers who own and maintain international gateway switches, such as switches 22, 26, and 28, or who own and maintain a telecommunication node 44-48, may transmit rate information to server node 56 via telecommunications nodes 44-48. Fig. 3A illustrates one suitable arrangement for such a template. As shown in Fig. 3A, the template comprises a plurality of fields for entering information regarding an offer of service. Illustratively, these fields may include:

offer-number field 301;
provider-name field 302;
provider-identification-number field 304;
password field 306;
date/time-submitted field 308;

quality field 310 (stores the quality rating for the connection);

originating-location field 312 (stores the originating location for the offered service; where multiple gateway switches per location exist, the gateway address from which the service is offered will also be specified);

terminating-location field 314 (stores the destination location for the offered service; this may take the form of a country code, if the service is available to anywhere in the country, a country and area code, if the service is available only to particular areas in the country, or an entire destination number, if service is provided only to particular called telephones; where multiple terminating gateway switches are capable of routing the call, the specific gateway address offered will be specified);

bandwidth/time-available field 318 (stores the bandwidth/time available in, e.g., Mgbs or minutes per month);

number-of-circuits field 320 (stores the maximum concurrent number of communication connections that can be handled by the provider);

price field 322;

hours-of-operation field 324 (stores the hours of operation (which may be specified in terms of time of day, date, and/or days of the week) during which bulk-reserved connect time may be used at the price specified; time is preferably specified in universal terms such as Universal Time (UT); the price and hours-of-operation fields may be employed to construct a table listing distinct prices for distinct periods of time; this information may also be displayed in calendar form).

In addition, the template may preferably comprise the following fields:

service-type field (stores the type of service offered, e.g., voice, fax, data, video);

post-dial-delay (PDD) field (stores the maximum post dial delay for communication services included in the offer);

valid-from field (stores the date on which the offer is

available for purchase);

valid-until field (stores the date until which the offer is available for purchase);

usage-pattern field 320 (stores a representation of permissible patterns of usage for the offered service. For example, limits on usage patterns may be specified in terms of the maximum number of concurrent communication links that may be maintained during specific time intervals. The field may specify distinct usage patterns for weekdays, weekend days, and holidays. In addition, this field may also store values for guaranteed throughput, peaking characteristics (burst capacity) above guaranteed throughput, etc. Permitted usage patterns may also be specified in terms of a mathematical formula, e.g., in the form of L = f(t), where L is the number of concurrent links permitted as a function of the time t. This field may preferably be presented as a calendar structure.)

legal-restrictions field (stores information on legal (e.g., regulatory restrictions) that may affect use of the connect time or price);

payment-terms field (stores any special payment terms required by the provider);

compression-level field (stores the maximum level of compression that will be employed in transmission);

compression-type field (stores the type of compression used; this is especially useful in matching encoding and decoding (transcoding) gateways so as to avoid multiple transcoding, thus permitting higher quality end-to-end connections through appropriate matching of resources along the selected route);

equipment-type field (stores the type of equipment employed by the service provider);

signaling-compatibility field (stores the signaling protocols which the provider can handle, e.g., SS7, IN, H.323); and

maximum-latency field (latency in this context is the aggregate delay due to such causes as transcoding, congestion

at a router, satellite, etc.).

Also, the template may preferably further comprise:

provide-local-termination? field;

provide-settlement? field;

via-private-line? field;

length-of-contract field;

via-satellite? field;

termination-options? field and

carrier-preference field,

the purposes of which are described below.

As those skilled in the art will recognize, the above list of fields is merely illustrative of fields which template 300 may comprise. Template 300 may include fields for additional or different information (e.g., business considerations), which would aid server node 56 in making routing decisions and brokering transactions between service providers and service requesters.

In a preferred embodiment, three levels of passwords are issued by server node 56. A first level password permits the password holder to access published rates, but does not permit the password holder to either buy (request service) or sell (offer service) time via server node 56. A second level password permits the password holder to buy (request), but not sell (offer), connect time through server node 56. A third level password entitles the password holder to either buy or sell connect time via server node 56. Thus, service providers submitting template 300 would be required to possess a third level password, since the template represents the interface required for offering service.

In one preferred embodiment, all routes listed on a single template are of the same quality. Thus, as shown for example in Fig. 3A, each template is preferably provided with only a single quality field. Service providers who wish to offer additional routes of a different quality, would do so on a different template. Also, all routes listed on a single template are preferably for the same service type. As those skilled in the art will recognize, other arrangements of

templates may alternatively be employed.

Similarly, in a preferred embodiment, all routes listed on a single template are from the same originating location. Thus, as shown for example in Fig. 3A, each template is preferably provided with a single originating-location field 312. Where multiple gateway switches per country exist, the address of the gateway switch from which the service is offered will also be specified. Service providers who wish to offer connectivity from additional originating locations, would (in this embodiment) do so on a different template.

As shown in Fig. 3A, template 300 may comprise two or more hours-of-operation fields 324, number-of-circuits fields 320, price fields 322, and bandwidth/time-available fields 318 for each route listed by a service provider. This permits service providers to offer different prices for service at different times of the day and week. It also accommodates the practice of many service providers to employ a graduated pricing scale. In a graduated pricing scale, the rate charged for connect time up to a certain capacity (e.g., 300k minutes/month) is different from the rate for connect time above that capacity. Similarly, a service provider could offer a certain price up to a specific number of circuits, then offer the same connection at another (e.g., higher) price for the remaining available circuits.

Illustratively, as shown in Fig. 3A, a service provider might list more than one price for service from the United States to Korce (city code 824) in Albania (country code 355). For example, for purchases under 300K minutes per month, the service provider might charge 62.5 cents per minute for calls Monday through Friday 22:00 to 08:00 UT and Saturday and Sunday 12:00 to 18:00 UT. In contrast, for purchases above 300K minutes per month, the service provider might charge 59.8 cents per minute for calls Monday through Friday 20:00 to 24:00 UT, and Saturday and Sunday from 05:00 to 16:00 UT. The days of the week are only one method of classifying time. Special days - e.g., Mother's Day, Christmas - should also be specifiable. The template may include a calendar

representation for ease of use.

Also shown in Fig. 3A is an initial trading date and time field 326, which is automatically completed based on the content of field 308. Field 308 is automatically time stamped in synchronization with a universal clock maintained by server node 56. This date reflects the precise day and time that the service offer will be available on the global network. As noted on template 300, sellers are required to submit rate information some predetermined amount of time prior to the initial trading date (e.g., three days). This gives server node 56 time to process received rate information, and generate rate-tables therefrom, as described in more detail below. As those skilled in the art will recognize, the predetermined time before a service offer becomes valid may be modified in accordance with the capabilities of the global network to calculate and deploy new rates and routes, and subject to human-factor limits on rational decision-making intervals. These decision intervals can be shortened through the use of computer-trading tools by buyers and sellers. These tools can be a part of the carrier interface mechanism provided by the global network to its traders, or can be independently developed and provided.

As noted, the template may comprise additional fields not shown in Fig. 3A. For example, template 300 may include a field provide-local-termination? which stores a boolean value indicative of whether the service provider will provide local termination for the call in the location stored in terminating-location field 314 for the price quoted. Local termination might not be possible for several reasons. For example, termination might be forbidden by local regulation or the service provider might not have the equipment necessary to terminate calls in a particular location, or may not have a termination agreement (independent of the global network) with a company able to provide such service.

Template 300 may further comprise a boolean provide-settlement? field. Certain service providers are required by law to route calls in a manner such that a settlement

agreement with the terminating country is invoked. Settlement agreements are invoked when a call is transmitted via the Public Switched Telephone Network (PSTN) but not when routed via private or data lines. It may therefore be important for server node 56 to establish whether a particular route offered by a service provider will trigger settlement.

Template 300 may further comprise a boolean via-private-line? field. As described in more detail below, this permits server node 56 to accommodate service requesters who do not want to purchase connect time on routes which employ private lines.

Template 300 may further comprise a boolean via-satellite? field. As noted below, server node 56 may combine services provided by more than one service provider to create a calling route from a first location to a second location. As known in the art, the quality and post dial delay of a connection employing two satellite links in a route are often unacceptable. This field permits server node 56 to avoid routing paths which employ more than one satellite link to connect the calling location and the called location.

Template 300 may further comprise a termination-options field. Illustratively, a service provider might offer fax bypass capability as a termination option. Fax bypass provides a way for substantially decreasing the cost of fax transmissions. Typically, fax transmissions are sent via telephone lines which are subject to settlement at high accounting rates. In fax bypass, a node in the route recognizes the fax tone of the fax transmission and reroutes the call via a data line. In this way, the fax may be transmitted at significantly reduced cost. In addition, as those skilled in the art will recognise, other termination options might be listed such as voice over IP. The termination option may be significant where the particular type of codec and signaling used for determination may have to be matched by the service provider.

As those skilled in the art will recognize, the types of services traded on the global network may be varied, and may

include messaging services (voice mail, e-mail, universal mailbox, fax, paging), conferencing, Internet access, and other services. The price charged by service providers may depend on the telecommunications service offered; each may have a different rate assigned by the service provider. Furthermore, various levels of voice service may be provided, for example, dedicated lines and ISDN lines.

Template 300 may further include a carrier-preference field. This field may be used by carriers to exclude certain other carriers from buying (bulk-reserving) or using (on a call-by-call basis) the services offered. The field may also be used by carriers to offer special, reduced rates to certain other carriers with whom they partner. The seller may specify that this parameter overrides other parameters (i.e., that service should not be sold to the specified carriers under any circumstances) or alternatively may establish an explicit, specified cost margin that must be exceeded to override the preference against selling to the specified carriers.

After the system collects rate information from service providers around the world regarding cost and service parameters of routing various classes of calls from a first location to a second location, it proceeds to stage (2) of Fig. 2. In stage (2), the system evaluates the received information, in particular the service-related information such as transmission quality and reliability, and determines the accuracy of the provided parameters. Since server node 56 acts as the clearing house for telecommunication transactions, it is important that service requesters purchasing time from server node 56 trust the accuracy of server node 56's published service parameters. Consequently, server node 56 may independently evaluate the service parameter information received from service providers and/or otherwise authenticate the ability of carriers to provide the telecommunications services that they offer for sale. Server node 56 then assigns for each parameter (e.g., quality) a rating such as "A," "B," "C," etc. that is universally accepted by carriers participating in the global network. The evaluation is based

on information about the services of the service providers previously stored at server node 56. Server node 56 may upgrade or downgrade assigned parameters based on various considerations, e.g., the historical measurements and experiences of a particular service provider. Thus, for example, if server node 56 generally assigns satellite connections a "B" reliability rating, it might assign a particular satellite connection an "A" rating if that connection historically exhibits a higher level of reliability. The system may maintain ratings for a carrier and/or for particular routes serviced by the carrier. These ratings may be maintained adaptively, based on a smoothed average of measurements taken over time during calls.

In stage (3), server node 56 derives rate tables (from the collected rate information) which list the cost of connecting any two locations served by the telecommunications-node network via various routes, and any service parameters associated with each route. Preferably, server node 56 derives separate rate-tables for each class of service that may be provided by the global network (e.g., voice, data, video conferencing, etc.). This information is then stored in a rate-table database located in server node 56. Fig. 4 illustratively represents one possible arrangement for some of the data in rate-table database 400 representative of rates charged by different service providers for various routes.

As noted in my copending application, Serial No. 08/811,071, which is hereby incorporated herein by reference in its entirety, it will be recognized that a call from an originating location to a terminating location may be connected via a call routing path comprising several calling legs, each leg bridging two locations in a call routing path. Furthermore, as taught therein, each leg may be completed in either the forward or reverse direction. Thus, the routing paths determined and stored in rate-table database 400 may be formed by combining services provided by multiple service providers.

For example, if a first service provider submits a

template to server node 56 offering service from the United States to the United Kingdom at a first price, and a second service provider submits a template to server node 56 offering service from the United Kingdom to Germany at a second price, server node 56 may combine the two and offer the combination as a route from the United States to Germany at a price equal to the sum of the first price and the second price. In this case the price of the first leg should not include termination, since the United Kingdom gateway switch is used for transit only.

The associated service parameter information for a route takes into account both the evaluated parameters of the submitted rate information as well as other factors that may affect a parameter assigned to a route. For example, the quality rating of a route may be determined as a function of the type of link employed to carry communications via the route. In addition, although a route may comprise two "A" quality legs, the two legs in combination may not constitute an "A" quality connection because of substantial delays in establishing the two-leg call, or cumulative service-degrading effects of the serial combination of the two legs.

Often, the application determines in large measure the parameters of importance to the call. For example, the parameters (e.g., round-trip latency) which are important for an interactive voice call are different from those required for messaging (e.g., fax), instant messaging, or voicemail.

As further noted in my copending patent application Serial No. 08/811,071, the total number of possible routing paths between any two nodes in a network rises steeply as the number of nodes and the degree of their interconnection increase. As those skilled in the art will recognize, however, the number of routes for which rate-table entries need be calculated and stored may be kept to a manageable number for several reasons.

First, although the number of theoretically possible routes may be extremely high, many routes may be immediately excluded from the rate-table calculus because of legal or

other constraints. For example, local regulations may prohibit certain transactions, such as terminating traffic originated via a private line or terminating traffic except through the local gateway switch. Rate-table entries for such calling routes need not be calculated or stored.

Moreover, as those skilled in the art recognize, heuristic techniques exist for identifying with a reasonable degree of accuracy cost-efficient routes connecting two nodes in a network. Using such known heuristic techniques, the system may choose a reasonable number of cost-efficient routing paths, and calculate and store the cost and service parameters associated with each of these routing paths.

Furthermore, as known in the art, these heuristic techniques can be employed to find approximately optimum routes with respect to one parameter while imposing constraints with respect to other parameters. Thus, for example, such heuristic techniques may identify the most cost-efficient routes for each of several quality or security levels.

Illustratively, the system might calculate the costs of five (or more, depending on anticipated traffic volumes) cost-efficient routes connecting each pair of nodes for each defined level of quality and service. These five routes would be ranked according to some parameter, e.g., price, and stored in rate-table database 400 at server node 56 for each level of service. Also, as transactions are made and routes fill up, the system may determine additional routes adaptively given the new state of the network.

Furthermore, in accordance with the teachings of my copending application, Serial No. 08/727,681, which is hereby incorporated herein by reference in its entirety, a routing path may be constructed of several calling legs each of which employs a different technology. For example, a routing path might comprise a first leg transmitted over the public switched telephone network (PSTN), a second leg transmitted over an IP (Internet Protocol) network, and third leg transmitted over ATM. As taught in my application Serial No.

08/727,481, calling legs of different technologies (e.g., PSTN, packet network) may be transparently linked to provide end to end connectivity between a calling party and a called party, even though some of the intermediate legs of the routing path comprise technologies with which neither the calling party nor the called party is compatible. This may require the employment of transcoding gateway resources (e.g., a media transcoding device such as required for converting from Mu-Law to G.729 voice coding standards) which may be provided as part of telecommunication services, or offered by service providers and specialized transcoding gateway-resources providers selling their services over the global network.

Once the rate-tables have been computed and stored in the rate-table database 400, copies of the database may be transmitted to each telecommunications node 44-49 in the telecommunications node network. Alternatively, each node may receive only a subset of the rate-tables calculated by server node 56 as required or on request. For example, nodes in the United States may only receive rate-tables relating to routes originating from the United States. In an alternative embodiment, the telecommunication nodes may receive a version of the tables that does not comprise cost information.

Updated rate-tables are preferably generated by the system on a periodic basis, for example, bi-weekly. Alternatively, if the speed and power of the system's computer hardware and software permit, rate-table generation may be performed more frequently. Indeed, with sufficient computational power, the system may update its rate-tables each time a rate or service parameter in the network changes. Server node 56 will ensure that the use of each periodic update is synchronously triggered at all telecommunications nodes. This may be accomplished through means known in the art of concurrent database updating and distributed databases.

Server node 56 permits service requesters to purchase blocks of bandwidth/connect-time (using bulk-reservation requests) from originating to terminating locations, or to

purchase connect time on a transmission-by-transmission basis (through a call-routing request). The latter instructs the telecommunications node to route each call through the best (e.g., least expensive) compatible route available through the global network. Server node 56 acts as a clearing house for executing transactions between service providers who wish to offer connection services and service requesters who wish to purchase connection services. This aspect of the invention facilitates an open market for telecommunications services, allowing a service requester to purchase bandwidth at the lowest available price. The transaction clearing aspect of the present invention will be described in connection with two illustrative examples. The first example (Figs. 5 and 6A-C) illustrates a purchase of a block of connect time by a service requester using a bulk-reservation request, and connection of a call using a portion of the purchased connect time. The second example (Figs. 11A-B) illustrates the purchase of connect time on a call-by-call basis.

Beginning with the first illustrative example, assume that a U.S. carrier (service requester) wishes to purchase 10 million minutes of "A"-level quality and "B"-level reliability connect time to Germany for the month of September, 1999 at a price not greater than 23 cents per minute. In step 502, the U.S. carrier places a bulk-reservation request with server node 56 on the above terms.

Preferably, service requesters will enter bulk-reservation requests via a template 350 which may be accessed at a secure world-wide-web site connected to server node 56. Alternatively, service requesters who own and maintain international gateway switches, such as switches 22-28, may transmit bulk-reservation requests to server node 56 via telecommunications nodes 44-49. Traders (e.g., investors who are not carriers) not connected to the telecommunications nodes will enter their orders through the secure web site.

Fig. 3B illustrates one suitable arrangement for such a bulk-reservation request template 350. As shown in Fig. 3B, the template comprises a plurality of fields for entering

information regarding a reservation request. In a preferred embodiment, template 350 may comprise the following fields:

request-number field;
requester-name field;
requester-identification-number field;
password field;
date/time-submitted field;
quality field;
originating-location field;
terminating-location field;
bandwidth/time-requested field;
number-of-circuits field;
hours-of-operation field;

In addition, the template may preferably comprise the following fields:

service-type field;
post-dial-delay (PDD) field (stores the maximum acceptable post dial delay for the requested communications);
valid-from field;
valid-until field;
usage-pattern field;
require-local-termination? field;
require-settlement? field;
allow-private-line? field;
length-of-contract field;
sort-by field;
unacceptable-service-providers field; and
preferred-service-providers field.

As those skilled in the art will recognize, the above list of fields is merely illustrative of fields which template 350 may comprise. For example, fields analogous to most of the fields discussed in association with Fig. 3A may also be made part of template 350. Template 350 may include a field for any information that would aid server node 56 in making routing decisions and in brokering transactions between service providers and service requesters.

request-number field is a unique number assigned for

identification and audit purposes.

date/time-submitted field is the time stamp used, e.g., to adjudicate between two similar bulk-reservation requests, where service node 56 gives precedence to the earlier request.

valid-until field permits a requester to limit the time during which the request is pending; the request becomes void at the specified date and time unless an agreement with service providers is brokered by server node 56 before then.

originating-location field and terminating-location field 362 have meanings identical to their counterparts in Figure 3A (fields 312 and 314 respectively).

As noted above, some service providers may not be able to provide local termination for certain calls. Require-local-termination? field permits a service requester to indicate that it can provide its own local termination in the terminating location, and thus can employ service providers who do not have termination capability.

As noted above, some service requesters may require that calls be terminated in a manner that invokes a settlement agreement. Service requesters may indicate that this is so in require-settlement field.

usage-pattern field 320 stores a representation of anticipated patterns of usage for the service to be purchased. For example, limits on usage patterns may be specified in terms of the maximum number of concurrent communication links that may be required during specific time intervals. The field may specify distinct usage patterns for weekdays, weekend days, and holidays. In addition, this field may also store values for anticipated throughput, anticipated peaking characteristics (burst capacity) above guaranteed throughput, etc. Anticipated usage patterns may also be specified in terms of a mathematical formula, e.g., in the form of $L = f(t)$, where L is the number of concurrent links desired as a function of the time t. This field may preferably be presented as a calendar structure. This field enables the sharing of circuits by service requesters whose customers have complementary calling patterns.

quality field stores the overall quality ranking of the service desired by the requester. One component of quality is Post Dial Delay, which is specified separately in this preferred example.

post-dial-delay field stores the maximum number of seconds the service requester is willing to accept from the time dialing is completed to the time the called telephone starts to ring. This may affect the routes that may be allocated to a call since some routes, in particular those with many calling legs or satellite links, may take longer to connect than others.

As noted above, some service requesters may not wish a call to be transmitted via a private line. allow-private-line? field 374 permits the service requester to enter this information.

In sort-by field 376, the service requester ranks in order of importance the fields in the template relating to service parameters. For example, the service requester may rank quality as the most important field, maximum PDD as second most important, etc. As described below, server node 56 uses this information when it is unable to exactly match all service parameters contained in the service request.

In length-of-contract field, the service requester may enter the desired starting and ending date and time for which it wishes to bulk-reserve (buy) connect time. In a preferred embodiment, time may be specified in manageable units of granularity, e.g., 4 hours. For example, time periods may be specified to start and end at any of the following hours Universal Time: 00:00, 04:00, 08:00, 12:00, 16:00, and 20:00.

In unacceptable-service-providers field, the requester may place constraints on the carriers via which its traffic may be routed, or whose circuits are bulk-reserved. For example, a requester may want to avoid using the circuits of its direct competitors.

In preferred-service-providers field the requester may request that its traffic be transmitted by providers with whom the requester has special relationships, or only via one of,

e.g., 5 top carriers with respect to some parameter (e.g., quality) as ranked by server node 56. In another example, if a service requester needs to buy connect time to carry overflow traffic, it may request that it not be resold time on its own network that had originally been sold to a third party.

In addition, the template may comprise an additional field that specifies the technological properties of the communications that will be provided by the requester to the service provider. For example, the originating location may deliver voice/Internet Protocol that is encoded with a specific technology; the service provider(s) must then use a compatible codec en route to the called telephone. For example, a call may be delivered to a node 44-49 as packetized voice over Internet Protocol, encoded using the G.723.1 codec at 6.3 kilobits/sec, and then be routed as a PSTN telephone call as a result of a determination that such routing represents the most cost-efficient manner to connect the call. The availability of such transcoding services may be specified in a service offer.

As depicted in Figure 5, in step 502 a service requester places a bulk-reservation service request. Upon receipt of the purchase order at server node 56, the system proceeds to step 504, where server node 56 searches rate-table database 400 in ascending-price order for routes that meet the service requester's required parameters and that have available connect time for sale. When server node 56 identifies a route with available capacity, it allocates that capacity to fill the service requester's bulk-reservation request, as depicted in step 506. Steps 504-506 are repeated until either the bulk-reservation request is filled or until all available routes that meet the service requester's requirements have been exhausted, as depicted in steps 508 and 510, respectively.

Alternatively, the system may be programmed to match the service request to a route on the basis of a predetermined subset of parameters in the request. For example, server node

56 may match the service request to a route comprising the top 5 parameters listed in the sort-by field.

For example, assume that Fig. 6A represents the state of a portion of rate-table database 400 at the time that the bulk-reservation request for 10 million voice minutes at 25 cents per minute or less is received from the service requester. In that case, server node 56 would complete the loop described by steps 504-510 three times in filling the service requester's 10 million minute bulk-reservation request. At the conclusion of the third loop, two million minutes of capacity from the least expensive route, four million minutes of capacity from the second least expensive route, and four million minutes of capacity from the third least expensive route would have been allocated to fill the service requester's bulk-reservation request. Fig. 6B represents the state of rate-table database 400 at the conclusion of this illustrative example.

In step 512a, server node 56 sends a data message to every service provider participating in the routing path informing the service provider that a buyer has been found for the allocated block of connect time. In step 512b, the service providers transmit an authorization message to server node 56, authorizing the transaction. Alternatively, the server node 56 may be preauthorized to sell any time submitted by the service providers to the global network, subject to business rules (e.g., the exclusion of certain service requesters) if desired.

In step 512c, server node 56 transmits a service offer to originating telecommunications node 44 offering for sale the block of allocated connect time. In step 512d, originating telecommunications node 44 transmits an acceptance message to server node 56. In step 512e, server node 56 clears the transaction by adjusting the account balances of every service provider and service requester (whether a carrier or not) in the transaction to reflect the transfer of the allocated connect time to the service requester, and the transfer of the cost of the allocated connect time to the service providers,

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as described in more detail below, and transmits a confirmation message to all parties.

In a preferred embodiment, server node 56 may be operated by an entity that assures the ability of carriers and other participants to meet the financial commitments implied by their purchasing activities.

As those skilled in the art will recognize, allocated capacity may alternatively be measured using other capacity measures (e.g., max-number of concurrent calls at specific times of day/day-of-week/holiday schedules). Also, additional parameters such as blocking % at peak demand may preferably be taken into account by service node 56 when allocating resources.

In contrast, assume instead that rate-table database 400 is as shown in Fig. 6C. In that event, in response to a request for 10 million minutes at 23 cents per minute, server node 56 would complete the loop described by steps 504-510 twice, during which two million minutes from the least expensive route and four million minutes from the second least expensive route are allocated to fill the service requester's bulk-reservation request. In the example of Fig. 6C, however, the cost of all other routes connecting the U.S. and Germany is greater than 23 cents per minute. Consequently, after the second loop traversal, step 510 fails and the system proceeds to step 514.

In step 514, server node 56 transmits a data message to the service requester, informing it that its bulk-reservation request can not be completely filled at 23 cents per minute or less. The message also provides the service requester the next best price available to secure connect time between the United States and Germany (e.g., 28 cents per minute). Alternatively, server node 56 may identify rate-table entries with available connect time/band width on routes that satisfy a predetermined subset of the parameters specified in the request and transmit an offer to the requester offering to fill the remainder of its request with this service. For example, server node 56 may identify entries for routes

matching the 5 most important parameters as specified in the request's sort-by field. As depicted in step 516, the service requester may respond to the message from server node 56 in three ways.

First, the service requester may transmit an acceptance, in which case server node 56 allocates the connect time (including the connect time at 28 cents per minute) to fill the service requester's bulk-reservation request (step 518). In step 520, server node 56 clears the transaction in a manner similar to that described in steps 512a-e.

Second, the service requester may transmit a denial, in which case, server node 56 cancels the transaction, as depicted in step 522.

Third, the service requester may accept the available minutes of connect time that satisfy its price requirement even though the amount of reservable connect time is less than originally requested. In that event, server node 56 allocates the connect time which meets the service requester's terms to the service requester, as depicted in step 524. In step 526, server node 56 clears the transaction in a manner similar to that described in steps 512a-e.

Server node 56 maintains a running account for each carrier or other entity (e.g., investors or speculators desiring to trade resources on the global network) that either buys or sells connect time via the global network of the present invention. Thus, once authorization of a transaction has been given by server node 56 to the service requester, server node 56 adjusts the balances of the service requester and the associated service provider(s) to reflect the purchase of service by the service requester from the service providers. Periodically (e.g., monthly), server node 56 sends statements to buyers and sellers. Such statements may include bills for entities with negative balances and forward payments to entities with positive balances. In this way, server node 56 manages settlement of all accounts. In addition, the statements may be made available for online perusal via, for example, the world wide web. Server node 56 may also transmit

telecommunication status and other account status information to all buyers and sellers. This information may also be made available for online perusal via, for example, the world wide web.

Server node 56 also manages credit risks associated with the transactions and with the ongoing operations. In managing credit risks, server node 56 may reject some traders and/or carriers as bad risks, while others may have limits set on the value of telecommunications resources traded by them. This may be accomplished in combination with a financial services company.

If a carrier or other trader that purchased a block of connect time finds that it cannot use the purchased capacity, it may resell the connect time, either as blocks and/or one connect-transaction at a time (call-by-call) at a higher or lower rate than is originally paid depending on market conditions. Server node 56 may also support futures and derivatives markets for telecommunication resources (e.g., connect time). Carriers and other traders may also employ hedging techniques to protect themselves from large price fluctuations.

As those skilled in the art will recognize, the protocol described above for the purchase of a block of telecommunication time is illustrative, and other protocols may alternatively be employed. For example, the service requester may bulk-reserve a block of connection time satisfying particular service parameter requirements without specifying a price. In that event, server node 56 may identify a block of telecommunication time via one or more routes with the best available price which most closely matches the service parameters requested, and offer the block to the service requester.

In addition, the above protocol allocates capacity to requesters on a first-come-first-served basis. Thus, the above protocol allocates communications services to a requester without considering other service requests submitted before or after the request under consideration. In a further

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preferred embodiment an alternative protocol may employ alternative methodologies to allocate communications services to a plurality of requesters. For example, the protocol may identify all requests received within a period of time (e.g., one second) and allocate available communication resources to those requests in a manner designed to maximize the total amount of communication services sold. Illustratively, assume that for a given route and set of parameters that three service offers are pending in the server node, each for two million minutes, the first at 10 cents per minute, the second at 8 cents per minute, and the third at 6 cents per minute. Assume further that within a short interval the server node receives three requests, each for two million minutes on the given route. The first request offers to pay 6 cents per minute, the second request offers to pay 8 cents per minute, and the third request offers to pay 10 cents per minute. If the protocol follows a first-come-first-served methodology, then the server node would allocate the two million minutes offered by the 6 cent offer to the 10 cent request. In that event, the third (i.e., 6 cent) request would not be filled since the price of the remaining capacity is greater than the price offered by the requester. In an alternative embodiment, however, the protocol may concurrently process all three requests in order to maximize the amount of communication services sold by matching the 10 cent request to the 10 cent offer. This alternative embodiment may advantageously rank a plurality of received purchase requests as a function of one or more parameters, such as, e.g., price, network utilization, and/or quality. Preferably, the plurality of ranked purchase requests may be ranked in accordance with the same parameter or parameters used to rank service offers in rate-table database 400, in order to facilitate matching of offers and requests by server node 56. Also, the protocol may employ an auction methodology, such as, for example, a Vickrey-style auction, for allocating available communication services as between competing requesters. Alternatively, other auction methodologies may be employed. Also, the auction may match

all service requests received through a specific point in time with all service requests received through that same point in time, including requests and offers already matched in previous auctions in order to enable optimization of all resources based on the latest available information rather than optimizing only incremental activity.

An overview of a call-routing operation of the global network of the present invention will now be described in connection with Fig. 7. Each of the stages shown in Fig. 7 will then be explained in greater detail in connection with Figs. 8-10.

As shown in Fig. 7, a preferred embodiment employs a three-step process for routing any call from a calling telephone to a called telephone. In stage (1), a connection is established between calling telephone 2 and originating international gateway switch 22. In stage (2), the system allocates a routing path to connect the call to the called location. In stage (3), the routing path is established and the calling party is connected to the called party.

The three step process will be described using an illustrative example showing the routing for one exemplary call from an originating location to a terminating location. As those skilled in the art will recognize, this example presents a relatively simple set of potential call routings. However, as noted in my copending application, Serial No. 08/811,071, a call from an originating location to a terminating location may be connected via a path comprising many legs, each leg bridging two locations in a call routing path. Furthermore, as taught therein, each leg may be completed in either the forward or reverse direction based on the availability of connect time and of the service type requested, and the resulting cost.

When the present application is taken together with my copending application 08/811,071, those skilled in the art will recognize how the teachings of the present invention may be applied to the selection of desired call routings, including ones with many calling legs, both in the forward and

reverse direction.

The illustrative call routing example will now be described in connection with Fig. 1A. Turning to Fig. 1A, assume that the originating location for the call from calling telephone 2 to called telephone 4 is the United States and that originating toll switch 14 and originating international gateway switch 22 are owned and maintained by AT&T (TM). Assume further that the terminating location for the call is Germany, and that terminating toll switch 18 and terminating international gateway switch 24 are owned and maintained by a German telephone company which is a monopolist. Assume further that international gateway switch 28 is located in the United Kingdom (U.K.) and is operated by British Telecom (TM) (BT). Finally, assume that international gateway switch 26 is located in Belgium and is operated by Belgacom (TM), a Belgian carrier.

Assume further that the 10 million minutes of purchased connect time described above in connection with Fig. 5, is divided between three routing paths which connect AT&T's international gateway switch 22 to the German telephone company's international gateway switch 24. With reference to Fig. 1A, the first routing path connects the call directly to Germany's international gateway switch 24 via line 32. The second routing path connects the call to international gateway switch 24 via international gateway switch 28 in the U.K. and lines 34, 38. The third routing path connects the call to international gateway switch 24 via international gateway switch 26 in Belgium and lines 30, 36.

Stage (1) of the process shown in Fig. 7 will now be described in more detail in connection with the flowchart shown in Fig. 8. Turning to Fig. 8, in step 802, the caller dials the telephone number of called telephone 4 from calling telephone 2. The dialed number will typically comprise a prefix (such as 011) signifying that the call is an international telephone call. The dialed number will further comprise a country code (e.g., 49 for Germany) and area code (89 for Munich) representative of the overseas location to

which the call is being placed. Local telephone network 6 is programmed to recognize overseas calls and to route such calls to the caller's long distance carrier.

Thus, in step 804, local telephone network 6 transmits appropriate SS7 signaling information regarding the call to originating toll switch 14 via line 16. Supervision is thus passed to originating toll switch 14. Concurrently, in step 806, local telephone network 6 creates a path through the local network's transmission lines to establish a connection between calling telephone 2 and originating toll switch 14.

From the signaling information, originating toll switch 14 recognizes the call as an overseas call, and routes the call to originating international gateway switch 22. In particular, in step 808, originating toll switch 14 transmits appropriate SS7 signaling information to originating international gateway switch 22, thereby transferring supervision to switch 22. Concurrently, in step 810, the long distance network creates a path (circuit) through its transmission lines to establish a connection between calling telephone 2 and originating international gateway switch 22.

Thus, as described above, in stage (1) a transmission connection is established between calling telephone 2 and originating international gateway switch 22, and supervision for the call is passed to originating international gateway switch 22.

In stage (2), the system allocates a route for the call from calling telephone 2 to called telephone 4. Stage (2) is described in more detail in connection with the flowchart shown in Figs. 9A-B.

Turning to Fig. 9A, in step 902, originating international gateway switch 22 determines whether the called location is one to which it may route calls via the global network. If decision step 902 fails, international gateway switch 22 employs alternate means for connecting to the called location, as depicted in step 904. Otherwise, if decision step 902 succeeds, international gateway switch 22 passes supervision to originating telecommunications node 44, as

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depicted in step 906, for routing the call to the terminating location.

In step 908, telecommunications node 44 retrieves from memory the routing paths on which the originating carrier (service requester) has purchased connect time. As noted above, in connection with Fig. 1B, telecommunications node 44 is provided with several databases 97-99 which store information on the network cost, published cost, and global network cost for connecting calls to the called location. Thus, in decision step 909, telecommunications node 44 compares the various costs retrieved from databases 97-99, and determines whether to route the call via its own network connections, or via a route purchased through the global network.

Decision step 909 may incorporate a procedure which applies sophisticated business rules to determine whether to use internally available routes or to seek connection via the global network. For example, telecommunications node 44 might be programmed to route the call via a global network route, unless the cost of that route is greater than 80% of the network cost of connecting the call.

If decision step 909 chooses not to use the global network, the system proceeds to step 904, and connects the call via an alternative route (e.g., by passing supervision back to gateway switch 22). Otherwise, the system proceeds to step 915, where telecommunications node 44 sends a call-routing request to service node 56. The system then proceeds to Fig. 9B step 930, while simultaneously triggering a timer that is queried in step 920.

In step 930, server node 56 searches among the paths bulk-reserved by the service requester, and selects the best available circuit(s) for carrying the call given the service parameters on record. The system proceeds to step 940 to determine whether the identified circuit is available. In particular, server node 56 queries each telecommunications node in the path as to the availability of ports to carry the call.

If an appropriate circuit on a route previously bulk-reserved by the service requesters is available, the system proceeds to step 950, where server node 56 signals to telecommunications node 44 the identity of the available circuit. The system then proceeds to step 920, as described below. Otherwise, as depicted in step 945, steps 930-940 are repeated until either an available bulk-reserved circuit is identified, or until all bulk reserved routes have been examined. If no appropriate path previously bulk-reserved by the service requester is available, the system proceeds to step 955.

In step 955, service node 56 determines whether the agreement with the service requestor (or the specific call-routing request received) permits call-by-call routing over non-reserved circuits using resources available through the global network. If permitted, the system proceeds to Fig. 11A, step 1103 and a routing for the call is identified as described below in connection with Fig. 11. If call-by-call routing on non-reserved circuits is not permitted, the system proceeds to step 957.

As those skilled in the art will recognize, the search for an available circuit could be performed concurrently from among reserved and non-reserved (call-by-call) paths, which can be compared by node 56 and selected according to a pre-established policy dependent on a single or multiple criteria.

In step 957, service node 56 signals to telecommunications node 44 that no circuits are available through the global network, and the system proceeds to step 904 described above.

In step 920, if the identity of an available circuit has been signaled to node 44 within an allotted time period measured by the timer, the system proceeds to stage (3) of Fig. 7, where the identified route is established and the caller is connected to the called party. Stage (3) of Fig. 7 is described below in detail in connection with Fig. 10. Otherwise, the system proceeds to step 904, where supervision is returned to the originating gateway switch, which seeks an

alternative route not using the global network.

As noted in the background of the invention above, it has not been possible to date to cost-effectively and dynamically route calls via the international gateway network because of the lengthy contractual negotiations and physical reconfiguration which were required to establish new call routings. Without reconfiguration, the international gateway switches were unable to distinguish incoming terminating traffic from incoming transit traffic and could not dynamically redirect calls without human intervention. As a result, all incoming traffic was treated as terminating traffic subject to high settlement agreement accounting rates or was based on prenegotiated contracts and static links which could not be easily modified. As described in more detail below, the present invention overcomes this drawback of the prior art and permits dynamic routing of transit and terminating traffic to gateway switches in the gateway network or any other network.

For purposes of this example, assume that the routing decision made in stage (2) of Fig. 7 above is that the call from calling telephone 2 to called telephone 4 should be routed via international gateway switch 28 in the U.K.

The system then proceeds to step 1002 of the flowchart depicted in Fig. 10. In step 1002, AT&T's international gateway switch 22 establishes a transmission path to carry the call to international gateway switch 28 based on instructions from telecommunications node 44 regarding routing, signaling, the appropriate port with which to connect, and the destination number to employ. Concurrently, in step 1004, telecommunications node 44 transmits an SS7 (or C7 or other appropriate protocol) message to international gateway switch 28 via line 34.

The C7 message comprises a code which informs international gateway switch 28 that the call is not for termination in the U.K. (i.e., that the call is a transit call), and instructs switch 28 to pass supervision of the call to telecommunications node 48.

The particular C7 code used to inform international gateway switch 28 that the call is a transit call is unimportant as long as the gateway switch is configured to recognize the C7 code as indicating a transit call. For example, the originating gateway switch (under the control of telecommunications node 44) may send both call and signaling to the transit gateway switch, which will recognize the dial string as terminating elsewhere, and hence behave as a transit gateway switch.

With the trend towards deregulation, competition for services such as call completion would enable multiple, competing international gateway switches to terminate phone calls. Where this is the case, international gateway switch 28 will not be able to parse the dialed telephone number to derive the unique address of the intended terminating international gateway switch, which is one specific gateway out of multiple alternative options.

One way to address a specific country gateway switch is to enrich the addressing of country codes for this purpose. When international gateway switch 28 sees the enriched country code (dictated by telecommunications node 44), it immediately recognizes the call as a transit call to one specific gateway switch of several optional international gateway switches in Germany.

Another alternative is to insert a flag anywhere in the signaling stream that would force the transit gateway switch to pass supervision to telecommunications node 48 for routing instructions. A further alternative is to define a new class of service code, which may be transmitted as part of the C7 message.

Also, some telecommunications nodes may acquire a C7 point code, thus permitting a gateway switch to direct traffic to the node where this may be advantageous (e.g., for re-origination). Where C7 permits direct communication between transit gateway switch 28 and the German gateway switch 24, step 1005 depicts that capability. Otherwise, (e.g., when there may be more than a single gateway option for completing

the call in Germany) the system proceeds to step 1006. In step 1006, international gateway switch 28 passes supervision of the call to telecommunications node 48, which had been informed (through signaling over line 62 or using C7 signaling) by server node 56 of the call's route to Germany. In step 1008, telecommunications node 48 signals to international gateway switch 28 an instruction to complete the call to the telephone number of called telephone 4 in Germany.

In step 1010, international gateway switch 28 establishes a transmission path to carry the call to Germany's international gateway switch 24. Concurrently, in step 1012, international gateway switch 28 transmits a C7 signaling message to international gateway switch 24 informing switch 24 of an incoming call for termination in Germany. In step 1014, international gateway switch 24 routes the call through terminating toll switch 18 and local network 10 to called telephone 4, thus establishing a connection between the calling party and the called party.

When a call is terminated, every participating telecommunications node in the routing path transmits a data message to server node 56 containing the details of the call, including the duration of the call and other price-affecting parameters (e.g., quality). Server node 56 uses this information to credit account balances for every service provider who participated in the routing path, and debit the account of the service requester.

While the invention has been described in conjunction with specific embodiments, it is evident that numerous alternatives, modifications, and variations will be apparent to those skilled in the art in light of the foregoing description. For example, the recent availability of circuits on a specific route may be used as an indication that circuits on the route are presently available. In that case, instead of specifying a circuit number, the telecommunications node may signal to its associated international gateway switch an instruction to complete the call. If all circuits on the selected route are busy at the time the call is attempted

(which is some short interval after the availability of the circuit was initially probed), the caller hears an appropriate announcement. Another alternative would enable a telecommunications node (when probed by the server node for circuit availability) to seize the circuit. The actual call will have to arrive within a standard, short interval or else the seized circuit will be released.

As noted in my copending application 08/811,071, the speed of the system may be increased by synchronizing the concurrent establishment of two or more calling legs in a routing path. Thus, in the illustrative example given above, several of the steps might be performed in parallel such as establishing transmission paths from the U.S. to the U.K. and from the U.K. to Germany, in order to increase the speed of the system. For example, upon receiving a request or instruction to route a call, the U.K. node may verify that trunks are available to transmit the call to Germany, and that the destination, such as called phone 4, is available (on-hook).

It should be noted that when the gateway switches described above are IN compatible, server node 56 is aware of this fact and informs telecommunications node 44. Telecommunications node 44 may then interact directly with the U.K. gateway switch using IN signaling rather than SS7 or C7. In this event, telecommunications node 44 need not interact with U.K. telecommunications node 48. Moreover, if gateway switch 24 is also IN compatible, telecommunications node 44 may employ IN signaling to communicate directly with gateway switch 24 to determine, for example, whether called telephone 4 is off-hook.

More generally, when the present disclosure is taken in combination with my copending application Serial No. 08/728,670, which is hereby incorporated herein by reference in its entirety, it will be recognized that the present invention employs data lines to provide data signaling external to the telecommunications network in order to facilitate the efficient routing of calls. As will be

recognized, the degree to which external data signaling is required will depend on the ability of the telecommunications network's signaling capability to carry the data messages necessary to interoperate with the overlay network of the present invention.

In the first illustrative example described above, a service requester purchased (block-reserved) connect time. The global network can also satisfy call-routing requests on a call-by-call basis for carriers who have not reserved capacity on the relevant route or when bulk-reserved circuits are not available. A second example, which illustrates such a transaction will now be described in connection with Figs. 11A-B.

As shown in Figs. 11A-B, the system employs a multi-step protocol to clear a call-by-call connection transaction. In step 1101, when a call is received at gateway switch 22, the switch passes supervision of the call to telecommunications node 44. In step 1102, telecommunications node 44 transmits a call-routing request to at least one server node 56, and triggers an interval timer; the timer will be used by telecommunications node 44 to return call supervision to gateway switch 22 if the global network cannot provide a suitable circuit within an acceptable time interval, as described below. For purposes of this illustrative example, it will be assumed that telecommunications node 44 transmits a request to only one server node 56. As explained in greater detail below, however, telecommunications node 44 may transmit a service request to a plurality of server nodes 56 (co-located or distributed), each of which may be optimized for a different parameter, such as price or network utilization.

In step 1103, server node 56 processes the request and identifies the routing path which best meets the requirements of the requesting node given the optimization priorities of server node 56. For example, assuming that server node 56 is programmed to optimize routes by price, server node 56 would identify the least expensive routing path which meets the service parameter requirements of telecommunications node 44.

Note that step 1103 and the remaining process is also executed for service requesters who had reserved capacity, yet choose to avail themselves of the call-by-call routing service under certain circumstances (as depicted in Fig. 9B step 955).

In step 1104, server node 56 transmits an offer of service to telecommunications node 44 comprising the particulars of the identified route.

In decision step 1105, telecommunications node 44 compares the offer to other potential routes which might be employed to connect the call from calling telephone 2 to called telephone 4. This determination may be based on sophisticated business rules supplied to telecommunications node 44 by the service requester. For example, as noted above in connection with Fig. 1B, telecommunications node 44 is provided with a network cost database which stores the carrier's internal cost of connecting a call from gateway switch 22 to the called location. Telecommunications node 44 might be programmed to accept the offer from server node 56 only if it is 10% less expensive than the network's own internal cost of completing the call.

If decision step 1105 fails, telecommunications node 44 transmits a rejection message to server node 56. This ends the protocol.

Otherwise, if decision step 1105 succeeds, the system proceeds to step 1106 where telecommunications node 44 transmits an acceptance to server node 56.

In step 1107, server node 56 transmits data messages to every node in the routing path requesting service to connect the call. In step 1108, the nodes in the path agree to provide the service, and transmit a data message to server node 56 to that effect.

In step 1109, server node 56 brokers the financial transactions resulting from establishment of the routing path. As part of step 1109, server node 56 reserves a portion of the service requester's credit limit to cover the cost of the call. The reserved dollar amount is chosen based on an estimate of how long the call will last. This estimate may be

based on historical call lengths.

In step 1110, server node 56 transmits a confirmation message to telecommunications node 44, confirming purchase of connect time on the identified routing path. The message also preferably comprises information concerning the port on gateway switch 22 via which the call is to be routed, as well as destination numbers and other service data necessary to complete the call to the called location.

In decision step 1120, telecommunications node 44 compares the time elapsed from the initial call-routing request to the present, and rejects the resulting confirmation if the elapsed time exceeds the established maximum. Note that telecommunications node 44 returns supervision to gateway switch 22 when the max time has expired, not waiting for the aforementioned confirmation; hence, when the telecommunications node rejects the confirmation, the call is already being established independently of the global network.

In step 1130, service node 56 reverses all the transactions leading to the aforementioned confirmation, and resets all associated financial changes.

In step 1140, if the confirmation was received within the allotted time, the call is initiated following the established route (as previously described in relation to Fig. 10).

In step 1111, at the conclusion of the call, each node in the routing path transmits an end-of-transaction message (which may preferably include the length of the call) to server node 56.

In step 1112, server node 56 adjusts the account balances of all service providers and node operators participating in the routing to reflect the cost of the call. In step 1113, server node 56 settles the accounts of all carriers, trader accounts, and node operators by transmitting payment to parties with positive balances and bills to parties with negative balances. Step 1113 may be performed periodically, e.g., monthly.

In step 1114, server node 56 updates capacity to reflect that ports that had been employed to carry the call are now

clear and records the number of minutes of network time that were used to carry the call.

The nodes may also provide routing decisions based on sophisticated business considerations submitted by a service requester to its local node. Assume, for example, that a service requester only wishes to buy connect time via the global network if the cost is below 80% of its own cost unless it needs the connect time for overflow traffic. This business consideration can be transmitted to its local node which will evaluate routes proposed by server node 56 in accordance with the transmitted business considerations. Server node 56, however, will generally not have access to these proprietary business considerations, unless the system is a closed network where node 56 is employed to optimize capacity, rather than price, as described, for example, below.

As noted, in the above-described embodiments originating telecommunications node 44 was shown to communicate with server node 56, which constituted a single source of rate information and a single exchange for telecommunications capacity. In other embodiments, however, several server nodes may be used, which communicate with telecommunications node 44 in the same or similar way as discussed above. Server nodes may be collocated or geographically distributed. In such another embodiment each telecommunications node 44-49 would be connected to one or multiple server nodes.

In a multiple server-node embodiment, each server node 56 may rank potential routing paths in accordance with a particular parameter or set of parameters. For example, some server nodes may rank routes by price. Other server nodes may rank routes in a manner designed to maximize network utilization. A given service provider may offer its telecommunication capacity on one server node or on multiple server nodes. Because each server node may rank routes according to different priorities, a particular service query from an originating node might yield different proposed routes from each of the server nodes 56.

Consequently, an originating node, such as

telecommunications node 44, connected to multiple server nodes 56 must store selection rules for determining which route to choose from among the several that may be proposed by the different server nodes 56. The decision in selecting a server node may depend on various business factors and conditions specific to a service requester. For example some service requesters may first transact business with server nodes having lower transaction surcharge, while others may prefer server nodes that are known for availability of high volumes of connect time for sale.

A person skilled in the art will understand that a specific selection of choices may be programmed based on a carrier's specific business needs. For example certain carriers might have an affiliation or a special volume discount with a company providing telecommunication capacity which is available on only one specific server node. In such a case, the service requester might first attempt to purchase telecommunication capacity from the specific server node, which offers the affiliated company's connections before purchasing capacity on other server nodes. In another example, the service requester might prefer to purchase connect time from a server node with which it is affiliated, unless the price offered by that server node is, e.g., 10% greater than the price available from a second server node with which the carrier has no affiliation. Telecommunications node 44 is programmed to implement these business rules supplied to it by the service requester.

The present invention also permits a carrier who owns or is associated with a telecommunications node 44-49 to dynamically control its capacity in accordance with a set of business rules. With respect to this aspect of the invention, if a telecommunications node receives a volume of calls that exceeds or is close to the limit of its previously purchased connection capacity to a given destination, the telecommunications node can contact server node 56 with a request to purchase additional minutes of connect time to accommodate this unforeseen demand. Additional capacity may

either be requested automatically when a call volume reaches a specified threshold or by a system operator who monitors telecommunication traffic conditions.

Furthermore, a node may include a capability to adjust its resources based on the actual and anticipated telecommunication traffic conditions. It is known to keep track of call traffic volume to a given destination and to store measurements of the call volume periodically in a resource utilization database. Such data representing network utilization coupled with other variables, such as time of the day and day of the week, may provide a basis for a reasonable prediction of the capacity utilization during the next time interval, for example the next hour.

Then, if anticipated utilization exceeds a desired utilization level, the node would purchase additional capacity, e.g. connect time to a destination, for the next time interval. Conversely if the predicted utilization is lower than desired, the node would offer excess minutes during the next time period for sale.

For example, if the desired utilization is 80% of the purchased capacity, a node will purchase or sell capacity so as to adjust anticipated utilization to 80%.

Fig. 12 illustrates a flowchart of this functionality. At 1201 the system ascertains recent utilization by referring to the utilization database and at 1202 predicts, based on recent utilization and other factors such as time of the day and day of the week, the anticipated utilization for the next period, e.g., an hour. At 1203, if the anticipated utilization for a period is approximately the same as the desired utilization, this execution terminates until the next period. (Of course, as discussed before, if volume rises unexpectedly the node should react to such a situation and purchase additional capacity automatically or upon operator's instruction).

If anticipated utilization materially deviates from the desired utilization (test 1204), the node proceeds to purchase or sell capacity for the next period accordingly. If

utilization is predicted to exceed the desired utilization, at 1205 the node purchases additional capacity so that the anticipated utilization is at the desired level. Similarly if utilization is predicted to be lower than desired, at 1205 the system sells excess capacity to bring anticipated utilization to the desired level.

The desired utilization may take the form of a formula which incorporates business considerations. As a simple example, the node may be instructed to maintain utilization at 80% of capacity unless purchase of additional connect time is above a certain price, or sale of excess connect time is below a certain price. The business rules applied by the node may be substantially more sophisticated than the example described above, and may take into account any factor desired by carriers (requesters and/or providers).

In a preferred embodiment the system is capable of displaying market-price information to prospective sellers and buyers of connection time. As described below, display of market-price information may preferably be in the form of a streaming banner generated by a Java applet running on a client-PC located at the customer. In other embodiments, the information to be displayed may be in another form and/or displayed on another display device, as known in the art.

As shown in Fig. 13, in this preferred embodiment, the system architecture shown in Fig. 1A is preferably further provided with a market-price monitoring subsystem 1300. The structure and operation of market-price monitoring subsystem 1300 is described in connection with Figs. 14-18.

As shown in Fig. 14, market-price monitoring subsystem 1300 preferably comprises a processor 1310 that is connected to server node 56 via a communication link 1320. In addition, market-price monitoring subsystem 1300 further comprises a market-price database 1330 and a customer database 1340. As explained in more detail below, market-price database 1330 stores information regarding the market price of the telecommunication routes managed by server node 56. Customer database 1340 maintains a list of routes that are of interest

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to particular customers so that display of market-price information may be customized for each customer. Subsystem 1300 is connected to webserver 1350 via a communication link 1360. Webserver 1350 is connected to server node 56 by a communication link 1325. Communication links 1320, 1325, and 1360 may be realized via the internet.

A preferred embodiment of a portion of market-price database 1330 is shown in Fig. 15. As shown in Fig. 15, market-price database 1330 preferably comprises an entry 1510 for each telecommunications route via which service is offered by server node 56. In a preferred embodiment, a route may be defined by the geographic locations it connects, the defined levels of quality and service it guarantees, and the time of day during which the connection time may be utilized. Alternatively, a route may be defined by additional, fewer, or other groups of parameters. Illustratively, the table may contain fields for the days of the week on which the connection time may be utilized, and the time-period during which the connection time may be utilized (e.g., September 1 through November 30, 1998). In addition, the table may comprise an additional field storing the quantity of connection time for the defined route that is available for purchase. Thus, as shown for example in Fig. 15, market-price database 1330 may comprise separate entries 1510 for distinct routes connecting the United States and Germany, including, for example, a first route offering an "A" quality level and an "A" security level between the hours of 1 PM and 7 PM Greenwich Mean Time, and a second route offering an "A" quality level and a "B" security level between the hours of 7 PM and 1 AM Greenwich Mean Time. For each such entry, market-price database 1330 stores a unique identifier 1520 and a price 1530 calculated by processor 1310 as constituting the market price for the route. As described below, processor 1310 may employ one of several techniques to determine market price.

A preferred embodiment of a portion of customer database 1340 is shown in Fig. 16. As shown in Fig. 16, customer

database 1340 comprises entries 1610 for various customers of the system who buy or sell telecommunication time via server node 56. For each customer having an entry, customer database 1340 stores one or more routes that may be of interest to customer. For example, the routes of interest may be those that directly impact the customer or a subset of buyers and sellers of interest to the customer. The routes stored for each customer may be determined by historical purchasing patterns of the customer. Alternatively, the customer may be permitted to choose routes of interest to the customer when it logs onto webserver 1350. Thus, for example, customer "Austria Telecom" may be particularly interested in voice quality, high security routings between France and Austria and between Germany and Austria. In that event, customer database 1340 would store identifiers 6435 and 6909, representative of those routes of interest, as part of the Austria Telecom entry of customer database 1340.

In addition, database 1340 preferably comprises one or more default entries 1620 for storing route identifiers representative of routes to be displayed to customers or potential customers of the system who do not have entries in customer database 1340. In a preferred embodiment, each default entry may be associated with a particular location so that the default routes displayed to a customer who does not have an entry in customer database 1340 may be chosen based on the customer's location, as described below. In an alternative preferred embodiment, the default displays may focus (at the customer's option) on trends in trading activities that are of interest to the customer such as routes that are experiencing significant volatility in price and/or large trading volumes.

In operation, processor 1310 monitors all transactions brokered by server node 56 and, on the basis of these monitored transactions, determines a market price for each defined route stored in market-price database 1330. As noted, processor 1310 may use one of several methods to determine market price. In a preferred embodiment, market price for a

route may be determined as the price paid for the most recent transaction comprising the parameters that define the route (e.g., geographic route, quality, security, etc.). Each time processor 1310 detects a transaction brokered by server node 56, it updates the market price stored for the route in market-price database 1330. Alternatively, market price for a route may be computed as the average price of transactions for the route that have been brokered by server node 56 over the past hour, or other time period.

When a customer or potential customer logs on to webserver 1350, webserver 1350 and market-price monitoring subsystem 1300 cooperate to display to the customer up-to-date market information concerning a selection of the routes maintained by server node 56, as will now be described in connection with Figs. 17-18.

As shown in Fig. 17, in step 1705, when a customer logs on to webserver 1350, the webserver transmits a data message to processor 1310 preferably comprising the identity of the customer and/or the customer's location. In step 1710, processor 1310 searches customer database 1340 to determine whether the customer has an entry in the database. If the customer has an entry, processor 1310 retrieves from memory the route identifiers for the routes that are of interest to the customer (step 1715). Otherwise, processor 1310 retrieves from memory the route identifiers from the default entry associated with the customer's location or other default entry that may be based, e.g., on the customer's interest in particular trading trends, as described above (step 1720). Alternatively, the information concerning routes of interest to the customer may be stored in a cookie placed by the webserver in the browser of the customer's client-PC.

In step 1725, processor 1310 retrieves from market-price database 1330 the market price and route parameters (e.g., geographic route, quality level, security level, and time of day) for the identified routes, and in step 1730, transmits that information to webserver 1350 via communication link 1360. In step 1735, webserver 1350 causes to be displayed on

the client-PC the received information concerning the routes of interest to the customer. Alternatively, a portion of the received information, relating to a subset of the parameters defining the route, may be displayed. The subset of parameters to be displayed may be defined by the customer.

In a preferred embodiment, the market-price information is displayed to the customer in the form of a streaming banner generated, e.g., by a Java applet or other software running on the client-PC or directly on webserver 1350. An illustrative example of a webpage comprising such a streaming banner is shown in Fig. 18. If desired, the streaming banner may have a height of two or more lines in order to increase the amount of information displayed simultaneously to the customer.

In a preferred embodiment, as shown in step 1740, if the price of a displayed route changes while the customer remains on-line, processor 1310 transmits updated market-price information to webserver 1350 which communicates with the Java applet on the client-PC to update the appropriate entry within the streaming banner.

In a preferred embodiment, the customer may conveniently purchase connection time on one of the displayed routes by clicking on the displayed information. In that event, the system directly prompts the customer with a template or other graphical interface to permit the user to enter the amount of time to be bought or sold, the asking price, etc. The system then proceeds to attempt to broker a transaction to buy or sell the desired connection time, as described above.

While the invention has been described in conjunction with specific embodiments, it is evident that numerous alternatives, modifications, and variations will be apparent to those skilled in the art in light of the foregoing description.

For example, although illustrated primarily in connection with international telephone calls, the present invention may also be applied to improve the efficiency of a network located within one country.

Also, although illustrated primarily in connection with a

public network comprised of a plurality of carriers, the present invention may also be employed to efficiently manage a private network, or a network made up of facilities maintained by affiliated carriers. In this context, server node 56 will frequently be programmed to rank routing paths according to a parameter other than simple price. For example, the network may rank and allocate routes in a manner designed to maximize utilization of the network facilities.

Claims

1. A system for trading telecommunication services, comprising:

a clearing node adapted to:

receive service offers from sellers of telecommunication services, each service offer comprising an offer to sell a block of telecommunication service larger in size than a single telecommunication transaction, each offer comprising a plurality of parameters, the parameters comprising;

a price;

an origination location; and

a destination location;

derive from the service offers a rate table having a plurality of entries that store price information for a plurality of routes, wherein each route is defined by a plurality of parameters comprising;

an origination location; and

a destination location;

receive purchase requests from purchasers of telecommunication services, each purchase request requesting purchase of a block of telecommunication service larger in size than a single telecommunication transaction, each request comprising a plurality of parameters, the parameters comprising;

a price;

an origination location; and

a destination location;

maintain an account for each seller and purchaser of telecommunication services, each account having a balance;

broker sales of telecommunications services between sellers and purchasers in accordance with a predefined protocol, the protocol comprising;

comparing the parameters that define each purchase request to the parameters that define a plurality of the routes in the rate table;

identifying a route in the rate table having a plurality of parameters that correspond to the parameters in at least one purchase request, wherein the corresponding parameters comprise the origination location and the destination location;

identifying a rate table entry representative of available service for carrying communications via the identified route;

choosing a purchase request from among one or more purchase requests requesting purchase of telecommunication service via the route;

creating a sale record, the record comprising:

the identity of the buyer that submitted the chosen request;

the identity of a seller that submitted an offer used to fill the chosen request; and

the sold telecommunication services;

updating the account balance of each seller that submitted an offer used to derive the identified rate table entry and the buyer that submitted the chosen request.

2. The system of claim 1, wherein the rate-table entries for each route are ranked as a function of at least one parameter.

3. The system of claim 2, wherein the purchase requests are ranked as a function of the at least one parameter.

4. The system of claim 2, wherein the parameter is price.

5. The system of claim 2, wherein the parameter is network utilization.

6. The system of claim 2, wherein the parameter is return traffic volumes.

7. The system of claim 2, wherein the parameter is quality.

8. The system of claim 1, wherein the requester is chosen in accordance with a rule or set of rules.

9. The system of claim 8, wherein the rule is first-come-first-served.

10. The system of claim 8, wherein the rule is an auction between all service requests received within a predetermined window of time.

11. The system of claim 10, wherein the auction is a Vickrey style auction.

12. The system of claim 10, wherein the auction matches all service requests received through a specific point in time with all service offers received through that same point in time, including requests and offers already matched in previous auctions.

13. The system of claim 8, wherein the rule is an auction that matches all service requests received within a predetermined window of time with all available service offers.

14. The system of claim 8, wherein the rule is designed to maximize the amount of communication services sold in response to a plurality of requests received within a predetermined amount of time.

15. The system of claim 1, wherein the rate-table entry is chosen in accordance with a rule or set of rules.

16. The system of claim 1, wherein the clearing node matches a plurality of service offers to a plurality of service requests in accordance with a rule or set of rules.

17. The system of claim 1, wherein at least one seller is a

person or entity that does not possess telecommunication transmission facilities capable of providing the offered service.

18. The system of claim 1, wherein a single entity may act as both a buyer and a seller of telecommunication services.

19. The system of claim 18, wherein at least some of the telecommunication service offered for sale is service that had previously been purchased by the seller.

20. The system of claim 18, wherein the entity is in possession of a computer system adapted to dynamically monitor trends relating to sales brokered by the clearing node and sell or buy telecommunication services on the basis of expected supply and demand for such services.

21. The system of claim 1, wherein the clearing node periodically transmits statements to each seller and buyer.

22. The system of claim 21, wherein the statements are made available for buyer and seller online perusal.

23. The system of claim 22, wherein the online perusal is via the world wide web.

24. The system of claim 1, wherein the clearing node periodically transmits telecommunication status and account status information to each seller and buyer.

25. The system of claim 24, wherein the status information is made available for buyer and seller online perusal.

26. The system of claim 25, wherein the online perusal is via the world wide web.

27. The system of claim 1, wherein the clearing node is

operated by an entity that authenticates the ability of carriers to provide telecommunication services offered for sale.

28. The system of claim 27, wherein the authentication is based at least in part on the carriers' historical performance.

29. The system of claim 27, wherein the system maintains carrier ratings.

30. The system of claim 29, wherein the carrier ratings are maintained adaptively, based on a smoothed average of measurements taken over time.

31. The system of claim 29, wherein the carrier ratings are based on the ability of carriers to provide offered services.

32. The system of claim 1, wherein the clearing node is operated by an entity that assures the ability of carriers and other participants to meet the financial commitments implied by their purchasing activities.

33. The system of claim 1, further comprising:

a telecommunications node and adapted to compare the cost and availability for connecting a telecommunication transaction using telecommunication service purchased via the clearing node to the cost of connecting the telecommunication transaction via an alternate means and to determine whether the transaction should be connected using telecommunication service purchased via the clearing node or using an alternate means.

34. The system of claim 33, wherein status information on trading activities is available to buyers and sellers.

35. The system of claim 34, wherein the information provided

is limited to information directly impacting a subset of buyers and sellers.

36. The system of claim 34, wherein the status information is provided for online perusal by buyers and sellers.

37. The system of claim 36, wherein the online perusal is via the world wide web.

38. The system of claim 33, wherein the telecommunications node and the clearing node are owned by the same entity.

39. The system of claim 38, further comprising a telecommunications switch, wherein the telecommunications switch, the telecommunications node, and the clearing node are owned by the same entity.

40. The system of claim 33, wherein the telecommunications node determines that the transaction should be connected using telecommunication service purchased via the clearing node if the cost of doing so is less than a predetermined percentage of the cost of connecting the transaction via alternate means.

41. The system of claim 33, wherein the telecommunications node determines that the transaction should be connected using telecommunication service purchased via the clearing node on the basis of business considerations.

42. The system of claim 41, wherein the clearing node is not privy to the business considerations.

43. The system of claim 33, wherein the telecommunications node determines that the transaction should be connected using telecommunication service purchased via the clearing node when no alternative means for carrying the call is available.

44. The system of claim 33, further comprising a plurality of

clearing nodes, wherein each clearing node is optimized for at least one parameter.

45. The system of claim 44, wherein each clearing node is optimized for a distinct parameter.

46. The system of claim 44, wherein one of the parameters is price.

47. The system of claim 44, wherein one of the parameters is network utilization.

48. The system of claim 44, wherein each telecommunications node stores one or more selection rules for determining the service offer to accept from among a plurality of service offers proposed by the plurality of clearing nodes.

49. The system of claim 48, wherein the set of selection rules is a function of at least one of the following: affiliations between the requester and one or more of the clearing nodes; bandwidth/time volumes available from one or more of the clearing nodes; volume discounts available from one or more of the clearing nodes; or transaction charges imposed by one or more of the clearing nodes.

50. The system of claim 33, wherein the telecommunication node is adapted to:

predict on the basis of a plurality of factors the anticipated demand for services via a telecommunications switch for an upcoming predetermined period of time;

compare the anticipated demand to the communication services available for the predetermined period of time to the telecommunications switch;

purchase communications services via the clearing node when the comparison indicates that the anticipated demand exceeds the available communication services for the predetermined period of time; and

sell communications services via the clearing node when the comparison indicates that the anticipated demand is less than the available communication services for the predetermined period of time.

51. The system of claim 50, wherein the prediction is based at least in part on recent utilization patterns for the telecommunication switch.

52. The system of claim 50, wherein the decision to sell or purchase communication services is additionally a function of a set of predefined rules.

53. The system of claim 33, further comprising a plurality of telecommunications nodes, wherein the telecommunications nodes and the clearing node comprise an overlay network over a distinct communications network.

54. The system of claim 53, wherein telecommunications nodes are distributed to optimize economic considerations related to the interconnection of purchasers and seller networks to the system of trading telecommunication services.

55. The system of claim 53, wherein the telecommunication nodes may communicate directly with elements of the distinct communications network using IN signaling.

56. The system of claim 33, wherein the telecommunications node comprises a first database that stores the cost to a carrier of connecting a call from an originating location to a terminating location.

57. The system of claim 33, wherein the routing tables stored by the clearing node comprise cost information and the telecommunications nodes store routing tables that do not comprise cost information.

58. The system of claim 33, wherein the telecommunications node comprises a second database that stores the price published by a service requester offering to connect an originating location to a terminating location.

59. The system of claim 33, wherein the telecommunications node comprises a third database that stores a map of the physical transmission facilities maintained by a communications provider, the technologies supported by the facilities, and the names and locations of other carriers with which the carrier's facilities interconnect.

60. The system of claim 33, wherein the rate tables are used to periodically update routing tables located at one or more telecommunication switches.

61. The system of claim 1, further comprising:

an IN compatible telecommunications switch;

a telecommunications node associated with the telecommunication switch;

wherein the telecommunications node is adapted to cause an IN signal to be transmitted by the telecommunications switch to a second switch in a route of a telecommunication transaction, the content of the IN signal informing the second switch that the telecommunication is not for termination in the location of the second switch.

62. The system of claim 1, further comprising:

an SS7 compatible telecommunications switch;

a telecommunication node associated with the telecommunication switch;

wherein the telecommunications node is adapted to cause an SS7 signal to be transmitted by the telecommunications switch to a second switch in a route of a telecommunication transaction, the content of the SS7 signal informing the second switch that the telecommunication is not for termination in the location of the second switch.

63. The system of claim 1, wherein the clearing node comprises a distributed network of computers.

64. The system of claim 63, wherein the distributed computers are associated with telecommunications nodes.

65. The system of claim 1, further comprising a plurality of clearing nodes wherein each clearing node employs a subset of matching criteria for determining clearing activities.

66. The system of claim 65, wherein a separate computer adjudicates a single clearing result from the plurality of results offered by the distributed network.

67. The system of claim 1, wherein the rate table is generated from the submitted service offers and a network-topology map.

68. The system of claim 67, wherein the network-topology map includes both circuit-switched and packet-switched networks.

69. The system of claim 68, wherein gateway platforms disposed as part of telecommunications nodes are included in the network-topology map.

70. The system of claim 1, wherein the service offers are submitted via a world-wide-web site.

71. The system of claim 1, wherein the purchase requests are submitted via a world-wide-web site.

72. The system of claim 1, wherein the service offers are submitted via a telecommunication node connected to the clearing node.

73. The system of claim 1, wherein the purchase requests are submitted via a telecommunications node connected to the

clearing node.

74. The system of claim 1, wherein the service offers are submitted using a template comprising the following fields:

an offer number field;
a provider name field;
a provider identification number field;
a password field;
a date/time submitted field;
a quality field;
an originating location field;
a terminating location field;
a bandwidth/time available field;
a number of circuits field;
a price field; and
an hours of operation field;

75. The system of claim 74,wherein the template further comprises a valid until field.

76. The system of claim 74, wherein the price and hours of operation fields comprise a table listing distinct prices for distinct periods of time.

77. The system of claim 75, wherein the distinct periods of time are described in terms of a calendar.

78. The system of claim 1, wherein the service requests are submitted using a template comprising the following fields:

a request number field;
a requester name field;
a requester identification number field;
a password field;
a date/time submitted field;
a quality field;
an originating location field;
a terminating location field;

a bandwidth/time requested field;
a number of circuits field; and
an hours of operation field.

79. The system of claim 1, wherein the telecommunications services for which service offers are submitted comprise voice telephone communications.

80. The system of claim 79, wherein the communications are over PSTN.

81. The system of claim 79, wherein the communications are over packet networks.

82. The system of claim 79, wherein the communications are over both PSTN and packet networks.

83. The system of claim 79, wherein the communications are transcoded between PSTN and packet networks using gateways engaged as instructed by the clearing network.

84. The system of claim 83, wherein the gateways are owned by the operator of the clearing node.

85. The system of claim 1, wherein the telecommunications services for which service offers are submitted comprise gateway services for transcoding communications between PSTN and packet-switched networks.

86. The system of claim 1, wherein the telecommunications services for which service offers are submitted comprise fax transmissions.

87. The system of claim 1, wherein the telecommunications services for which service offers are submitted comprise data communications.

86. The system of claim 1, wherein the telecommunications services for which service offers are submitted comprise messaging services.

89. The system of claim 1, wherein the telecommunications services for which service offers are submitted comprise voice mail.

90. The system of claim 1, wherein the telecommunications services for which service offers are submitted comprise e-mail.

91. The system of claim 1, wherein the telecommunications services for which service offers are submitted comprise paging.

92. The system of claim 1, wherein the telecommunications services for which service offers are submitted comprise universal mailbox.

93. The system of claim 1, wherein one of the parameters that define a service offer is connection quality.

94. The system of claim 1, wherein one of the parameters that define a service offer is service type.

95. The system of claim 1, wherein one of the parameters that define a service offer is post dial delay.

96. The system of claim 1, wherein one of the parameters that define a service offer is legal restrictions.

97. The system of claim 1, wherein one of the parameters that define a service offer is compression level.

98. The system of claim 1, wherein one of the parameters that define a service offer is compression type.

99. The system of claim 1, wherein one of the parameters that define a service offer is equipment type.

100. The system of claim 1, wherein one of the parameters that define a service offer is signaling compatibility.

101. The system of claim 1, wherein one of the parameters that define a service offer is maximum latency.

102. The system of claim 1, wherein one of the parameters that define a service offer is a boolean field that indicates whether the service provider will provide local termination for communications under the offer.

103. The system of claim 102, wherein the clearing node brokers sales of the telecommunication service offered without local termination only to requesters that do not require local termination.

104. The system of claim 1, wherein one of the parameters that define a service offer is a boolean field that indicates whether communications covered by the offer will trigger a settlement agreement.

105. The system of claim 1, wherein one of the parameters that define a service offer is a boolean field that indicates whether communications covered by the offer will be carried via a private line.

106. The system of claim 1, wherein one of the parameters that define a service offer is a boolean field that indicates whether communications covered by the offer will be carried via a private network.

107. The system of claim 1, wherein one of the parameters that define a service offer is a boolean field that indicates whether communications covered by the offer will be carried

via satellite.

108. The system of claim 1, wherein one of the parameters that define a service offer is usage pattern.

109. The system of claim 108, wherein the clearing node brokers a plurality of transactions so that two or more buyers requiring complementary communication services usage patterns purchase communication services from one service provider.

110. The system of claim 1, wherein one of the parameters that defines a service offer is termination options, including fax bypass.

111. The system of claim 1, wherein one of the parameters that defines a service offer is carrier preference.

112. The system of claim 111, wherein carrier preference overrides other parameters.

113. The system of claim 111, wherein carrier preference establishes an explicit, specified cost margin that must be exceeded to override the preference.

114. The system of claim 1, wherein buyers are required to provide a password that is above a predetermined level before being permitted to submit purchase requests.

115. The system of claim 114, wherein sellers are required to provide a password having a level above the predetermined level before being permitted to submit service offers.

116. The system of claim 1, wherein one of the parameters that defines a route is quality.

117. The system of claim 116, wherein the quality rating of a route may be decreased if the route comprises two or more

satellite legs.

118. The system of claim 116, wherein the quality rating of a route may be determined as a function of the type of link employed to carry communications via the route.

119. The system of claim 1, wherein the clearing node is maintained by an entity that independently verifies the accuracy of at least one of the parameters that make up the submitted service offers.

120. The system of claim 1, wherein the clearing node derives additional rate-table entries for particular routes

121. The system of claim 120, wherein the additional rate-table entries are derived as service in earlier-derived entries becomes unavailable.

122. The system of claim 1, wherein at least one entry for one of the routes in the rate table is derived from a plurality of service offers including at least a first service offer for connecting communications from a first location to a second location and a second service offer for connecting communications from the second location to a third location, wherein the first location is the origination location for the at least one route and the third location is the termination location for the at least one route.

123. The system of claim 1, wherein the clearing node fills a purchase request submitted by a buyer by brokering at least two sales of communications service, a first sale between a first seller and the buyer and a second sale between a second seller and the buyer.

124. The system of claim 123, wherein the clearing node is maintained by an entity that independently assigns at least one parameter that describes each entry in the rate table.

wherein the assigned parameter may be modified when the entry is derived from a plurality of service offers.

125. The system of claim 124, wherein the modified parameter is quality.

126. The system of claim 1, wherein the at least one entry is derived from a plurality of calling legs each of which corresponds to a distinct service offer submitted by a seller.

127. The system of claim 126, wherein each of the calling legs that comprise the entry may be established in the forward or reverse direction.

128. The system of claim 126, wherein at least one of the legs comprising the entry employs a technology or protocol for transmitting communications that is different from that of at least a second one of the legs comprising the entry.

129. The system of claim 128, wherein the legs comprising the entry are transparently linked.

130. The system of claim 129, wherein the transparent linking is achieved using transcoding gateway resources.

131. The system of claim 130, wherein the transcoding gateway resource is a media transcoding device for converting from Mu-Law to packet-telephony voice codec.

132. The system of claim 1, wherein the rate tables are stored in the clearing node.

133. The system of claim 1, wherein at least a portion of the rate tables are stored in a telecommunications node connected to the clearing node.

134. The system of claim 1, wherein the rate tables are

periodically updated.

135. The system of claim 1, wherein a purchase request comprises a sort-by parameter regarding the rank order of importance to the buyer of at least one of the other parameters that define the request.

136. The system of claim 135, wherein the clearing node compares the purchase request parameters to the route parameters in accordance with the ranking defined in the sort-by parameter.

137. The system of claim 135, wherein the clearing node compares a first subset of the parameters defining a route to a subset of the most highly ranked parameters in the request.

138. The system of claim 137, wherein the comparison is performed when the clearing node is unable to match the request to a second subset of parameters defining a route, wherein the second subset of parameters is larger than the first subset of parameters.

139. The system of claim 1, wherein the clearing node is further adapted to identify the route in the rate table on the basis of a subset of the parameters that define the route.

140. The system of claim 139, wherein the subset of parameters is specified by the requester.

141. The system of claim 1, wherein a purchase request comprises an unacceptable carrier parameter.

142. The system of claim 1, wherein a purchase request comprises a preferred service providers parameter.

143. The system of claim 1, wherein the clearing node manages a futures market in communication services.

144. The system of claim 1, wherein the clearing node manages a derivatives market in communications services.

145. The system of claim 1, wherein the clearing node is further adapted to receive purchase requests for a single telecommunication transaction from requesters and to broker sales of a single telecommunication transaction.

146. The system of claim 145, wherein the clearing node is adapted to reserve a portion of a requester's credit limit to cover the cost of the single telecommunication transaction.

147. The system of claim 146, wherein the portion reserved is estimated on the basis of historical calling patterns.

148. The system of claim 145, wherein a service request for a single telecommunication transaction is automatically withdrawn if not filled within a predetermined amount of time.

149. The system of claim 1, wherein the clearing node ranks the entries in the rate table for each route in accordance with at least one parameter.

150. The system of claim 149, wherein the at least one parameter is price.

151. The system of claim 149, wherein the at least one parameter is network utilisation.

152. The system of claim 1, wherein the offer price represents the lowest price that the seller is willing to accept for the offered communication services.

153. The system of claim 1, wherein the request price represents the highest price that the purchaser is willing to pay for the requested communication services.

154. A method of trading telecommunication services, comprising:

receiving a plurality of service offers from a plurality of sellers, each service offer comprising an offer to sell a block of telecommunication service larger in size than a single telecommunication transaction, each offer comprising a plurality of parameters, the parameters comprising:

a price;

an origination location; and

a destination location;

deriving from the service offers a rate table having a plurality of entries that store price information for a plurality of routes, wherein each route is defined by a plurality of parameters comprising:

an origination location; and

a destination location;

receiving purchase requests from a plurality of purchasers, each purchase request requesting purchase of a block of telecommunication service larger in size than a single telecommunication transaction, each request comprising a plurality of parameters, the parameters comprising:

a price;

an origination location; and

a destination location;

maintaining an account for each seller and purchaser of telecommunication services, each account having a balance;

brokering sales of telecommunications services between sellers and purchasers in accordance with a predefined protocol, the protocol comprising:

comparing the parameters that define each purchase request to the parameters that define a plurality of the routes in the rate table;

identifying a route in the rate table having a plurality of parameters that correspond to the parameters in at least one purchase request, wherein the corresponding parameters comprise the origination location and the

destination location;

identifying a rate table entry representative of available service for carrying communications via the identified route;

choosing a purchase request from among one or more purchase requests requesting purchase of telecommunication service via the route;

creating a sale record, the record comprising:

the identity of the buyer that submitted the chosen request;

the identity of a seller that submitted an offer used to fill the chosen request; and

the sold telecommunication services;

updating the account balance of each seller that submitted an offer used to derive the identified rate table entry and the buyer that submitted the chosen request.

CALLING TELEPHONE
2
LOCAL NETWORK
8
6
ORIGINATING COUNTRY
16
ORIG. TOLL SW.
14
40
INT'L GATEWAY SW.
22
50
NODE
44
32
30
34
TRANSIT COUNTRY
28
INT'L GATEWAY SW.
54
NODE
48
NODE
49
38
24
INT'L GATEWAY SW.
42
18
TERMINATING TOLL SW.
20
36
TRANSIT COUNTRY
INT'L GATEWAY SW.
26
52
NODE
46
56
SERVER
58
60
62
TERMINATING COUNTRY
10
LOCAL NETWORK
12
CALLED TELEPHONE
4

FIG.1A

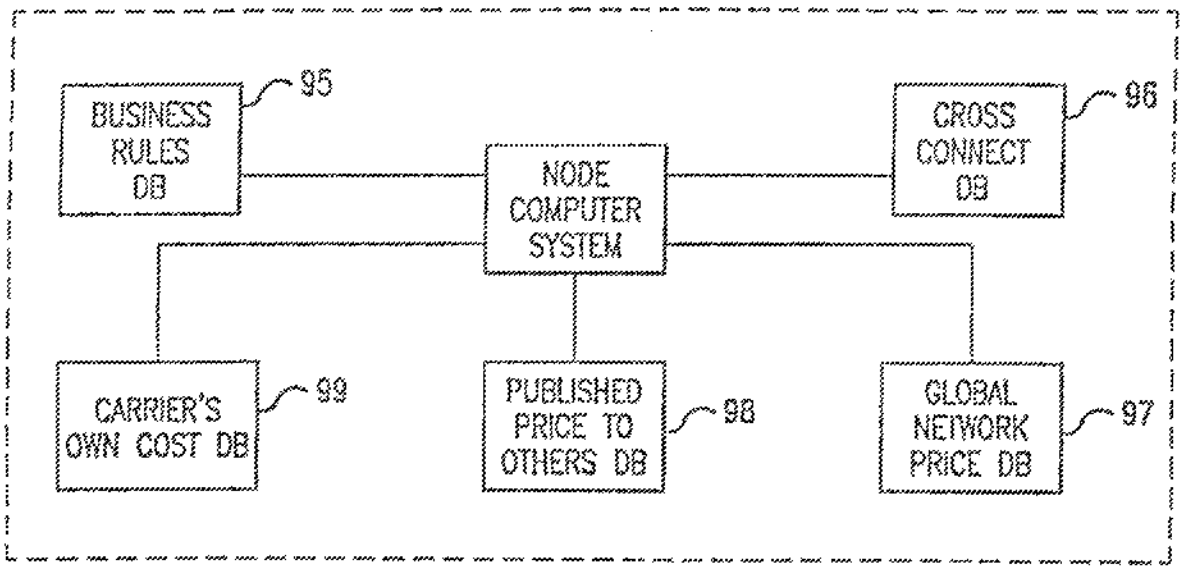
BUSINESS RULES DB
95
NODE COMPUTER SYSTEM
CROSS CONNECT DB
96
CARRIER'S OWN COST DB
99
PUBLISHED PRICE TO OTHERS DB
98
GLOBAL NETWORK PRICE DB
97

FIG.1B

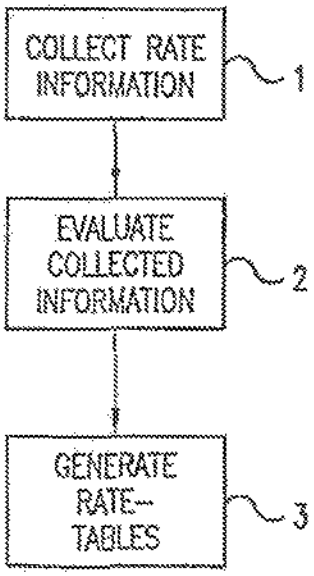

FIG.2

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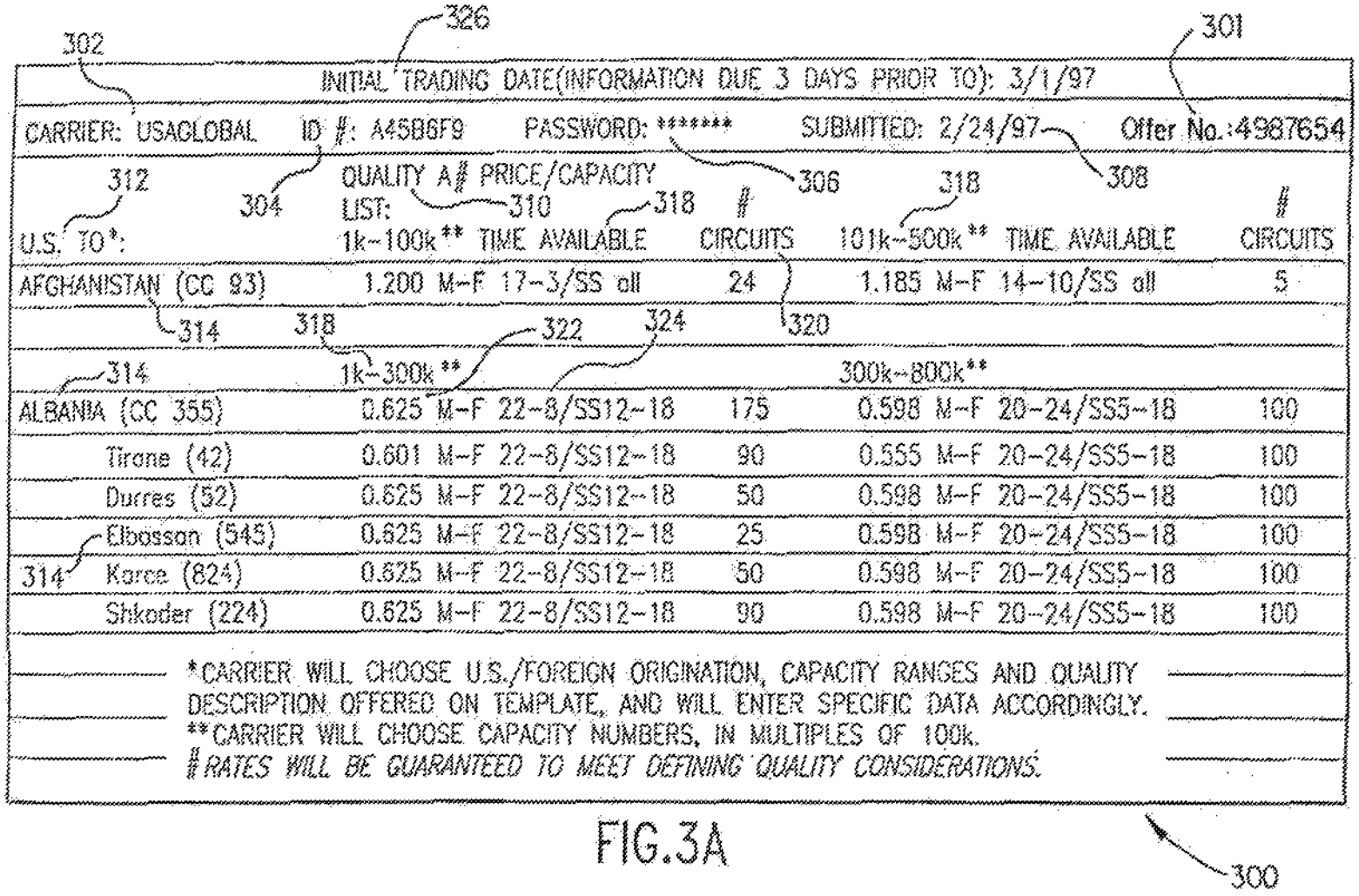
302 326 301



INITIAL TRADING DATE(INFORMATION DUE 3 DAYS PRIOR TO): 3/1/97

CARRIER: USAGLOBAL ID #: A45B6F9 PASSWORD: ******* SUBMITTED: 2/24/97 Offer No.:4987654

304 306 308

312 QUALITY A# PRICE/CAPACITY LIST: 310 318 318

U.S. TO*:	1k-100k**	TIME AVAILABLE	# CIRCUITS	101k-500k**	TIME AVAILABLE	# CIRCUITS
AFGHANISTAN (CC 93)	1.200 M-F	17-3/SS all	24	1.185 M-F	14-10/SS all	5
314	318	322	324 320			
314	1k-300k**			300k-800k**		
ALBANIA (CC 355)	0.625 M-F	22-8/SS12-18	175	0.598 M-F	20-24/SS5-18	100
Tirone (42)	0.601 M-F	22-8/SS12-18	90	0.555 M-F	20-24/SS5-18	100
Durres (52)	0.625 M-F	22-8/SS12-18	50	0.598 M-F	20-24/SS5-18	100
Elbassan (545)	0.625 M-F	22-8/SS12-18	25	0.598 M-F	20-24/SS5-18	100
314 Korce (824)	0.625 M-F	22-8/SS12-18	50	0.598 M-F	20-24/SS5-18	100
Shkoder (224)	0.625 M-F	22-8/SS12-18	90	0.598 M-F	20-24/SS5-18	100

*CARRIER WILL CHOOSE U.S./FOREIGN ORIGINATION, CAPACITY RANGES AND QUALITY DESCRIPTION OFFERED ON TEMPLATE, AND WILL ENTER SPECIFIC DATA ACCORDINGLY.
**CARRIER WILL CHOOSE CAPACITY NUMBERS, IN MULTIPLES OF 100k.
 # RATES WILL BE GUARANTEED TO MEET DEFINING QUALITY CONSIDERATIONS.

FIG.3A

300

REQUEST NUMBER: 599428
REQUESTER NAME: USAGLOBAL
REQUESTER IDENTIFICATION NUMBER: A4586F9
PASSWORD: *******
DATE/TIME SUBMITTED: 18:42 UT, 11/30/98
QUALITY: A
ORIGINATING LOCATION: U.S.
TERMINATING LOCATION: Germany
BANDWIDTH/TIME REQUESTED: 200k min/month
NUMBER OF CIRCUITS: 50
HOURS OF OPERATION: M-F 20-24 UT

FIG.3B

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400

SERVICE: VOICE			
QUALITY A: Country	USA Global	RSL (ITC)	Primus
AFGHANISTAN (CC 93)	1.2010	1.6047	1.2500
ALBANIA (CC 355)	0.6195	0.5288	0.5540
Tirane (42)	0.6003	0.5288	0.5540
Durres (52)	0.6195	0.5288	0.5540
Elbassan (545)	0.6195	0.5288	0.5540
Korce (824)	0.6195	0.5288	0.5540
Shkoder (224)	0.6195	0.5288	0.5540
ALGERIA (213) rest	0.6589	0.4650	0.5540
Bejaia (5)			
AMERICAN SAMOA (all)	0.6667	0.4984	0.6510
ANDORRA (FRANCE) (all)	0.4057	0.2438	0.5000

FIG.4

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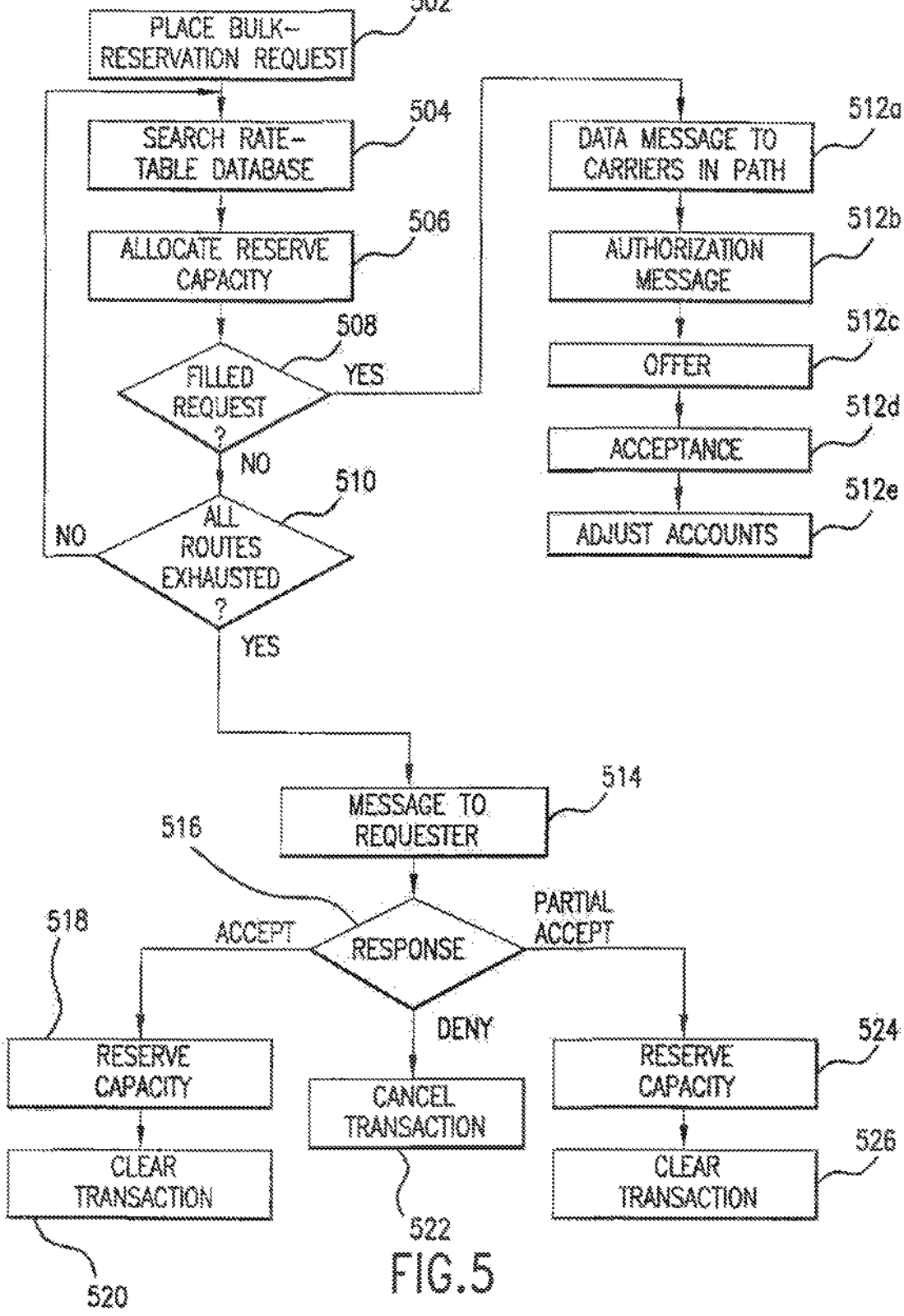

FIG.5

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SUBSTITUTE SHEET (RULE 26)

WO 00/36815

ROUTING	PRICE/MIN.	Q	R	TOTAL CAPACITY	AVAIL. CAP.	ALLOCATED CAP.
US-GERMANY	18 ¢	A	B	8	2	6
US-GERMANY	22 ¢	A	B	40	4	36
US-GERMANY	23 ¢	A	B	6	4	2
US-GERMANY	28 ¢	A	B	16	12	4
US-GERMANY	32 ¢	A	B	9	8	1
US-GERMANY	50 ¢	A	B	27	12	15

FIG.6A

ROUTING	PRICE/MIN.	Q	R	TOTAL CAPACITY	AVAIL. CAP.	ALLOCATED CAP.
US-GERMANY	18 ¢	A	B	8	0	8
US-GERMANY	22 ¢	A	B	40	0	40
US-GERMANY	23 ¢	A	B	6	0	6
US-GERMANY	28 ¢	A	B	16	12	4
US-GERMANY	32 ¢	A	B	9	8	1
US-GERMANY	50 ¢	A	B	27	12	15

FIG.6B

PCT/US99/29258

SUBSTITUTE SHEET (RULE 26)

ROUTING	PRICE/MIN.	Q	R	TOTAL CAPACITY	AVAIL. CAP.	ALLOCATED CAP.
US–GERMANY	18 ¢	A	B	8	2	6
US–GERMANY	22 ¢	A	B	40	4	36
US–GERMANY	28 ¢	A	B	6	4	2
US–GERMANY	28 ¢	A	B	16	12	4
US–GERMANY	32 ¢	A	B	9	8	1
US–GERMANY	50 ¢	A	B	27	12	15

FIG.6C

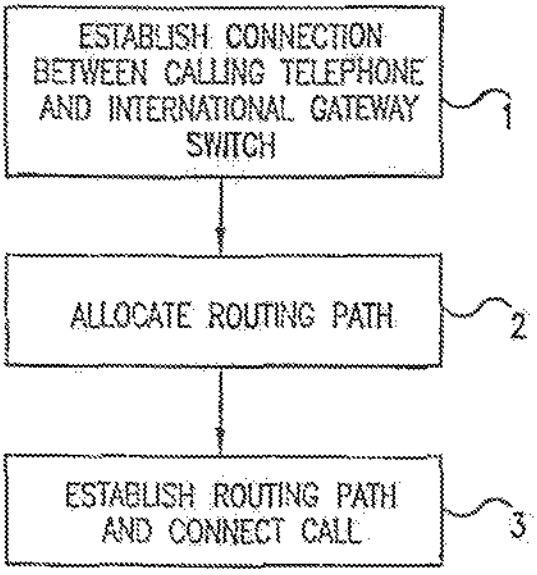

FIG.7

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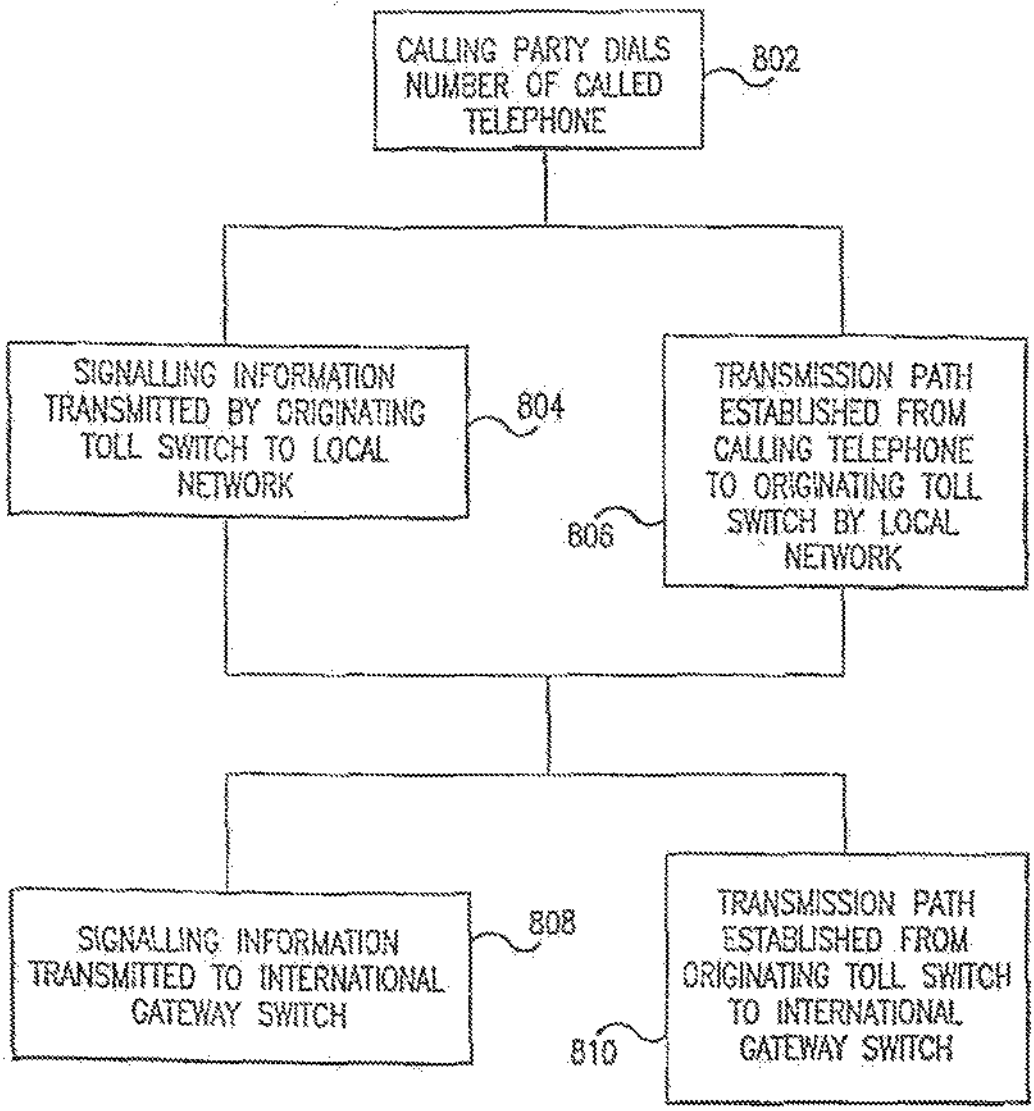

FIG.8

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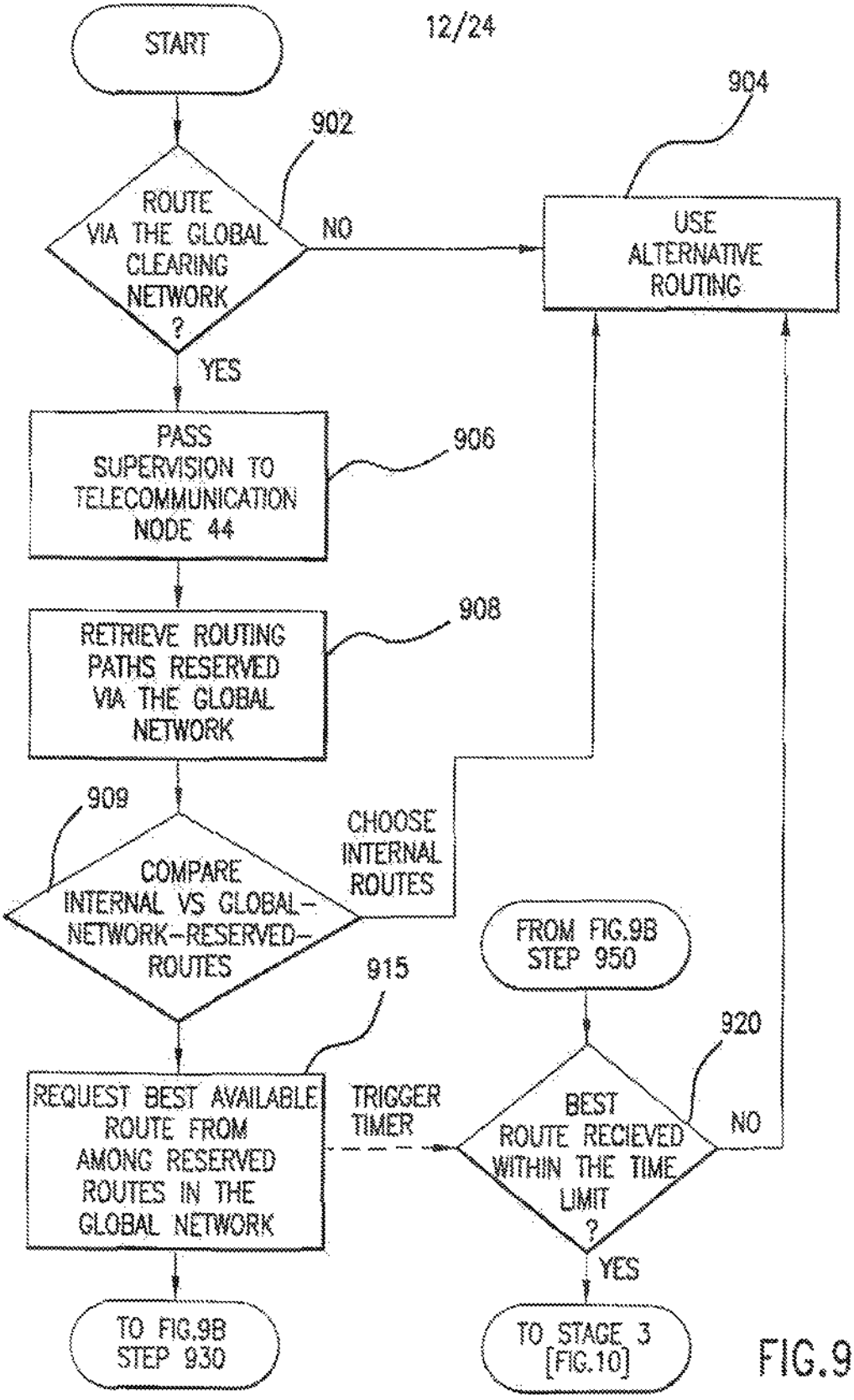

FIG.9A

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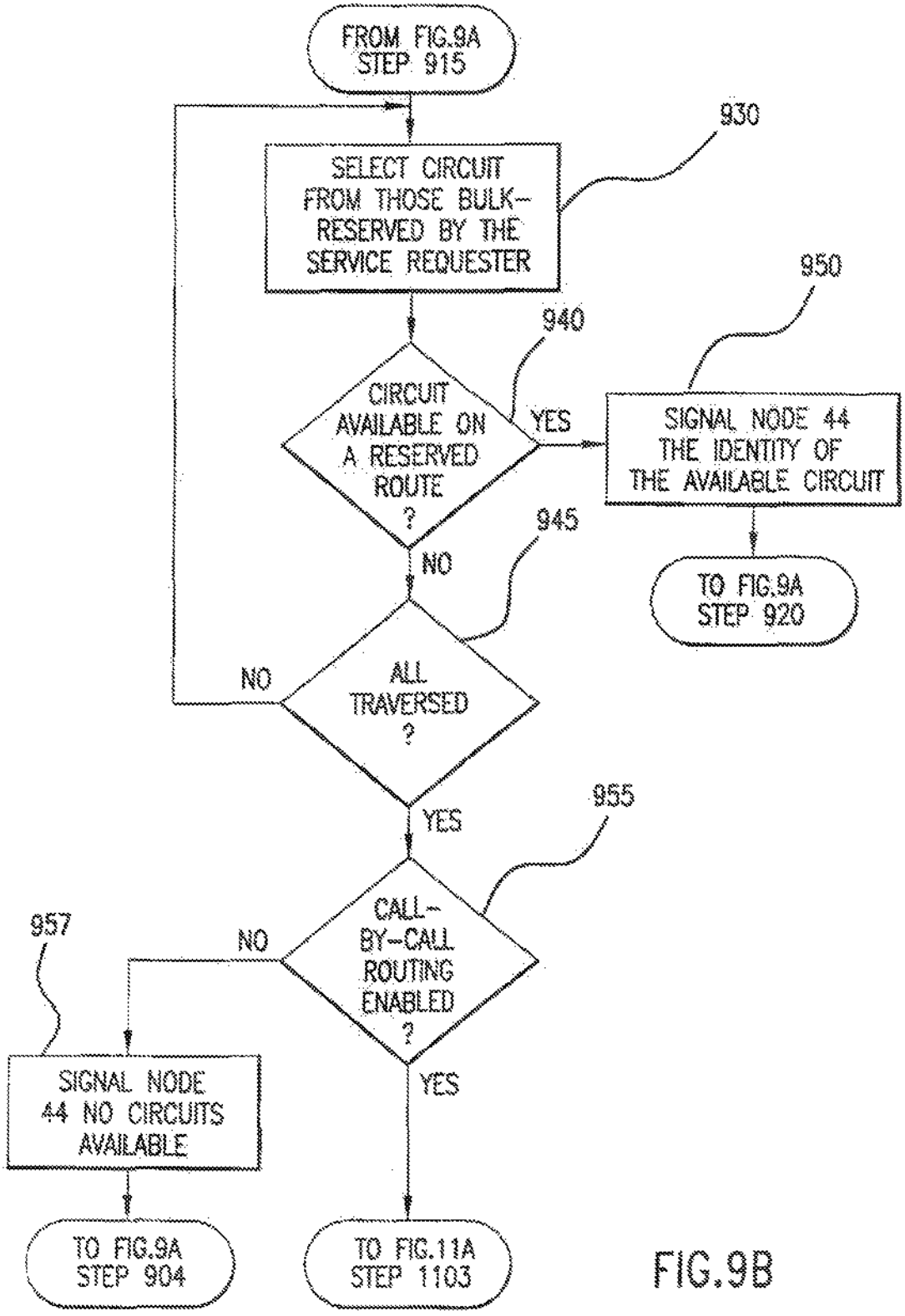

FIG.9B

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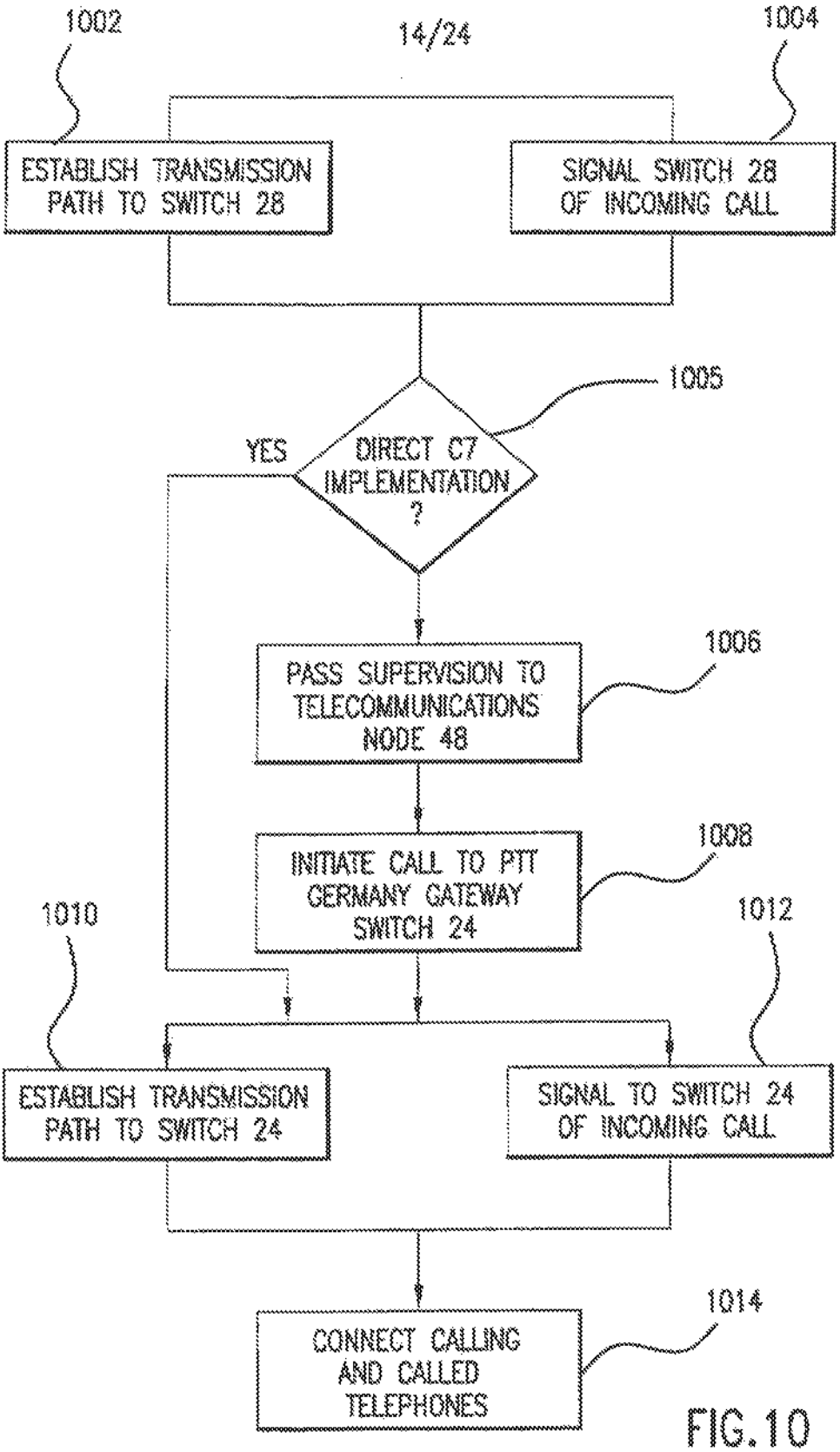

FIG.10

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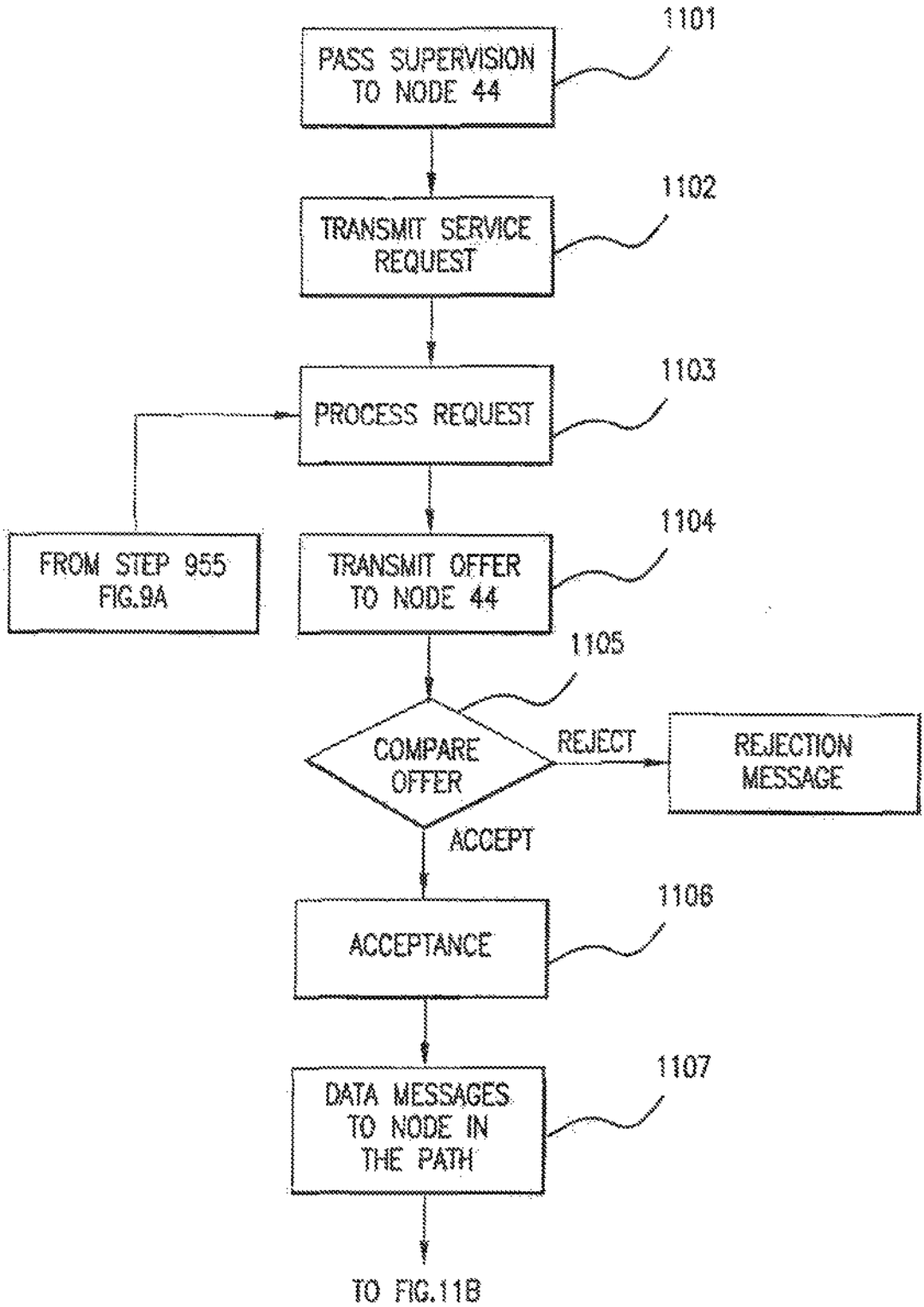

FIG.11A

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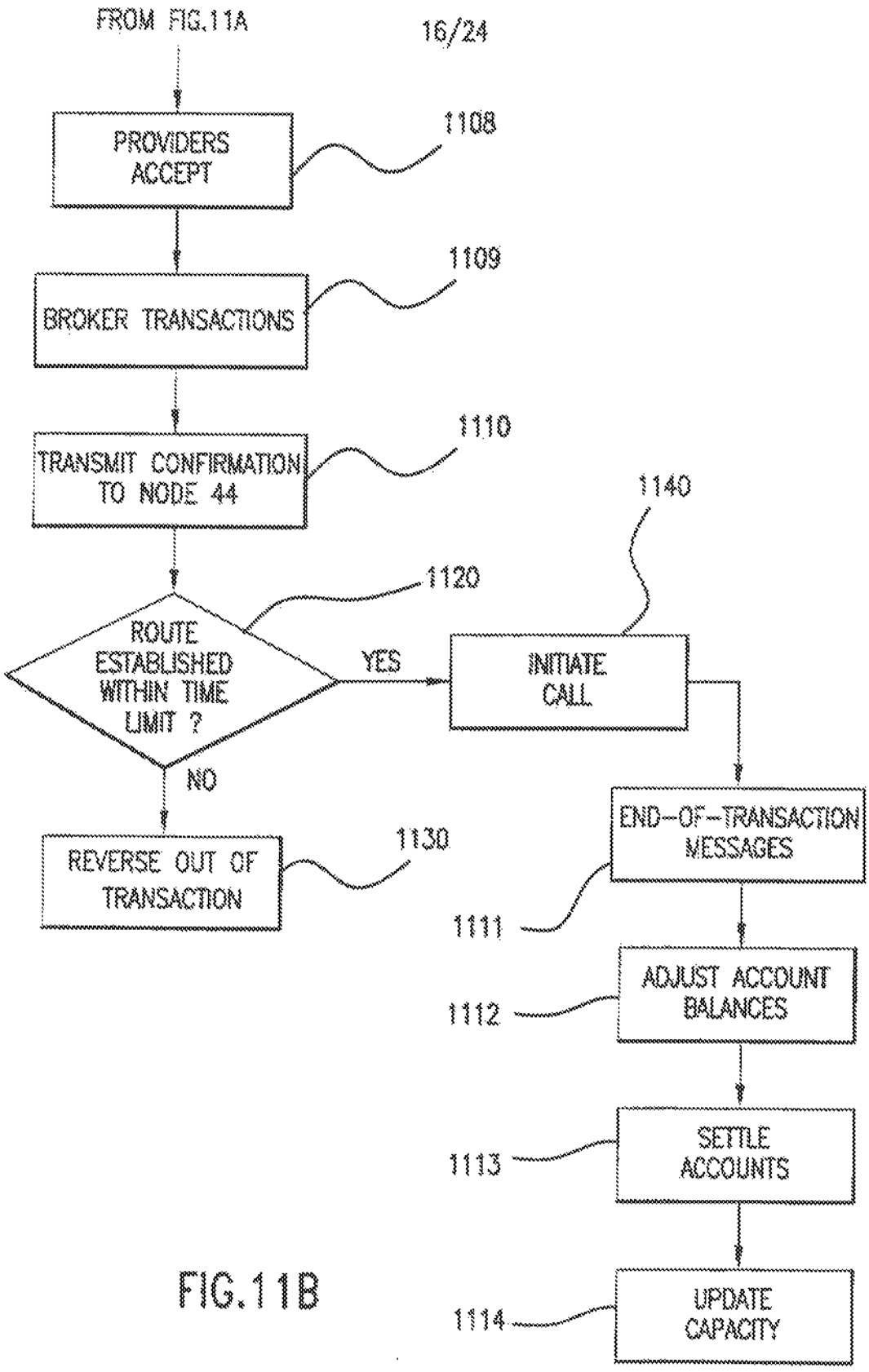

FIG.11B

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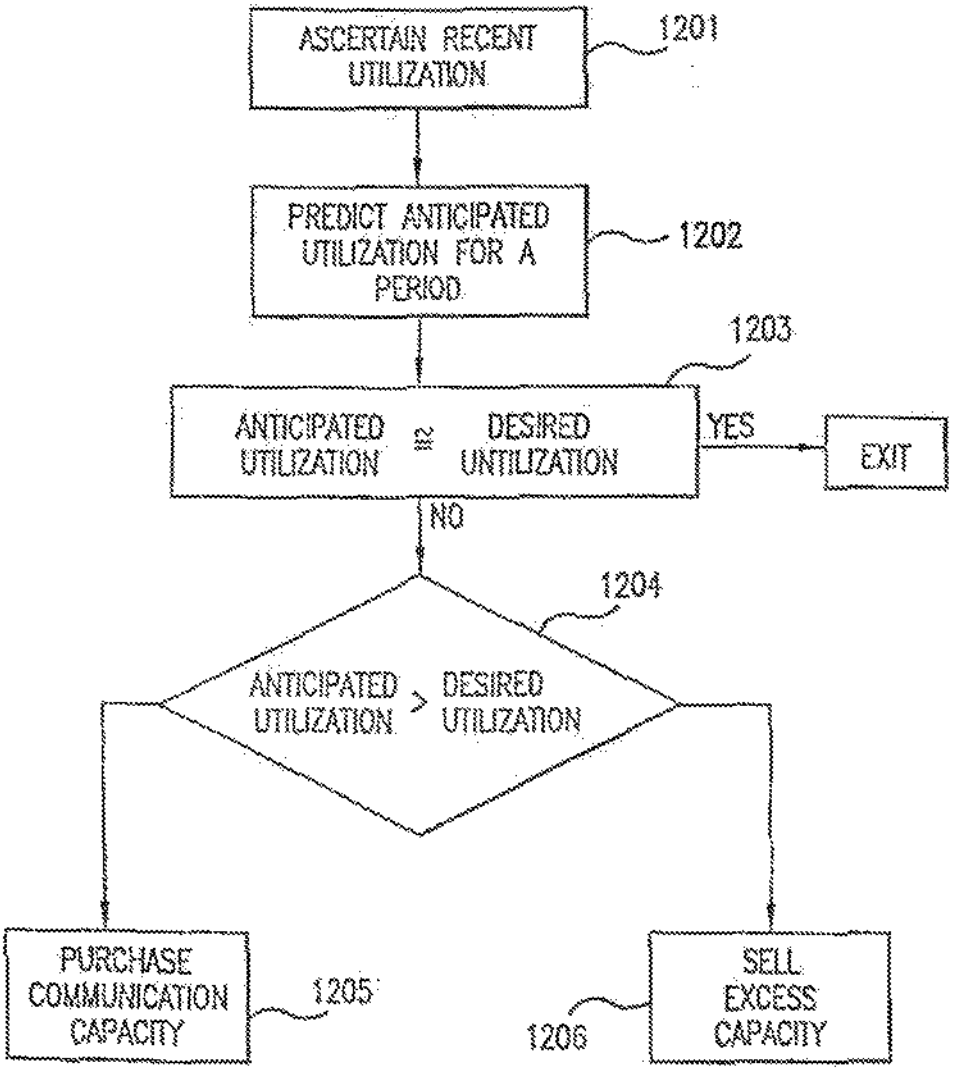

FIG.12

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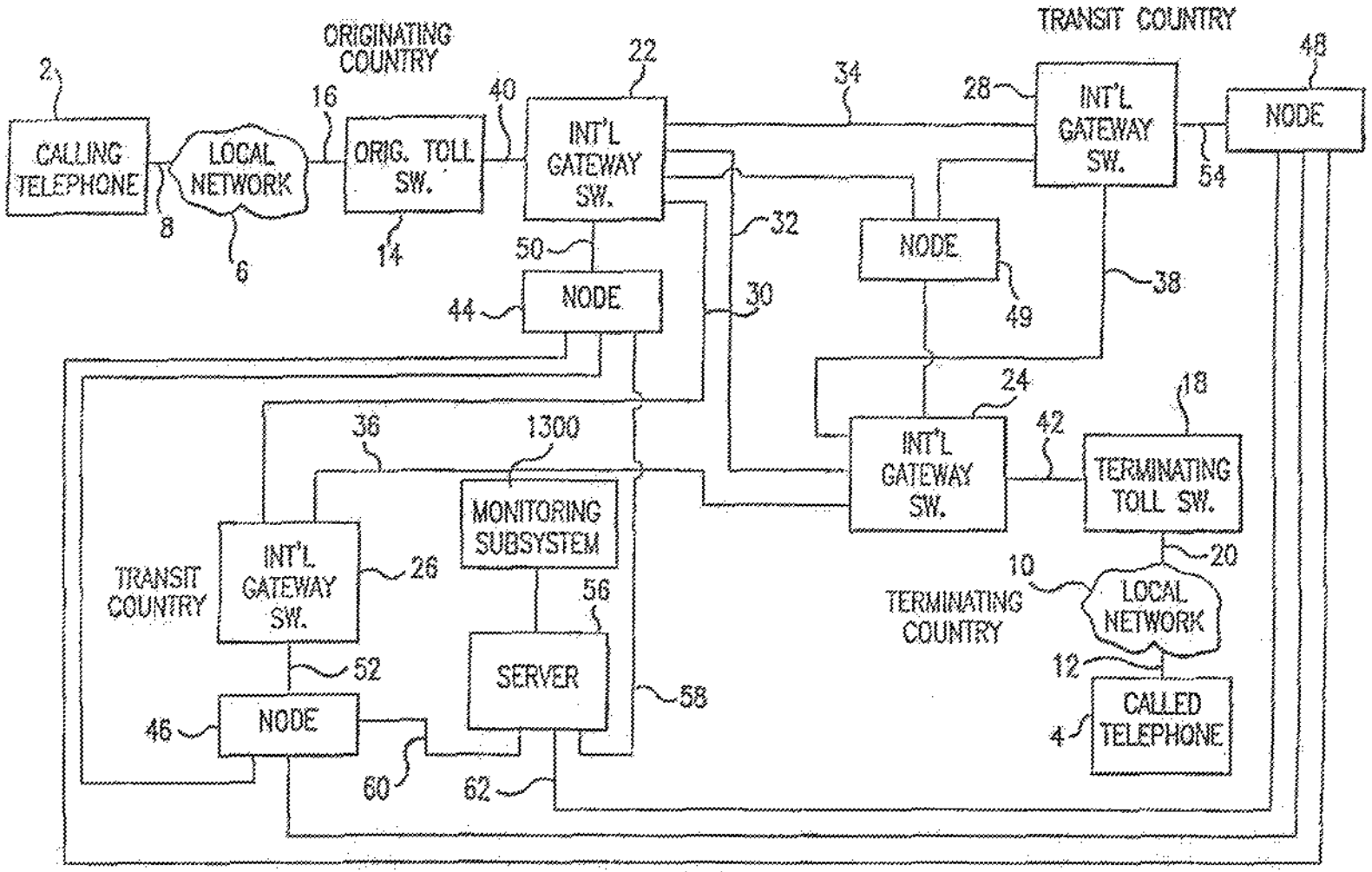
ORIGINATING COUNTRY
TRANSIT COUNTRY
2
CALLING TELEPHONE
8
LOCAL NETWORK
6
16
ORIG. TOLL SW.
14
40
22
INT'L GATEWAY SW.
34
28
INT'L GATEWAY SW.
48
NODE
54
50
NODE
44
32
30
NODE
49
38
24
INT'L GATEWAY SW.
42
18
TERMINATING TOLL SW.
20
36
1300
MONITORING SUBSYSTEM
56
SERVER
58
TRANSIT COUNTRY
INT'L GATEWAY SW.
26
52
NODE
46
60
62
10
TERMINATING COUNTRY
LOCAL NETWORK
12
CALLED TELEPHONE
4

FIG.13

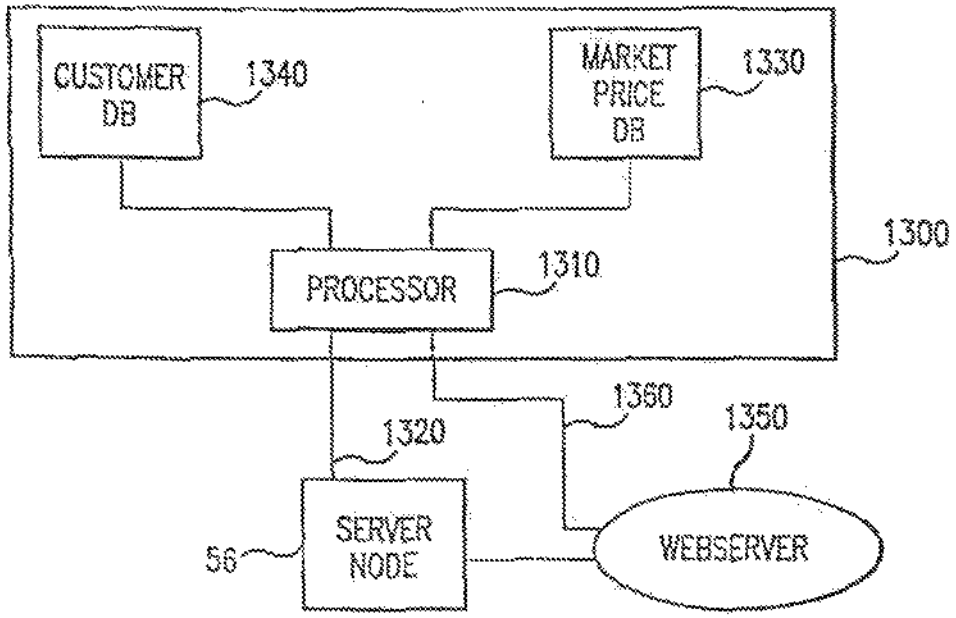

FIG.14

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	IDENTIFIER	GEOGRAPHIC ROUTE	QUALITY	SECURITY	TIME OF DAY	MARKET PRICE	
	***	***	***	***	***	***	
1520	4765	USA-GERMANY	A	A	1300-1900 GMT	16 CENTS/MIN	1510
	4766	USA-GERMANY	A	B	1900-0100 GMT	13 CENTS/MIN	
	4777	USA-GERMANY	B	A	1300-1900 GMT	12 CENTS/MIN	1530
	***	***	***	***	***	***	
1520	6435	FRANCE-AUSTRIA	A	A	0700-1800 GMT	8 CENTS/MIN	1530
	***	***	***	***	***	***	
	6908	GERMANY-AUSTRIA	A	A	0700-1800 GMT	5 CENTS/MIN	1510
	***	***	***	***	***	***	

FIG.15

CUSTOMER	ROUTES OF INTEREST	
***	***	
AUSTRIA TELECOM	6435, 6908	1610
AT&T(TM)	1546, 3444, 4765	
***	***	
OVERSEAS TELECOM		1610
***	***	
DEFAULT (USA)	3967, 4555, 4765	1620
DEFAULT (WESTERN EUROPE)	6435, 8999	1620
***	***	

FIG.16

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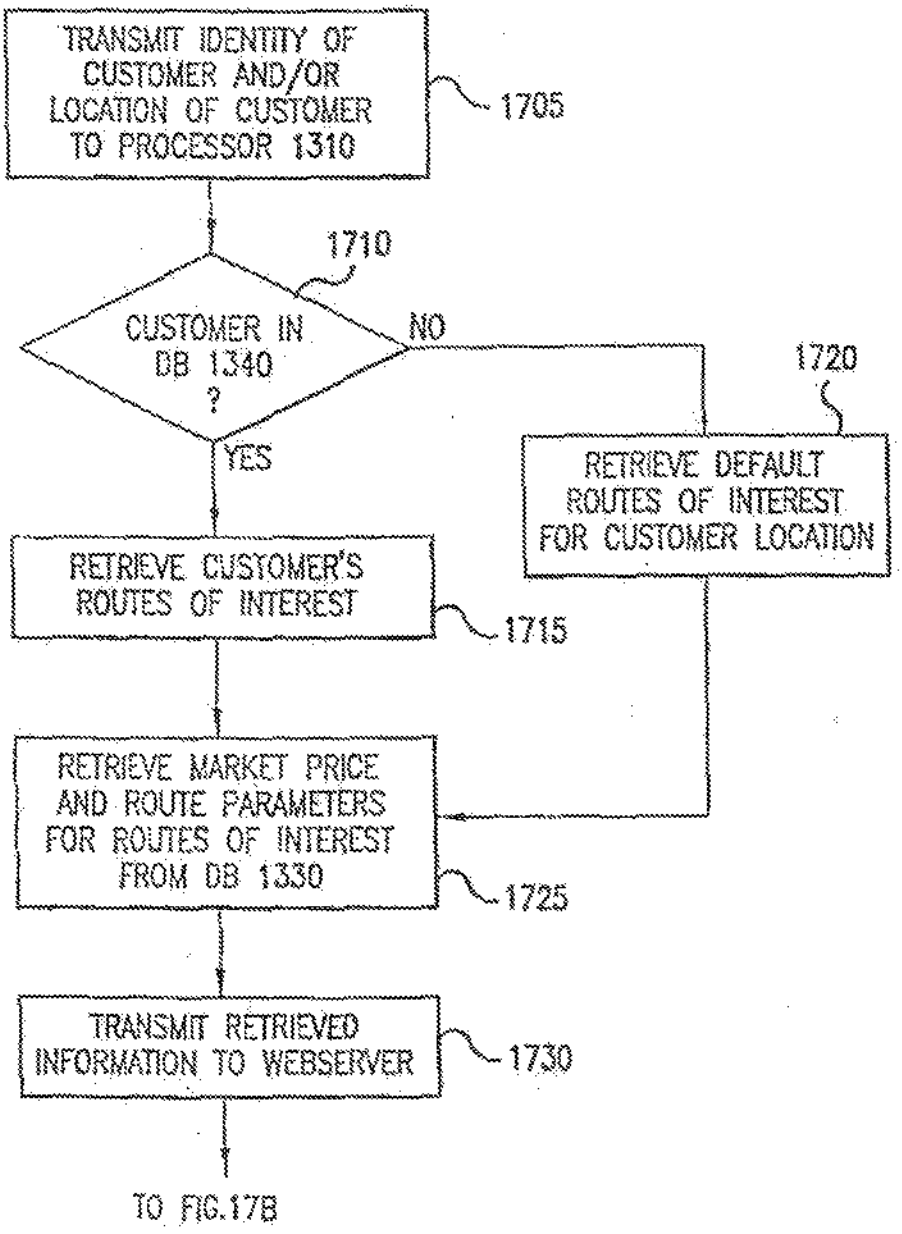

FIG.17A

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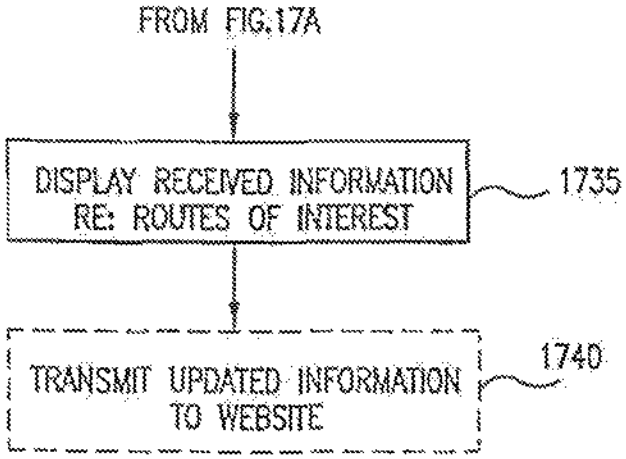

FIG.17B

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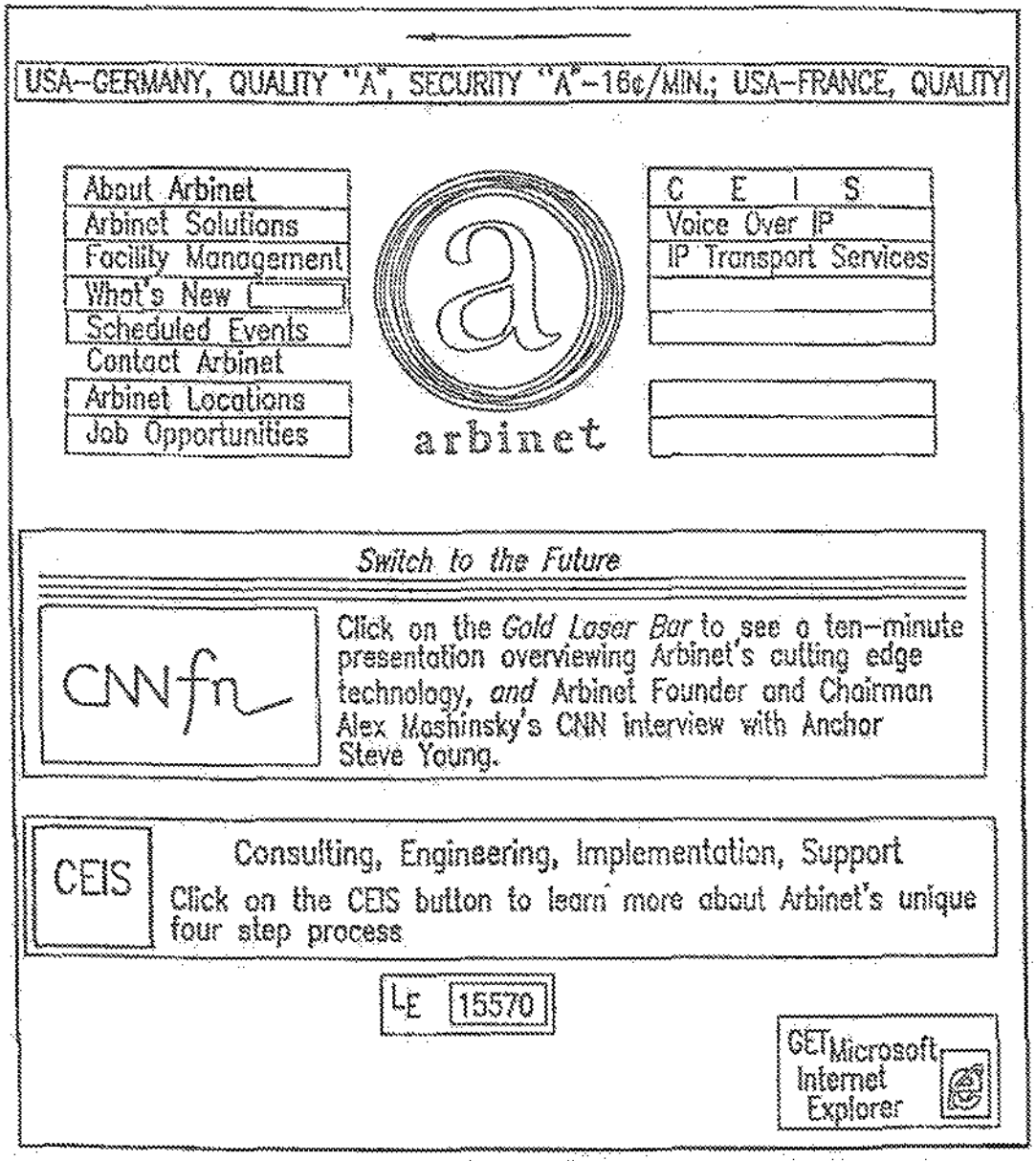

FIG.18

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US99/29258

A. CLASSIFICATION OF SUBJECT MATTER
IPC(7) : H04M 15/00
US CL. : 379/111, 114, 121
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
U.S. : 379/111, 114, 121, 112, 115, 116, 118, 126, 127, 163, 144

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5,606,602 A [JOHNSON et al] 25 February 1997, see figure 1, col.3, line 15 - col.9, line 44.	1-154
Y	US 5,790,642 A [TAYLOR et al] 04 August 1998, see figure 1, col.4, line 10 - col.10, line 37.	1-154
Y	US 5,802,502 A [GELL et al] 01 September 1998, col.4, line 50 - col.18, line 67.	1-154
Y	US 5,065,393 A [SIBBITT et al] 12 November 1991, col.4, line 25 - col.9, line 58.	1-154

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:
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"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
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"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
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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
16 MARCH 2000	07 APR 2000
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230	Authorized officer CURTIS KUNTZ James R. Matthews Telephone No. (703) 305-4708

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

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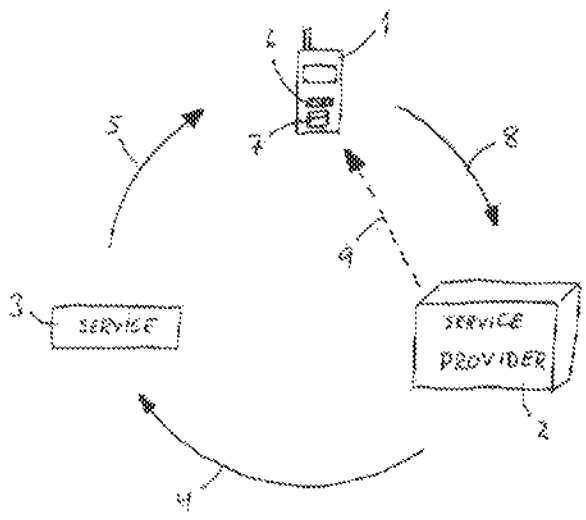
Published:
— *with international search report*

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

(54) Title: METHOD AND MEANS FOR HANDLING THE USE OF SERVICES



(57) Abstract: A method of collecting, storing and retrieving statistical information about use of at least one specified service (3) for a user communication device, said service (3) being provided by a specified service provider (2). The method comprises the steps of internally in the user communication device collecting IC specified statistical information about the use of the specified service (3), storing said statistical information in a database (7), and giving access to said statistical information stored in said database (7) to the user and to a specified service provider (2) IS providing the specified service (3). A method of billing a user is also provided as well as an arrangement and a transaction server (6) for use in said methods.

WO 03/039119 A1

Title

Method and means for handling the use of services.

Technical field

The invention relates to a method and means for collecting, storing, retrieving and using statistical information about use of specified services via a user communication device.

Related prior art

Services available for communication devices, such as mobile telephones, PCs, stationary telephones, etc., can be divided in two: internal services and external services. Internal services are services that are applicable independent of any communication network, i.e. services integrated in or connected to the communication device and immediately applicable as such. External services are services that are applicable only in connection with an external network, i.e. services that are dependent on applications external to the communication device. Examples of internal services are games, text processing programs, phone books, etc. None of these services require any external connection to other appliances in order to be used. Examples of external services are telephone calls, searches on the Internet, "show incoming number" services for telephones, etc. These services all require a connection between the communication device and one or more service providers that provides the specified services.

Today, the use of external services is to a high degree limited by one service provider: the operator, who owns or leases the communication lines needed. In fact, all communication between the user and a desired service provider is controlled by the operator who also is in a position to bill the user for use of the communication line and for use of other services offered by the operator. In this way the operator can be said to sit as a spider in the web since the user is fully dependent on the operator and since the operator is in charge of collecting and storing statistical information about the use of specified services that later are to be billed to the user.

It is possible for the user to collect and store certain statistical information (e.g. time used in connection with telephone conversations) so that the bill from the operator can be checked against this information. However, the possibilities are very limited and the operator may operate with different prices at different times of the day and may offer a wide range of special agreements which makes it very difficult to check the correctness of the bill.

Mostly, the manufacturer of the user's communication device provides the communication device with a certain number of services immediately applicable. An example of such services is the "show number" service in a telephone, either a mobile telephone or a stationary telephone. This service would often be immediately applicable from the manufacturer of the telephone. However, the service will only be available for the user of the telephone if the operator owing or leasing the telephone line offers the "show number" service to its customer, mostly by requiring a fee for the service. Again, the user is dependent on the operator.

It is also possible for the user to get or buy service products, such as computer programs or external devices that can be connected to the user's communication device for performing specified operations, which, after they are installed or connected to the communication device, can be used for that specified service free of charge. Examples of such service products are computer programs that can be installed in the communication device from a CD-rom or downloaded from e.g. the Internet, and external devices, such as web cameras, MP3 player, radios, etc. that are connectable to the user's communication device and which then can be used free of charge. An operator owing or leasing the communication line may though bill the user if that communication line is used in connection with the use of the service product.

Object of the invention

The manufacturers of communication devices and of service products usable with the communication device have an interest in obtaining statistical information about the use of such devices or services. Such statistical information shows the user's use of the devices or services and this information is very useful for the manufacturer in developing new devices or services since it may reflect new needs and wishes from the user.

A further advantage for the manufacturer of devices or services is that the statistical information about the use of the devices or services can be used for billing the user for the use of these specified devices or services. This opportunity will prompt the manufacturer even more to develop new devices or services that in turn

gives the user an even wider range of products or services to chose between.

Finally, the statistical information about the use of specified devices or services should be available for the user. Thereby the user can check the use of the devices and services for his own information and can also check the correctness of any bill sent from a service provider or a service provider collaborator.

It is therefore an object of the invention to provide a method and means for making the use of specified services available for the user of the communication device without being dependent on a single operator owing or leasing the communication lines needed, and furthermore to make it possible for the service providers providing the specified services to measure and possibly billing the use of these specified services.

Summary of the invention

The object of the invention is achieved by a method of collecting, storing and retrieving statistical information about use of at least one specified service for a user communication device, said service being provided by a specified service provider, said method comprises the steps of:

- internally in the user communication device collecting specified statistical information about the use of the specified service,
- storing said statistical information in a database,
- giving access to said statistical information stored in said database to the user and to a specified service provider providing the specified service.

Thereby it is obtained that all statistics about the use of the specified service or services are collected by the user communication device and stored in a database from where the user and the service provider can extract information about the specified use. The user may use this information to check the bill from the service provider, and the service provider may use the information as feed back on the offered services or in connection with designing new services or for billing the user for use of the specified services.

In a first embodiment the statistical information is stored in a database that is integrated in the user communication device. This means that the service provider must have access to the user's communication device in order to extract relevant data. Thereby the user will be "sitting like a spider in the web", since all informations are stored in the user's communication device.

In another embodiment the statistical information is transmitted to and stored in a database located externally in relation to the user communication device, preferably at a server connected to an infranet, such as the Internet, from where the user as well as the service provider can retrieve relevant statistical information. In this embodiment the database would typically be owned by a service provider.

Preferably the user communication device is a mobile radio station, such as a mobile telephone.

In another method according to the invention the service provider specifically uses the statistical information

retrieved from the database to bill the user for use of the specified services.

Furthermore, the invention specifies an arrangement of devices for collecting, storing and retrieving statistical information about use of at least one specified service provided by a service provider, which arrangement comprises a user communication device using the specified service. This arrangement further comprises:

- a transaction server integrated in the user communication device, said transaction server being able to collect and at least temporarily store said statistical information, said user communication device having access to the stored statistical information, and
- a service provider communication device having access to the stored statistical information.

With this arrangement it is possible to carry out the methods described above resulting in the mentioned advantages for the user and for the service provider.

The user communication device is preferably provided with means for transmitting the statistical information to a database to which service provider communication device has access to said database. The database may be integrated in the user communication device or it can be located externally in relation to the user communication device, e.g. at a server connected to an infranet, such as the Internet.

The invention also specifies a transaction server integrated in the user communication device for collecting and at least temporarily storing statistical information about use of at least one specified service

by a user communication device, which transaction server giving access to a user and to a service provider to retrieve statistical information collected by said transaction server about a service provided by said service provider.

It shall be emphasised that the term "comprise/comprising" when used in this specification is taken to specify the presence of stated features, integers, steps or components but does not preclude the presence or addition of one or more other features, integers, steps components or groups thereof.

Furthermore, the term "service/services" when used in this specification is taken to mean services, products or devices made available to the user from a manufacturer or any kind of service provider.

Also the term "service provider" when used in this specification is taken to mean any person or company that offers and/or are in charge of and/or are responsible for certain service provided for a user, e.g. a manufacturer, a distributor, an operator, etc., and any collaborators of such persons or companies.

Description of the drawings

The invention will be described in detail in the following with reference to the drawings in which

Fig. 1 shows in a simplified manner the relationship between the user and a service provider operating in a method according to a first embodiment of the invention,

Fig. 2 shows in a simplified manner the relationship between the user and a service provider operating in a method according to a second embodiment of the invention,

Fig. 3 shows a third exemplified embodiment of the invention, and

Fig. 4 shows a fourth exemplified embodiment of the invention.

Detailed description of embodiments of the invention

Fig. 1 shows in a first embodiment of the invention the relationship between the user of a communication device such as a mobile telephone 1 and a service provider 2 offering a service 3 that is used by the user of the mobile telephone 1. In Fig. 1 the mobile telephone 1 represents any kind of communication device as well as the user using the communication device.

The service provider 2 represents any supplier of a service 3, i.e. the service provider 2 could be an operator of a communication line, a manufacturer of devices usable in connection with the mobile telephone 1, a manufacturer of the mobile telephone 1, a software developer offering a certain software for use in the mobile telephone 1, etc.

The service 3 can be any kind of service or device that is usable in connection with the mobile telephone 1. Examples of services 3 are open communication lines, a device usable in connection with the mobile telephone, e.g. MP3 player, web camera, radio, and software that can be stored in the mobile telephone.

The solid arrow 4 indicates that the service provider 2 offers the service 3, and the solid arrow 5 indicates that the user (the mobile telephone 1) uses the service 3. A transaction server 6 for collecting and storing statistical information about the use of the service 3 is integrated in the mobile telephone 1. The statistical information collected by the transaction server 6 is stored in a database 7 also integrated in the mobile telephone 1.

According to the invention the service provider 2 has access to the collected and stored data about the use of the service 3 offered by the service provider 2. This is indicated by the solid arrow 8. This information is very useful for the service provider 2 in relation to developing new services to be offered to the user and it also gives the service provider a possibility to bill the user for the use of the offered service 3. The billing of the user is indicated by the dotted arrow 9.

In accordance with the invention the statistic information about the use of the specified service 3 is collected by the transaction server 6 integrated in the mobile telephone 1 and is stored in the database 7 which in this first embodiment also is integrated in the mobile telephone 1. This means that all transaction concerning the use of the specified service 3 are registered in the mobile telephones 1, i.e. the user sits on all the statistical information about the use of the service 3. Preferably, the user has immediately access to the information so collected and stored. If the service provider 2 is an operator who owns or leases communication lines he will be able to collect information about the use of these communication lines. However, in accordance with the invention the billing of the use of the communication lines is preferably based on

the information that can be extracted from the database 7. Since information about the use of any specified service is collected and stored by the user (more precisely by the mobile telephone 1) the user may have full information about the data on which a bill from a service provider 2 is based. This also means that the user will be able to check the bill from the service provider 2 since he has access to the data on which the bill is based.

Fig. 2 shows in a second embodiment of the invention the relationship between the user of a communication device such as a mobile telephone 1 and a service provider 2 offering a service 3 that is used by the user of the mobile telephone 1. It should be noted that the same reference numerals as used in Fig. 1 are used for like parts in Fig. 2 and in further Figures.

The only difference between the embodiments shown in Fig. 1 and Fig. 2 is that the database 7 is positioned outside the mobile telephone 1. In this embodiment the mobile telephone 1 only comprises the transaction server that collects and temporarily stores the statistical information about the use of the specified service 3. Whenever possible the transaction server transmits the temporarily stored data to the database 7 so that the database 7 is as updated as possible.

As in Fig. 1 the solid arrow 4 indicates that the service provider 2 offers the service 3, and the solid arrow 5 indicates that the user (the mobile telephone 1) uses the service 3. A transaction server 6 for collecting and temporarily storing statistical information about the use of the service 3 is integrated in the mobile telephone 1. The statistical information collected by the transaction

server 6 is transmitted to the database 7 as indicated by the solid arrow 10.

The service provider 2 has access to the database 7 as indicated by the solid arrow 8, and he may bill the user for the use of the offered service 3 as indicated by the dotted arrow 9. Additionally, the user has access to the database 7 via the mobile telephone 1 as indicated by the solid arrow 11. Thereby the user will be able to check the bill from the service provider 2 since he has access to the data on which the bill is based.

Fig. 3 shows an example of the roles of different parties in relation to development and usage of a software product. As in Figs. 1 and 2 there is shown a mobile telephone 1 provided with an integrated transaction server 6 operating as described above. The external database 7 is also present. At the centre of Fig. 3 a box denotes a number of service providers 2 operating in the shown environment as it will be described later.

The user has a mobile telephone 1 manufactured by a manufacturer of mobile telephones and this manufacturer is a first service provider included in the box of service providers 2. The solid arrow between the box of service providers 2 and the mobile telephone 1 indicates that the manufacturer provides the mobile telephone 1 to the user. The database 7 is provided by a second service provided in the box of service providers 2 which could be but necessarily are the same service provider as the first service provider, i.e. the manufacturer of the mobile telephone 1. The solid arrow between the box of service providers 2 and the database 7 indicates that the database is provided by a service provider. The solid arrow 10 indicates that statistical information about the use of specified services are transmitted to the database

7 from the mobile telephone 1, and the solid arrows 8 and 11 indicates that the statistical information is available for the service providers 2 and the user, respectively. The dotted arrow 9 indicates that the service providers 2 may bill the user for use of the specified services based on the information extracted from the database 7. This part of Fig. 3 corresponds to Fig. 2.

If a software developer 12 wishes to develop new software for use in the mobile telephone 1 and wishes to be able to have statistical information about the use of this software he must have knowledge of the interface to the transaction server 6 integrated in the mobile telephone 1. This interface may be of any generally known type so that the new software having a standard interface is immediately applicable in the mobile telephone 1. In the preferred embodiment, however, the manufacturer of the mobile telephone 1 provides a software development kit 13 that must be used in designing the new software for the mobile telephone 1.

When the software is finished it is certificated and uploaded to a server 14 from where it can be downloaded to the mobile telephone 1 via wireless communication symbolized by the antenna 15. Preferably the server 14 is accessible via an infranet (e.g. the Internet, an intranet or an extranet).

In all the steps from the development of the software to the use of the software in the mobile telephone 1 and even to the feed back to the software developer 12 from the database 7 as indicated by the solid arrow 16 service providers 2 are present. This is indicated by all the solid arrows emanating from the box of service providers 2. For instance, the service provider who provides access

to a network from the mobile telephone 1 via the antenna 15 corresponds to the present operators of communication lines. It may be different service providers 2 that offers the different services described above. All service providers may put a tag on the software and since the software is designed using the software development kit 13 which is compatible with the transaction server 6 in the mobile telephone, the transaction server 6 can transmit statistical information related to all the service providers 2 involved to the database 7. All service providers 2 having access to the database 7 can therefore extract information about the use of their specified services and possibly bill the user for such use. This is indicated by the solid arrow 8 and the dotted arrow 9.

The software developer 12 is also a service provider, since he provides the specific software usable in the mobile telephone 1. Therefore, the software developer 16 will also be able to bill the user for any use of the specific software as indicated by the dotted arrow 17.

Fig. 4 shows yet another embodiment of the invention. In this embodiment the user's communication device is a PC (Personal Computer) 18 connected to the Internet. Again a transaction server 6 is integrated in the PC 18 and it collects all transactions related to specified services provided by one or more service providers 2. The collected data is transmitted, preferably via the Internet, to a database 7 located on a server connected to the Internet as indicated by the solid arrow 10. The user as well as the service provider 2 have access to relevant contents of the database as indicated by solid arrows 8 and 11, and the service provider 2 may use this information for billing the user for use of specified services provided by the service provider 2 as indicated

by the dotted arrow 9. Of course, there may be more than one service provider 2 as was the case shown in Fig. 3. The user communication device need not be a PC, but might as well be a mobile telephone as shown in Figs. 1-3 or any other type of communication device.

The invention has been described with emphasis on the possibility for the service providers to bill a user for the use of specified services. This is, however, only one advantage for the service providers in having access to statistical information about the use of specified services. For many service providers such statistical information is valuable in evaluating services provided and in the development of new services. For instance, it lies within the scope of the present invention to transmit information about malfunction of certain services to the database. The service provider who has provided the malfunctioning service then has access to data concerning the malfunctioning and he may take any necessary steps in relation to the user in order to correct the service if possible.

C l a i m s

1. A method of collecting, storing and retrieving statistical information about use of at least one specified service (3) for a user communication device, said service (3) being provided by a specified service provider (2), **characterised** in that said method comprises the steps of:

- internally in the user communication device collecting specified statistical information about the use of the specified service (3),
- storing said statistical information in a database (7),
- giving access to said statistical information stored in said database (7) to the user and to a specified service provider (2) providing the specified service (3).

2. A method according to claim 1, **characterised** in that the statistical information is stored in a database (7) that is integrated in the user communication device.

3. A method according to claim 1, **characterised** in that the statistical information is transmitted to and stored in a database (7) located externally in relation to the user communication device.

4. A method according to claim 3, **characterised** in that the statistical information is transmitted to and stored in a database (7) located at a server connected to an infranet, such as the Internet.

5. A method according to claim 4, **characterised** in that said service provider (2) retrieves the statistical

information from said database (7) located at a server connected to an infranet, such as the Internet.

6. A method according to any one of claims 1-5, characterised in that the user communication device is a mobile radio station, such as a mobile telephone (1).

7. A method of billing a user for the use of at least one specified service (3) for a user communication device, said service (3) being provided by a specified service provider (2), characterised in that said method comprises the steps of:

- internally in the user communication device collecting specified statistical information about the use of at least one billable specified service (3),
- storing said statistical information in a database (7),
- giving access to said statistical information stored in said database (7) to the user and to said specified service provider (2) providing the specified service,
- billing the user by the specified service provider (2) for the use of the specified service (3).

8. A method according to claim 7, characterised in that the statistical information is stored in a database (7) that is integrated in the user communication device.

9. A method according to claim 7, characterised in that the statistical information is transmitted to and stored in a database (7) located externally in relation to the user communication device.

10. A method according to claim 9, characterised in that the statistical information is transmitted to and stored

in a database (7) located at a server connected to an infranet, such as the Internet.

11. A method according to claim 10, **characterised** in that said service provider (2) retrieves the statistical information from said database (7) located at a server connected to an infranet, such as the Internet.

12. A method according to any one of claims 7-11, **characterised** in that the user communication device is a mobile radio station, such as a mobile telephone (1).

13. An arrangement of devices for collecting, storing and retrieving statistical information about use of at least one specified service (3) provided by a service provider (2), said arrangement comprising a user communication device using the specified service (3), **characterised** in that said arrangement further comprises:

- a transaction server (6) integrated in the user communication device, said transaction server (6) being able to collect and at least temporarily store said statistical information, said user communication device having access to the stored statistical information, and
- a service provider communication device having access to the stored statistical information.

14. An arrangement according to claim 13, **characterised** in that user communication device is provided with means for transmitting the statistical information to a database (7), and that the service provider communication device has access to said database (7).

15. An arrangement according to claim 14, **characterised** in that said database (7) is integrated in the user communication device.

16. An arrangement according to claim 14, **characterised** in that said database (7) is located externally in relation to the user communication device.

17. An arrangement according to claim 16, **characterised** in that the database (7) is located at a server connected to an infranet, such as the Internet, and that the user communication device as well as the service provider communication device are connectable to said infranet.

18. An arrangement according to any one of claims 13-17, **characterised** in that the user communication device is a mobile radio station, such as a mobile telephone (1).

19. A transaction server (6) for collecting and at least temporarily storing statistical information about use of at least one specified service (3) by a user communication device, said transaction server (6) giving access to a user and to a service provider (2) to retrieve statistical information collected by said transaction server (6) about a service (3) provided by said service provider (2), **characterised** in that the transaction server (6) is integrated in the user communication device.

20. A transaction server according to claim 19, **characterised** in that it is capable of transmitting said statistical information to a database (7) integrated in the user communication device and to which said service provider (2) has access.

21. A transaction server according to claim 19, **characterised** in that it is capable of transmitting said statistical information to a database (7) external of the

user communication device and to which said service provider (2).

22. A transaction server according to any one of claims 19-21, characterised in that it is integrated in a mobile radio station, such as a mobile telephone (1).

1/2

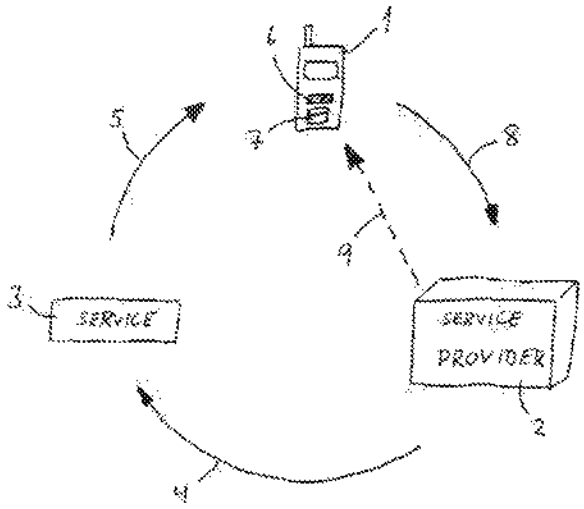
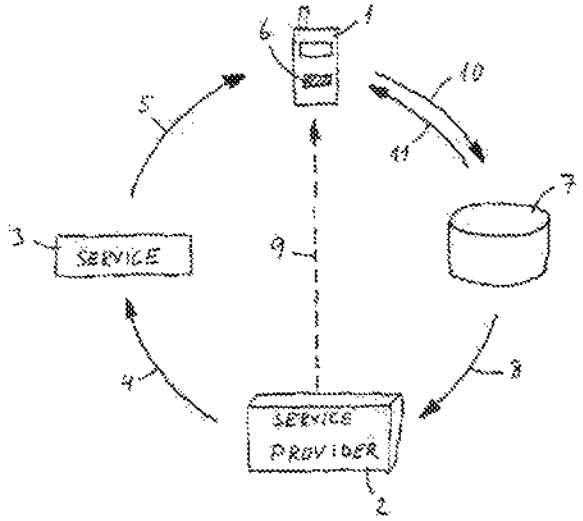

1
6
5
8
9
3
SERVICE
SERVICE PROVIDER
2
4

Fig. 1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SERVICE
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3
SERVICE PROVIDER
2

Fig. 2

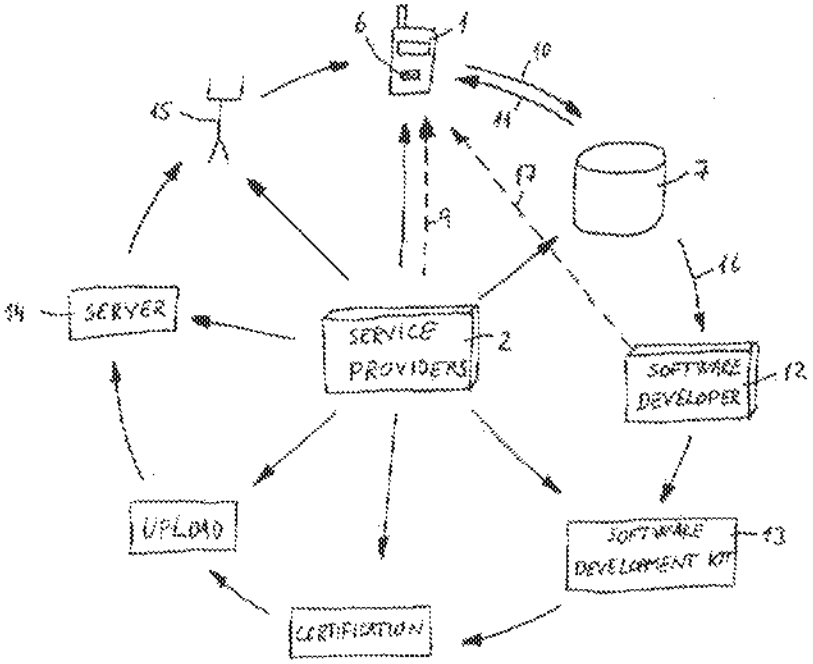
SERVICE PROVIDER
SERVER
UPLOAD
CERTIFICATION
SOFTWARE DEVELOPER
SOFTWARE DEVELOPMENT KIT

Fig.3

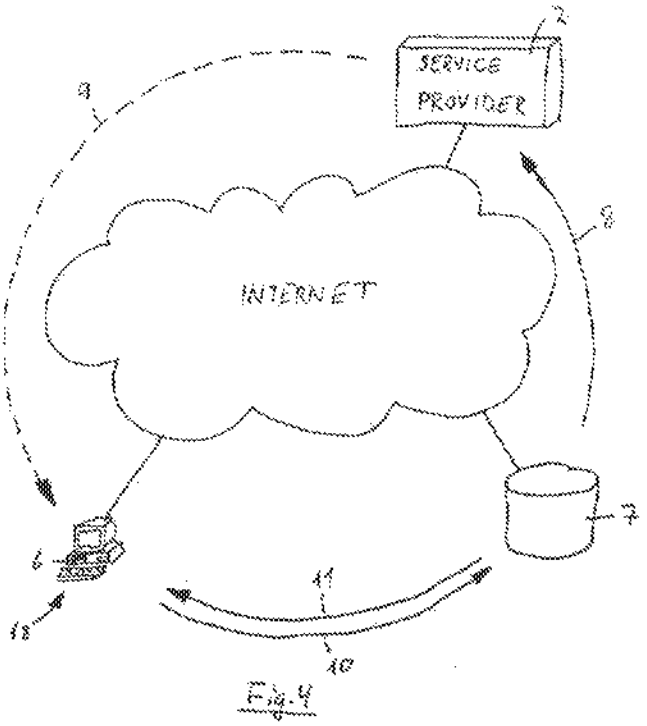
SERVICE PROVIDER
INTERNET

Fig.4

INTERNATIONAL SEARCH REPORT

International Application No
PCT/EP 02/11267

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04M3/42 H04M15/28 H04M15/30 H04M1/725 H04M1/247

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 H04M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data, PAJ, INSPEC, COMPENDEX

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 684 861 A (VAN DWINGELEN JAY W ET AL) 4 November 1997 (1997-11-04) column 2, line 45 -column 3, line 8	1,7,13, 19
A		2-6, 8-12, 14-18, 20-22
A	EP 0 866 596 A (AT & T CORP) 23 September 1998 (1998-09-23) column 2, line 14 -column 3, line 21	1-22

-/--

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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'P' document published prior to the international filing date but later than the priority date claimed

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'&' document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
26 November 2002	05/12/2002

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	Schweitz, M

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INTERNATIONAL SEARCH REPORT

International Application No
PCT/EP 02/11267

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	MATSUO N ET AL: "PERSONAL TELEPHONE SERVICES USING IC-CARDS" IEEE COMMUNICATIONS MAGAZINE, IEEE SERVICE CENTER, PISCATAWAY, N.J, US, vol. 27, no. 7, 1 July 1989 (1989-07-01), pages 41-48, XP000038828 ISSN: 0163-6804 the whole document	1-22
A	EP 0 920 178 A (IBM) 2 June 1999 (1999-06-02) abstract	1-22
A	US 5 960 409 A (WEXLER DANIEL D) 28 September 1999 (1999-09-28) abstract	1-22
A	US 5 905 736 A (RONEN YZHAK ET AL) 18 May 1999 (1999-05-18) abstract	1-22

Form PCT/ISA/210 (continuation of second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Information on patent family members

Inter Application No
PCT/EP 02/11267

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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		WO 9721299 A1	12-06-1997
EP 0866596 A	23-09-1998	US 6104704 A	15-08-2000
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US 5905736 A	18-05-1999	AU 2200397 A	12-11-1997
		WO 9740615 A2	30-10-1997

Inventor Information for 12/815165

Inventor Name	City	State/Country
[redacted]		

App'n Info | Contents | Petition Info | Atty/Agent Info | Continuity Data | Foreign Data | **Inventors** | Address | Fees | Post Info | Pre Grant Pub

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Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12815165	RAPPAPORT, THEODORE S.
	Examiner	Art Unit
	SRIRAMA CHANNAVAJJALA	2157

SEARCHED

Class	Subclass	Date	Examiner
707	608-609,688,705,748,825,827	3/28/2012	sc
455	406,408,417,445,560	3/28/2012	sc
379	1.01,9.04,32.01,88.09,114.08	3/28/2012	sc
705	14.33,14.1,14.11,39	3/28/2012	sc
709	203,218-220	3/28/2012	sc

SEARCH NOTES

Search Notes	Date	Examiner
Inventor searched	3/28/2012	sc
PLUS search	3/28/2012	sc
goole serch attached	3/28/2012	sc
WEST search attached	3/28/2012	sc

INTERFERENCE SEARCH

Class	Subclass	Date	Examiner

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12815165	RAPPAPORT, THEODORE S.
	Examiner	Art Unit
	SRIRAMA CHANNAVAJJALA	2157

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

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

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Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12815165	RAPPAPORT, THEODORE S.
	Examiner	**Art Unit**
	SRIRAMA CHANNAVAJJALA	2157

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

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

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Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12815165	RAPPAPORT, THEODORE S.
	Examiner	**Art Unit**
	SRIRAMA CHANNAVAJJALA	2157

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
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☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

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	82	✓								

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▨	L37	(455/406 |455/408 |455/417 |455/445 |455/560).ccls.	7169
▨	L36	709/$.ccls.	118431
▨	L35	707/$.ccls.	125382
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▨	L22	(telecommunicat$4 and performance and carrier$1).ab. and @py<=2008	186
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▨	L20	L19 and telecommunication$1 and carrier$1	15
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▨	L15	L14 and (wireless near5 network$3)	20
▨	L14	(clearinghouse near5 database$1) and (telecommunication$1 near5 provider$1)	120
▨	L11	6542588.uref.	16
▨	L10	6542588.pn.	2

▨	L9	L7 and (business near5 rule$1)	6
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▨	L3	(clearing$house and database$1).ti. and @py<=2008	5

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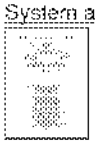
System and method for determining whether to request additional ...

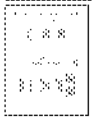


www.google.com/patents US8045692
US Pat. 8045692 - Filed Nov 28, 2006 - Issued Oct 25, 2011 - Embarq Holdings Company, LLC
In one embodiment, the **databases** 240 store NRUF **reports** 108 (FIG. ... present invention for providing **communication services** between each of the servers
Overview - Abstract - Drawing - Description - Claims

System and Method for auditing a telephone number inventory of a ...

www.google.com/patents/US20080046477
US Pat. App. 11/605553 - Filed Nov 29, 2006
The NRUF **reports** stored in the **databases** 240 may be utilized by NANPA the **reporting ...** for providing **communication services** between each of the servers
Overview - Abstract - Drawing - Description - Claims

Telecommunications access cost management system

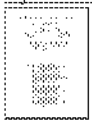


www.google.com/patents/US6144726
US Pat. 6144726 - Filed Jun 12, 1998 - Issued Nov 7, 2000 - OSG Systems, Inc.
The amount charged between various **communication carrier service** 35 ... both the **report** and the billed charges are loaded into a production **database**.
Overview - Abstract - Drawing - Description - Claims

Order processing and reporting system for telecommunications ...

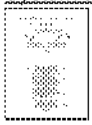
www.google.com/patents/US6104798
US Pat. 6104798 - Filed Feb 16, 1998 - Issued Aug 15, 2000 - MCI Communications Corporation
1 ORDER PROCESSING AND **REPORTING** SYSTEM FOR **TELECOMMUNICATIONS CARRIER SERVICES** FIELD OF THE INVENTION 5 The present invention relates generally to carrier ...
Overview - Abstract - Drawing - Description - Claims

System and method for reporting telecommunications utilization and ...



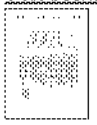
www.google.com/patents US20090055570
US Pat. App. 11/507142 - Filed Aug 21, 2006
In addition, telecommunications **service** providers 105 fill out a forecast ... that is part of the NRUF **Report Telecommunications carriers** in non-pooling ...
Overview - Abstract - Drawing - Description - Claims

System and method for determining telephone number blocks ...



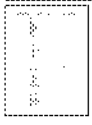
www.google.com/patents/US20050083177
US Pat. App. 11/608496 - Filed Nov 29, 2006
In one embodiment, the **databases** 240 store NRUF **reports** 108 (FIG. ... present invention for providing **communication services** between each of the servers.
Overview - Abstract - Drawing - Description - Claims

Telecommunications access cost management system



www.google.com/patents/US6032182
US Pat. 6032182 - Filed Jun 12, 1998 - Issued Feb 29, 2000 - OSG Systems, Inc.
The amount charged between various **communication carrier service** ... from a **database** maintained or otherwise readily accessed by the first carrier.
Overview - Abstract - Drawing - Description - Claims

Method for managing wireless telecommunications bills



www.google.com/patents/US7483844
US Pat. 7483844 - Filed Sep 30, 2003 - Issued Feb 3, 2009 - The Bill Police LLC
They will receive the same **reporting services** and 5 the same proposed changes for ... for the implementation of these **services** directly with their **carrier**.
Overview - Abstract - Drawing - Description - Claims

TELECOMMUNICATION SERVICES REPORTING SYSTEM

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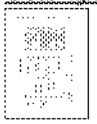
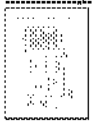
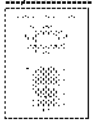


Clearinghouse system, method, and process for inventorying and ...
www.google.com/patents/US20090070373
US Pat. App 12208007 - Filed Sep 10, 2008
A clearinghouse system for communications networks, comprising: a **database** including performance or **quality** of **service** information for one or more specific ...
Overview - Abstract - Drawing - Description - Claims

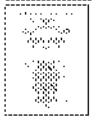
Clearinghouse System and Method for Enhancing the Quality, ...
www.google.com/patents/US20100250268
US Pat. App 12615076 - Filed Jun 14, 2010
[0046] A computer system according to the invention includes a **database** of **locations** of end users who are willing to assist with the provisioning of **telecom** ...
Overview - Abstract - Drawing - Description - Claims



Clearinghouse System and Method for Determining Availability of ...
www.google.com/patents/US20100250269
US Pat. App 12615165 - Filed Jun 14, 2010
[0048] A computer system according to the invention includes a **database** of **locations** of end users who are willing to assist with the provisioning of **telecom** ...
Overview - Abstract - Drawing - Description - Claims



System and method for determining whether to request additional ...
www.google.com/patents/US20080042948
US Pat. App 11606655 - Filed Nov 29, 2006
Pooling carriers, where a pooling carrier is a **telecommunications carrier** that has pooled telephone number resources in certain rate center **locations**, ...
Overview - Abstract - Drawing - Description - Claims



System and method for determining telephone number blocks ...
www.google.com/patents/US20080063177
US Pat. App 11606496 - Filed Nov 29, 2006
Pooling carriers, where a pooling carrier is a **telecommunications carrier** ... 2, the LERG **database** 220 and NeuStar **database** 232 are accessible via a network ...
Overview - Abstract - Drawing - Description - Claims

Low cost call routing system for **telecommunications** unit
www.google.com/patents/US6330311
US Pat. 6330311 - Filed Aug 19, 1998 - Issued Dec 11, 2001 - L.C.R. Global Communications, Inc
The following LCC **database** table lists some of the typical information ... "high **quality**" **telecommunications carrier** during business hours in order to avoid ...
Overview - Abstract - Drawing - Description - Claims

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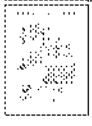

Providing information on wireless **service** coverage along routes ...
www.google.com/patents/US7609678
US Pat. 7609678 - Filed Mar 13, 2006 - Issued Oct 27, 2009 - Alcatel-Lucent USA Inc.
Some or all of the information contained in **databases** 6 48 and 52 could be ... or 55 request that all **communication carriers** serving the specific **locations** ...
Overview - Abstract - Drawing - Description - Claims

Bidding for **telecommunications** traffic with request for **service**

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http://www.google.com/search?q=telecommunication+carriers+services+reports+database... 3/29/2012

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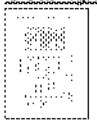

Clearinghouse system, method, and process for inventorying and ...
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US Pat. App 12208007 - Filed Sep 10, 2008
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www.google.com/patents/US20100250268
US Pat. App 12615076 - Filed Jun 14, 2010
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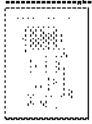

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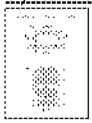

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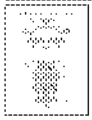

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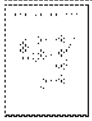

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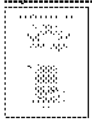

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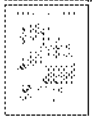

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www.google.com/patents/US7609678
US Pat. 7609678 - Filed Mar 13, 2006 - Issued Oct 27, 2009 - Alcatel-Lucent USA Inc.
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Bidding for **telecommunications** traffic with request for **service**

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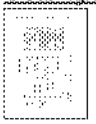
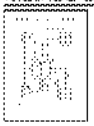


Clearinghouse system, method, and process for inventorying and ...
www.google.com/patents/US20090070373
US Pat. App 12208007 - Filed Sep 10, 2008
... comprising, a **database** including records for one or more **telecommunications carriers** which identifies **infrastructure** needs for one or more ...
Overview - Abstract - Drawing - Description - Claims



Method of managing a peering **database** in a **telecommunications** network
www.google.com/patents/US8000464
US Pat. 8000464 - Filed Mar 23, 2010 - Issued Aug 16, 2011 - IntelePeer Inc
BACKGROUND A **telecommunications carrier**, such as a competitive local exchange ... maintained 2 within a peering **database**, the telecommunications peering ...
Overview - Abstract - Drawing - Description - Claims

System and Method for Using Lifecycle **Telecommunications** Expense ...
www.google.com/patents/US20100049667
US Pat. App 12699972 - Filed Feb 25, 2009
[0026] The TEM **database** 150 can be, for example, configured to contain the existing TEM **infrastructure** information and existing **telecommunication carrier** ...
Overview - Abstract - Drawing - Description - Claims

Clearinghouse System and Method for Enhancing the Quality, ...
www.google.com/patents/US20100250268
US Pat. App 12815076 - Filed Jun 14, 2010
[0036] The invention provides a system and method that permits a **carrier**, ... Mapinfo, USGS, is used with a **database** of **infrastructure** locations provided by ...
Overview - Abstract - Drawing - Description - Claims

Clearinghouse System and Method for Determining Availability of ...
www.google.com/patents/US20100250269
US Pat. App 12815165 - Filed Jun 14, 2010
[0038] The invention provides a system and method that permits a **carrier**, ... Mapinfo, USGS, is used with a **database** of **infrastructure** locations provided by ...
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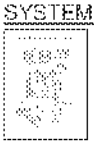
Order processing and reporting system for **telecommunications** ...
www.google.com/patents/US6104798
US Pat. 6104798 - Filed Feb 12, 1998 - Issued Aug 15, 2000 - MCI Communications Corporation
1 ORDER PROCESSING AND REPORTING SYSTEM FOR **TELECOMMUNICATIONS CARRIER** SERVICES FIELD ... are additionally performed using the same systems **infrastructure**.
Overview - Abstract - Drawing - Description - Claims

Clearinghouse System and Method for **Carriers**, Advertisers, and ...
www.google.com/patents/US20100299974
US Pat. App 12814974 - Filed Jun 14, 2010
Not only is wireless **infrastructure** a problem for **carriers** today, ... These are firms or websites that use the FCC **database** of tower locations, ...
Overview - Abstract - Drawing - Description - Claims



SYSTEM AND METHOD FOR STORING AND DISTRIBUTING PROFILES
www.google.com/patents/US20110099120
US Pat. App 12910570 - Filed Oct 22, 2010 - Wavemarket, Inc
... profile request API 16, a device location API 18, and a subject profile **database** 20 ... **database** as part of a **telecommunication carrier infrastructure**, ...
Overview - Abstract - Drawing - Description - Claims

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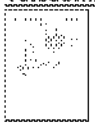
Telecommunication system



www.google.com/patents/US20040034283
US Pat. App. 10272545 - Filed Oct 16, 2002
The LIP will own the wires or other **telecommunications infrastructure** running from the access point through the LIP **real estate** to each parcel of **property** ...
Overview - Abstract - Drawing - Description - Claims

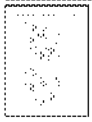
Telecom equipment with memory

www.google.com/patents/US7403771
US Pat. 7403771 - Filed Oct 7, 2005 - Issued Jul 22, 2008 - Telcel Inc
... components, equipment, and devices takes up valuable **real estate** in a ... For example, a housing in a **telecommunication infrastructure** may hold numerous ...
Overview - Abstract - Drawing - Description - Claims

Waveguide-based, fabricless switch for telecommunication system ...

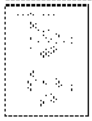
www.google.com/patents/US5781318
US Pat. 5781318 - Filed Dec 27, 1995 - Issued Jul 28, 1998 - Lucent Technologies Inc
... nication system and **telecommunication infrastructure** employing the switch. ... physical size requirements (ie. **real estate**) and, especially, high cost.
Overview - Abstract - Drawing - Description - Claims

ENVIRONMENTS FOR A MOBILE, BROADBAND, ROUTABLE INTERNET



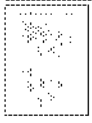
www.google.com/patents/US20100149445
US Pat. App. 12554833 - Filed Sep 4, 2009
efficient use of **real estate** required for fixed radio installation, 2.) efficient connection to other wired **telecom infrastructure** required for connection ...
Overview - Abstract - Drawing - Description - Claims

MARKETS FOR A MOBILE, BROADBAND, ROUTABLE INTERNET



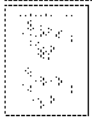
www.google.com/patents/US20100149421
US Pat. App. 12554726 - Filed Sep 4, 2009
efficient use of **real estate** required for fixed radio installation, 2.) efficient connection to other wired **telecom infrastructure** required for connection ...
Overview - Abstract - Drawing - Description - Claims

BUSINESS MANAGEMENT SYSTEMS FOR A MOBILE, BROADBAND, ROUTABLE INTERNET



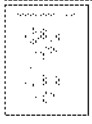
www.google.com/patents/US20100149448
US Pat. App. 12554754 - Filed Sep 4, 2009
efficient use of **real estate** required for fixed radio installation, 2.) efficient connection to other wired **telecom infrastructure** required for connection ...
Overview - Abstract - Drawing - Description - Claims

METHODS AND SYSTEMS FOR A MOBILE, BROADBAND, ROUTABLE INTERNET



www.google.com/patents/US20090252134
US Pat. App. 12413363 - Filed Apr 3, 2009
efficient use of **real estate** required for fixed radio installation, 2.) efficient connection to other wired **telecom infrastructure** required for connection ...
Overview - Abstract - Drawing - Description - Claims

DEVICES FOR A MOBILE, BROADBAND, ROUTABLE INTERNET



www.google.com/patents/US20100149448
US Pat. App. 12554821 - Filed Sep 4, 2009
The availability of suitable **real estate** sites in the relevant geography to ... wired **telecom infrastructure** required for connection to other networks, ...
Overview - Abstract - Drawing - Description - Claims

WEB APPLICATIONS FOR A MOBILE, BROADBAND, ROUTABLE INTERNET

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Sorted by relevance
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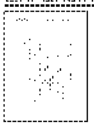
Filing date: oldest

Method and system for automatically initiating a ...
www.google.com/patents/US20020111173
US Pat. App 9876145 - Filed Jun 8, 2001
6, a first MU 101a may be connected via the **telecommunication infrastructure** 120 to the matchmaker service & **database** 107 (hereinafter referred to as **...**
Overview - Abstract - Drawing - Description - Claims



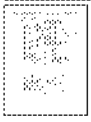
Enhancing **user** experience during handoffs in wireless **communication**
www.google.com/patents/US7546125
US Pat. 7546125 - Filed Oct 2, 2006 - Issued Jun 2, 2009 - DiVitas Networks, Inc.
As mentioned above, the wireless **communication** system may further include **...** The **user** interface may include a web-based interface. **Database** (**DB**) manager **...**
Overview - Abstract - Drawing - Description - Claims

Distributed information methods and systems used to collect and ...
www.google.com/patents/US20020120519
US Pat. App 9668667 - Filed May 25, 2001
[0180] The **infrastructure database** includes information on the locations **...** [0181] The system components communicate via a data engine to **user** terminals.
Overview - Abstract - Drawing - Description - Claims

REDUCING DATA LOSS DURING HANDOFFS IN WIRELESS **COMMUNICATION**
www.google.com/patents/US20070091646
US Pat. App 11587960 - Filed Oct 2, 2006
[0218] The **telecommunication** request by the **user** of outside telephone 802 may **...** [0228] **Database** (**DB**) manager module 908 may be configured to manage one or **...**
Overview - Abstract - Drawing - Description - Claims

Method and system for providing a financial analysis of an ...
www.google.com/patents/US7415434
US Pat. 7415434 - Filed Jul 13, 2007 - Issued Aug 19, 2008 - Accenture LLP
15 Besides cost data, the reference **database** 10 includes revenue data 18 from an **...** estimator 66 and a **telecommunications infrastructure** configurator 68.
Overview - Abstract - Drawing - Description - Claims

Mobile cellular **telecommunications infrastructure** based multi-**user** ...
www.google.com/patents/US7801541
US Pat. 7801541 - Filed Jan 5, 2007 - Issued Sep 21, 2010 - Celltick Technologies Ltd
1 MOBILE CELLULAR **TELECOMMUNICATIONS INFRASTRUCTURE** BASED MULTI-**USER** APPLICATIONS **...** 2 is a schematic representation of a **database** record of an exemplary **...**
Overview - Abstract - Drawing - Description - Claims



Incorporation of a web page program to modify a **database**
www.google.com/patents/US20000195968
US Pat. App 10417853 - Filed Apr 18, 2003
... user PAP ID and PAP password entry in the network services **database** 206 to **...** areas may have insufficient **telecommunications infrastructure** that may **...**
Overview - Abstract - Drawing - Description - Claims

SYSTEM AND METHOD FOR MATCHING **USERS** OF MOBILE **COMMUNICATION** DEVICES

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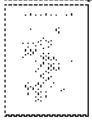
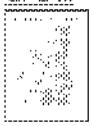
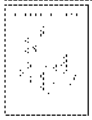


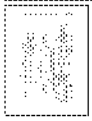
Link adaptation in mobile **telecommunication** system
www.google.com/patents/US20080248822
US Pat. App. 11808904 - Filed Jun 13, 2007
Accordingly, the transmission conditions and **properties** of the ... **communication** link in order to determine a geographical **location** of the mobile terminal.
Overview - Abstract - Drawing - Description - Claims



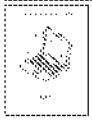
Communication of real estate information utilizing moving map GPS ...
www.google.com/patents/US20030064705
US Pat. App. 10072344 - Filed Feb 7, 2002
... MOVING MAP GPS AND WIRELESS **TELECOMMUNICATIONS** TO ACCESS MLS AND OTHER **PROPERTY ... property locations** and addresses in relation to the PED'S **location**.
Overview - Abstract - Drawing - Description - Claims



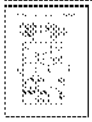
Method for informing about the **properties** of a **communication** ...
www.google.com/patents/US20020168999
US Pat. App. 10118998 - Filed Apr 8, 2002 - Nokia Corporation
Thus, some mobile **communication** networks implement the **properties** of all the ... the **location** of the mobile terminal, the mobile **communication** network can, ...
Overview - Abstract - Drawing - Description - Claims



CENTRALIZED MULTI-**PROPERTY** MANAGEMENT SYSTEM
www.google.com/patents/US20100030690
US Pat. App. 12202148 - Filed Aug 29, 2008
This generating **communication** signals in response to the status of the room or ... individual hospitality **properties** or **locations**. [0072] Registration is a ...
Overview - Abstract - Drawing - Description - Claims



METHOD FOR LINKAGE OF **TELECOMMUNICATIONS** BY MEANS OF DIGITAL MAPS
www.google.com/patents/US20030223451
US Pat. App. 12400415 - Filed Mar 9, 2009
... longitude and address of **location**) and descriptive **properties** (pictorial profiles, introductions of business contents and data of **telecommunications**)
Overview - Abstract - Drawing - Description - Claims



Method for storing and informing **properties** of a wireless ...
www.google.com/patents/US7200384
US Pat. 7200384 - Filed Apr 28, 2000 - Issued Apr 3, 2007 - Nokia Mobile Phones, Ltd.
1, the mobile services switching centre MSC1 maintains information on the **location** of the wireless **communication** devices MS1-MS4 in 5 the area of cells ...
Overview - Abstract - Drawing - Description - Claims

Telecommunication system
www.google.com/patents/US20040076283
US Pat. App. 10272545 - Filed Oct 16, 2002
The LIP will own the wires or other **telecommunications** infrastructure running from the access point through the LIP real estate to each parcel of **property ...**
Overview - Abstract - Drawing - Description - Claims

Location-based ringbacks
www.google.com/patents/US20060147012
US Pat. App. 11028997 - Filed Jan 4, 2005 - Avaya Technology Corp.
Image and video **properties** might include brightness, contrast, resolution, ... that is based on the geo-**location** of a called **telecommunications** terminal. 2.
Overview - Abstract - Drawing - Description - Claims

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http://www.google.com/search?q=telecommunication+properties+locations&tbm=pts&tbo... 3/30/2012

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... telecommunications carriers. ADC offers end-to-end network **infrastructure ...** office (CO), outside Plant (OSP), Cell Site, and Multiple **Dwelling** Unit (MDU) ...

Facilities & Technology
www.security-central.com/index.php/explore/81-facilities-a-tech
Geographically diverse call routing, via multiple POP's. Path redundancy from multiple **telecom carriers**. Multi-homed BGP routing internet **infrastructure** for IP ...

Broadband Wireless | GeoTel Communications, LLC
www.geo-tel.com/broadband-wireless/
Telecommunications Geography ... This includes cellular **carriers** and fixed wireless broadband providers (WISP's). ... understanding of a **Carrier's infrastructure** attributes and specific **geographic** coverage areas. ... use to deliver services; Calculate the number of **homes** and population covered by a **carrier** network; Examine ...

[PDF] **The Economic Geography of the Internet's Infrastructure***
www.casa.ucl.ac.uk/cyberspace/Malecki_econ_geog.pdf
File Format: PDF/Adobe Acrobat - Quick View
by EJ Malecki - Cited by 161 - Related articles
Department of **Geography** and Center for Urban and Regional Analysis., Ohio State **....** the only **communication infrastructure** will be a set of **.....** their potential clients---office tower-**dwelling** producer ... These new **carriers** must interconnect ...

[PDF] **TELECOMMUNICATIONS INFRASTRUCTURE IN DISASTERS:**
www.nyu.edu/ccpr/pubs/NYU-DisasterCommunications1-Final.pdf
File Format: PDF/Adobe Acrobat - Quick View
infrastructure and **geographic** isolation of the affected communities as factors.2 **....** communications.13 At the local level, Internet service for small businesses and **homes** ..... "Asian **telecom carriers** mobilize after quake, tsunami disaster".

Last mile - Wikipedia, the free encyclopedia
en.wikipedia.org/wiki/Last_mile
The phrase is therefore often used by the **telecommunications** and cable **...** Dual Parenting is where the telephone **carrier** provides the same numbers ... low- latency and high-volume **communication** of information to **homes** and **...** a large amount of installed fiber **infrastructure** is not being used because it is ..... **Geographic** ...

[DOC] **CHAPTER 1 -- INTRODUCTION AND EXECUTIVE SUMMARY**
www.acma.gov.au/.../introduction%20with%20no%20map.doc
File Format: Microsoft Word - Quick View
2004--05 saw the number of newly licensed **telecommunications carriers** increase to 40 **...** Frequently the two are operating together to install **infrastructure** for the provision of broadband services **....** The wider **geographic** availability of broadband access networks is being driven by the demand for **...** 2.6 million **homes ...**

Clearinghouse system, method, and process for inventorying and ...
www.faqs.org/patents/app/20030070379
Mar 12, 2009 -- **...** to offer the use of their **dwelling** or other assets to carriers. **...** one or more **telecommunications carriers** which identifies **infrastructure** needs for one **...** for said **geographic** locations, and information about carriers serving said ...

[PDF] **Economics of Shared Infrastructure Access**
stakeholders.ofcom.org.uk/binaries/consultations/wla/.../csmg.pdf
File Format: PDF/Adobe Acrobat - Quick View
infrastructure would allow **Communication** Providers (CP) to avoid the high upfront cost of **...** The available revenues in a particular **geography** will also influence choice of entry option. **...** of **homes** in an area to breakeven. Further, if demand **.....** to create laws to facilitate competition by mandating **carrier infrastructure** sharing.

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20080133311 82
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PTO/SB/08a (01-10)
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(Not for submission under 37 CFR 1.99)

Application Number	12815165
Filing Date	2010-06-14
First Named Inventor	Theodore S. Rappaport
Art Unit	2617
Examiner Name	
Attorney Docket Number	110-009US

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	1	6879584		2005-04-12	Thro et al.	
	2	7286649		2007-10-23	Nelson et al.	
	3	6032132		2000-02-29	Nelson	

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	1	20020123919		2002-09-05	Brockman et al.	
	2	20080049745		2008-02-28	Edwards et al.	
	3	20080065570		2008-03-13	Schultz	

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	Filing Date	2010-06-14
	First Named Inventor	Theodore S. Rappaport
	Art Unit	2617
	Examiner Name	
	Attorney Docket Number	110-009US

	4	20020147726		2002-10-10	Yehia et al.	
	5	20030167175		2003-09-04	Salom	
	6	20100142446		2010-06-10	Schlicht et al.	
	7	20070176745		2007-08-02	Gibson et al.	

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	1	WO2009114923			2009-09-24	Zabawskyj et al.		☐
	2	WO9524093			1995-09-08	Gordon et al.		☐

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	Application Number	12815165
	Filing Date	2010-06-14
	First Named Inventor	Theodore S. Rappaport
	Art Unit	2617
	Examiner Name	
	Attorney Docket Number	110-009US

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OR

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

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

☒ A certification statement is not submitted herewith.

SIGNATURE

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

Signature	/William E. Winters/	Date (YYYY-MM-DD)	2012-03-15
Name/Print	Wiliam E. Winters	Registration Number	42,232

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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.

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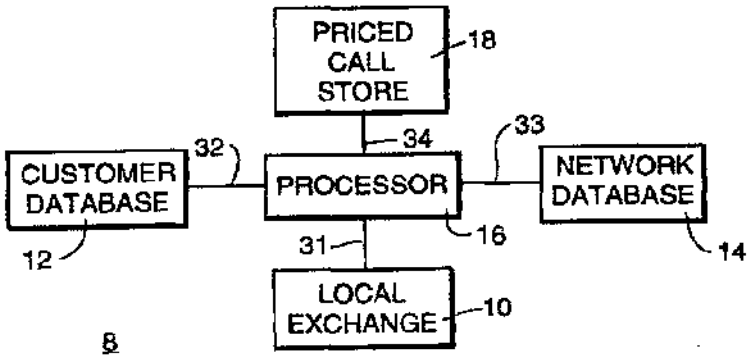

(57) Abstract

A system is described for pricing calls made by customers in a telecommunications network. The system includes a local exchange (10) which provides a call record for each call, a database (12) containing details of the customers of the network, a database (14) which contains the locations of the individual numbers, details of routes between the numbers and a set of tariffs for pricing calls, a processor (16) which receives call records from the local exchange (10) and data from the databases (12) and (14) and uses the call records and data to price calls, and a store (18) for storing details of the priced calls. In order to price a typical call, the processor (16) evaluates a factor relating to the type of service used in the call, a factor relating to the type of customer, a factor relating to the locations of the calling and called number in the network and a factor relating to the day on which the call is made. The values of the factors are used to select the tariff from the set of call tariff stored in database (14) and the call is then priced in accordance with this tariff.

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PRICING METHOD FOR TELECOMMUNICATIN SYSTEM

This invention relates to a method of pricing a call originating in a telecommunications network and also to a system for pricing a telecommunications call originating in a telecommunications network.

In a known method of pricing calls in a public telephone network, each call is initially priced in arbitrary units at the local exchange of the calling number. The main parameters used in the initial pricing are the distance between the calling and called numbers, the duration of the call and the charging period in which the call occurs. The price of the call in arbitrary units is then transferred, usually in a batch, to a computer located at a remote position which has a database containing details of the customers of the telephone network. This computer then translates the price in arbitrary units to a price in local currency using the tariff applicable to the customer.

This known method of pricing a telephone call is generally inflexible. For example, if it is desired to change the tariff for calls in a particular charge period for the whole telephone network, the data must be changed at each local exchange.

According to a first aspect of this invention, there is provided a method of pricing a call originating in a telecommunications network comprising the steps of: retrieving a record of the call from a point located in the telecommunications network; providing a first database containing details of customers of the network; providing a second database containing details of the network and a set of call tariffs; and processing data from the call record, the first database and the second database to price the call.

Because calls are priced using data from call records and from the first and second databases, the present invention makes it possible to price calls in a flexible manner. For example, in order to provide a new tariff, it is only necessary to provide the data for the new tariff in the

second database and details of a new tariff are not required at points where records of calls originate.

According to a second aspect of this invention, there is provided a method of pricing a call originating in a telecommunications network comprising the steps of: retrieving a record of a call from a point located in the telecommunications network; finding a factor (the service factor) relating to the type of service used in the call by processing data contained in the call record; finding a factor (the customer factor) relating to the type of customer making the call; finding a factor (the network factor) relating to the locations of the calling number and the called number; finding a factor (the calendar factor) relating to the day of the call; selecting a call tariff from a set of call tariffs stored in a database in accordance with a combination of the service factor, the customer factor, the network factor and the calendar factor; and pricing the call in accordance with the selected call tariff.

According to a third aspect of this invention, there is provided a method of pricing a call originating in a telecommunications network, the price of the call having at least one component, said method comprising the steps of: retrieving a record of a call from a point located in the telecommunications network; finding a factor (the first service factor) relating to the type of service used in the call by processing data contained in the call record; using the first service factor to select an algorithm from a set of algorithms which defines which factors from a group of factors are to be used in determining the or each component of the price of the call and the manner of combining the components to determine the price of the call, said group of factors comprising a factor (the second service factor) relating to the type of service used in the call, a factor (the customer factor) relating to the type of customer making the call, a factor (the network factor) relating to the locations of the calling and called numbers, and a factor (the calendar factor) which relates to the day of the call;

for the or each component of the price finding the factors defined in the algorithm; for the or each component of the price, selecting a call tariff from a set of call tariffs stored in a database in accordance with the factors defined in the algorithm; for the or each component of the price, determining the component in accordance with the selected algorithm; and where the price of the call has more than one component, combining the components in the manner defined in the algorithm.

According to a fourth aspect of this invention, there is provided a system for pricing a telecommunications call originating in a telecommunications network, said system comprising: a telecommunications point located in the network for providing a call record for each call; a first database containing details of the customers of the network; a second database containing details of the network and a set of call tariffs; means for processing data from a call record, the first database and the second database to price a call; and means for providing a communication link between the processing means and each of the telecommunications switch, the first database and the second database.

According to a fifth aspect of this invention, there is provided a system for pricing a telecommunications call originating in a telecommunications network, said system comprising:

a telecommunications point located in the network for providing a call record for each call;

means for finding a factor (the service factor) relating to the type of service used in a call by processing data contained in the call record for the call;

means for finding a factor (the customer factor) relating to the type of customer making a call;

means for finding a factor (the network factor) relating to the locations of the calling number and the called number for a call;

means for finding a factor (the calendar factor) relating to the day of a call;

means for selecting a call tariff from a set of call tariffs in accordance with the combination of the service factor, the customer factor, the network factor and the calendar factor found for a call; and

means for pricing a call in accordance with a selected call tariff.

According to a sixth aspect of this invention, there is provided a system for pricing a telecommunications call originating in a telecommunications network, said system comprising:

a telecommunications point located in the network for providing a call record for each call;

means for finding a factor (the first service factor) relating to the type of service used in a call;

means for using the first service factor to select an algorithm from a set of algorithms which defines which factors from a group of factor are to be used in determining the or each component of a price of a call and the manner of combining the components to determine the price of the call, said group of factors comprising a factor (the second service factor) relating to the type of service used in the call, a factor (the customer factor) relating to the type of customer making a call, a factor (the network factor) relating to the locations of the calling number and the called number for a call, and a factor (the calendar factor) relating to the day of a call;

means for finding the factors defined in the algorithm for the or each component of the price of a call;

means for selecting a call tariff for the or each component of the price of a call from a set of call tariffs in accordance with the factors defined in the algorithm;

means for determining the or each component of the price of a call in accordance with the selected call tariff; and

means for combining the components in the manner defined in the algorithm.

This invention will now be described in more detail, by way of example, with reference to the drawings in which:

Figure 1 is a block diagram of a system for pricing calls originating in a telecommunications network embodying this invention;

Figure 2 is a diagram showing the fields of a call record;

each of Figures 3 to 5 is a flow chart of an algorithm which may used in the system of Figure 1 for pricing a call;

Figures 6 to 10 are flow charts of some of the individual steps used in the algorithms shown in Figures 3 to 5;

Figure 11 is a diagram showing how a call is divided into time segments in order to price it; and

Figure 12 is a block diagram of a computer which implements the process shown in Figure 10.

An example of this invention will now be described with reference to a public telecommunications network which is capable of providing two types of main service, namely, a service for PSTN (Public Switched Telephony Network) calls and a service for ISDN (Integrated Services Digital Network) calls. It is to be understood that the present invention is suitable for both public and private networks and is suitable for pricing calls using various main services.

Referring now to Figure 1, there is shown a system 8 for pricing calls originating in a public telecommunications network. The system includes a point in the network in the form of a local exchange or switch 10, a database 12 which contains details of the customers of the network, a database 14 which contains both details of the network and a set of call tariffs, a processor 16 which processes data from the local exchange 10, the customer database 12 and the network database 14 to price calls, and a store 18 for storing details of the priced calls. The processor 16 is implemented as a general purpose computer illustrated in Figure 12. The databases 12, 14 and store 18 are computer data stores.

Referring now to Figure 12, the computer which implements the processor 16 comprises a central processing unit (CPU)50, a memory 52, an input/output port 54, a keyboard 56 and a visual display unit (VDU)58 connected to a data bus 60. The memory 52 is formed from random-access memory (RAM), read-only memory (ROM) and hard and floppy discs. The input/output port 54 is connected to external communication links. The memory 52 contains the program for controlling the computer.

In a public telecommunications network, there are typically a large number of local exchanges and so the local exchange 10 merely represents one of many local exchanges in the network. By way of example, local exchange 10 may be a System X exchange manufactured by GEC Plessey Telecommunications. Although not shown, the local exchanges are connected to a network of trunk exchanges. For each call, the local exchange 10 produces a call record and the fields relevant to pricing a call are shown in Figure 2.

Referring now to Figure 2, the fields relevant to pricing calls include a field 20 for the calling number, a field 22 for the called number, a field 24 for the main type of service used in the call, a field 25 for the sub-type of service used in the call, a field 26 for any supplementary service used in the call, a field 27 for the start time of the call and a field 28 for the duration of the call. In more detail, field 24 gives the main service used in the call which in the present example is either PSTN or ISDN. Field 25 give the sub-type of service used in the call. In the present example, there are three sub-types of service and these are basic call, basic call with call-related supplementary service and non-call related supplementary service. Field 26 gives details of any supplementary service. An example of a call-related supplementary service is charge advice in which a caller is advised of the price of a call immediately after making it. An example of a non-call related supplementary service is setting-up call barring.

When applying the present invention to a private network, the call records could be produced at a switch or other suitable network point.

The customer database 12 contains various details of each customer. For each customer, these details include the customer's telephone number, the type of customer (residential, business (PSTN) or business (ISDN)) and the numbers of any options subscribed to by the customer. Examples of such options will be described below. Typically, a public telecommunications network is divided into areas and each area has its own database of customers details. Thus, the customer database 12 represents only one of several such databases. By way of modification, customer type data may be kept at exchanges and supplied as part of the call record.

The network database 14 contains details of the network which are relevant to pricing calls and also a set of call tariffs. The details which are relevant to pricing calls include the geographical location of each telephone number and the types of routes which connect the telephone numbers. As will be described below, both the distance between calling and called numbers and the type of route connecting the numbers are used in pricing system 8. The network database 14 represents a single database for the entire network.

Although Figure 1 shows only a single store 18 for storing the details of priced calls, it is convenient to provide one such store for each customer database. Normally, the customer databases and stores for priced calls are located together.

In a small network, a single processor, such as a processor 16, can serve all the customer databases and local exchanges. However, in a larger network, there may be several processors such as processor 16 each of which services a sub-set of the customer databases and local exchanges.

The local exchange 10, customer database 12, network database 14 and store 18 are connected to the processor 16 by

telecommunications links 31 to 34 and these links may be either permanent links or established as required. As may be appreciated, the local exchange 10, customer database 12, network database 14 and processor 16 are located remotely from each other. Call records are transmitted from the local exchange 10 to the processor 16 either one at a time immediately after each call or in batches. Likewise, details of priced calls are transmitted from the processor 16 to the store 18 either one at a time immediately after each call is priced or in batches. The processor 16 retrieves data from the databases 12, 14 as required. Where call records are transmitted one at a time to the processor 16 and the details of priced calls are then transmitted one at a time to the store 18, the price of each call is available immediately after it has been made.

The processor 16 is provided with a program for processing the data from the local exchange 10, customer database 12 and network database 14 to price each call. This program will now be described.

In pricing each call, the program evaluates up to four factors. The factors are then used to select one or more tariffs which are used to price the call. The factors include a factor SF (the service factor) relating to the type of service used in the call, a factor CustF (the customer factor) relating to the details of the customer making the call, a factor NF (the network factor) relating to the locations of the calling and called numbers in the network and a factor CF (the Calendar factor) relating to the date on which the call is made. The price of each call has one or more components. Initially, in order to price a call, a factor SCN is found. The factor SCN also relates to the type of service used in the call. The factor SCN is then used to select an algorithm from a set of algorithms which defines, for each component of the price, the factors which should be evaluated and used to select an appropriate tariff. The algorithm also defines the manner in which the price components are combined to give the total price. An

algorithm is needed for each value of SCN. In the present example, the factor SCN has three values and so there are three algorithms.

The method of finding the factor SCN will now be described. This will be followed by a description of the flow charts for three algorithms and then the flow charts for evaluating each of the factors SF, CustF, NF and CF will be described.. After this, there will be described the method of selecting a tariff and the method of evaluating each component of the price of a call.

In the present example, the factor SCN is found in the same way for PSTN and ISDN calls. As mentioned above, some calls have a call related network service and other calls have a non-call related network service. Using the data contained in the field 25 of the call record, the factor SCN is found as shown in Table 1 below.

Table 1

SCN	Service Sub-Type
SCN1	Basic call
SCN2	Call related network service
SCN3	Non-call network service

By way of modification, the factor SCN may have different values for PSTN and ISDN calls.

Each of the values SCN1 to SCN3 is associated with an algorithm. After finding the factor SCN the appropriate algorithm is selected. In the present example, the algorithms are stored in the processor 16. As an alternative, they may be stored in the network database 14 and retrieved when required. The flow charts for the algorithms associated with the values SCN1 to SCN3 are shown, respectively, in Figures 3 to 5 and these will now be described.

In the algorithm associated with the value SCN1, there is only one component in the price. After entering the algorithm, in a set of steps S9 to S12, values for the factors SF, CustF, NF and CF are evaluated. The method of evaluating these factors will be described in more below. Then, in a step S13, the values for the factors SF, CustF, NF and CF are used to select a tariff from the tariffs stored in database 14. In a step S14, the price PA of the call is calculated in accordance with the selected tariff and the data for the start of the call and its duration given in fields 27 and 28 of the call record. The method of calculating the price will be described in greater detail below.

In the algorithm associated with the value SCN2, there are two components for the price of each call. Referring to Figure 4, after entering the algorithm in a set of steps S19 to S22, the factors SF, CustF, NF and CF are evaluated. Then, in a step S23, a tariff is selected in accordance with the values of the factors SF, CustF, NF and CF for calculating the first component PA1 of the price. This component is then calculated in step S24. Then, in a step S25, the values for the factors NF and CF are both set to a value NULL. The result of setting these factors to this value is that they are not used in selecting the tariff for calculating the second component PA2 of the price. Then, in a step S26, the tariff for calculating the second component of the price is selected and the second component PA2 is calculated in a step S27. The second component is for a supplementary service. Finally, in a step S28, the price PA of the call is found by summing the components PA1 and PA2. Thus, in this algorithm, the two components are combined by summing.

In the algorithm associated with the value SCN3, there is only one component for the price. After entering this algorithm, in a pair of steps S29, S30 the factors SF and CustF are evaluated. Then, in a step S31, the factors NF and CF are both set to a value NULL. Thus, these factors are not

used in selecting the tariff. The tariff is selected in a step S32 and the price PA in calculated in a step S33. The price calculated in step S33 is for a supplementary service.

In Table 1, only three values are given for the factor SCN. Where special types of call are available on a network, for example credit card calls, there may be one or more values of the factor SCN for each special type of call. Each of these values of the factor SCN will have its own algorithm.

Referring now to Figure 6, there is shown the flow chart for evaluating the factor SF. In a step S35, the factor SF is determined from the data given in the service sub-type field 25 of the call record. The values for the factor SF are shown in Table 2 below:

Table 2

SF	Service Sub-Type
SF1	Basic call
SF2	Call related network service
SF3	Non-call related network service

By way of modification, the service type field 24 may also be used in evaluating the service factor SF so that the service factor SF has different values for PSTN and ISDN calls.

Referring now to Figure 7, there is shown a flow chart for evaluating the factor CustF. In the network described in this example, there are two types of customer, namely residential and business. The values for the factor CustF for these two types of customer are shown in Table 3 below:

Table 3

CustF	Type of Customer
CustF1	Residential
CustF2	Business (PSTN)
CustF3	Business (ISDN)

In a step S41, the details of the customer of the calling number are retrieved from the database 12 and the factor CustF is set in accordance with the values given in Table 3 above.

Each customer will normally subscribe to one or more options and the details of the options subscribed to by each customer are held in the customer database 12. Each option is assigned an option number and some examples of options and their associated options numbers are set out in Table 4 below.

Table 4

Option No	Option
1	Basic
2	Reduced rate in peak period
3	Free calls in cheap period
4	Half rate on Sundays
5	Reduced rate 00.00-04.00 hours and 22.00-00.00 hours
6	Reduced rate on calls between London and Glasgow

All customers will normally subscribe to the basic option. The explanation for option numbers 2, 3, 4 and 6 is clear from Table 4 above. In option number 5, calls are charged at a reduced rate between midnight and 4.00 am and

again between 10.00 pm and midnight. There may also be provided a default option which is used where a customer has no subscribed options.

In a step S42, the number or numbers of the options subscribed to by the customer of the calling number are retrieved from the customer database 12 and stored together with the value of the factor CustF.

In addition to the options to which customers subscribe, there may be "global" options which are available for all customers. Examples of such options are calls between main towns and calls at a reduced rate on Sundays for a limited period. Global options are retrieved from the network database 14 in a step S43.

The options are ranked in order of precedence.

Referring now to the flow chart shown in Figure 8, there is shown the procedure for evaluating the factor NF. Initially, in a step S50, details are retrieved from the network database 14 of the called or destination number. In the network described in this example, calls to certain destination numbers are free. Then, in a step S51, a check is made to determine if the call is free. If the call is free, in a step S52, a flag is set to indicate this. The call is then priced as having no charge. If the call is not free, the program continues with step S53.

In step S53, a sub-factor NR is evaluated for each option to which the customer subscribes. The sub-factor NR relates to the route between the calling and called numbers. Exemplary values for the sub-factor NR are set out in Table 5 below:

Table 5

NR	Explanation
NR1	Basic route
NR2	Calls between main towns
NR3	London to anywhere in the United Kingdom
NR4	London to Glasgow

Thus, where there is no special route available between two numbers, the sub-factor NR has a value of NR1. For calls between main towns, the sub-factor NR is set to a value of NR2. For calls between London and anywhere in the United Kingdom, the sub-factor NR is set to a value of NR3. For calls between certain main towns, the sub-factor NR has a value which is specific to the towns. In the example of Table 5, the sub-factor NR is set to a value of NR4 for calls between London and Glasgow.

The values of the sub-factor NR are ranked in order of precedence. In the present example, precedence increases with value. Where two or more values for the sub-factor NR are applicable to a particular option for a particular call, the value having the highest position in order of precedence is used. For some options there may be no applicable value of the sub-factor NR and such options are removed in step S53.

The factor NF is then evaluated in step S54 for each option. For each option, the factor NF is evaluated mainly on the basis of the distance between the calling and called numbers and the value of the sub-factor NR. The distance is calculated by retrieving the geographical location of the calling and called numbers from database 14. These locations may be the actual locations of the numbers. Alternatively, the network may be divided into small areas and the location of each number is then a central point within the area in which the number is located. From the geographical locations of the two numbers, the distance between them is calculated. Some exemplary values for the factor NF are given in Table 6 below for a network located in the United Kingdom.

Table 6

NF	Explanation
NF1	0 - 50km over any route
NF2	51 - 200km over any route
NF3	>200km over a route between main towns
NF4	London to Glasgow
NF5	Calls to mobile 'phones
NF6	UK to France

The values NF1 to NF4 of the factor NF set out in Table 6 above are self-expplanatory. For some calls, the value of the factor NF does not depend upon distance while for calls between the UK and other countries the value is set in accordance with the country of the called number. Thus, for calls to mobile 'phones, the factor NF is set to a value of NF5 and for calls to France the factor NF is set to a value of NF6.

Some values of the factor NF depend upon the type of route between the calling and called numbers and not just the distance between the calling and called numbers. Thus, NF3 applies only to routes between main towns and NF4 applies only to calls between London and Glasgow. A value of NF which depends on the type of route is selected for a particular option if it is contained within the value of the sub-factor NR for that option. Thus, in the present example, a value of NF4 for the factor NF will only be chosen for a particular option if the sub-factor for that option has a value of NR4. Values of the factor NF which depend on the type of route are selected, where applicable, in preference to values which do not depend on the type of route. Also, values of factor NF which depend on the type of route are routed in order of precedence. In the present example, the value NF4 is higher in order of precedence than the value NF3.

Thus, it may be appreciated that the sub-factor NR is used in selecting the value of the factor NF. For each option, there will be a single value of the factor NF.

Referring now to Figure 9 there is shown the flow chart for evaluating the factor CF. A set of exemplary values for this factor are shown in Table 7 below.

Table 7

CF	Day	Date
CF1	Sunday	-
CF2	Monday	-
CF3	Tuesday	-
CF4	Wednesday	-
CF5	Thursday	-
CF6	Friday	-
CF7	Saturday	-
CF8	-	01 May 1994
CF9	-	25 December 1994
CF10	-	01 January 1995
CF11	-	02 January 1995

The data of Table 7 is stored in the network database 14.

Some of the values are valid only where the calling number is located in a particular country. For example, 2 January 1995 is a holiday in Scotland but not in other countries in the UK. The value CF11 is valid only where the calling number is located in Scotland.

In a step S60, all the values of the factor CF are found for the day of the call and the country of the calling number. For some days there will only be one value for the factor CF. For other days there will be more than one value. For example, for 1 May 1994 which is Sunday, the factor CF will have the values CF1 and CF8. Where a call covers two or

more days, it is partitioned into separate days and the values of the factor CF are found for each individual day.

Each option has a period during which it is valid. For example, a particular option may be valid only on Wednesdays. In a step S61, the period for which each option is valid is retrieved from the database 14. Any option which is not applicable on any of the days found for the factor CF is removed. In a step S62, each remaining option is associated with one or more of the values of the factor CF. For a reason which is explained below, the values of the factor CF are ranked in order of precedence. Thus, after step S62, for each component of a price, for each option there will be a set of values of the applicable ones of factors SF, CustF, NF and CF. For some options, there may be two or more applicable values of the factor CF and hence two or more sets of values for the various factors.

As mentioned above, the network database 14 has a set of tariffs for pricing calls. Each tariff gives either a complete set of rates for pricing a call in accordance with its duration for a whole day or a set of prices for supplementary services. In the case of a tariff for pricing a call in accordance with its duration, each day is divided into one or more periods with different charging rates applying to different periods. For example, a day may be divided into a peak period between 9.00 am and 1.00 pm during which calls are relatively expensive, a standard period between 8.00 am and 9.00 am and 1.00 and 6.00 pm during which calls are cheaper, and a cheap period between midnight and 8.00 am and 6.00 pm and midnight during which calls are charged at the cheapest rate. For each period, a call may cost a certain amount of money for each 10ms. By using 10ms as the charging period, the cost of a call will match up exactly, for all practical purposes, to its duration. Alternatively, a call may be priced at a fixed sum of money for an initial longer period, for example 60 seconds, and then priced at a certain amount for each further period of 10ms. This would ensure a minimum charge for each call.

Each of the tariffs contained in the network database 14 has a tariff number. Each tariff number is associated with a particular set of values for the applicable factors and an option number. Examples of tariff numbers and the values for the factors and option numbers are set out below in Table 8.

Table 8

Tariff No	SF	CustF	NF	CF	Option No
100	SF1	CustF1	NF1	CF1	1
110	SF1	CustF1	NF3	CF3	3
123	SF1	CustF2	NF2	CF5	2
130	SF2	CustF1	NF1	CF2	1
140	SF2	CustF1	NULL	NULL	1

Thus, for each option for a particular component of a call, the appropriate tariff is retrieved from the network database 14. If a particular option is associated with two or more sets of values of the various factors, then the tariff is retrieved for the value of the factor CF having the highest order of precedence. For some options and corresponding set of values for the various factors, it may be found there is no applicable tariff.

Thus, for a component of a call that has an option number 2 and for which the values of the factors SF, CustF, NF and CF are, respectively, SF1, CustF2, NF2 and CF5, tariff number 123 is retrieved. By way of another example, for a component of a call for which option number 1 applies and only factors SF and CustF are to be used in selecting the tariff and these have values, respectively, of SF2 and CustF1, then tariff number 140 is retrieved. Tariff number 140 is for supplementary services.

Referring now to Figure 10, there is shown the flow chart for calculating the price of a component of a call in accordance with its duration. Thus, the flow chart shown in

Figure 10 corresponds, for example, to step S14 shown in Figure 3 or step S24 shown in Figure 4.

As mentioned above, each option has a period for which it is valid. Also, each tariff is divided into charging periods. In a step S71, for each day of the call, the call is divided into segments according to the charging periods and also the applicable time periods of the options. For example, as shown in Figure 11, if a call commences at 17:35 hours and terminates at 18:30 hours, it may be divided into two time segments, namely, one commencing at 1735 and ending at 1800 and one commencing at 1800 and terminating at 1830. In the example shown in Figure 10, the standard charging period and option number 1 apply in the first segment and options number 1 and 2 and the charging rate for the cheap period apply in the second segment.

Then, in a step S72, the price is calculated for each option which is applicable for the first segment of the call. If during this segment the call is simply charged at a fixed amount of money for each 10ms, then the price of the segment is found by multiplying the fixed amount by the number of units of 10ms which fall in the duration of the first segment. By way of another example, if a call is charged at a first fixed amount for first 10 seconds and then a second fixed for each further period of 10ms, and the duration is longer than 10s, then the price is found by summing the first fixed amount and the second fixed amount multiplied by the number of remaining units of 10ms within the duration of the segment. If the duration of the first segment is less than 10 seconds, then the proportion of the 10 seconds which falls within the first segment is charged as a proportion of the first fixed amount and the remaining portion of the 10 seconds is charged according to the charging rates which apply in the next segment.

The price of a call may also be charged on a cyclic basis. For example, in a particular segment, following the end of each 60 second interval, the next 5 seconds could be free.

Where two or more options are applicable in the first segment, then it is necessary to select a price. In a step S73, the price is selected by choosing the option which has the highest order of precedence. Normally, but not necessarily, this will be the cheapest price.

Then, in a step S74, a check is made to determine if there are any more segments to be charged. If there are any further segments, in a step S75, the price is determined for each applicable option in a manner similar to that described for step S72. Then, in a step S76, if there are two or more prices for the segment, the price is selected in a manner similar to that described for step S73. The program then returns to step S74.

When there are no more segments to be priced, the program continues with a step S77 in which the prices for the various components are summed. Where a call covers two or more days, the price is calculated for each day separately and the prices for the individual days are added together.

There will now be described the procedure for calculating the price of the component of a call where the tariff gives the prices for supplementary services. Thus, the procedure corresponds to step S27 shown in Figure 4 or step S33 shown in Figure 5. The supplementary service is retrieved from field 26 of the call record. Then, the price for the supplementary service is found for the option which has the highest order of precedence.

In the example described above, four factor are used in selecting tariffs. By way of modification, one or more further factors may be used in selecting tariffs, the value of each further factor being specified in a field, or a bit within a field, of the call record produced by the local exchange. For example, there could be a factor relating to the type of bearer used in a call. This factor could have one value where the bearer is a bearer for speech calls and another value where the bearer is a bearer for data calls.

CLAIMS

1. A method of pricing a call originating in a telecommunications network comprising the steps of:

retrieving a record of the call from a point located in the telecommunications network;

providing a first database containing details of customers of the network;

providing a second database containing details of the network and a set of call tariffs; and

processing data from the call record, the first database and the second database to price the call.

2. A method as claimed in claim 1, in which said data processing step comprises the steps of:

finding a factor (the service factor) relating to the type of service used in the call by processing data contained in the call record;

finding a factor (the customer factor) relating to the type of customer making the call;

finding a factor (the network factor) relating to the location of the calling number and the called number;

finding a factor (the calendar factor) relating to the day of the call;

selecting a call tariff from a set of call tariffs in accordance with the combination of the service factor, the customer factor, the network factor and the calendar factor; and

pricing the call in accordance with the selected call tariff.

3. A method as claimed in claim 1, in which the price of the call has at least one component, and said data processing step comprises the steps of:

finding a factor (the first service factor) relating to the type of service used in the call;

using the first service factor to select an algorithm from a set of algorithms which defines which factors from a group of factors are to be used in determining the or each component of the price and the manner of combining the components to determine the price of the call, said group of factors comprising a factor (the second service factor) relating to the type of service used in the call, a factor (the customer factor) relating to the type of customer making the call, a factor (the network factor) relating to the locations of the calling number and the called number, and a factor (the calendar factor) relating to the day of the call;

for the or each component of the price, finding the factors defined in the algorithm;

for the or each component of the price, selecting a call tariff from a set of call tariffs in accordance with the factors defined in the algorithm;

for the or each component of the price, determining the component in accordance with the selected call tariff; and

when the price of the call has more than one component, combining the components in the manner defined in the algorithm.

4. A method as claimed in claim 2 or claim 3, in which the network factor relates both to the distance between the calling number and the called number and to the route between the calling number and the called number.

5. A method as claimed in any one of claims 2 to 4, including the step of finding the number of an option to which the customer has subscribed, the number of being used in selecting the call tariff.

6. A method as claimed in any one of claims 2 to 5, in which one or more further factors are used in selecting the call tariff.

7. A method of pricing a call originating in a telecommunications network comprising the steps of:

retrieving a record of a call from a point located in the telecommunications network;

finding a factor (the service factor) relating to the type of service used in the call by processing data contained in the call record;

finding a factor (the customer factor) relating to the type of customer making the call;

finding a factor (the network factor) relating to the locations of the calling number and the called number;

finding a factor (the calendar factor) relating to the day of the call;

selecting a call tariff from a set of call tariffs stored in a database in accordance with the combination of the service factor, the customer factor, the network factor and the calendar factor; and

pricing the call in accordance with the selected call tariff.

8. A method of pricing a call originating in a telecommunications network, the price of the call having at least one component, said method comprising the steps of:

retrieving a record of a call from a point located in the telecommunications network;

finding a factor (the first service factor) relating to the type of service used in the call by processing data contained in the call record;

using the first service factor to select an algorithm from a set of algorithms which defines which factors from a group of factors are to be used in determining the or each component of the price of the call and the manner of combining the components to determine the price of the call, said group of factors comprising a factor (the second service factor) relating to the type of service used in the call, a factor (the customer factor) relating to the type of customer making the call, a factor (the network factor) relating to

the locations of the calling and called numbers, and a factor (the calendar factor) which relates to the day of the call;

for the or each component of the price finding the factors defined in the algorithm;

for the or each component of the price, selecting a call tariff from a set of call tariffs stored in a database in accordance with the factors defined in the algorithm;

for the or each component of the price, determining the component in accordance with the selected algorithm; and

where the price of the call has more than one component, combining the components in the manner defined in the algorithm.

9. A system for pricing a telecommunications call originating in a telecommunications network, said system comprising:

a telecommunications point located in the network for providing a call record for each call;

a first database containing details of the customers of the network;

a second database containing details of the network and a set of call tariffs;

means for processing data from a call record, the first database and the second database to price a call; and

means for providing a communication link between the processing means and each of the telecommunications point, the first database and the second database.

10. A system as claimed in claim 9, in which the processing means comprises:

means for finding a factor (the service factor) relating to the type of service used in a call by processing data contained in the call record for the call;

means for finding a factor (the customer factor) relating to the type of customer making a call;

means for finding a factor (the network factor) relating to the locations of the calling number and the called number for a call;

means for finding a factor (the calendar factor) relating to the day of a call;

means for selecting a call tariff from a set of call tariffs in accordance with the combination of the service factor, the customer factor, the network factor and the calendar factor found for a call; and

means for pricing a call in accordance with a selected call tariff.

11. A system as claimed in claim 9, in which the price of a call has at least one component, and the processing means comprises:

means for finding a factor (the first service factor) relating to the type of service used in a call;

means for using the first service factor to select an algorithm from a set of algorithms which defines which factors from a group of factor are to be used in determining the or each component of a price of a call and the manner of combining the components to determine the price of the call, said group of factors comprising a factor (the second service factor) relating to the type of service used in the call, a factor (the customer factor) relating to the type of customer making a call, a factor (the network factor) relating to the locations of the calling number and the called number for a call, and a factor (the calendar factor) relating to the day of a call;

means for finding the factors defined in the algorithm for the or each component of the price of a call;

means for selecting a call tariff for the or each component of the price of a call from a set of call tariffs in accordance with the factors defined in the algorithm;

means for determining the or each component of the price of a call in accordance with the selected call tariff; and

means for combining the components in the manner defined in the algorithm.

12. A system as claimed in claim 10 or claim 11, in which the network factor relates to the distance between the calling number and the called number, and to the route between the calling number and the called number.

13. A system as claimed in any one of claims 10 to 12, including means for finding the number of an option to which the customer has subscribed, the means for selecting a call tariff using the number of the option in selecting a call tariff.

14. A system as claimed in any one of claims 9 to 13, in which the telecommunications point, the first database and the second database are all located remotely from each other.

15. A system as claimed in any one of claims 9 to 14, including means for storing the details of priced calls.

16. A system as claimed in any one of claims 9 to 15, in which the telecommunications point is a telecommunications switch.

17. A system for pricing a telecommunications call originating in a telecommunications network, said system comprising:

a telecommunications point located in the network for providing a call record for each call;

means for finding a factor (the service factor) relating to the type of service used in a call by processing data contained in the call record for the call;

means for finding a factor (the customer factor) relating to the type of customer making a call;

means for finding a factor (the network factor) relating to the locations of the calling number and the called number for a call;

means for finding a factor (the calendar factor) relating to the day of a call;

means for selecting a call tariff from a set of call tariffs in accordance with the combination of the service factor, the customer factor, the network factor and the calendar factor found for a call; and

means for pricing a call in accordance with a selected call tariff.

18. A system for pricing a telecommunications call originating in a telecommunications network, said system comprising:

a telecommunications point located in the network for providing a call record for each call;

means for finding a factor (the first service factor) relating to the type of service used in a call;

means for using the first service factor to select an algorithm from a set of algorithms which defines which factors from a group of factor are to be used in determining the or each component of a price of a call and the manner of combining the components to determine the price of the call, said group of factors comprising a factor (the second service factor) relating to the type of service used in the call, a factor (the customer factor) relating to the type of customer making a call, a factor (the network factor) relating to the locations of the calling number and the called number for a call, and a factor (the calendar factor) relating to the day of a call;

means for finding the factors defined in the algorithm for the or each component of the price of a call;

means for selecting a call tariff for the or each component of the price of a call from a set of call tariffs in accordance with the factors defined in the algorithm;

means for determining the or each component of the price of a call in accordance with the selected call tariff; and

means for combining the components in the manner defined in the algorithm.

Fig.1

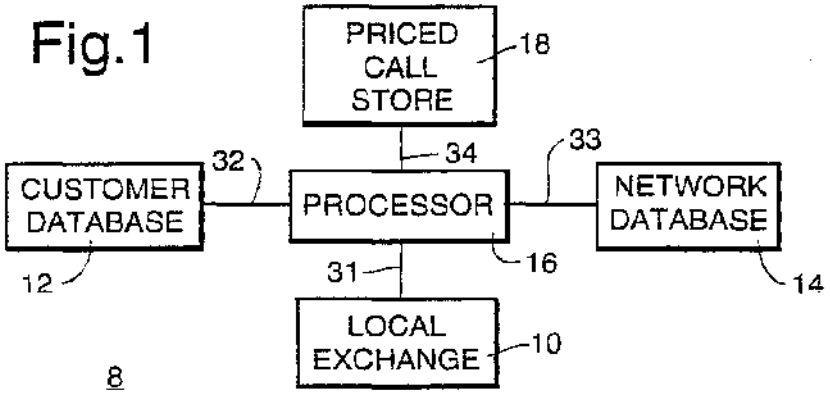

Fig.2

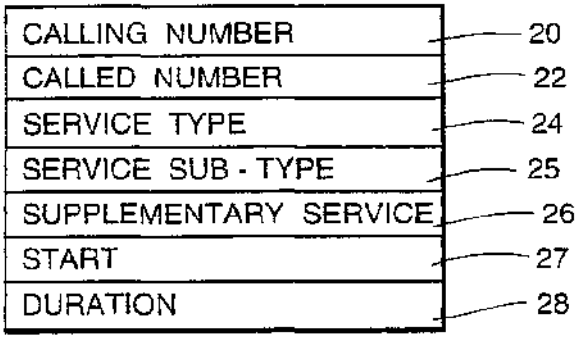

Fig.3

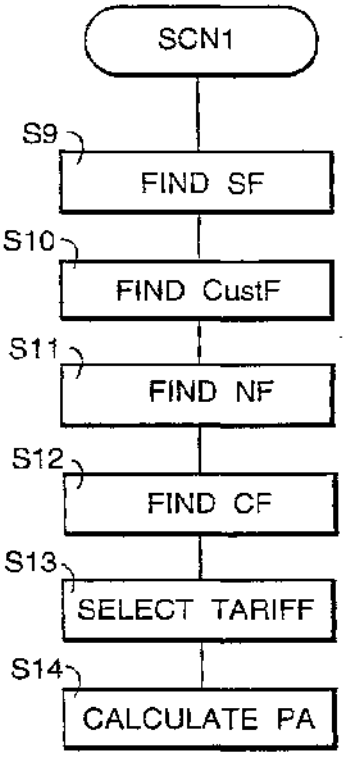

Fig.6

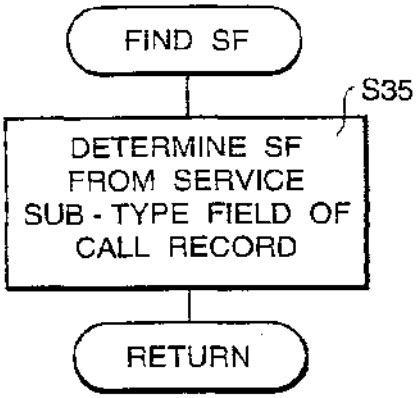

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Fig.4

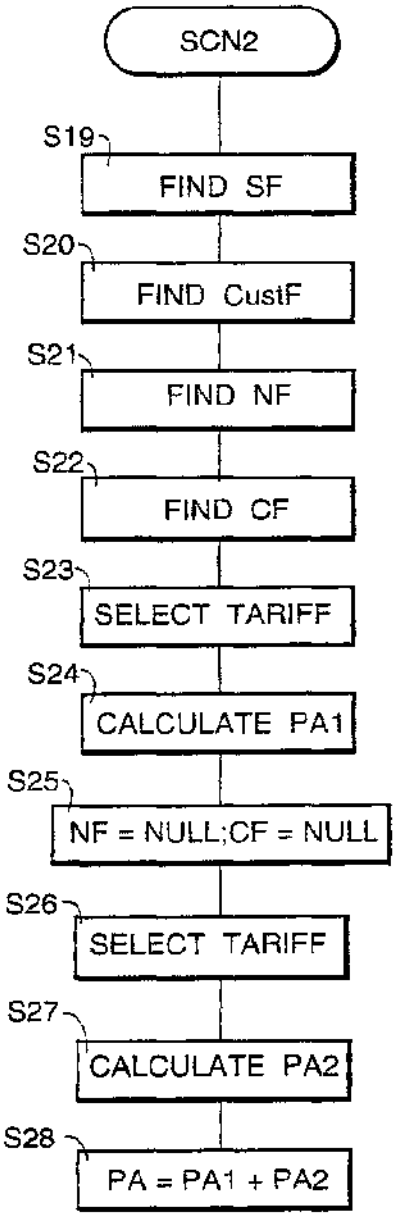


Fig.5

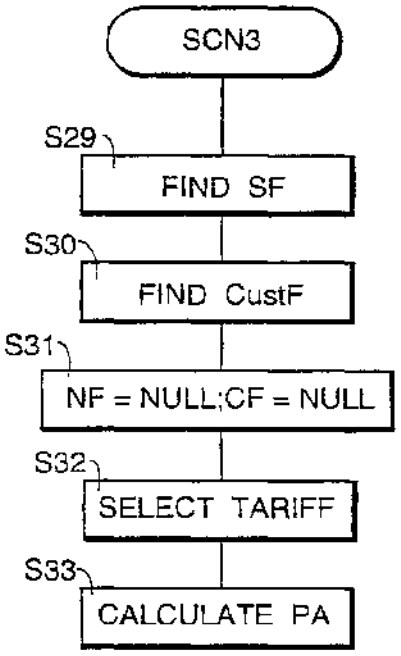
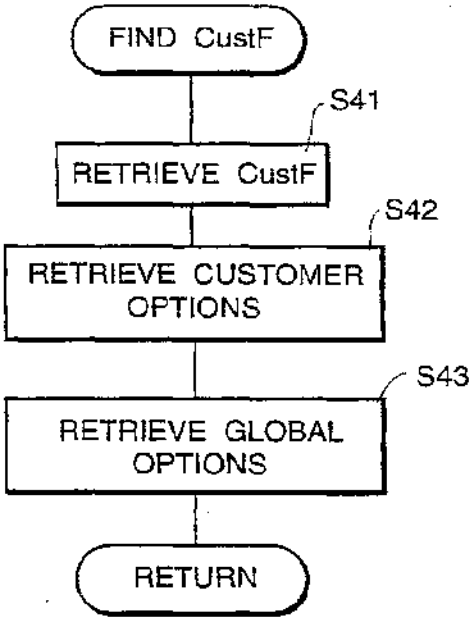


Fig.7



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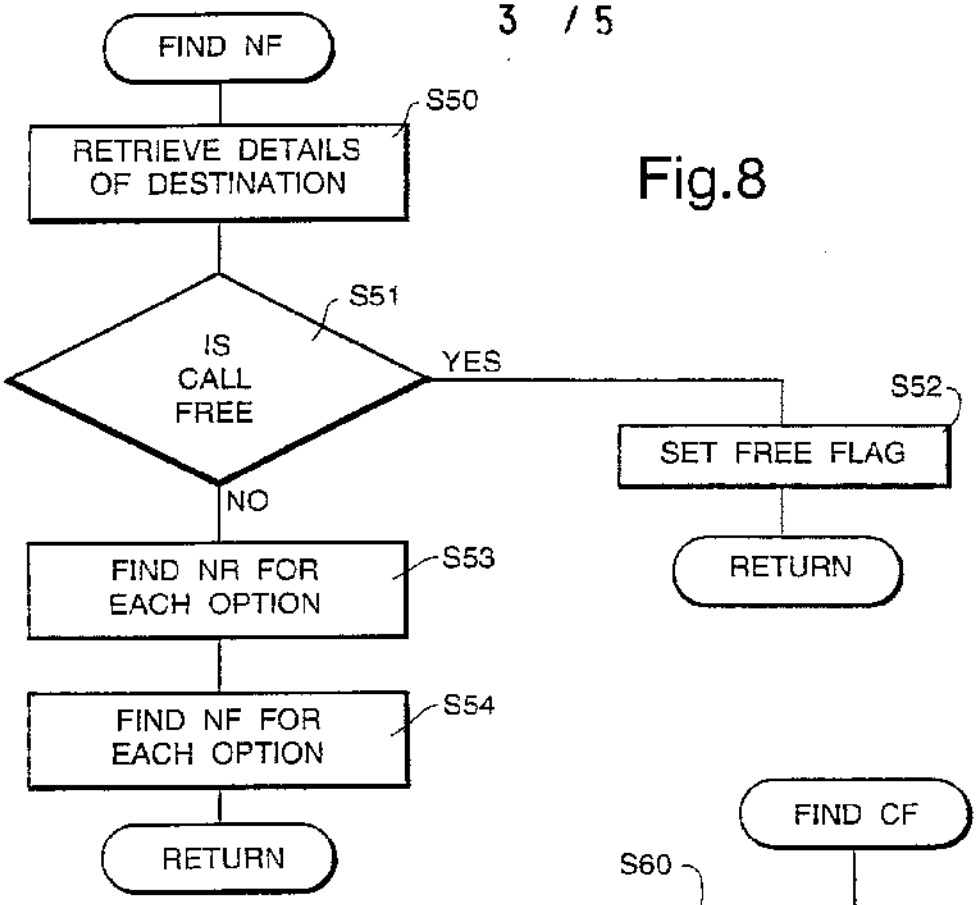


Fig.8

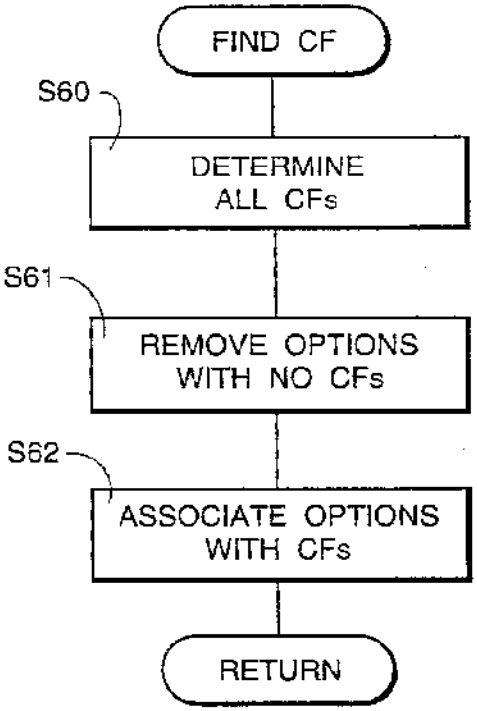
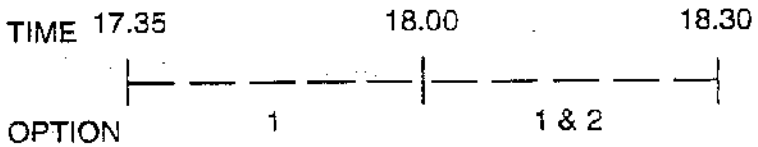


Fig.9

Fig.11



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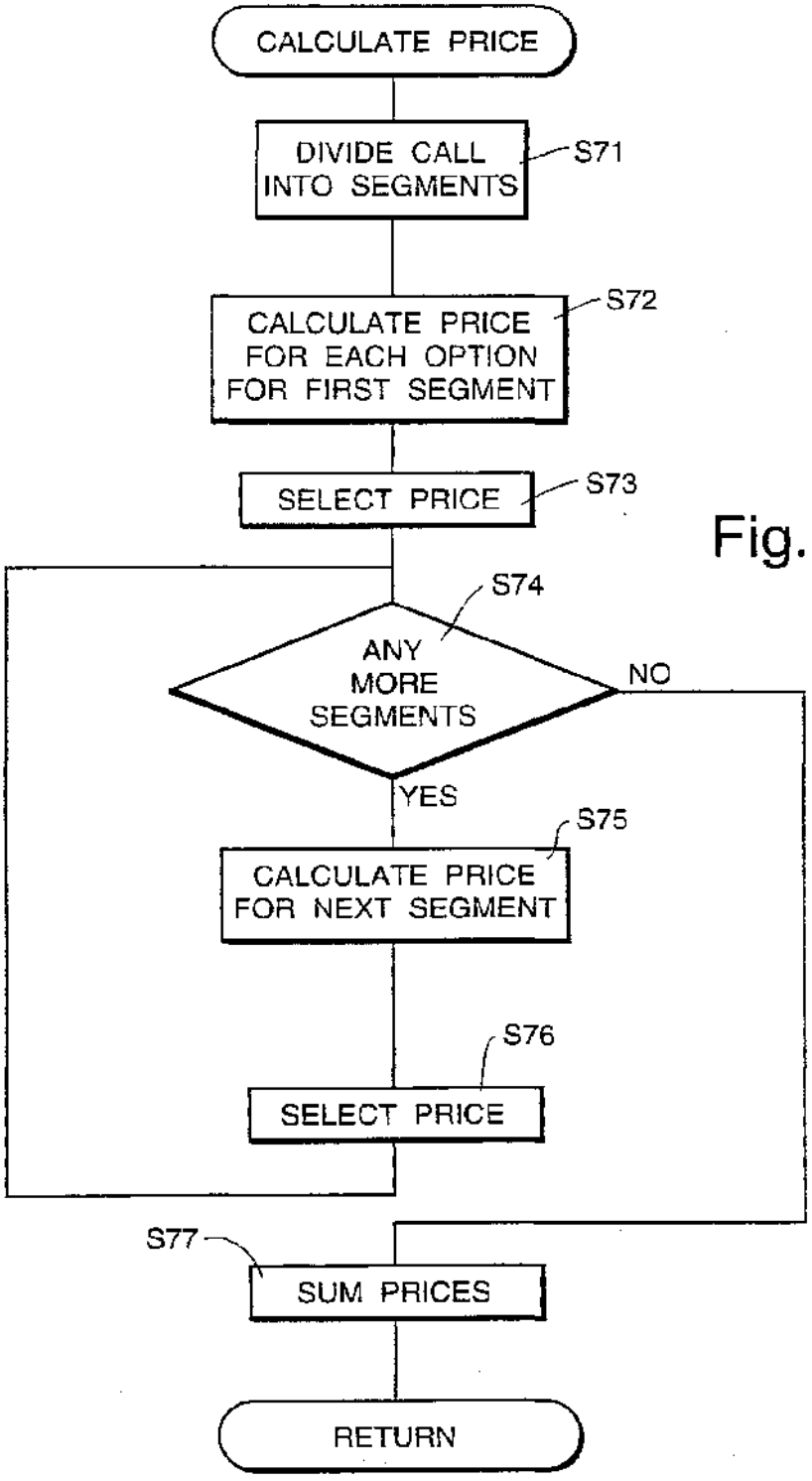
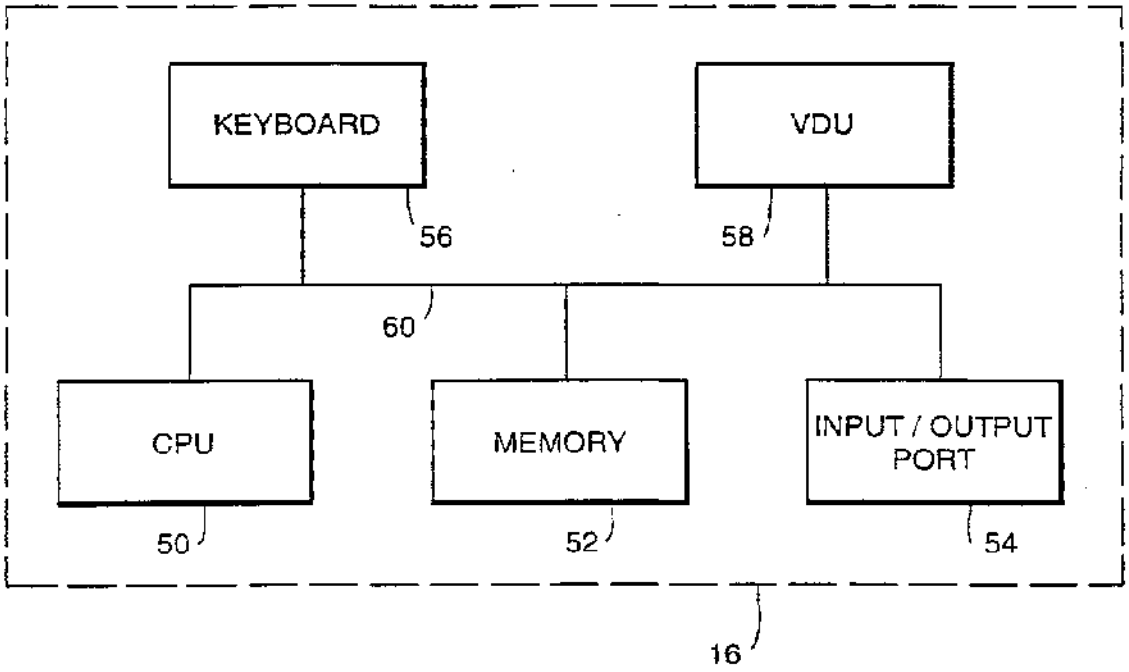

CALCULATE PRICE
DIVIDE CALL INTO SEGMENTS
S71
CALCULATE PRICE FOR EACH OPTION FOR FIRST SEGMENT
S72
SELECT PRICE
S73
S74
ANY MORE SEGMENTS
NO
YES
S75
CALCULATE PRICE FOR NEXT SEGMENT
S76
SELECT PRICE
S77
SUM PRICES
RETURN

Fig.10

Fig.12.



INTERNATIONAL SEARCH REPORT

Internat Application No
PCT/GB 95/00422

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 H04M15/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 H04M H04Q

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.
A	BRITISH TELECOMMUNICATIONS ENGINEERING, vol.10, no.3, October 1991, LONDON GB pages 250 - 253, XP279046 S. SMYTON ET AL. 'National Charging Database' see the whole document ---	1-18
A	US,A,5 185 785 (FUNK ET AL.) 9 February 1993 see the whole document ---	1-18
A	TENCON '89, November 1989, BOMBAY,INDIA pages 593 - 599, XP203943 I. BENYACAR ET AL. 'Concepts in Recording of Services' see the whole document ---	1-18

-/--

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
10 May 1995	22.05.95

Name and mailing address of the ISA	Authorized officer
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INTERNATIONAL SEARCH REPORT

Internat Application No
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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US,A,5 103 475 (SHUEN) 7 April 1992 see abstract -----	1-18

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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(74) Agent: **CURRIER, T., Andrew**; Perry + Currier Inc., 1300 Yonge Street, Suite 500, Toronto, Ontario M4T 1X3 (CA).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

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[Continued on next page]

(54) Title: METERING OF TELECOMMUNICATION SERVICES

(57) Abstract: A configurator is provided that connects with various disparate elements in a telecommunication system. The configurator is adapted to receive a traffic plan that has a plurality of different aspects that are implemented across the disparate elements. The configurator is adapted to generate processing schemas and/or databases that can be used by the disparate elements in order to implement the traffic plan.

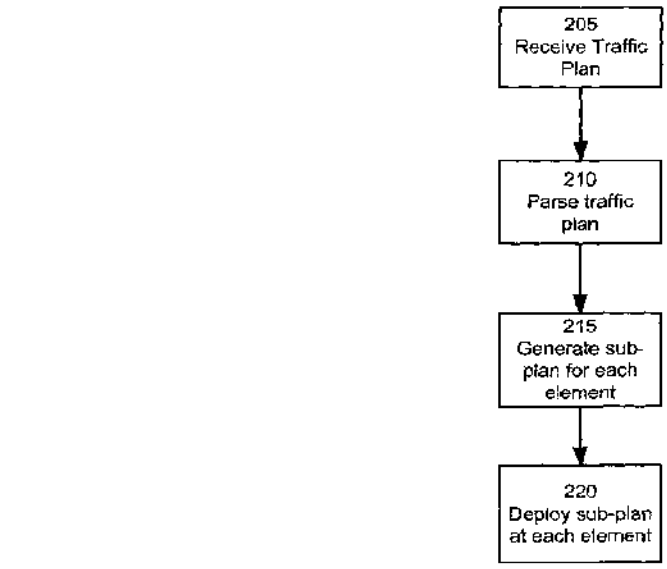

Fig. 2

WO 2009/114923 A1

(BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*

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METERING OF TELECOMMUNICATION SERVICES

FIELD

[0001] The present specification relates generally to telecommunications and more particularly relates to metering of telecommunication services.

BACKGROUND

[0002] Hardware advances in computing devices and the networks which interconnect those devices has facilitated an explosion in software applications. Applications such as real-time chat, voice and video are increasingly commonplace and widespread. Voice over Internet Protocol ("VOIP") telephony allows real-time duplex voice communications to be carried over traditional data channels, potentially obviating the need for traditional voice channels, without the latency or jitter normally associated with the specifications of such data channels.

[0003] While somewhat behind wireline networks, wireless networks are also increasing in bandwidth to allow substantially real-time chat, voice and video applications to be carried thereover. Likewise, the processing power of handheld portable devices such as cellular telephones and wireless personal digital assistants can now accommodate such applications.

[0004] Traditional revenue sources for wireline and wireless networks include voice telephony and traditional data communications. However, the above-mentioned advances are confusing the means by which network operators are compensated by consumers. For example, traditional voice channels were configured to be carried over twisted pair copper telephone wires, yet, technology advances now permit high speed Internet communications to be carried over twisted pair. Still further advances now permit voice communications to be carried over those Internet connections. As a result, the subscriber may eschew the underlying voice service in favour of the Internet service which now serves to provide both voice and traditional data connectivity for the subscriber. This erodes the underlying revenue base for the wireline carrier, whose business model may depend on charging separate fees for both voice and traditional data services. Hardware advances now raise the same possibility of erosion of revenue sources for wireless carriers, which originally offered only wireless voice connectivity but are increasing offering both voice and data connectivity. However the subscriber may be able to find applications to carry the voice service over the data link and thereby avoid charges for voice services.

[0005] The preceding examples are the tip of the iceberg. Applications such as Skype,

Google Maps, You Tube, file sharing services were unforeseen applications that can radically alter the bandwidth profiles for each subscriber, with deleterious effects on bandwidth and quality-of-service allocations which did not anticipate these services. The result can be a serious deterioration of quality of service for some subscribers as other subscribers unfairly monopolize all available bandwidth.

[0006] To address the foregoing, it is increasingly becoming known to monitor wireless traffic so that it can be classified and further processed according to classification, such further processing including the possibility of blocking the traffic and/or to apply different rates of charge according to classification. However, current network infrastructures can still be improved. Indeed, one problem is that, even within the current 3GPP or 3GPP2 specifications for different telecommunication elements, it can readily arise that configurations for those elements within one carrier infrastructure are handled in a disparate manner.

SUMMARY

[0007] From one perspective, the present specification provides a configurator that connects with various disparate elements in a telecommunication system. The configurator is adapted to receive a traffic plan that has a plurality of different aspects that are implemented across the disparate elements. Exemplary aspects include policy aspects and charging aspects. Such a traffic plan can include tariffs, rating rules, pricing, bandwidth, priorities, allow/block indicators, bundling details and can include other controls that pertain to the behavior of a subscriber's use of an application, content, or service. The configurator is adapted to generate processing schemas and/or databases that can be used by the disparate elements in order to implement the traffic plan.

[0008] From another perspective, the present specification provides a method for metering telecommunication services. The method comprises receiving a plurality of variable inputs at a subscriber terminal. Each of inputs represent a different metering level for a different application, content, or service. The method also comprises generating a traffic plan based on each metering level. The generated traffic plan can be provided to the configurator or to a similar type component so that telecommunication services can be delivered according to the traffic plan. The method also comprises generating a representation of the traffic plan at the subscriber terminal.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] Figure 1 is a schematic representation of a communication system.

[0010] Figure 2 is a flow-chart depicting a method of configuring a communication system.

[0011] Figure 3 is a schematic representation of a communication system which is a variation on the system of Figure 1.

[0012] Figure 4 is a schematic representation of the subscriber terminal of Figure 3.

[0013] Figure 5 is a flow-chart depicting a method for metering telecommunication services.

[0014] Figure 6 shows the display of the device of Figure 4 during part of the performance of the method of Figure 5.

[0015] Figure 7 is a schematic representation of a communication system which is a variation of the system of Figure 1.

[0016] Figure 8 is a flow-chart depicting a method for metering telecommunication services as a variation on the method of Figure 5.

[0017] Figure 9 shows the display of the device of Figure 4 during part of the performance of the method of Figure 8.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0018] The following definitions relate to telecommunication structures referenced in this specification:

[0019] "3GPP Standards" means the Technical Specifications as have been produced by the 3rd Generation Partnership Project (3GPP) as updated from time to time.

[0020] "3GPP2 Standards" means the Technical Specifications as have been produced by the 3rd Generation Partnership Project 2 (3GPP2) as updated from time to time.

[0021] "AAA" means Authentication, Authorization and Accounting

[0022] "AF" means Application Function as described in 3GPP TS 23.203 – "3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Policy and charging control architecture" as updated from time to time

[0023] "AS" means Application Server

[0024] "CDR" means Call Detail Record

[0025] "DIAMETER protocol" means the computer networking protocol for AAA that is a successor to RADIUS as generally described by IETF RFC 3588 – "Diameter Base Protocol" as updated from time to time

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[0026] "DPI" means Deep Packet Inspection

[0027] "GGSN" means GPRS Gateway Service Node as described in 3GPP TS 23.203 – "3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Policy and charging control architecture" as updated from time to time

[0028] "Gx" means the link and protocol that resides between the PCEF and the PCRF as generally described in 3GPP TS 23.203 – "3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Policy and charging control architecture" as updated from time to time

[0029] "Gy" means the link and protocol that resides between the OCS and the PCEF as generally described in 3GPP TS 23.203 – "3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Policy and charging control architecture" as updated from time to time

[0030] "GPRS" means General Packet Radio Service

[0031] "IETF" means Internet Engineering Task Force

[0032] "IMS" means IP Multimedia Subsystem as described in 3GPP TS 23.228 – "3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; IP Multimedia Subsystem (IMS); Stage 2" as updated from time to time.

[0033] "IP" means Internet Protocol

[0034] "ISDN" means Integrated Services Digital Network

[0035] "MSISDN" means Mobile Subscriber ISDN Number

[0036] "OCS" means Online Charging Server as described in 3GPP TS 23.203 – "3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Policy and charging control architecture" as updated from time to time

[0037] "PCC" means Policy and Charging Control as described in 3GPP TS 23.228 – "3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; IP Multimedia Subsystem (IMS); Stage 2" as updated from time to time

[0038] "PCEF" means Policy Charging Enforcement Function as described in 3GPP TS 23.203 – "3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Policy and charging control architecture" as updated from time to time

[0039] "PCRF" means Policy Charging Rules Function as described in 3GPP TS 23.203 – "3rd

Generation Partnership Project; Technical Specification Group Services and System Aspects; Policy and charging control architecture" as updated from time to time.

[0040] "P-CSCF" means Proxy Call Session Control Function as described in 3GPP TS 23.228 – "3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; IP Multimedia Subsystem (IMS); Stage 2" as updated from time to time

[0041] "RADIUS" means Remote Authentication Dial In User Service

[0042] "RAT type" means Radio Access Technology type

[0043] "Rx" means the link and protocol that resides between the AF and the PCRF as generally described in 3GPP TS 23.203 – "3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Policy and charging control architecture" as updated from time to time

[0044] "RFC" means Request for Comments

[0045] "SIP" means Session Initiation Protocol

[0046] "SCP" means Service Control Point

[0047] "SPR" means Subscription Profile Repository as generally described in 3GPP TS 23.203 – "3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Policy and charging control architecture" as updated from time to time

[0048] "SIP" identity means canonical SIP Uniform Resource Identifier employed to reach a user or device (such as 'sip:alice@atlanta.com')

[0049] "SUB ID" means any unique SUB IDentifier. SUB ID can be, for example, a MSISDN or a SIP identity.

[0050] Referring now to Figure 1, a communication system is indicated generally at 50. System 50 comprises a GGSN 54 operated by a carrier C. GGSN 54 interconnects a wireless client device 58 operated by a subscriber S and a server 62. GGSN 54 is based on known GGSN infrastructures, with novel modifications thereto as will be discussed further below. Those skilled in the art will recognize that the GGSN 54 may be manifested as other network elements in the context of other access technologies. For example, a packet serving data node (PDSN) for a code division multiple access (CDMA) based network; the IP edge router for a European Telecommunications Standards Institute (ETSI) based network; the cable Modem termination system (CMTS) for a PacketCable based network; a access service network (ASN) gateway for

a WiMax based network; or a deep-packet inspection node for a generic internet protocol based network.

[0051] Wireless client device 58 is associated with a subscriber S and can be based on any known or future-conceived mobile or nomadic communication equipment including, for example, a cellular telephone or a wireless personal digital assistant. While not shown herein, it will understood by those skilled in the art that the wireless client device 58 includes a hardware configuration that may comprise one or more input devices in the form of a keyboard, microphone and the like; one or more output devices in the form of a display, a speaker and the like; a radio for conducting wireless communications; all of which are interconnected by a microcomputer comprised of one or more central processing units that itself is connected to volatile memory and non-volatile memory.

[0052] Wireless client device 58 connects to GGSN 54 via a first link 66. First link 66 is based on any combination of wireless and wired infrastructures that are now-known, or future-conceived, that can connect wireless client device 58 with GGSN 54. For example, first link 66 can conform with a 3GPP infrastructure that includes a wireless base station that communicates wirelessly with the radio in client device 58, backhaul such as a T1, a mobile switching center, routers and the like.

[0053] Server 62 can be based on any known or future-conceived servers, including for example, a web server or any other type of server capable of hosting a service 70 on behalf of client device 58 and for use by subscriber S. Any type of service 70 is contemplated including applications. Examples of services include, but are not limited to, software downloads, web-pages, instant messaging, email, web-mail, mapping services, location applications, social networking services and applications, file sharing services and applications, peer-to-peer services, music or video streams or downloads. Thus, it should be understood that server 62 can be any other computing device to which client device 58 may communicate, including another client device, and thus service 70 can also include peer-to-peer type applications including voice over IP, and file sharing. While not shown herein, it will understood by those skilled in the art the server 62 includes a hardware configuration that may comprise one or more input devices in the form of a keyboard, a mouse and the like; one more output devices in the form of a display, and the like; a network interface for conducting network communications; all of which are interconnected by a microcomputer comprised of one or more central processing units that itself is connected to volatile memory and non-volatile memory.

[0054] Server 62 connects to GGSN 54 via a second link 74. Second link 74 is based on any

combination of wireless or wired infrastructures that are now-known, or future-conceived, that can connect server 62 with GGSN 54. For example, second link 74 can include a 3GPP infrastructure associated with GGSN 54 that includes a gateway to a local area network or wide area network that in turn uses a data protocol such as the IP. Likewise, second link 74 can include relevant portions of the Internet associated with server 62, which connects to the network interface in server 62.

[0055] GGSN 54 itself can be based on any known or future-conceived servers having a hardware structure that is generally consistent with the hardware structure discussed in relation to server 62 except including the appropriate interfaces to connect to link 66 and link 74 and (other links as discussed below as shown in Figure 1), as well as including software that configures the server to fulfill the function of a GGSN as prescribed by the relevant 3GPP standards. GGSN 54 is configured to implement a DPI engine 75. Those skilled in the art will recognize that the methods of identifying and classifying distinct subscriber and application specific bearer flows are collectively referred to as 'Deep Packet Inspection' capabilities. With respect to parametric information that is inherent in the bearer data flow that can be used to identify and classify subscriber or application specific data flows, this may include the source and destination internet protocol addresses, port information, protocol information, and other information that conveys the access technology used (such as the Radio Access Technology parameter). Information that may be conveyed between the device 58 and the server 62 may include the application identifier, flow identifiers, and the media type(s) associated with a given service or application. In addition to the utilization of explicit addressing or application information inherent in the data flow or conveyed from external network elements or application servers, the DPI engine 75 may recognize patterns or characteristic traffic flows as indicative 'signatures' that are associated with a given service or application. GGSN 54 is also configured to implement a PCEF 76 as will be discussed further below. In a present embodiment, DPI engine 75 and PCEF 76 are implemented as software processes on GGSN 54, although it is to be understood that they can be implemented on one or more separate pieces of hardware functionally connected to GGSN 54.

[0056] GGSN 54 also connects to an OCS 82 via a third link 86. OCS 82 itself can be based on any known or future-conceived servers having a hardware structure that is generally consistent with the hardware structure discussed in relation server to 62 except including the appropriate interfaces to connect to link 86, as well as including software that configures the server to fulfill the function of an OCS as prescribed in the 3GPP standards OCS 82 is configured to fulfill

charging functions in relation to the subscriber account associated with subscriber S (such as maintaining records in association with the MSISDN of device 58) in at least one of a post-paid and a pre-paid context. In the post-paid context OCS 82 is thus configured to generate CDRs that can be used to add charges to the bill or account of a subscriber. In the pre-paid context OCS 82 is thus configured to fulfill the functions of an SCP (and in fact OCS 82 can be implemented as an SCP) that can be used to deduct amounts from a subscriber's prepaid balance. Regardless of the post-paid or pre-paid context, in a present exemplary embodiment OCS 82 is configured to perform such charging in a substantially real-time manner, whereby as the service is being delivered to subscriber S, the charges associated with that service are being applied. Third link 86 can be based on any physical infrastructure that is suitable for connecting GGSN 54 to OCS 82 as will now occur to those of skill in the art. For example, third link 86 can be configured to carrying communications using the Gy protocol. Those skilled in the art will now recognize that the Gy protocol may be manifested as other protocols in the context of other access technologies. For example, where the analogous protocol for a code division multiple access (CDMA) based network is generally described in 3GPP2 X.S0013 – "All-IP Core Network Multimedia Domain" as amended from time to time and where the analogous protocol for an internet protocol access technology is generally described in ETSI ES 282 003: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Resource and Admission Control Sub-system (RACS) Functional Architecture" as amended from time to time.

[0057] GGSN 54 also connects to a PCRF 90 via a fourth link 94. PCRF 90 itself can be based on any known or future-conceived servers having a hardware structure that is generally consistent with the hardware structure discussed in relation server to 62 except including the appropriate interfaces to connect to link 94 as well as including software that configures the server to fulfill the function of a PCRF as prescribed in the 3GPP standards. PCRF 90 is configured to fulfill tariff decision, bandwidth quality decision and traffic gating decision (collectively the traffic plan decision) functions which in turn can be used by PCEF 76 within GGSN 54 and eventually by OCS 82 in order to determine the actual charge. PCRF 90 is thus configured to decide traffic policies between device 58 and server 62, including, but not limited to, traffic associated with the access of service 70 on device 58. Indeed PCRF 90 is configured to decide traffic policies on all traffic types carried by GGSN 54. PCRF 90 is also configured to perform such traffic plan decision in substantially real time in order to coordinate with the real time functionality of OCS 82.

[0058] Fourth link 94 can be based on any physical infrastructure that is suitable for connecting GGSN 54 to PCRF 90. In a present embodiment fourth link 94 is configured to communications using the Gx protocol. In a more general embodiment, fourth link 94 is configured to carry communications relative to the final determination of an actual traffic plan decision for a given traffic that is being carried between device 58 and server 62.

[0059] Those skilled in the art will now recognize that the various protocols discussed herein may be manifested as other protocols in the context of other access technologies. For example, where the analogous protocols for a code division multiple access (CDMA) based network are generally described in 3GPP2 X.S0013 – "All-IP Core Network Multimedia Domain" as amended from time to time and where the analogous protocols for an internet protocol access technology are generally described in ETSI ES 282 003: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Resource and Admission Control Sub-system (RACS) Functional Architecture" as amended from time to time.

[0060] PCRF 90 also connects to SPR 102 via fifth link 106. SPR 102 can be implemented as a file server which includes a microcomputer, a network interface and persistent storage in order to maintain data and in order to allow that data to be accessed by PCRF 90 and any other network element that connects to SPR 102. The data that SPR 102 is configured to maintain includes profile information about subscriber S. Such profile information can include, but need not be limited to, an identification of subscriber S (including for example the MSISDN of device 58), whether subscriber S is a prepaid or postpaid subscriber, the various types of traffic that subscriber S is permitted to received on device 58, the various rates for any traffic that subscriber S accesses on device 58, including rates for traffic associated with the accessing of service 70 on device 58, subscriber preferences such as a preferred quality of service to be associated with accessing a given service 70 via device 58, and subscriber or network operator imposed limitations such as an upper bound on the total bandwidth consumed by subscriber S via device 58.

[0061] Fifth link 106 can be based on any desired physical link and protocol in order to communicate subscriber profile data to PCRF 90. It should now be apparent that SPR 102 can be implemented within PCRF 90, or it can be situated remotely from PCRF 90 so that a plurality of different PCRFs (not shown) and other network elements can centrally access profile data relative to subscriber 102.

[0062] System 50 also comprises a plurality of storage devices 110, 114 and 118. As can be seen in Figure 1, storage device 110 is connected to OCS 82 and is therefore configured to

maintain data usable by OCS 82 to permit OCS 82 to fulfill its functions. Likewise, storage device 114 is connected to PCRF 90 and is therefore configured to maintain data usable by PCRF 90 to permit PCRF 90 to fulfill its functions. Likewise, storage device 118 is connected to SPR 102 and is therefore configured to maintain data usable by SPR 102 to permit SPR 102 to fulfill its functions. It should now be apparent that each storage device 110, 114 and 118 can be implemented, if desired, as a component within its respective component.

[0063] It can also be noted at this point that storage devices 110, 114 and 118 each maintain using different data structures, and that some of those data structures can be common amongst all storage devices 110, 114 and 118, while some of those data structures can be disparate amongst all storage devices 110, 114 and 118. The common data structures can arise because aspects of those storage devices are constrained by the requirements 3GPP Standards. The fact The different data structures can arise because aspects of those storage devices will be constrained by unique specifications of the carrier C that defines the domain in which GGSN 54, PCRF 90, OCS 82 and SPR 102 are operated. Alternatively, or additionally, the fact that different specifications for data structures have arisen can result from the fact that GGSN 54, PCRF 90, OCS 82 and SPR 102 may themselves be designed according to different specifications (e.g. one or more of GGSN 54, PCRF 90, OCS 82 and SPR 102 may be provided by different originating equipment manufacturers each with their own unique "flavor" or variation.) Alternatively, or additionally, the fact that different specifications for data structures have arisen can result from the fact that GGSN 54, PCRF 90, OCS 82 and SPR 102 may have been deployed at different times and according to different programs and therefore the data structures associated therewith have been specified differently.

[0064] Notwithstanding the specific examples above, it should now be understood that in general each storage device 110, 114, and 118 needs to maintain data that is consistent with the other storage devices 110, 114 and 118; but each storage device 110, 114 and 118 can also have extra data that is not found at the other storage devices 110, 114 and 118. Therefore, all storage device 110, 114, and 118 have to be synchronized according to the specific configuration detail they each need to hold. (Those skilled in the art will now recognize that in Figure 1 GGSN 54, PCRF 90, OCS 82, SPR 102 and the associated storage devices 110, 114 and 118 are enclosed within the dashed enclosed area indicated at reference C, which represents the carrier C that operates those components. It should also now be understood however that carrier C is a simplified example and that those skilled in the art will recognize how a variation of system 50 can accommodate the components within carrier C being operated by

multiple carriers to accommodate roaming scenarios).

[0065] System 50 also comprises a configurator 122 that connects to each of GGSN 54, PCRF 90, OCS 82 and SPR 102. As will be discussed further below, configurator 122 is configured to receive a traffic plan for subscribers and to automatically deploy that plan amongst GGSN 54, PCRF 90, OCS 82 and SPR 102 such that GGSN 54, PCRF 90, OCS 82 and SPR 102 will be configured to implement said traffic plan.

[0066] Configurator 122 can be implemented using known computing environments having appropriate network interfaces to connected with GGSN 54, PCRF 90, OCS 82 and SPR 102. Such a computing environment could be based on a commercial server that includes a microprocessor and volatile storage. The volatile storage can be implemented as random access memory ("RAM") and can be used to temporarily store applications and data as they are being used by processor. Configurator 122 also includes read only memory ("ROM") connected to the microprocessor which contains a basic operating system containing rudimentary programming instructions, commonly known as a Basic Input/Output System ("BIOS") that are executable by the microprocessor when configurator 122 is initially powered so that a higher level operating system and applications can be loaded and executed on processor. Collectively, one can view the processor, volatile storage device and ROM as a microcomputer. It should now be apparent that configurator 122 can be based on the structure and functionality of a commercial server such as a Sun Fire X4450 Server from Sun Microsystems Inc., of Palo Alto, USA, but it is to be stressed that this is a purely exemplary server, as configurator 122 could also be based on any type of computing device including from other manufacturers.

[0067] Referring now to Figure 2, a communication method represented in the form of a flow-chart is indicated generally at 200. Method 200 can be implemented using system 50 or functionally equivalent modified versions of system 50. To help provide further understanding relative to method 200 and system 50, method 200 will be discussed in relation to exemplary performance of method 200 using system 50.

[0068] At block 205, a traffic plan is received. Block 205 is performed at configurator 122 which can receives a data file representing a traffic plan. The mean by which the plan is received is not particularly limited, and can occur, for example, via a user operating a computer terminal that is connected to configurator 122, whereby the user enters in data via a graphical user interface that represents the traffic plan.

[0069] In the present exemplary embodiment the traffic plan is unique to a set of subscribers,

including subscriber S, that are associated with traffic plans being offered by carrier C. It should be understood that traffic policies for any number of subscribers S associated with carrier C are contemplated.

[0070] The traffic plan includes a plurality of aspects. In a present embodiment, the traffic plan is based on the 3GPP standards and therefore includes charging aspects and policy aspects, where the charging aspects are aspects respective to OCS 82, and the policy aspects are aspects respective to PCRF 90 and SPR 102, and both charging aspects and policy aspects respective to GGSN 54. Table I shows a simplified example of a traffic plan, which includes entries that are unique to subscriber S.

Table I
Exemplary contents of Traffic plan

	Field 1	Field 2	Field 3	Field 4	Field 5	Field 6	Field 7	Field 8
Entry	SUB ID	Service	Bit Rate	Volume	Usage Period	Billing Arrange-ment	Basic Rate	Roaming Rate
1	S	VT1 - VOIP tel 1	115 kbps	100 MB	Day	Postpaid	$10.00/ MB	$30.00/MB
2	S	TC1 - Text chat 1	1 kbps	Unlimited	Unlimited	Postpaid	$2.00/ MB	$3.00MB
3	S	MS1 - Music stream 1	25 kbps	50 songs	Day	Postpaid	$1.00 / song	$2.00/ song

[0071] Explaining the structure of Table I in greater detail, Field 1 entitled "SUB ID", is an identifier that can be used uniquely identify a subscriber (e.g. subscriber S). The identifier can either be specific to a device (such as device 58), or to each specific subscriber (such as subscriber S) contemplating that each subscriber could authenticate with different computing devices and still be subject to the same traffic plan. (While not discussed herein, where subscribers are permitted to authenticate with different computing devices, then policy P could be further enriched, beyond what is shown in Table I, to vary the policy according to the computing device, or even the nature of links connecting the device to network 58). Field 2 of Table I, entitled "Service" identifies the various types of services that are subject to the traffic plan. As will be explained in greater detail below, services can include any type of service that is currently known or as yet unknown, including voice telephony, chat, video streaming, music streaming and so on. Field 3 of Table I, entitled "Bit Rate" is the maximum permitted bit rate associated with a particular service. Field 4 of Table I, entitled "Volume' is the maximum amount of data that can be downloaded to device 70 and uploaded from device 70. Field 5, of Table I, entitled "Usage Period" defines the period during which the volume defined in Field 4 is

measured. That is to say where usage period indicates "Day" and Volume indicates "1MB", then the subscriber will be permitted one Megabyte of data transfer during one day. Field 6, of Table I, entitled "Excess Permitted" defines whether the subscriber is permitted to exceed the limits defined in Fields 4 and 5. Such excess may be permitted should the subscriber S agree to be subject to increased billing rates, and/or the sacrifice of limits for other services, and/or some other consideration in exchange for being permitted to exceed the limits defined in Fields 4 or 5. Those skilled in the art will recognize that Fields 3, 4, and 5 can be each divided into two separate fields, one for up-stream traffic from device 70 to network 58 and the other for downstream traffic from network 58. Field 6 of Table I, entitled "Billing Arrangement" indicates whether a particular service is on a post paid or prepaid basis. Field 7 entitled "Basic Rate" indicates the rate that is charged for a particular service if that particular subscriber accesses that service from within carrier C's coverage area, and according to the corresponding data in Fields 3,4 and 5. Field 8 entitled "Roaming Rate" indicates the rate that is charged for a particular service if that subscriber S does not that service from within carrier C's coverage area, but instead within the coverage are of another carrier.

[0072] Explaining each exemplary service in greater detail, "VT1 - VOIP tel 1" in Field 2, Entry 1 identifies a VOIP telephony service that is offered by a first service provider. For example "VT1 - VOIP tel 1" could be the well known VOIP application Skype, available at http://www.skype.com. "TC1 - Text chat 1" in Field 2, Entry 2 identifies a "chat" service that is offered by a first service provider. For example "TC1 - Text chat 1" could be the well known chat application, Google Talk, available at http://google.com. "MS1 - Music stream 1" in Field 2, Entry 3 identifies a streaming audio application that is offered by a first service provider. For example "MS1 - Music stream 1" could be based on the well known web-site Pandora, available at http://www.pandora.com. Each of these services will be ascertainable by DPI engine 75 as part of its regular function.

[0073] It should now be understood that any type of service can be included in Table I, such as peer-to-peer, video services, mapping services. Also a catchal. "unknown" service can also be provided where a particular service is being carried that is not ascertainable by DPI engine 75.

[0074] It should now be reemphasized that Table I is a non-limiting example, and one of the features of the specification is the inherent flexibility provided by system 50. Carrier C is able to define any traffic plan that is desired and provide that traffic plan to configurator 122.

[0075] At block 210 the traffic plan from block 205 is parsed. As part of this block,

configurator 122 will analyze the field structures within Table I and determine which fields are relevant to GGSN 54, PCRF 90, OCS 82 and SPR 102. At a general level, at block 210 configurator will parse the traffic plan according to which portion of the traffic plan is relevant to the policy aspects of the traffic plan, and which port of the traffic plan is relevant to the charging aspects of the traffic plan. Table II shows which fields are applicable to the policy aspects or charging aspects or both.

Table II
Fields in Traffic plan Applicable to Different Aspects

	Field 1 SUB ID	Field 2 Service	Field 3 Bit Rate	Field 4 Volume	Field 5 Usage Period	Field 6 Billing Arrange-ment	Field 7 Basic Rate	Field 8 Roaming Rate
Applicable To:	Both policy and charging aspects	Both policy and charging aspects	Policy aspect	Both policy and charging aspects	Policy aspect	Charging Aspect	Charging Aspect	Charging Aspect

[0076] Moving beyond this general analysis, configurator 122 also maps each field to the appropriate element (e.g. GGSN 54, PCRF 90, OCS 82 and SPR 102). Thus, continuing with the present example Table III.

Table III
Fields in Traffic plan Applicable to Different Elements

Element	Field 1 SUB ID	Field 2 Service	Field 3 Bit Rate	Field 4 Volume	Field 5 Usage Period	Field 6 Billing Arrange-ment	Field 7 Basic Rate	Field 8 Roaming Rate
GGSN 54	Y	Y	Y	Y	Y	N	N	N
PCRF 90	Y	Y	Y	Y	Y	N	N	N
SPR 102	Y	Y	Y	Y	Y	N	N	N
OCS 82	Y	Y	N	Y	N	Y	Y	Y

[0077] Explaining Table III in greater detail, various flags are provided which indicate whether a particular field in Table I are applicable to each of GGSN 54, PCRF 90, OCS 82 and SPR 102. Where a particular field is relevant, then that field will be used as part of creating a sub-plan for that component. For example, Field 1, SUB ID is indicated as being relevant for each of GGSN 54, PCRF 90, OCS 82 and SPR 102 as part of deploying the traffic plan in Table I across GGSN 54, PCRF 90, OCS 82 and SPR 102. However, Field 7 Billing Arrangement is only applicable to OCS 82.

[0078] At block 215, a sub-plan for each element is generated. Block 215 is also performed by configurator 122, which generates a sub-plan for each element.

[0079] Beginning with the first element in Table III (GGSN 54) configurator 122 can provide a processing schema for use by GGSN 54 in the application of the traffic plan from Table I.

Table IV shows an example of a processing schema that can be generated for GGSN 54 as part of block 215

Table IV
Processing schema for use by GGSN 54

SUB ID (Field 1 from Table I)	Service (Field 2 from Table I)	Bit Rate (Field 3 from Table I)	Volume (Field 4 from Table I)	Usage Period (Field 5 from Table I)
1. Obtain SUB ID from device 58 as part of monitoring access to service 70. 2. Obtain Service type of service 70 using DPI Engine 75. 3. Forward SUB ID and service type to PCRF 90 to obtain bit rate, volume and usage period policy information		1.Obtain bit rate cap as part of policy information from PCRF 90 respective to SUB ID and Service.	1.Obtain volume cap as part of policy from PCRF 90 respective to SUB ID and Service.	1. Obtain usage period restrictions as part of policy from PCRF 90 respective to SUB ID and service.
1. Forward SUB ID and service type to OCS 82 to obtain permission 2. If permission granted by OCS 82, permit service 70 applying bit rate, volume and usage period restrictions. 3. Record usage of service 70 by SUB ID in view of bit rate, volume and usage periods. 4. Forward results or recorded usage to OCS 82.				

[0080] Thus, the processing schema in Table IV can be deployed at block 220 to GGSN 54 in order to configure GGSN 54 to operate in accordance with the traffic plan in Table I, such that accessing of service 70 by subscriber S is permitted in accordance with the traffic plan of Table I.

[0081] Returning again to block 215, turning now to the second element in Table III (PCRF 90) configurator 122 can provide a processing schema for use by PCRF 90 in the application of the traffic plan from Table I. Table V shows an example of a processing schema that can be generated for PCRF 90 as part of block 215.

Table V
Processing schema for use by PCRF 90

SUB ID (Field 1 from Table I)	Service (Field 2 from Table I)	Bit Rate (Field 3 from Table I)	Volume (Field 4 from Table I)	Usage Period (Field 5 from Table I)
1. Obtain SUB ID from GGSN 54. 2. Obtain Service type from GGSN 54. 3. Access policy information relative to same from SPR 102		1.Obtain bit rate cap as part of policy information from SPR 102 respective to SUB ID and Service.	1.Obtain volume cap as part of policy from SPR 102 respective to SUB ID and Service.	1. Obtain usage period restrictions as part of policy from SPR 102 respective to SUB ID and service.
1. Forward bit rate cap, volume cap and usage period restrictions to GGSN 54.				

[0082] Thus, the processing schema in Table V can be deployed at block 220 to PCRF 90 in order to configure PCRF 90 to operate in accordance with the traffic plan in Table I, such that accessing of service 70 by subscriber S is permitted in accordance with the traffic plan of Table I.

[0083] Returning again to block 215, turning now to the third element in Table III (SPR 102) configurator 122 can provide a policy and processing schema for use by SPR 102 in the

application of the traffic plan from Table I. Table VI shows an example of a policy that can be generated as part of block 215.

Table VI
Contents of Policy to be stored at SPR 102

	Field 1	Field 2	Field 3	Field 4	Field 5
Entry	Subscr-iber ID	Service	Bit Rate	Volume	Usage Period
1	S	VT1 - VOIP tel 1	115 kbps	100 MB	Day
2	S	TC1 - Text chat 1	1 kbps	Unlimited	Unlimited
3	S	MS1 - Music stream 1	25 kbps	50 songs	Day

[0084] Thus, the database in Table VI can be deployed at block 220 to SPR 102 in order to maintain a policy that reflects the policy aspects of Table I. Table VII shows an example of a processing schema that can be generated for SPR 102 as part of block 215.

Table VII
Processing schema for use by SPR 102

SUB ID (Field 1 from Table I)	Service (Field 2 from Table I)	Bit Rate (Field 3 from Table I)	Volume (Field 4 from Table I)	Usage Period (Field 5 from Table I)
1. Obtain SUB ID from PCRF 90. 2. Obtain Service type from PCRF 90. 3. Access policy information relative to same from Table VI.		1.Obtain bit rate cap for subscriber and particular service from Table VI.	1.Obtain volume cap for subscriber and particular service from Table VI.	1. Obtain usage period restrictions for subscriber and particular service from Table VI.
1. Forward bit rate cap, volume cap and usage period restrictions to PCRF 90				

[0085] Thus, the processing schema in Table VII can be deployed at block 220 to SPR 102 in order that SPR 102 processes requests from PCRF 90 in a manner that reflects the policy aspects of Table I.

[0086] Returning again to block 215, turning now to the fourth element in Table III (OCS 82) configurator 122 can provide a charging database and a processing schema for use by OCS 82 in the application of the traffic plan from Table I. Table VIII shows an example of a charging database that can be generated for PCRF 90 as part of block 215.

Table VIII
Contents of Charging Database to be stored at OCS 82

Entry	SUB ID (Field 1 from Table I)	Service (Field 2 from Table I)	Billing arrangement (Field 6 from Table I)	Basic Rate (Field 7 from Table I)	Roaming Rate (Field 8 of Table I)
1	S	VT1 - VOIP tel 1	Postpaid	$10.00/MB	$30.00/MB
2	S	TC1 - Text chat 1	Postpaid	$2.00/MB	$3.00MB
3	S	MS1 - Music stream 1	Postpaid	$1.00 / song	$2.00/song

[0087] Thus, the database in Table VIII can be deployed at block 220 to OCS 90 in order to maintain a charging database that reflects the charging aspects of Table I. Table IX shows an example of a processing schema that can be generated for OCS 82 as part of block 215.

Table IX
Processing schema for use by OCS 82

SUB ID (Field 1 from Table I)	Service (Field 2 from Table I)	Billing arrangement (Field 6 from Table I)	Basic Rate (Field 7 from Table I)	Roaming Rate (Field 8 of Table I)
1. Obtain SUB ID from GGSN 54. 2. Obtain Service type from GGSN 54. 3. Permit or deny permission to use service based on charging records associated with SUB ID		1. Generate billing records according to billing arrangement. For pre-paid arrangements, deduct from pre-paid account. For post-paid arrangement, add total charge to subscriber bill.	1. Determine if subscriber is using basic rate, and, if so, apply charges based on basic rate.	1. Determine if subscriber is roaming, and, if so, apply charges based on roaming rate.

[0088] Thus, the processing schema in Table IX can be deployed at block 220 to OCS 82 in order to configure OCS 82 to operate in accordance with the traffic plan in Table I, such that accessing of service 70 by subscriber S is permitted in accordance with the traffic plan of Table I.

[0089] When system 50 is configured according to method 200 using Table I, the usage of service 70 by subscriber S will be performed in accordance with the traffic plan of Table I. In operation, assume that service 70 is VT1 – VOIP Tel 1. When subscriber S attempts to access service 70, DPI engine 75 within GGSN 54 will inspect the packets forming the request to access service 70, and will ascertain that subscriber S using device 58 is attempting to access service 70. In turn, GGSN 54 will utilize the processing schema of Table IV to access PCRF 90 to obtain policy information relative to the terms of use of service 70 by subscriber S.

[0090] In turn, PCRF 90 will utilize the processing schema of Table V in order to ascertain the relevant policy information. In using the processing schema of Table V, PCRF 90 will access SPR 102. SPR 102 will in turn use the processing schema of Table VII and access the policy in Table VI to obtain the relevant policy information for VT1 - VOIP tel 1, in order to ascertain a bit-rate cap of 115 kbps with a maximum volume of 100 megabytes per day. SPR 102 will return this policy information to PCRF 90 which will forward that policy information back to GGSN 54. GGSN 54, still utilizing the processing schema in Table IV, will now access OCS 82 which will use its own processing schema from Table IX coupled with the charging database in Table VIII

to perform the charging aspect function of the traffic plan of Table I. If OCS 82 instructs that it permits access, GGSN 54 will (continuing to apply the processing schema of Table IV) permit subscriber S to access service 70, sending appropriate charging information back to OCS 82.

[0091] Those skilled in the art will now recognize that the traffic plan in Table I has now been implemented using the foregoing teachings, such that accessing of service 70 by subscriber S is permitted in accordance with the traffic plan of Table I. Advantageously, configurator 122 has provided a central location for receiving the traffic plan and automatically configured the various elements of system 50 to implement the traffic plan. This permits carrier C to modify the traffic plan at any time without having to individually update GGSN 54, PCRF 90, SPR 102 and OCS 82 to respond to such modifications.

[0092] Those skilled in the art will also recognize that the Configurator can also apply the traffic plan to other network elements including, but limited to, the Mobile Switching Center Service Capability Interaction Manager (SCIM), and the Call Session Control Function (CSCF) as well as value added service platforms such as the Multimedia Messaging Service Center (MMS-C), Application Server, Wireless Application Protocol (WAP) Gateway, Short Message Service Center (SMS-C), Unified Messaging Server, and content (e.g. music or video) distribution servers.

[0093] The nature and scope of such service profile criteria information is not particularly limited. For example, traffic plan criteria can include a flag indicating that access of service 70 is not permitted whatsoever by device 58 such that device 58 will be prevented access to service 70. Where access to service 70 is permitted according to the traffic plan criteria, then the traffic plan criteria can include rating information, which can include complex criteria, such as, at least one of: times of day, week or month that access to service 70 is restricted or prevented; tiered rates of charge for accessing service 70 depending on the time of day service 70 is being accessed; maximum bandwidth allocations associated with access to service 70; maximum amounts of data that can be accessed from service 70; tiers of rates associated with higher bandwidths or capacities; tiers of rates associated with whether device 58 is roaming or within its home network; privacy management that anonymizes certain data carried between device 58 and service 70; flat rate charges for unlimited access to service 70; and combinations of any of the foregoing. Other traffic plan criteria will now occur to those of skill in the art. Indeed, traffic plan criteria can be found in the Applicants' co-pending application number PCT/CA2007/001528 and entitled Policy Services, the contents of which are incorporated herein by reference.

[0094] While the foregoing describes certain specific embodiments, it is to be reemphasized that those embodiments are exemplary and can be modified and that variations, subsets and combinations of those embodiments are contemplated. Indeed, it is to be reemphasized that the specific examples of processing schemas and databases are simplified for ease of explanation. But it should be understood that the database format of Table I, and the database formats and schema formats of the other Tables can vary according to the specific computing environments used to implement each of the components in system 50, and therefore configurator 122 can in turn be structured to accommodate such specific computing environments. As a still further example, the teachings of PCT/CA2007/001528 can be incorporated into the teachings herein.

[0095] Referring now to Figure 3, a communication system in accordance with another embodiment is indicated generally at 50a. System 50a is a variation on system 50 and therefore components in system 50a that have like components in system 50 bear the same reference character in both systems, except that in system 50a the reference character is followed by the suffix "a".

[0096] Of note is that system 50a includes a subscriber terminal 300a which connects to configurator 422a via a network 304a. In a present, purely exemplary, embodiment network 304a is the Internet. Subscriber terminal 300a is based on the functionality of desktop computing device that includes at least networking capabilities. Many well known desktop computing devices, or variants thereof, are suitable for the present embodiment. Referring now to Figure 4, a schematic block diagram of each subscriber terminal 300a is shown. It should be emphasized that the structure in Figure 4 is purely exemplary, and contemplates a device that can be used for Internet communications over network 304a. Subscriber terminal 300a includes a plurality of input devices, which in a present embodiment includes a keyboard 400 and a microphone 404. Other input devices, such as a microphone are also contemplated. Input from keyboard 400 and mouse 404 is received at a processor 408, which in turn communicates with a non-volatile storage unit 442 (e.g. read only memory ("ROM"), Erase Electronic Programmable Read Only Memory ("EEPROM"), Flash Memory) and a volatile storage unit 446 (e.g. random access memory ("RAM")). Programming instructions that implement the functional teachings of subscriber terminal 400a as described herein are typically maintained, persistently, in non-volatile storage unit 442 and used by processor 408 which makes appropriate utilization of volatile storage 446 during the execution of such programming instructions. Variants on subscriber terminal 300a can include a laptop computer equipped with wireless capabilities. It will become apparent that even device 58a can serve the function as subscriber terminal 300a.

thereby obviating the need for a separate subscriber terminal 300a.

[0097] Subscriber terminal 300a is configurator is configured to operate as a web-browser and therefore a web-browser application 436 is maintained in non-volatile storage 442 in order to permit subscriber S to operate subscriber terminal 300a and perform web-browsing functions. Also of note in system 50a is that configurator 422a is configured to operate a web-server to host web-browsing sessions on subscriber terminal 300a.

[0098] Referring now to Figure 2, a method for metering of telecommunication services is indicated in the form of a flow-chart generally at 500. Method 500 (or variants thereof) can be used, if desired, prior to invocation of method 200 (or a variation thereof), such that the traffic plan referenced at block 525 can be all or part of the traffic plan introduced at block 205.

[0099] At block 505, inputs are received representing metering levels. In a present exemplary embodiment, block 505 can be performed by the web-server executing on configurator 422a in conjunction with the web-browser application 436 executing on subscriber terminal 300a. In other words, a graphical user interface can be generated on subscriber terminal 300a which receives inputs from subscriber S that represent metering levels and which are in turn received at the web-server on configurator 422a.

[00100] Figure 6 shows an example graphical user interface (GUI) 450 that can be hosted by configurator 422a for generation on display 420. GUI 450, via processor 408, is responsive to inputs from keyboard 400 and mouse 404. GUI 450 comprises a volume section, a quality of service section, an alert section and a pricing section.

[00101] The volume section outlines maximum amounts of data that can be downloaded to device 70a and uploaded from device 70a for various services. The volume selection is generally analogous in concept to Field 4 of Table I. In general, note that that the metering levels in Figure 6 do not correspond exactly to the various levels that can form part of a tariff plan as discussed in relation to system 50. This difference is intended illustrate that different types and configurations of tariff plans and the constituent elements thereof are contemplated. The volume section comprises a plurality of sliders 454-1, 454-2, 454-3, 454-4, 454-5, 454-6, 454-7 (collectively, sliders 454 and generically, slider 454. This nomenclature is used elsewhere). Sliders are graphical representations of electro-mechanical rheostats. Each slider 454 is respective to a different service and can be used to select a different maximum amount of data that can be downloaded and/or uploaded in a given month. Slider 454-1 thus can be used to provide input representing maximum amount of data that can be downloaded and/or

uploaded in a given month for a web-browsing service. Slider 454-2 thus can be used to provide input representing maximum amount of data (between zero and one Gigabyte) that can be downloaded and/or uploaded in a given month for a VoIP service that is hosted by carrier C. Slider 454-3 thus can be used to provide input representing maximum amount of data (between zero and two-hundred megabytes) that can be downloaded and/or uploaded in a given month for a VoIP service that is hosted by carriers ***other*** than carrier C. Slider 454-4 thus can be used to provide input representing maximum amount of data (between zero and five-hundred megabytes) that can be downloaded and/or uploaded in a given month for an IP Media Sharing service (e.g. Bittorrent or other peer to peer file sharing service). Slider 454-5 thus can be used to provide input representing maximum amount of data (between zero and one-hundred megabytes) that can be downloaded and/or uploaded in a given month for an Instant Messaging service hosted by carrier C (e.g. Bittorrent or other peer to peer file sharing service). Slider 454-6 thus can be used to provide input representing maximum amount of data (between zero and one-hundred megabytes) that can be downloaded and/or uploaded in a given month for an Instant Messaging service hosted by a carrier ***other*** than carrier C (e.g. Bittorrent or other peer to peer file sharing service). Slider 454-7 thus can be used to provide input representing maximum amount of data (between zero and fifty megabytes) that can be downloaded and/or uploaded in a given month for a gaming service (e.g. an online video game such as poker which is played via multiple devices like device 70 which are also connected to carrier C).

[00102] It should also be understood that the volume section, can, in other embodiments express different, or additional volume metrics, such as an event count (e.g. number of instant messages), minutes (e.g. maximum number of minutes of VoIP calling). Other volume metrics will now occur to those of skill in the art. Each slider 454 can also be configured to reflect a different volume metric.

[00103] Furthermore, as another variation, each slider 454 can be configured to show a representation of the exact amount of volume that is currently selected by that particular slider 454. In this variation, each slider 454 would have a current value depicted in the slider which changes in real time as that slider 454 is slid up and down. The values within each slider 454 can be configured to be editable within the slider itself, so that one can simply enter the text, for example, "50Mb" instead of having to accurately move it up and down to achieve 50 Mb.

[00104] GUI 450 can also be modified, for other embodiments, to have multiple screens, whereby "double-clicking" (or other selecting technique) on a particular slider 454 could invoke another GUI that provides granular detail about a particular service. For example, gaming slider

454-7 could be configured to be selectable so that another GUI is invoked (not shown in the Figures) on screen 420 with an additional set of sliders, and each of those sliders could be configured to reflect individual games, which in their aggregate would be capped by the volume selected according to slider 454-7 on GUI 450. The quality of service section of GUI 450 comprises a plurality of switches 458. Each switch 458 is respective to a slider 454 and the associated service. Switches 458 are, in a present example, graphical representations of 3-way electromechanical switches. Each switch 458 can be set to define a quality of service level for a particular service. In the present example, each switch 458 has three positions, labeled "B" for Bronze; "S" for Silver; and "G" for Gold. Bronze level of service would be the lowest quality of service level, while silver would be an intermediate quality of service level, and gold would be the highest quality of service level. Each quality of service level would generally reflect a maximum bit rate (generally analogous to Field 3 of Table I). Those skilled in the art will recognize that each switch 458 can be manifested via an alternative control (for example, a slider) that provides for a finer degree of granularity in terms of defining the quality of service level for a particular service.

[00105] The alert section of GUI 450 comprises a plurality of radio-boxes 459 that simply indicate "Y" for "Yes" or "N" for No. The radio-boxes, when set to "Y" indicate that a message is to be sent to device 70 when device 70 reaches (or nears) the maximum volume indicated in the maximum volume section. GUI 450 can be modified so that alert section also includes a volume metric that indicates the exact volume of consumption which will trigger the delivery of the alert to device 70. The alert section could be modified to be an automatic quality of service adjustment. The identification of a volume metric in the alert section could thus be used (in lieu of or in addition to the actual alert notification) as part of generation of the tariff plan at block 520, whereby a quality of service selection at switch 450 would be automatically dropped to the next lower setting once the selected volume in the alert section is reached, thereby deferring the reaching of the threshold value in exchange for a reduction in quality of service.

[00106] Note that GUI 450 can be implemented different combinations of sliders, switches or radio-boxes or other interactive graphics that can be used to provide the input contemplated at block 505 of method 500.

[00107] At block 510, a tariff plan representation is generated based on the inputs received at block 505. In a present exemplary embodiment, block 510 is also performed by the web-server executing on configurator 422a in conjunction with the web-browser application 436 executing on subscriber terminal 300a. In a present embodiment, the graphical user interface in Figure 6

is also used as part of the implantation of block 510, whereby a representation of the tariff plan is generated on subscriber terminal 300a based on determinations made at configurator 422a.

[00108] Block 510 is implemented via the pricing section of GUI 450, which comprises a pie-graph 462 that includes a dial-pointer 466 that indicates the total monthly price of a subscription that has a tariff plan that is implemented in accordance with the inputs provided in volume section, quality-of-service section and alert section. Also note, in the present exemplary embodiment, pie-graph 462 has two portions: a basic package portion 470 and an enhanced package portion 474. Basic package portion 470 is filled with hatching, while enhanced package portion 474 is filled with cross-hatching. Such hatching and cross-hatching, it will be appreciated, can be effected with different colours rather than hatching and cross-hatching. Note that the hatching in basic package portion 470 corresponds to hatching on sliders 454-1, 454-2 and 454-5, while the cross-hatching in enhanced package portion 474 corresponds to cross-hatching on sliders 454-3, 454-4, 454-6 and 454-7. Thus, pie-graph 462 indicates which portion of the tariff plan is attributable to basic services (i.e. those services associated with sliders 454-1, 454-2 and 454-5) and which portion of the tariff plan is attributable to enhanced services (i.e. those services associated with sliders 454-3, 454-4, 454-6 and 454-7). It will be appreciated that what is designated "basic services" vs "enhanced services" can be determined by carrier C, and so designated in such a manner to encourage the use of "basic services" vs "enhanced services", or to make clear that additional charges are being levied for "enhanced services" due to the fact that they are more costly for carrier C to implement.

[00109] Note that while pie-graph 462 comprises two portions 470 and 474, GUI 450 can be modified to have only one portion or to have more than one portion. For example, pie-graph 462 could be configured to have seven portions, with one portion being respective to each slider 454. Furthermore, pie-graph 462 can be further segmented into further portions, with such additional portions configured to show which portion of the pie-graph 462 is attributable to a particularly quality of service respective to switches 458.

[00110] Thus, in a typical scenario, the position of dial-pointer 466 will point to higher prices as any one or more of sliders 454 are raised. Likewise, the position of dial-pointer 466 will point to lower prices as any one or more of sliders 454 are lowered. Also the position of dial-pointer 466 will point to higher prices as any one or more of switches 458 are increased from a lower quality of service level to a higher quality of service level. Likewise, the position of dial-pointer 466 will point to lower prices as any one or more any one or more of switches 458 are decreased to a lower quality of service level from a higher quality of service level. Pricing can

also be changed according to whether or not any of the radio-boxes are selected.

[00111] Also of note, is that the size of basic package portion of 470 will increase or decrease according to changes to sliders 458-1, 458-2 and 458-5 or switches 458-1, 458-2, and 458-5, while the size of enhanced package portion of 474 will increase or decrease according to changes to sliders 454-3, 454-4, 454-6 and 454-7 or switches 458-3, 458-4, 458-6 and 458-7.

[00112] In another variation, dial-pointer 466 can itself be configured to be selectable and movable, so that selecting and moving dial-pointer 466 towards a lower value can automatically cause corresponding sliders 454 and/or switches 458 to likewise lower. Conversely, moving dial-pointer 466 towards a higher value can automatically cause corresponding sliders 454 and/or switches 458 to likewise raise. As a still further variation, dial-pointer 466 can be configured so that individual sliders 458 and/or switches 458 can be "locked" in a given position, so that moving dial-pointer 466 will only cause corresponding movement in those sliders 458 and/or switches 458 which are not "locked". As a still further variation, dial-pointer 466 can be configured to be "locked", in addition to the ability to "lock" sliders 454 and/or switches 458, so that movement of one unlocked slider 454 or switch 458 will only cause corresponding movement in those sliders 454 or switches 458 that are unlocked.

[00113] Referring again to Figure 5, at block 515 a determination is made as to whether the plan is accepted. In a present embodiment, and referring now to Figure 6, the determination of whether or not the plan is accepted is based on whether or not a selection button 478 is selected (via for example a selection and click of mouse 404). If selection button 478 is not selected then method 500 cycles back to block 505. If selection button 478 is selected then method 500 advances to block 520.

[00114] At block 520, a tariff plan is generated based on the inputs from block 505. The resulting tariff plan can perform the input for block 205 of method 200. At this point, however, it is to be reiterated that the specific services and associated options for the tariff plans that can be selected through the exemplary GUI 450 are not intended to be identical to the exemplary services and associated options for the tariff plans shown in Table I. In fact, each has different examples in order to illustrate the configurability associated with the teachings herein.

[00115] It should now be understood that method 500 need not be limited to system 50a, and that indeed method 500 and GUI 450 can be used to permit subscribers S to provide input representing desired home or business tariff plans for other types of data services, including home or business Internet access through wired services (e.g. T1, T3, Fibre-optic, Community

Access TeleVision (CATV) coaxial links, Digital Subscriber Line (DSL)) or wireless services (WiMax, Universal Mobile Telecommunications Service, Enhanced Data Rates for GSM Evolution (EDGE)). Referring now to Figure 7, an example of another communication system that can be used with method 500 is indicated generally at 50b. System 50b is a variation on system 50a and therefore components in system 50b that have like components in system 50a bear the same reference character in both systems, except that in system 50b the reference character is followed by the suffix "b" instead of "a".

[00116] Of note is that system 50b is a much simplified version of system 50a and is based on a wired configuration. Link 66b is based on DSL, CATV, T1 or T3 (though it can be based on a wireless link). Carrier C operates any generic gateway equipment 54b (instead of GGSN 54a or GGSN 54) that can connect link 66b to Internet 304b. Carrier C is an Internet Service Provider for subscriber station 300b. Subscriber station 300b can be used to access Internet 304b, but can also be used to access configurator 122b in order to perform method 500b. Configurator 122b is a simplified abstraction of configurator 122 in that configurator 122b is intended to generically cooperates with gateway equipment 54b to implement the tariff plan, and cooperating in a manner that is complementary to the functionality of gateway equipment 54b. Note that the billing functions of system 50b are omitted for simplified convenience, but that configurator 122b and gateway 54b likewise interact with such billing functions.

[00117] As a still further variation, GUI 450 can be modified to include radio-buttons, a drop-down box or other selection means that permits the selection of a number of pre-set tariff plans (not shown). Upon selection of one of the pre-set tariff plans, each slider 454, switch 458, radio-boxes 459, pig-graph 462 and dial-pointer 466 will move to a predefined location on GUI 450. In this modified embodiment, a tariff-plan with particular setting can be established with minimal input, or a predefined tariff plan can be tweaked to reflect unique preferences. As an example, a "basic" package and an "enhanced" package could be offered as pre-set plans. In this example, Figure 6 could reflect the "enhanced" package, while selection of the "basic" package would cause: sliders 454-3, 454-4, 454-6 and 454-7 to drop to zero; dial-pointer 466 to point to the fifteen-pounds marker; and enhanced package portion 474 to disappear.

[00118] Still further variations are contemplated. Figure 8 shows a method for metering of telecommunication services is indicated in the form of a flow-chart generally at 500a, which is a variation on method 500. Figure 9 shows another example graphical user interface GUI 450a, which is a variation on GUI 450. GUI 450a is configured for use in conjunction with method 500a. Method 500a includes substantially the same blocks as method 500 and thus like blocks

bear like references, except followed by the suffix "a". GUI 450a includes substantially the same components as GUI 450 and thus like components bear like references, except followed by the suffix "a". Of note is that method 500a includes two extra blocks: Block 507a is a decision block whereby a determination is made as to whether the tariff plan will allow sponsorships to subsidize the tariff plan; block 508a is arrived at from the "yes" branch of block 507a, whereby inputs are received relative to accepted sponsorship levels. To implement the functionality of block 507a, GUI 450a comprises a permit sponsorship selection button 480a. To implement functionality of block 508a, GUI 450a comprises a sponsorship section with a plurality of sponsorship level switches 481a, with each switch 481a respective to a slider 454a.

[00119] Permit sponsorship selection button 480a can be implemented in a toggle or on/off fashion, whereby if toggled "on" then switches 481a become interactive and if toggled "off" then switches 481a become non-interactive (perhaps disappearing altogether or becoming "greyed"). In a present embodiment, switches 481a have three settings: N which represents "no" sponsorship; "P" which represents "partial" sponsorship; and "F" which represents "full" sponsorship. No sponsorship means that no sponsorship is used to subsidize the service; partial sponsorship means that the service is partially subsidized, while full sponsorship means that the service is fully subsidized. A partially subsidized service could refer to, for example, in the context of VoIP, the playing of an audio advertisement prior to the connection of a voice call. As another example of a partially subsidized service, a video streaming service could be paused at periodic intervals for the playing of one or more video sponsorship messages. At the completion of the video sponsorship message(s), the video streaming service would resume. A fully subsidized service could refer to, for example, in the context of Gaming, the streaming of a banner across the screen 420 during entire playing of any particular game. Note in the example shown in Figure 9, that switches 481a-1, 481a-2, and 481a-5 are set to "N" for no sponsorship, while the remaining switches 481a are set to "P" for partial sponsorship. Note that since switches 481a-1, 481a-2, and 481a-5 are set to "N", and that those same switches 481a-1, 481a-2, and 481a-5 relate to basic package portion 470a, that basic package portion 470a is unchanged from basic package portion 470. However, since switches 481a-3, 481a-4, 481a-6, and 481a-7 are set to "P", and that those switches 481a-3, 481a-4, 481a-6 and 481a-7 relate to enhanced package portion 474a, that enhanced package portion 474a has been reduced in half in relation to enhanced package portion 474. Those skilled in the art will recognize that switches 481a can be manifested via alternative controls (for example, sliders) that provide for a finer degree of granularity in terms of defining the level of sponsorship for a particular service.

[00120] It should be understood that the foregoing teachings can be combined with the teachings of Applicant's co-pending United States Patent application 11/744,588 entitled "SYSTEM AND METHOD FOR PROVIDING CONTEXT BASED SERVICES" filed May 4, 2007.

[00121] Further variations, combinations and subsets of the foregoing embodiments will now occur to those skilled in the art.

[00122] The novel teachings herein can provide certain advantages. For example, where elements in system are produced by different vendors or have been deployed using separate specifications, configurator 122 can be deployed so as to automatically accommodate such differences to facilitate efficient deployments of different traffic plans. The teachings herein can satisfy this need.

[00123] All documents referenced are incorporated herein by reference.

CLAIMS

1. A communication system comprising:

at least one element for interconnecting a client device and a server for hosting a service; said element for implementing a traffic plan; said traffic plan for regulating access of said service by said client device;

a configurator connected to said element and to a subscriber device; said configurator adapted to receive inputs from said subscriber device representing a proposed version of said traffic plan; said configurator further adapted to generate a representation of said proposed version on said subscriber device; said configurator further adapted to continue receiving said inputs and generating said representation based on variations of said proposed version until an indication is received from said subscriber device that said traffic plan is accepted, whereupon said configurator generates said traffic plan.

2. The communication system of claim 1 wherein said elements include one or more of a GGSN, a PCRF, an SPR and an OCS.

3. The communication system of claim 1 wherein said elements include one or more of a Mobile Switching Center, Call Session Control Function, Service Capability Interaction Manager (SCIM), Application Server, Multimedia Messaging Service Center (MMS-C), Application Server, Wireless Application Protocol (WAP) Gateway, Short Message Service Center (SMS-C), Unified Messaging Server, and content (e.g. music or video) distribution servers.

4. The communication system of claim 2 wherein tariff plan includes said policy aspects that are respective to said PCRF and said SPR.

5. The communication system of claim 2 wherein said tariff plan includes charging aspects that are respective to said OCS.

6. The communication system of claim 1 wherein said service is one of software downloads, web-pages, instant messaging, email, web-mail, mapping services, location applications, social networking services and applications, file sharing services and applications, peer-to-peer services, music or video streams or downloads.

7. The communication system of claim 1 wherein said elements are configured to connect said client device to a plurality of different servers hosting different servers and said traffic plan is for regulating access to each of said services.

8. The communication system of claim 7 wherein said services include at least one of software downloads, web-pages, instant messaging, email, web-mail, mapping services, location applications, social networking services and applications, file sharing services and applications, peer-to-peer services, music or video streams or downloads.

9. A configurator in accordance with any of the preceding claims.

10. A method for configuring a communication system comprising:

receiving a inputs representing a proposed traffic plan at a configurator;

generating a representation of said proposed traffic plan based on said inputs;

repeating the foregoing steps until an indication is received that said proposed traffic plan is accepted and thereupon, generating a tariff plan based on said inputs.

11. The method according to claim 10 wherein one of said tariff plan comprises policy aspects and a charging aspects.

12. The method according to claim 10 wherein said elements include one or more of a GGSN, Service Capability Interaction Manager (SCIM), a PCRF, an SPR and an OCS.

13. The method of claim 10 wherein said elements include one or more of a Mobile Switching Center, Call Session Control Function, Application Server, Multimedia Messaging Service Center (MMS-C), Application Server, Wireless Application Protocol (WAP) Gateway, Short Message Service Center (SMS-C), Unified Messaging Server, and content (e.g. music or video) distribution servers.

14. The method according to claim 11 wherein said policy aspects are respective to a PCRF and said SPR.

15. The method according to claim 11 wherein said charging aspects are respective to an OCS.

16. The method according to claim 10 wherein said service is one of software downloads, web-pages, instant messaging, email, web-mail, mapping services, location applications, social networking services and applications, file sharing services and applications, peer-to-peer services, music or video streams or downloads.

17. The method according to claim 10 wherein said elements are configured to connect said client device to a plurality of different servers hosting different servers and said traffic plan is for regulating access to each of said services.

18. The method according to claim 17 wherein said services include at least one of software downloads, web-pages, instant messaging, email, web-mail, mapping services, location applications, social networking services and applications, file sharing services and applications, peer-to-peer services, music or video streams or downloads.

19. The method according to claim 10 wherein said inputs are received via a graphical user interface, said graphical user interface comprising input values respective to different types of services.

20. The method according to claim 19 wherein said representation is generated on said graphical user interface to indicate a total price for a tariff plan based on said inputs.

21. The method according to claim 19 wherein said inputs are provided using at least one of of sliders, switches and radio boxes.

22. The method of claim 19 wherein said input values represent at least one of maximum volume and quality of service for each of said types of services.

23. The method of claim 19 wherein said maximum volume is respective to a given period of time.

24. The method of claim 19 wherein said different types of services incluces a first class of services and a second class of services.

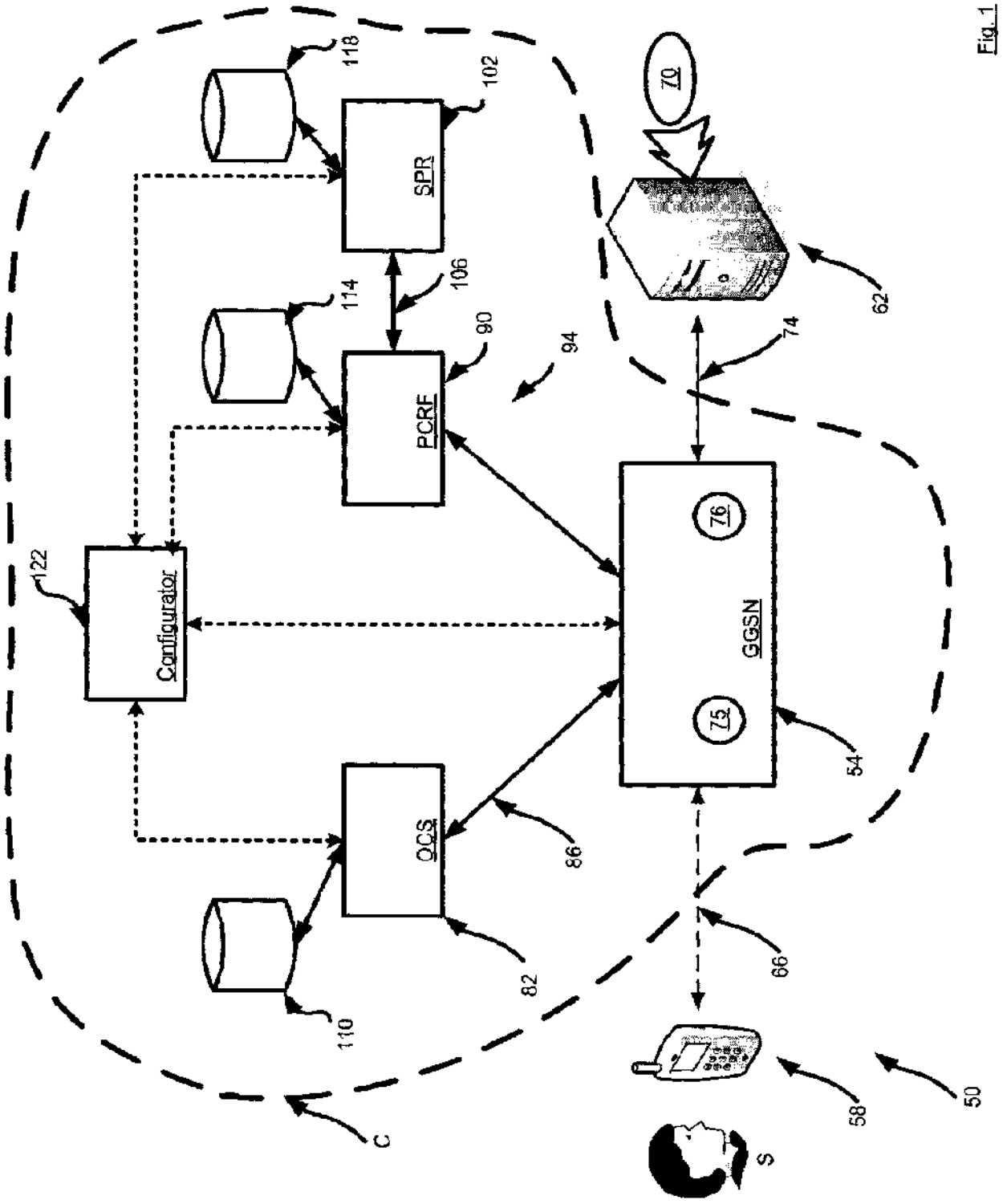
25. The method of claim 24 wherein said first class of services is basic services and said second class of services is enhanced services.

26. The method of claim 24 wherin said representation is generated on said graphical user interface and indicates a total price for a tariff plan based on said inputs and further indicates

which portion of said price is associated with said first class of services and which portion of said price is associated with said second class of services.

27. The method of claim 19 wherein said input values include a representation of whether to send an alert as to whether a maximum volume has been reached under said tariff plan.

28. The method according to claim 10 wherein said inputs include least one of said services.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102
SPR
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114
90
94
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PCRF
76
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Configurator
GGSN
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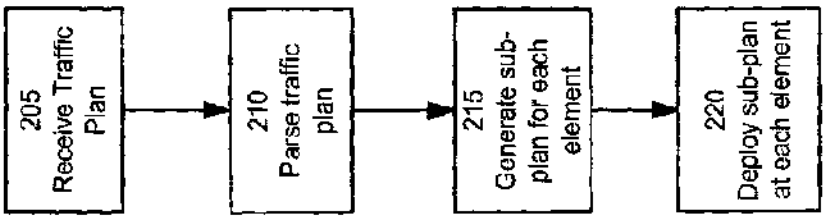
OCS
86
82
66
110
58
50
C
S

Fig. 1

Fig.2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Receive Traffic Plan
210
Parse traffic plan
215
Generate sub-plan for each element
220
Deploy sub-plan at each element

200

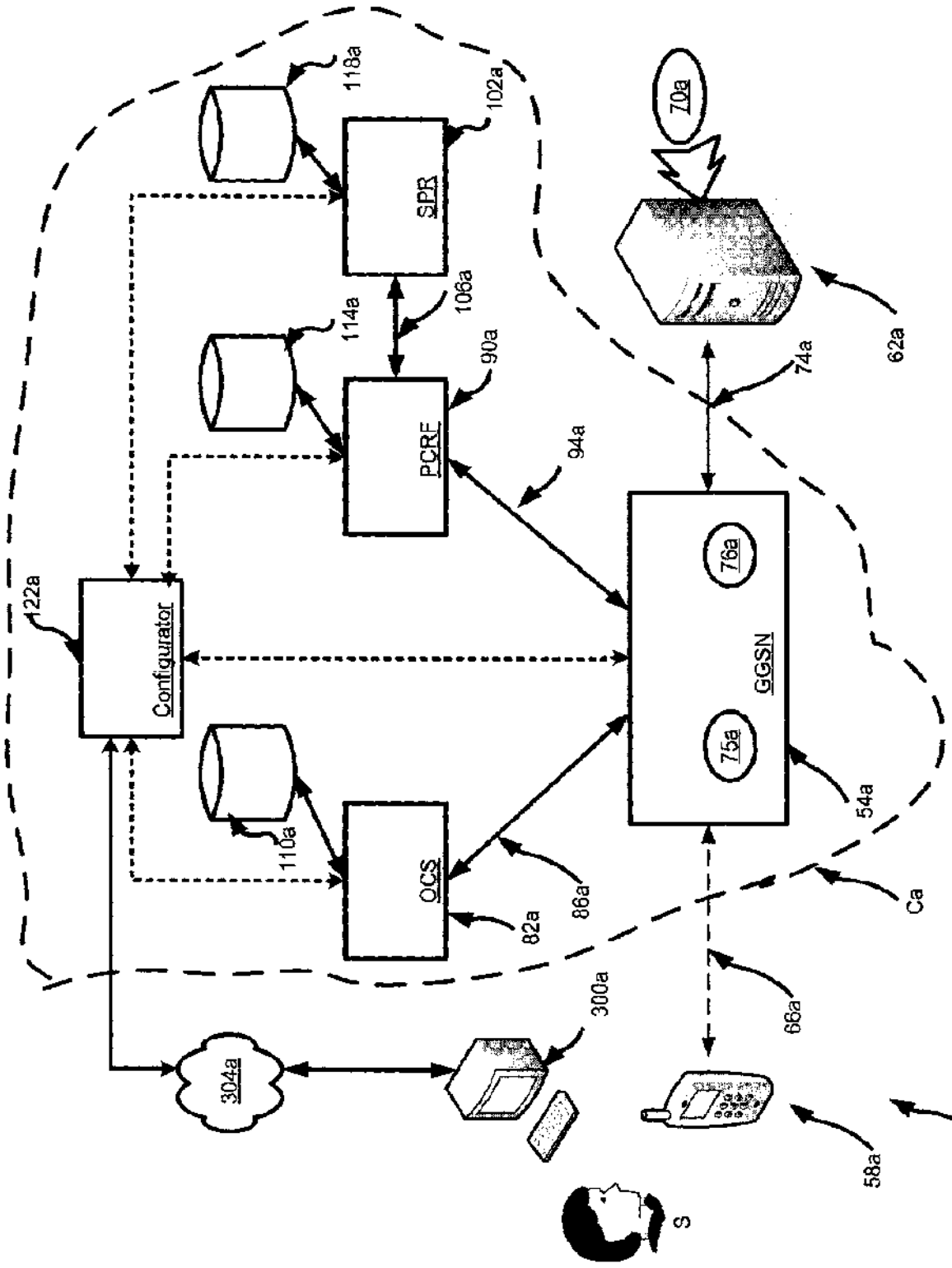


Fig. 3

Samsung Ex. 1004, page 848 of 974

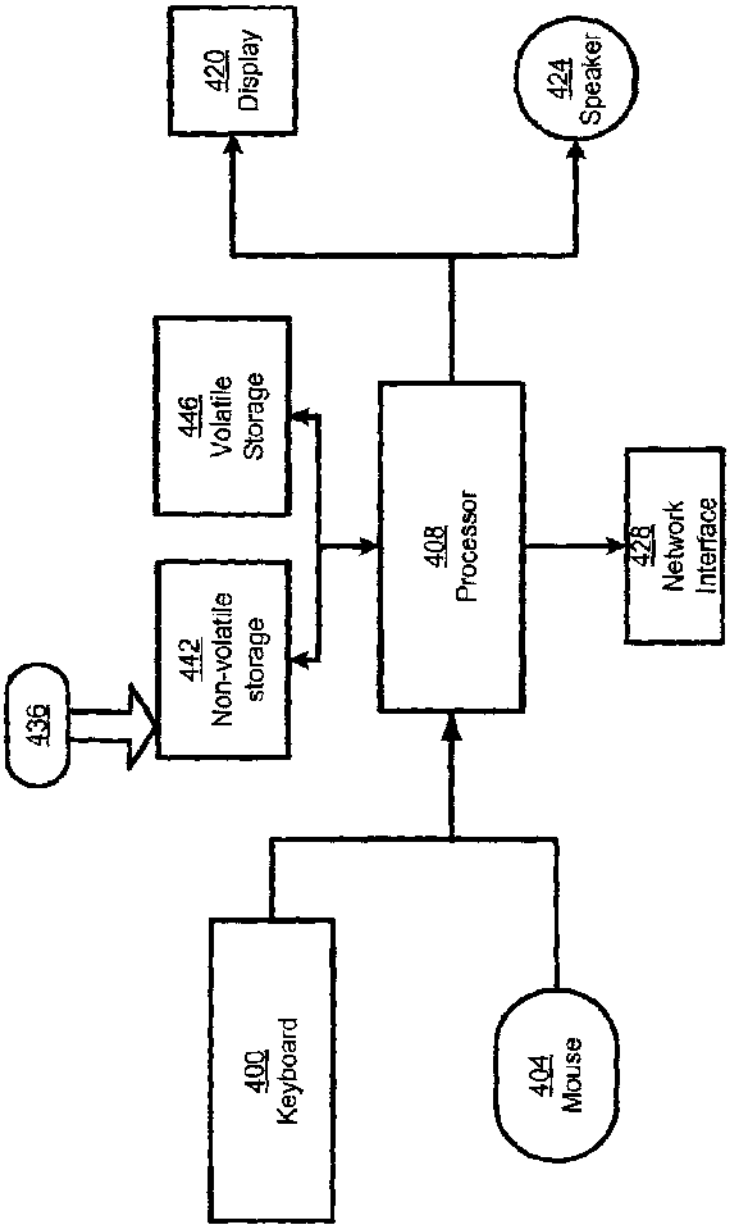
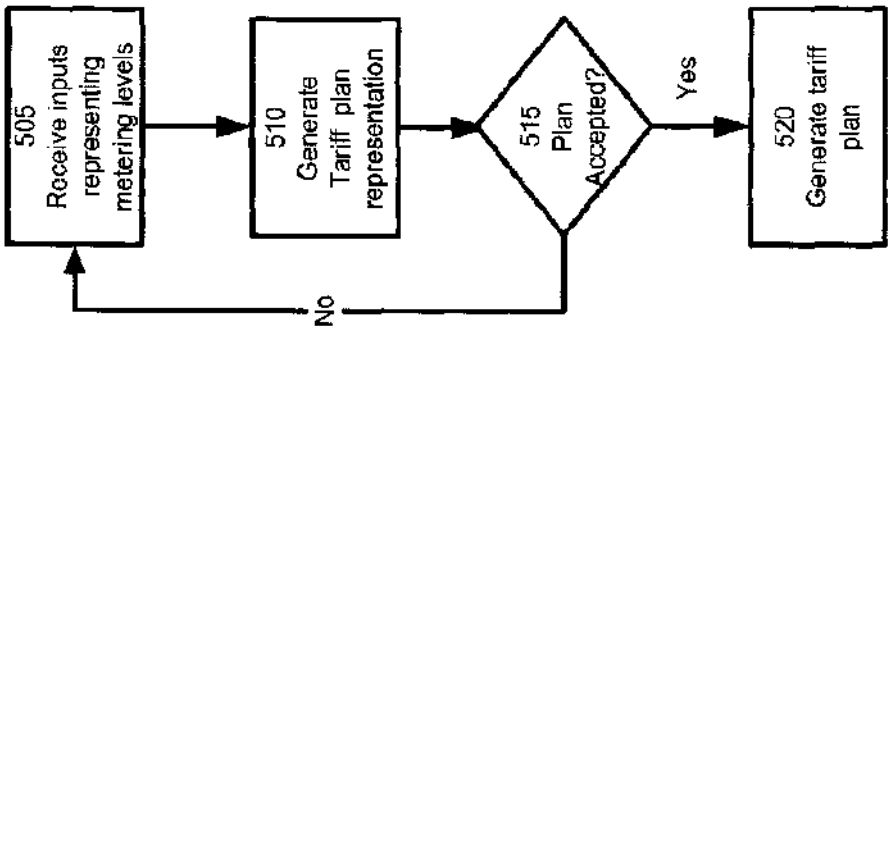


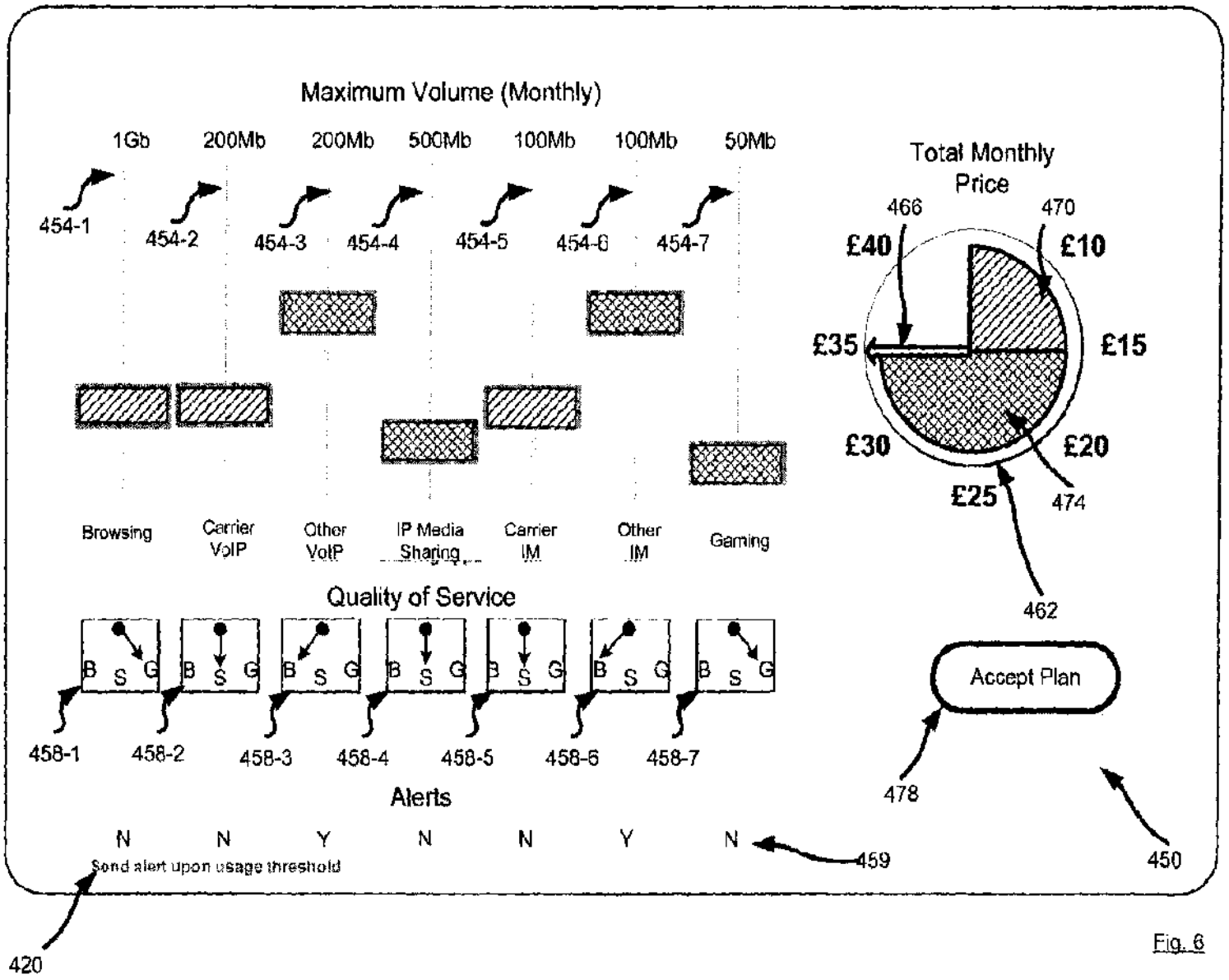
Fig. 4

Samsung Ex. 1004, page 849 of 974

Samsung Ex. 1004, page 850 of 974

Fig. 5

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Browsing
Carrier VoIP
Other VoIP
IP Media Sharing
Carrier IM
Other IM
Gaming
Quality of Service
B S G
458-1
458-2
458-3
458-4
458-5
458-6
458-7
Alerts
N N Y N N Y N
Send alert upon usage threshold
420
459
Total Monthly Price
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462
Accept Plan
478
450

Fig. 6

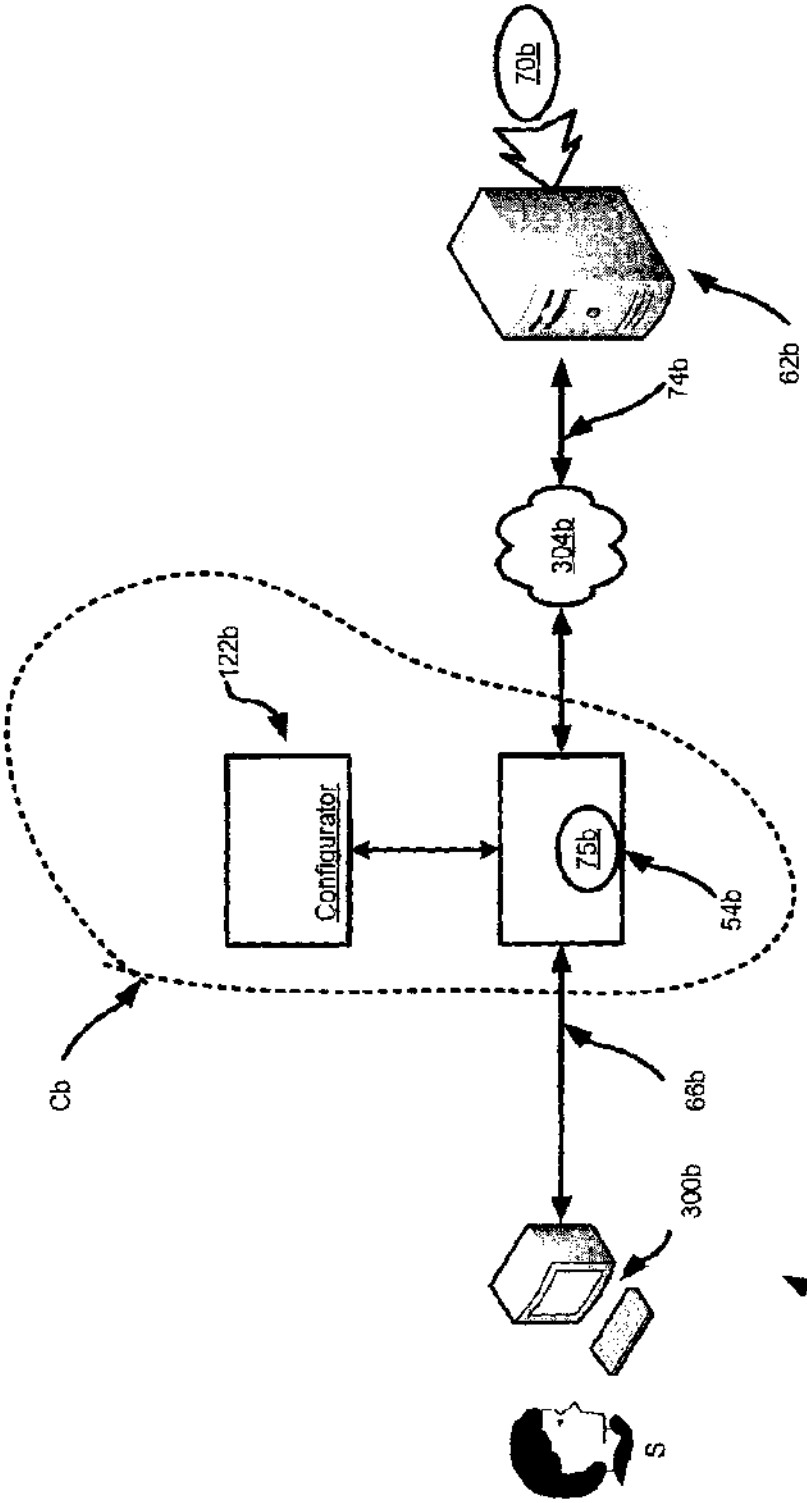


Fig. 7

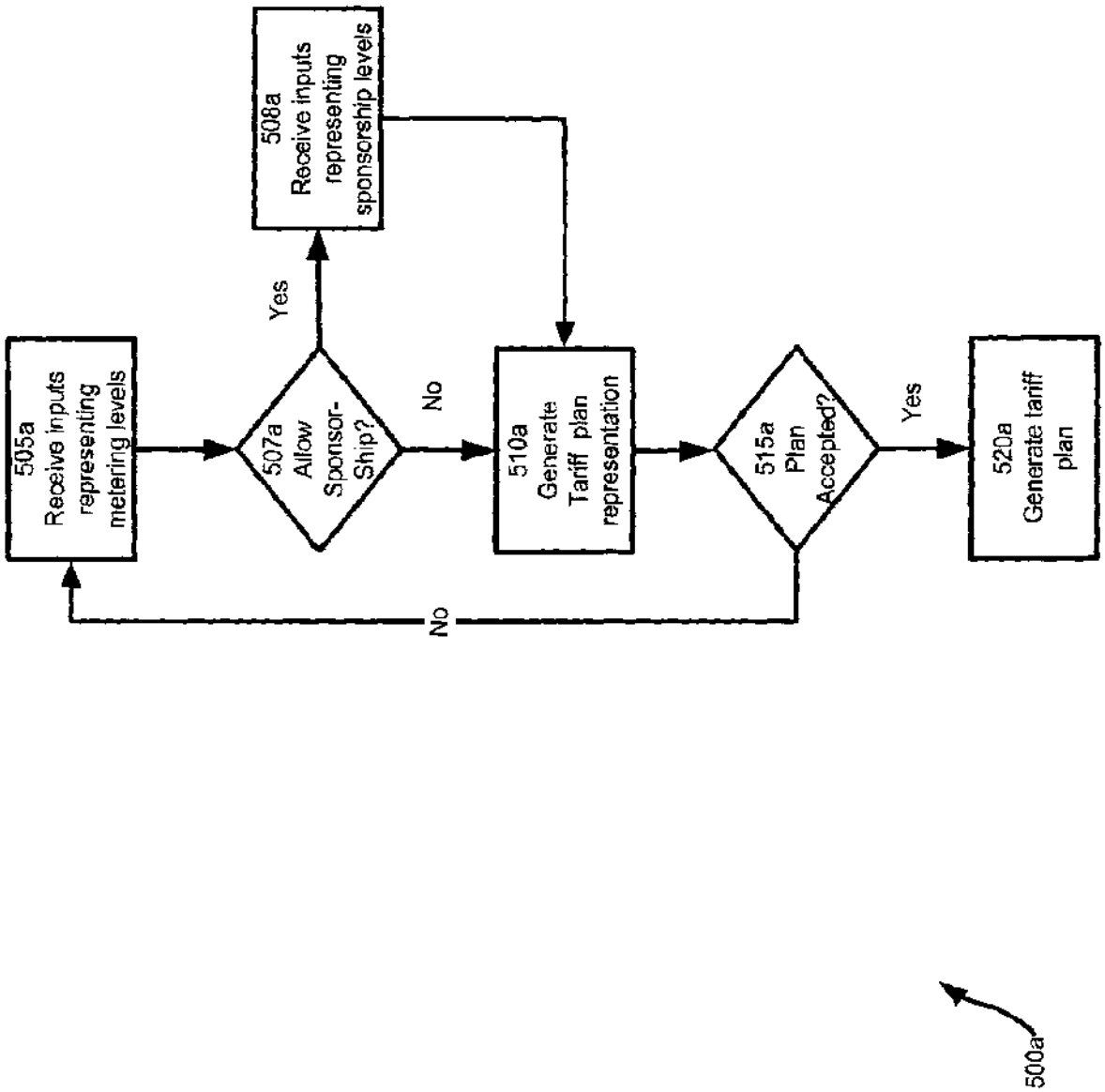
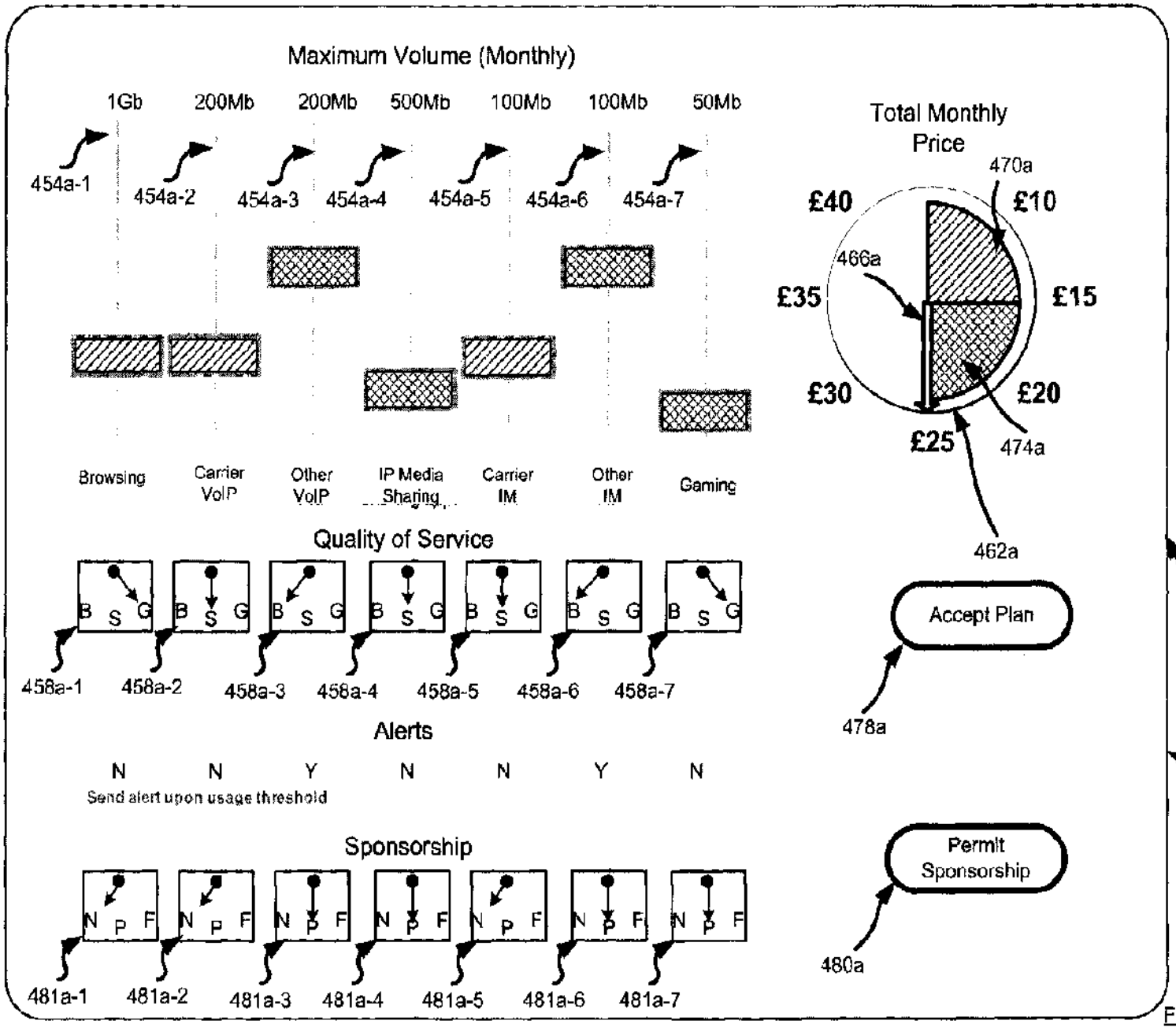


Fig. 8

Samsung Ex. 1004, page 853 of 974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Browsing
Carrier VoIP
Other VoIP
IP Media Sharing
Carrier IM
Other IM
Gaming
Quality of Service
B S G
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458a-2
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458a-4
458a-5
458a-6
458a-7
Alerts
N N Y N N Y N
Send alert upon usage threshold
Sponsorship
N P F
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481a-2
481a-3
481a-4
481a-5
481a-6
481a-7
Total Monthly Price
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£10
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£15
£30
£20
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470a
466a
474a
462a
Accept Plan
478a
450a
420
Permit Sponsorship
480a

Fig. 9

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CA2008/000527

A. CLASSIFICATION OF SUBJECT MATTER
IPC: ***H04L 12/14*** (2006.01) , ***H04L 12/24*** (2006.01), ***H04Q 7/20*** (2006.01)
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC: ***all***

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic database(s) consulted during the international search (name of database(s) and, where practicable, search terms used)
Canadian patent database, Delphion, Internet and WEST
Some search term used: tariff, traffic, plan, configurator, policy, charging, metering, interface, GUI, service, level, cost, price

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No
X	US 2007/0172040 (Cesarini et al.) 26 July 2007 (26-07-2007) abstract; paragraphs 11-43; figures 1-6	1, 7-11 and 16-28
Y		2-6 and 12-15
Y	3GPP TS 23.203 V8.0.0; 3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Policy and charging control architecture; December 2007 see entire document	2-6 and 12-15
A	US 2003/0033398 (Carlson et al.) 13 February 2003 (13-02-2003) see entire document	1-28

[ ] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
28 November 2008 (28-11-2008)	10 December 2008 (10-12-2008)

Name and mailing address of the ISA/CA	Authorized officer
Canadian Intellectual Property Office Place du Portage I, C114 - 1st Floor, Box PCT 50 Victoria Street Gatineau, Quebec K1A 0C9 Facsimile No.: 001-819-953-2476	C. Wong 819- 934-2666

Form PCT/ISA/210 (second sheet) (July 2008)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CA2008/000527

Patent Document Cited in Search Report	Publication Date	Patent Family Member(s)	Publication Date
US 2007172040A1	26-07-2007	AU 2007200280A1	09-08-2007
		EP 1814298A1	01-08-2007
US 2003033398A1	13-02-2003	AU 2002331027A1	24-02-2003
		WO 03014911A2	20-02-2003
		WO 03014911A3	01-04-2004

Form PCT/ISA/210 (patent family annex) (July 2008)

Electronic Acknowledgement Receipt

EFS ID:	12368090
Application Number:	12815165
International Application Number:	
Confirmation Number:	1819
Title of Invention:	Clearinghouse System and Method for Determining Availability of Carrier-Based Services and Enhancing the Quality, Operation and Accessibility of Carrier-Based Networks
First Named Inventor/Applicant Name:	Theodore S. Rappaport
Customer Number:	63409
Filer:	William E. Winters
Filer Authorized By:	
Attorney Docket Number:	110-009US
Receipt Date:	22-MAR-2012
Filing Date:	14-JUN-2010
Time Stamp:	13:53:05
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	110-009US_IDS.pdf	612949 5d65a32bb990d40b79d9da50f8fe936f9c0e5b6	no	5

Warnings:	
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2	Foreign Reference	WO9524093A1.pdf	1403680 a663dd8f2fdcf9e0a2f4f614f7739f4ab3J7218f	no	38
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		Total Files Size (in bytes):	7890011		

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<u>National Stage of an International Application under 35 U.S.C. 371</u>
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.

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

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

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	12815165
Filing Date	2010-06-14
First Named Inventor	Theodore S. Rappaport
Art Unit	2617
Examiner Name	
Attorney Docket Number	110-009US

U.S.PATENTS

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

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U.S.PATENT APPLICATION PUBLICATIONS

Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20100299274	A1	2010-11-25	Rappaport	
	2	20100250268	A1	2010-09-30	Rappaport	

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FOREIGN PATENT DOCUMENTS

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

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	12815165
	Filing Date	2010-06-14
	First Named Inventor	Theodore S. Rappaport
	Art Unit	2617
	Examiner Name	
	Attorney Docket Number	110-009US

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1		☐
	2		☐

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

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	12815165
	Filing Date	2010-06-14
	First Named Inventor	Theodore S. Rappaport
	Art Unit	2617
	Examiner Name	
	Attorney Docket Number	110-009US

CERTIFICATION STATEMENT

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

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

OR

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

☐ See attached certification statement.

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

☒ A certification statement is not submitted herewith.

SIGNATURE

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

Signature	/William E. Winters/	Date (YYYY-MM-DD)	2012-01-09
Name/Print	William E. Winters	Registration Number	42,232

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

Electronic Acknowledgement Receipt

EFS ID:	11789001
Application Number:	12815165
International Application Number:	
Confirmation Number:	1819
Title of Invention:	Clearinghouse System and Method for Determining Availability of Carrier-Based Services and Enhancing the Quality, Operation and Accessibility of Carrier-Based Networks
First Named Inventor/Applicant Name:	Theodore S. Rappaport
Customer Number:	63409
Filer:	William E. Winters
Filer Authorized By:	
Attorney Docket Number:	110-009US
Receipt Date:	09-JAN-2012
Filing Date:	14-JUN-2010
Time Stamp:	14:38:09
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	110-009US_IDS.pdf	62668 501182318e9ec09d960907d31c61ab03dac76d06	no	3

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This is not an USPTO supplied IDS fillable form	
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National Stage of an International Application under 35 U.S.C. 371

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

New International Application Filed with the USPTO as a Receiving Office

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

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

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	12815165
Filing Date	2010-06-14
First Named Inventor	Theodore S. Rappaport
Art Unit	2165
Examiner Name	Abel Jalil Neveen
Attorney Docket Number	110-009US

U.S.PATENTS

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	6757543		2004-06-29	Moran et al.	
	2	6542588		2003-04-03	Mashinsky	
	3	6405028		2002-06-11	DePaola et al.	
	4	6061558		2009-05-09	Kennedy et al.	
	5	6628934		2003-09-30	Rosenberg et al.	
	6	7246045		2007-07-17	Rappaport et al.	
	7	7286971		2007-10-23	Rappaport et al.	
	8	7096160		2006-08-22	Skidmore et al.	

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(**Not for submission under 37 CFR 1.99)**

Application Number	12815165
Filing Date	2010-06-14
First Named Inventor	Theodore S. Rappaport
Art Unit	2165
Examiner Name	Abel Jalil Neveen
Attorney Docket Number	110-009US

U.S.PATENT APPLICATION PUBLICATIONS

Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20050216421		2005-09-29	Barry et al.	
	2	20040230563		2004-11-18	Mahon et al.	

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Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] ¡	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1							☐

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NON-PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1	CHRISTOPHE LINDEMANN ET AL., "Adaptive Performance Management for Universal Mobile Telecommunications System Networks," Computer Networkds 38 (2002) 477-496	☐

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EXAMINER SIGNATURE

Examiner Signature		Date Considered	

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

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	12815165
	Filing Date	2010-06-14
	First Named Inventor	Theodore S. Rappaport
	Art Unit	2165
	Examiner Name	Abel Jalil Neveen
	Attorney Docket Number	110-009US

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

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	12815165
Filing Date	2010-06-14
First Named Inventor	Theodore S. Rappaport
Art Unit	2165
Examiner Name	Abel Jalil Neveen
Attorney Docket Number	110-009US

CERTIFICATION STATEMENT

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

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

OR

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

☐ See attached certification statement.

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

☒ A certification statement is not submitted herewith.

SIGNATURE

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

Signature	/William E. Winters/	Date (YYYY-MM-DD)	2011-01-27
Name/Print	William E. Winters	Registration Number	42,232

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

Electronic Acknowledgement Receipt

EFS ID:	9319065
Application Number:	12815165
International Application Number:	
Confirmation Number:	1819
Title of Invention:	Clearinghouse System and Method for Determining Availability of Carrier-Based Services and Enhancing the Quality, Operation and Accessibility of Carrier-Based Networks
First Named Inventor/Applicant Name:	Theodore S. Rappaport
Customer Number:	63409
Filer:	William E. Winters
Filer Authorized By:	
Attorney Docket Number:	110-009US
Receipt Date:	27-JAN-2011
Filing Date:	14-JUN-2010
Time Stamp:	13:33:12
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Filed (SB/08)	110-009US_IDS.pdf	30812 d1a5bb773e2ca12da91a5bcc7ab17aad78e c71c2	no	4

Warnings:	
Information:	

This is not an USPTO supplied IDS fillable form					
2	NPL Documents	NPL.pdf	430537 d065c82e0a13415f147ae1ffe1b7e38b6bcc6e5a	no	20
Warnings:					
Information:					
		Total Files Size (in bytes):	461349		

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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.

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
12/815,165	06/14/2010	Theodore S. Rappaport	110-009US

CONFIRMATION NO. 1819

63409
PATENT LAW PROFESSIONALS
P.O. BOX 612407
SAN JOSE, CA 95161

PUBLICATION NOTICE

OC000000043782473

Title: Clearinghouse System and Method for Determining Availability of Carrier-Based Services and Enhancing the Quality, Operation and Accessibility of Carrier-Based Networks

Publication No.US-2010-0250269-A1
Publication Date:09/30/2010

NOTICE OF PUBLICATION OF APPLICATION

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

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

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

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

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

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

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
12/815,165	06/14/2010	Theodore S. Rappaport	110-009US

CONFIRMATION NO. 1819

63409
PATENT LAW PROFESSIONALS
P.O. BOX 612407
SAN JOSE, CA 95161

NOTICE

OC000000042211395

Date Mailed: 06/22/2010

NOTICE OF INFORMAL APPLICATION

This application is considered to be informal since it does not comply with the regulations for the reason(s) indicated below. The period within to correct the informalities noted below and avoid abandonment is set in the accompanying Office action.

Items Required To Avoid Processing Delays:

The item(s) indicated below are also required and should be submitted with any reply to this notice to avoid further processing delays.

A new oath or declaration, identifying this application number, or, if appropriate, an application data sheet (37 CFR 1.76), is required. The oath or declaration does not comply with 37 CFR 1.63 in that it:

- does not identify the residence (e.g., city and either state or foreign country) of each inventor.
- does not identify the complete mailing or post office address of each inventor.

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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
12/815,165	06/14/2010	2617	2514	110-009US	82	7

CONFIRMATION NO. 1819

63409
PATENT LAW PROFESSIONALS
P.O. BOX 612407
SAN JOSE, CA 95161

FILING RECEIPT

Date Mailed: 06/22/2010

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

Applicant(s)

Theodore S. Rappaport, Residence Not Provided;

Power of Attorney: The patent practitioners associated with Customer Number 63409

Domestic Priority data as claimed by applicant

This application is a CON of 12/208,007 09/10/2008
which claims benefit of 60/971,175 09/10/2007
and claims benefit of 60/977,582 10/04/2007
and claims benefit of 61/028,261 02/13/2008

Foreign Applications

If Required, Foreign Filing License Granted: 06/21/2010

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 12/815,165**

Projected Publication Date: 09/30/2010

Non-Publication Request: No

Early Publication Request: No
** **SMALL ENTITY** **

Title

Clearinghouse System and Method for Determining Availability of Carrier-Based Services and Enhancing the Quality, Operation and Accessibility of Carrier-Based Networks

Preliminary Class

455

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

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

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

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

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

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4158).

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Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

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

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NOT GRANTED

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
12/815,165	06/14/2010	Theodore S. Rappaport	110-009US

CONFIRMATION NO. 1819

63409
PATENT LAW PROFESSIONALS
P.O. BOX 612407
SAN JOSE, CA 95161

POA ACCEPTANCE LETTER

OC000000042211438

Date Mailed: 06/22/2010

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 06/14/2010.

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.

/ebekele/

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

PTO/SB/05 (08-08)
Approved for use through 06/30/2010. OMB 0651-0032
U.S. Patent and Trademark Office. U.S. DEPARTMENT OF COMMERCE
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UTILITY PATENT APPLICATION TRANSMITTAL

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Attorney Docket No.	110-009US
First Inventor	Theodore S. Rappaport
Title	Clearinghouse System and Method...
Express Mail Label No.	

APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents.

1. ☐ **Fee Transmittal Form** (e.g., PTO/SB/17)
2. ☑ **Applicant claims small entity status.** See 37 CFR 1.27.
3. ☑ **Specification** [*Total Pages* 68]
   Both the claims and abstract must start on a new page
   (For information on the preferred arrangement, see MPEP 608.01(a))
4. ☑ **Drawing(s)** (*35 U.S.C. 113*) [*Total Sheets* ____]
5. **Oath or Declaration** [*Total Sheets* 15]
   a. ☑ Newly executed (original or copy)
   b. ☐ A copy from a prior application (37 CFR 1.63(d))
   (for continuation/divisional with Box 18 completed)
   i. ☐ DELETION OF INVENTOR(S)
   Signed statement attached deleting inventor(s) name in the prior application, see 37 CFR 1.63(d)(2) and 1.33(b).
6. ☐ **Application Data Sheet.** See 37 CFR 1.76
7. ☐ **CD-ROM or CD-R** in duplicate, large table or Computer Program *(Appendix)*
   ☐ Landscape Table on CD
8. **Nucleotide and/or Amino Acid Sequence Submission**
   (if applicable, items a. – c. are required)
   a. ☐ Computer Readable Form (CRF)
   b. Specification Sequence Listing on:
      i. ☐ CD-ROM or CD-R (2 copies); or
      ii. ☐ Paper
   c. ☐ Statements verifying identity of above copies

ADDRESS TO: **Commissioner for Patents**
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ACCOMPANYING APPLICATION PARTS

9. ☐ **Assignment Papers** (cover sheet & document(s))
   Name of Assignee ____
10. ☐ **37 CFR 3.73(b) Statement** *(when there is an assignee)* ☑ **Power of Attorney**
11. ☐ **English Translation Document** *(if applicable)*
12. ☑ **Information Disclosure Statement** (PTO/SB/08 or PTO-1449)
    ☐ Copies of citations attached
13. ☐ **Preliminary Amendment**
14. ☐ **Return Receipt Postcard** (MPEP 503)
    (Should be specifically itemized)
15. ☐ **Certified Copy of Priority Document(s)**
    (if foreign priority is claimed)
16. ☐ **Nonpublication Request** under 35 U.S.C. 122(b)(2)(B)(i). Applicant must attach form PTO/SB/35 or equivalent.
17. ☐ Other: ____

18. If a CONTINUING APPLICATION, *check appropriate box, and supply the requisite information below and in the first sentence of the specification following the title, or in an Application Data Sheet under 37 CFR 1.76:*

☑ Continuation ☐ Divisional ☐ Continuation-in-part (CIP) of prior application No.: 12/208,007

Prior application information: *Examiner* Abel Jalil. Neveen *Art Unit:* 2165

19. CORRESPONDENCE ADDRESS

☑ The address associated with Customer Number: 63409 ***OR*** ☐ Correspondence address below

Name					
Address					
City		State		Zip Code	
Country		Telephone		Email	

Signature	/William E. Winters/		Date	June 14, 2010	
Name (Print/Type)	William E. Winters			Registration No. (Attorney/Agent)	42,232

This collection of information is required by 37 CFR 1.53(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.

UNITED STATES PATENT APPLICATION

FOR

Clearinghouse System and Method for Determining Availability of Carrier-Based Services and Enhancing the Quality, Operation and Accessibility of Carrier-Based Networks

Inventor: Theodore S. Rappaport

PATENT LAW PROFESSIONALS, P.C.
P.O. Box 612407
San Jose, CA 95161
(408) 453-2144

Clearinghouse System and Method for Determining Availability of Carrier-Based Services and Enhancing the Quality, Operation and Accessibility of Carrier-Based Networks

Cross-Reference to Related Applications

This application is a continuation of Application No. 12/208,007, filed on September 10, 2008, which claims the benefit of provisional Application No. 60/971,175, filed on September 10, 2007, provisional Application No. 60/977,582, filed on October 4, 2007, and provisional Application No. 61/028,261, filed on February 13, 2008.

Background

Many companies own or lease towers, and have expertise in the positioning (sighting), leasing, designing and/or building of towers and other equipment that are used in providing or installing telecommunications networks. American Tower, Crown Castle, InnerWireless and America Connect, are examples of companies that own, lease, use, or construct towers or distributed antenna systems in and around towers or buildings to enable wireless communications services to be distributed by various users, including without limitation either their own company or their customers, such as AT&T Wireless, Vodaphone, Sprint, or public or private radio system operators. These companies have proprietary techniques, and their own staff which is generally quite large and includes lawyers, engineers, sales people, and accountants, to conduct some or all of the following businesses: charge rent for towers and or antenna systems, charge for tower/antenna maintenance or tower location services, provide engineering or physical plant maintenance for towers, or antennas, and other associated equipment, install equipment, provide wireless service for telecom carriers, argue zoning ordinances and request variances for tower or equipment installations, negotiate leases of rooftops or tower sites, and other related products and services pertaining to towers, antennas, and wireless infrastructure in general, in order to maintain and grow a business.

The aforementioned companies often use maps and population projections, along with topographical or geographical features, and radio frequency (RF) software simulators, in order to determine where to place towers or antennas for effective coverage of a service region, how high the tower should be, where a distributed antenna system

(DAS) should be placed, what types of antennas are best suited for a particular need, and other technical, esthetic, physical, legal, or economic details regarding how towers and/or antennas will effectively support radio communications through its coverage regions and through its building database and tower database. These firms also generally use lawyers to review and assess zoning ordinances involved with the erection of towers or equipment, and to negotiate site leases or purchases.

US patents 6,317,599; 6,442,507; 6,493,679; 6,499,006; 6,625,454; 6,721,769; 6,850,946; 6,876,951; 6,971,063; 6,973,622; 7,019,753; 7,035,642; 7,055,107; 7,085,697; 7,096,160; 7,096,173; 7,155,228; 7,164,883; 7,171,208; 7,243,054; and 7,246,045, as well as patents and publications of such organizations as American Tower, Spectrasite (which merged with American Tower, Crown Castle International, Galaxy Engineering, InCode (bought by Verasign), and InnerWireless deal with technical issues that must be engineered for specific applications in the telecommunications business. These solutions are not aimed at or directly useable by ordinary end-user customers or ordinary landowners, homeowners, farmers, church parishioners, public service organizations, local governments, or building tenants who are generally not at all familiar with the technical details of telecommunications engineering, radio frequency planning, zoning restrictions, lease negotiations for tower sites, neighborhood covenants, or network management and operations. Further, the prior art does not at all contemplate the future, open-spectrum world of wireless, where carriers will likely be required by law to share their end users (e.g. subscribers) with other carriers or services, in a way that is similar to the Carterphone ruling and MCI rulings in the US that required AT&T to provide open access of equipment to its telephone (landline) infrastructure, and which is now adopted globally in the landline world.

Other companies, such as power utility and television cable companies, also have a need for accessing, designing, acquiring, or leasing towers, and using towers, light poles, rooftops, and other structures such as parts cabinets, remote power supplies, storage facilities for vehicles, and the like, for supporting the provisioning of their services. These carriers also have a need of being able to access the location of towers and other equipment, such as utility boxes and cabling, for maintenance purposes, and need to be able to access the physical locations of their equipment and cabling runs, for

the purpose of installing or modifying, or upgrading equipment associated with its distribution of services. These companies pay staff and consultants large amounts of money to acquire real estate or to determine possible solutions to these problems.

In the specific case of tower companies, they typically lease or sell access to their towers to carriers, often with complicated lease arrangements, and at times may also sell their towers in undesirable or less useful locations. Typically, these leases and sales require complicated contracts, deal terms, and protracted negotiations through brokers and technical consultancies. Sometimes carriers own their own tower business subsidiary, again requiring large staff and costly consultants. The public is generally not aware of these activities and has no way to participate in this business or activity, which is a disadvantage for both the carriers and the public at large.

It is well understood that Ebay has emerged as a leader for citizens to auction goods directly over the internet, and the Ebay website allows people to auction off items through the internet without having to deal with a large staff or complicated legal agreements. Meanwhile, many Web 2.0 companies, such as MySpace, Itaggit, eHarmony, and Facebook allow people with similar interests or specific needs to meet on line, and allow the exchange of information between people, often resulting in bartering or sharing of knowledge or information. Google has become one of the most trusted sources to find information on the web, because of its powerful searching capability to find postings on many topics. The public is able to access items quickly, efficiently, and at no cost to them. All of these previously mentioned websites allow people to easily and directly interact, without a lot of overhead or hassle.

Unfortunately, however, customers of internet or telephone service are generally viewed by the carrier as passive subscribers, paying a monthly bill to the telecom provider but not actively participating in the engineering or business improvement of the telecom provider's service. Today, telecommunication customers generally have no ability to readily participate in the improvement of services or the quality of their provider, or to actively play a useful role in the distribution of the telecom company's capabilities, except through the action of calling customer service to complain about their personal service experience. Today's telecom end-user customer is virtually powerless to readily participate in the improvement of delivery of service of a commercial

telecommunication company's product, and is thus shut out from benefiting financially from any such improvement that that individual customer might otherwise be able to offer. While there may be special cases, where "someone knows someone at the telephone company who has a problem", by and large, telecom companies have no way to readily scale or access the interests of individual customers who have a willingness and interest to help improve their own telecom experience, while also helping the carrier.

In short, today, there does not exist a system or method or apparatus that allows for the general public to easily alert or notify their telecommunications carrier, or any carrier, that they are interested and willing to offer their premises to allow the carrier to improve service. Further, there does not presently exist a public clearinghouse where carriers can explore readily (and without public knowledge, if so desired) available tower sites or available real estate or land available to their business needs. Not only does the public lose the ability to help the carrier, but the carriers also lose out because they are not aware of those customers who would be willing to help them with infrastructure or over-the-air monitoring needs. Instead, carriers pay high priced consultants in a close marketplace for infrastructure acquisition, thereby missing out on a virtually unlimited untapped number of viable sites for use by their businesses.

Currently, companies such as Tropos Netwtorks, and the MotoMesh and Canopy products (by Motorola), and many other companies are offering wireless telecom gear that can offer communications network connectivity, where network traffic is sent wirelessly through one or several nodes of a network over a geographic area such as a city. An example of this was explained at the 2006 Texas Wireless Summit conference by a Tropos Networks executive, Oct. 2006, in Austin Texas. Many cellular, WIMAX, and Wireless Internet Service Providers (WISPs) today are deploying cellular or hub and spoke networks using line of sight radios at 900MHz, 2.4 GHz, and 5 GHz in various unlicensed (and sometimes licensed) bands for backhaul, and cable television over wireless and T1/T3 wireless replacements are sure to emerge as a vital marketplace. WiMax and 4th Generation cellular, with increasing bandwidths, will require more tower/site locations per square km, in line with the Power vs. Bandwidth tradeoff, that requires that more towers per square kilometer be used when the operating bandwidth increases for a given transmit power. See Wireless Communications: Principles and

Practice, c. 2002, Prentice Hall, written by the inventor. Many cellular carriers, public/private network carriers, municipalities, WISPs, etc. today struggle with finding suitable towers or rooftop locations, or struggle gaining access to water tower locations, and are often hindered by zoning ordinances, lack of public understanding, or knowledge of why and how they could easily place their equipment to serve customers. Even though many rural residents would love to have wireless service, it is difficult for many WISPs to deploy broadband networks with limited capital, and the difficulty with dealing with town ordinances, neighborhood covenants, and other restrictions, regulations, or bureaucracy involved for gaining permission to use or erect towers and other infrastructure deployments.

As an example, in today's implementation of Mesh or WiFi Networks, the deployments of such systems usually rely on a particular municipality (muni-wifi customer) to have its own tower infrastructure (for example, city lamp poles, or water towers or police towers near city hall, etc.) in order to build the system. Keeping track of this infrastructure currently is difficult, often requiring consultants or different software, operating in a stove-pipe fashion, across different municipalities, where there is little or no public way to view or add to the knowledge base of the infrastructure.

An important emerging trend is that as carrier frequencies go higher, and as digital signal processing and modulation techniques such as MIMO and OFDM improve, the physical size of antennas will decrease, or at least become distributed in space, meaning that the future tower structures and physical size of antennas needed for telecom's wireless communications links will shrink. Cooperative networking, mesh networking, and peer-to-peer communications will also likely evolve, making the base station infrastructure less different then the end user equipment, and less bulky than today's infrastructure. Thus, towers of the future will not need to be today's large, bulky and ugly cellular or line-of-sight microwave variety, but will be much more lightweight, less obtrusive (e.g. skinnier), and more convenient, less expensive, and readily available for use on rooftops, billboard, church towers, or home TV or ham towers, and requiring many more tower locations per square kilometer than today.

Wireless equipment is being installed throughout the world to bring telephone and internet services in locations where broadband previously did not exist. This is trend is

certain to remain in other countries throughout the world, and most particularly in countries such as China, India, and other emerging nations that have a strong need to be connected on the world's telecom grid, e.g. the world wide web or telephone network. Because of the necessity of towers or antennas, and associated network equipment, to be situated at particularly good radio locations that are specific to each telecom company and their customer's specific locations, and given each carrier's need is specific to their own network's specific design criteria and history of evolution, and because of the radio propagation aspects and geographical impact associated with wireless transmissions, it has been heretofore impossible for telecom companies to engage in direct communication with a large customer base, in order to energize and engage its customer base to help its product and service delivery.

Today, the inventor envisions very early signs of what will eventually be the "democratization" of the telecommunications infrastructure industry, where all users may participate in helping carriers locate infrastructure, and where open-access spectrum will require that all subscribers of any particular carrier be allowed too use the spectrum and services of competing carriers. Today, end user customers are willing to subscribe to satellite TV services, such as Echostar or Direct TV, and as part of that service, home owners allow the satellite carrier to bolt antennas and cables onto their homes or on masts in their yards. These satellite services require that a technician come directly to the end user's home, and in a matter of just a few hours, the technician installs a satellite dish and receiver on the roof, yard, or telephone pole or tree of the end- user's property, often having to drill holes through the exterior of the home, or through a wiring cabinet to bring the cable into the end users home, all the while hammering/bolting hardware to the exterior or roof of the home. Customers are willing to allow equipment to be installed at their premises, as shown by the satellite TV industry, and its very rapid growth in just a few years. While satellite dish antennas serve the individual homeowner, the satellite system is a receive-only system and the equipment installed at the homeowner does not allow the satellite provider to improve the delivery of its content to neighboring houses or neighborhoods. Furthermore, there does not exist a public clearinghouse that lets others know which homes have satellite dish equipment in their yards, and which do not. But this example is an early indicator, illustrating how citizens are now willing to have alien

telecom equipment installed on their own premises, and to allow a technician to climb around on the roof, yard, and drill holes in the house, if it provides some benefit to them (e.g. gives them the ability to watch satellite TV). Note that satellite antennas being installed today by Echostar and DirecTV are relatively small and unobtrusive, which is a harbinger of future wireless technologies.

Today, customers do not have a methodical, computerized way of receiving perks or bartered value in addition to improved service from carriers, in exchange for giving carriers the right to install and operate the carrier's special equipment on its own property. However, if the carrier was able to communicate and take inventory of each end user's capabilities, the carrier could derive great value in its business and technical operations beyond just servicing the end user, in exchange for the end user's willingness to allow the carrier access to its dwelling and property for the carrier's overall benefit. End users, if allowed to provide access to carriers, could enjoy the goodwill of the surrounding neighbors, as they would be acting as a provider and enabler of services that would benefit households around them.

Today, thousands of small, medium, and large telecom companies, such as wireless cable companies, wireless Internet service providers (WISPs), and mainstream wireless carriers throughout the world such as those companies mentioned above are deploying wireless broadband networks, using an inventory of towers and or building structures where they have access, to deliver last-mile services, but with no ability to enlist or solicit the interests of ordinary citizens or even hobbyists who, if they were aware of the opportunity, might be willing to offer assistance to carriers. Today, the telecommunications industry is unable to solicit the help directly from its customer base, or from the citizenry at large, because of the previously mentioned technical difficulties and trust issues involved with tower and equipment site selection, and the sheer lack of ability to communicate the needs and wants and capabilities of the service provider, and the needs and wants and capabilities of the end customer, in an easy, clear, and orderly manner. There has not been, to date, a trusted source that carriers can rely upon to broker communications directly between end users and the carrier, itself. That is, there has not been, to date, such a "convener" for the telecommunications industry that would allow carriers to tap the interest of its end user customers to aid it in the rapid expansion, or

improvement of quality and capabilities of telecommunication services, particular broadband, multimedia, WiFi, WiMax, cellular, satellite, public/private network, RFID or sensor based mass- communication networks, and at lower design, operating, and ongoing cost levels. Furthermore, as shown herein, there are enormous benefits for the provisioning of network services and content, on a localized or specific end-user basis, through the establishment of a trusted clearinghouse.

Summary of Invention

An exemplary embodiment of this invention is to provide a system, method, process, and apparatus that will dramatically enhance the knowledge of available wireless network infrastructure locations, which will reduce the costs of antenna, equipment, or tower site acquisition, dramatically improve the ability for carriers to deploy wireless networks from a cost, efficiency, and quality standpoint, and provide previously unavailable, non-obvious, and unknown methods, systems, processes, and techniques for carrier networks to be augmented or built from scratch more efficiently through the aid and participation of end users. In addition to the assistance offered by citizens through this invention, the invention further contemplates the public at large being able to contribute to and expand the knowledge base that may be exploited by both carriers and end users, since the invention contemplates that ordinances, laws, zoning regulations, technical details, and graphical data such as plat maps, topographical contours of land, and radio coverage zones, as well as educational information and public data, be made available through the disclosed clearinghouse. From this expanded knowledge, the invention exploits the clearinghouse to provide the ability to monitor and control large numbers of wireless devices across different networks and frequency bands for enhanced operation, based on location specific information. The invention also allows for location-specific content, such as advertising, to be provided to particular groups of telecommunication users in specific areas where infrastructure exists.

The present invention allows the customers of a carrier to benefit from better service, lower price for service, as well as receive benefits from the carrier for being a "helping" or "value added" customer, etc. while the carrier is able to use the "helping" customer to improve its service or better utilize its resources, better locate its

infrastructure, and improve its capital expenditures. In the specific case of a telecom carrier, more effective, reliable and cost effective provisioning and placement of network gear, antennas, bandwidth allocation over its geographic region, more effective equipment or tower locations, etc. results from awareness and access to end users who are in a position to help the carrier. Furthermore, with this clearinghouse and included database comes the ability to monitor, in real-time or in non-real time, through automatic or manual processes, the performance or quality experienced by various end users and to provide rank ordering of various carrier services for end users in various locations throughout the earth, so that either/both the clearinghouse or an end user of wireless telecommunications services (or even a third party) may enjoy and archive/remember/know the performance or quality of service, such as performance metrics of wireless service, availabity of service, a ranked list of preferred carriers, etc., as a function of where the wireless end user wishes or plans to use wireless service. The clearinghouse and database further allows localized content to be delivered to particular end users, or users in particular local areas, in a way not contemplated before.

It is the complexity of tower height, tower engineering and installation, antenna design and radio propagation fundamentals, and town ordinances and restrictions in neighborhoods, combined with the often secretive nature of a network operator's approach to coverage and quality issues, that has led to the current state of affairs, where specific companies and high priced consultancies serve as tower owners or brokers, and where specific, specialized companies provide for the telecom carrier detailed technical or electrical services, such as antenna engineering or propagation design, or access to building structures or towers, at higher costs than what telecom companies would likely pay if they otherwise could deal directly with their end customers in a non-confusing and trusted way. Not only is wireless infrastructure a problem for carriers today, but there are instances where a carrier would like to install power conditioning, wired infrastructure, vehicles, parking places, or backup equipment or gear in a particular location, and if the carrier could locate such devices or infrastructure on a particular customer's premises, it would be of great value to the carrier, particularly if the end user was trustworthy, had expressed an interest and willingness to help the carrier, and gained some consideration (e.g. free internet or payments to help with her power bill). The invention solves the

problem stated in this paragraph, by democratizing the site acquisition process, and furthermore builds on the inherent knowledge created through the clearinghouse to create powerful quality/performance monitoring as well as localized content provisioning.

Mobiledea and its extension, CellReception.com, were started by Allen Tasi. These are firms or websites that use the FCC database of tower locations, and plot the approximate coverage for customers to see using Google Maps. These websites also allow customers to share comments on cellphone reception. Consumer-based websites and companies such as Mobiledia.com and CellReception.com provide revenues for the website owner by allowing for advertising by companies such as Radio Shack and various cellphone vendors, and the sites provide for public comments regarding cell reception, individual cellphones, and other cellular and wireless issues, but they do not serve in a clearinghouse capacity as contemplated by this invention. Antennasearch.com is a website provided by General Data Resources that provides a search of various public domain databases regarding tower locations and tower filings, such as the database provided by the FCC website that lists all tower locations and pending tower applications. Antennasearch.com generates an on-line report that shows a map of tower locations for a specific street address or zipcode. The on-line report may be completed by someone browsing the worldwide web. Google has recently begun to show the location of WiFi hotspots (infrastructure locations) on its Google Maps or Google Earth applications, in order to provide a position location capability for end–users. However, Google, AntennaSearch, and everyone else for that matter, has not offered a clearinghouse that allows any citizen or any carrier to exploit a database of wants and needs in order to create a marketplace for determining available infrastructure sites, and furthermore has not exploited such a clearinghouse in order to provision, monitor, or control wireless networks for the benefit of end users or carriers, nor has anyone further exploited such a database to offer localized advertising or site-specific content.

Clearly the aforementioned companies, services, and websites do not allow customers or the public to offer their own assets for the deployment of telecom services, nor do they shed light on antenna regulations, zoning ordinances, RF planning (suitable for specifying new or inventoried tower sites), or neighborhood restrictions. These types of websites furthermore offer no forum to exchange or add public domain documents

pertaining to town ordinances or covenants for neighborhoods in specific zip codes, which would be of great value to end users, the public, and carriers wishing to serve that particular area. Zip codes are a popular sorting technique for parcel delivery services that are scheduling using the world-wide web for companies such as FedEx, DHL, and UPS. These websites also do not allow a carrier to discretely determine which of its customers, or potential customers, might have some land, tower site, rooftop, or building that he would be willing to allow the carrier to use for buildout of its network. Thus, there is no attempt currently to create a clearinghouse of telecom infrastructure assets, which may further be exploited to offer the capabilities disclosed herein.

Use of mapping technologies and applications such as Google Maps or a GIS package, such as the USGS, or commercial programs such as those made by EDX Engineering, Wireless Valley Communications (now owned by Motorola), Comsearch, Celplan, etc., are well known in the art. In schools across the world, students are learning how to interact with Google Maps and other GIS applications, even when they have no or little regard for wireless theory, telecom regulations, the needs of the telecom industry, or RF propagation. For example, at the Massachusetts Institute of Technology (MIT) in Spring 2007, a computer science course on pervasive human-centric and mobile computing (MIT 6.883 taught by Larry Rudolph) had students using Google Maps to create circular contours of hypothetical tower locations, without regard for tower zoning ordinances or RF coverage or equipment installation guidelines, and with no contemplation of the invention disclosed herein. The user's manuals for these mapping technologies and applications , and the course notes and links to information which are posted on the worldwide web for the Spring 2007 Class of 6.883 at MIT are hereby incorporated by reference. It should be evident that none of these contemplate or make obvious the invention disclosed herein.

See:

http://people.csail.mit.edu/rudolph/Teaching/home883.html, and

http://people.csail.mit.edu/rudolph/Teaching/ps1.pdf

This patent describes a computerized "convener" apparatus, system, and method where individual citizens or businesses of a community may offer the use of their homes, land, building structures, outbuildings, apartments, billboards, churches, water towers,

towers, trees, light poles, barns, and any other possible location on or about their premises to eager telecom service providers. Up until now, telecommunications companies were not able to alert a wide customer base that it needs a specific tower located at a particular latitude and longitude or street address, for example, that it needs a tower that complies with neighborhood covenants, town ordinances, and yet requires a tower that permits RF propagation with a signal strength (say of -70 dBm), and a particular front to back ratio (say of 20 dB) at a particular address or geographic region in order to cover a particular neighborhood that is just out of reach of its existing towers. Until this invention, a telecommunications company could not acquire the information from its large customer base as to who would be interested in helping them with a specific tower location. It simply has not been done in the history of the telecommunications industry, and this invention solves this unmet need to allow both customers and telecom providers to benefit. Furthermore, this invention provides the key to offering services to end users and to carriers, as well as third party intermediaries as the telecommunications world evolves to an open-standard, where end users may share the networks of many competing providers.

Today, carriers are often secretive about where they have service problems because it may alienate customers in that area, and could allow competitors to seize opportunities where the carrier is known to be having poor quality or coverage problems. This invention solves this problem, among others.

Furthermore, this patent describes a new kind of apparatus, system, and method that can exploit the inventorying and clearinghouse information provided by end users, carriers, and the public, in a form such that it may be franchised or distributed in a private label or Original Equipment Manufacturing (OEM) manner, and where the systems and methods described herein may be offered as a trusted service by carriers, non-profits, for-profit companies, governments, intermediaries and the like, either across specific customer types, or within specific geographic localities.

This invention applies to any carrier-based system, but is preferably used for a telecommunication network, no matter what the distance is between users of the network, whether it is wired or wireless, or what the transmitter-receiver separation distance is of wireless components, or what the technology, modulation, access method, etc. may be.

That is, this patent is not limited to wireless, optical, cellular, WiMax, Mesh, WiFi, RFID, LMDS, cable, or satellite, and not limited to fixed, mobile, or portable operation by users, as it is intended to be used in its broadest form, as would be understood by one skilled in the art in deploying, designing, operating, or using such a network that has end users, and where infrastructure is needed and must be located, at physical locations, for carrying out communications, either wired or wireless communications, and also as well anticipating the provisioning of an open access environment where federal or local regulations require end users to have access or the ability to specify or select (either manually, pre-selected, or automatically on-the-fly as the wireless device is used by the end-user) more than one single carrier for broadband access with a particular end user and/or her device. Thus, this invention serves the needs of indoor/enterprise networks or femtocells within public or private buildings, as well as microcell or macrocell cellular network usage and coverage ranges, emerging WiMax systems, satellite systems, future cable TV/wireless networks, and city/county, country, or worldwide networks, and public safety networks, whether public or private.

Furthermore, this invention may be extended beyond telecommunications, and may be applied to any carrier-based service, where subscribers pay for an on-going service over a period of several days, months, or years, and where participation of the end users, and direct interaction between the carrier and the users could improve the efficiency, quality, business operations, or technical operations of the carrier over its serving areas.

The invention allows a 3rd party entity (A person, or a corporation, say a website company, or tower holding company, or an intermediary, for example) to offer inventory and polling services to carriers and the carrier's customers (end users), as well as to the public, through the use of the knowledge-base that is created from the clearinghouse of interested citizens willing to assist telecom companies.

The invention further allows a person or a carrier or an intermediary to inform, educate, and solicit inputs from its customers regarding its customer's interest or ability to help the carrier with expansion, alteration, or improvement of the carrier's network, or on multi-carrier networks, through the use of the knowledge-base that is created from the clearinghouse of interested citizens willing to assist telecom companies.

The invention provides a system and method and process that allows a person or a company, such as a publisher, a Web 2.0 company, a carrier, or a trusted web portal, to offer an e-magazine, a printed magazine, a newsletter, a website, and/or an internet blog, where each may include an inventorying service between one or more carriers and its customer base of end users, such that end users are able to provide the carrier an inventory of their assets that may be used to help the carrier(s).

The invention provides a system and method and process that allows a person or company, such as a publisher, a Web 2.0 company, a carrier, a tower holding company, or a trusted web portal, to offer an e-magazine, a printed magazine, a newsletter, a website, or an internet blog, where each may include a bartering system and method between one or more carriers and its customer base, for the bartering of installation or redeployment of equipment at the end user's dwelling in exchange for compensation of some type from the carrier(s) or an intermediary.

The invention provides a system and method and process that allows a person or a company, such as a publisher, a Web 2.0 company, a carrier, or a trusted web portal, to offer an e-magazine, a printed magazine, a newsletter, a website or an internet blog, where each may include a registration system and method between a carrier and its customer base, whereby end user customers may register to express interest and ability to support equipment at their dwelling with one or more carriers, and where each may include a system and method that allows a carrier to execute an agreement regarding the installation or modification of telecommunications equipment at the dwelling owned or or used or controlled by end users in its customer base, with pre-negotiated or selectable terms for remuneration, or with terms handled over the internet or through computer access, thereby eliminating the need of costly lawyers and protracted, cumbersome negotiations for site acquisition which is the state of affairs today.

The invention provides a system and method and process that permits carriers or an independent clearinghouse, or a third party intermediary, to communicate with end user customers, or the wireless devices of end-user customers, in order to aid the end-user in determining how and where new or existing telecommunications assets may be deployed or where service and which service is best or more preferred to the end user, while allowing performance or quality of service knowledge or rank ordering of available

telecommunication services to be provided to a wireless end-user. The invention furthermore allows for the control of the operation of a wireless device for enhanced operation, in a particular location based on a ranking of performance or specific requests (made either automatically or as preset) by an end -user, or carrier, or a clearhinghouse that provides knowledge on multiple carriers.

The invention provides a system and method and process that permits a clearinghouse to communicate with end user customers, or the wireless devices of end-user customers, in order to allow the clearinghouse to monitor the radio operating conditions and location of end user devices, whereby the monitored radio operating conditions and locations may be stored, processed and used to update the clearinghouse for monitoring wireless network performance and quality.

The invention provides a system and method that permits a carrier, technician or the end-user to determine how and where new or existing telecommunications assets may be deployed or are available. The system and method is available to the end user, and allows one or more carriers, or a clearinghouse with knowledge of multiple carriers, to provide measures of wireless quality and rank ordering of available telecommunication services to a wireless end-user, for the benefit of the end user, or to control the operation of a wireless device for enhanced operation, in a particular location based on a ranking of performance or specific requests by an end -user or carrier. Furthermore, the invention provides a system and method that permits one or more end users to report their observations of wireless performance and quality, or rank orderings thereof, as a function of location, to the clearinghouse so that the clearinghouse may maintain archived or updated knowledge of wireless quality as a function of location throughout earth.

The invention provides a system and method and process that allows a person or company, such as a publisher, a Web 2.0 company, a carrier, or a trusted web portal, to offer one or more of an inventorying, registration, lease agreement execution, and bartering service, system, or method to specific types of real estate owners in order to aggregate the assets available to form a database for the clearinghouse.

The computerized system according to this invention serves at least two types of customers: end users or carriers, with password protection and opt-in capabilities where

the end users may chose to have their availability/interest in supporting carrier needs shared among more than one carrier.

The computerized system according to this invention provides the entry of customer interests/desires, customer data, and provides access to documents such as town ordinances, town zoning rules, neighborhood covenants, and contracts or sample contracts or agreements between telecom carriers and end users for allowing end users to aid the carriers under mutually agreeable terms.

A computerized system according to the invention allows end users or carriers or a third party to add documents such as town ordinances, town zoning rules, neighborhood covenants, state or local laws, and contracts or sample contracts or agreements between telecom carriers and end users.

A computerized system and method where a graphical information system (GIS), such as (but not limited to) Google Earth, MapInfo, USGS, is used with a database of infrastructure locations provided by end-users through the clearinghouse in order to aid carriers or end users for determining radio coverage footprints or possibly useful/valuable infrastructure locations.

A computerized system according to the invention allows radio propagation prediction algorithms to be run using the GIS and equipment models in order to determine coverage regions, obstacles due to terrain or buildings, and viable locations for towers, antennas, repeaters, nodes, and end user premise equipment.

A computer system according to the invention can be built upon a database of customer needs, and may also include carrier needs, that allows the rapid sorting and pinpointing of available locations for a carrier or other party to build, lease, or use a Dwelling or existing location for improvement of services.

A computer system according to the invention allows end users to learn about telecom laws, ordinances, opportunities, and technical details so that they are more knowledgeable and interested in assisting telecom carriers in the provisioning of telecom networks.

A computerized system according to the invention allows end users to rank their happiness or satisfaction with their carrier, or with information providers to the

clearinghouse, after entering into a relationship through the "convener" clearinghouse, and where carriers or other parties may also rank their happiness with end users, as well.

A computer system according to the invention includes a database of locations of end users who are willing to assist with the provisioning of telecom services at their premises, combined with RF coverage details that enable the determination of promising locations of towers or structures (either existing or to be built), combined with legal records such as covenants, town ordinances, combined with plat maps or zoning boundaries, so that a telecom carrier or end user can quickly and easily see what is viable for provisioning of telecom services. One embodiment of the invention allows for the computerized system and method to automatically determine the best locations from a wish-list provided by one or more carriers or third parties, based on the available public records and end user inventory of locations available.

A computer system according to the invention allows for an educational or newsworthy web publication or paper publication to be created rapidly from content stored on a computer, where such web publication or paper publication may be private labeled or customized specifically for a particular carrier, neighborhood, locality, or group of people or specific entities/customers.

Description of Figures

This invention will be further understood through illustrations provided in the accompanying figures, which are now described.

Figure 1 is a block diagram of the clearinghouse computer system, including applications that run on the computer system, the types of interfaces provided to end-users, and the types of users of the clearinghouse.

Figure 2 illustrates an embodiment of how the database of the clearinghouse system is organized, and the types of information and records maintained for each of the types of users.

Figure 3 illustrates an example form that is completed by an end user or carrier for input to the clearinghouse system, using the various types of available interfaces.

Figure 4 illustrates a flow diagram of how the clearinghouse determines matches between the end user interests, the carrier's infrastructure requirements, and local

ordinances that apply, and how the clearinghouse notifies the carrier. This also can assume an automated process that may have carrier involvement/intercession if required by the carrier to notify end users that they may be of assistance to the carrier's needs, and the terms and conditions available to the end user. Not shown, but implied, is the ability to generate lease forms or business forms needed to codify a legal and business agreement between end-user and carrier.

Figure 5 illustrates a database, which may be a primary database or back-up database, which is accessible by various users of the clearinghouse, and which may be refreshed or updated upon computer command.

Figure 6 illustrates the various applications that may be actuated by the invention, and which are available to users.

Figure 7 illustrates a mobile device and how it may be connected by wireless or wired means through the worldwide web to the clearinghouse.

Figure 8 illustrates a mobile device and how it may report its observations of its location, as well as network quality and the available spectrum back to the clearinghouse.

Figure 9 illustrates a mobile device receiving information from the clearinghouse so that a mobile device may be manually or automatically configured for improved wireless operation.

Figure 10 shows a flow diagram of how a clearinghouse works with a wireless device, such as a cellphone, to enhance wireless performance at the wireless device.

Figure 11 shows a flow diagram of how the wireless device reports its observations to the clearinghouse for ranking of possible wireless connection options, and updating of knowledge of wireless environment at the clearinghouse.

Figure 12 shows a flow diagram of how a wireless device is able to receive updated information about its operating parameters, based on the knowledge of the operating environment by clearinghouse, so that the wireless device may be sent instructions that cause the wireless device to be automatically tuned to appropriate frequencies, air interfaces, and other operating parameters to provide enhanced operation for the particular wireless device, or the entire network.

Figure 13 shows a diagram of wireless infrastructure using an Internet Protocol (IP) network backhaul from the base transceiver station (BTS) or switch. The BTS or

switch, as well as infrastructure components closer to edge of the wireless network, are coupled to the clearinghouse using IP or world wide web addressing, where through such addressing, advertising content is provided to particular pieces of infrastructure through an advertiser server that may be located centrally or may be integrated and coupled to various wireless infrastructure components.

Figure 14 illustrates a flow diagram of how local advertising may be cached or stored at the clearinghouse and may also be optionally distributed to local ad servers throughout a wireless network.

Figure 15 shows a flow diagram of how the clearinghouse may be used to provide local advertising content by identifying the requested IP address or worldwide web address requested by the wireless device (wireless user) and by formatting data suitable for interpretation by the wireless user.

DETAILED DESCRIPTION

This invention uses a computer, also known as a central processing unit, or CPU, which may be a single computer, a web server, a cluster of web servers, or some other configuration of computing equipment, whether in series or in parallel or distributed that is able to obtain information through telephonic, text, voice/telephone, internet communication, or other methods known now or in the future. The computer runs programs and algorithms in order to prompt and to determine an end-user's interest in adding his or her property and locations, and facts about the available real estate that the end –user wishes to make available. The computer provides for the storage of provided information in memory of the computer, for use in the clearinghouse repository. The CPU is also understood to use memory for storage and retrieval of operating instructions which dictate the proper operation of the website, the response to various inputs from users via the worldwide web, telephone, or other various interfaces, and the programs needed to interpret inputs, store and process the received information, and to properly format and display the information, and also uses memory to retain information stored in databases, where such databases represent the details provided by end-users, or carriers, or which represent data that has been obtained through the use of web-crawlers from public websites, as further described in the accompanying figures.

The computer interacts with employees from carriers, or from the computers of other companies, such as carriers or tower companies, or from public websites, as well as from intermediaries that may help to store, cache, process, or post data to memory (where such memory is coupled to the clearinghouse computer, or elsewhere) in order to determine the specific needs and interests of the carrier or tower company. The computer is able to provide or process one or more of: automated voice prompts, speech recognition, touchtone recognition, web-based communication, handwritten, or human to human interaction, and so on. Through the computer interface, and the associated systems and methods described subsequently, end user customers of telecommunications services are able to make its telecom carrier, or, optionally, even potential competitors to their current telecom carrier, aware of his or her ability and/or interest to help carriers with their distribution of telecommunications services through the use of their own premises. Similarly, the computer interface and associated systems and methods described subsequently allow a carrier, a public organization, or optionally the general public to be aware of the locations at which citizens are willing or interested in allowing their locations to be used to house telecommunications infrastructure.

Below are some useful definitions of terms used throughout this patent.

Dwelling or **Premises**: any property, building, outbuilding, structure, tower, vegetation, or land, or any thing on or in or over or under a property occupied or used or controlled by an end user for which the end user may wish to make available for use by others. The definition of "dwelling" may also include one or more rooftops, silos, billboards, trees, church steeples, poles, towers, ledges, parts of a building, outbuildings, lookouts, extensions to buildings, or signs, and/or any improvements.

Carrier: Any company or entity that offers services to an end user on a regular basis over time. The term "carrier" is intended to be given its broadest possible meaning, as it is meant to describe companies that offer to end users services such as telecommunications, connectivity, entertainment (such as movies, cable, multimedia, music, on all possible media and all possible delivery mechanisms), AC power for the home, mail delivery/retrieval, archiving or storage, inventorying, cleaning, yard maintenance, water delivery, laundry service, and the like.

End user: Any person or entity that participates in an ongoing service from a provider. An end user may be someone who simply stumbles across the clearinghouse disclosed herein, who browses or interacts with the clearinghouse only one time, or someone who interacts with the clearinghouse many times, and who may even list their infrastructure location with the clearinghouse disclosed herein. Alternatively, an end user may be a telecommunications subscriber or a clearinghouse participant who obtains cellphone or internet service from a telecom carrier or quality/ranking/performance information or local content from the clearinghouse. End-users may also include those people or entities which are not yet subscribing to the service offered by a carrier or the clearinghouse, but who have interest in participating and inquiring about the content of the clearinghouse and possibly contributing assets or capabilities to the clearinghouse or to a carrier, either from their own personal interest or edification, or because they hope to gain some benefit or remuneration of some kind at some point. An end user may be a person, but also may be an entity or an enterprise, such as a church, and apartment building complex, a co-op of people, a shopping mall, a car dealership or chain of car dealerships, or a business, either stand-alone or spread out on a campus or throughout the world, for example. End-users may be people from the general public, or may be a typical user from a specific type of user population (for example, employees within a large corporation may be end-users of the invention, if the invention were implemented in an enterprise fashion for a particular corporation. As another example, not meant to be limiting, an end user could be a ham radio operator who is a member of the American Radio Relay League, ARRL, if the invention were made available to all ARRL members). Other examples are readily understood.

Computer: May be a single computer or a group of computers, or CPUs, which may include associated circuitry and components, such as banks of memory (storage), back up gear, displays, human and machine interfaces of various kinds, parallel computer processors, distributed computer processors, distributed or single connections to the internet, distributed or single displays or editing/viewing capabilities, one or more web servers, mail servers, and multipurpose servers and routers, or any coupling of computerized components that allow for one or more of: telephonic answering, touch tone interpretation, voice recognition, handwriting recognition, facial or fingerprint

recognition, stylus recognition or typed data entry (either directly from a keyboard, via telephone or internet connection, from a phone, over wired or wireless or optical connection), text recognition, file transfers, data transfers, file caching, file storage or entry or manipulation, running of software, hosting of applications, running of applications made up of computer programs from one or many sources, where components and software are coupled or combined as known to one skilled in the art. The term "Computer" is to be construed in its broadest interpretation, as the invention may clearly be practiced at a single location, distributed across a country, a city, or used worldwide with a network of computers and backup storage located throughout different continents, as it is contemplated to host at least one website, and to enable connections of the website with and between end users and carriers. This specification describes the operations implemented on a computer, but it must be understood that a computer with memory may be implemented in many ways, and that the computer of the clearinghouse may need to directly or indirectly interact with other computers and databases as provided by web intermediaries, such as Akamai that can cache/store/stream content, Rackspace or INetU, that can provide web hosting, and so on. The disclosed invention, including the computer (CPU) described herein, is understood to include the ability to interface using some or all of these known techniques for hosting a web-based clearinghouse for end users as described herein through the use of sub-contractors and external vendors and service providers for internet access and commerce.

Many techniques are known in the art for computers to be able to interact with and assimilate data from people. Consider some examples of telephonic and touch tone phone inputs that are provided by humans and are processed by a computer. Furthermore, voice recognition systems, and voice over IP (VoIP) calls to a computer are well understood today, and it is further recognized that end uses of telecom services, and people throughout the world in general, may access a computer in many different ways using the worldwide web. For example, web interfaces are used in programs for personal computers, and personal computers may be connected via any form of internet connection to a computer that hosts a website. Websites may also be accessed by cellphones, PDAs, tablet computers, such as those made by Motion Computing with handwriting and fingerprint recognition, and many other devices.

Websites which allow for posted materials, updated materials, and graphical and text interactions, even podcasts or videos, are well known in the art, as demonstrated by Google, Inc.'s wide range of web portals, as well as those by eBay, YouTube, Yahoo, and the like. All of these websites and product companies described above use a "computer" as contemplated here. Furthermore, automatic document generators are also well known and are in regular use today, where content can be bundled and packaged into web form, electronic media form, or print form, to have a homogenous look and feel, based on content that is stored in file formats such as files in .XML, .HTML, .BMP, .TIG, .GIF, .PDF and other formats known now or in the future, and through use of JavaScript programming language, and cross-platform techniques such as AJAX (Asynchronous Java Script and XML), which allows web applications to seem much more responsive by not interfering with normal web page loading.

To launch a commercial website, many companies provide tools and capabilities that make it viable. For example, InetU or Rackspace provide Managed Web Hosting, where they provide a computerized system that a customer (the website company) can use and access through a log in to edit, remove, add, or reorganize content in the form of webpages, downloads, documents, and a wide range of other viewable or useable multimedia forms that may be accessed by the public, or by password protected classes of users who may or may not pay a subscription for access to the website. Also, the website company may choose to simply do hosted services. In order to generate revenue, PayPal offers software and servicers that enables a hosted site to exploit the PayPal developer network to create webpage(s) that allows a website company to securely collect monies from the browsing public, accepting all major credit cards and PayPal currency through web transactions. To maintain databases that contain important information, a website company will use MySQL (open source) or SQLServer, or Postgress as a backend database system to store myriads of data records, for rapid access by the applications running on the computer, and other known document management techniques are used for archiving and retrieving documents, and for accessing applications over the web such as Google Earth, USGS, or county or local city/county plat maps, ordinances, or board meeting notes that are often available on line.

With reference to the drawings, Figure 1 shows an exemplary embodiment of the Clearinghouse system. On the left portion of Figure 1, various types of users of the system are shown. Note that Carriers 10, End user customers 12, and public users 14 each may have access to the clearinghouse 16 via a wide range of interfaces, including web 18, phone 20 or 22 (using cellphone or wired phone or VoIP phone), email 24, or through automated voice recognition or digital recorders (that may recognize speech, handwriting, fingerprinting, etc). The owner or operator or proprietor 26 (and any employees or subcontractors) of the clearinghouse 16 may also access the clearinghouse 16 by these interfaces, as well, and may have one or more additional proprietary interfaces to the system (not shown). On the right side of Figure 1, a number of applications 28, capable of running on the Clearinghouse computer 30, or being controlled by the computer on distributed processors (not shown), and some applications which may be made available to only certain classes of users (e.g. end users, carriers, third parties, the public, owners/operators of the clearinghouse itself, and so on), are shown and are further described subsequently. Figure 1 also shows that carrier records 32 and end user records 31 are also available to the computer 30, and that a sorting and parsing application 36 is available to process these records. Note that the Clearinghouse computer 30 is preferably coupled to the Internet 38, as shown in Figure 1, so that the various users and user classes may access the Clearinghouse (Figures 1 and 6) and its database (Figure 5) through the Internet (e.g. worldwide web), as well as the other interfaces shown in Figure 1. Note that the Internet access shown in Figure 1 may be a public web connection, or provided on a private network.

The carriers 10 and end user customers 12 may or may not be regular subscribers or participants of the clearinghouse 16. A preferred embodiment is for the clearinghouse 16 to have revenue-generating subscribers, where the carriers 10 and end user customers 12 sign up for access, preferably using credit card (although written check or wire transfer or debit card or purchase orders may also be accepted by the clearinghouse) for monthly or annual billing. The sign up and password management and credit card billing is preferably handled by the credit card sign up and password management application 40 (shown on right portion of Figure 1). This application 40 is preferably run under computer control and provides various prompts through the interfaces for users to enter

credit card data, password and user identification information, so that the Clearinghouse 16 may uniquely identify individual users, store their log in and password information, and store credit card information for billing purposes. These data may be stored in a single memory location 42 or in a distributed memory bank or in any other suitable storage medium or database, and would preferably be encrypted for privacy.

By signing up as a subscriber, for example over a year period, carriers have continual access to the clearinghouse and end user database (see Figure 5) during that time, and some of the features that they would enjoy are exemplified by the various applications shown in Figure 1 and Figure 6. For example, a carrier 10 that is a user of the Clearinghouse 16 could provide its current locations of all its infrastructure assets and could also include desired "wish list" locations for infrastructure access through the carrier records application which is described in more detail subsequently (also see Figures 2 and 3). Based on the inputs, the computer 30 implements the sorting and parsing application 36 to periodically search the end user records 31 provided by end user 12. Note that in a preferred embodiment, the carrier 10 or the end user 12 may specify locations by simply clicking on a web page for "click on map" (not shown in Figure 2, shown on Figure 3 as 310), and then using a mouse or other computer indicating device, may simply click on a map displayed on a webpage in order to express or denote a particular location that is entered as a record 210. This capability is also available to general public users 14, and other users of the Clearinghouse 16 in order to rapidly denote locations of interest.

Figure 3 shows, as an example, both an end user form and a carrier form, that exemplifies what may be used by users and presented by the Clearinghouse for data entry to create information used in the end user records and carrier records. Of course, other data as contemplated within this patent may be included, and is not shown in Figure 3. Also, other approaches may be used to input data to the clearinghouse, including file transfers, catalog entries from third parties that aggregate user information, and other input techniques known to provide inputs of large numbers of customers into clearinghouses and their databases. For the case of a carrier 10 specifying its particular infrastructure needs, the user 10 (the employee, consultant, or agent of the carrier) could simply press "click on map" 311 shown in Figure 3 in the carrier record form, and could

identify portions of a map where needs exist as indicated above. Alternatively, carriers 10 could indicate their "wish list" for infrastructure by entering streets, counties, zip codes, Lat./Long. Coordinates, or even text descriptions of where they need coverage, or uploadable files that contain many listings of locations, in GPS or Lat./Long format, address, or zipcode format, etc. such that the computer could interpret the entry to determine the geographic locations of needed infrastructure (not shown on Figure 3, but should be understood from this description). It is clear that carriers 10 could alternatively enter their current infrastructure locations using the carrier records (e.g., entering data on the form in Figure 3-the form in Figure 3 is preferably a computer-fillable form; however, paper based forms and electronic files can be used in some applications. In addition, the information in the form can include or more less information than that shown on Figure 3). By having some or all of a carrier's infrastructure cataloged in the carrier records database (Figure 5), the Clearinghouse 16 can then better manage the carrier's assets and better display and process the end user databases to meet the carriers current and future needs. For example, the Clearinghouse 16, given knowledge of the carrier's 10 complete inventory of existing infrastructure, could implement the RF engineering/planning application to take into account RF propagation, interference, spectrum use, and antenna patterns to better determine site needs and to provide management of RF planning for the carrier 10. Information generated by the Clearinghouse 16 may be displayed 44 on site or remotely, and different displayed information can be provided to different users 10, 12, 14, and 26.

The Clearinghouse database 510, shown in Figure 5, is accessible by many different classes of users 512, 514, 516 or 518, and is made up of records provided and modified by end users and carriers, as shown in Figure 1 and described above. The Clearinghouse database 510 also includes data that is submitted or provided by the public (e.g. through public websites, through links to external databases, or which is provided as inputs from general public users). Also, the employees/owners/managers/suppliers of the Clearinghouse itself must be able to access and at times manipulate the database. The Clearinghouse computer 30 or a computing system under its control determines the refresh update rate of the database 510, and governs how often the databases are backed up, refreshed, and modified for presentation to the outside world through the interfaces

shown in Figure 1. Thus, preferably the various classes of users, when accessing the Clearinghouse 16, are not necessarily obtaining the most recent information provided by all classes of users, but are obtaining information that is updated at a rate specified by or at least acceptable to the Clearinghouse computer 30, which would typically be once a day, but could be more often or less often. Data inputs might be made instantly at the discretion of the computer 30 or outside vendors or other computers which interface with computer 30. The term "database" means all of the data available to the Clearinghouse, but it should be clear when a subset of data is being discussed, the term "database" may only refer to that subset of information. The term database should not be viewed as limiting, as the database for the clearinghouse may be implemented in parallel, distributed, real time, non-real time, and a wide variety of forms known now or in the future. Note that database 510 may incorporate a wide range of possible data formats, mixed formats, and may include data that is contained at various locations, by various suppliers or vendors. That is, while a MySQL format may be the preferred format for storing data in the database, nothing is meant to limit the way in which the database is formed, as it is understood that the database may comprise a wide range of different sources and formats of data, and in fact the database may be distributed geographically, and provided by many different sources and vendors, such as through Akamai for caching/storage, Rackspace as a web host, and public websites which are accessed by the clearinghouse to provide on-demand or cached versions of public data. This patent intends for the database 510 to include data that may be retained in current and future data formats that may not be known today, and it is understood that various methods for storing/archiving, modifying, and retrieving data, which includes the use of software that is run by the Clearinghouse CPU to provide hooks into/interact with other computers which may control access to external databases, as well as data maintained or owned by the clearinghouse itself, may be contained in database 510. Furthermore, the database may be populated or edited by various sources, including people who are remote or employed by third parties, and web crawlers that may or may not be under control of the Clearinghouse computer 30. Human intervention, to vet or approve data that comes from internal and external sources, may also be used, and the entry of human-approved data may also be included in the database 510.

When matches to the desired needs of the carrier are found in the database containing end user records, a "hit list" of all potentially available properties or locations that are deemed suitable is constructed by the applications. The computer then may implement the email application to send an email to the carrier 10, and optionally also to the end users 12 (depending on carrier preference), or alternatively, the web application may be implemented to provide the "hit list" in web viewable format available to the carrier 10 when they are logged in to the Clearinghouse 16. In this manner, the Clearinghouse 16 may over time allow the carrier 10 to be automatically notified when new end-users 12 offer dwellings for use, either by email or by on-screen notification when they log on or through a messaging feature.

Furthermore, the computer may run the selection/optimizer application 34 on occasion or periodically (on an hourly/daily/weekly/or some other time basis or on a random basis) where the application 34 uses inputs by the carrier 10 that are stored in the Clearinghouse 16. The interval may be determined by the clearinghouse provider 16, or may be selected by the carrier 10, perhaps with a premium being charged for searches that occur more often. The clearinghouse computer 30 preferably runs a computer program or subroutine, or groups of programs or subroutines that may be running in many geographically dispersed locations under control of the clearinghouse, or perhaps on various vendors/suppliers/subcontractors computers as well as on the clearinghouse computer 30, that systematically checks the carriers' needs with the end-user offerings (which are stored and processed using the end user record application and the sorting and parsing application 36). Figure 4 shows a flow diagram, where the computer reads the carrier records 410, and uses the specified data by the carrier to check all of the records in the database attributable to end user records 412. Note that end user records 412 are understood to also include public domain records available from public databases, or from data sources not provided by end users but which are blended with the end user records for sake of the applications being run at the Clearinghouse (e.g. Google Earth may have WiFi hot spot locations, and this information may be included along with end user records that have been provided by citizens to the Clearinghouse). Note that a user of the Clearinghouse may specify the option of including or excluding various public domain databases from the end user database processing, so as to distinctively identify

and process only true end user submissions in the various applications. The sorting implemented by the computer to find the carrier needs may be done in any number of ways which are well known to those skilled in the art of computer programming and database sorting. Zip code sort, price/leasing terms sort, physical building type or land use sort, or past history or profile of the end user herself might be used to determine "best" sites that exist in the end user database. As shown in Figure 4, after entry into the clearinghouse 414 and checking of the availability of locations 416, algorithms at 418 that compare the end user database to the carrier needs may include the RF engineering application 29, which provides for RF propagation prediction coverage mapping in determining whether a particular end user entry satisfactorily meets the carrier needs. Alternatively, no RF propagation may be used, where simple straight line distances, crude address matching or simple text string matches on zipcodes or street addresses, or even county addresses or GPS coordinates (Lat/Long.) are used to determine good matches in the database during the computer controlled sort. The carrier may establish one or more criterion for rank ordering the end user sites, such as based on fee wanted by an end user, the RF coverage of each end user location, the land use or type of property being offered by the end user, or if there are carriers already using the end user site. A hard or soft limit on what should be and should not be deemed suitable may be specified by the carrier, or may be preset by the Clearinghouse in order to manage database sizes and CPU time. A rank ordered list of properties is presented to the carrier at 420, either by email, by a web page hosted by the Clearinghouse specifically for the carrier, or by fax, mail, cellphone alert, or some other known method. Note that the rank ordering may be done in a wide range of methods, where close proximity to the carrier needs may be one rank, or lowest cost end-user access may be another, whereas the ranking may be based on a carrier's preset priority for properties that it needs (e.g. to fill an urgent customer request in a particular location. Alternatively, there may not be any ranking done by the Clearinghouse, leaving the data in an unsorted form for the carrier or third party to analyze on its own. The Clearinghouse may also alert the end users as to potential interest by the carrier at 422, if the carrier indicates in its records that it wishes for the Clearinghouse to do so upon finding a match (this may be done using a canned or prepared message by the carrier in order to entice interest by the end user). The sorting in

the Selection Optimizer application may be run over and over again, as often as needed, and alerts may be issued by the Clearinghouse for just new hits, or the most recent several hits, or the entire rank ordered list. Pricing may be instituted to offer premium or basic notification and search results. Interest by the end user can be confirmed by a responsive message by telephone, e-mail or web posting at 424, and non-interest can be provided similarly at 426, which presumably results in a return and rerunning of the search processes. The sorting process may also include a check of zoning and other ordinances at 428 that may have a beneficial or negative impact on the suitability of any particular end user's assets by the carrier.

Alternatively, depending on the business model, the clearinghouse may be implemented without a subscriber model, where carriers and end users access the clearinghouse for no charge. In either case, the carriers or end users may simply be given unique ID's or clearinghouse names using the credit card/password application (their unique ID may be their email address, or a customer–specified log in name), and in any case, these customers are provided passwords (that may either be specified by them, or issued by the clearinghouse) that allows the end users and carrier customers access to the clearinghouse. The various access permissions allowed to each class of user of the clearinghouse is preferably managed by the access to web manager application 33.

The clearinghouse allows its users to connect over the myriad of connections, such as phone, internet, email, etc. The clearinghouse is preferably connected via the internet to allow dissemination of its content over the worldwide web, so that the public can gain access and view/use the information contained in the clearinghouse. The content of the clearinghouse is stored in a wide range of forms, such as databases that may be within the computer, databases that are located outside of the computer, in applications that may be run or managed by third parties, and may include public domain databases and information from links on the worldwide web.

Some of the information may be modified or viewed by different users. For example, and with reference to Figure 2, carriers may view the records of all end users 210 to help the carrier see what opportunities exist for it to locate its equipment, and the carriers could also use the clearinghouse to indicate its own desires, needs, interests, and problem areas where they have need to find locations for equipment in the carrier records

212. In one embodiment, other carriers, end-users, or the public users would not be privy to the carrier's specific desires or needs, but the carrier would be able to use these records. End-users may use the clearinghouse to enter their data, expressing their interest (an offer) in having their dwelling used by carriers. In one embodiment, other end-users would not generally be allowed to see the offers of a particular end-user, but carriers would be allowed to see it. The storing, parsing, controlling, and organization of end-user records 210 is done by the sorting and parsing applications 36 used by the clearinghouse (shown on right of Figure 1). The construction and creation of software applications to do this are well understood, and this could be internally developed by the clearinghouse staff, or developed using well known third party programs.

All users, including public users could use the clearinghouse to view various zoning/covenants affecting their own neighborhoods. Users can preferably submit records, documents, plat maps, zoning ordinances, or provide web links thereto, by accessing the Clearinghouse and using one of the applications dedicated for such locationing and mounting or linking of records in the Clearinghouse. Thereby, all users of the Clearinghouse can readily access public records 214 in an easy manner, such as key documents, zoning records, or other public ordinances surrounding telecom regulations in their specific location, neighborhood, country, or city, etc. Such records can be mounted in the Clearinghouse and sorted using either Zipcode, city, county, township, state, country name, whereby applications allow the documents to be retrieved and stored in a manner that makes them easily retrievable and accessible by users of the Clearinghouse. For specific classes of users, such as end users and carriers, for example, lease agreements, which provide for the business and legal terms for a legal contract between an end user and one or more carriers, may also be available for download, execution, and upload between parties, where the Clearinghouse serves as the agent that provides this capability. By law, some documents may need to be notarized or faxed, instead of uploaded, but the Clearinghouse could nevertheless provide the appropriate legal documents and store them, crossing the transaction between the parties, and may also participate in a commission, either one time or on going during the lease of the end user property. Carriers and perhaps even end users could provide the Clearinghouse with a small commission, on the order of 2 or 3%, for the monthly rental charge paid by the

carrier to the end user, and this could be automatically deducted from credit card or electronic banking funds, or other means known now or in the future.

Note that some documents may be uploaded to the Clearinghouse by PDF or other well known document formats, or may simply be pointed to using URL addresses or other techniques known now or in the future. Services such as Google or webcrawlers or web bots may also be used to provide the clearinghouse information, through end user records 210, carrier records 212 or public records 214 as shown in Figure 2, and in many instances a particular map or document might need to be categorized under a state or national as well as local category. The Clearinghouse computer could maintain this data in its own storage facility (e.g in its own internal database), or rely on the web-based storage of other websites as part of its overall database 510 (although this latter approach may mean some data disappears or becomes incorrectly pointed to over time).

Figure 6 shows a number of the same elements as Figure 1 including the computer 30, display 44, internet connection 38, as well as a variety of applications 28 for covenants and/or plat maps, city planning and zoning ordinances and neighborhood covenants, Google Earth , GIS or other mapping applications, forums and exchanges including chat features, education and customer content, re-engineering applications, and proprietary or public RF Design. Figure 6 also shows customized advertising or web content provided to homeowners or other end users 610 and carriers 612. Carriers, end users and public users may access the Clearinghouse with phone banks, web servers, telephone operators (either its own phone operators, or through a leased or rented call center, or using a 3rd party provider for telephone answering services), automatic speech recognition devices (not shown), voice mail, or digital recorders and email servers. Note that some or all of these may be used in an actual embodiment, and it is understood that other embodiments other than the one shown could be used, based on the cost or preference or technology or rollout of the Clearinghouse. It should be clear that not all applications shown in Figures 1 and 6 would need to be installed or used at once, and one skilled in the art can envision different applications, or different approaches to organizing content, or subsets of the applications, or a merge between some of these applications could be implemented over time, while keeping in the spirit and intent of the invention.

Given the aggregation capabilities of the Clearinghouse, advertisers, attempting to focus on various customer segments, can preferably provide advertising to the various users of the Clearinghouse, either through email, the website display, through voice mail and video/multimedia services when users access the Clearinghouse, and through regular mail, based on the address records contained in the end user records and carrier records applications. Web advertising is an emerging business, and the Clearinghouse would serve as a highly targeted and useful medium for advertising over many domains, given the new capability and targeted clientele afforded by the present invention. The email application may also be used by the Clearinghouse, itself, to send email alerts to users of the Clearinghouse (e.g. to end users or carriers, or to the public which has registered their email with the Clearinghouse), and the web application may be used by the Clearinghouse, as well, to provide web postings to specific users who are allocated specific web addresses or password protected access for confidential or specialized data.

Figures 1 and 6 show the Clearinghouse also supports forums and exchanges, where end users may communicate with one another, where carriers and end users may communicate with each other, and where carriers may meet and communicate with each other. This may be provided using chat facilities, instant messaging, VoIP, or web posting, as well as other forms of peer-to-peer and peer-to-group hosting applications. The archives in this portion of the Clearinghouse will help others in gaining knowledge and understanding of the clearinghouse and the needs of the telecommunication industry, carriers, and end users in general, thereby providing valuable insights for a growing customer base. In addition to the forums, Figures 1 and 6 show the Clearinghouse serves as an educator, a trusted resource that provides content, links to important telecom rulings and happenings, and provides open content for the world to access. This education/content application allows the Clearinghouse to also publish, either in print, email, or web, or podcast, or broadcast form, newsletters, information pieces, and promotional pieces that may advance the needs of particular carriers or segments of the telecom industry.

Access to carriers and end-users as described herein allows the Clearinghouse to be private labeled or OEMed by particular carriers, or by particular intermediaries in the infrastructure industry, or entities, such as the American Radio Relay League or JARL,

which has many constituents who own towers or have interest in advancing telecom in general. By creating a private labeled enterprise or user class web presence or print presence, the knowledge and content of the Clearinghouse can be dispensed to particular groups of customers or end users, for the benefit of the industry or for the benefit of a particular carrier, intermediary, business, or industry segment. Thus, the knowledge contained by the Clearinghouse may be distributed in many different ways in parallel. This perpetuates the growth of subscribers or users of the Clearinghouse, while serving an unmet need which would benefit many carriers or organizations, particularly small and medium WISPs, citizens in general, expanding telecom providers in rural or emerging lands, large carriers looking to roll out "small iron" infrastructure, and large and small telecom companies that realize that the clearinghouse is a less expensive resource to promote their own technology or their own presence or needs.

In addition to the abilities mentioned above, the computer provides the Clearinghouse with the ability to allow a carrier to exploit the end-user information in order to identify locations or dwellings where end users will allow it to install equipment or towers, etc. Without divulging the needs of the carriers, or the entire contents of the end user database, the Clearinghouse may allow the general public to view its own local areas of interest, say through zip code search or street search, to see who in their community is offering site opportunities. Of course, the end user must first have opted to have his or her listing made public for the general public to be able to see it, which is an option that may be provided when end user records are provided to the Clearinghouse. By viewing local listings, the community may validate that the listing, the map, and description is good – generally people in the same neighborhood will be interested in seeing if it's the right plat map, the right link, etc). If made public by the end user or carrier, or clearinghouse, neighbors may also be interested in the remuneration provided to the end user from one or more carriers. The Clearinghouse preferably would allow the general public to rate the quality of the postings (for example, one to five stars), and to provide customer feedback, thoughts on the experience, etc. (social commerce and word of mouth). Everyone who uses the Clearinghouse website would optionally and preferably need to have an assigned account or screen name so they can be credited with finding and posting info/data, and get ranked by the community.

In one embodiment, the Clearinghouse allows carriers or intermediaries to have a look at all end user offerings without giving away what the carrier wants or needs. Carriers may list their standard legal and business term agreements and have the ability to use the Clearinghouse to see readily if there will be local ordinance hassles, neighborhood hassles, limitations due to covenants, as shown in Figure 4 and as described above. Letting the end users and the public post this information, on a zip code or neighborhood by neighborhood, county by county, township by township, sq mile by sq mile basis, is best, as these maps for the boundaries exist.

Ham radio operators already have towers and are technically savvy, often ready to help with the provisioning of broadband. The Amateur Radio Relay League, (ARRL); Japan Amateur Radio League (JARL), Radio Society of Great Britain (RSGB), etc. would likely have interest in hosting or rebranding the Clearinghouse to its own purposes and for its membership, possibly as a revenue generating opportunity for its own society and as a service to its ham radio operator members, who often have towers and have already taken care of the zoning issues in their own neighborhoods. Amateur radio towers are often exempt from tower restrictions due to the common good and emergency preparedness that amateur (or "ham") operators provide to society. The lower profile ("small iron" footprint) of today's wireless telecom equipment, such as WiFi, WiMax, and much of the emerging broadband wireless infrastructure, does not require bulky cell towers, and can readily be installed on most ham radio towers today. The invention will allow carriers or intermediaries to immediately find these hams and offer leasing terms, so that the carriers may approach this community for potential tower sites. This helps quicken the deployment of wireless without the need to erect new towers or to go through extensive zoning hearings. Increasing the time to build out coverage or capacity is very valuable to a carrier, and thus the carrier would likely pay to have access to the Clearinghouse.

Record Forms shown in Figure 3 are submitted via web or submitted by voice, email/ touch tone, data entry/handwriting, fax, and other electronic means known now or in the future, including file transfer, etc . The forms reflect data shown in Figures 2 and 3, which is processed, sorted and parsed by the sorting and parsing application 36, and stored in the Clearinghouse database 510 (Figure 5). The data preferably indicate where

the end user is physically located, and whether the end user has a Tower, or places on roof, house, building for antenna mounting or equipment mounting, etc . For example, either through entered data by the end user, or through public access to records that augments the end user provided records,or from file transfers from third parties, the carrier or third party uses the clearinghouse to determine answers to questions such as: Does the end user have to be on site when telecom company comes? Does end user have power or utilities available? Does end user want maintenance of tower/building? Will user want cash, cash rebate, or free internet or phone service? Does end user own the land or rent? Is user aware of any zoning or limitations, neighborhood covenants that would prevent stuff going up, if so where? Does the owner have insurance, and what liability insurance is needed, required, on hand? Has end user successfully leased to a carrier before? Is the end user a ham radio operator or technically minded? Can cabling be buried on the premises? How close is the end user to other towers included in the end user database or public databases? What is the value of end users home, as identified by tax plat public tax record database, and is it a single family residence, apartment, commercial building, etc.? What are the desired business and/or legal terms to do a lease transaction, and what is the first/best/desired offer. These types of data would be linked in with town/country records of public land, and further linked with Google maps or another mapping technology, so that end users and or carriers or third parties could view potential locations with a vast amount of information contained in the Clearinghouse database.

Of course, some end users may wish to negotiate for deal terms on leases to carriers, in which case the Clearinghouse can provide the forum for an electronic negotiation, or an auction, where a carrier may find a potential site of interest, notify the end-user through email about their interest and with a first offer, and then wait for a reply from the end user as to how to move to a final negotiation and signed lease agreement. Alternatively, the end user may have an idea of their initial business terms, and this may be provided in the end user's provided records. All of these steps are handled by the Clearinghouse and its applications as described above, preferably through the worldwide web, or by other electronic interface means.

Using the Clearinghouse for radio quality and service for wireless devices

As described above, the Clearinghouse provides a database of tower locations provided by end users and carriers, and further provides for the ability to access public records such as governmental tower databases and frequency planning rules and regulations. Thus, it is clear that the Clearinghouse is able to maintain information about more than one carrier, and in fact can store information about every publicly disclosed tower, as well as the inventory of towers provided by end users, as well as infrastructure information provided by multiple carriers. Data such as transmitter frequencies, antenna heights above ground, owners of spectrum, leaser of spectrum, type of license, date the license expires, type of services offered, may all be cataloged and stored in (or accessible to) the database in the Clearinghouse so that there exists, on the worldwide web at the Clearinghouse website, a position-tagged listing of wireless assets for multiple bands, and multiple carriers. This web site may be private access (password/subscriber protected) or open access to the world, depending on the desired business model.

Given that the clearinghouse is coupled to the internet, the Clearinghouse database can be used for cataloging the wireless availability (signals, bandwidth/capacity, services, carriers who provide service, quality of offered service, over multiple bands and for one or many carriers and services that are available to a particular wireless device in a specific location or locations on earth. Furthermore, the Clearinghouse may average, smooth, or provide best/worst/average estimates of the quality of wireless service, and its availability, based on the on-going measurements reported by end users and their devices at various parts of the globe. Thus, the Clearinghouse becomes an archived record of wireless quality at various locations, and this record is included in the clearinghouse database and updated or refreshed under computer control as described in Figure 5. This invention can be extended to work for different kinds of wireless devices, for example WiFi LANs are different than cellular/WiMax/LTE networks, so this Clearinghouse capability could be available for each type of service, or providing information for all services in a single clearinghouse.

The inventor envisions a clearinghouse that can be used/updated/accessed and built upon, by individual's experiences in accessing wireless connectivity across the globe. As shown in Figure 7, the reports of RF quality and capacity are preferably done

by the end user or the end user's device, where the user of the wireless device, or the wireless device 710 itself (as shown in Figure 7), reports to the web Clearinghouse its experiences over a wide range of bands, frequencies, providers, and services. The wireless device 710 may be capable of voice, data, multimedia, and/or wireless call connections. Web connections could be in band, the same channel as current wireless "call" connection or out of band, or different channels than the present wireless call. Note that the coupling of the mobile device 710 to the internet (e.g. the Clearinghouse website) is done over the wireless call connection. However, this coupling may also be done over a wired means as described below, or may be conducted at a different time or location using a different wireless carrier or frequency than used for a wireless call or internet session. While not shown explicitly in Figure 7, another embodiment of this feature of the invention would be for the base station or fixed infrastructure of a wireless network (and not the wireless end user device) to collect measurements or performance metrics over a wide range of spectrum for the quality of RF coverage, capacity, and overall communications quality, on either/both the forward and reverse wireless links, and to provide that data to the Clearinghouse via worldwide web connection that is often provided at the base station or fixed infrastructure. Of course, both the fixed infrastructure and the mobile device could collectively and cooperatively report back data to the clearinghouse, as well as receive data from the Clearinghouse.

Preferably, the end users phone 710 would report its observations to the Clearinghouse in an automatic manner without ongoing user control and even without knowledge by the user. Indeed, phones or wireless mobile devices 710 of the future may be simple dongles, computers, and a wide range of wearable or sensor devices 711 that may access the Clearinghouse in real time, or prior to a wireless phone call, or intermittently during or after a call, while the mobile device 710 is idle, or even when the cellphone (e.g mobile device) is off or not in use (but connected to the internet by wired means). That is, the memory 712 of the wireless device 710 may store the measurements and observations of various radio quality and performance metrics, for uploading to the Clearinghouse using any type of connection to the worldwide web – wired or wireless, not necessarily just during a call or during travel. These measurements will be paired with geographic location information obtained using a GPS or any other location sensing

or position estimating techniques 714 that may involve an onboard computer (not shown) in the cellphone or computer 711, or external to the mobile device 710, such as through infrastructure position location methods. Thus, the Clearinghouse is able to continue to build a database that is built upon location-specific reports of radio coverage, services, carriers, bandwidths, and past user experiences, even when certain mobile devices must wait to report their observations (due to poor coverage, priorities of the device or user in providing communications, or when battery 716 is too weak to justify accessing the Clearinghouse at certain times). Figure 7 contemplates a mobile device 710 that is able to access the Clearinghouse via the worldwide web, in order to query or determine information, in either real-time or non-real time, about the radio environment and performance quality in its particular location. This access may also be in real time or non real time by either wireless or wired means.

As shown in Figure 8, using the invention described herein, a wireless device 810 is able to couple to the Clearinghouse website (and consequently the Clearinghouse database 820) through its wireless carrier to automatically provide (e.g. upload) its readings, measurements, or observations to the Clearinghouse, either in a batch (stored) method, or periodic, intermittent, or random update method, using either wireless 825 or wired connectivity to the internet 830, and is also able to access the Clearinghouse database (e.g download) to determine general information about the radio environment (to help optimize the battery use, RF radiation, or mode/data rate selection of the mobile device) or to find what channel to tune to, what carrier to use, or what services to expect or access, without wasting transmit power, battery life. Thus, the Clearinghouse can both rely on data provided by wireless devices at various locations in order to provide data that allows particular inquiring wireless devices to adjust their access techniques to the wireless channel in a certain geographic area in a manner that matches the specific coverage/RF/quality of the location. While Figure 8 shows a wireless connection, the device 810 could be connected by wired/optical connection through the Internet 830 to the Clearinghouse database 820. Note that location information may be provided by the mobile device 810, or may obtained through an external or alternative means, perhaps from the carrier's infrastructure, or through other methods.

The network performance or quality of service information as a function of location may be downloaded to the wireless device from the Clearinghouse either before a user of the device travels to a location, or during the travel, itself, as illustrated in Figure 9. While Figure 9 shows a wireless connection, it should be noted that clearinghouse information may be provided to the mbile device 910 using wired means, as well. Figure 9 is substantially similar to Figure 8, and shows the flow of information from the Clearinghouse, and consequently the Clearinghouse database 920 to the wireless device 910 through the Internet 930 and Tower 925.As shown in Figure 9, recent snapshots or data values of quality as a function of location, as obtained from the Clearinghouse, may be stored in the memory of a mobile device 910, and updated at a rate determined by either the Clearinghouse, the end user, or the wireless carrier providing end user service. When in the field with a planned trip, the user can get downloaded information after handshake by the wireless device 910 being able to retrieve from the Clearinghouse 920 (in an automated fashion or with a user interfacing interval) the local "state" of the RF environment he or she is in or traveling to which may include the services that are available, carriers, locations of towers, etc., so that the phone can use power and allocate spectrum better. This handshake may be provided over the air in real time or pseudo real time, or may take place earlier when the phone is connected or idle at home in a wired or wireless home network, or docked in its charger, etc.

Figure 10 shows a flow diagram of how the Clearinghouse and mobile device work together to provide enhanced service for the wireless subscriber end user. The network quality information, and relative ranking of carriers, frequencies, or selected power levels or data rates/modulation types as a function of location may be downloaded from the internet at steps 1010 and 1012 (e.g. Clearinghouse website) before leaving for the trip, where the position location coordinates are obtained prior to the trip path from Google Map, Mapquest, or some other path finding method that allows for interpolation or storage of position coordinates, and these position location coordinates are stored in the memory of the mobile device. Alternatively, if implemented in real time or in near real time during a trip, the mobile device may use a road navigation system in the car, a navigation application in the phone, or GPS in the phone in order to determine its position location as shown at step 1010. The wireless device thus has latitude/longitude

or GPS coordinates, either measured by GPS or by its own navigation application, or as interpolated or as stored from a pre-planned trip route stored in memory. These locations are then provided by the mobile device to the Clearinghouse at 1012, (note that the locations provided by the mobile device to the Clearinghouse could be determined on the fly as the user moves with her wireless device on the trip, either in band or out of band, across a wireless network during the travel.) The Clearinghouse, based on the locations presented by the mobile device, provides to the device specific performance or quality of service metrics or rankings, such as desired frequencies, best or rank ordered list of carriers to use at each specific location, preferred modulation types, upper or lower limit on data rate, upper or lower limit on bandwidth, or a ranked listing of available (in the area who provide service) wireless carriers at the various interpolated locations at step 1014. This information may be transparent to the user of the mobile device, as shown at step 1014, and may match a user profile, such as "highest download speed", or "cheapest cost" or "always pick Verizon if it can give me better than 10 Mbps", which the user may have programmed on his cellphone or programmed through his wireless carrier through a website or in the store upon purchase or renewal. Alternatively, the information provided by the Clearinghouse may be visible to the end user, as also shown at step 1014, either over the wireless device, or at the Clearinghouse website, provided the end user is a participant of the Clearinghouse. In this manner, the Clearinghouse facilitates multiple-carrier operation at step 1020 and may provide network enhancements over a wide range of spectrum for a single user, which will be required if federal regulations require an open spectrum policy where various carriers must support traffic by users of a specific carrier network. Such operation enhances battery life and improves phone and network performance through control of interference, spectrum usage, and power, while being impartial to any one particular wireless carrier.

Given the location (whether actual or estimated) of the wireless device, and information of the radio frequency (RF) quality and coverage and the services and bands available for access are identified at step 1016, the wireless device may make good decisions at step 1018 as how to access wireless in the particular location, thereby saving battery life, cost, time, or improving connectivity for the particular desired application used by the user of the wireless device. The Clearinghouse/database on the web would

communicate to wireless devices either in real time over the web, or prior to the wireless device going to a location, with information that allows the phone to determine the best or 2nd best (or a priority/ranked list) of frequencies, or carrier providers, or services, or bandwidths, based on the customer's predetermined desires/needs (lowest cost service, highest data rate service, longest battery life service, etc). Or the user may adjust their desires for service priority on the fly as they travel and learn the quality of the networks they are in. This may be done automatically (with preset user settings) or may be visible/shown to the user through an application on the web or via the wireless device. Note that the carrier/service provider, or the wireless device manufacturer, or some other party, may also set the priorities for desired service based on price, availability, instant channel loading in the network, or other factors.

In fact, the world's RF/QoS/coverage/service map could be loaded on to a wireless device from the web clearinghouse, and then updated periodically or infrequently, at either the request of the phone user or automatically by the wireless device, to update the database of the RF/QoS/services, capabilities over location.

The phone/wireless device could access the web either through a user application or this could be done autonomously, where a web server that hosts the clearinghouse communicates over wireless or wired means with the wireless device. This can be done using low level formatting that would not be readable by a regular user, but which is loaded into memory of the wireless device.

The web server and clearinghouse may be central or distributed, and can store and represent the services, locations, frequencies, carrier/owners, and other information that would be useful for a wireless device to automatically determine what frequencies or applications or capabilities it might experience in a particular location on the globe. Global coordinates may be represented in many ways known to those skilled in the art, and the ability to autonomously access the web is well understood today.

Users may also, either by their own activities, or through the wireless device autonomously either known or unknown to the user, communicate updates or in-the-field readings of the various signals and capacities/bandwidths received by the wireless device in a particular location back to the clearinghouse. That is, wireless devices may report back (autonomously in a preferred embodiment) to the clearinghouse their user

experiences over a wide range of frequencies, bands, applications, along with the location of the wireless device. Figure 11 indicates a flow chart that shows how a mobile device provides information to the Clearinghouse, and how such information is applied to the location-specific database maintained by the Clearinghouse. The idea of using GPS or some other position location means, even if as crude as sensing what major tower or market or carrier signal or nearby TV or FM or AM transmitter, etc. is received by the wireless device (crude position locationing) could be used, as could more accurate TDOA or GPS methods. In any case, the invention contemplates the ability of users to report back to the Clearinghouse in step 1110, either in real time or when they become located where network access is easy or free, the measured quality and coverage and capabilities of wireless in a particular location/geographic region. The courseness of the geographic region may be determined based on speed of user, the application used by the user, or set by the Clearinghouse, or by many other methods. Similarly, the courseness or the position location may be specified or set by the Clearinghouse, and more value or cost or premium preference may be given to certain subscribers or users of the Clearinghouse who wish to have more accurate (fine resolution, say within a few meters, few hundred meters) of wireless spectrum quality/availability than those who are satisfied with course position locationing (say a few thousand meters).

The measurements reported back to the Clearinghouse by wireless users are added to the location specific database in step 1112, and just like the obtaining of various radio qualities and metrics for a particular location of the wireless user, may also be done without knowledge by the user, and may be done in an autonomous communication between the wireless device and clearinghouse.

This database can also be contributed to by users who wish to add/record their own experiences, either autonomously or manually through a public website offered by the Clearinghouse. Carriers could enter their own database into the web clearinghouse, or the clearinghouse could use bots or automated web crawlers to find websites from FCC, Chinese government, private or public company wesbsites, Comsearch, etc. to build a large database of spectrum availability and tower locations and bandwidths/services with a common website. Note that this Clearinghouse could also have users provide inputs as to their perceived or experiential views of radio coverage or phone/web quality at step

1114 when they were in a particular location. Note that the entry of this "performance" data could be added by users based on their own experience, and could also be provided by carriers based on their known infrastructure locations. Alternatively, phones of the future, equipped with GPS or any other type of location capability, could automatically, without any human interaction, upload to the website, on a periodic, one-time, infrequent, or regular basis, the perceived/measured radio reception quality, bitrate, capacity, availability, average use profile, average available profile, statistics on outage or reliability or coverage or capacity carrying capabilities, or an evaluation of the RF or end-user application performance, and this information may be loaded to the Clearinghouse for inclusion in the database that is available. The database is updated at step 1116 at various intervals that make sense for the implementation of the Clearinghouse (daily, hourly, by minute, by week, and this may be done on a global or on a specific location basis across the clearinghouse database, that itself may be distributed or located centrally). The updated information is made available to users on an ongoing basis, for further utility and enjoyment.

Reporters of RF quality and quality of the services, and access to the clearinghouse may be shared between carriers, user populations, owners, etc. so that information may be made available to update the global clearinghouse while providing those updates to large numbers of users who own wireless devices, for the improvement of operation of the wireless devices, or benefit to the carrier(s) or to the customers of wireless devices or customers of the wireless service access.

Once this clearinghouse is created, then future phones or wireless devices could access this Clearinghouse web site at step 1118, either conducted by the person who is the subscriber, or automatically by the phone device itself, or by the carrier or service provider, and could even be accessed by the application running on the mobile device that is intended to be used at the specific location, and over a wireless channel, to rapidly determine the type of coverage/ quality of coverage, the various vendors in the geographic region of the user, how to best send the message, how to conserve bandwidth, improve battery life, etc.

Figure 12 illustrates the flow diagram of how a mobile device may access the Clearinghouse, whether in the idle mode, or during a cellphone or internet session, or

whether connected to the internet via wireless or wired means. The mobile device is able to use the Clearinghouse-provided rankings of best service providers or air interface specifications and observations in order to enhance or optimize its own performance. This may simultaneously correspond to enhanced performance of the entire network that the phone is operating in. The wireless device is able to maintain a ranked list of preferred operating modes and carriers or services based on its current location, as well as estimated future locations, as it provided to the Clearinghouse. Future locations may be determined from past records maintained in the phone itself as to where it often in use (using past position location measurements), or future locations may be determined by the carrier, which may provide intermittent measurements of an end user's location. Alternatively, the Clearinghouse may maintain records of past usage and location information of particular end users, through low overhead wireless internet connections or through batched (stored) records from particular wireless devices.

The exchange between the end user mobile device and the Clearinghouse's worldwide web address (e.g. IP Address) requires a handshake so that users may be properly identified and properly monitored and controlled uniquely by the Clearinghouse at step 1210. Thus, there is a negotiated password/access that must take place whenever the mobile device attempts to connect with the Clearinghouse, and vice versa. This may be facilitated through the credit card sign up and password management application of the Clearinghouse, or may be a separate application under computer control. The end user's Mobile ID number (MIN), Electronic Serial Number (ESN), or some combination of data using one or both of these numbers may be used for registration/access to the Clearinghouse, and so that mobile devices may be identified uniquely through over the air or web-access data exchanges. Once identified, data can be sent to the phone from the Clearinghouse at step 1212, and the phone can be properly tuned to the best band service provider or be interfaced for minimum power drain at step 1214. The Clearinghouse will also allow reporters of information to be ranked based on their accuracy and collaboration with other reporters of quality/RF/services/information. Furthermore, the service providers or spectrum allocations, themselves, would be ranked by the Clearinghouse (e.g. at this Location, WiMax band is best, and gets 5 stars, whereas PCS Band has bad coverage or performance, and only gets 1 star, etc). This listing

information can be maintained in the phone at step 1216 and can be updated based on current and estimated future locations. Step 1218 shows that when the device is in motion , updates can be obtained automatically from the Clearinghouse. Individuals who report in their observations may also be ranked (.e.g. Bill Smith does a good job reporting quality of different radio bands and services near Austin, and gets 5 stars, or a 99% rating, as opposed to someone who frauds the system by reporting bogus measurements – the peer group or the web crawlers/data analysis of the database would find these outliers and give them lower rankings, say 1 star or 10% accuracy). These rankings could be weighted to give assessment of the entire radio spectrum and services/quality/coverage in any location on the earth. This will be a critical and vital invention for the future of multiband radios, and has clear applications in open-access wireless which is likely to evolve with the 700 MHz FCC spectrum auction, and the entrance of Google, Amazon, EBay/Skype into the wireless world. This invention also has strong impact and will assist the evolution of Cognitive or Software defined radios (SDRs).

Using the Clearinghouse for Local Advertising using wireless infrastructure

This invention may be extended further to allow for distributed wireless content, either provided through standard internet browsers, or through recorded, or real-time means in audio or video or multimedia or text formats, that may be transmitted through transmission to cellphone devices, computer devices, or other mobile devices or other devices that are connected using wireless transmission, known now or in the future, to be delivered on a location–specific basis. As mentioned above, media content may be audio, video, multimedia, or webpage based, as well as other forms that may be known now or in the future. This invention has particular applicability to local advertising, as advertising content is often difficult to provide through the worldwide web. Furthermore, this invention can be used generally for any type of content, not just advertisement content, that has specific value to users or viewers in specific geographic, physical locations. That is, the invention may be used for signage that provides location-specific content to wireless displays or wireless users, for example, or which, for example, provides information about movies that are playing in a movie theater to wireless users who are in the parking lot of the movie theater.

Today, the internet advertising industry has difficulty in providing location-based content, since people who log onto the web may be located anywhere in the world. For example, on a Google search page, ads that appear on the right hand column of the display, are generally not displayed in a location-specific basis. Indeed, access over the internet allows users from all over the planet to access a particular webpage, through a web address (an Internet Protocol address). Thus, the standard internet protocol does not allow a web server to know, ahead of time, the specific physical location of a particular browsing user. While there are techniques to improve the guess as to where web browsers are located, through the use of cookies and previously entered data by a fixed internet user, wireless communications (which includes optical communications, and all electromagnetic signals), based on the law of physics such as Friis free space equation, is the best way to provide local coverage, since wireless is limited in propagation distance based on a number of factors such as the radiated power of the transmitter, the height of the transmitting and receiving antenna, antenna gains, and carrier frequency, obstructions in the physical environment, etc. Thus, wireless provides a built in ability to ensure location-based advertising which has not been previously exploited. This invention describes a way that advertising content can be pushed to users within the radio frequency (RF) propagation range of mobile/portable/fixed users who are tuned to a specific transmitted signal. Similarly, the processes described herein have application for devices that are capable of receiving multiple transmitted signals, from multiple radiating sources, either simultaneously or in sequence, or sporadically.

The concept of today's internet-based advertising is to use generic, nationwide webpages, such as a typical webpage that may use banner ads to offer a product or service, or the use of banner ads on web blogs or other web pages, or adsense or adword ads (by Google, for example). However, the difficulty with these ads, from the standpoint of the advertiser, is that it is unknown where the specific user is physically located, thus it is very difficult to offer, in an efficient or market-driven manner, ads that are specifically local to the wireless users that might have interest (for example, a local coffee shop in a particular city would not want to pay for a national ad on a national webpage, but would rather pay only for those ads which are viewed specifically by mobile or fixed wireless

users who are in the same city/town or neighborhood of the café and who want to take advantage of special coffee specials.

One approach to provide location-based ads, is being pursued by Loopt, where they are working to sign up carriers in the cellular radio field. It was reported in December 2007 that Loopts has partnerships with Sprint Nextel and Boost Wireless. Loopt relies on users being able to run a middleware application on their cellphone device, which allows the mobile device to send its GPS coordinates through the cellular infrastructure, and based on the cellular infrastructure and GPS location, the location of user is determined, and an ad may be pushed to the device from the carrier network. See New York Times, Feb 6, 2008, Business Day article,"In CBS Test, Mobile ads find users"

In the invention, I approach location-based advertising in a different, and more efficient way than Loopt. The invention allows for the Clearinghouse and its database to be an integral and valuable part of a novel local advertising system and method, that uses readily available hardware to store, reformat, revise and transmit altered web pages that have specific local content. No middleware is required on the mobile/fixed wireless device in this invention, although in some embodiments it may be used for acquiring user data, and helping to cache or provision the invention in a more efficient manner.

By using the Clearinghouse and database for radio quality and service for wireless devices, and by maintaining an on-going list of performance records of users and infrastructure locations, it becomes possible to build a listing of towers, frequencies, types of service, users who have permission/access abilities to the network, coverage regions of a particular tower or transmitting signal, etc. as well as the physical location and proximity of users on one or more wireless services. However, even without the GPS information from users, one can provide location based advertising, as disclosed herein and in conjunction with the knowledge of towers, frequencies, and services offered.

Instead of having to determine the GPS location of each mobile user, as with Loopt, using the present invention it is possible to use the information of the specific tower or transmitter site in order to "alter" or "fill" the national webpage with specific, local ads in particular places on the displayed webpage. That is, a server, which may be remote or located at the same location as the wireless infrastructure providing the local

signal, would be used to alter, modify, or rewrite the "original" webpage, and then would transmit the 'localized" webpage over the local infrastructure, so that local advertisements would be used in place of national advertisements, in various places on a webpage, or in various audio or video fill locations, or in specific text messages that are tailored for specific locations.

In this manner, its possible for a national or international organization, or an international web portal, to be able to provide local, target-specific ads, through knowledge of the location of specific base stations. In addition, the clearinghouse system would further allow particular users to be monitored for what type of ads they use, how they select different links (in the case of a webpage) and the internet browsing patterns or effectiveness of the localized ads.

Figure 13 shows a diagram of local content wireless infrastructure. Figure 13 shows a computerized Clearinghouse system, that may be a web-server, or multiple servers, that may be located at, near, or remote from the base station infrastructure 1310 or 1312, whereby this server 1314 (or group of servers) may be provided the local-advertising information, in a machine readable format that allows the server 1314 to "override" or replace the national webpage server in particular parts of the displayed webpage at the mobile/fixed wireless device. Note that the fixed infrastructure at the edge of the wireless network, shown as a base transceiver station (BTS) or Switch or WLAN access point 1316, is connected to the Internet 1318 through an IP network 1320 backbone. The Clearinghouse 1322 is also connected to the IP Network 1320, thus it is possible to couple the Clearinghouse 1322 content to the edge infrastructure 1316, as contemplated above (see Figures 1, 5, 6, 7, 8 and 9, for example). The Clearinghouse 1322 provides format information for the content server (also called an ad server) , so that the content server 1314 knows what content to offer, and how to integrate the local content it has to offer along with the standard content provided over the wireless network. Noted that Clearinghouse 1322 can be copied to the local ad server 1314. The local advertising content or content from the Clearinghouse 1322 is transmitted to the mobile or fixed device 1324, thereby assuring delivery of localized advertising to the mobile or fixed device 1324.

The local content server 1314 is shown coupled to the edge infrastructure 1316 in Figure 13. This local content server 1314 may receive copies of local content as provided by the Clearinghouse 1322, or may obtain content from other sources over the worldwide web, under the control of the Clearinghouse 1322. Note, however, the local content server 1314 may be located remotely from the edge, or it may alternatively be embedded within the hardware of the edge infrastructure 1316. Since there is internet connectivity, the physical location of the content server 1314 doesn't matter tremendously, unless very high speed traffic is contemplated, in which case providing the server near the edge infrastructure 1316 is the best choice.

Using the position-tagged listing of wireless assets for one or multiple bands, and one or multiple carriers, the disclosed invention provides the ability to provide local advertising content for transmission in the datastreams at particular local infrastructure locations. This may be done by providing content for a localized ad (or other content) in a computer file, and then providing a format for said content within the file so that it may be conveniently packaged/placed, as either a banner or pop-up or adword type or other form suitable for use on a partial webpage display that is transmitted by the edge infrastructure 1316. The mobile or fixed device 1324 receives the local advertising content from the infrastructure 1310 and 1312, and establishments desiring localized advertisements to devices within range of the infrastructure can be assured of a more targeted advertising campaign.

Figure 14 shows a flow chart that allows local advertisers or local content providers to access the Clearinghouse system through the worldwide web, where the local advertisers can create and alter localized content. When the content is created at step 1410 and loaded onto the Clearinghouse system at step 1412, the advertiser is then able to use the Clearinghouse to specify the format of their local content at step 1414, and view it at step 1416 as it will appear in the local edge transmissions, and may select geographical areas, cities, or specific locations at step 1418 where the local content may appear. The Clearinghouse may use its billing application to receive revenues at step 1420 for local advertisers, and the local content is then loaded into the Clearinghouse, and may be distributed to the network edge servers at step 1422. As noted in Figure 14, the order of steps can vary, and the process allows the advertiser to alter, draft, and create

in an iterative fashion to achieve the content or style that is desired and to better identify the targeted audience. In some embodiments, the advertising may be distributed to a plurality of local ad servers 1420 (e.g., distribution to multiple states during a primary campaign season for a national elected office, etc.) Also, as noted in Figure 14, some of the steps are optional and can be varied in the practice of the invention. For example, instead of a monetary payment, the advertiser may provide some other form of service in exchange for the local advertising afforded by the invention.

Figure 15 shows how the local ad server continually checks the web pages that are accessed by the local users in the vicinity of the edge infrastructure. Once a local advertiser has registered with the Clearinghouse, and has placed its content on the Clearinghouse (and also the local ad servers, if caching is done), then the local content provider's web address is added to a list of local advertisers. When any webpage is requested by a local wireless user at step 1510, the local ad server (or, alternatively, the Clearinghouse or the edge infrastructure itself) searches the list of local advertisers at step 1520, and if a local advertiser's web address is received at step 1530, the local ad server replaces the "normal" national webpage with the content specified in the local format at step 1540. This modified, local format web page is then passed to the edge infrastructure at step 1550 for transmission over the local edge network. It should be clear that while web pages are discussed here, any type of content could be replaced, and any type of local content could be inserted in this manner. If the local advertiser's web address is not received the requested web page is retrieved at step 1560.

The local webpage may be of ordinary form, with the local content in standard form as would be used for display on a wireless device (such as a laptop or cellphone). Then, a server computer or computers is used to take a source webpage (say from the national or the standard template provided over the internet) to then alter the datastreams transmitted from the local infrastructure, being different from the datastream obtained from the source (such as a national webpage), and altered specifically for the specific physical location of the transmitter tower, or group of towers, or infrastructure that is located in some physical location such that wireless coverage is provided within a specified geographical range. The transmitted local webpage is altered efficiently based on the format of the local content file, which provides instructions as to where,

specifically on the web page, the local ad should be placed. This placement may either replace an ad on the national webpage, or it could be a complete replacement of the national webpage with a custom local webpage, or some other content could be made to be transmitted from the local infrastructure.

This allows an advertiser to have local information filled in the proper locations on a web page display, or at the proper time sequence or file location in an audio or video or multi-media transmission. This also allows web portals such as Google or Yahoo or Ebay or any other to provide localized advertising without requiring a specific GPS coordinate for each user in its region, thereby preserving valuable wireless resources that would otherwise be used up to provide position acquisition and handshaking between the wireless infrastructure and the mobile device.

The invention also has the ability to measure web statistics, web page viewing, information about the use, page views, and click-through activity of localized advertisement or content webpages that are provided by the Clearinghouse or the local ad-server. It is understood that web hits may be counted and tabulated, using many commercial providers of such web statistics, or may be implemented by software running at the local content server, or at the Clearinghouse, in order to count the various views and uses of webpages by local end users. This data would be valuable for justifying and presenting the value and utility of local ad or local content provisions to the owner of the wireless network, as well as determining formats, presentation techniques, delay times, and other technical and non-technical implementation of local content for improved activity, use, and monetization.

The Clearinghouse could maintain a large archive of local advertisement files, and formats, that could be used and invoked over multiple bands and for one or many carriers and services that could be provided over wireless infrastructure for specific locations on earth. This invention can be extended to work for different kinds of wireless infrastructures and devices, for example WiFi LANs are different than cellular/WiMax/LTE systems, which are different than standard 2.5 cellular. The advertising system could be used in conjunction with the clearinghouse system described above, and one can envision this type of local advertising system being available for each type of service or carrier, or for a specific set of infrastructure (e.g. a WLAN system in a

convention center, where our invention would provide specific local advertising for the specific convention center, whereas other convention centers around the world would have their own specific ads placed on their web pages). This invention could also be used to provide local ad content and information for all types of infrastructures and wireless standards from a single clearinghouse.

It is envisioned that the local ad content can be updated by a specific advertiser, where they are able to access a web portal and format their ad, along with payment for their ad, and having the ability indicate which city, specific tower locations, or specific geographies they would like to have their ad appear on. Furthermore, they may pick if they want continual, or partial time ad placements, which would be at differing costs.

The advertiser would have the ability to view through the web portal what their ad would look like to mobile users in the specific selected geographic area, and they could compare that to the template, or national website.

Figures 13 through 15 illustrate an exemplary embodiment of how the local ad sever and Clearinghouse work together. They may be the same device, or information from the Clearinghouse may be copied, in part or in whole, to the local ad server. The local ad server, itself, may be collocated with base station or network provider infrastructure, or itself may be remote and addressable, although speed is of the essence to allow the localized webpage to quickly be revised and sent out over the infrastructure. It should be clear, however, that this disclosure is not limited to advertising, but any type of content may be applicable (e.g., localized emergency alerts; localized traffic announcements, etc.).

While the invention has been described in terms of several embodiments, it will be recognized that the invention can be practiced in a variety of forms within the scope of the appended claims.

CLAIMS

What is claimed is:

1. A system, comprising:

means for receiving end user location information and quality or service information of one or more communications networks for end users of said one or more communications networks, said quality or service information comprising coverage, outage or performance information of said one or more communications networks;

means for storing said end user location information and said quality or service information;

means for managing, controlling and updating said means for storing; and

means for providing access to quality or service information stored by said means for storing.

2. The system of Claim 1 wherein said means for providing access to quality or service information comprises means for reporting quality or service information to one or more carriers.

3. The system of Claim 1, further comprising means for generating a recommended operating band, operating mode, communications network or carrier for an end user communications device based on end user location information received by said means for receiving.

4. The system of Claim 3 wherein said means for generating a recommended operating band, operating mode, communication network or carrier is further based on quality or service information received by said means for receiving.

5. The system of Claim 1, further comprising means for providing end user access to quality or service information stored by said means for storing to end users of said one or more communications networks.

6. The system of Claim 5 wherein said means for providing end user access comprises means for reporting quality or service information to said end users.

7. The system of Claim 1, further comprising means for providing access to quality or service information stored by said means for storing to a party or parties other than end users and carriers of said one or more communications networks.

8. A method of collecting and providing access to quality or service information associated with one or more communications networks, comprising:

using a computer, receiving for end users of one or more communications networks end user location information and quality or service information of said one or more communications networks, said quality or service information comprising coverage, outage or performance information of said one or more communications networks;

storing, by action of said computer, said end user location information and said quality or service information in a memory or database;

managing, controlling and updating by action of said computer said memory or database; and

providing access to quality or service information stored in said memory or database to one or more users through a communications interface coupled to said computer.

9. The method of Claim 8 wherein said one or more users comprises one or more end users of said one or more communication networks.

10. The method of Claim 8 wherein said one or more users comprises one or more carriers.

11. The method of Claim 10 wherein providing access to quality or service information stored in said memory or database includes reporting quality or service information to said one or more carriers.

12. The method of Claim 10, further comprising by action of said computer:

processing said quality or service information; and

generating quality or availability-of-service information of services offered by said one or more carriers.

13. The method of Claim 12 wherein said quality or availability-of-service information comprises quality or availability-of-service information of services offered by a plurality of carriers.

14. The method of Claim 13 wherein said quality or availability-of-service information is location specific.

15. The method of Claim 8 wherein said computer comprises a server configured to generate and serve data from end user location information and quality or service information stored in said memory or database.

16. The method of Claim 15 wherein said data comprises a recommended operating band, operating mode, communications network and/or carrier for end users.

17. The method of Claim 16 wherein said server comprises a web server and said data is formatted as one or more web pages served to said end users.

18. The method of Claim 15 wherein said computer is configured to serve said data to one or more carriers.

19. The method of Claim 8 wherein providing access to quality or service information stored in said memory or database comprises providing access to a party or parties other than end users and carriers of said one or more communications networks.

20. A system for collecting and providing access to quality or service information of one or more communications networks, comprising:

a computer configured to receive for end users of one or more communications networks end user location information and quality or service information of said one or more communications networks, said quality or service information comprising coverage, outage or performance information of said one or more communications networks;

a memory or database configured to store the received end user location and quality or service information; and

an interface through which one or more users access quality or service information stored in said memory or database.

21. The system of Claim 20 wherein said one or more users comprises one or more end users of said one or more communication networks.

22. The system of Claim 20 wherein said one or more users comprises one or more carriers.

23. The system of Claim 22 wherein said computer is configured to report quality of service information stored in said memory or database to said one or more carriers.

24. The system of Claim 22 wherein said computer is further configured to:

process said quality or service information; and

generate quality or availability-of-service information of services offered by said one or more carriers.

25. The system of Claim 24 wherein said quality or availability-of-service information comprises location-specific quality or availability-of-service information of services offered by a plurality of carriers.

26. The system of Claim 20 wherein said computer comprises a server configured to generate and serve data from end user location information and quality or service information stored in said memory or database.

27. The system of Claim 26 wherein said data comprises a recommended operating band, operating mode, communications network and/or carrier for end users.

28. The system of Claim 27 wherein said server comprises a web server and said data is formatted as one or more web pages served to said end users.

29. The system of Claim 26 wherein said computer is configured to serve said data to one or more carriers.

30. The system of Claim 20 wherein said computer is configured to provide access to quality or service information stored in said memory or database, via said interface, to a party or parties other than end users and carriers of said one or more communications networks.

31. A method of building and providing access to a database for extending the use of, or improving the operation of, carrier-based networks, comprising:

collecting, using a computer, carrier information of one or more carriers and property information associated with property available for possible use by said one or more carriers ;

storing in a database, by action of said computer, said carrier information and said property information; and

providing access to carrier information and property information stored in said database through an electronic interface coupled between said computer and the Internet.

32. The method of Claim 31, further comprising, using said computer, negotiating a business transaction between a carrier and an end user of a service provided by said carrier using property information stored in said database.

33. The method of Claim 31 wherein providing access to carrier information and property information stored in said database comprises granting access to one or more parties other than said one or more carriers and end users of carrier-based services provided by said one or more carriers.

34. The method of Claim 33 wherein said one or more parties comprises one or more content providers.

35. The method of Claim 33 wherein said one or more parties comprises one or more advertisers.

36. The method of Claim 31 wherein collecting said carrier information comprises collecting information concerning availability of services provided by said one or more carriers.

37. The method of Claim 31 wherein collecting said carrier information comprises collecting information concerning quality or services provided by said one or more carriers.

38. The method of Claim 31 wherein collecting said carrier information comprises collecting infrastructure information relating to infrastructure used by said one or more carriers.

39. The method of Claim 31 wherein said electronic interface comprises a human viewable web-page.

40. The method of Claim 31 wherein said electronic interface comprises internet addressing without a visible web page interface.

41. The method of Claim 31 wherein providing access to carrier information and property information stored in said database comprises granting access to said one or more carriers.

42. The method of Claim 31 wherein providing access to carrier information and property information stored in said database comprises granting access to end users one or more carrier-based services provided by said one or more carriers.

43. A clearinghouse system, comprising:

a clearinghouse database configured to store property information and carrier infrastructure information of carrier infrastructure dispersed over a geographical region, said carrier infrastructure information including information of carrier infrastructure installed or attached to dwellings or premises of property owners in said geographical region;

a computer configured to manage and update said clearinghouse database, said computer having a server configured to serve data based on carrier infrastructure information stored in said clearinghouse database; and

an interface through which property information is received by said computer and stored in said clearinghouse database.

44. The clearinghouse system of Claim 43, further comprising a carrier interface through which one or more carriers access property information stored in said clearinghouse database.

45. The clearinghouse system of Claim 43 wherein said property information includes information about property available for possible use by a carrier of a carrier-based service.

46. The clearinghouse system of Claim 45 wherein said property information further includes information of property that is subject to contractual, legal, government or zoning restrictions.

47. The clearinghouse system of Claim 43 wherein said computer is configured to match a property need or property specification of a carrier with one or more property records stored in said clearinghouse database.

48. The clearinghouse system of Claim 43 wherein said computer is configured to receive and store in said clearinghouse database coverage or reception quality information of end users of one or more communications networks.

49. The clearinghouse system of Claim 48 wherein said computer is further configured to serve coverage or reception quality data using coverage or reception information stored in said clearinghouse database.

50. The clearinghouse system of Claim 43 wherein said computer is configured to receive and store in said clearinghouse database service information of a plurality of different services provided by one or more carriers over one or more networks.

51. The clearinghouse system of Claim 50 wherein said computer is further configured to serve service data using service information stored in said clearinghouse database.

52. The clearinghouse system of Claim 43 wherein said computer is configured to receive and store in said clearinghouse database bandwidth and capacity information of one or more communications networks.

53. The clearinghouse system of Claim 52 wherein said computer is further configured to serve bandwidth and capacity data using bandwidth and capacity information stored in said clearinghouse database.

54. The clearinghouse system of Claim 43 wherein said computer is configured to receive and store in said clearinghouse database coverage or reception quality information of one or more communications networks.

55. The clearinghouse system of Claim 54 wherein said computer is further configured to serve coverage or reception quality data using coverage or reception quality information stored in said database.

56. A clearinghouse system, comprising:

means for storing property information and carrier infrastructure information of carrier infrastructure dispersed over a geographical region, said carrier infrastructure information including information of carrier infrastructure installed or attached to dwellings or premises of property owners in said geographical region;

means for processing said property and carrier infrastructure information;

means for receiving property information for processing by said means for processing and storing by said means for storing;and

means for serving data based on carrier infrastructure information stored by said means for storing.

57. The clearinghouse system of Claim 56, further comprising means for providing one or more carriers access to property information stored by said means for storing.

58. The clearinghouse system of Claim 56 wherein said property information includes information about property available for possible use by a carrier of a carrier-based service.

59. The clearinghouse system of Claim 58 wherein said property information further includes information of property that is subject to contractual, legal, government or zoning restrictions.

60. The clearinghouse system of Claim 56, further comprising means for matching a property need or property specification of a carrier with one or more property records stored in said clearinghouse database.

61. The clearinghouse system of Claim 56, further comprising means for receiving and storing coverage or reception quality information of end users of one or more communications networks.

62. The clearinghouse system of Claim 61, further comprising means for serving coverage or reception quality data using coverage or reception information received and stored by said means for receiving and storing coverage or reception quality information.

63. The clearinghouse system of Claim 56, further comprising means for receiving and storing service information of a plurality of different services provided by one or more carriers over one or more networks.

64. The clearinghouse system of Claim 63, further comprising means for serving service data using service information received and stored by said means for receiving and storing service information.

65. The clearinghouse system of Claim 56, further comprising means for receiving and storing bandwidth and capacity information of one or more communications networks.

66. The clearinghouse system of Claim 65, further comprising means for serving bandwidth and capacity data using bandwidth and capacity information received and stored by said means for receiving and storing bandwidth and capacity information.

67. The clearinghouse system of Claim 56, further comprising means for receiving and storing coverage or reception quality information of one or more communications networks.

68. The clearinghouse system of Claim 67, further comprising means for serving coverage or reception quality data using coverage or reception quality information received and stored by said means for receiving and storing coverage or reception quality information.

69. A method of collecting and providing access to property and network information, comprising:

collecting, using a computer, property information and carrier infrastructure information of carrier infrastructure dispersed over a geographical region, said carrier infrastructure information including information of carrier infrastructure installed or attached to dwellings or premises of property owners in said geographical region;

storing, by action of said computer, said property information and carrier infrastructure information in a memory or database;

managing, controlling and updating, by action of said computer, said memory or database; and

providing access to property information stored in said memory or database.

70. The method of Claim 69 wherein providing access to property information stored in said memory or database comprises providing access to one or more carriers.

71. The method of Claim 69 wherein said property information includes information about property available for possible use by a carrier of a carrier-based service.

72. The method of Claim 71 wherein said property information further includes information of property that is subject to contractual, legal, government or zoning restrictions.

73. The method of Claim 69, further comprising, by action of said computer, matching a property need or property specification of a carrier with one or more property records stored in said memory or database.

74. The method of Claim 73, further comprising serving matched property need or matched property specification data to one or more carriers.

75. The method of Claim 69, further comprising, by action of said computer, receiving and storing in said memory or database coverage or reception quality information of end users of one or more communications networks.

76. The method of Claim 75, further comprising serving coverage or reception quality data using coverage or reception information stored in said memory or database.

77. The method of Claim 69, further comprising, by action of said computer, receiving and storing in said memory or database service information of a plurality of different services provided by one or more carriers over one or more networks.

78. The method of Claim 77, further comprising serving service data using service information stored in said memory or database.

79. The method of Claim 69, further comprising, by action of said computer, receiving and storing is said memory or database bandwidth and capacity information of one or more communications networks.

80. The method of Claim 79, further comprising serving bandwidth and capacity data using bandwidth and capacity information stored in said memory or database.

81. The method of Claim 69, further comprising, by action of said computer, receiving and storing in said memory or database coverage or reception quality information of one or more communications networks.

82. The method of Claim 81, further comprising serving coverage or reception quality data using coverage or reception quality information stored in said memory or database.

Abstract

A computerized system, method and process allows telecommunications carriers to find, evaluate and select locations for equipment through direct access to end users, while providing citizens the opportunity to offer the use of their dwelling or other assets to carriers. The system and method further provides a computerized mechanism for (a) creating an inventory and marketplace for available properties for use in telecommunications networks, (b) providing quality and/or performance monitoring and control for wireless communication systems based on data in the clearinghouse, and (c) providing localized content over wireless networks using the clearinghouse.

Fig. 1 Clearinghouse System

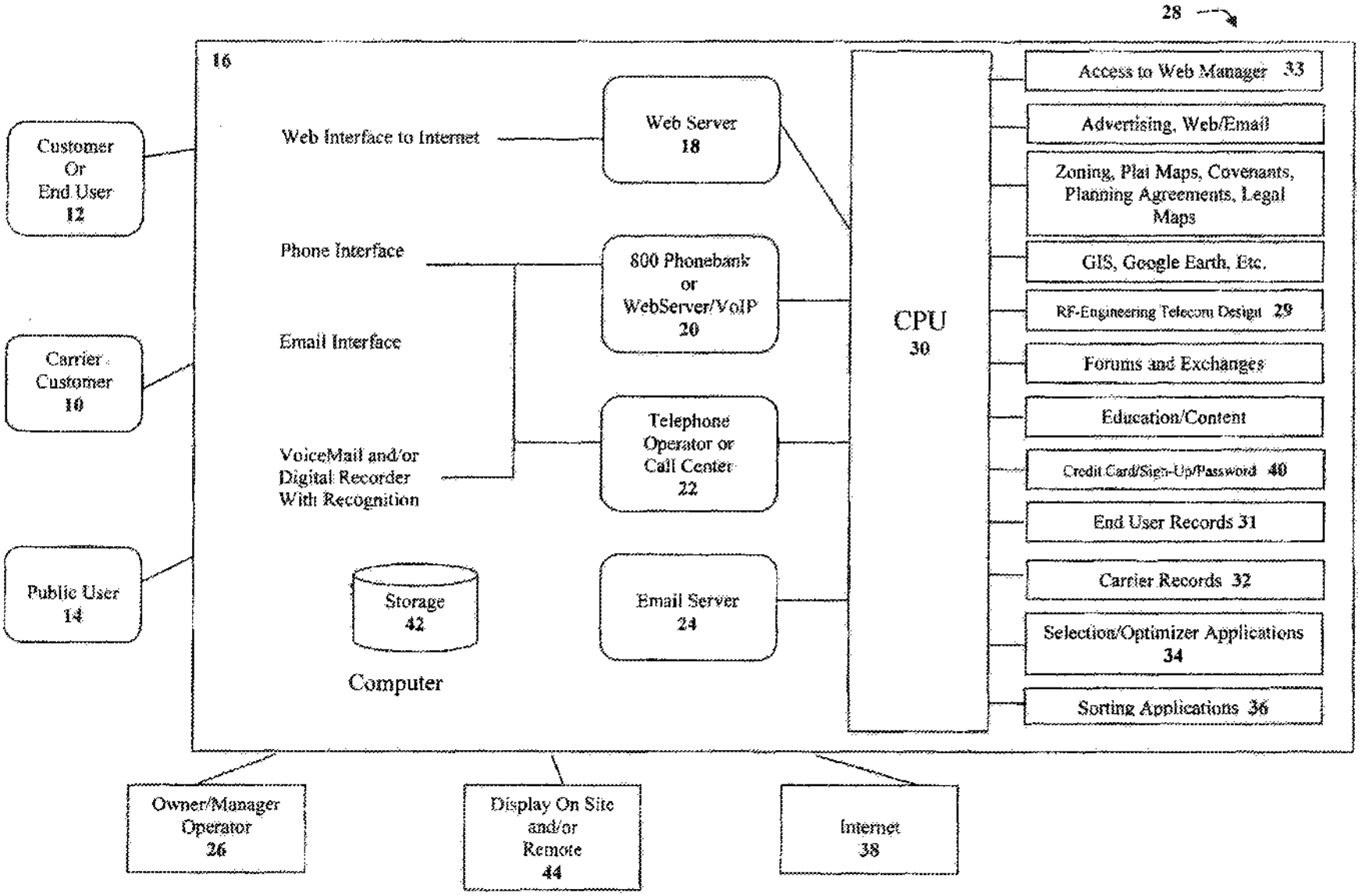


Fig. 2 All Records

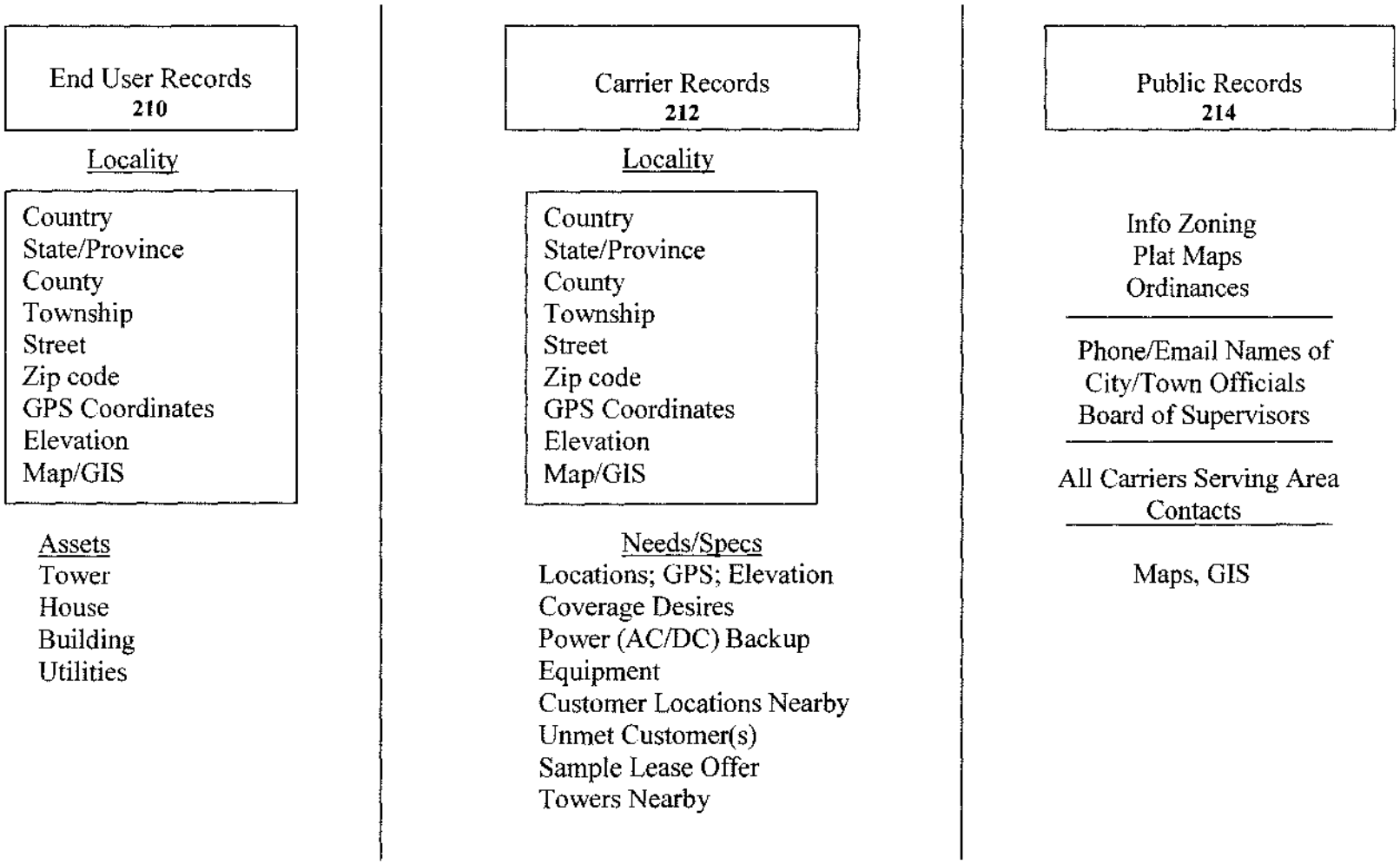


Fig. 3

End User Form

Name
Address
Phone/Email
Own or Rent?
Property Size
Identify Plat Map or Similar
Locator_____
Call_____

Your Interests:

I have a: Tower ☐
Rooftop ☐
Outbuilding ☐
Church Steeple ☐
AC Power ☐
Backup or Generator ☐

I would like: Free Internet ☐
Installed Tower ☐
Installed Generator ☐
Monthly credit on service ☐
Nothing ☐

Click On Map 310

Carrier Form

Name
Address
Phone/Email
Market_____

Number of Customers Currently in Market_____

Number of Desired Customers in Market_____

Enter GPS Coordinates of Current Equipment

Number of Sites:

Site 1 Latitude____ Longitude____
Site 2 Latitude____ Longitude____
Site 3 Latitude____ Longitude____

Specific Needs:

Towers ☐
AC ☐
AC Backup ☐
Cable Right of Way ☐
Storage Barn ☐
Base Station ☐

Click On Map 311

Fig. 4

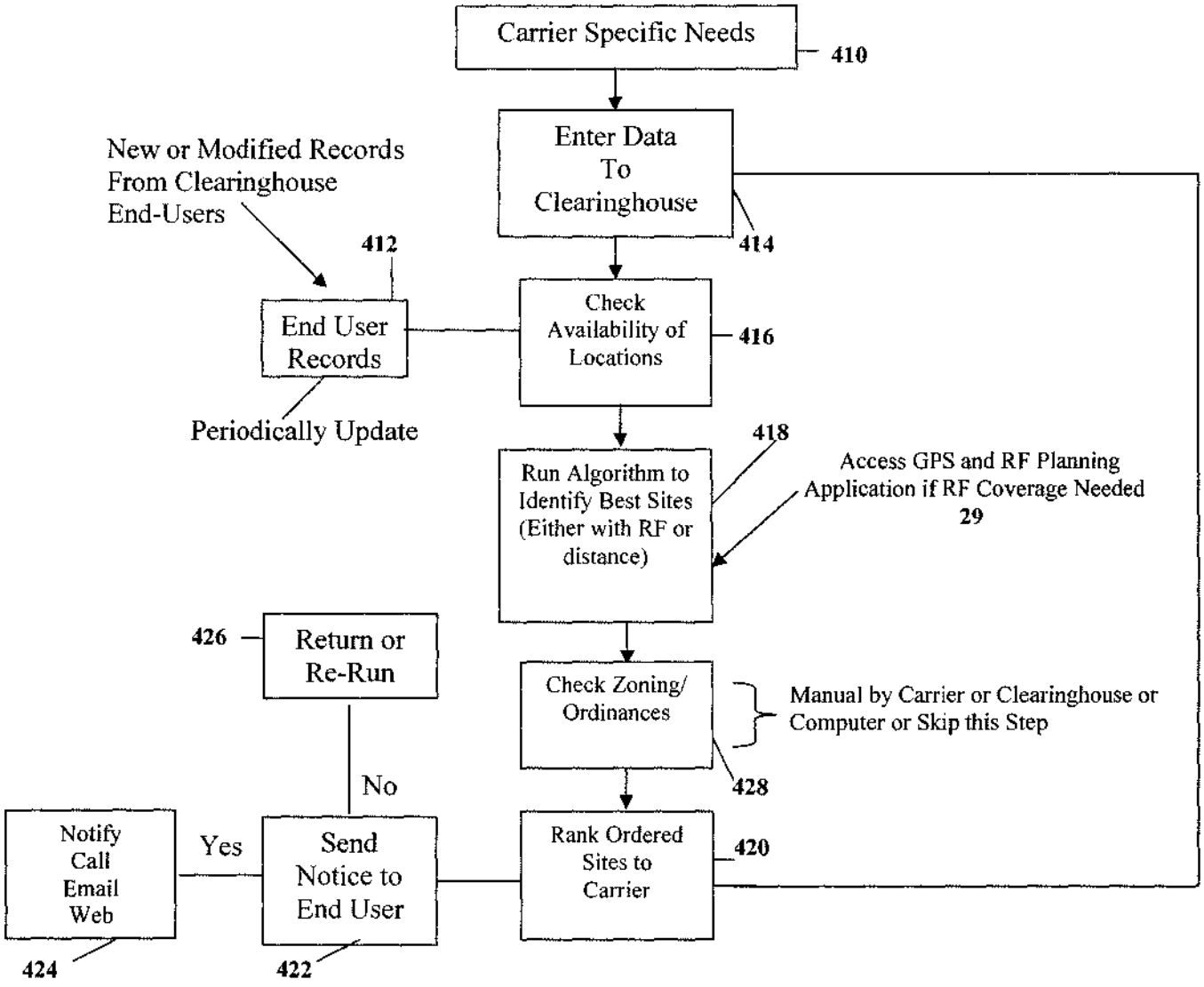

Carrier Specific Needs
410
Enter Data To Clearinghouse
414
New or Modified Records From Clearinghouse End-Users
412
End User Records
Periodically Update
Check Availability of Locations
416
418
Run Algorithm to Identify Best Sites (Either with RF or distance)
Access GPS and RF Planning Application if RF Coverage Needed
29
426
Return or Re-Run
Check Zoning/ Ordinances
Manual by Carrier or Clearinghouse or Computer or Skip this Step
428
No
Notify Call Email Web
Yes
Send Notice to End User
Rank Ordered Sites to Carrier
420
424
422

Fig. 5

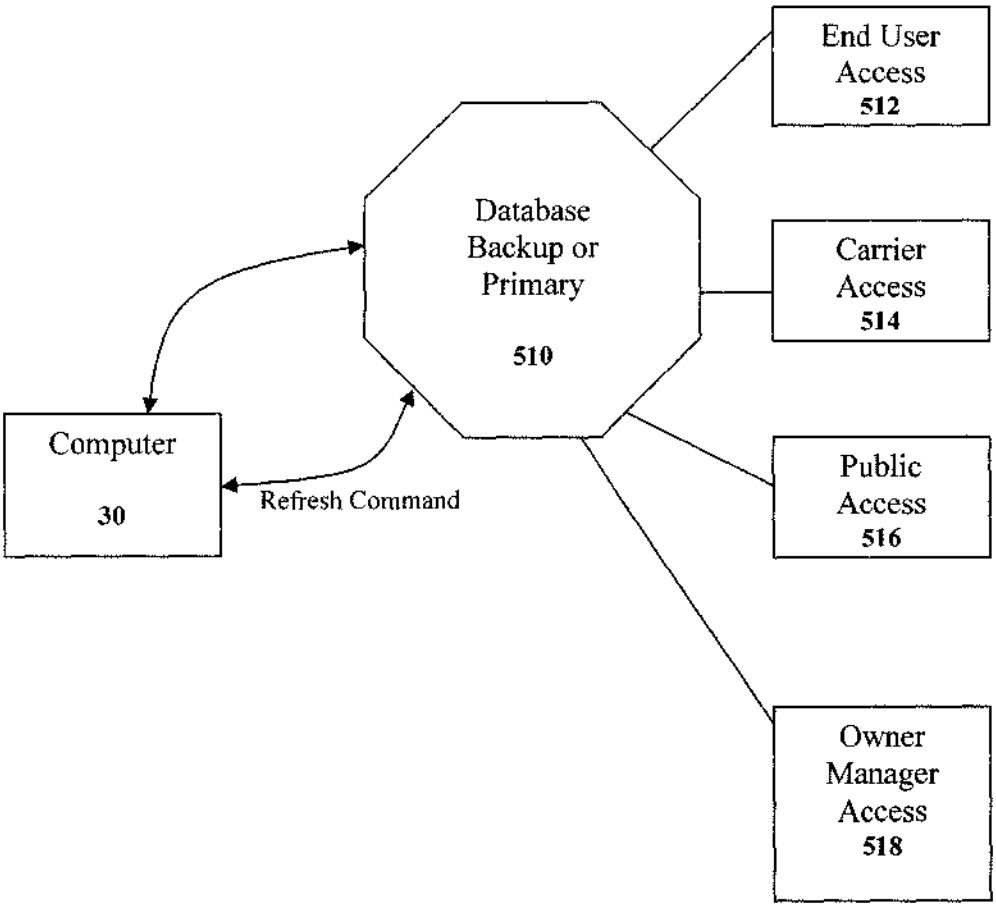

End User Access 512
Database Backup or Primary 510
Carrier Access 514
Computer 30
Refresh Command
Public Access 516
Owner Manager Access 518

Fig. 6

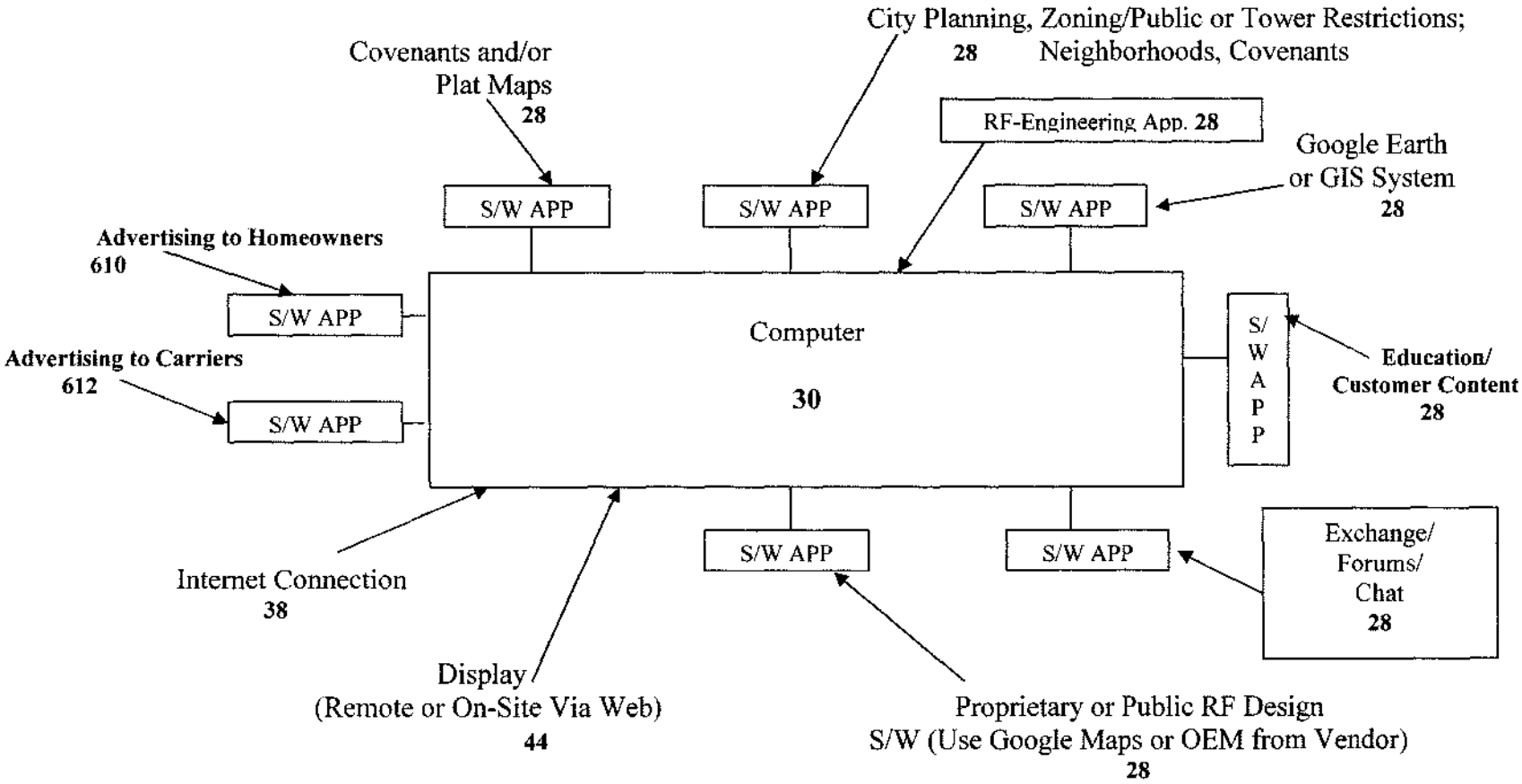

City Planning, Zoning/Public or Tower Restrictions;
28 Neighborhoods, Covenants
Covenants and/or
Plat Maps
28
RF-Engineering App. 28
Google Earth
or GIS System
28
S/W APP
S/W APP
S/W APP
Advertising to Homeowners
610
S/W APP
Advertising to Carriers
612
S/W APP
Computer
30
S/
W
A
P
P
Education/
Customer Content
28
S/W APP
S/W APP
Exchange/
Forums/
Chat
28
Internet Connection
38
Display
(Remote or On-Site Via Web)
44
Proprietary or Public RF Design
S/W (Use Google Maps or OEM from Vendor)
28

Fig. 7

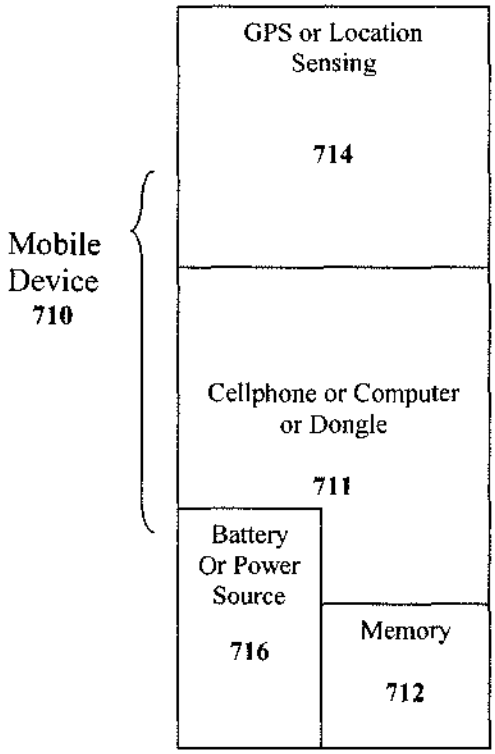
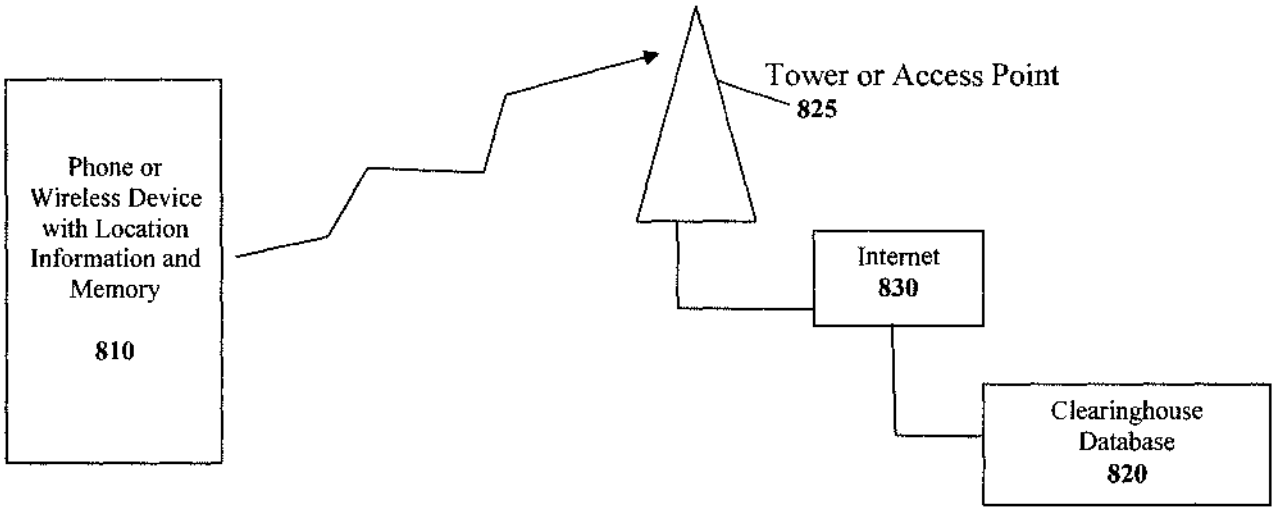

GPS or Location Sensing
714
Mobile Device
710
Cellphone or Computer or Dongle
711
Battery Or Power Source
716
Memory
712

Fig. 8



Phone reports back its "observations" to Clearinghouse

Fig. 9

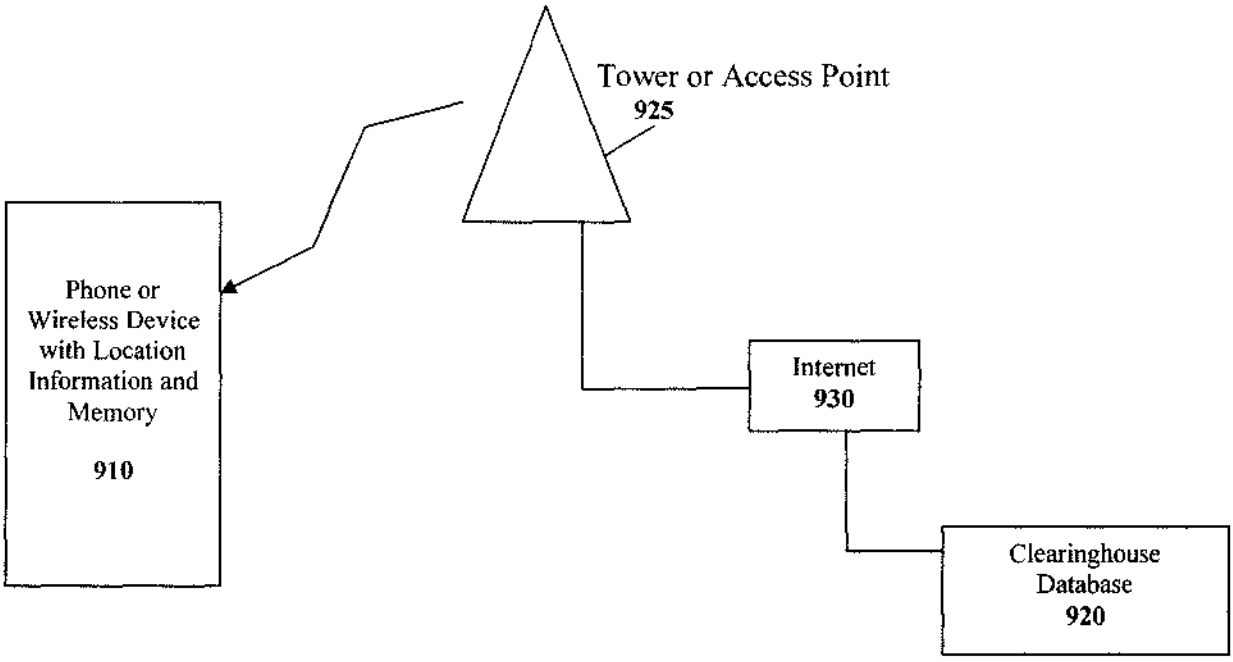

Tower or Access Point
925
Phone or Wireless Device with Location Information and Memory
910
Internet
930
Clearinghouse Database
920

Fig. 10

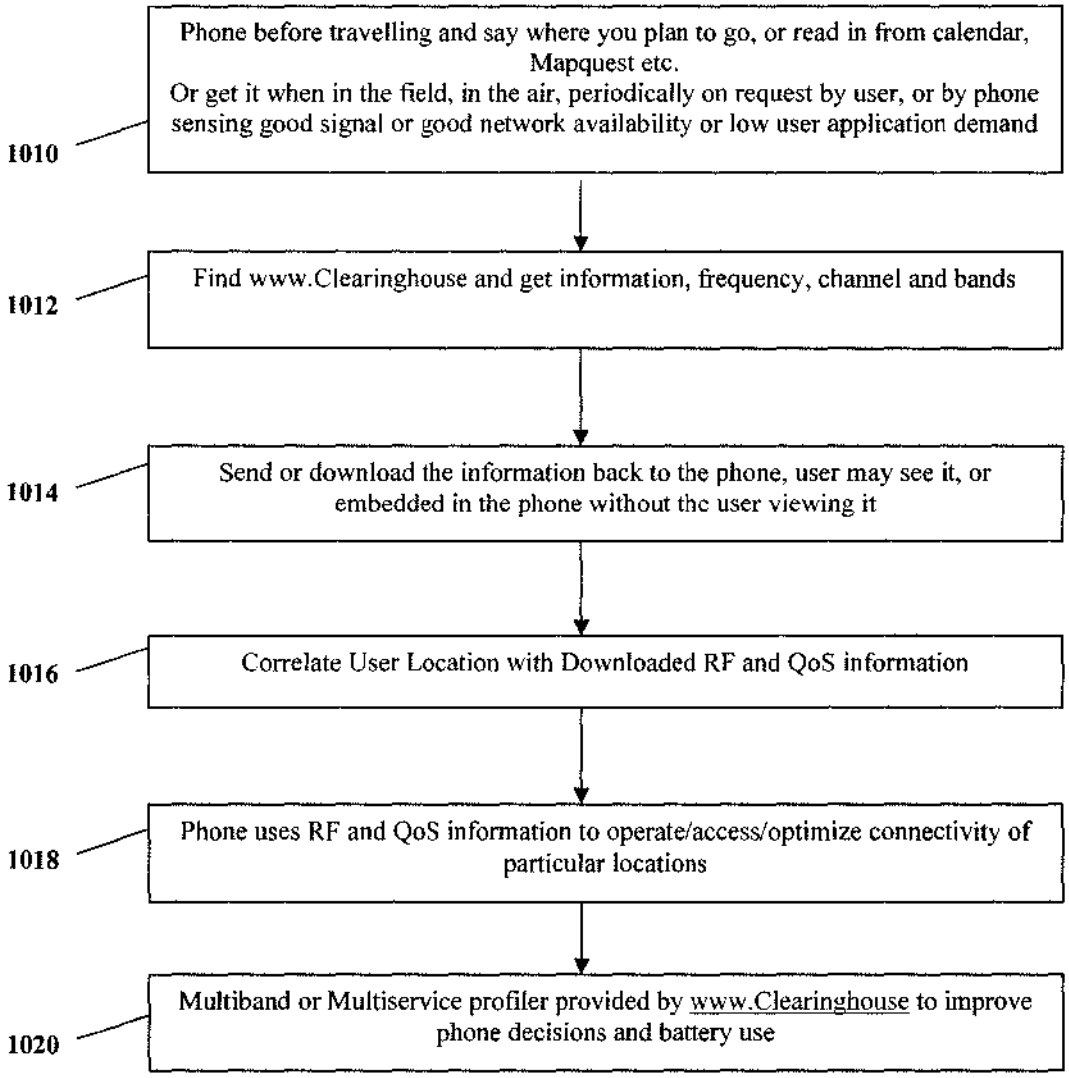

Phone before travelling and say where you plan to go, or read in from calendar, Mapquest etc.
Or get it when in the field, in the air, periodically on request by user, or by phone sensing good signal or good network availability or low user application demand
1010
Find www.Clearinghouse and get information, frequency, channel and bands
1012
Send or download the information back to the phone, user may see it, or embedded in the phone without the user viewing it
1014
Correlate User Location with Downloaded RF and QoS information
1016
Phone uses RF and QoS information to operate/access/optimize connectivity of particular locations
1018
Multiband or Multiservice profiler provided by www.Clearinghouse to improve phone decisions and battery use
1020

Fig. 11

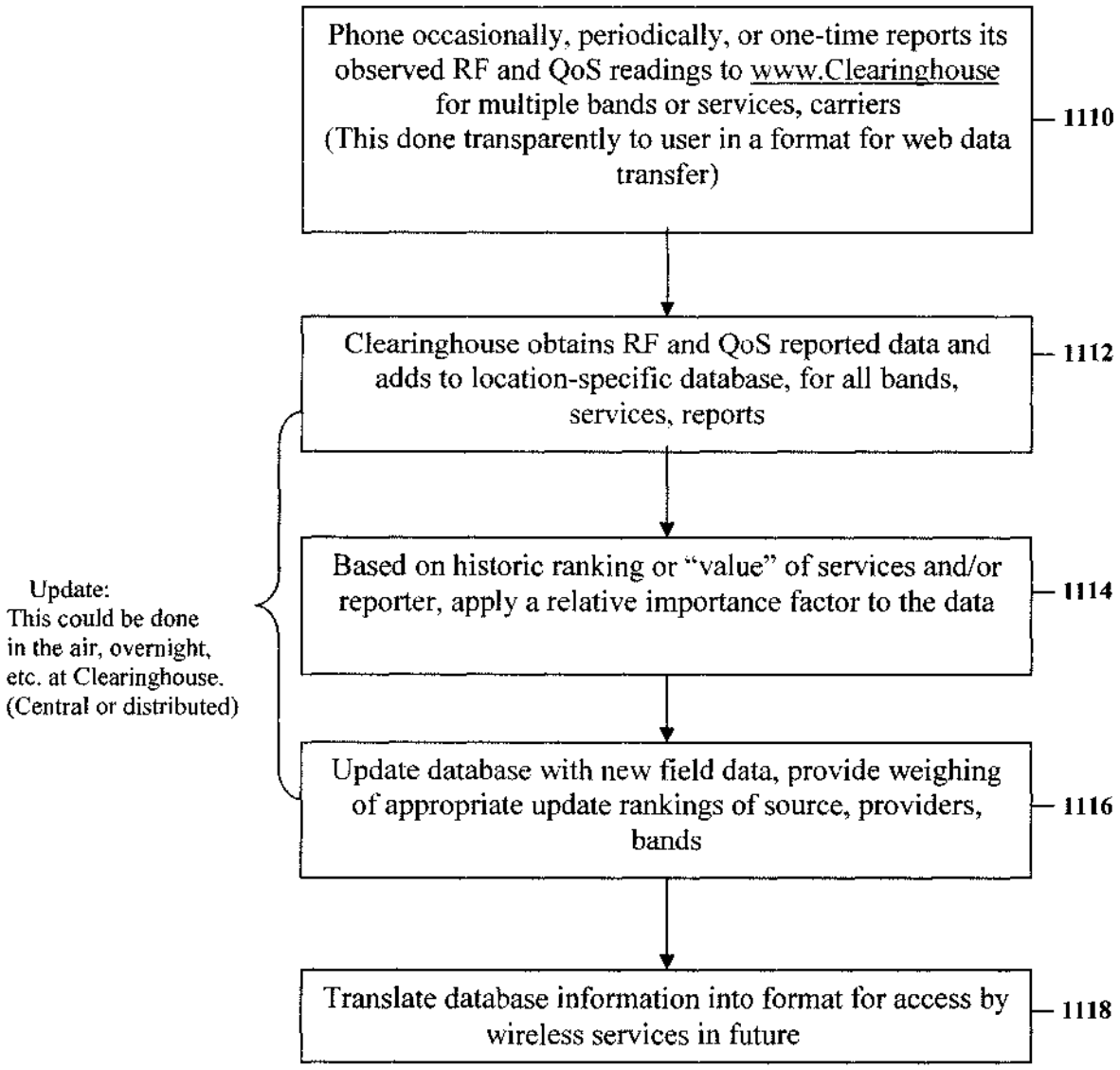

Phone occasionally, periodically, or one-time reports its observed RF and QoS readings to www.Clearinghouse for multiple bands or services, carriers (This done transparently to user in a format for web data transfer)
1110
Clearinghouse obtains RF and QoS reported data and adds to location-specific database, for all bands, services, reports
1112
Based on historic ranking or "value" of services and/or reporter, apply a relative importance factor to the data
1114
Update database with new field data, provide weighing of appropriate update rankings of source, providers, bands
1116
Translate database information into format for access by wireless services in future
1118
Update:
This could be done in the air, overnight, etc. at Clearinghouse. (Central or distributed)

Fig. 12

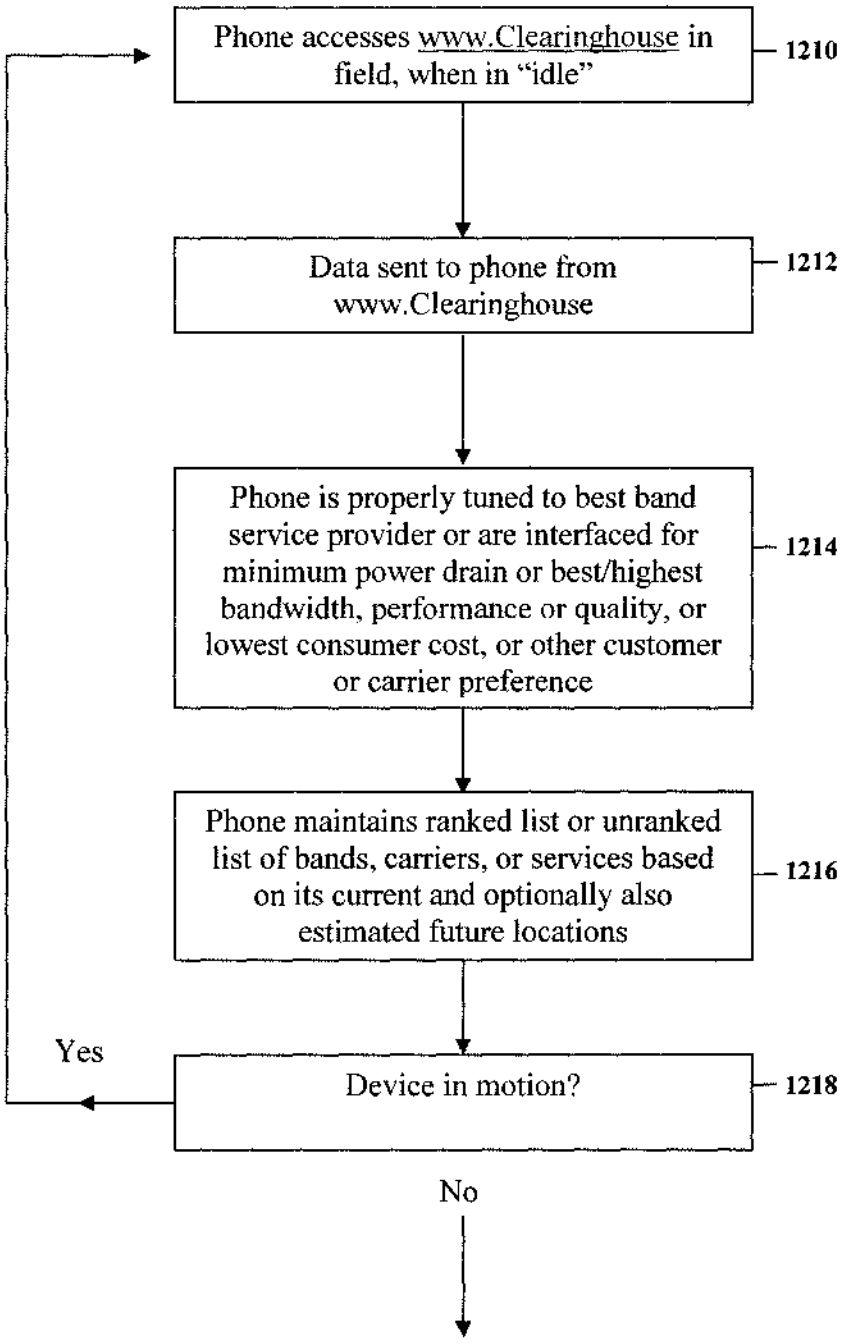

Phone accesses www.Clearinghouse in field, when in "idle"
1210
Data sent to phone from www.Clearinghouse
1212
Phone is properly tuned to best band service provider or are interfaced for minimum power drain or best/highest bandwidth, performance or quality, or lowest consumer cost, or other customer or carrier preference
1214
Phone maintains ranked list or unranked list of bands, carriers, or services based on its current and optionally also estimated future locations
1216
Yes
Device in motion?
1218
No

Fig. 13

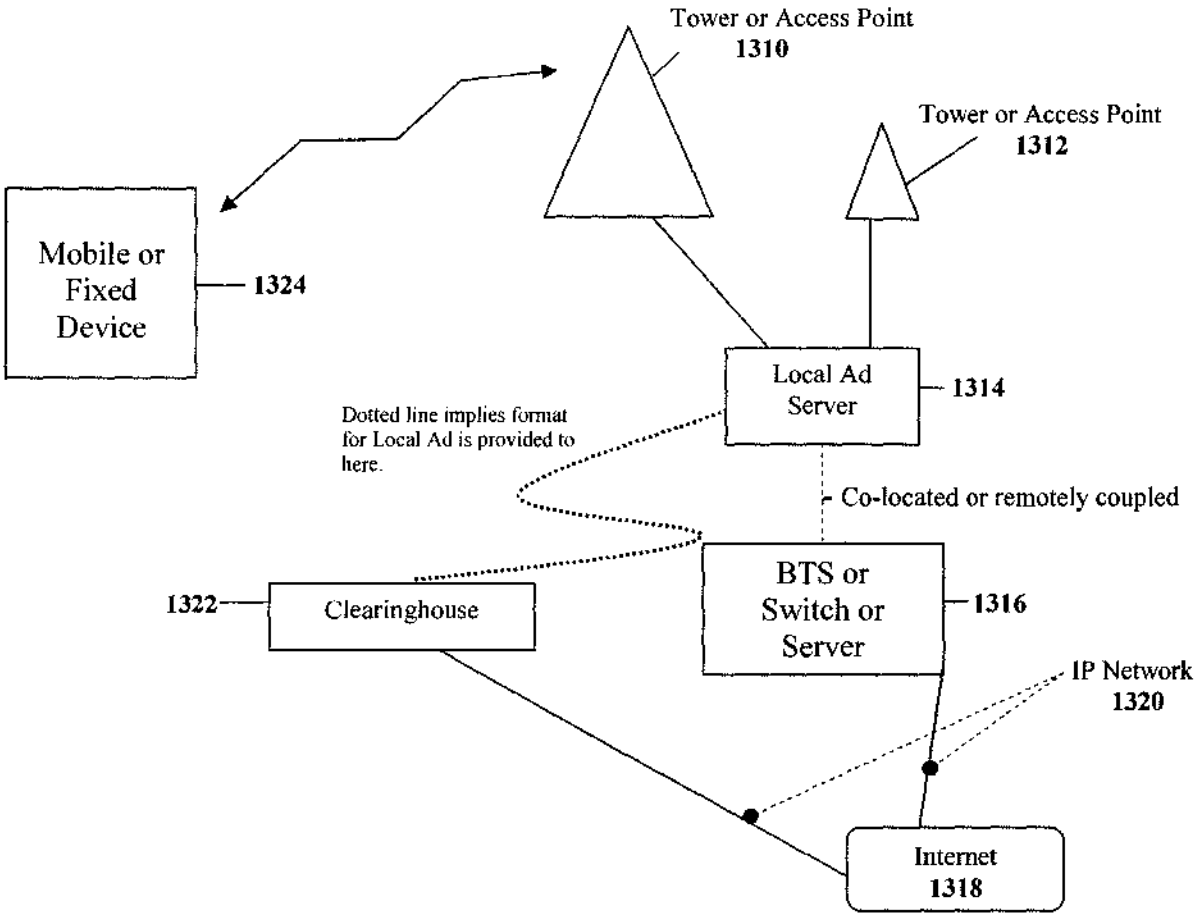

Tower or Access Point
1310
Tower or Access Point
1312
Mobile or
Fixed
Device
1324
Local Ad
Server
1314
Dotted line implies format
for Local Ad is provided to
here.
Co-located or remotely coupled
BTS or
Switch or
Server
1316
1322
Clearinghouse
IP Network
1320
Internet
1318

Fig. 14

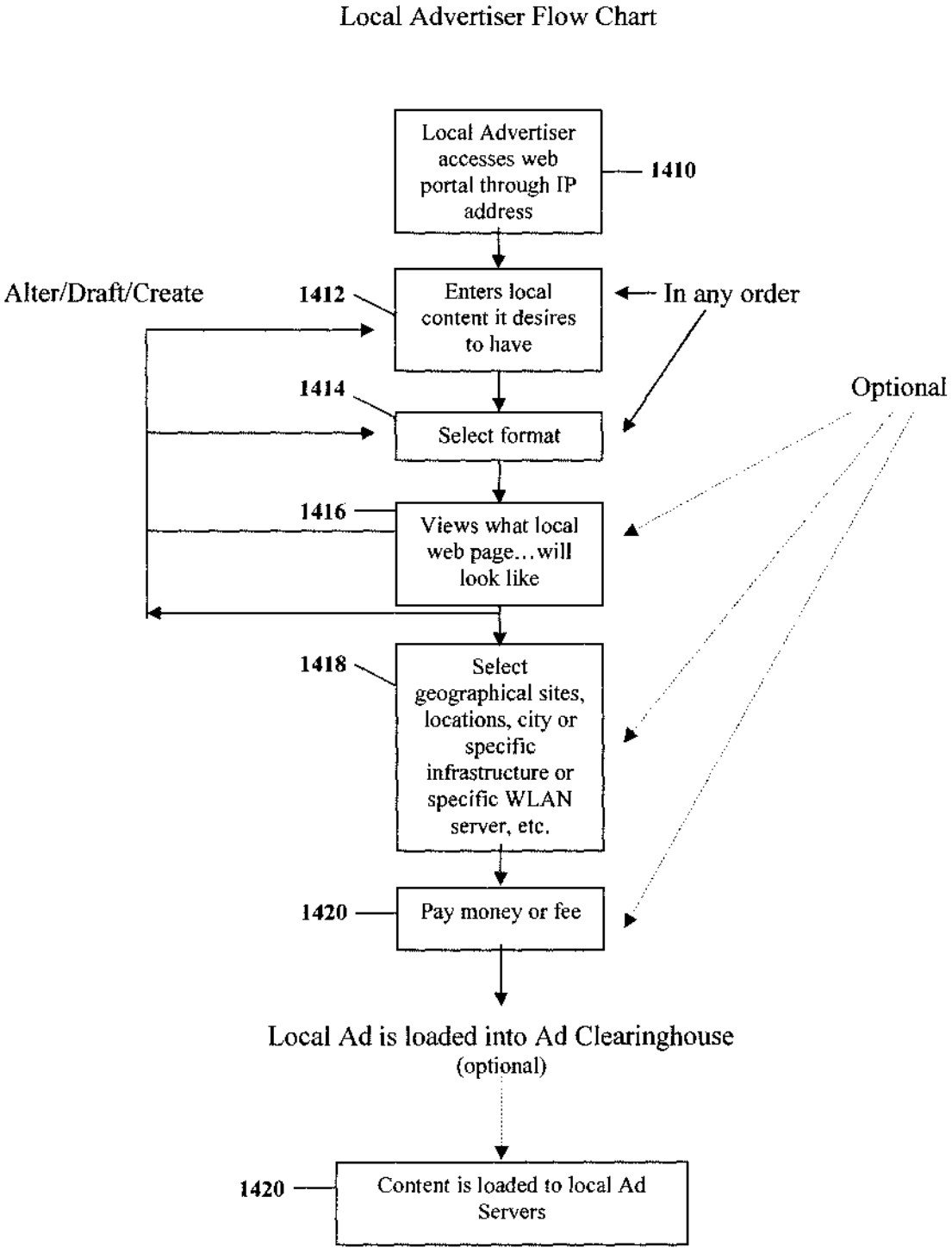
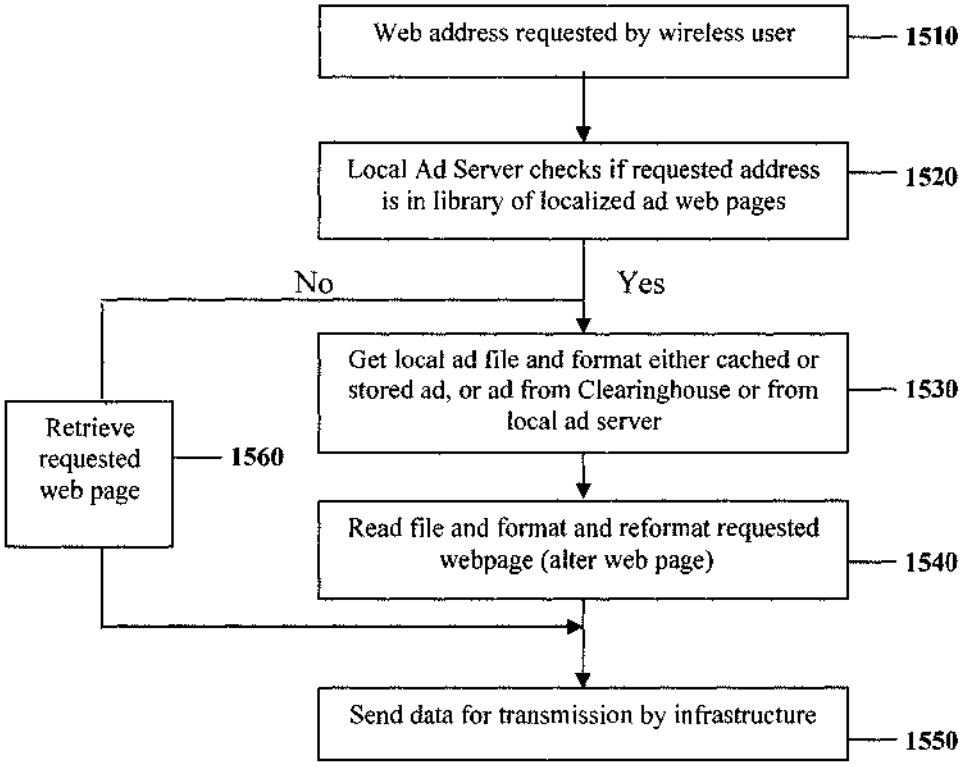

Local Advertiser Flow Chart
Local Advertiser accesses web portal through IP address
1410
Alter/Draft/Create
1412
Enters local content it desires to have
In any order
1414
Select format
Optional
1416
Views what local web page…will look like
1418
Select geographical sites, locations, city or specific infrastructure or specific WLAN server, etc.
1420
Pay money or fee
Local Ad is loaded into Ad Clearinghouse
(optional)
1420
Content is loaded to local Ad Servers

Fig. 15


Web address requested by wireless user
1510
Local Ad Server checks if requested address is in library of localized ad web pages
1520
No
Yes
Get local ad file and format either cached or stored ad, or ad from Clearinghouse or from local ad server
1530
Retrieve requested web page
1560
Read file and format and reformat requested webpage (alter web page)
1540
Send data for transmission by infrastructure
1550

PTO/SB/01 (04-09)
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DECLARATION FOR UTILITY OR DESIGN PATENT APPLICATION (37 CFR 1.63)

☒ Declaration Submitted With Initial Filing OR ☐ Declaration Submitted After Initial Filing (surcharge (37 CFR 1.16(f)) required)

Attorney Docket Number	110-009US
First Named Inventor	Theodore S. Rappaport
COMPLETE IF KNOWN	
Application Number	
Filing Date	
Art Unit	
Examiner Name	

I hereby declare that: (1) Each inventor's residence, mailing address, and citizenship are as stated below next to their name; and (2) I believe the inventor(s) named below to be the original and first inventor(s) of the subject matter which is claimed and for which a patent is sought on the invention titled:

Clearinghouse System and Method for Determining Availability of Carrier-Based Services and Enhancing the Quality, Operation and Accessibility of Carrier-Based Networks

(Title of the Invention)

the application of which

☒ is attached hereto

OR

☐ was filed on (MM/DD/YYYY) _____ as United States Application Number or PCT International Application Number _____ and was amended on (MM/DD/YYYY) _____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified application, including the claims, as amended by any amendment specifically referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 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.

Authorization To Permit Access To Application by Participating Offices

☐ If checked, the undersigned hereby grants the USPTO authority to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the World Intellectual Property Office (WIPO), and any other intellectual property offices in which a foreign application claiming priority to the above-identified patent application is filed access to the above-identified patent application. See 37 CFR 1.14(c) and (h). This box should not be checked if the applicant does not wish the EPO, JPO, KIPO, WIPO, or other intellectual property office in which a foreign application claiming priority to the above-identified patent application is filed to have access to the above-identified patent application.

In accordance with 37 CFR 1.14(h)(3), access will be provided to a copy of the above-identified patent application with respect to: 1) the above-identified patent application-as-filed; 2) any foreign application to which the above-identified patent application claims priority under 35 U.S.C. 119(a)-(d) if a copy of the foreign application that satisfies the certified copy requirement of 37 CFR 1.55 has been filed in the above-identified patent application; and 3) any U.S. application-as-filed from which benefit is sought in the above-identified patent application.

In accordance with 37 CFR 1.14(c), access may be provided to information concerning the date of filing the Authorization to Permit Access to Application by Participating Offices.

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. 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 21 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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DECLARATION — Utility or Design Patent Application

Claim of Foreign Priority Benefits

I hereby claim foreign priority benefits under 35 U.S.C. 119(a)-(d) or (f), or 365(b) of any foreign application(s) for patent, inventor's or plant breeder's rights certificate(s), 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, inventor's or plant breeder's rights certificate(s), or any PCT international application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application Number(s)	Country	Foreign Filing Date (MM/DD/YYYY)	Priority Not Claimed	Certified Copy Attached? YES	NO
			☐	☐	☐
			☐	☐	☐
			☐	☐	☐
			☐	☐	☐

☐ Additional foreign application number(s) are listed on a supplemental priority data sheet PTO/SB/02B attached hereto.

PTO/SB/01 (04-09)
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DECLARATION — Utility or Design Patent Application

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Name

Address

City | State | Zip

Country | Telephone | Email

WARNING:

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available. Petitioner/applicant is advised that documents which form the record of a patent application (such as the PTO/SB/01) are placed into the Privacy Act system of records DEPARTMENT OF COMMERCE, COMMERCE-PAT-7, System name: *Patent Application Files*. Documents not retained in an application file (such as the PTO-2038) are placed into the Privacy Act system of COMMERCE/PAT-TM-10, System name: *Deposit Accounts and Electronic Funds Transfer Profiles*.

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 18 U.S.C. 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

NAME OF SOLE OR FIRST INVENTOR: ☐ A petition has been filed for this unsigned inventor

Given Name (first and middle (if any)): Theodore S.

Family Name or Surname: Rappaport

Inventor's Signature: [signature] Date: 6/02/10

Residence: City | State | Country: U.S.A. | Citizenship: U.S.A.

Mailing Address

City | State | Zip | Country

☐ Additional inventors or a legal representative are being named on the ____ supplemental sheet(s) PTO/SB/02A or /02LR attached hereto

PTO/SB/81 (04-09)
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POWER OF ATTORNEY OR REVOCATION OF POWER OF ATTORNEY WITH A NEW POWER OF ATTORNEY AND CHANGE OF CORRESPONDENCE ADDRESS

Application Number	
Filing Date	JUNE 14, 2010
First Named Inventor	Theodore S. Rappaport
Title	Clearinghouse System and ...
Art Unit	
Examiner Name	
Attorney Docket Number	110-008US

I hereby revoke all previous powers of attorney given in the above-identified application.

☐ A Power of Attorney is submitted herewith.

OR

☒ I hereby appoint Practitioner(s) associated with the following Customer Number as my/our attorney(s) or agent(s) to prosecute the application identified above, and to transact all business in the United States Patent and Trademark Office connected therewith:

83409

OR

☐ I hereby appoint Practitioner(s) named below as my/our attorney(s) or agent(s) to prosecute the application identified above, and to transact all business in the United States Patent and Trademark Office connected therewith:

Practitioner(s) Name	Registration Number

Please recognize or change the correspondence address for the above-identified application to:

☒ The address associated with the above-mentioned Customer Number.

OR

☐ The address associated with Customer Number:

OR

☐ Firm or Individual Name					
Address					
City		State		Zip	
Country					
Telephone		Email			

I am the:

☒ Applicant/Inventor.

OR

☐ Assignee of record of the entire interest. See 37 CFR 3.71.
Statement under 37 CFR 3.73(b) (Form PTO/SB/96) submitted herewith or filed on _____

SIGNATURE of Applicant or Assignee of Record

Signature	/Theodore S. Rappaport/	Date	June 2, 2010
Name	Theodore S. Rappaport	Telephone	540-818-2284
Title and Company	TELSITE Corp.		

NOTE: Signature of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below*

☒ *Total of 1 forms are submitted.

This collection of information is required by 37 CFR 1.31, 1.32 and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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PTO/SB/08a (01-10)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	
Filing Date	
First Named Inventor	Theodore S. Rappaport
Art Unit	
Examiner Name	
Attorney Docket Number	110-009US

U.S.PATENTS

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	6317599		2001-11-13	Rappaport et al.	
	2	6442507		2002-08-27	Skidmore et al.	
	3	6493679		2002-12-10	Rappaport et al.	
	4	6499006		2002-12-24	Rappaport et al.	
	5	6625454		2003-09-23	Rappaport et al.	
	6	6721769		2004-04-13	Rappaport et al.	
	7	6788766		2004-09-07	Logan	
	8	6850946		2005-02-01	Rappaport et al.	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	
	Filing Date	
	First Named Inventor	Theodore S. Rappaport
	Art Unit	
	Examiner Name	
	Attorney Docket Number	110-009US

	9	6876951		2005-04-05	Skidmore et al.	
	10	6937869		2005-08-30	Rayburn	
	11	6971063		2005-11-29	Rappaport et al.	
	12	6973622		2005-12-06	Rappaport et al.	
	13	7019753		2006-03-28	Rappaport et al.	
	14	7035642		2006-04-25	Rappaport et al.	
	15	7055107		2006-05-30	Rappaport et al.	
	16	7085697		2006-08-01	Rappaport et al.	
	17	7096160		2006-08-22	Skidmore et al.	
	18	7096173		2006-08-22	Rappaport et al.	
	19	7155228		2006-12-26	Rappaport et al.	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	
	Filing Date	
	First Named Inventor	Theodore S. Rappaport
	Art Unit	
	Examiner Name	
	Attorney Docket Number	110-009US

	20	7164883		2007-01-16	Rappaport et al.	
	21	7171208		2007-01-16	Rappaport et al.	
	22	7243054		2007-07-10	Rappaport et al.	
	23	7246045		2007-07-17	Rappaport et al.	

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U.S.PATENT APPLICATION PUBLICATIONS

Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20090313113		2009-12-17	Dye et al.	
	2	20090313318		2009-12-17	Dye et al.	
	3	20030134648		2003-07-17	Reed et al.	
	4	20040236547		2004-11-25	Rappaport et al.	
	5	20080232574		2008-09-25	Baluja et al.	

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	
	Filing Date	
	First Named Inventor	Theodore S. Rappaport
	Art Unit	
	Examiner Name	
	Attorney Docket Number	

Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1							☐

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NON-PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1	The Wireless Clearinghouse - Request for Proposals: Planning, Data Gathering, Database development, and Website creation, Plattsburgh State University of New York, 2008. (http://www.cbnconnect.org/pdf/RFP-Wireless-Clearinghouse.pdf)	☐

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EXAMINER SIGNATURE

Examiner Signature		Date Considered	

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

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

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	
	Filing Date	
	First Named Inventor	Theodore S. Rappaport
	Art Unit	
	Examiner Name	
	Attorney Docket Number	

CERTIFICATION STATEMENT

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

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

OR

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

☐ See attached certification statement.

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

☒ None

SIGNATURE

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

Signature	/William E. Winters/	Date (YYYY-MM-DD)	2010-06-14
Name/Print	William E. Winters	Registration Number	42,232

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

Electronic Patent Application Fee Transmittal

Application Number:	
Filing Date:	
Title of Invention:	Clearinghouse System and Method for Determining Availability of Carrier-Based Services and Enhancing the Quality, Operation and Accessibility of Carrier-Based Networks
First Named Inventor/Applicant Name:	Theodore S. Rappaport
Filer:	William E. Winters
Attorney Docket Number:	110-009US

Filed as Small Entity

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Utility filing Fee (Electronic filing)	4011	1	82	82
Utility Search Fee	2111	1	270	270
Utility Examination Fee	2311	1	110	110
Pages:				
Claims:				
Claims in excess of 20	2202	62	26	1612
Independent claims in excess of 3	2201	4	110	440
Miscellaneous-Filing:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**2514**

Electronic Acknowledgement Receipt

EFS ID:	7810359
Application Number:	12815165
International Application Number:	
Confirmation Number:	1819
Title of Invention:	Clearinghouse System and Method for Determining Availability of Carrier-Based Services and Enhancing the Quality, Operation and Accessibility of Carrier-Based Networks
First Named Inventor/Applicant Name:	Theodore S. Rappaport
Customer Number:	63409
Filer:	William E. Winters
Filer Authorized By:	
Attorney Docket Number:	110-009US
Receipt Date:	14-JUN-2010
Filing Date:	
Time Stamp:	18:10:43
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$2514
RAM confirmation Number	4804
Deposit Account	
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)

1	Transmittal of New Application	110-009US_Transmittal.pdf	62981 566564169 75b8d6c5d139d5dbf3f95932e0ff265	no	1
Warnings:					
Information:					
2		110-009US_Patent_Appl_Spec.pdf	1100308 1444961951J6084f59df8d8d12145c5579d0eca7	yes	83
	Multipart Description/PDF files in .zip description				
	Document Description		**Start**	**End**	
	Specification		1	54	
	Claims		55	67	
	Abstract		68	68	
	Drawings-only black and white line drawings		69	83	
Warnings:					
Information:					
3	Oath or Declaration filed	110-009US_Declaration.pdf	1689175 46866d749ef0aa4fa161d0c1f50495b2d96af70a	no	3
Warnings:					
Information:					
4	Power of Attorney	110-009US_Power_of_Attorney.pdf	2013293 d9bc5a226828f480a600fb8Jee3e7b25ca2c913e	no	1
Warnings:					
Information:					
5	Information Disclosure Statement (IDS) Filed (SB/08)	110-009US_IDS.pdf	49666 84aa06a02713ba469f2b5786f76ee2a1aeb787cf	no	5
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
6	NPL Documents	110-009US_NPL.pdf	103173 64ca7b525d7cda4cJacJ746J5Jaa3cd74cff1691	no	9
Warnings:					
Information:					
7	Fee Worksheet (PTO-875)	fee-info.pdf	38330 cd577c45e8dd72e5a0b74a7f7d482ee7601e9909	no	2

Warnings:	
Information:	
Total Files Size (in bytes):	5056926

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.

Date: 06/14/10

Approved for use through 7/31/2006. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 12/815,165

APPLICATION AS FILED – PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE ($)	SMALL ENTITY FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	OTHER THAN SMALL ENTITY FEE ($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	82		N/A	
SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A	N/A	270		N/A	
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	110		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	82 minus 20 =	62	x$26	1612	OR	x$52	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	7 minus 3 =	* 4	x$110	440		x$220	
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $260 ($130 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR						
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))			195			390	
			TOTAL	2514		TOTAL	

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

APPLICATION AS AMENDED – PART II

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE ($)	SMALL ENTITY ADDITIONAL FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE ($)
AMENDMENT A	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))					N/A		OR	N/A	
						TOTAL ADD'T FEE		OR	TOTAL ADD'T FEE	

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)	OR	RATE ($)	ADDITIONAL FEE ($)
AMENDMENT B	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))					N/A		OR	N/A	
						TOTAL ADD'T FEE		OR	TOTAL ADD'T 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.

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.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.