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APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/356,581	11/24/2020	10848398	20145-054US	4319

146571 7590 11/04/2020

North Weber & Baugh LLP - ASSIA
3260 Hillview Avenue, 1st Floor
Palo Alto, CA 94304

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 0 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):

Wonjong Rhee, Seoul, KOREA, REPUBLIC OF;

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

Charter Communications, Inc.
Exhibit 1006
Page #1

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	14356581
Filing Date	2014-05-06
First Named Inventor	Wonjong Rhee
Art Unit	2446
Examiner Name	Grijalva Lobos, Boris
Attorney Docket Number	20145-054US

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	6469982	B1	2002-10-22	Michel Andre Robert Henrion et al.	
	2	6618356	B1	2003-09-09	Olivier Bonaventure	
	3	6678247	B1	2004-01-13	Olivier Bonaventure	
	4	6680907	B1	2004-01-20	Olivier Bonaventure	
	5	7864669	B2	2011-01-04	Bonaventure, et al. ~~Cisco Technology, Inc.~~	

Change(s) applied to document,
/D.M./
8/31/2020

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

U.S.PATENT APPLICATION PUBLICATIONS Remove

Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20160315976	A1	2016-10-27	Gregory Detal et al.	

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /B.D.G/

Doc Code: IFEE PTOL/85B-EFS

Document Description: Issue Fee Payment (PTO-85B)

Issue Fee Transmittal Form

Application Number	Filing Date	First Named Inventor	Atty. Docket No.	Confirmation No.
14356581	06-May-2014	Wonjong Rhee	20145-054US	4319

TITLE OF INVENTION :

METHOD, APPARATUS, AND SYSTEM FOR OPTIMIZING PERFORMANCE OF A COMMUNICATION UNIT BY A REMOTE SERVER

Entity Status	Application Type	Art Unit	Class - Subclass	EXAMINER
Regular Undiscounted	U.S. National Stage under 35 USC 371	2446	224000	BORIS GRIJALVA LOBOS

Issue Fee Due	Publication Due	Total Fee(s) Due	Date Due	Prev. Paid Fee
$1000	$0	$1000	14-Oct-2020	$0

1.Change of Correspondence Address and/or Indication Of Fee Address (37 CFR 1.33 & 1.363)

Current Correspondence Address:	Current Indicated Fee Address :
146571 North Weber & Baugh LLP - ASSIA 3260 Hillview Avenue, 1st Floor Palo Alto CA 94304 UNITED STATES 650-856-7539 docket1@northweber.com	
☐ Change of correspondence address requested, system generated AIA/122-EFS form attached	☐ Fee Address indication requested, system generated SB/47-EFS form attached

2.Entity Status

Change in Entity Status

○ Applicant certifying micro entity status; system generated Micro Entity certification form attached. See 37 CFR 1.29.
Note: Absent a valid certification of micro entity status, issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment. If this box is checked, you will be prompted to choose a micro entity status on the gross income basis (37 CFR 1.29(a)) or the institution of higher education basis (37 CFR 1.29(d)), and make the applicable certification online.

○ 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.

Document Description: Issue Fee Payment (PTO-85B)

3.The Following Fee(s) Are Submitted:

☒ Issue Fee	☐ I authorize USPTO to apply my previously paid issue fee to the current fees due
☐ Publication Fee	☐ The Director is hereby authorized to apply my previously paid issue fee to the current fee due and to charge deficient fees to Deposit Account Number _____
☐ Advance Order - # of copies _____	☐ If **in addition to** the payment of the issue fee amount submitted with this form, there are any discrepancies in any amount(s) due, the Director is authorized to charge any deficiency, or credit any overpayment, to Deposit Account Number _____ . The **issue fee must be submitted** with this form. **If payment of the issue fee does not accompany this form, checking this box and providing a deposit account number will NOT be effective to satisfy full payment of the fee(s) due.**

4.Firm and/or Attorney Names To Be Printed

NOTE: If no name is listed, no name will be printed
For printing on the patent front page, list to be displayed as entered

1. NORTH WEBER AND BAUGH LLP
2. MICHAEL NORTH
3.

5.Assignee Name(s) and Residence Data To Be Printed

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.

Name	City	State	Country	Category
ASSIA SPE, LLC	Wilmington	DELAWARE	united states	corporation

6.Signature

I certify, in accordance with 37 CFR 1.4(d)(4) that I am an attorney or agent registered to practice before the Patent and Trademark Office who has filed and has been granted power of attorney in this application. I also certify that this Fee(s) Transmittal form is being transmitted to the USPTO via EFS-WEB on the date indicated below.

Signature	/Michael V. North/	**Date**	10-14-2020
Name	Michael V. North	**Registration Number**	46963

Charter Communications, Inc.
Exhibit 1006
Page #4

Electronic Patent Application Fee Transmittal

Application Number:	14356581
Filing Date:	06-May-2014
Title of Invention:	METHOD, APPARATUS, AND SYSTEM FOR OPTIMIZING PERFORMANCE OF A COMMUNICATION UNIT BY A REMOTE SERVER
First Named Inventor/Applicant Name:	Wonjong Rhee
Filer:	Michael V. North/Domarina Alkhas
Attorney Docket Number:	20145-054US

Filed as Large Entity

Filing Fees for U.S. National Stage under 35 USC 371

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
UTILITY APPL ISSUE FEE	1501	1	1000	1000
PUBL. FEE- EARLY, VOLUNTARY, OR NORMAL	1504	1	0	0
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**1000**

Electronic Acknowledgement Receipt	
EFS ID:	40847055
Application Number:	14356581
International Application Number:	
Confirmation Number:	4319
Title of Invention:	METHOD, APPARATUS, AND SYSTEM FOR OPTIMIZING PERFORMANCE OF A COMMUNICATION UNIT BY A REMOTE SERVER
First Named Inventor/Applicant Name:	Wonjong Rhee
Customer Number:	146571
Filer:	Michael V. North/Domarina Alkhas
Filer Authorized By:	Michael V. North
Attorney Docket Number:	20145-054US
Receipt Date:	14-OCT-2020
Filing Date:	06-MAY-2014
Time Stamp:	18:35:06
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$1000
RAM confirmation Number	E20200DI35038001
Deposit Account	502776
Authorized User	Domarina Alkhas
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: 37 CFR 1.17 (Patent application and reexamination processing fees) 37 CFR 1.19 (Document supply fees)	

37 CFR 1.20 (Post Issuance fees)

37 CFR 1.21 (Miscellaneous fees and charges)

37 CFR 1.492 (National application filing, search, and examination fees)

37 CFR 1.492(a) (Basic national fee only)

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)	Web85b.pdf	46377 0bb3c06a247fc6d79e119c50f740c79d978738b5	no	2
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	32139 756c248a03befd90bd54367cc9414c13029b6e40	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	78516		

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.

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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
14/356,581	05/06/2014	2446	2080	20145-054US	20	3

CONFIRMATION NO. 4319

CORRECTED FILING RECEIPT

146571
North Weber & Baugh LLP - ASSIA
3260 Hillview Avenue, 1st Floor
Palo Alto, CA 94304

Date Mailed: 08/21/2020

Receipt is acknowledged of this non-provisional utility 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 FIRST INVENTOR, 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 corrected Filing Receipt, including a properly marked-up ADS showing the changes with strike-through for deletions and underlining for additions. If you received a "Notice to File Missing Parts" or other Notice requiring a response for this application, please submit any request for correction 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 provided that the request is grantable.

Inventor(s)

Wonjong Rhee, Seoul, KOREA, REPUBLIC OF;

Applicant(s)

Wonjong Rhee, Seoul, KOREA, REPUBLIC OF;

Assignment For Published Patent Application

ADAPTIVE SPECTRUM AND SIGNAL ALIGNMENT, INC., Redwood City, CA

Power of Attorney: The patent practitioners associated with Customer Number 146571

Domestic Priority data as claimed by applicant

This application is a 371 of PCT/US2011/060265 11/10/2011

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.

Permission to Access Application via Priority Document Exchange: No

Permission to Access Search Results: No

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

If Required, Foreign Filing License Granted: 06/25/2014

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 14/356,581**

Projected Publication Date: Not Applicable

Non-Publication Request: No

Early Publication Request: No

Title

METHOD, APPARATUS, AND SYSTEM FOR OPTIMIZING PERFORMANCE OF A COMMUNICATION UNIT BY A REMOTE SERVER

Preliminary Class

709

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

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

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

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

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

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

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

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

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

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

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

NOT GRANTED

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

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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.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/356,581	05/06/2014	Wonjong Rhee	20145-054US	4319

146571 7590 08/18/2020

North Weber & Baugh LLP - ASSIA
3260 Hillview Avenue, 1st Floor
Palo Alto, CA 94304

EXAMINER	
GRIJALVA LOBOS, BORIS D	

ART UNIT	PAPER NUMBER
2446	

NOTIFICATION DATE	DELIVERY MODE
08/18/2020	ELECTRONIC

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.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

docket1@northweber.com

Corrected ***Notice of Allowability***	**Application No.** 14/356,581	**Applicant(s)** Rhee, Wonjong	
	Examiner BORIS D GRIJALVA LOBOS	**Art Unit** 2446	**AIA (FITF) 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 communications filed on 7/25/2020.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

3. ☑ The allowed claim(s) is/are 1,3-5,8,10,12-16,34,36-37,53-54 and 57-65 . As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see **http://www.uspto.gov/patents/init_events/pph/index.jsp** or send an inquiry to **PPHfeedback@uspto.gov.**

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

   Certified copies:

   a) ☐ All b) ☐ Some *c) ☐ None of the:

   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____ .

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

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

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

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

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☑ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date 7/25/2020.
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material _____.
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date. _____.
5. ☐ Examiner's Amendment/Comment
6. ☑ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/B.D.G/ Examiner, Art Unit 2446	/MICHAEL A KELLER/ Primary Patent Examiner, Art Unit 2446

Charter Communications, Inc.
Exhibit 1006
Page #13

nThis Office action is in response to communications filed on 7/2/2020.

DETAILED ACTION

Notice of Pre-AIA or AIA Status

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

Information Disclosure Statement

The information disclosure statement (IDS) submitted on 7/25/2020 (with a corresponding list of references dated 7/17/2020) was filed after the mailing date of the Notice of Allowance on 7/14/2020. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Response to Amendment

The amendments filed on 5/27/2020 have been fully considered.

Claims 1, 10, 34, 57, and 64-65 have been amended.

Claims 1, 3-5, 8, 10, 12-16, 34, 36-37, 53-54, and 57-65 are pending.

Claims 2, 6-7, 9, 11, 17-33, 35, 38-52, and 55-56 have been cancelled.

Allowable Subject Matter

Claims 1, 3-5, 8, 10, 12-16, 34, 36-37, 53-54, and 57-65 are allowed.

REASONS FOR ALLOWANCE

No reason for allowance is necessary as the record is clear. See MPEP 1302.14(I).

Conclusion

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled “Comments on Statement of Reasons for Allowance.”

Any inquiry concerning this communication or earlier communications from the examiner should be directed to BORIS D GRIJALVA LOBOS whose telephone number is (571)272-0767. The examiner can normally be reached on M-F 10:30AM to 6:30PM EST.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian Gillis can be reached on 571-272-7952. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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

/B.D.G/
Examiner, Art Unit 2446

/MICHAEL A KELLER/
Primary Patent Examiner, Art Unit 2446

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14/356,581	Rhee, Wonjong
	Examiner	Art Unit
	BORIS D GRIJALVA LOBOS	2446

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

CLAIMS										
☐ Claims renumbered in the same order as presented by applicant						☐ CPA		☐ T.D.		☐ R.1.47
CLAIM		DATE								
Final	Original	12/21/2015	11/16/2016	12/20/2017	10/21/2018	01/27/2019	07/26/2019	02/23/2020	07/02/2020	08/12/2020
1	1	✓	✓	✓	✓	✓	✓	✓	=	=
-	2	✓	-	-	-	-	-	-	-	-
2	3	✓	✓	✓	✓	✓	✓	✓	=	=
3	4	✓	✓	✓	✓	✓	✓	✓	=	=
5	5	✓	✓	✓	✓	✓	✓	✓	=	=
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-	7	✓	✓	✓	✓	-	-	-	-	-
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-	32	-	-	-	-	-	-	-	-	-
-	33	-	-	-	-	-	-	-	-	-
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21	36	✓	✓	✓	✓	✓	✓	✓	=	=
22	37	✓	✓	✓	✓	✓	✓	✓	=	=
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-	41	-	-	-	-	-	-	-	-	-
-	42	-	-	-	-	-	-	-	-	-

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Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14/356,581	Rhee, Wonjong
	Examiner	**Art Unit**
	BORIS D GRIJALVA LOBOS	2446

CLAIM		DATE								
Final	Original	12/21/2015	11/16/2016	12/20/2017	10/21/2018	01/27/2019	07/26/2019	02/23/2020	07/02/2020	08/12/2020
-	43	-	-	-	-	-	-	-	-	-
-	44	-	-	-	-	-	-	-	-	-
-	45	-	-	-	-	-	-	-	-	-
-	46	-	-	-	-	-	-	-	-	-
-	47	-	-	-	-	-	-	-	-	-
-	48	-	-	-	-	-	-	-	-	-
-	49	-	-	-	-	-	-	-	-	-
-	50	-	-	-	-	-	-	-	-	-
-	51	-	-	-	-	-	-	-	-	-
-	52	-	-	-	-	-	-	-	-	-
7	53				✓	✓	✓	✓	=	=
4	54				✓	✓	✓	✓	=	=
-	55				✓	-	-	-	-	-
-	56				✓	✓	✓	✓	-	-
23	57				✓	✓	✓	✓	=	=
8	58						✓	✓	=	=
9	59						✓	✓	=	=
10	60						✓	✓	=	=
17	61						✓	✓	=	=
18	62						✓	✓	=	=
19	63						✓	✓	=	=
24	64						✓	✓	=	=
25	65						✓	✓	=	=

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Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14/356,581	Rhee, Wonjong
	Examiner	**Art Unit**
	BORIS D GRIJALVA LOBOS	2446

CPC							
Symbol						**Type**	**Version**
H04L	/	43	/	04		F	2013-01-01
H04L	/	1	/	20		I	2013-01-01
H04L	/	1	/	0019		I	2013-01-01

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

/BORIS D GRIJALVA LOBOS/ Examiner, Art Unit 2446	12 August 2020	**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	25	
/MICHAEL A KELLER/ Primary Patent Examiner, Art Unit 2446	12 August 2020	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	2

U.S. Patent and Trademark Office — Part of Paper No.: 20200812

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Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14/356,581	Rhee, Wonjong
	Examiner	**Art Unit**
	BORIS D GRIJALVA LOBOS	2446

INTERNATIONAL CLASSIFICATION				
CLAIMED				
H04L	/	1	/	00
H04L	/	1	/	20
H04L	/	12	/	26

NON-CLAIMED				
	/		/	

US ORIGINAL CLASSIFICATION	
CLASS	**SUBCLASS**

CROSS REFERENCES(S)						
CLASS	**SUBCLASS (ONE SUBCLASS PER BLOCK)**					

/BORIS D GRIJALVA LOBOS/ Examiner, Art Unit 2446	12 August 2020	**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	25	
/MICHAEL A KELLER/ Primary Patent Examiner, Art Unit 2446	12 August 2020	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	2

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14/356,581	Rhee, Wonjong
	Examiner	**Art Unit**
	BORIS D GRIJALVA LOBOS	2446

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

CLAIMS

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
1	1	11	10	-	19	-	28	22	37	-	46	-	55	24	64
-	2	-	11	-	20	-	29	-	38	-	47	-	56	25	65
2	3	12	12	-	21	-	30	-	39	-	48	23	57		
3	4	13	13	-	22	-	31	-	40	-	49	8	58		
5	5	14	14	-	23	-	32	-	41	-	50	9	59		
-	6	15	15	-	24	-	33	-	42	-	51	10	60		
-	7	16	16	-	25	20	34	-	43	-	52	17	61		
6	8	-	17	-	26	-	35	-	44	7	53	18	62		
-	9	-	18	-	27	21	36	-	45	4	54	19	63		

/BORIS D GRIJALVA LOBOS/ Examiner, Art Unit 2446	12 August 2020	**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	25	
/MICHAEL A KELLER/ Primary Patent Examiner, Art Unit 2446	12 August 2020	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	2

U.S. Patent and Trademark Office — Part of Paper No.: 20200812

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Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14/356,581	Rhee, Wonjong
	Examiner	Art Unit
	BORIS D GRIJALVA LOBOS	2446

CPC - Searched*		
Symbol	**Date**	**Examiner**
H04L7/00,0004	12/21/2015	BGL
H04L12/00,14,16,24,2414,2415,2417-2419,2424-2426,2428-2433,2439,244-2442,2447,2464,2465,2468-247,2472,2473,2476,2478,26,2602,2618,2634-2642,2668-2678,2692	12/21/2015	BGL
H04L41/00,06,08-0806,0813-0836,085-0859,0866-0869,50-5016,5035,5038	12/21/2015	BGL
H04L43/00,04,08-0817,0876-10,16	12/21/2015	BGL
H04L47/00,10,11,12,28,29,32	12/21/2015	BGL
H04L7/00,0004 H04L41/00,06,08-0806,0813-0836,085-0859,0866-0869,50-5016,5035,5038 H04L43/00,04,08-0817,0876-10,16 H04L47/00,10,11,12,28,29,32	10/21/2018	BGL
H04L7/00,0004 H04L41/00,06,08-0806,0813-0836,085-0859,0866-0869,50-5016,5035,5038 H04L43/00,04,08-0817,0876-10,16 H04L47/00,10,11,12,28,29,32	07/26/2019	BGL
H04L7/00,0004 H04L41/00,06,08-0806,0813-0836,085-0859,0866-0869,50-5016,5035,5038 H04L43/00,04,08-0817,0876-10,16 H04L47/00,10,11,12,28,29,32	02/22/2020	BGL
H04L1/00,0019,20 H04L7/00,0004 H04L41/00,06,08-0806,0813-0836,085-0859,0866-0869,50-5016,5035,5038 H04L43/00,04,08-0817,0876-10,16 H04L47/00,10,11,12,28,29,32	06/30/2020	BGL

CPC Combination Sets - Searched*		
Symbol	**Date**	**Examiner**

US Classification - Searched*			
Class	**Subclass**	**Date**	**Examiner**

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of

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Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14/356,581	Rhee, Wonjong
	Examiner	Art Unit
	BORIS D GRIJALVA LOBOS	2446

the search.

Search Notes		
Search Notes	**Date**	**Examiner**
EAST Inventor Name Search Performed	12/21/2015	BGL
EAST Text Limited Classification Search Performed (see attached search notes)	12/21/2015	BGL
EAST Text Search Performed (see attached search notes)	12/21/2015	BGL
EAST Inventor Name Search Performed	11/16/2016	BGL
EAST Text Search Performed	11/16/2016	BGL
Updated EAST Text Search (see attached search notes)	12/20/2017	BGL
Updated EAST Inventor Name Search (see attached search notes)	12/20/2017	BGL
Updated EAST Inventor Name Search (see attached search notes)	10/21/2018	BGL
Updated EAST Text Limited Classification Search (see attached search notes)	10/21/2018	BGL
Updated EAST Text Search (see attached search notes)	10/21/2018	BGL
GOOGLE Search Performed	10/21/2018	BGL
Updated EAST Inventor Name Search (see attached search notes)	01/28/2019	BGL
Updated EAST Text Search (see attached search notes)	01/28/2019	BGL
Google search performed	01/28/2019	BGL
Updated EAST Inventor Name Search (see attached search notes)	07/26/2019	BGL
Updated EAST Text Limited Classification Search (see attached search notes)	07/26/2019	BGL
Updated EAST Text Limited Classification Search (see attached search notes)	12/10/2019	BGL
Updated EAST Text Search (see attached search notes)	12/10/2019	BGL
Updated EAST Text Limited Classification Search (see attached search notes)	02/22/2020	BGL
Updated EAST Text Search (see attached search notes)	02/22/2020	BGL
Updated EAST Inventor Name Search (see attached search notes)	02/23/2020	BGL
Updated EAST Inventor Name Search (see attached search notes)	06/30/2020	BGL

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	Examiner	Art Unit
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Updated EAST Text Limited Classification Search (see attached search notes)	06/30/2020	BGL
Updated EAST Text Search (see attached search notes)	06/30/2020	BGL
GOOGLE search performed	06/30/2020	BGL
Consulted Allowable Subject Matter with Primary Examiner Arvin Eskandarnia	07/01/2020	BGL

Interference Search			
US Class/CPC Symbol	**US Subclass/CPC Group**	**Date**	**Examiner**
H04L1	0019,20	06/30/2020	BGL
H04L41	06,08-0806,0813-0836,085-0859,0866-0869,50-5016,5035,5038	06/30/2020	BGL
H04L43	04,08-0817,0876-10,16	06/30/2020	BGL

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EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S1	1,026	((access near1 point) (base near1 station) (wireless near1 LAN near1 device) (DSLAM) (gateway) (performance near1 device) DSL CPE (customer near1 premises near1 equipment) modem (in-home near1 powerline) (in-home coax) (HPNA) (metering near1 device) (LAN near3 appliance) (femtocell) (wifi near1 base) (repeater) STB STU (IP near2 TV) (IP near2 media near1 device) (gam$3 near1 console) gateway device computer router bridge switch) with ((transmit$4 send$3 forward$3 receiv$3) near5 policy) with operation	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/16 12:31
S2	84	((access near1 point) (base near1 station) (wireless near1 LAN near1 device) (DSLAM) (gateway) (performance near1 device) DSL CPE (customer near1 premises near1 equipment) modem (in-home near1 powerline) (in-home coax) (HPNA) (metering near1 device) (LAN near3 appliance) (femtocell) (wifi near1 base) (repeater) STB STU (IP near2 TV) (IP near2 media near1 device) (gam$3 near1 console) gateway device computer router bridge switch) with ((transmit$4 send$3 forward$3 receiv$3) near5 policy) with operation with (location time)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/16 12:48
S3	26,692	RSSI	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/16 15:31
S4	1,040	monitor$3 near3 RSSI	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/16 15:32
S6	0	(monitor$3 near3 RSSI) with (adjust$3 near3 rate)	US-PGPUB; USPAT	OR	ON	2015/12/16 15:32

			; EPO; JPO			
S7	8	((transmit$3 send$3 receiv$3 forward$3 monitor$3) near3 RSSI) with (adjust$3 near3 rate)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/16 15:33
S8	26	((send$3 transmit$4 receiv$3 forward$3) near5 conditions near3 operation) with ((access near1 point) AP)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/17 18:26
S9	4,998	adaptation near1 algorithm	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/17 18:58
S10	3	(adaptation near1 algorithm) with ((real near1 time) real-time) with historical	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/17 18:58
S11	1	"14356581"	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/17 20:14
S12	0	((send$3 transmit$4 forward$3 receiv$3) near3 policy) near20 RSSI	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/17 20:39
S13	0	((send$3 transmit$4 forward$3 receiv$3) near3 policy) with RSSI	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/17 20:39
S14	31	((send$3 transmit$4 forward$3 receiv$3) near7 policy) with RSSI	US-PGPUB; USPAT	OR	ON	2015/12/17 20:39

			; EPO; JPO			
S15	1	(policy near1 server) with RSSI	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/17 20:59
S16	26	(policy near1 server) same2 RSSI	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/17 20:59
S17	0	((transmit$3 send$3 receiv$3 forward$3) near5 policy near5 algorithms) with RSSI	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/18 18:19
S18	178	((transmit$3 send$3 receiv$3 forward$3) near5 policy near5 algorithms)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/18 18:19
S19	1	((transmit$3 send$3 receiv$3 forward$3) near5 policy near5 algorithms) and RSSI	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/18 18:19
S20	2	((transmit$3 send$3 receiv$3 forward$3) near5 policy near5 algorithms) with AP	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/18 18:20
S21	7	((transmit$3 send$3 receiv$3 forward$3) near5 policy near5 algorithms) and (((access near1 point) AP) with server)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/18 18:20
S22	109	rhee near1 wonjong	US-PGPUB; USPAT	OR	ON	2015/12/21 13:24

			; EPO; JPO			
S23	10	(rhee near1 wonjong) and policy	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/21 13:30
S24	58,484	(H04L7/00,0004 H04L12/00,14,16,24,2414,2415,2417-2419,2424-2426,2428-2433,2439,244-2442,2447,2464,2465,2468-247,2472,2473,2476,2478,26,2602,2618,2634-2642,2668-2678,2692 H04L41/00,06,08-0806,0813-0836,085-0859,0866-0869,50-5016,5035,5038 H04L43/00,04,08-0817,0876-10,16 H04L47/00,10,11,12,28,29,32).cpc.	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/21 15:17
S25	25	((transmit$3 send$3 receiv$3 forward$3) near5 policy near5 algorithms) and S24	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/21 15:17
S26	41	(rhee near1 wonjong) and S24	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/21 15:18
S27	1	"7840220".pn.	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/21 16:50
S28	1,672,280	adaptation algorithm	US-PGPUB; USPAT; EPO; JPO	OR	ON	2016/11/14 19:55
S29	5,390	adaptation near1 algorithm	US-PGPUB; USPAT; EPO; JPO	OR	ON	2016/11/14 19:55

S30	394	(creat$3 generat$3 comput$3 calculat$3) near5 (adaptation near1 algorithm)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2016/11/14 19:56
S31	0	((creat$3 generat$3 comput$3 calculat$3) near5 (adaptation near1 algorithm)) with policy	US-PGPUB; USPAT; EPO; JPO	OR	ON	2016/11/14 19:56
S32	5	((creat$3 generat$3 comput$3 calculat$3) near5 (adaptation near1 algorithm)) same2 policy	US-PGPUB; USPAT; EPO; JPO	OR	ON	2016/11/14 19:56
S33	13	(rhee near1 wonjong) and policy	US-PGPUB; USPAT; EPO; JPO	OR	ON	2016/11/16 17:17
S34	2,862	(generat$3 creat$3 develop$3) near10 RSSI	US-PGPUB; USPAT; EPO; JPO	OR	ON	2016/11/16 17:18
S35	361	((generat$3 creat$3 develop$3) near10 RSSI) with ((observ$3 collect$3 obtain$3 receiv$3 detect$3) near5 (data status information state))	US-PGPUB; USPAT; EPO; JPO	OR	ON	2016/11/16 17:19
S36	0	((generat$3 creat$3 develop$3) near10 RSSI) with ((observ$3 collect$3 obtain$3 receiv$3 detect$3) near5 (data status information state)) with policy	US-PGPUB; USPAT; EPO; JPO	OR	ON	2016/11/16 17:19
S37	4	((generat$3 creat$3 develop$3) near10 RSSI) with ((observ$3 collect$3 obtain$3 receiv$3 detect$3) near5 (data status information state)) same2 policy	US-PGPUB; USPAT; EPO; JPO	OR	ON	2016/11/16 17:20

S38	5,394	adaptation near1 algorithm	US-PGPUB; USPAT; EPO; JPO	OR	ON	2016/11/16 17:20
S39	2	S35 and S38	US-PGPUB; USPAT; EPO; JPO	OR	ON	2016/11/16 17:20
S40	5,784	adaptation near1 algorithm	US-PGPUB; USPAT; EPO; JPO	OR	ON	2017/12/20 14:02
S41	451	(transmit$4 send$3 receiv$3 forward$3 push$3) near5 (adaptation near1 algorithm)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2017/12/20 14:03
S42	4	"7840220".pn. "2007136337"	US-PGPUB; USPAT; EPO; JPO	OR	ON	2017/12/20 15:43
S43	46	(policy near7 algorithm) and (communication near5 algorithm) and WIFI	US-PGPUB; USPAT; EPO; JPO	OR	ON	2017/12/20 21:13
S44	0	S43 and S41	US-PGPUB; USPAT; EPO; JPO	OR	ON	2017/12/20 21:13
S51	33	("2006/0187885").URPN.	USPAT	OR	OFF	2018/10/19 20:09
S52	10,158	monitor$3 near7 (signal near1 strength)	US-PGPUB; USPAT	OR	OFF	2018/10/19 23:07

			; EPO; JPO			
S53	86,958	(H04L7/00,0004 H04L41/00,06,08-0806,0813-0836,085-0859,0866-0869,50-5016,5035,5038 H04L43/00,04,08-0817,0876-10,16 H04L47/00,10,11,12,28,29,32).cpc.	US-PGPUB; USPAT; EPO; JPO	OR	ON	2018/10/19 23:08
S54	335	S52 and S53	US-PGPUB; USPAT; EPO; JPO	OR	ON	2018/10/19 23:08
S55	38	("4161628" | "4229734" | "4279032" | "4430788" | "4558358" | "4694453" | "4730302" | "4799211" | "4816825" | "4860001" | "4890278" | "4896315" | "4926162" | "5048009" | "5115199").PN. OR ("5198805").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2018/10/19 23:11
S56	316	(monitor$3 near7 (signal near1 strength)) and (dynamic$4 near5 adapt$3)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2018/10/19 23:27
S57	58	(monitor$3 near7 (signal near1 strength)) and (dynamic$4 near5 adapt$5) not S56	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2018/10/19 23:33
S58	5	("2009/0059872").URPN.	USPAT	OR	OFF	2018/10/19 23:51
S59	1	("2012/0077533").URPN.	USPAT	OR	OFF	2018/10/19 23:54
S60	839	(monitor$3 near7 (signal near1 strength)) and (dynamic$4 near5 (adapt$5 chang$3 modif$3)) not (S56 S57)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2018/10/19 23:57
S61	433	(monitor$3 near7 (signal near1 strength)) and (dynamic$4 near5 (adapt$5 chang$3 modif$3)) and @AD<="20111110" not (S56 S57)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2018/10/20 00:04

S62	15	("2004/0223470").URPN.	USPAT	OR	OFF	2018/10/20 00:09
S63	31	remote$2 near3 manag$5 near3 QOS	USPAT	OR	OFF	2018/10/20 00:15
S64	6,276	S52 and @AD<="20111110"	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2018/10/20 00:20
S65	1,349	RSSI and S64	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2018/10/20 00:21
S66	15	("2004/0223470").URPN.	USPAT	OR	OFF	2018/10/20 00:33
S67	89	("2007/0082677").URPN.	USPAT	OR	OFF	2018/10/20 00:40
S71	20	("20030031180" | "20030076784" | "20050261915" | "20060126613" | "20060187885" | "20070153807" | "20080186873" | "20090055900" | "20100290465" | "20110013529" | "20110110359" | "20110182182" | "20110273979" | "20120294310" | "5970064" | "5974106" | "6430612" | "7840220" | "8520586" | "8880666").PN.	US-PGPUB; USPAT	OR	OFF	2018/10/20 23:05
S72	1	("20120151540").PN.	US-PGPUB; USPAT	OR	OFF	2018/10/20 23:23
S73	7	("20160315976" | "20180248984" | "6469982" | "6618356" | "6678247" | "6680907" | "7864669").PN.	US-PGPUB; USPAT	OR	OFF	2018/10/21 00:11
S74	3,178	(monitor$3 with ((real near1 time) real-time)) and (parameter with algorithm)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2019/01/27 14:58
S75	56	(monitor$3 with ((real near1 time) real-time)) and (parameter with algorithm) and (policy with (rule condition))	US-PGPUB; USPAT	OR	OFF	2019/01/27 14:59

			; EPO; JPO			
S83	2	"13995901"	US-PGPUB; USPAT; EPO; JPO	OR	ON	2019/01/27 23:14
S84	3	("10057080" | "20160261490" | "8126011").PN.	US-PGPUB; USPAT	OR	ON	2019/07/26 17:45
S85	3	("20080186873" | "6430612" | "9819595").PN.	US-PGPUB; USPAT	OR	ON	2019/07/26 17:46
S86	238	(network near5 monitor$3) and (policy with (histor$4 near5 data)) and (communication near4 performance)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2019/07/26 17:56
S87	94,363	(H04L7/00,0004 H04L41/00,06,08-0806,0813-0836,085-0859,0866-0869,50-5016,5035,5038 H04L43/00,04,08-0817,0876-10,16 H04L47/00,10,11,12,28,29,32).cpc.	US-PGPUB; USPAT; EPO; JPO	OR	ON	2019/07/26 17:56
S88	68	S86 and S87	US-PGPUB; USPAT; EPO; JPO	OR	ON	2019/07/26 17:56
S97	111,342	monitor$3 near3 ((real near1 time) real-time)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2019/12/10 19:44
S98	911,536	(improv$3 increas$3) near5 (service qos quality)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2019/12/10 19:47
S99	256,602	(histor$4 near4 data)	US-PGPUB;	OR	ON	2019/12/10 19:47

			USPAT; EPO; JPO			
S100	4,558	S97 and S98 and S99	US-PGPUB; USPAT; EPO; JPO	OR	ON	2019/12/10 19:47
S101	15,642	((improv$3 increas$3) near5 (service qos quality)) with (policy rules configuration)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2019/12/10 19:48
S102	228	S97 and S99 and S101	US-PGPUB; USPAT; EPO; JPO	OR	ON	2019/12/10 19:48
S103	891,108	(chang$3 updat$3 upgrad$3 transmit$4 receiv$3 forward$3 sent) near5 (policy rules configuration)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2019/12/10 20:36
S104	7,014	S97 and S99 and S103	US-PGPUB; USPAT; EPO; JPO	OR	ON	2019/12/10 20:37
S105	911,536	((improv$3 increas$3) near5 (service qos quality))	US-PGPUB; USPAT; EPO; JPO	OR	ON	2019/12/10 20:37
S106	2,510	S104 and S105	US-PGPUB; USPAT; EPO; JPO	OR	ON	2019/12/10 20:38
S107	98,439	(H04L7/00,0004 H04L41/00,06,08-0806,0813-0836,085-0859,0866-0869,50-5016,5035,5038 H04L43/00,04,08-	US-PGPUB; USPAT	OR	ON	2019/12/10 20:38

		0817,0876-10,16 H04L47/00,10,11,12,28,29,32).cpc.	; EPO; JPO			
S108	724	S106 and S107	US-PGPUB; USPAT; EPO; JPO	OR	ON	2019/12/10 20:38
S109	22,274,817	@AD<="20111110"	US-PGPUB; USPAT; EPO; JPO	OR	ON	2019/12/10 20:44
S110	191	S108 and S109	US-PGPUB; USPAT; EPO; JPO	OR	ON	2019/12/10 20:45
S111	6	("20030031180" | "20060126613" | "20080186873" | "20090147697" | "20110110359" | "20140304408").PN.	US-PGPUB; USPAT	OR	ON	2020/02/22 06:04
S112	144	(interference noise) with ((send$3 transmit$4 push$3 forward$3) near5 policy)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/02/22 06:07
S113	1,248	((send$3 transmit$4 push$3 forward$3) near7 (interference noise)) and ((send$3 transmit$4 push$3 forward$3) near5 policy)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/02/22 06:18
S114	1,119	((send$3 transmit$4 push$3 forward$3) near7 (interference noise)) and ((send$3 transmit$4 push$3 forward$3) near5 policy) not S112	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/02/22 06:18
S115	100,577	(H04L7/00,0004 H04L41/00,06,08-0806,0813-0836,085-0859,0866-0869,50-5016,5035,5038 H04L43/00,04,08-0817,0876-10,16 H04L47/00,10,11,12,28,29,32).cpc.	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/02/22 06:18

S116	115	S114 and S115	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/02/22 06:19
S117	54	((avoid$3 reschedul$3) near3 (send$3 transmit$4 push$3 forward$3) near7 (interference noise)) and ((send$3 transmit$4 push$3 forward$3) near5 policy) not (S112 S116)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/02/22 06:22
S123	2	("10530695" | "9819595").PN.	US-PGPUB; USPAT	OR	ON	2020/06/30 15:53
S124	8	("20080159124" | "20080186873" | "20090016358" | "20090201805" | "20090310528" | "20110182182" | "20110273979" | "20130077482").PN.	US-PGPUB; USPAT	OR	ON	2020/06/30 15:53
S125	3	((detect$3 determin$3 identif$4 observ$3 encounter$3 recogniz$3 diagnos$3) near5 noise) same2 (((send$3 transmit$4 forward$3) near5 (policy configuration algorithm)) with (improv$3 near5 (performance quality)))	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/06/30 17:54
S126	104,560	(H04L7/00,0004 H04L41/00,06,08-0806,0813-0836,085-0859,0866-0869,50-5016,5035,5038 H04L43/00,04,08-0817,0876-10,16 H04L47/00,10,11,12,28,29,32).cpc.	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/06/30 17:54
S127	2,206	((detect$3 determin$3 identif$4 observ$3 encounter$3 recogniz$3 diagnos$3) near5 noise) same2 (((send$3 transmit$4 forward$3) near5 (policy configuration algorithm)))	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/06/30 17:57
S128	224	S127 and S126	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/06/30 18:03
S131	104,560	(H04L7/00,0004 H04L41/00,06,08-0806,0813-0836,085-0859,0866-0869,50-5016,5035,5038 H04L43/00,04,08-0817,0876-10,16 H04L47/00,10,11,12,28,29,32).cpc.	US-PGPUB; USPAT	OR	ON	2020/06/30 21:16

			; EPO; JPO			
S132	2,206	((detect$3 determin$3 identif$4 observ$3 encounter$3 recogniz$3 diagnos$3) near5 noise) same2 (((send$3 transmit$4 forward$3) near5 (policy configuration algorithm)))	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/06/30 21:16
S133	224	S132 and S131	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/06/30 21:16
S134	113,115	(H04L1/00,0019,20 H04L7/00,0004 H04L41/00,06,08-0806,0813-0836,085-0859,0866-0869,50-5016,5035,5038 H04L43/00,04,08-0817,0876-10,16 H04L47/00,10,11,12,28,29,32).cpc.	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/06/30 21:16
S135	22,276,145	@AD<="20111110"	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/06/30 21:17
S136	200	S133 and S135	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/06/30 21:21
S137	12	(S132 and S134 and S135) not S136	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/06/30 21:22

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S45	100	rhee near1 wonjong	US-PGPUB; USPAT	OR	ON	2017/12/20 20:54

S46	889	(policy with algorithm).clm.	US-PGPUB; USPAT	OR	ON	2017/12/20 20:54
S47	1	S45 and S46	US-PGPUB; USPAT	OR	ON	2017/12/20 20:54
S48	42,097	((transmission near1 control$4) (communication near1 algorithm)).clm.	US-PGPUB; USPAT	OR	ON	2017/12/20 20:55
S49	13	S46 and S48	US-PGPUB; USPAT	OR	ON	2017/12/20 20:55
S50	5	S48 and S45	US-PGPUB; USPAT	OR	ON	2017/12/20 20:56
S68	104	rhee near1 wonjong	US-PGPUB; USPAT	OR	ON	2018/10/20 02:52
S69	106,792	((transmission near1 control$4) (communication near1 algorithm) policy).clm.	US-PGPUB; USPAT	OR	ON	2018/10/20 02:53
S70	7	S68 and S69	US-PGPUB; USPAT	OR	ON	2018/10/20 02:53
S76	105	rhee near1 wonjong	US-PGPUB; USPAT	OR	ON	2019/01/27 14:41
S77	7,741	(monitor$3 with real-time).clm.	US-PGPUB; USPAT	OR	ON	2019/01/27 14:55
S78	2	S76 and S77	US-PGPUB; USPAT	OR	ON	2019/01/27 14:55
S79	37,017	(monitor$3 with parameter).clm.	US-PGPUB; USPAT	OR	ON	2019/01/27 14:56
S80	4	S76 and S79	US-PGPUB; USPAT	OR	ON	2019/01/27 14:56
S81	3,094	(policy and algorithm).clm.	US-PGPUB; USPAT	OR	ON	2019/01/27 14:57
S82	1	S76 and S81	US-PGPUB; USPAT	OR	ON	2019/01/27 14:57

S89	110	rhee near1 wonjong	US-PGPUB; USPAT	OR	ON	2019/07/26 17:46
S90	25,771	(network near3 monitor$3).clm.	US-PGPUB; USPAT	OR	ON	2019/07/26 17:50
S91	1	S89 and S90	US-PGPUB; USPAT	OR	ON	2019/07/26 17:50
S92	1,397	(policy and (histor$4 near4 data)).clm.	US-PGPUB; USPAT	OR	ON	2019/07/26 17:52
S94	1	S92 and S89	US-PGPUB; USPAT	OR	ON	2019/07/26 17:52
S95	7,800	(communication near5 performance).clm.	US-PGPUB; USPAT	OR	ON	2019/07/26 17:53
S96	8	S89 and S95	US-PGPUB; USPAT	OR	ON	2019/07/26 17:53
S118	118	rhee near1 wonjong	US-PGPUB; USPAT	OR	ON	2020/02/23 09:12
S119	1,101	(policy with algorithm).clm.	US-PGPUB; USPAT	OR	ON	2020/02/23 09:12
S120	1	S118 and S119	US-PGPUB; USPAT	OR	ON	2020/02/23 09:12
S121	119,468	((transmission near1 control$4) (communication near1 algorithm) policy).clm.	US-PGPUB; USPAT	OR	ON	2020/02/23 09:13
S122	8	S118 and S121	US-PGPUB; USPAT	OR	ON	2020/02/23 09:13
S129	122	rhee near1 wonjong	US-PGPUB; USPAT	OR	ON	2020/06/30 17:55
S138	122	rhee near1 wonjong	US-PGPUB; USPAT	OR	ON	2020/06/30 20:49
S139	120	((detect$3 determin$3 identif$4 observ$3 encounter$3 recogniz$3 diagnos$3) near5 noise) same2 (((send$3 transmit$4 forward$3) near5 (policy configuration algorithm))).clm.	US-PGPUB; USPAT	OR	ON	2020/06/30 20:49

S140	175	(adaptive near1 spectrum near2 signal near1 alignment).as. (adaptive near1 spectrum near2 signal near1 alignment).aanm.	US-PGPUB; USPAT	OR	ON	2020/06/30 20:50
S141	0	(S138 S140) and S139	US-PGPUB; USPAT	OR	ON	2020/06/30 20:53
S142	1,398	((detect$3 determin$3 identif$4 observ$3 encounter$3 recogniz$3 diagnos$3) near5 noise) and (((send$3 transmit$4 forward$3) near5 (policy configuration algorithm))).clm.	US-PGPUB; USPAT	OR	ON	2020/06/30 20:53
S143	6	(S138 S140) and S142	US-PGPUB; USPAT	OR	ON	2020/06/30 20:55
S144	75,982	(H04L1/0019,20 H04L41/06,08-0806,0813-0836,085-0859,0866-0869,50-5016,5035,5038 H04L43/04,08-0817,0876-10,16).cpc.	US-PGPUB; USPAT	OR	ON	2020/06/30 21:17
S145	9,004,209	@AD<="20111110"	US-PGPUB; USPAT	OR	ON	2020/06/30 21:17
S146	27,666	S144 and S145	US-PGPUB; USPAT	OR	ON	2020/06/30 21:23
S147	45	S146 and S142	US-PGPUB; USPAT	OR	ON	2020/06/30 21:23

8/12/2020 1:20:19 PM
C:\Users\bgrijalva\Documents\EAST\Workspaces\14356581.wsp

PTO/SB/08b (07-09)
Approved for use through 07/31/2012. OMB 0651-0031
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 1

Complete if Known	
Application Number	14/356,581
Filing Date	May 6, 2014
First Named Inventor	Wonjong Rhee
Art Unit	2446
Examiner Name	GRIJALVA LOBOS, BORIS D
Attorney Docket Number	20145-054US

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	Examination Report mailed 6/15/2020 in related Australian Application No. 2019202408 [Docket No. 20145-054AUD2] 5 pgs.	

Examiner Signature	/BORIS D GRIJALVA LOBOS/	Date Considered	08/12/2020

*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.**

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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.

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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.
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/356,581	05/06/2014	Wonjong Rhee	20145-054US	4319

146571 7590 08/06/2020

North Weber & Baugh LLP - ASSIA
3260 Hillview Avenue, 1st Floor
Palo Alto, CA 94304

EXAMINER	
GRIJALVA LOBOS, BORIS D	

ART UNIT	PAPER NUMBER
2446	

NOTIFICATION DATE	DELIVERY MODE
08/06/2020	ELECTRONIC

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.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

docket1@northweber.com

Applicant-Initiated Interview Summary	**Application No.** 14/356,581	**Applicant(s)** Rhee, Wonjong	
	Examiner BORIS D GRIJALVA LOBOS	**Art Unit** 2446	**AIA (FITF) Status** No

All participants (applicant, applicants representative, PTO personnel):

(1) BORIS D. GRIJALVA LOBOS. (3) _____.

(2) ALI UYANIK (67080). (4) _____.

Date of Interview: 31 July 2020.

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.

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...)

Proposed amendments to the claims after the Notice of Allowance mailed on 7/14/2020 were discussed. The examiner believes the proposed amendments would modify the scope of the invention and suggested entering the amendments as a continuation because further search and/or consideration would be necessary..

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

/BORIS D GRIJALVA LOBOS/ Examiner, Art Unit 2446	

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 examiners 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 applicants 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 applicants 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 examiners 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 examiners initials.

UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/356,581	05/06/2014	Wonjong Rhee	20145-054US	4319

7590 07/23/2020

North Weber & Baugh LLP - ASSIA
3260 Hillview Avenue, 1st Floor
Palo Alto, CA 94304

EXAMINER	
GRIJALVA LOBOS, BORIS D	

ART UNIT	PAPER NUMBER
2446	

NOTIFICATION DATE	DELIVERY MODE
07/23/2020	ELECTRONIC

NOTICE OF NON-COMPLIANT INFORMATION DISCLOSURE STATEMENT

An Information Disclosure Statement (IDS) filed 07/17/2020 in the above-identified application fails to meet the requirements of 37 CFR 1.97(d) for the reason(s) specified below. Accordingly, the IDS will be placed in the file, but the information referred to therein has not been considered.

The IDS is not compliant with 37 CFR 1.97(d) because:

☑ The IDS lacks a statement as specified in 37 CFR 1.97(e).

☐ The IDS lacks the fee set forth in 37 CFR 1.17(p).

☐ The IDS was filed after the issue fee was paid. Applicant may wish to consider filing a petition to withdraw the application from issue under 37 CFR 1.313(c) to have the IDS considered. See MPEP 1308.

N. Horne, for

571-272-4200 or 1-888-786-0101
Application Assistance Unit
Office of Data Management

FORM PTOM327-B (Rev. 02/08)

Charter Communications, Inc.
Exhibit 1006
Page #45

Electronic Acknowledgement Receipt

EFS ID:	40104952
Application Number:	14356581
International Application Number:	
Confirmation Number:	4319
Title of Invention:	METHOD, APPARATUS, AND SYSTEM FOR OPTIMIZING PERFORMANCE OF A COMMUNICATION UNIT BY A REMOTE SERVER
First Named Inventor/Applicant Name:	Wonjong Rhee
Customer Number:	146571
Filer:	Michael V. North/Domarina Alkhas
Filer Authorized By:	Michael V. North
Attorney Docket Number:	20145-054US
Receipt Date:	25-JUL-2020
Filing Date:	06-MAY-2014
Time Stamp:	22:06:48
Application Type:	U.S. National Stage under 35 USC 371

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	054US_Trans.pdf	17496 7376dde1ef1980825ee3fc772e454b35ff2e bfa0	no	1

Warnings:

Information:					
2	Transmittal Letter	054US_SIDS_Trans.pdf	26130 81860ccb45cef299ad45b0de21e1d4a70af2dd8e	no	3
Warnings:					
Information:					
3	Miscellaneous Incoming Letter	054US_Ntc_IDSLacksStatement.pdf	32331 71db3a6e33eb5fef590c00f1509ec9a9c3c2d2cf	no	1
Warnings:					
Information:					
			Total Files Size (in bytes):	75957	

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.

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appl. No.	:	14/356,581	Confirmation No. :	4319
Inventor(s)	:	Wonjong Rhee		
Filing Date	:	May 6, 2014		
Title	:	METHOD, APPARATUS, AND SYSTEM FOR OPTIMIZING PERFORMANCE OF A COMMUNICATION UNIT BY A REMOTE SERVER		
Art Unit	:	2446		
Examiner	:	GRIJALVA LOBOS, BORIS D		
Docket No.	:	20145-054US		
Customer No.	:	146571		

CERTIFICATE OF MAILING (37 CFR §1.8)

I hereby certify, pursuant to 37 CFR §1.8, that this correspondence is being electronically transmitted via EFS-Web addressed to Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on the date shown below:

Date: July 25, 2020 By: /Domarina Alkhas/
Domarina Alkhas

TRANSMITTAL

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

Dear Examiner GRIJALVA LOBOS:

Submitted herewith in response to the NOTICE OF NON-COMPLIANT INFORMATION DISCLOSURE STATEMENT mailed July 23, 2020, is a transmittal with statement as specified in 37 CFR 1.97(e).

If any fees are due with this communication, the Director is hereby authorized to charge the fees to Deposit Account No. 50-2776.

Respectfully submitted,

Date: July 25, 2020

By: /Michael V. North/
Michael V. North
Reg. No. 46,963

Charter Communications, Inc.
Exhibit 1006
Page #48

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appl. No.	:	14/356,581	Confirmation No. :	4319
Inventor(s)	:	Wonjong Rhee		
Filing Date	:	May 6, 2014		
Title	:	METHOD, APPARATUS, AND SYSTEM FOR OPTIMIZING PERFORMANCE OF A COMMUNICATION UNIT BY A REMOTE SERVER		
Art Unit	:	2446		
Examiner	:	GRIJALVA LOBOS, BORIS D		
Docket No.	:	20145-054US		
Customer No.	:	146571		

CERTIFICATE OF MAILING (37 CFR §1.8)

I hereby certify, pursuant to 37 CFR §1.8, that this correspondence is being electronically transmitted via EFS-Web addressed to Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on the date shown below:

Date: July 23, 2020 By: /Domarina Alkhas/
Domarina Alkhas

INFORMATION DISCLOSURE STATEMENT

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

Dear Examiner GRIJALVA LOBOS:

Filed herewith, in accordance with the provisions of 37 CFR §§ 1.56 and 1.97–1.98, listing various references for consideration by the Examiner, is an Information Disclosure Statement ("IDS").

The filing of this IDS shall not be construed as a representation that a search has been made, or regarding the completeness of the list of references, or that no other material information exists. Furthermore, the filing of this IDS shall not be construed as a representation that inclusion of a reference in this list is an admission that it is prior art or is pertinent to this application, or as an admission that the information listed is, or may be considered to be, material to the patentability of the above referenced application. The filing of this IDS shall not be construed in any manner as an admission against interest.

Charter Communications, Inc.
Exhibit 1006
Page #49

This IDS is being filed:

☐ within three months of the filing date of a national application, other than a continued prosecution application under § 1.53(d);

☐ within three months of the date of entry of the national stage as set forth in § 1.491 in an international application;

☐ before the mailing of a first Office Action on the merits;

☐ before the mailing of a first Office Action after the filing of a request for continued examination under § 1.114;

☐ after three months of the filing date or entry into the national stage or after the mailing of a first Office action on the merits, but before the mailing date of any final action under § 1.113, a notice of allowance under §1.311, or an action that otherwise closes prosecution in the application;

AND

☐ enclosed herein is the fee set forth in 37 CFR § 1.17(p);

OR

☐ Applicant certifies pursuant to 37 CFR § 1.97(e):

☐ That each item of information contained in the information disclosure statement was first cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this information disclosure statement;

OR

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

☒ on or before the payment of the issue fee but after the mailing of a final action under § 1.113, a notice of allowance under §1.311, or an action that otherwise closes prosecution in the application;

AND

☒ enclosed herein is the fee set forth in 37 CFR § 1.17(p);

AND

☒ Applicant certifies pursuant to 37 CFR § 1.97(e):

☒ That each item of information contained in the information disclosure statement was first cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this information disclosure statement;

OR

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

☐ Applicant submits that the enclosed Information Disclosure Statement is timely; therefore, no fee is required.

☒ Except as provided for under 37 CFR § 1.98(a)(2), Applicant has enclosed a copy of each listed reference.

☐ Pursuant to 37 CFR § 1.704(d), Applicant certifies that each of the references cited herein were first cited in a communication from a foreign patent office in a counterpart application and that this communication was not received by any individual designated in 37 CFR § 1.56(c) more than thirty days prior to the filing of this Information Disclosure Statement.

Consideration of the listed references and favorable action are requested. If any additional fees are due in connection with the filing of this Information Disclosure Statement, the Commissioner is hereby authorized to charge such fees to Deposit Account 50-2776.

Respectfully submitted,

Date: July 23, 2020

By: /Michael V. North/
Michael V. North
Reg. No. 46,963

Charter Communications, Inc.
Exhibit 1006
Page #51

UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/356,581	05/06/2014	Wonjong Rhee	20145-054US	4319

7590 07/23/2020

North Weber & Baugh LLP - ASSIA
3260 Hillview Avenue, 1st Floor
Palo Alto, CA 94304

EXAMINER	
GRIJALVA LOBOS, BORIS D	

ART UNIT	PAPER NUMBER
2446	

NOTIFICATION DATE	DELIVERY MODE
07/23/2020	ELECTRONIC

NOTICE OF NON-COMPLIANT INFORMATION DISCLOSURE STATEMENT

An Information Disclosure Statement (IDS) filed 07/17/2020 in the above-identified application fails to meet the requirements of 37 CFR 1.97(d) for the reason(s) specified below. Accordingly, the IDS will be placed in the file, but the information referred to therein has not been considered.

The IDS is not compliant with 37 CFR 1.97(d) because:

☑ The IDS lacks a statement as specified in 37 CFR 1.97(e).

☐ The IDS lacks the fee set forth in 37 CFR 1.17(p).

☐ The IDS was filed after the issue fee was paid. Applicant may wish to consider filing a petition to withdraw the application from issue under 37 CFR 1.313(c) to have the IDS considered. See MPEP 1308.

N. Horne, for

571-272-4200 or 1-888-786-0101
Application Assistance Unit
Office of Data Management

FORM PTOM327-B (Rev. 02/08)

Charter Communications, Inc.
Exhibit 1006
Page #52

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
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 1

Complete if Known	
Application Number	14/356,581
Filing Date	May 6, 2014
First Named Inventor	Wonjong Rhee
Art Unit	2446
Examiner Name	GRIJALVA LOBOS, BORIS D
Attorney Docket Number	20145-054US

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	Examination Report mailed 6/15/2020 in related Australian Application No. 2019202408 [Docket No. 20145-054AUD2] 5 pgs.	

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.

Privacy Act Statement

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

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

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

Electronic Patent Application Fee Transmittal

Application Number:	14356581
Filing Date:	06-May-2014
Title of Invention:	METHOD, APPARATUS, AND SYSTEM FOR OPTIMIZING PERFORMANCE OF A COMMUNICATION UNIT BY A REMOTE SERVER
First Named Inventor/Applicant Name:	Wonjong Rhee
Filer:	Michael V. North/Domarina Alkhas
Attorney Docket Number:	20145-054US

Filed as Large Entity

Filing Fees for U.S. National Stage under 35 USC 371

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($)
Miscellaneous:				
SUBMISSION- INFORMATION DISCLOSURE STMT	1806	1	240	240
		Total in USD ($)		**240**

Electronic Acknowledgement Receipt

EFS ID:	40028403
Application Number:	14356581
International Application Number:	
Confirmation Number:	4319
Title of Invention:	METHOD, APPARATUS, AND SYSTEM FOR OPTIMIZING PERFORMANCE OF A COMMUNICATION UNIT BY A REMOTE SERVER
First Named Inventor/Applicant Name:	Wonjong Rhee
Customer Number:	146571
Filer:	Michael V. North/Domarina Alkhas
Filer Authorized By:	Michael V. North
Attorney Docket Number:	20145-054US
Receipt Date:	17-JUL-2020
Filing Date:	06-MAY-2014
Time Stamp:	03:50:24
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$240
RAM confirmation Number	E20207G450463354
Deposit Account	502776
Authorized User	Domarina Alkhas
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: 37 CFR 1.17 (Patent application and reexamination processing fees) 37 CFR 1.19 (Document supply fees)	

37 CFR 1.20 (Post Issuance fees)

37 CFR 1.21 (Miscellaneous fees and charges)

37 CFR 1.492 (National application filing, search, and examination fees)

37 CFR 1.492(a) (Basic national fee only)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal Letter	054US_SIDS_Trans.pdf	26120 d13d088c2a7818ee3ce17e9a4839675fbafaf962	no	3
Warnings:					
Information:					
2	Information Disclosure Statement (IDS) Form (SB08)	054US_SIDS_SB08b.pdf	322607 dda967c8b794b9b0e72fec5f1c65de798c743376	no	2
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
3	Non Patent Literature	054US_SIDS_NPL1.pdf	109472 c4747dba46e12a3215f2c700079b2b11e6eb07f2	no	5
Warnings:					
Information:					
4	Fee Worksheet (SB06)	fee-info.pdf	30791 68529dd888c845cf2bb248f5961e2124af3a2113	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	488990		

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.

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New International Application Filed with the USPTO as a Receiving Office

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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appl. No.	:	14/356,581	Confirmation No. :	4319
Inventor(s)	:	Wonjong Rhee		
Filing Date	:	May 6, 2014		
Title	:	METHOD, APPARATUS, AND SYSTEM FOR OPTIMIZING PERFORMANCE OF A COMMUNICATION UNIT BY A REMOTE SERVER		
Art Unit	:	2446		
Examiner	:	GRIJALVA LOBOS, BORIS D		
Docket No.	:	20145-054US		
Customer No.	:	146571		

CERTIFICATE OF MAILING (37 CFR §1.8)

I hereby certify, pursuant to 37 CFR §1.8, that this correspondence is being electronically transmitted via EFS-Web addressed to Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on the date shown below:

Date: July 17, 2020 By: /Domarina Alkhas/
Domarina Alkhas

INFORMATION DISCLOSURE STATEMENT

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

Dear Examiner GRIJALVA LOBOS:

Filed herewith, in accordance with the provisions of 37 CFR §§ 1.56 and 1.97–1.98, listing various references for consideration by the Examiner, is an Information Disclosure Statement ("IDS").

The filing of this IDS shall not be construed as a representation that a search has been made, or regarding the completeness of the list of references, or that no other material information exists. Furthermore, the filing of this IDS shall not be construed as a representation that inclusion of a reference in this list is an admission that it is prior art or is pertinent to this application, or as an admission that the information listed is, or may be considered to be, material to the patentability of the above referenced application. The filing of this IDS shall not be construed in any manner as an admission against interest.

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This IDS is being filed:

☐ within three months of the filing date of a national application, other than a continued prosecution application under § 1.53(d);

☐ within three months of the date of entry of the national stage as set forth in § 1.491 in an international application;

☐ before the mailing of a first Office Action on the merits;

☐ before the mailing of a first Office Action after the filing of a request for continued examination under § 1.114;

☐ after three months of the filing date or entry into the national stage or after the mailing of a first Office action on the merits, but before the mailing date of any final action under § 1.113, a notice of allowance under §1.311, or an action that otherwise closes prosecution in the application;

AND

☐ enclosed herein is the fee set forth in 37 CFR § 1.17(p);

OR

☐ Applicant certifies pursuant to 37 CFR § 1.97(e):

☐ That each item of information contained in the information disclosure statement was first cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this information disclosure statement;

OR

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

☒ on or before the payment of the issue fee but after the mailing of a final action under § 1.113, a notice of allowance under §1.311, or an action that otherwise closes prosecution in the application;

AND

☒ enclosed herein is the fee set forth in 37 CFR § 1.17(p);

AND

☐ Applicant certifies pursuant to 37 CFR § 1.97(e):

☐ That each item of information contained in the information disclosure statement was first cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this information disclosure statement;

OR

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

☒ Applicant submits that the enclosed Information Disclosure Statement is timely; therefore, no fee is required.

☒ Except as provided for under 37 CFR § 1.98(a)(2), Applicant has enclosed a copy of each listed reference.

☐ Pursuant to 37 CFR § 1.704(d), Applicant certifies that each of the references cited herein were first cited in a communication from a foreign patent office in a counterpart application and that this communication was not received by any individual designated in 37 CFR § 1.56(c) more than thirty days prior to the filing of this Information Disclosure Statement.

Consideration of the listed references and favorable action are requested. If any additional fees are due in connection with the filing of this Information Disclosure Statement, the Commissioner is hereby authorized to charge such fees to Deposit Account 50-2776.

Respectfully submitted,

Date: July 17, 2020

By: /Michael V. North/
Michael V. North
Reg. No. 46,963

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UNITED STATES PATENT AND TRADEMARK OFFICE

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

NOTICE OF ALLOWANCE AND FEE(S) DUE

146571 7590 07/14/2020
North Weber & Baugh LLP - ASSIA
3260 Hillview Avenue, 1st Floor
Palo Alto, CA 94304

EXAMINER
GRIJALVA LOBOS, BORIS D

ART UNIT	PAPER NUMBER
2446	

DATE MAILED: 07/14/2020

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/356,581	05/06/2014	Wonjong Rhee	20145-054US	4319

TITLE OF INVENTION: METHOD, APPARATUS, AND SYSTEM FOR OPTIMIZING PERFORMANCE OF A COMMUNICATION UNIT BY A REMOTE SERVER

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$1000	$0.00	$0.00	$1000	10/14/2020

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: Maintenance fees are due in utility patents issuing on applications filed on or after Dec. 12, 1980. It is patentee's responsibility to ensure timely payment of maintenance fees when due. More information is available at www.uspto.gov/PatentMaintenanceFees.

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PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via EFS-Web.

By mail, send to: Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

By fax, send to: (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)

146571 7590 07/14/2020
North Weber & Baugh LLP - ASSIA
3260 Hillview Avenue, 1st Floor
Palo Alto, CA 94304

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 transmitted to the USPTO via EFS-Web or by facsimile to (571) 273-2885, on the date below.

(Typed or printed name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/356,581	05/06/2014	Wonjong Rhee	20145-054US	4319

TITLE OF INVENTION: METHOD, APPARATUS, AND SYSTEM FOR OPTIMIZING PERFORMANCE OF A COMMUNICATION UNIT BY A REMOTE SERVER

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$1000	$0.00	$0.00	$1000	10/14/2020

EXAMINER	ART UNIT	CLASS-SUBCLASS
GRIJALVA LOBOS, BORIS D	2446	709-224000

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 03-09 or more recent) attached. **Use of a Customer Number is required.**

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

1_____
2_____
3_____

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

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). 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. Fees submitted: ❑Issue Fee ❑Publication Fee (if required) ❑Advance Order - # of Copies _____

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

❑ Electronic Payment via EFS-Web ❑ Enclosed check ❑ Non-electronic payment by credit card (Attach form PTO-2038)

❑ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. _____

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

❑ Applicant certifying micro entity status. See 37 CFR 1.29

❑ Applicant asserting small entity status. See 37 CFR 1.27

❑ Applicant changing to regular undiscounted fee status.

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.
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.
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. _____

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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
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/356,581	05/06/2014	Wonjong Rhee	20145-054US	4319

146571 7590 07/14/2020

North Weber & Baugh LLP - ASSIA
3260 Hillview Avenue, 1st Floor
Palo Alto, CA 94304

EXAMINER	
GRIJALVA LOBOS, BORIS D	
ART UNIT	PAPER NUMBER
2446	

DATE MAILED: 07/14/2020

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

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

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

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

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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 30 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

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

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

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

Notice of Allowability	Application No. 14/356,581	Applicant(s) Rhee, Wonjong	
	Examiner BORIS D GRIJALVA LOBOS	Art Unit 2446	AIA (FITF) 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 communications filed on 5/27/2020.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

3. ☑ The allowed claim(s) is/are 1,3-5,8,10,12-16,34,36-37,53-54 and 57-65 . As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see **http://www.uspto.gov/patents/init_events/pph/index.jsp** or send an inquiry to **PPHfeedback@uspto.gov.**

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

   Certified copies:

   a) ☐ All b) ☐ Some *c) ☐ None of the:

   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____ .

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

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

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

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

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☑ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date 4/19/2020, 5/27/2020.
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material _____.
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date. _____.
5. ☐ Examiner's Amendment/Comment
6. ☑ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/B.D.G/ Examiner, Art Unit 2446	/ARVIN ESKANDARNIA/ Primary Patent Examiner, Art Unit 2446

Charter Communications, Inc.
Exhibit 1006
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DETAILED ACTION

Notice of Pre-AIA or AIA Status

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

Response to Amendment

This Office action is in response to communications filed on 5/27/2020.

Claims 1, 10, 34, 57, and 64-65 have been amended. The amendments have been fully considered.

Claims 1, 3-5, 8, 10, 12-16, 34, 36-37, 53-54, and 57-65 are pending.

Claims 2, 6-7, 9, 11, 17-33, 35, 38-52, and 55-56 have been cancelled.

Allowable Subject Matter

Claims 1, 3-5, 8, 10, 12-16, 34, 36-37, 53-54, and 57-65 are allowed.

REASONS FOR ALLOWANCE

The following is an examiner's statement of reasons for allowance:

The prior art of record fails to teach, neither singly nor in combination, the claimed limitations of "determining a policy for at least one of the two or more communication units; and in response to the server detecting interference or noise from nearby wireless channels, determining that packets will be lost regardless of rate selection and, otherwise, communicating the policy to at least one or more communication units that implement one or more algorithms that use the parameter and at least a rule or a condition for the one or more communication units to improve a performance of the one or more communication units" as recited in claim 1 and similarly stated in claim(s) 10 and 34. These limitations, in conjunction with other limitations in the independent claim(s), are not specifically disclosed or remotely suggested in the prior art of record. A review of claim(s) 1, 3-5, 8, 10, 12-16, 34, 36-37, 53-54, and 57-65 indicates claim(s) 1, 3-5, 8, 10, 12-16, 34, 36-37, 53-54, and 57-65 are allowable over the prior art of record.

Conclusion

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Any inquiry concerning this communication or earlier communications from the examiner should be directed to BORIS D GRIJALVA LOBOS whose telephone number is (571)272-0767. The examiner can normally be reached on M-F 10:30AM to 6:30PM EST.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian Gillis can be reached on 571-272-7952. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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

/B.D.G/
Examiner, Art Unit 2446

/ARVIN ESKANDARNIA/
Primary Patent Examiner, Art Unit 2446

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14/356,581	Rhee, Wonjong
	Examiner	**Art Unit**
	BORIS D GRIJALVA LOBOS	2446

CPC							
Symbol						**Type**	**Version**
H04L	/	43	/	04		F	2013-01-01
H04L	/	1	/	20		I	2013-01-01
H04L	/	1	/	0019		I	2013-01-01

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

/BORIS D GRIJALVA LOBOS/ Examiner, Art Unit 2446	02 July 2020	**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	25	
/ARVIN ESKANDARNIA/ Primary Patent Examiner, Art Unit 2446	06 July 2020	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	2

U.S. Patent and Trademark Office — Part of Paper No.: 20200702

Charter Communications, Inc.
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Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14/356,581	Rhee, Wonjong
	Examiner	Art Unit
	BORIS D GRIJALVA LOBOS	2446

INTERNATIONAL CLASSIFICATION				
CLAIMED				
H04L	/	1	/	00
H04L	/	1	/	20
H04L	/	12	/	26

NON-CLAIMED				
	/		/	

US ORIGINAL CLASSIFICATION	
CLASS	SUBCLASS

CROSS REFERENCES(S)						
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)					

/BORIS D GRIJALVA LOBOS/ Examiner, Art Unit 2446	02 July 2020	Total Claims Allowed:	
(Assistant Examiner)	(Date)	25	
/ARVIN ESKANDARNIA/ Primary Patent Examiner, Art Unit 2446	06 July 2020	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	2

U.S. Patent and Trademark Office — Part of Paper No.: 20200702

Charter Communications, Inc.
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Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14/356,581	Rhee, Wonjong
	Examiner	Art Unit
	BORIS D GRIJALVA LOBOS	2446

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

CLAIMS

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
1	1	11	10	-	19	-	28	22	37	-	46	-	55	24	64
-	2	-	11	-	20	-	29	-	38	-	47	-	56	25	65
2	3	12	12	-	21	-	30	-	39	-	48	23	57		
3	4	13	13	-	22	-	31	-	40	-	49	8	58		
5	5	14	14	-	23	-	32	-	41	-	50	9	59		
-	6	15	15	-	24	-	33	-	42	-	51	10	60		
-	7	16	16	-	25	20	34	-	43	-	52	17	61		
6	8	-	17	-	26	-	35	-	44	7	53	18	62		
-	9	-	18	-	27	21	36	-	45	4	54	19	63		

/BORIS D GRIJALVA LOBOS/ Examiner, Art Unit 2446	02 July 2020	**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	25	
/ARVIN ESKANDARNIA/ Primary Patent Examiner, Art Unit 2446	06 July 2020	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	2

U.S. Patent and Trademark Office — Part of Paper No.: 20200702

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Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14/356,581	Rhee, Wonjong
	Examiner	Art Unit
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CPC - Searched*		
Symbol	**Date**	**Examiner**
H04L7/00,0004	12/21/2015	BGL
H04L12/00,14,16,24,2414,2415,2417-2419,2424-2426,2428-2433,2439,244-2442,2447,2464,2465,2468-247,2472,2473,2476,2478,26,2602,2618,2634-2642,2668-2678,2692	12/21/2015	BGL
H04L41/00,06,08-0806,0813-0836,085-0859,0866-0869,50-5016,5035,5038	12/21/2015	BGL
H04L43/00,04,08-0817,0876-10,16	12/21/2015	BGL
H04L47/00,10,11,12,28,29,32	12/21/2015	BGL
H04L7/00,0004 H04L41/00,06,08-0806,0813-0836,085-0859,0866-0869,50-5016,5035,5038 H04L43/00,04,08-0817,0876-10,16 H04L47/00,10,11,12,28,29,32	10/21/2018	BGL
H04L7/00,0004 H04L41/00,06,08-0806,0813-0836,085-0859,0866-0869,50-5016,5035,5038 H04L43/00,04,08-0817,0876-10,16 H04L47/00,10,11,12,28,29,32	07/26/2019	BGL
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H04L1/00,0019,20 H04L7/00,0004 H04L41/00,06,08-0806,0813-0836,085-0859,0866-0869,50-5016,5035,5038 H04L43/00,04,08-0817,0876-10,16 H04L47/00,10,11,12,28,29,32	06/30/2020	BGL

CPC Combination Sets - Searched*		
Symbol	**Date**	**Examiner**

US Classification - Searched*			
Class	**Subclass**	**Date**	**Examiner**

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of

/B.D.G/ Examiner, Art Unit 2446	/ARVIN ESKANDARNIA/ Primary Patent Examiner, Art Unit 2446

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the search.

Search Notes		
Search Notes	**Date**	**Examiner**
EAST Inventor Name Search Performed	12/21/2015	BGL
EAST Text Limited Classification Search Performed (see attached search notes)	12/21/2015	BGL
EAST Text Search Performed (see attached search notes)	12/21/2015	BGL
EAST Inventor Name Search Performed	11/16/2016	BGL
EAST Text Search Performed	11/16/2016	BGL
Updated EAST Text Search (see attached search notes)	12/20/2017	BGL
Updated EAST Inventor Name Search (see attached search notes)	12/20/2017	BGL
Updated EAST Inventor Name Search (see attached search notes)	10/21/2018	BGL
Updated EAST Text Limited Classification Search (see attached search notes)	10/21/2018	BGL
Updated EAST Text Search (see attached search notes)	10/21/2018	BGL
GOOGLE Search Performed	10/21/2018	BGL
Updated EAST Inventor Name Search (see attached search notes)	01/28/2019	BGL
Updated EAST Text Search (see attached search notes)	01/28/2019	BGL
Google search performed	01/28/2019	BGL
Updated EAST Inventor Name Search (see attached search notes)	07/26/2019	BGL
Updated EAST Text Limited Classification Search (see attached search notes)	07/26/2019	BGL
Updated EAST Text Limited Classification Search (see attached search notes)	12/10/2019	BGL
Updated EAST Text Search (see attached search notes)	12/10/2019	BGL
Updated EAST Text Limited Classification Search (see attached search notes)	02/22/2020	BGL
Updated EAST Text Search (see attached search notes)	02/22/2020	BGL
Updated EAST Inventor Name Search (see attached search notes)	02/23/2020	BGL
Updated EAST Inventor Name Search (see attached search notes)	06/30/2020	BGL

/B.D.G/ Examiner, Art Unit 2446	/ARVIN ESKANDARNIA/ Primary Patent Examiner, Art Unit 2446

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Updated EAST Text Limited Classification Search (see attached search notes)	06/30/2020	BGL
Updated EAST Text Search (see attached search notes)	06/30/2020	BGL
GOOGLE search performed	06/30/2020	BGL
Consulted Allowable Subject Matter with Primary Examiner Arvin Eskandarnia	07/01/2020	BGL

Interference Search			
US Class/CPC Symbol	**US Subclass/CPC Group**	**Date**	**Examiner**
H04L1	0019,20	06/30/2020	BGL
H04L41	06,08-0806,0813-0836,085-0859,0866-0869,50-5016,5035,5038	06/30/2020	BGL
H04L43	04,08-0817,0876-10,16	06/30/2020	BGL

/B.D.G/ Examiner, Art Unit 2446	/ARVIN ESKANDARNIA/ Primary Patent Examiner, Art Unit 2446

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	BORIS D GRIJALVA LOBOS	2446

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

CLAIMS										
☐ Claims renumbered in the same order as presented by applicant						☐ CPA	☐ T.D.		☐ R.1.47	
CLAIM		DATE								
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-	2	✓	-	-	-	-	-	-	-	
2	3	✓	✓	✓	✓	✓	✓	✓	=	
3	4	✓	✓	✓	✓	✓	✓	✓	=	
5	5	✓	✓	✓	✓	✓	✓	✓	=	
-	6	✓	-	-	-	-	-	-	-	
-	7	✓	✓	✓	✓	-	-	-	-	
6	8	✓	✓	✓	✓	✓	✓	✓	=	
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11	10	✓	✓	✓	✓	✓	✓	✓	=	
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15	15	✓	✓	✓	✓	✓	✓	✓	=	
16	16	✓	✓	✓	✓	✓	✓	✓	=	
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22	37	✓	✓	✓	✓	✓	✓	✓	=	
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-	41	-	-	-	-	-	-	-	-	
-	42	-	-	-	-	-	-	-	-	

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	14/356,581	Rhee, Wonjong
	Examiner	**Art Unit**
	BORIS D GRIJALVA LOBOS	2446

CLAIM		DATE								
Final	Original	12/21/2015	11/16/2016	12/20/2017	10/21/2018	01/27/2019	07/26/2019	02/23/2020	07/02/2020	
-	43	-	-	-	-	-	-	-	-	
-	44	-	-	-	-	-	-	-	-	
-	45	-	-	-	-	-	-	-	-	
-	46	-	-	-	-	-	-	-	-	
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-	51	-	-	-	-	-	-	-	-	
-	52	-	-	-	-	-	-	-	-	
7	53				✓	✓	✓	✓	=	
4	54				✓	✓	✓	✓	=	
-	55				✓	-	-	-	-	
-	56				✓	✓	✓	✓	-	
23	57				✓	✓	✓	✓	=	
8	58						✓	✓	=	
9	59						✓	✓	=	
10	60						✓	✓	=	
17	61						✓	✓	=	
18	62						✓	✓	=	
19	63						✓	✓	=	
24	64						✓	✓	=	
25	65						✓	✓	=	

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EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L9	104,560	(H04L7/00,0004 H04L41/00,06,08-0806,0813-0836,085-0859,0866-0869,50-5016,5035,5038 H04L43/00,04,08-0817,0876-10,16 H04L47/00,10,11,12,28,29,32).cpc.	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/06/30 21:16
L10	2,206	((detect$3 determin$3 identif$4 observ$3 encounter$3 recogniz$3 diagnos$3) near5 noise) same2 (((send$3 transmit$4 forward$3) near5 (policy configuration algorithm)))	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/06/30 21:16
L11	224	L10 and L9	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/06/30 21:16
L12	113,115	(H04L1/00,0019,20 H04L7/00,0004 H04L41/00,06,08-0806,0813-0836,085-0859,0866-0869,50-5016,5035,5038 H04L43/00,04,08-0817,0876-10,16 H04L47/00,10,11,12,28,29,32).cpc.	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/06/30 21:16
L15	22,276,145	@AD<="20111110"	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/06/30 21:17
L16	200	11 and 15	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/06/30 21:21
L17	12	(10 and 12 and 15) not 16	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/06/30 21:22

S1	1,026	((access near1 point) (base near1 station) (wireless near1 LAN near1 device) (DSLAM) (gateway) (performance near1 device) DSL CPE (customer near1 premises near1 equipment) modem (in-home near1 powerline) (in-home coax) (HPNA) (metering near1 device) (LAN near3 appliance) (femtocell) (wifi near1 base) (repeater) STB STU (IP near2 TV) (IP near2 media near1 device) (gam$3 near1 console) gateway device computer router bridge switch) with ((transmit$4 send$3 forward$3 receiv$3) near5 policy) with operation	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/16 12:31
S2	84	((access near1 point) (base near1 station) (wireless near1 LAN near1 device) (DSLAM) (gateway) (performance near1 device) DSL CPE (customer near1 premises near1 equipment) modem (in-home near1 powerline) (in-home coax) (HPNA) (metering near1 device) (LAN near3 appliance) (femtocell) (wifi near1 base) (repeater) STB STU (IP near2 TV) (IP near2 media near1 device) (gam$3 near1 console) gateway device computer router bridge switch) with ((transmit$4 send$3 forward$3 receiv$3) near5 policy) with operation with (location time)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/16 12:48
S3	26,692	RSSI	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/16 15:31
S4	1,040	monitor$3 near3 RSSI	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/16 15:32
S6	0	(monitor$3 near3 RSSI) with (adjust$3 near3 rate)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/16 15:32
S7	8	((transmit$3 send$3 receiv$3 forward$3 monitor$3) near3 RSSI) with (adjust$3 near3 rate)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/16 15:33

S8	26	((send$3 transmit$4 receiv$3 forward$3) near5 conditions near3 operation) with ((access near1 point) AP)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/17 18:26
S9	4,998	adaptation near1 algorithm	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/17 18:58
S10	3	(adaptation near1 algorithm) with ((real near1 time) real-time) with historical	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/17 18:58
S11	1	"14356581"	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/17 20:14
S12	0	((send$3 transmit$4 forward$3 receiv$3) near3 policy) near20 RSSI	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/17 20:39
S13	0	((send$3 transmit$4 forward$3 receiv$3) near3 policy) with RSSI	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/17 20:39
S14	31	((send$3 transmit$4 forward$3 receiv$3) near7 policy) with RSSI	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/17 20:39
S15	1	(policy near1 server) with RSSI	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/17 20:59

S16	26	(policy near1 server) same2 RSSI	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/17 20:59
S17	0	((transmit$3 send$3 receiv$3 forward$3) near5 policy near5 algorithms) with RSSI	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/18 18:19
S18	178	((transmit$3 send$3 receiv$3 forward$3) near5 policy near5 algorithms)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/18 18:19
S19	1	((transmit$3 send$3 receiv$3 forward$3) near5 policy near5 algorithms) and RSSI	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/18 18:19
S20	2	((transmit$3 send$3 receiv$3 forward$3) near5 policy near5 algorithms) with AP	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/18 18:20
S21	7	((transmit$3 send$3 receiv$3 forward$3) near5 policy near5 algorithms) and (((access near1 point) AP) with server)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/18 18:20
S22	109	rhee near1 wonjong	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/21 13:24
S23	10	(rhee near1 wonjong) and policy	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/21 13:30

S24	58,484	(H04L7/00,0004 H04L12/00,14,16,24,2414,2415,2417-2419,2424-2426,2428-2433,2439,244-2442,2447,2464,2465,2468-247,2472,2473,2476,2478,26,2602,2618,2634-2642,2668-2678,2692 H04L41/00,06,08-0806,0813-0836,085-0859,0866-0869,50-5016,5035,5038 H04L43/00,04,08-0817,0876-10,16 H04L47/00,10,11,12,28,29,32).cpc.	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/21 15:17
S25	25	((transmit$3 send$3 receiv$3 forward$3) near5 policy near5 algorithms) and S24	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/21 15:17
S26	41	(rhee near1 wonjong) and S24	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/21 15:18
S27	1	"7840220".pn.	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/21 16:50
S28	1,672,280	adaptation algorithm	US-PGPUB; USPAT; EPO; JPO	OR	ON	2016/11/14 19:55
S29	5,390	adaptation near1 algorithm	US-PGPUB; USPAT; EPO; JPO	OR	ON	2016/11/14 19:55
S30	394	(creat$3 generat$3 comput$3 calculat$3) near5 (adaptation near1 algorithm)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2016/11/14 19:56
S31	0	((creat$3 generat$3 comput$3 calculat$3) near5 (adaptation near1 algorithm)) with policy	US-PGPUB; USPAT	OR	ON	2016/11/14 19:56

			; EPO; JPO			
S32	5	((creat$3 generat$3 comput$3 calculat$3) near5 (adaptation near1 algorithm)) same2 policy	US-PGPUB; USPAT; EPO; JPO	OR	ON	2016/11/14 19:56
S33	13	(rhee near1 wonjong) and policy	US-PGPUB; USPAT; EPO; JPO	OR	ON	2016/11/16 17:17
S34	2,862	(generat$3 creat$3 develop$3) near10 RSSI	US-PGPUB; USPAT; EPO; JPO	OR	ON	2016/11/16 17:18
S35	361	((generat$3 creat$3 develop$3) near10 RSSI) with ((observ$3 collect$3 obtain$3 receiv$3 detect$3) near5 (data status information state))	US-PGPUB; USPAT; EPO; JPO	OR	ON	2016/11/16 17:19
S36	0	((generat$3 creat$3 develop$3) near10 RSSI) with ((observ$3 collect$3 obtain$3 receiv$3 detect$3) near5 (data status information state)) with policy	US-PGPUB; USPAT; EPO; JPO	OR	ON	2016/11/16 17:19
S37	4	((generat$3 creat$3 develop$3) near10 RSSI) with ((observ$3 collect$3 obtain$3 receiv$3 detect$3) near5 (data status information state)) same2 policy	US-PGPUB; USPAT; EPO; JPO	OR	ON	2016/11/16 17:20
S38	5,394	adaptation near1 algorithm	US-PGPUB; USPAT; EPO; JPO	OR	ON	2016/11/16 17:20
S39	2	S35 and S38	US-PGPUB; USPAT	OR	ON	2016/11/16 17:20

			; EPO; JPO			
S40	5,784	adaptation near1 algorithm	US-PGPUB; USPAT; EPO; JPO	OR	ON	2017/12/20 14:02
S41	451	(transmit$4 send$3 receiv$3 forward$3 push$3) near5 (adaptation near1 algorithm)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2017/12/20 14:03
S42	4	"7840220".pn. "2007136337"	US-PGPUB; USPAT; EPO; JPO	OR	ON	2017/12/20 15:43
S43	46	(policy near7 algorithm) and (communication near5 algorithm) and WIFI	US-PGPUB; USPAT; EPO; JPO	OR	ON	2017/12/20 21:13
S44	0	S43 and S41	US-PGPUB; USPAT; EPO; JPO	OR	ON	2017/12/20 21:13
S51	33	("2006/0187885").URPN.	USPAT	OR	OFF	2018/10/19 20:09
S52	10,158	monitor$3 near7 (signal near1 strength)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2018/10/19 23:07
S53	86,958	(H04L7/00,0004 H04L41/00,06,08-0806,0813-0836,085-0859,0866-0869,50-5016,5035,5038 H04L43/00,04,08-0817,0876-10,16 H04L47/00,10,11,12,28,29,32).cpc.	US-PGPUB; USPAT; EPO; JPO	OR	ON	2018/10/19 23:08
S54	335	S52 and S53	US-PGPUB;	OR	ON	2018/10/19 23:08

			USPAT; EPO; JPO			
S55	38	("4161628" | "4229734" | "4279032" | "4430788" | "4558358" | "4694453" | "4730302" | "4799211" | "4816825" | "4860001" | "4890278" | "4896315" | "4926162" | "5048009" | "5115199").PN. OR ("5198805").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2018/10/19 23:11
S56	316	(monitor$3 near7 (signal near1 strength)) and (dynamic$4 near5 adapt$3)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2018/10/19 23:27
S57	58	(monitor$3 near7 (signal near1 strength)) and (dynamic$4 near5 adapt$5) not S56	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2018/10/19 23:33
S58	5	("2009/0059872").URPN.	USPAT	OR	OFF	2018/10/19 23:51
S59	1	("2012/0077533").URPN.	USPAT	OR	OFF	2018/10/19 23:54
S60	839	(monitor$3 near7 (signal near1 strength)) and (dynamic$4 near5 (adapt$5 chang$3 modif$3)) not (S56 S57)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2018/10/19 23:57
S61	433	(monitor$3 near7 (signal near1 strength)) and (dynamic$4 near5 (adapt$5 chang$3 modif$3)) and @AD<="20111110" not (S56 S57)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2018/10/20 00:04
S62	15	("2004/0223470").URPN.	USPAT	OR	OFF	2018/10/20 00:09
S63	31	remote$2 near3 manag$5 near3 QOS	USPAT	OR	OFF	2018/10/20 00:15
S64	6,276	S52 and @AD<="20111110"	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2018/10/20 00:20

S65	1,349	RSSI and S64	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2018/10/20 00:21
S66	15	("2004/0223470").URPN.	USPAT	OR	OFF	2018/10/20 00:33
S67	89	("2007/0082677").URPN.	USPAT	OR	OFF	2018/10/20 00:40
S71	20	("20030031180" | "20030076784" | "20050261915" | "20060126613" | "20060187885" | "20070153807" | "20080186873" | "20090055900" | "20100290465" | "20110013529" | "20110110359" | "20110182182" | "20110273979" | "20120294310" | "5970064" | "5974106" | "6430612" | "7840220" | "8520586" | "8880666").PN.	US-PGPUB; USPAT	OR	OFF	2018/10/20 23:05
S72	1	("20120151540").PN.	US-PGPUB; USPAT	OR	OFF	2018/10/20 23:23
S73	7	("20160315976" | "20180248984" | "6469982" | "6618356" | "6678247" | "6680907" | "7864669").PN.	US-PGPUB; USPAT	OR	OFF	2018/10/21 00:11
S74	3,178	(monitor$3 with ((real near1 time) real-time)) and (parameter with algorithm)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2019/01/27 14:58
S75	56	(monitor$3 with ((real near1 time) real-time)) and (parameter with algorithm) and (policy with (rule condition))	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2019/01/27 14:59
S83	2	"13995901"	US-PGPUB; USPAT; EPO; JPO	OR	ON	2019/01/27 23:14
S84	3	("10057080" | "20160261490" | "8126011").PN.	US-PGPUB; USPAT	OR	ON	2019/07/26 17:45

S85	3	("20080186873" | "6430612" | "9819595").PN.	US-PGPUB; USPAT	OR	ON	2019/07/26 17:46
S86	238	(network near5 monitor$3) and (policy with (histor$4 near5 data)) and (communication near4 performance)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2019/07/26 17:56
S87	94,363	(H04L7/00,0004 H04L41/00,06,08-0806,0813-0836,085-0859,0866-0869,50-5016,5035,5038 H04L43/00,04,08-0817,0876-10,16 H04L47/00,10,11,12,28,29,32).cpc.	US-PGPUB; USPAT; EPO; JPO	OR	ON	2019/07/26 17:56
S88	68	S86 and S87	US-PGPUB; USPAT; EPO; JPO	OR	ON	2019/07/26 17:56
S97	111,342	monitor$3 near3 ((real near1 time) real-time)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2019/12/10 19:44
S98	911,536	(improv$3 increas$3) near5 (service qos quality)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2019/12/10 19:47
S99	256,602	(histor$4 near4 data)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2019/12/10 19:47
S100	4,558	S97 and S98 and S99	US-PGPUB; USPAT; EPO; JPO	OR	ON	2019/12/10 19:47
S101	15,642	((improv$3 increas$3) near5 (service qos quality)) with (policy rules configuration)	US-PGPUB;	OR	ON	2019/12/10 19:48

			USPAT; EPO; JPO			
S102	228	S97 and S99 and S101	US-PGPUB; USPAT; EPO; JPO	OR	ON	2019/12/10 19:48
S103	891,108	(chang$3 updat$3 upgrad$3 transmit$4 receiv$3 forward$3 sent) near5 (policy rules configuration)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2019/12/10 20:36
S104	7,014	S97 and S99 and S103	US-PGPUB; USPAT; EPO; JPO	OR	ON	2019/12/10 20:37
S105	911,536	((improv$3 increas$3) near5 (service qos quality))	US-PGPUB; USPAT; EPO; JPO	OR	ON	2019/12/10 20:37
S106	2,510	S104 and S105	US-PGPUB; USPAT; EPO; JPO	OR	ON	2019/12/10 20:38
S107	98,439	(H04L7/00,0004 H04L41/00,06,08-0806,0813-0836,085-0859,0866-0869,50-5016,5035,5038 H04L43/00,04,08-0817,0876-10,16 H04L47/00,10,11,12,28,29,32).cpc.	US-PGPUB; USPAT; EPO; JPO	OR	ON	2019/12/10 20:38
S108	724	S106 and S107	US-PGPUB; USPAT; EPO; JPO	OR	ON	2019/12/10 20:38
S109	22,274,817	@AD<="20111110"	US-PGPUB; USPAT	OR	ON	2019/12/10 20:44

			; EPO; JPO			
S110	191	S108 and S109	US-PGPUB; USPAT; EPO; JPO	OR	ON	2019/12/10 20:45
S111	6	("20030031180" | "20060126613" | "20080186873" | "20090147697" | "20110110359" | "20140304408").PN.	US-PGPUB; USPAT	OR	ON	2020/02/22 06:04
S112	144	(interference noise) with ((send$3 transmit$4 push$3 forward$3) near5 policy)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/02/22 06:07
S113	1,248	((send$3 transmit$4 push$3 forward$3) near7 (interference noise)) and ((send$3 transmit$4 push$3 forward$3) near5 policy)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/02/22 06:18
S114	1,119	((send$3 transmit$4 push$3 forward$3) near7 (interference noise)) and ((send$3 transmit$4 push$3 forward$3) near5 policy) not S112	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/02/22 06:18
S115	100,577	(H04L7/00,0004 H04L41/00,06,08-0806,0813-0836,085-0859,0866-0869,50-5016,5035,5038 H04L43/00,04,08-0817,0876-10,16 H04L47/00,10,11,12,28,29,32).cpc.	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/02/22 06:18
S116	115	S114 and S115	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/02/22 06:19
S117	54	((avoid$3 reschedul$3) near3 (send$3 transmit$4 push$3 forward$3) near7 (interference noise)) and ((send$3 transmit$4 push$3 forward$3) near5 policy) not (S112 S116)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/02/22 06:22

S123	2	("10530695" | "9819595").PN.	US-PGPUB; USPAT	OR	ON	2020/06/30 15:53
S124	8	("20080159124" | "20080186873" | "20090016358" | "20090201805" | "20090310528" | "20110182182" | "20110273979" | "20130077482").PN.	US-PGPUB; USPAT	OR	ON	2020/06/30 15:53
S125	3	((detect$3 determin$3 identif$4 observ$3 encounter$3 recogniz$3 diagnos$3) near5 noise) same2 (((send$3 transmit$4 forward$3) near5 (policy configuration algorithm)) with (improv$3 near5 (performance quality)))	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/06/30 17:54
S126	104,560	(H04L7/00,0004 H04L41/00,06,08-0806,0813-0836,085-0859,0866-0869,50-5016,5035,5038 H04L43/00,04,08-0817,0876-10,16 H04L47/00,10,11,12,28,29,32).cpc.	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/06/30 17:54
S127	2,206	((detect$3 determin$3 identif$4 observ$3 encounter$3 recogniz$3 diagnos$3) near5 noise) same2 (((send$3 transmit$4 forward$3) near5 (policy configuration algorithm)))	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/06/30 17:57
S128	224	S127 and S126	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/06/30 18:03

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	122	rhee near1 wonjong	US-PGPUB; USPAT	OR	ON	2020/06/30 20:49
L3	120	((detect$3 determin$3 identif$4 observ$3 encounter$3 recogniz$3 diagnos$3) near5 noise) same2 (((send$3 transmit$4 forward$3) near5 (policy configuration algorithm))).clm.	US-PGPUB; USPAT	OR	ON	2020/06/30 20:49
L4	175	(adaptive near1 spectrum near2 signal near1 alignment).as. (adaptive near1	US-PGPUB; USPAT	OR	ON	2020/06/30 20:50

		spectrum near2 signal near1 alignment).aanm.				
L6	0	(1 4) and 3	US-PGPUB; USPAT	OR	ON	2020/06/30 20:53
L7	1,398	((detect$3 determin$3 identif$4 observ$3 encounter$3 recogniz$3 diagnos$3) near5 noise) and (((send$3 transmit$4 forward$3) near5 (policy configuration algorithm))).clm.	US-PGPUB; USPAT	OR	ON	2020/06/30 20:53
L8	6	(1 4) and 7	US-PGPUB; USPAT	OR	ON	2020/06/30 20:55
L13	75,982	(H04L1/0019,20 H04L41/06,08-0806,0813-0836,085-0859,0866-0869,50-5016,5035,5038 H04L43/04,08-0817,0876-10,16).cpc.	US-PGPUB; USPAT	OR	ON	2020/06/30 21:17
L14	9,004,209	@AD<="20111110"	US-PGPUB; USPAT	OR	ON	2020/06/30 21:17
L18	27,666	13 and 14	US-PGPUB; USPAT	OR	ON	2020/06/30 21:23
L19	45	18 and 7	US-PGPUB; USPAT	OR	ON	2020/06/30 21:23
S45	100	rhee near1 wonjong	US-PGPUB; USPAT	OR	ON	2017/12/20 20:54
S46	889	(policy with algorithm).clm.	US-PGPUB; USPAT	OR	ON	2017/12/20 20:54
S47	1	S45 and S46	US-PGPUB; USPAT	OR	ON	2017/12/20 20:54
S48	42,097	((transmission near1 control$4) (communication near1 algorithm)).clm.	US-PGPUB; USPAT	OR	ON	2017/12/20 20:55
S49	13	S46 and S48	US-PGPUB; USPAT	OR	ON	2017/12/20 20:55
S50	5	S48 and S45	US-PGPUB; USPAT	OR	ON	2017/12/20 20:56
S68	104	rhee near1 wonjong	US-PGPUB; USPAT	OR	ON	2018/10/20 02:52

S69	106,792	((transmission near1 control$4) (communication near1 algorithm) policy).clm.	US-PGPUB; USPAT	OR	ON	2018/10/20 02:53
S70	7	S68 and S69	US-PGPUB; USPAT	OR	ON	2018/10/20 02:53
S76	105	rhee near1 wonjong	US-PGPUB; USPAT	OR	ON	2019/01/27 14:41
S77	7,741	(monitor$3 with real-time).clm.	US-PGPUB; USPAT	OR	ON	2019/01/27 14:55
S78	2	S76 and S77	US-PGPUB; USPAT	OR	ON	2019/01/27 14:55
S79	37,017	(monitor$3 with parameter).clm.	US-PGPUB; USPAT	OR	ON	2019/01/27 14:56
S80	4	S76 and S79	US-PGPUB; USPAT	OR	ON	2019/01/27 14:56
S81	3,094	(policy and algorithm).clm.	US-PGPUB; USPAT	OR	ON	2019/01/27 14:57
S82	1	S76 and S81	US-PGPUB; USPAT	OR	ON	2019/01/27 14:57
S89	110	rhee near1 wonjong	US-PGPUB; USPAT	OR	ON	2019/07/26 17:46
S90	25,771	(network near3 monitor$3).clm.	US-PGPUB; USPAT	OR	ON	2019/07/26 17:50
S91	1	S89 and S90	US-PGPUB; USPAT	OR	ON	2019/07/26 17:50
S92	1,397	(policy and (histor$4 near4 data)).clm.	US-PGPUB; USPAT	OR	ON	2019/07/26 17:52
S94	1	S92 and S89	US-PGPUB; USPAT	OR	ON	2019/07/26 17:52
S95	7,800	(communication near5 performance).clm.	US-PGPUB; USPAT	OR	ON	2019/07/26 17:53

S96	8	S89 and S95	US-PGPUB; USPAT	OR	ON	2019/07/26 17:53
S118	118	rhee near1 wonjong	US-PGPUB; USPAT	OR	ON	2020/02/23 09:12
S119	1,101	(policy with algorithm).clm.	US-PGPUB; USPAT	OR	ON	2020/02/23 09:12
S120	1	S118 and S119	US-PGPUB; USPAT	OR	ON	2020/02/23 09:12
S121	119,468	((transmission near1 control$4) (communication near1 algorithm) policy).clm.	US-PGPUB; USPAT	OR	ON	2020/02/23 09:13
S122	8	S118 and S121	US-PGPUB; USPAT	OR	ON	2020/02/23 09:13
S129	122	rhee near1 wonjong	US-PGPUB; USPAT	OR	ON	2020/06/30 17:55

6/30/2020 9:24:44 PM
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(Not for submission under 37 CFR 1.99)

Application Number	14356581
Filing Date	2014-05-06
First Named Inventor	Wonjong Rhee
Art Unit	2446
Examiner Name	Boris D. Grijalva Lobos
Attorney Docket Number	20145-054US

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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	10530695	B2	2020-01-07	Cioffi et al.	
	2	9819595	B2	2017-11-14	Cioffi et al.	

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	Art Unit	2446
	Examiner Name	Boris D. Grijalva Lobos
	Attorney Docket Number	20145-054US

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	Examination Search Report mailed on March 10, 2020 in related Canadian Application No. 3,034,504 Attorney Docket No. [20145-055AD], (3 pgs).	

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Examiner Signature	/BORIS D GRIJALVA LOBOS/	Date Considered	06/30/2020

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	Art Unit	2446
	Examiner Name	Boris D. Grijalva Lobos
	Attorney Docket Number	20145-054US

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☒ 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	/Michael North/	Date (YYYY-MM-DD)	2020-04-19
Name/Print	Michael North	Registration Number	46963

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CONFIRMATION NO. 4319

SERIAL NUMBER	FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
14/356,581	05/06/2014 RULE	709	2446	20145-054US

APPLICANTS
ADAPTIVE SPECTRUM AND SIGNAL ALIGNMENT, INC., Redwood City, CA;

INVENTORS
Wonjong Rhee, Seoul, KOREA, REPUBLIC OF;

**** CONTINUING DATA ***************************
This application is a 371 of PCT/US2011/060265 11/10/2011

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

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Foreign Priority claimed	☐ Yes ☑ No	☐ Met after Allowance	STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
35 USC 119(a-d) conditions met	☐ Yes ☑ No		KOREA, REPUBLIC OF	6	20	3
Verified and Acknowledged	/BORIS D GRIJALVA LOBOS/ Examiner's Signature	Initials				

ADDRESS

North Weber & Baugh LLP - ASSIA
3260 Hillview Avenue, 1st Floor
Palo Alto, CA 94304
UNITED STATES

TITLE

METHOD, APPARATUS, AND SYSTEM FOR OPTIMIZING PERFORMANCE OF A COMMUNICATION UNIT BY A REMOTE SERVER

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Art Unit	2446
Examiner Name	Boris D. Grijalva Lobos
Attorney Docket Number	20145-054US

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	2	20080186873	A1	2008-08-07	Pujet et al.	
	3	20090016358	A1	2009-01-15	Lee	
	4	20090201805	A1	2009-08-13	Begen et al.	
	5	20090310528	A1	2009-12-17	Tamura	

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14356581
	Filing Date	2014-05-06
	First Named Inventor	Wonjong Rhee
	Art Unit	2446
	Examiner Name	Boris D. Grijalva Lobos
	Attorney Docket Number	20145-054US

	6	20110182182	A1	2011-07-28	Yang et al.	
	7	20110273979	A1	2011-11-10	Grabelsky et al.	
	8	20130077482	A1	2013-03-28	Krishna et al.	

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Signature	/Michael North/	Date (YYYY-MM-DD)	2020-05-26
Name/Print	Michael North	Registration Number	46963

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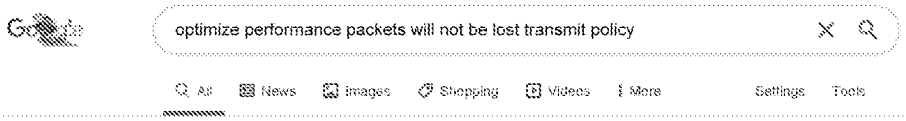
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Mar 25, 2015 - The aim of this document is not to provide specific tuning information, but to ... Another important aspect of the Linux kernel is network **packet** egress ... dev field which contains the address of the net_device which it will **transmitted** through: ... be **lost**. Occasionally, it is necessary to **increase** the time that ...

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This guide tells you how to configure and optimize Blast Extreme for these situations ... Because of its efficiency and excellent **performance**, UDP, which is the default ... the display protocol to be lossless, ensuring nothing is **lost** in **transmission**. ... If testing reveals the Blast Codec is not yet able to fully support an application ...

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Networking QoS Guide: Why it's important plus Best QoS ...

May 29, 2020 - Liku Zeileke Network configuration, **optimization**, and security expert ... These sorts of data need to be **transmitted** in the shortest amount of time ... The **packets will lose** their priority and slow down to that device's data ... Not having a correctly configured QoS **could** result in one (or all) of the following issues:.

Searches related to optimize performance packets will not be lost transmit policy

- **tcp throughput**
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ENTITY: ☑ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $80 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $420 =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).				
☐ 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	

APPLICATION AS AMENDED - PART II

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT	05/27/2020	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 25	Minus	** 26	= 0		x $100 =	0
	Independent (37 CFR 1.16(h))	* 3	Minus	*** 3	= 0		x $460 =	0
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	0

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=		x $0 =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		x $0 =	
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
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	Filing Date	2014-05-06
	First Named Inventor	Wonjong Rhee
	Art Unit	2446
	Examiner Name	Boris D. Grijalva Lobos
	Attorney Docket Number	20145-054US

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Signature	/Michael North/	Date (YYYY-MM-DD)	2020-05-26
Name/Print	Michael North	Registration Number	46963

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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.

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s)	:	Wonjong Rhee	Confirmation No.:	4319
Appl. No.	:	14/356,581		
Filing Date	:	2014-05-06		
Title	:	METHOD, APPARATUS, AND SYSTEM FOR OPTIMIZING PERFORMANCE OF A COMMUNICATION UNIT BY A REMOTE SERVER		
Art Unit	:	2446		
Examiner	:	GRIJALVA LOBOS, BORIS D		
Docket No.	:	20145-054US		
Customer No.	:	146571		

CERTIFICATE OF MAILING (37 CFR §1.8)

I hereby certify, pursuant to 37 CFR §1.8, that this correspondence is being electronically transmitted via EFS-Web addressed to Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on the date shown below:

Date: May 26, 2020 By: /Domarina Alkhas/
Domarina Alkhas

INFORMATION DISCLOSURE STATEMENT

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

Dear Examiner GRIJALVA LOBOS:

Filed herewith, in accordance with the provisions of 37 CFR §§ 1.56 and 1.97–1.98, listing various references for consideration by the Examiner, is an Information Disclosure Statement ("IDS").

The filing of this IDS shall not be construed as a representation that a search has been made, or regarding the completeness of the list of references, or that no other material information exists. Furthermore, the filing of this IDS shall not be construed as a representation that inclusion of a reference in this list is an admission that it is prior art or is pertinent to this application, or as an admission that the information listed is, or may be considered to be, material to the patentability of the above referenced application. The filing of this IDS shall not be construed in any manner as an admission against interest.

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Page #113

This IDS is being filed:

☐ within three months of the filing date of a national application, other than a continued prosecution application under § 1.53(d);

☐ within three months of the date of entry of the national stage as set forth in § 1.491 in an international application;

☐ before the mailing of a first Office Action on the merits;

☐ before the mailing of a first Office Action after the filing of a request for continued examination under § 1.114;

☒ after three months of the filing date or entry into the national stage or after the mailing of a first Office action on the merits, but before the mailing date of any final action under § 1.113, a notice of allowance under §1.311, or an action that otherwise closes prosecution in the application;

AND

☒ enclosed herein is the fee set forth in 37 CFR § 1.17(p);

OR

☐ Applicant certifies pursuant to 37 CFR § 1.97(e):

☐ That each item of information contained in the information disclosure statement was first cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this information disclosure statement;

OR

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

☐ on or before the payment of the issue fee but after the mailing of a final action under § 1.113, a notice of allowance under §1.311, or an action that otherwise closes prosecution in the application;

AND

☐ enclosed herein is the fee set forth in 37 CFR § 1.17(p);

AND

☐ Applicant certifies pursuant to 37 CFR § 1.97(e):

☐ That each item of information contained in the information disclosure statement was first cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this information disclosure statement;

OR

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

☒ Applicant submits that the enclosed Information Disclosure Statement is timely; therefore, no fee is required.

☒ Except as provided for under 37 CFR § 1.98(a)(2), Applicant has enclosed a copy of each listed reference.

☐ The above referenced application relies upon Application No. _____, filed _____ for an earlier effective filing date under 35 U.S.C. 120. Although, pursuant to 37 CFR § 1.98(d), the references submitted herein are not required to be submitted for the Examiner to consider them, Applicant submits the references herein so that the information will be printed on the patent issuing from this application.

☐ Pursuant to 37 CFR § 1.704(d), Applicant certifies that each of the references cited herein were first cited in a communication from a foreign patent office in a counterpart application and that this communication was not received by any individual designated in 37 CFR § 1.56(c) more than thirty days prior to the filing of this Information Disclosure Statement.

Consideration of the listed references and favorable action are requested. If any additional fees are due in connection with the filing of this Information Disclosure Statement, the Commissioner is hereby authorized to charge such fees to Deposit Account 50-2776.

Respectfully submitted,

Date: May 26, 2020

By: /Michael V. North/
Michael V. North
Reg. No. 46,963

Charter Communications, Inc.
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Page #115

Electronic Patent Application Fee Transmittal

Application Number:	14356581
Filing Date:	06-May-2014
Title of Invention:	METHOD, APPARATUS, AND SYSTEM FOR OPTIMIZING PERFORMANCE OF A COMMUNICATION UNIT BY A REMOTE SERVER
First Named Inventor/Applicant Name:	Wonjong Rhee
Filer:	Michael V. North/Domarina Alkhas
Attorney Docket Number:	20145-054US

Filed as Large Entity

Filing Fees for U.S. National Stage under 35 USC 371

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($)
Miscellaneous:				
SUBMISSION- INFORMATION DISCLOSURE STMT	1806	1	240	240
		Total in USD ($)		**240**

Electronic Acknowledgement Receipt

EFS ID:	39543823
Application Number:	14356581
International Application Number:	
Confirmation Number:	4319
Title of Invention:	METHOD, APPARATUS, AND SYSTEM FOR OPTIMIZING PERFORMANCE OF A COMMUNICATION UNIT BY A REMOTE SERVER
First Named Inventor/Applicant Name:	Wonjong Rhee
Customer Number:	146571
Filer:	Michael V. North/Domarina Alkhas
Filer Authorized By:	Michael V. North
Attorney Docket Number:	20145-054US
Receipt Date:	27-MAY-2020
Filing Date:	06-MAY-2014
Time Stamp:	01:49:11
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$240
RAM confirmation Number	E20205Q249393201
Deposit Account	502776
Authorized User	Domarina Alkhas
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: 37 CFR 1.17 (Patent application and reexamination processing fees) 37 CFR 1.19 (Document supply fees)	

37 CFR 1.20 (Post Issuance fees)

37 CFR 1.21 (Miscellaneous fees and charges)

37 CFR 1.492 (National application filing, search, and examination fees)

37 CFR 1.492(a) (Basic national fee only)

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)	054US_SIDS_SB08.pdf	612378 11dbeb16e58f8fabea16b0acd243bdda462b0aec	no	5
Warnings:					
Information:					
2	Non Patent Literature	054US_SIDS_NPL1.pdf	7491612 795f3d4fa8d409313ddbbc324d5780a4c6ff1ac8	no	96
Warnings:					
Information:					
3	Transmittal Letter	054US_SIDS_Trans.pdf	27396 46a5ba80c2843ea91ab4cc9a29ddbd1339e7988b	no	3
Warnings:					
Information:					
4	Fee Worksheet (SB06)	fee-info.pdf	30790 7f37d8613520de31d31d1dc9954c252845bf2570	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	8162176		

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

Appl. No.	:	14/356,581	Confirmation No.	: 4319
Inventor	:	Wonjong Rhee		
Filing Date	:	May 06, 2014		
Title	:	METHOD, APPARATUS, AND SYSTEM FOR OPTIMIZING PERFORMANCE OF A COMMUNICATION UNIT BY A REMOTE SERVER		
Art Unit	:	2446		
Examiner	:	Grijalva Lobos, Boris D.		
Docket No.	:	20145-054US		
Customer No.	:	146571		

CERTIFICATE OF MAILING (37 CFR §1.8)

I hereby certify, pursuant to 37 CFR §1.8, that this correspondence is being electronically transmitted to the United States Patent and Trademark Office via EFS-Web addressed to: Mail Stop RCE, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on the date shown below:

Dated: May 26, 2020 By: /Domarina Alkhas/
Domarina Alkhas

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

RESPONSE TO NON-FINAL OFFICE ACTION

Examiner Grijalva Lobos:

This paper is responsive to the Non-Final Office Action dated February 27, 2020 and having a shortened statutory response period expiring May 27, 2020. Accordingly, this paper is timely filed. Further examination is respectfully requested in view of the remarks set forth below.

Amendments to the Claims are reflected in the Listing of Claims which begins on page 2 of this paper.

Remarks/Arguments begin on page 8 of this paper.

Electronic Acknowledgement Receipt

EFS ID:	39543789
Application Number:	14356581
International Application Number:	
Confirmation Number:	4319
Title of Invention:	METHOD, APPARATUS, AND SYSTEM FOR OPTIMIZING PERFORMANCE OF A COMMUNICATION UNIT BY A REMOTE SERVER
First Named Inventor/Applicant Name:	Wonjong Rhee
Customer Number:	146571
Filer:	Michael V. North/Domarina Alkhas
Filer Authorized By:	Michael V. North
Attorney Docket Number:	20145-054US
Receipt Date:	27-MAY-2020
Filing Date:	06-MAY-2014
Time Stamp:	01:02:49
Application Type:	U.S. National Stage under 35 USC 371

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		054US_NFOAR.pdf	56091 ef0cbaddb2900089a908abdffc224484f1be3e0f	yes	9

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Applicant Arguments/Remarks Made in an Amendment	8	9
	Claims	2	7
	Amendment/Req. Reconsideration-After Non-Final Reject	1	1
Warnings:			
Information:			
	Total Files Size (in bytes):	56091	

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.

REMARKS

Claims 1, 3-5, 8, 10, 12-16, 34, 36-37, 53-54, and 56-65 were presented for examination. All pending claims were rejected by the Examiner in a Non-Final Office Action (hereinafter, "Office Action").

In response, Applicant hereby amends claims 1, 10, 34, 57, 64-65, and cancels claim 56. Support for the claim amendments may be found, e.g., in paragraph 55.

Applicant respectfully request reconsideration in light of the amendments to the claims and the below remarks.

I. Interview Summary

Applicant thanks Examiner Grijalva Lobos for the courtesy of a telephone interview on April 22, 2020. During this interview, the Examiner and the Applicant discussed possible claim amendments that the Examiner confirmed overcome the current rejections.

In light of the agreement reached during the interview, Applicant hereby amends claims 1, 10, 34 and respectfully requests that all rejections be withdrawn.

II. Conclusion

Because the cited documents, separately and in combination, fail to teach or suggest at least one claim element for each of the pending claims, Applicant respectfully requests removal of the rejections of claims, claims 1, 3-5, 8, 10, 12-16, 34, 36-37, 53-54, and 57-65.

Applicant notes that at least some of the claims include additional claim elements that are missing from the cited documents; however, additional reasons and responses to additional rejections for the independent and dependent claims are not presented in order to avoid unnecessary and/or cumulative arguments. However, Applicant reserves the right to challenge any assertions made by the Examiner in the Office Action that are not herein addressed, including but not limited to, the right to challenge that one or more of the cited documents were valid references. It shall also be noted that the absence of any discussion about one or more of the rejections is in no way an acceptance by acquiescence by the Applicant.

The Commissioner is hereby authorized to charge any fees which may be due, and to credit any overpayment of fees, to Deposit Account No. 50-2776.

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Should the Examiner believe that a telephone conference would expedite the prosecution of this application, the undersigned can be reached at 650-353-3786.

Respectfully submitted,

Date: May 26, 2020

By: /Ali Uyanik/
Ali Uyanik
Reg. No. 67,080

NORTH WEBER & BAUGH LLP
3260 Hillview Avenue
Palo Alto, CA 94304
Tel.: (650) 353-3786
Fax: (650) 856-0542
auyanik@northweber.com

Charter Communications, Inc.
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AMENDMENTS TO THE CLAIMS

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

Listing of the Claims:

1. (Currently Amended) A method for improving performance of one or more communication units, the method comprising:

receiving, by a server, from network monitoring devices that monitor, in real-time, data associated with an operation of two or more communication units located in different geographical areas, the data comprising a parameter;

processing, by the server, at least one of the data and historical data;

based on the processed data, determining a policy for at least one of the two or more communication units; and

in response to the server detecting ~~the absence of an~~ interference or noise from nearby wireless channels, determining that packets will be lost regardless of rate selection and, otherwise, communicating the policy~~, by the server, via a network,~~ to at least one or more communication units that~~, in response to receiving the policy, implements~~ implement one or more algorithms that use the parameter and at least a rule or a condition for the one or more communication units to improve a performance of the one or more communication units.

2. (Cancelled)

3. (Previously Presented) The method of claim 1, wherein the data further comprises determining a received signal strength indication.

4. (Previously Presented) The method of claim 1, further comprising, based on a change in the operation, updating the policy.

5. (Previously Presented) The method of claim 1, wherein determining the policy comprises selecting the policy from a set of policies that are stored on the one or more communication units.

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6. (Cancelled)

7. (Cancelled)

8. (Previously Presented) The method of claim 1, wherein the one or more communication units comprise at least one of:

an access point (AP);

a base station;

a wireless LAN device;

a DSLAM;

a gateway;

a performance enhancement device;

a Digital Subscriber Line (DSL) Customer Premises Equipment (CPE) modem;

an in-home powerline device;

a Home Phoneline Network Alliance (HPNA) based device;

an in-home coax distribution device;

a G.hn (Global Home Networking Standard) compatible device;

an in-home metering communication device;

an in-home appliance communicatively interfaced with the LAN;

a wireless femtocell base station;

a wireless WiFi compatible base station;

a wireless mobile device repeater;

a wireless mobile device base station;

a set-top box (STB)/set-top unit (STU) customer electronics device;

an Internet Protocol (IP) enabled television;

an IP enabled media player;

an IP enabled gaming console;

an Ethernet gateway;

a computing device connected to the LAN;

an Ethernet connected computer peripheral device;

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an Ethernet connected router;

an Ethernet connected wireless bridge;

an Ethernet connected network bridge; or

an Ethernet connected network switch.

9. (Canceled)

10. (Currently Amended) A non-transitory machine-readable storage medium having computer executable instructions stored thereon that when executed cause a processor of a server to perform a method for improving performance of one or more communication units, the method comprising:

receiving from network monitoring devices that monitor, in real-time, data associated with an operation of two or more communication units located in different geographical areas, the data comprising a parameter;

processing at least one of the data and historical data;

determining by the server, a policy for each of the one or more communication units, based on the processed data; and

in response to the server detecting the absence of an interference or noise from nearby wireless channels, determining that packets will be lost regardless of rate selection and, otherwise, communicating~~, via a network,~~ the policy to two or more communication units that~~, in response to receiving the policy, implements~~ implement one or more algorithms based on at least a rule or a condition to improve a performance of the one or more communication units.

11. (Cancelled)

12. (Previously Presented) The non-transitory machine-readable storage medium of claim 10, wherein processing comprises storing at least one of the data and the historical data in a memory device.

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13. (Previously Presented) The non-transitory machine-readable storage medium of claim 10, wherein determining the policy comprises determining a condition for communicating the policy.

14. (Previously Presented) The non-transitory machine-readable storage medium of claim 10, wherein the data further comprises determining a received signal strength.

15. (Previously Presented) The non-transitory machine-readable storage medium of claim 10, further comprising updating the parameter based on a change in the operation to update the policy.

16. (Previously Presented) The non-transitory machine-readable storage medium of claim 10, wherein determining the policy comprises selecting the policy from a set of policies.

17. – 33. (Cancelled)

34. (Currently Amended) An apparatus comprising:

a memory; and

a processor, coupled to the memory, and operable to:

receive, from network monitoring devices that monitor, in real-time, data associated with an operation of two or more communication units located in different geographical areas, the data comprising a parameter;

analyze at least one of the data and historical data;

based on the analyzed data, determine a policy for at least one of the two or more communication units; and

in response to ~~the~~ a server detecting the absence of an interference or noise from nearby wireless channels, determining that packets will be lost regardless of rate selection and, otherwise, communicate the policy~~, via a network that is communicatively coupled to the processor,~~ to at least one or more communication units that~~, in response to receiving the policy, implements~~ implement one or more algorithms based on at least a rule or a condition to improve a performance of the one or more communication units.

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35. (Cancelled)

36. (Previously Presented) The apparatus of claim 34, wherein the network monitoring devices determine a received signal strength.

37. (Previously Presented) The apparatus of claim 34, wherein determining the policy comprises selecting the policy from a set of policies and updating the parameter.

38. – 52. (Cancelled)

53. (Previously Presented) The method of claim 1, wherein processing comprises storing at least one of the data and historical data in a memory.

54. (Previously Presented) The method of claim 4, wherein updating the policy comprises updating the parameter.

55. (Cancelled)

56. (Cancelled)

57. (Currently Amended) The apparatus ~~method~~ of claim 34, wherein determining the policy comprises determining a condition for communicating the policy.

58. (Previously Presented) The method of claim 1, wherein the data further comprises time-varying data.

59. (Previously Presented) The method of claim 1, wherein the server performs an analysis of at least one of the data and historical data.

60. (Previously Presented) The method of claim 59, wherein the analysis comprises a statistical analysis of at least one of the data and historical data.

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61. (Previously Presented) The method of claim 10, wherein the data further comprises time-varying data.

62. (Previously Presented) The method of claim 10, wherein the server performs an analysis of at least one of the data and historical data.

63. (Previously Presented) The method of claim 62, wherein the analysis comprises a statistical analysis of at least one of the data and historical data.

64. ((Currently Amended) The apparatus ~~method~~ of claim 34, wherein the data further comprises time-varying data.

65. (Currently Amended) The apparatus ~~method~~ of claim 34, wherein the server performs an analysis of at least one of the data and historical data.

Charter Communications, Inc.
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UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/356,581	05/06/2014	Wonjong Rhee	20145-054US	4319

146571 7590 05/04/2020
North Weber & Baugh LLP - ASSIA
3260 Hillview Avenue, 1st Floor
Palo Alto, CA 94304

EXAMINER	
GRIJALVA LOBOS, BORIS D	

ART UNIT	PAPER NUMBER
2446	

NOTIFICATION DATE	DELIVERY MODE
05/04/2020	ELECTRONIC

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.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

docket1@northweber.com

Applicant-Initiated Interview Summary	**Application No.** 14/356,581	**Applicant(s)** Rhee, Wonjong	
	Examiner BORIS D GRIJALVA LOBOS	**Art Unit** 2446	**AIA (FITF) Status** No

All participants (applicant, applicants representative, PTO personnel):

(1) BORIS D. GRIJALVA LOBOS. (3) _____.

(2) ALI UYANIK (67080). (4) _____.

Date of Interview: 22 April 2020.

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.

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...)

Proposed amendments to the claims were discussed. The examiner agreed that the proposed amendments would overcome all of the previously cited references..

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

/BORIS D GRIJALVA LOBOS/ Examiner, Art Unit 2446	

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Exhibit 1006
Page #133

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 examiners 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 applicants 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 applicants 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 examiners 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 examiners initials.

Grijalva Lobos, Boris

From: Ali Uyanik <auyanik@northweber.com>
Sent: Friday, April 17, 2020 10:23 PM
To: Grijalva Lobos, Boris
Subject: RE: Application No.: 14/356,581
Attachments: 054US Agenda2.pdf

Fyi: Small corrections to dependent claims & canceled claim 56.

Ali Uyanik | North Weber & Baugh, LLP | 3260 Hillview Ave. | Palo Alto, CA 94303 | Phone: (650) 353-3786 | Fax: (650) 856-0542

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-----Original Message-----
From: Grijalva Lobos, Boris <Boris.GrijalvaLobos@USPTO.GOV>
Sent: Friday, April 17, 2020 7:01 PM
To: Ali Uyanik <auyanik@northweber.com>
Subject: RE: Application No.: 14/356,581

Received,

V/R.

Boris Daniel Grijalva Lobos
Patent Examiner
U.S. Patent & Trademark Office
Art Unit 2446
Tel. (571) 272-0767

-----Original Message-----
From: Ali Uyanik <auyanik@northweber.com>
Sent: Friday, April 17, 2020 9:59 PM
To: Grijalva Lobos, Boris <Boris.GrijalvaLobos@USPTO.GOV>
Cc: Domarina Alkhas <dalkhas@northweber.com>; Michael North <mnorth@northweber.com>
Subject: Application No.: 14/356,581

Please see attached.

Ali Uyanik | North Weber & Baugh, LLP | 3260 Hillview Ave. | Palo Alto, CA 94303 | Phone: (650) 353-3786 | Fax: (650) 856-0542

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Page #136

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appl. No.	:	14/356,581	Confirmation No. :	4319
Inventor	:	Wonjong Rhee		
Filing Date	:	May 06, 2014		
Title	:	METHOD, APPARATUS, AND SYSTEM FOR OPTIMIZING PERFORMANCE OF A COMMUNICATION UNIT BY A REMOTE SERVER		
Art Unit	:	2446		
Examiner	:	Grijalva Lobos, Boris D.		
Docket No.	:	20145-054US		
Customer No.	:	146571		

AGENDA FOR PHONE INTERVIEW

Examiner Grijalva Lobos:

This paper is an outline for our phone interview on Thursday April 22, 2020 at 2:00 PM (EST) to discuss the following claim amendments concerning the above-mentioned patent application.

Proposed Claim Amendments

1. (Currently amended) A method for improving performance of one or more communication units, the method comprising:

receiving, by a server, from network monitoring devices that monitor, in real-time, data associated with an operation of two or more communication units located in different geographical areas, the data comprising a parameter;

processing, by the server, at least one of the data and historical data;

based on the processed data, determining a policy for at least one of the two or more communication units; and

in response to the server detecting ~~the absence of an~~ interference or noise from nearby wireless channels, determining that packets will be lost regardless of rate selection and, otherwise, communicating the policy~~, by the server, via a network,~~ to at least one or more communication units that~~, in response to receiving the policy, implements~~ implement one or more algorithms that use the parameter and at least a rule or a condition

for the one or more communication units to improve a performance of the one or more communication units.

2. (Cancelled)

3. (Previously presented) The method of claim 1, wherein the data further comprises determining a received signal strength indication.

4. (Previously presented) The method of claim 1, further comprising, based on a change in the operation, updating the policy.

5. (Previously presented) The method of claim 1, wherein determining the policy comprises selecting the policy from a set of policies that are stored on the one or more communication units.

6. (Cancelled)

7. (Cancelled)

8. (Previously presented) The method of claim 1, wherein the one or more communication units comprise at least one of:

an access point (AP);
a base station;
a wireless LAN device;
a DSLAM;
a gateway;
a performance enhancement device;
a Digital Subscriber Line (DSL) Customer Premises Equipment (CPE) modem;
an in-home powerline device;
a Home Phoneline Network Alliance (HPNA) based device;
an in-home coax distribution device;
a G.hn (Global Home Networking Standard) compatible device;

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an in-home metering communication device;

an in-home appliance communicatively interfaced with the LAN;

a wireless femtocell base station;

a wireless WiFi compatible base station;

a wireless mobile device repeater;

a wireless mobile device base station;

a set-top box (STB)/set-top unit (STU) customer electronics device;

an Internet Protocol (IP) enabled television;

an IP enabled media player;

an IP enabled gaming console;

an Ethernet gateway;

a computing device connected to the LAN;

an Ethernet connected computer peripheral device;

an Ethernet connected router;

an Ethernet connected wireless bridge;

an Ethernet connected network bridge; or

an Ethernet connected network switch.

9. (Canceled)

10. (Currently amended) A non-transitory machine-readable storage medium having computer executable instructions stored thereon that when executed cause a processor of a server to perform a method for improving performance of one or more communication units, the method comprising:

receiving from network monitoring devices that monitor, in real-time, data associated with an operation of two or more communication units located in different geographical areas, the data comprising a parameter;

processing at least one of the data and historical data;

determining by the server, a policy for each of the one or more communication units, based on the processed data; and

in response to the server detecting the absence of an interference or noise from nearby wireless channels, <u>determining that packets will be lost regardless of rate selection</u>

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and, otherwise, communicating~~, via a network,~~ the policy to two or more communication units that~~, in response to receiving the policy, implements~~ implement one or more algorithms based on at least a rule or a condition to improve a performance of the one or more communication units.

11. (Cancelled)

12. (Previously presented) The non-transitory machine-readable storage medium of claim 10, wherein processing comprises storing at least one of the data and the historical data in a memory device.

13. (Previously presented) The non-transitory machine-readable storage medium of claim 10, wherein determining the policy comprises determining a condition for communicating the policy.

14. (Previously presented) The non-transitory machine-readable storage medium of claim 10, wherein the data further comprises determining a received signal strength.

15. (Previously presented) The non-transitory machine-readable storage medium of claim 10, further comprising updating the parameter based on a change in the operation to update the policy.

16. (Previously presented) The non-transitory machine-readable storage medium of claim 10, wherein determining the policy comprises selecting the policy from a set of policies.

17. – 33. (Cancelled)

34. (Currently amended) An apparatus comprising:

a memory; and

a processor, coupled to the memory, and operable to:

receive, from network monitoring devices that monitor, in real-time, data associated with an operation of two or more communication units located in different geographical areas, the data comprising a parameter;

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analyze at least one of the data and historical data;

based on the analyzed data, determine a policy for at least one of the two or more communication units; and

in response to ~~the~~ a server detecting the absence of an interference or noise from nearby wireless channels, determining that packets will be lost regardless of rate selection and, otherwise, communicate the policy~~, via a network that is communicatively coupled to the processor,~~ to at least one or more communication units that~~, in response to receiving the policy, implements~~ implement one or more algorithms based on at least a rule or a condition to improve a performance of the one or more communication units.

35. (Cancelled)

36. (Previously presented) The apparatus of claim 34, wherein the network monitoring devices determine a received signal strength.

37. (Previously presented) The apparatus of claim 34, wherein determining the policy comprises selecting the policy from a set of policies and updating the parameter.

38. – 52. (Cancelled)

53. (Previously presented) The method of claim 1, wherein processing comprises storing at least one of the data and historical data in a memory.

54. (Previously presented) The method of claim 4, wherein updating the policy comprises updating the parameter.

55. (Cancelled)

56. (Cancelled)

57. (Currently amended) The apparatus ~~method~~ of claim 34, wherein determining the policy comprises determining a condition for communicating the policy.

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58. (Previously presented) The method of claim 1, wherein the data further comprises time-varying data.

59. (Previously presented) The method of claim 1, wherein the server performs an analysis of at least one of the data and historical data.

60. (Previously presented) The method of claim 59, wherein the analysis comprises a statistical analysis of at least one of the data and historical data.

61. (Previously presented) The method of claim 10, wherein the data further comprises time-varying data.

62. (Previously presented) The method of claim 10, wherein the server performs an analysis of at least one of the data and historical data.

63. (Previously presented) The method of claim 62, wherein the analysis comprises a statistical analysis of at least one of the data and historical data.

64. ((Currently amended) The apparatus ~~method~~ of claim 34, wherein the data further comprises time-varying data.

53. (Currently amended) The apparatus ~~method~~ of claim 34, wherein the server performs an analysis of at least one of the data and historical data.

Respectfully submitted,

Date: April 17, 2020

By: / Ali Uyanik /
Ali Uyanik
Reg. No. 67,080

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Page #142

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (01-10)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT
(Not for submission under 37 CFR 1.99)

Application Number	14356581
Filing Date	2014-05-06
First Named Inventor	Wonjong Rhee
Art Unit	2446
Examiner Name	Boris D. Grijalva Lobos
Attorney Docket Number	20145-054US

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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	10530695	B2	2020-01-07	Cioffi et al.	
	2	9819595	B2	2017-11-14	Cioffi et al.	

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	Application Number	14356581
	Filing Date	2014-05-06
	First Named Inventor	Wonjong Rhee
	Art Unit	2446
	Examiner Name	Boris D. Grijalva Lobos
	Attorney Docket Number	20145-054US

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	Examination Search Report mailed on March 10, 2020 in related Canadian Application No. 3,034,504 Attorney Docket No. [20145-055AD], (3 pgs).	

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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	14356581
	Filing Date	2014-05-06
	First Named Inventor	Wonjong Rhee
	Art Unit	2446
	Examiner Name	Boris D. Grijalva Lobos
	Attorney Docket Number	20145-054US

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	/Michael North/	Date (YYYY-MM-DD)	2020-04-19
Name/Print	Michael North	Registration Number	46963

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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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:	39199301
Application Number:	14356581
International Application Number:	
Confirmation Number:	4319
Title of Invention:	METHOD, APPARATUS, AND SYSTEM FOR OPTIMIZING PERFORMANCE OF A COMMUNICATION UNIT BY A REMOTE SERVER
First Named Inventor/Applicant Name:	Wonjong Rhee
Customer Number:	146571
Filer:	Michael V. North/Domarina Alkhas
Filer Authorized By:	Michael V. North
Attorney Docket Number:	20145-054US
Receipt Date:	19-APR-2020
Filing Date:	06-MAY-2014
Time Stamp:	22:09:06
Application Type:	U.S. National Stage under 35 USC 371

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	054US_SIDS_Trans.pdf	27396 309bd3ceef3b03c789358d72c6b433dd9878a2ff	no	3
Warnings:					

Information:					
2	Information Disclosure Statement (IDS) Form (SB08)	054US_SIDS_SB08.pdf	612092 b971dab524461afb14593fa507664fa3128f74f2	no	4
Warnings:					
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3	Non Patent Literature	054US_SIDS_NPL1.pdf	533290 5a9588aa3a12783191d13d018af39989bbdb1570	no	3
Warnings:					
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			Total Files Size (in bytes):	1172778	

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.

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s)	:	Wonjong Rhee	Confirmation No.:	4319
Appl. No.	:	14/356,581		
Filing Date	:	2014-05-06		
Title	:	METHOD, APPARATUS, AND SYSTEM FOR OPTIMIZING PERFORMANCE OF A COMMUNICATION UNIT BY A REMOTE SERVER		
Art Unit	:	2446		
Examiner	:	GRIJALVA LOBOS, BORIS D		
Docket No.	:	20145-054US		
Customer No.	:	146571		

CERTIFICATE OF MAILING (37 CFR §1.8)

I hereby certify, pursuant to 37 CFR §1.8, that this correspondence is being electronically transmitted via EFS-Web addressed to Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on the date shown below:

Date: April 19, 2020 By: /Domarina Alkhas/
Domarina Alkhas

INFORMATION DISCLOSURE STATEMENT

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

Dear Examiner GRIJALVA LOBOS:

Filed herewith, in accordance with the provisions of 37 CFR §§ 1.56 and 1.97–1.98, listing various references for consideration by the Examiner, is an Information Disclosure Statement ("IDS").

The filing of this IDS shall not be construed as a representation that a search has been made, or regarding the completeness of the list of references, or that no other material information exists. Furthermore, the filing of this IDS shall not be construed as a representation that inclusion of a reference in this list is an admission that it is prior art or is pertinent to this application, or as an admission that the information listed is, or may be considered to be, material to the patentability of the above referenced application. The filing of this IDS shall not be construed in any manner as an admission against interest.

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Page #149

This IDS is being filed:

☐ within three months of the filing date of a national application, other than a continued prosecution application under § 1.53(d);

☐ within three months of the date of entry of the national stage as set forth in § 1.491 in an international application;

☐ before the mailing of a first Office Action on the merits;

☐ before the mailing of a first Office Action after the filing of a request for continued examination under § 1.114;

☐ after three months of the filing date or entry into the national stage or after the mailing of a first Office action on the merits, but before the mailing date of any final action under § 1.113, a notice of allowance under §1.311, or an action that otherwise closes prosecution in the application;

AND

☐ enclosed herein is the fee set forth in 37 CFR § 1.17(p);

OR

☒ Applicant certifies pursuant to 37 CFR § 1.97(e):

☒ That each item of information contained in the information disclosure statement was first cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this information disclosure statement;

OR

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

☐ on or before the payment of the issue fee but after the mailing of a final action under § 1.113, a notice of allowance under §1.311, or an action that otherwise closes prosecution in the application;

AND

☐ enclosed herein is the fee set forth in 37 CFR § 1.17(p);

AND

☐ Applicant certifies pursuant to 37 CFR § 1.97(e):

☐ That each item of information contained in the information disclosure statement was first cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this information disclosure statement;

OR

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

☒ Applicant submits that the enclosed Information Disclosure Statement is timely; therefore, no fee is required.

☒ Except as provided for under 37 CFR § 1.98(a)(2), Applicant has enclosed a copy of each listed reference.

☐ The above referenced application relies upon Application No. _____, filed _____ for an earlier effective filing date under 35 U.S.C. 120. Although, pursuant to 37 CFR § 1.98(d), the references submitted herein are not required to be submitted for the Examiner to consider them, Applicant submits the references herein so that the information will be printed on the patent issuing from this application.

☐ Pursuant to 37 CFR § 1.704(d), Applicant certifies that each of the references cited herein were first cited in a communication from a foreign patent office in a counterpart application and that this communication was not received by any individual designated in 37 CFR § 1.56(c) more than thirty days prior to the filing of this Information Disclosure Statement.

Consideration of the listed references and favorable action are requested. If any additional fees are due in connection with the filing of this Information Disclosure Statement, the Commissioner is hereby authorized to charge such fees to Deposit Account 50-2776.

Respectfully submitted,

Date: April 19, 2020

By: /Michael V. North/
Michael V. North
Reg. No. 46,963

Charter Communications, Inc.
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UNITED STATES PATENT AND TRADEMARK OFFICE

USPTO Automated Interview Request (AIR)

Apr 17 2020

This paper requesting to schedule and/or conduct an interview is appropriate because:

This submission is requested to be accepted as an authorization for this interview to communicate via the internet. Recognizing that Internet communications are not secure, I hereby authorize the USPTO to communicate with the undersigned concerning scheduling of the interview via video conference, instant messaging, or electronic mail, and to conduct the interview in accordance with office practice including video conferencing.

Name(s):
Ali Uyanik

S-signature:
/Ali Uyanik/

Registration Number:
67080

U.S. Application Number:
14356581

Confirmation Number:
4319

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Proposed Time of Interview:
4-24-2020 1:00 PM ET

Alternative Proposed Time(s) of Interview:
4-24-2020 2:00 PM ET

Alternative Proposed Time(s) of Interview:
4-27-2020 1:00 PM ET

Prefered Interview Type:
Telephonic

I am the applicant or applicant's representative for this application.

Topic for Discussion:

uspto UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/356,581	05/06/2014	Wonjong Rhee	20145-054US	4319

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North Weber & Baugh LLP - ASSIA
3260 Hillview Avenue, 1st Floor
Palo Alto, CA 94304

EXAMINER	
GRIJALVA LOBOS, BORIS D	

ART UNIT	PAPER NUMBER
2446	

NOTIFICATION DATE	DELIVERY MODE
02/27/2020	ELECTRONIC

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.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

docket1@northweber.com

Office Action Summary	**Application No.** 14/356,581	**Applicant(s)** Rhee, Wonjong	
	Examiner BORIS D GRIJALVA LOBOS	**Art Unit** 2446	**AIA (FITF) Status** No

-- 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 MONTHS 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 1/29/2020.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

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) 1,3-5,8,10,12-16,34,36-37,53-54 and 56-65 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) 1,3-5,8,10,12-16,34,36-37,53-54 and 56-65 is/are rejected.

8) ☐ Claim(s) _____ is/are objected to.

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

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to **PPHfeedback@uspto.gov.**

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).

Priority under 35 U.S.C. § 119

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

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)).

** 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) ☑ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date 1/29/2020.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.

4) ☐ Other: _____.

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DETAILED ACTION

Notice of Pre-AIA or AIA Status

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

Response to Amendment

This Office action is in response to communications filed on 1/29/2020.

Claims 1, 5, 10, and 34 have been amended. The amendments have been fully considered.

Claims 2, 6-7, 9, 11, 17-33, 35, 38-52, and 55 have been cancelled.

Claims 1, 3-5, 8, 10, 12-16, 34, 36-37, 53-54, and 56-65 are pending.

Response to Arguments

Applicant's arguments with respect to claims 1, 3-5, 8, 10, 12-16, 34, 36-37, 53-54, and 56-65 have been considered but are moot because the arguments do not apply to any of the references being used in the current rejection.

Claim Rejections - 35 USC § 103

In the event the determination of the status of the application as subject to AIA 35 U.S.C. 102 and 103 (or as subject to pre-AIA 35 U.S.C. 102 and 103) is incorrect, any correction of the statutory basis for the rejection will not be considered a new ground of rejection if the prior art relied upon, and the rationale supporting the rejection, would be the same under either status.

The following is a quotation of pre-AIA 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, 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.

Claims 1, 4-5, 8, 16, 37, 53-54, 58-60, and 63 is/are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Clark et al. (US 5970064 A, hereinafter Clark) in view of Roy (US 2006/0187885 A1), and further in view of Stamoulis et al. (US 2009/0207730 A1, hereinafter Stamoulis).

Regarding claim 1, Clark discloses a method for improving performance of one or more communication units (**col. 12, lines 17-20**, improving performance of communication units), the method comprising:

receiving, by a server (**col. 12, lines 21-22**, collecting information; col. 10, lines 52-55, discloses that the information is collected by a network controller),

from network monitoring devices that monitor (**col. 10, lines 52-55**, the information transmitted to the network controller is from each switch in a network (see also **Fig. 7**, each switch transmits the information)),

in real-time (**col. 10, lines 52-55**, the data transmitted to the network controller is current information),

data associated with an operation of two or more communication units (**col. 12, lines 21-23**, the information is information associated with the operation of multiple nodes (see also **col. 12, lines 61-65**, QoS information is also transmitted))

located in different geographical areas (see **Fig. 3, and col. 6, 9-30**, switches are physical devices located at different locations),

the data comprising a parameter (**col. 12, lines 61-65**, QoS information (i.e. a parameter) is also transmitted);

processing, by the server, at least one of the data and historical data (**col. 12, lines 24-31**, processing the collected information);

based on the processed data, determining a policy for at least one of the two or more communication units (**col. 12, lines 24-31**, producing, as a result of the processing, at least one policy to be implemented by the nodes)

communicating the policy (**col. 13, lines 6-10**, distributing the one or more policies),

by the server (**col. 13, lines 6-10**, the policies are distributed by the network controller),

via a network (**col. 13, lines 6-10**, the policies are distributed from the network controller to the nodes;),

to at least one or more communication units that (**col. 6, lines 20-21**, the network controller is connected to switches via a network),

in response to receiving the policy implements one or more algorithms that use at least a rule or a condition for the one or more communication units (**col. 17, line 54-65**, selecting, in response to receiving policy data, a decision table, based on a condition and quality of service information)

to improve a performance of the one or more communication units (**col. 12, lines 17-20**, improving performance of communication units in response to performing the steps described).

Clark does not disclose that the one or more algorithms use the parameter; and that the policy is sent in response to the server detecting the absence of an interference or noise from nearby wireless channels.

Roy discloses that data comprises a parameter and that the one or more algorithms use the parameter (**¶[0061]**, a first station transmitting information to a second station, including a parameter (RSSI or SNR) and receiving, from the second station, a rate command (policy) indicating a preferred rate; **¶[0031]**, using an algorithm using the parameter (RSSI) and the preferred transmission rate (received from the second station)).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Clark in view of Roy so that the one or more algorithms use the parameter.

One of ordinary skill in the art would have been motivated because adjusting the rate based on parameters would benefit connections (Roy, **¶[0005]-[0006]**).

The combined system of Clark and Roy do not disclose that the policy is sent in response to the server detecting the absence of an interference or noise from nearby wireless channels.

Stamoulis discloses in response to the server detecting the absence of an interference or noise from nearby wireless channels, communicating a policy (**¶[0062]**, a first node (602) requests traffic information from a second node (604); **¶[0064]**, the first node receives traffic information from the second node, the first node including a transmission controller; **¶[0067]**, the transmission controller of the first node, in response to the traffic information, determines to send a policy message (RUM) to the second node; **¶[0083]**, a given node may decide to not transmit a RUM when quality of service is unacceptable (i.e. sent when quality of service is not unacceptable); **¶[0075]**, unacceptable quality of service may be due to noise or interference; **Fig. 1, ¶[0039]-[0040]**, nodes may communicate over wireless channels such as WIFI (close range)).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the combined system of Clark and Roy in view of Stamoulis so that the policy is sent in response to the server detecting the absence of an interference or noise from nearby wireless channels.

One of ordinary skill in the art would have been motivated because "data that is received through the use of the interference management message may not end up being forwarded to the intended destination in an efficient manner" when the quality of service is unacceptable (**Stamoulis, ¶[0016]**).

Regarding claim 4, the combined system of Clark, Roy, and Stamoulis discloses the invention substantially as applied to claim 1, above, further comprising, based on a change in the operation, updating the policy (**Clark, col. 17, line 51, to col. 18, line 3**, updating the policy based on operational changes).

Regarding claim 5, the combined system of Clark, Roy, and Stamoulis discloses the invention substantially as applied to claim 1, above.

Clark does not disclose that determining the policy comprises selecting the policy from a set of policies that are stored on the one or more communication units.

Roy discloses that determining a policy comprises selecting the policy from a set of policies that are stored on the one or more communication units (**Fig. 3**, monitoring a node (elements 310-330), and based on monitored parameters, selecting one of two policies (elements 330, 320, and 335) relating to transmission rates; **¶[0024]**, rates may be stored at a database of a WTRU (the elements to be configured, see **¶[0006]**)).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Clark in view of Roy so that determining a policy comprises selecting the policy from a set of policies.

One of ordinary skill in the art would have been motivated because predetermined policies improve processing time by not having to create policies from scratch.

Regarding claim 8, the combined system of Clark, Roy, and Stamoulis discloses the invention substantially as applied to claim 1, above, wherein the one or more communication units comprise at least one of: an access point (AP); a base station; a wireless LAN device; a DSLAM; a gateway; a performance enhancement device; a Digital Subscriber Line (DSL) Customer Premises Equipment (CPE) modem; an in-home powerline device; a Home Phoneline Network Alliance (HPNA) based device; an in-home coax distribution device; a G.hn (Global Home Networking Standard) compatible device; an in-

home metering communication device; an in-home appliance communicatively interfaced with the LAN; a wireless femtocell base station; a wireless WiFi compatible base station; a wireless mobile device repeater; a wireless mobile device base station; a set-top box (STB)/set-top unit (STU) customer electronics device; an Internet Protocol (IP) enabled television; an IP enabled media player; an IP enabled gaming console; an Ethernet gateway; a computing device connected to the LAN; an Ethernet connected computer peripheral device; an Ethernet connected router; an Ethernet connected wireless bridge; an Ethernet connected network bridge; or an Ethernet connected network switch (**Clark, col. 6, line 13**, the nodes may be network switches).

Regarding claim 16, the combined system of Clark and Stamoulis discloses the invention substantially as applied to claim 10, above.

The combined system of Clark and Stamoulis does not disclose that determining the policy comprises selecting the policy from a set of policies.

Roy discloses that determining a policy comprises selecting the policy from a set of policies (**Fig. 3**, monitoring a node (elements 310-330), and based on monitored parameters, selecting one of two policies (elements 330, 320, and 335)).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the combined system of Clark and Stamoulis in view of Roy so that determining a policy comprises selecting the policy from a set of policies.

One of ordinary skill in the art would have been motivated because predetermined policies improve processing time by not having to create policies from scratch.

Regarding claim 37, the combined system of Clark and Stamoulis discloses the invention substantially as applied to claim 34, above, wherein determining the policy comprises updating the parameter (**col. 12, lines 21-23**, the information includes admission policies and what's updated is the admission policies (see **col. 13, lines 10-12**)).

The combined system of Clark and Stamoulis does not disclose that determining the policy comprises selecting the policy from a set of policies.

Roy discloses that determining a policy comprises selecting the policy from a set of policies (**Fig. 3**, monitoring a node (elements 310-330), and based on monitored parameters, selecting one of two policies (elements 330, 320, and 335)).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the combined system of Clark and Stamoulis in view of Roy so that determining a policy comprises selecting the policy from a set of policies.

One of ordinary skill in the art would have been motivated because predetermined policies improve processing time by not having to create policies from scratch.

Regarding claim 53, the combined system of Clark, Roy, and Stamoulis discloses the invention substantially as applied to claim 1, above, wherein processing comprises storing at least one of the data and historical data in a memory (**Clark, col. 12, lines 55-58**, discloses that the network controller collects the information).

Regarding claim 54, the combined system of Clark, Roy, and Stamoulis discloses the invention substantially as applied to claim 4, above, wherein updating the policy comprises updating the parameter (**Clark, col. 12, lines 21-23**, discloses that the information includes admission policies (see also col. 12, lines 61-65, QoS information is also transmitted); Fig. 10 discloses that the method steps are repeated (element 1006 points back to 1000), and current parameters are obtained in each iteration (element 1002), which results in new policy (element 1004)).

Regarding claim 58, the combined system of Clark, Roy, and Stamoulis discloses the invention substantially as applied to claim 1, above, wherein the data further comprises time-varying data (**Clark, col. 12, lines 21-31**, the collected information is "current" information, which is updated at a later point in time).

Regarding claim 59, the combined system of Clark, Roy, and Stamoulis discloses the invention substantially as applied to claim 1, above, wherein the server performs an analysis of at least one of the data and historical data (**Clark, col. 12, lines 21-31**, the information is used by the network controller to create a new policy).

Regarding claim 60, the combined system of Clark, Roy, and Stamoulis discloses the invention substantially as applied to claim 59, above, wherein the analysis comprises a statistical analysis of at least one of the data and historical data (**Roy, ¶[0061]**, a computer device (second station) obtaining information regarding another device (first station) to determine a policy (preferred rate); **¶[0063]**, the information is analyzed by creating statistics and comparing the statistics to other data).

Regarding claim 63, the combined system of Clark and Stamoulis discloses the invention substantially as applied to claim 62, above.

The combined system of Clark and Stamoulis does not disclose that the analysis comprises a statistical analysis of at least one of the data and historical data.

Roy discloses that an analysis may comprise a statistical analysis of at least one of data and historical data (**¶[0061]**, a computer device (second station) obtaining information regarding another device (first station) to determine a policy (preferred rate); **¶[0063]**, the information is analyzed by creating statistics and comparing the statistics to other data).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the combined system of Clark and Stamoulis in view of Roy for the analysis to comprise a statistical analysis of at least one of the data and historical data.

One of ordinary skill in the art would have been motivated because it would benefit connections on a system (**Roy, implied, ¶[0005]-[0006]**).

Claim 3 is/are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Clark (US 5970064 A) in view of Roy (US 2006/0187885 A1) and Stamoulis (US 2009/0207730 A1), as applied to claim 1, above, and further in view of Malik et al. (US 2009/0147697 A1, hereinafter Malik).

Regarding claim 3, the combined system of Clark, Roy, and Stamoulis discloses the invention substantially as applied to claim 1, above.

The combined system of Clark, Roy, and Stamoulis does not disclose that the data further comprises determining a received signal strength indication.

Malik discloses that the data further comprises determining a received signal strength indication (**¶[0025]**, a first network element receiving from a second network element performance data related to communications between the second network element and a third network element of a plurality of elements (see **¶[0018]); ¶[0030]**, monitored parameters may include signal strength indicators; **¶[0046]-[0047]**, transmitting new policies to node devices based on the monitoring).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the combined system of Clark, Roy, and Stamoulis in view of Malik for the data to further comprise determining a received signal strength indication.

One of ordinary skill in the art would have been motivated because it would improve techniques for associating user devices with access points (**Malik, ¶[0003]**).

Claims 10, 12-13, 15, 34, 56-57, 61-62, and 64-65 is/are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Clark (US 5970064 A) in view of Stamoulis (US 2009/0207730 A1).

Regarding claim 10, Clark discloses a non-transitory machine-readable storage medium having computer executable instructions stored thereon that when executed cause a processor of a server to perform a method for improving performance of one or more communication units (**col. 11, lines 11-44**, a computer device including a memory with instructions to be executed by a processor to execute a

process at a network controller; **col. 12, lines 17-20**, discloses improving performance of communication units in response to performing steps by the network controller), the method comprising:

receiving, from network monitoring devices that monitor (**col. 12, lines 21-22**, collecting information; **col. 10, lines 52-55**, the information is collected by the network controller from each switch in a network (see also **Fig. 7**, each switch transmits the information)),

in real time (**col. 10, lines 52-55**, the data transmitted to the network controller is current information),

data associated with an operation of two or more communication units (**col. 12, lines 21-23**, the information is information associated with the operation of multiple nodes (see also **col. 12, lines 61-65**, QoS information is also transmitted))

located in different geographical areas (see **Fig. 3, and col. 6, 9-30**, switches are physical devices located at different locations),

the data comprising a parameter (**col. 12, lines 21-23**, the information includes admission policies (see also **col. 12, lines 61-65**, QoS information is also transmitted));

processing at least one of the data and historical data (**col. 12, lines 24-31**, processing the collected information);

determining a policy for each of the one or more communication units, based on the processed data (**col. 12, lines 24-31**, producing, as a result of the processing, at least one policy to be implemented by the nodes); and

communicating, via a network, the policy to two or more communication units (**col. 13, lines 6-10**, distributing the one or more policies; **col. 6, lines 20-21**, the network controller is connected to switches via a network)

that, in response to receiving the policy implements one or more algorithms based on at least a rule or a condition (**col. 17, line 54-65**, selecting, in response to receiving policy data, a decision table, based on a condition)

to improve a performance of the one or more communication units (**col. 12, lines 17-20**, improving performance of communication units in response to performing the steps described).

Clark does not disclose that the communicating the policy is in response to the server detecting the absence of an interference or noise from nearby wireless channels.

Stamoulis discloses in response to the server detecting the absence of an interference or noise from nearby wireless channels, communicating a policy (**¶[0062]**, a first node (602) requests traffic information from a second node (604); **¶[0064]**, the first node receives traffic information from the second node, the first node including a transmission controller; **¶[0067]**, the transmission controller of the first node, in response to the traffic information, determines to send a policy message (RUM) to the second node; **¶[0083]**, a given node may decide to not transmit a RUM when quality of service is unacceptable (i.e. sent when quality of service is not unacceptable); **¶[0075]**, unacceptable quality of service may be due to noise or interference; **Fig. 1, ¶[0039]-[0040]**, nodes may communicate over wireless channels such as WIFI (close range)).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the combined system of Clark and Roy in view of Stamoulis so that the communicating the policy is in response to the server detecting the absence of an interference or noise from nearby wireless channels.

One of ordinary skill in the art would have been motivated because "data that is received through the use of the interference management message may not end up being forwarded to the intended destination in an efficient manner" when the quality of service is unacceptable (**Stamoulis, ¶[0016]**).

Regarding claim 12, the combined system of Clark and Stamoulis discloses the invention substantially as applied to claim 10, above, wherein processing comprises storing at least one of the data and the historical data in a memory of the device (**Clark, col. 12, lines 55-58**, the network controller collects the information).

Regarding claim 13, the combined system of Clark and Stamoulis discloses the invention substantially as applied to claim 10, above, wherein determining the policy comprises determining a condition for communicating the policy (**Clark, col. 13, line 6-10**, the policies are transmitted once the policies are determined).

Regarding claim 15, the combined system of Clark and Stamoulis discloses the invention substantially as applied to claim 10, above, further comprising updating the parameter based on a change in the operation to update the policy (**Clark, col. 12, lines 21-23**, the information includes admission policies (see also col. **12, lines 61-65**, QoS information is also transmitted); **Fig. 10** discloses that the method steps are repeated (element 1006 points back to 1000), and current parameters are obtained in each iteration (element 1002), which results in new policy (element 1004)).

Regarding claim 34, Clark discloses an apparatus comprising:

a memory; and a processor, coupled to the memory (**col. 11, lines 11-44**, a computer device including a memory with instructions to be executed by a processor to execute a process at a network controller; **col. 12, lines 17-20**, improving performance of communication units in response to performing steps by the network controller), and operable to:

receive, from network monitoring devices that monitor (**col. 12, lines 21-22**, collecting information; **col. 10, lines 52-55**, the information is collected by the network controller from each switch in a network (see also **Fig. 7**, each switch transmits the information)),

in real-time (**col. 10, lines 52-55**, the data transmitted to the network controller is current information),

data associated with an operation of two or more communication units (**col. 12, lines 21-23**, the information is information associated with the operation of multiple nodes (see also **col. 12, lines 61-65**, QoS information is also transmitted))

located in different geographical areas (see **Fig. 3, and col. 6, 9-30**, switches are physical devices located at different locations),

the data comprising a parameter (**col. 12, lines 21-23**, the information includes admission policies (see also col. 12, lines 61-65, QoS information is also transmitted));

analyze at least one of the data and historical data (**col. 12, lines 24-31**, processing the collected information);

based on the analyzed data, determine a policy for at least one of the two or more communication units (**col. 12, lines 24-31**, producing, as a result of the processing, at least one policy to be implemented by the nodes); and

communicate the policy, via a network that is communicatively coupled to the processor, to at least one or more communication units (**col. 13, lines 6-10**, distributing the one or more policies; col. 6, lines 20-21, the network controller is connected to switches via a network)

that in response to receiving the policy implements one or more algorithms based on at least a rule or a condition (**col. 17, line 54-65**, selecting, in response to receiving policy data, a decision table, based on a condition)

to improve a performance of the one or more communication units (**col. 12, lines 17-20**, improving performance of communication units in response to performing the steps described).

Clark does not disclose that the communicating the policy is in response to the server detecting the absence of an interference or noise from nearby wireless channels.

Stamoulis discloses in response to the server detecting the absence of an interference or noise from nearby wireless channels, communicating a policy (**¶[0062]**, a first node (602) requests traffic

information from a second node (604); **¶[0064]**, the first node receives traffic information from the second node, the first node including a transmission controller; **¶[0067]**, the transmission controller of the first node, in response to the traffic information, determines to send a policy message (RUM) to the second node; **¶[0083]**, a given node may decide to not transmit a RUM when quality of service is unacceptable (i.e. sent when quality of service is not unacceptable); **¶[0075]**, unacceptable quality of service may be due to noise or interference; **Fig. 1, ¶[0039]-[0040]**, nodes may communicate over wireless channels such as WIFI (close range)).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the combined system of Clark and Roy in view of Stamoulis so that the communicating the policy is in response to the server detecting the absence of an interference or noise from nearby wireless channels.

One of ordinary skill in the art would have been motivated because "data that is received through the use of the interference management message may not end up being forwarded to the intended destination in an efficient manner" when the quality of service is unacceptable (**Stamoulis, ¶[0016]**).

Regarding claim 56, the combined system of Clark and Stamoulis discloses the invention substantially as applied to claim 34, above, wherein processing comprises storing at least one of the data and the historical data in the memory (**Clark, col. 12, lines 55-58**, the network controller collects the information).

Regarding claim 57, the combined system of Clark and Stamoulis discloses the invention substantially as applied to claim 34, above, wherein determining the policy comprises determining a condition for communicating the policy (**Clark, col. 13, line 6-10**, the policies are transmitted once the policies are determined).

Regarding claim 61, the combined system of Clark and Stamoulis discloses the invention substantially as applied to claim 10, above, wherein the data further comprises time-varying data (**Clark, col. 12, lines 21-31**, the collected information is "current" information, which is updated at a later point in time).

Regarding claim 62, the combined system of Clark and Stamoulis discloses the invention substantially as applied to claim 10, above, wherein the server performs an analysis of at least one of the data and historical data (**Clark, col. 12, lines 21-31**, the information is used by the network controller to create a new policy).

Regarding claim 64, the combined system of Clark and Stamoulis discloses the invention substantially as applied to claim 34, above, wherein the data further comprises time-varying data (**Clark, col. 12, lines 21-31**, the collected information is "current" information, which is updated at a later point in time).

Regarding claim 65, the combined system of Clark and Stamoulis discloses the invention substantially as applied to claim 34, above, wherein the server performs an analysis of at least one of the data and historical data (**Clark, col. 12, lines 21-31**, the information is used by the network controller to create a new policy).

Claims 14 and 36 is/are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Clark (US 5970064 A) in view of Stamoulis (US 2009/0207730 A1), as respectively applied to claims 10 and 34, above, and further in view of Malik (US 2009/0147697 A1)

Regarding claim 14, the combined system of Clark and Stamoulis discloses the invention substantially as applied to claim 10, above.

The combined system of Clark and Stamoulis does not disclose that the data further comprises determining a received signal strength indication.

Malik discloses that the data further comprises determining a received signal strength indication (**¶[0025]**, a first network element receiving from a second network element performance data related to communications between the second network element and a third network element of a plurality of elements (see **¶[0018]); ¶[0030]**, monitored parameters may include signal strength indicators; **¶[0046]-[0047]**, transmitting new policies to node devices based on the monitoring).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the combined system of Clark and Stamoulis in view of Malik for the data to further comprise determining a received signal strength indication.

One of ordinary skill in the art would have been motivated because it would improve techniques for associating user devices with access points (**Malik, ¶[0003]**).

Regarding claim 36, the combined system of Clark and Stamoulis discloses the invention substantially as applied to claim 34, above.

The combined system of Clark and Stamoulis does not disclose that the network monitoring devices determine a received signal strength.

Malik discloses monitoring devices that determine a received signal strength (**¶[0025]**, a first network element receiving from a second network element performance data related to communications between the second network element and a third network element of a plurality of elements (see **¶[0018]); ¶[0030]**, monitored parameters may include signal strength indicators; **¶[0046]-[0047]**, transmitting new policies to node devices based on the monitoring).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the combined system of Clark and Stamoulis in view of Malik so that the network monitoring devices determine a received signal strength.

One of ordinary skill in the art would have been motivated because it would improve techniques for associating user devices with access points (**Malik, ¶[0003]**).

Double Patenting

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 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., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); *In 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 nonstatutory double patenting provided the reference application or patent either is shown to be commonly owned with the examined application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement. See MPEP § 717.02 for applications subject to examination under the first inventor to file provisions of the AIA as explained in MPEP § 2159. See MPEP §§ 706.02(l)(1) - 706.02(l)(3) for applications not subject to examination under the first inventor to file provisions of the AIA. A terminal disclaimer must be signed in compliance with 37 CFR 1.321(b).

The USPTO Internet website contains terminal disclaimer forms which may be used. Please visit www.uspto.gov/patent/patents-forms. The filing date of the application in which the form is filed determines what form (e.g., PTO/SB/25, PTO/SB/26, PTO/AIA/25, or PTO/AIA/26) should be used. A web-based eTerminal Disclaimer may be filled out completely online using web-screens. An eTerminal Disclaimer that meets all requirements is auto-processed and approved immediately upon submission.

For more information about eTerminal Disclaimers, refer to

www.uspto.gov/patents/process/file/efs/guidance/eTD-info-I.jsp.

Claims 1, 10, and 34 are rejected on the ground of nonstatutory double patenting as being unpatentable over claim 1 of U.S. Patent No. 10171298 B2 in view of Clark (US 5970064 A), and further in view of Stamoulis (US 2009/0207730 A1).

Regarding claim 1,

14356581			10171298	
Claims	**Description**		**Claims**	**Description**
1	A method for improving performance of one or more communication units, the method comprising:		1	A Digital Subscriber Line (DSL) customer premises equipment (CPE) Management Center (CMC) coupled to a Broadband network, the CMC comprising:
	receiving, by a server, from network monitoring devices that monitor, in real-time, data associated with an operation			a data collection module, communicatively coupled to at least one DSL CPE device, to receive information from the CPE device regarding operation of the at least one DSL CPE device, wherein the information is to be received on a: periodic basis, on-demand basis, or in real-time basis;
	of two or more communication units located in different geographical areas,			
	the data comprising a parameter; processing, by the server, at least one of the data and historical data; based on the processed data, determining a policy for at least one of the two or more communication units; and			an analysis module coupled to the data collection module to analyze the received information, wherein the CMC is to determine one or more line parameter values associated with a central office imposed (CO-imposed) line constraint, and wherein the analysis module is to determine to what extent range of the one or more parameter values can be changed within the CO-imposed line constraints; and
	in response to the server detecting the absence of an interference or noise from nearby wireless channels,			
	communicating the policy, by the server, via a network, to at least one or more communication units that, in response to receiving the policy implementes one or more algorithms that use the parameter and at least a rule or a condition			a command signal generation module coupled to the analysis module to receive analysis results and to generate a corresponding command signal for transmission to the at least one DSL CPE device to modify the at least one DSL CPE device operation within the CO-imposed line constraints based on the analysis, wherein the CMC is able to modify an operation of the at least one DSL CPE device independent of management on a CO side of the Broadband network, and wherein the CMC is capable to be afforded for collecting operational data without control over operation of a digital subscriber line access multiplexer (DSLAM) coupled to the at least one DSL CPE device.
	for the one or more communication units to improve a performance of the one or more communication units.			

US Patent No. 10171298 B2 does not disclose that the data is associated with an operation of two or more communication units located in different geographical areas; that the communicating the

policy is in response to the server detecting the absence of an interference or noise from nearby wireless channels; and that the algorithm is to improve a performance of the one or more communication units.

Clark discloses that the data is associated with an operation of two or more communication units located in different geographical areas (col. 12, lines 21-23, discloses that the information is information associated with the operation of multiple nodes (see also col. 12, lines 61-65, QoS information is also transmitted); see Fig. 3, and col. 6, 9-30, discloses that switches are physical devices located at different locations); and

that the algorithm is to improve a performance of the one or more communication units (col. 12, lines 17-20, discloses improving performance of communication units in response to performing the steps described).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify US Patent No. 10171298 B2 in view of Clark so that the data is associated with an operation of two or more communication units located in different geographical areas; and that the algorithm is to improve a performance of the one or more communication units.

One of ordinary skill in the art would have been motivated because it would prevent loss of data due to overloading (Clark, implied, col. 2, lines 21-41).

The combined system of US Patent No. 10171298 B2 and Clark does not disclose that the communicating the policy is in response to the server detecting the absence of an interference or noise from nearby wireless channels.

Stamoulis discloses in response to the server detecting the absence of an interference or noise from nearby wireless channels, communicating a policy (¶[0062], a first node (602) requests traffic information from a second node (604); ¶[0064], the first node receives traffic information from the second node, the first node including a transmission controller; ¶[0067], the transmission controller of

the first node, in response to the traffic information, determines to send a policy message (RUM) to the second node; ¶[0083], a given node may decide to not transmit a RUM when quality of service is unacceptable (i.e. sent when quality of service is not unacceptable); ¶[0075], unacceptable quality of service may be due to noise or interference; Fig. 1, ¶[0039]-[0040], nodes may communicate over wireless channels such as WIFI (close range)).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the combined system of US Patent No. 10171298 B2 and Clark in view of Stamoulis so that the policy is sent in response to the server detecting the absence of an interference or noise from nearby wireless channels.

One of ordinary skill in the art would have been motivated because "data that is received through the use of the interference management message may not end up being forwarded to the intended destination in an efficient manner" when the quality of service is unacceptable (Stamoulis, ¶[0016]).

Regarding claim 10,

14356581		10171298	
Claims	**Description**	**Claims**	**Description**
10	A non-transitory machine-readable storage medium having computer executable instructions stored thereon that when executed cause a processor to perform a method for improving performance of one or more communication units, the method comprising:	**1**	A Digital Subscriber Line (DSL) customer premises equipment (CPE) Management Center (CMC) coupled to a Broadband network, the CMC comprising:
	receiving, from network monitoring devices, in real time, data associated with an operation		a data collection module, communicatively coupled to at least one DSL CPE device, to receive information from the CPE device regarding operation of the at least one DSL CPE device, wherein the information is to be received on a: periodic basis, on-demand basis, or in real-time basis;
	of two or more communication units located in different geographical areas,		
	the data comprising a parameter; processing at least one of the data and historical data; determining a policy for each of the one or more communication units, based on the processed data; and		an analysis module coupled to the data collection module to analyze the received information, wherein the CMC is to determine one or more line parameter values associated with a central office imposed (CO-imposed) line constraint, and wherein the analysis module is to determine to what extent range of the one or more parameter values can be changed within the CO-imposed line constraints; and
	in response to the server detecting the absence of an interference or noise from nearby wireless channels,		
	communicating, via a network, the policy to two or more communication units that, in response to receiving the policy implements one or more algorithms based on at least a rule or a condition		a command signal generation module coupled to the analysis module to receive analysis results and to generate a corresponding command signal for transmission to the at least one DSL CPE device to modify the at least one DSL CPE device operation within the CO-imposed line constraints based on the analysis, wherein the CMC is able to modify an operation of the at least one DSL CPE device independent of management on a CO side of the Broadband network, and wherein the CMC is capable to be afforded for collecting operational data without control over operation of a digital subscriber line access multiplexer (DSLAM) coupled to the at least one DSL CPE device.
	to improve a performance of the one or more communication units.		

US Patent No. 10171298 B2 does not disclose that the data is associated with an operation of two or more communication units located in different geographical areas; that the communicating of the policy is in response to the server detecting the absence of an interference or noise from nearby wireless channels, and that the algorithm is to improve a performance of the one or more communication units.

Clark discloses that the data is associated with an operation of two or more communication units located in different geographical areas (col. 12, lines 21-23, discloses that the information is information associated with the operation of multiple nodes (see also col. 12, lines 61-65, QoS information is also transmitted); see Fig. 3, and col. 6, 9-30, discloses that switches are physical devices located at different locations); and

that the algorithm is to improve a performance of the one or more communication units (col. 12, lines 17-20, discloses improving performance of communication units in response to performing the steps described).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify US Patent No. 10171298 B2 in view of Clark so that the data is associated with an operation of two or more communication units located in different geographical areas; and that the algorithm is to improve a performance of the one or more communication units.

One of ordinary skill in the art would have been motivated because it would prevent loss of data due to overloading (Clark, implied, col. 2, lines 21-41).

The combined system of US Patent No. 10171298 B2 and Clark does not disclose that the communicating of the policy is in response to the server detecting the absence of an interference or noise from nearby wireless channels.

Stamoulis discloses in response to the server detecting the absence of an interference or noise from nearby wireless channels, communicating a policy (¶[0062], a first node (602) requests traffic information from a second node (604); ¶[0064], the first node receives traffic information from the second node, the first node including a transmission controller; ¶[0067], the transmission controller of the first node, in response to the traffic information, determines to send a policy message (RUM) to the second node; ¶[0083], a given node may decide to not transmit a RUM when quality of service is unacceptable (i.e. sent when quality of service is not unacceptable); ¶[0075], unacceptable quality of

service may be due to noise or interference; Fig. 1, ¶[0039]-[0040], nodes may communicate over wireless channels such as WIFI (close range)).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the combined system of US Patent No. 10171298 B2 and Clark in view of Stamoulis so that the communicating the policy is in response to the server detecting the absence of an interference or noise from nearby wireless channels.

One of ordinary skill in the art would have been motivated because "data that is received through the use of the interference management message may not end up being forwarded to the intended destination in an efficient manner" when the quality of service is unacceptable (Stamoulis, ¶[0016]).

Regarding claim 34,

14356581		10171298	
Claims	**Description**	**Claims**	**Description**
34	An apparatus comprising: a memory; and a processor, coupled to the memory, and operable to:	**1**	A Digital Subscriber Line (DSL) customer premises equipment (CPE) Management Center (CMC) coupled to a Broadband network, the CMC comprising:
	receive, from network monitoring devices that monitor, in real-time, data associated with an operation of two or more communication units		a data collection module, communicatively coupled to at least one DSL CPE device, to receive information from the CPE device regarding operation of the at least one DSL CPE device, wherein the information is to be received on a: periodic basis, on-demand basis, or in real-time basis;
	located in different geographical areas,		
	the data comprising a parameter; analyze at least one of the data and historical data; based on the analyzed data, determine a policy for at least one of the two or more communication units; and		an analysis module coupled to the data collection module to analyze the received information, wherein the CMC is to determine one or more line parameter values associated with a central office imposed (CO-imposed) line constraint, and wherein the analysis module is to determine to what extent range of the one or more parameter values can be changed within the CO-imposed line constraints; and
	in response to the server detecting the absence of an interference or noise from nearby wireless channels,		
	communicate the policy, via a network that is communicatively coupled to the processor, to at least one or more communication units that in response to receiving the policy implements one or more algorithms based on at least a rule or a condition		a command signal generation module coupled to the analysis module to receive analysis results and to generate a corresponding command signal for transmission to the at least one DSL CPE device to modify the at least one DSL CPE device operation within the CO-imposed line constraints based on the analysis, wherein the CMC is able to modify an operation of the at least one DSL CPE device independent of management on a CO side of the Broadband network, and wherein the CMC is capable to be afforded for collecting operational data without control over operation of a digital subscriber line access multiplexer (DSLAM) coupled to the at least one DSL CPE device.
	to improve a performance of the one or more communication units.		

US Patent No. 10171298 B2 does not disclose that the data is associated with an operation of two or more communication units located in different geographical areas; that the communicating of the policy is in response to the server detecting the absence of an interference or noise from nearby wireless channels; and that the algorithm is to improve a performance of the one or more communication units.

Clark discloses that the data is associated with an operation of two or more communication units located in different geographical areas (col. 12, lines 21-23, discloses that the information is

information associated with the operation of multiple nodes (see also col. 12, lines 61-65, QoS information is also transmitted); see Fig. 3, and col. 6, 9-30, discloses that switches are physical devices located at different locations); and

that the algorithm is to improve a performance of the one or more communication units (col. 12, lines 17-20, discloses improving performance of communication units in response to performing the steps described).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify US Patent No. 10171298 B2 in view of Clark so that the data is associated with an operation of two or more communication units located in different geographical areas; and that the algorithm is to improve a performance of the one or more communication units.

One of ordinary skill in the art would have been motivated because it would prevent loss of data due to overloading (Clark, implied, col. 2, lines 21-41).

The combined system of US Patent No. 10171298 B2 and Clark does not disclose that the communicating of the policy is in response to the server detecting the absence of an interference or noise from nearby wireless channels.

Stamoulis discloses in response to the server detecting the absence of an interference or noise from nearby wireless channels, communicating a policy (¶[0062], a first node (602) requests traffic information from a second node (604); ¶[0064], the first node receives traffic information from the second node, the first node including a transmission controller; ¶[0067], the transmission controller of the first node, in response to the traffic information, determines to send a policy message (RUM) to the second node; ¶[0083], a given node may decide to not transmit a RUM when quality of service is unacceptable (i.e. sent when quality of service is not unacceptable); ¶[0075], unacceptable quality of service may be due to noise or interference; Fig. 1, ¶[0039]-[0040], nodes may communicate over wireless channels such as WIFI (close range)).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the combined system of US Patent No. 10171298 B2 and Clark in view of Stamoulis so that the communicating the policy is in response to the server detecting the absence of an interference or noise from nearby wireless channels.

One of ordinary skill in the art would have been motivated because "data that is received through the use of the interference management message may not end up being forwarded to the intended destination in an efficient manner" when the quality of service is unacceptable (Stamoulis, ¶[0016]).

Examiner's Note

The examiner notes that the limitation *in response to the server detecting the absence of an interference or noise from nearby wireless channels, communicating the policy, by the server*, as recited in claim 1, and similarly stated in claims 10 and 34, may be further amended to distinguish from the features disclosed by Stamoulis (US 2009/0207730 A1).

For example, the present application, in paragraph [0055] of the specification (as published), describes a server (e.g. corresponding to the server of claim 1) that determines that packets will be lost regardless of a transmission rate policy applied to a communication unit when interference or noise exists, but when interference or noise doesn't exists, then the server may establish a new rate. For example, the limitations could be amended to recite what happens when noise or interference is detected (e.g. "in response to the server detecting interference or noise from nearby wireless channels, determining that packets will be lost regardless of rate selection; and in response to the server detecting the absence of an interference or noise from nearby wireless channels, communicating the policy" – note that other alternatives may be possible). This is different than Stamoulis, because in Stamoulis, a RUM is not sent when the node determines that the RUM itself may not be received at the other node

due to noise or interference (see Stamoulis, ¶[0016]) and not because it determines that the RUM will not have an effect on the other node.

Therefore, it is possible to further limit the claims to differentiate the claimed subject matter from the teachings of Stamoulis.

The above suggestions should not be construed as a proposal for allowance, as any such amendments would necessitate further searching and/or consideration.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

Link adaptation in wireless networks for throughput maximization under retransmissions; US 8249520 B2; Chuang et al.

Method and apparatus to facilitate support for multi-radio coexistence; US 9277564 B2; Wang et al.

Automatic provisioning of power parameters for femtocell; US 9313752 B2; Czaja et al.

System and Method for Spectrum Management of a Shared Frequency Band; US 20030198200 A1; Diener et al.

System and method for adjusting DIDO interference cancellation based on signal strength measurements; US 20110002371 A1; Forenza et al.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to BORIS D GRIJALVA LOBOS whose telephone number is (571)272-0767. The examiner can normally be reached on M-F 10:30AM to 6:30PM EST.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian Gillis can be reached on 571-272-7952. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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

/BORIS D GRIJALVA LOBOS/
Examiner, Art Unit 2446

Notice of References Cited	Application/Control No. 14/356,581	Applicant(s)/Patent Under Reexamination Rhee, Wonjong	
	Examiner BORIS D GRIJALVA LOBOS	Art Unit 2446	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-8249520-B2	08-2012	Chuang; Justin Che-I	H04L1/0003	375/346
*	B	US-9277564-B2	03-2016	Wang; Jibing	H04W72/04	1/1
*	C	US-9313752-B2	04-2016	Czaja; Stanislaw	H04W52/343	1/1
*	D	US-20030198200-A1	10-2003	Diener , Neil R.	H04L1/1664	370/329
*	E	US-20090207730-A1	08-2009	Stamoulis; Anastasios	H04W72/1278	370/230.1
*	F	US-20110002371-A1	01-2011	Forenza; Antonio	H04B7/0417	375/227
	G					
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	J					
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	L					
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FOREIGN PATENT DOCUMENTS

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

NON-PATENT DOCUMENTS

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

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

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	14/356,581	Rhee, Wonjong
	Examiner	**Art Unit**
	BORIS D GRIJALVA LOBOS	2446

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

CLAIMS

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

CLAIM		DATE								
Final	Original	12/21/2015	11/16/2016	12/20/2017	10/21/2018	01/27/2019	07/26/2019	02/23/2020		
	1	✓	✓	✓	✓	✓	✓	✓		
	2	✓	-	-	-	-	-	-		
	3	✓	✓	✓	✓	✓	✓	✓		
	4	✓	✓	✓	✓	✓	✓	✓		
	5	✓	✓	✓	✓	✓	✓	✓		
	6	✓	-	-	-	-	-	-		
	7	✓	✓	✓	✓	-	-	-		
	8	✓	✓	✓	✓	✓	✓	✓		
	9	✓	✓	✓	✓	-	-	-		
	10	✓	✓	✓	✓	✓	✓	✓		
	11	✓	-	-	-	-	-	-		
	12	✓	✓	✓	✓	✓	✓	✓		
	13	✓	✓	✓	✓	✓	✓	✓		
	14	✓	✓	✓	✓	✓	✓	✓		
	15	✓	✓	✓	✓	✓	✓	✓		
	16	✓	✓	✓	✓	✓	✓	✓		
	17	-	-	-	-	-	-	-		
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	31	-	-	-	-	-	-	-		
	32	-	-	-	-	-	-	-		
	33	-	-	-	-	-	-	-		
	34	✓	✓	✓	✓	✓	✓	✓		
	35	✓	-	-	-	-	-	-		
	36	✓	✓	✓	✓	✓	✓	✓		
	37	✓	✓	✓	✓	✓	✓	✓		
	38	-	-	-	-	-	-	-		
	39	-	-	-	-	-	-	-		
	40	-	-	-	-	-	-	-		
	41	-	-	-	-	-	-	-		
	42	-	-	-	-	-	-	-		

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	Examiner	**Art Unit**
	BORIS D GRIJALVA LOBOS	2446

CLAIM		DATE								
Final	Original	12/21/2015	11/16/2016	12/20/2017	10/21/2018	01/27/2019	07/26/2019	02/23/2020		
	43	-	-	-	-	-	-	-		
	44	-	-	-	-	-	-	-		
	45	-	-	-	-	-	-	-		
	46	-	-	-	-	-	-	-		
	47	-	-	-	-	-	-	-		
	48	-	-	-	-	-	-	-		
	49	-	-	-	-	-	-	-		
	50	-	-	-	-	-	-	-		
	51	-	-	-	-	-	-	-		
	52	-	-	-	-	-	-	-		
	53				✓	✓	✓	✓		
	54				✓	✓	✓	✓		
	55				✓	-	-	-		
	56				✓	✓	✓	✓		
	57				✓	✓	✓	✓		
	58						✓	✓		
	59						✓	✓		
	60						✓	✓		
	61						✓	✓		
	62						✓	✓		
	63						✓	✓		
	64						✓	✓		
	65						✓	✓		

Charter Communications, Inc.
Exhibit 1006
Page #185

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14/356,581	Rhee, Wonjong
	Examiner	Art Unit
	BORIS D GRIJALVA LOBOS	2446

CPC - Searched*		
Symbol	**Date**	**Examiner**
H04L7/00,0004	12/21/2015	BGL
H04L12/00,14,16,24,2414,2415,2417-2419,2424-2426,2428-2433,2439,244-2442,2447,2464,2465,2468-247,2472,2473,2476,2478,26,2602,2618,2634-2642,2668-2678,2692	12/21/2015	BGL
H04L41/00,06,08-0806,0813-0836,085-0859,0866-0869,50-5016,5035,5038	12/21/2015	BGL
H04L43/00,04,08-0817,0876-10,16	12/21/2015	BGL
H04L47/00,10,11,12,28,29,32	12/21/2015	BGL
H04L7/00,0004 H04L41/00,06,08-0806,0813-0836,085-0859,0866-0869,50-5016,5035,5038 H04L43/00,04,08-0817,0876-10,16 H04L47/00,10,11,12,28,29,32	10/21/2018	BGL
H04L7/00,0004 H04L41/00,06,08-0806,0813-0836,085-0859,0866-0869,50-5016,5035,5038 H04L43/00,04,08-0817,0876-10,16 H04L47/00,10,11,12,28,29,32	07/26/2019	BGL
H04L7/00,0004 H04L41/00,06,08-0806,0813-0836,085-0859,0866-0869,50-5016,5035,5038 H04L43/00,04,08-0817,0876-10,16 H04L47/00,10,11,12,28,29,32	02/22/2020	BGL

CPC Combination Sets - Searched*		
Symbol	**Date**	**Examiner**

US Classification - Searched*			
Class	**Subclass**	**Date**	**Examiner**

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

/BORIS D GRIJALVA LOBOS/ Examiner, Art Unit 2446	

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Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14/356,581	Rhee, Wonjong
	Examiner	Art Unit
	BORIS D GRIJALVA LOBOS	2446

Search Notes		
Search Notes	**Date**	**Examiner**
EAST Inventor Name Search Performed	12/21/2015	BGL
EAST Text Limited Classification Search Performed (see attached search notes)	12/21/2015	BGL
EAST Text Search Performed (see attached search notes)	12/21/2015	BGL
EAST Inventor Name Search Performed	11/16/2016	BGL
EAST Text Search Performed	11/16/2016	BGL
Updated EAST Text Search (see attached search notes)	12/20/2017	BGL
Updated EAST Inventor Name Search (see attached search notes)	12/20/2017	BGL
Updated EAST Inventor Name Search (see attached search notes)	10/21/2018	BGL
Updated EAST Text Limited Classification Search (see attached search notes)	10/21/2018	BGL
Updated EAST Text Search (see attached search notes)	10/21/2018	BGL
GOOGLE Search Performed	10/21/2018	BGL
Updated EAST Inventor Name Search (see attached search notes)	01/28/2019	BGL
Updated EAST Text Search (see attached search notes)	01/28/2019	BGL
Google search performed	01/28/2019	BGL
Updated EAST Inventor Name Search (see attached search notes)	07/26/2019	BGL
Updated EAST Text Limited Classification Search (see attached search notes)	07/26/2019	BGL
Updated EAST Text Limited Classification Search (see attached search notes)	12/10/2019	BGL
Updated EAST Text Search (see attached search notes)	12/10/2019	BGL
Updated EAST Text Limited Classification Search (see attached search notes)	02/22/2020	BGL
Updated EAST Text Search (see attached search notes)	02/22/2020	BGL
Updated EAST Inventor Name Search (see attached search notes)	02/23/2020	BGL

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Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14/356,581	Rhee, Wonjong
	Examiner	Art Unit
	BORIS D GRIJALVA LOBOS	2446

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner

/BORIS D GRIJALVA LOBOS/ Examiner, Art Unit 2446	

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Exhibit 1006
Page #188

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	14356581
Filing Date	2014-05-06
First Named Inventor	Wonjong Rhee
Art Unit	2446
Examiner Name	Boris D. Grijalva Lobos
Attorney Docket Number	20145-054US

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					

/BORIS D GRIJALVA LOBOS/

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U.S.PATENT APPLICATION PUBLICATIONS Remove

Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20030031180	A1	2003-02-13	Datta et al.	
	2	20060126613	A1	2006-06-15	Zweig	
	3	20080186873	A1	2008-08-07	Pujet et al.	
	4	20090147697	A1	2009-06-11	Malik et al.	
	5	20110110359	A1	2011-05-12	Cooke et al.	

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /B.D.G/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14356581
	Filing Date	2014-05-06
	First Named Inventor	Wonjong Rhee
	Art Unit	2446
	Examiner Name	Boris D. Grijalva Lobos
	Attorney Docket Number	20145-054US

	6	20140304408	A1	2014-10-09	Rhee	

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FOREIGN PATENT DOCUMENTS Remove

Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2]	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1	2006091391	WO	A2	2006-08-31	INTERDIGITAL TECHNOLOGY CORPORATION		
	2	2007116411	WO	A1	2007-10-18	Link Fusion Ltd.		
	3	2013070232	WO	A1	2013-05-16	ASSIA INC.		

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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]
	1	First Office Action for Indian Patent Application No. 4205/CHENP/2014 [Attorney Docket No. 20145-055IN] mailed on March 22, 2019 (7 pgs).	X
	2	Response to the First Office Action for Indian Patent Application No. 4205/CHENP/2014 [Attorney Docket No. 20145-055IN] mailed on September 20, 2019, (9 pgs).	☐
	3	Third Office Action for Canadian Patent Application No. 2,855,461 [Attorney Docket No. 20145-055CA] mailed on July 30, 2019 (4 pgs).	☐

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /B.D.G/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14356581
	Filing Date	2014-05-06
	First Named Inventor	Wonjong Rhee
	Art Unit	2446
	Examiner Name	Boris D. Grijalva Lobos
	Attorney Docket Number	20145-054US

	4	Response to the Third Office Action for Canadian Patent Application No. 2,855,461 [Attorney Docket No. 20145-055CA] mailed on August 20, 2019 (6 pgs).	☐
	5	First Office Action for Chinese Patent Application No. 201180075399.4 [Attorney Docket No. 20145-054CN], mailed on June 11, 2019 (11 pgs).	☐
	6	Response to the First Office Action for Chinese Patent Application No. 201180075399.4 [Attorney Docket No. 20145-054CN], mailed on July 15, 2019 (11 pgs).	☐
	7	Notice of Allowance for Australian Patent Application No. 2018200787 [Attorney Docket No. 055AUD2], mailed on October 21, 2019 (3 pgs).	☐
	8	Exam Report for Australian Patent Application No. 2018200787 [Attorney Docket No. 055AUD2], mailed on October 22, 2019 (4 pgs).	☐
	9	Notice of Allowance for the US Patent Application No. 15/809,823 [Attorney Docket No. 20145-055USC], mailed on August 6, 2019 (9 pgs).	☐
	10	Cisco Systems, "IOS NAT Load-Balancing for Two ISP Connections", Document ID: 100658, dated February 22, 2008. Available from the Internet, <URL:https://www.cisco.com/c/en/us/support/docs/ip/network-address-translation-nat/100658-ios-nat-load-balancing-2isp.html>, (5 pgs).	☐

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EXAMINER SIGNATURE

Examiner Signature	/BORIS D GRIJALVA LOBOS/	Date Considered	02/22/2020

*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. /B.D.G/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14356581
	Filing Date	2014-05-06
	First Named Inventor	Wonjong Rhee
	Art Unit	2446
	Examiner Name	Boris D. Grijalva Lobos
	Attorney Docket Number	20145-054US

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	/Michael V. North/	Date (YYYY-MM-DD)	2020-01-28
Name/Print	Michael V. North	Registration Number	46,963

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.

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.

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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.

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.

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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.

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EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S1	1026	((access near1 point) (base near1 station) (wireless near1 LAN near1 device) (DSLAM) (gateway) (performance near1 device) DSL CPE (customer near1 premises near1 equipment) modem (in-home near1 powerline) (in-home coax) (HPNA) (metering near1 device) (LAN near3 appliance) (femtocell) (wifi near1 base) (repeater) STB STU (IP near2 TV) (IP near2 media near1 device) (gam$3 near1 console) gateway device computer router bridge switch) with ((transmit$4 send$3 forward$3 receiv$3) near5 policy) with operation	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/16 12:31
S2	84	((access near1 point) (base near1 station) (wireless near1 LAN near1 device) (DSLAM) (gateway) (performance near1 device) DSL CPE (customer near1 premises near1 equipment) modem (in-home near1 powerline) (in-home coax) (HPNA) (metering near1 device) (LAN near3 appliance) (femtocell) (wifi near1 base) (repeater) STB STU (IP near2 TV) (IP near2 media near1 device) (gam$3 near1 console) gateway device computer router bridge switch) with ((transmit$4 send$3 forward$3 receiv$3) near5 policy) with operation with (location time)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/16 12:48
S3	26692	RSSI	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/16 15:31
S4	1040	monitor$3 near3 RSSI	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/16 15:32
S6	0	(monitor$3 near3 RSSI) with (adjust$3 near3 rate)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/16 15:32
S7	8	((transmit$3 send$3 receiv$3 forward$3 monitor$3) near3 RSSI) with (adjust$3 near3 rate)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/16 15:33
S8	26	((send$3 transmit$4 receiv$3 forward$3) near5 conditions near3 operation) with ((access near1 point) AP)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/17 18:26

S9	4998	adaptation near1 algorithm	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/17 18:58
S10	3	(adaptation near1 algorithm) with ((real near1 time) real-time) with historical	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/17 18:58
S11	1	"14356581"	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/17 20:14
S12	0	((send$3 transmit$4 forward$3 receiv$3) near3 policy) near20 RSSI	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/17 20:39
S13	0	((send$3 transmit$4 forward$3 receiv$3) near3 policy) with RSSI	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/17 20:39
S14	31	((send$3 transmit$4 forward$3 receiv$3) near7 policy) with RSSI	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/17 20:39
S15	1	(policy near1 server) with RSSI	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/17 20:59
S16	26	(policy near1 server) same2 RSSI	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/17 20:59
S17	0	((transmit$3 send$3 receiv$3 forward$3) near5 policy near5 algorithms) with RSSI	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/18 18:19
S18	178	((transmit$3 send$3 receiv$3 forward$3) near5 policy near5 algorithms)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/18 18:19
S19	1	((transmit$3 send$3 receiv$3 forward$3) near5 policy near5 algorithms) and RSSI	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/18 18:19
S20	2	((transmit$3 send$3 receiv$3 forward$3) near5 policy near5 algorithms) with AP	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/18 18:20

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S21	7	((transmit$3 send$3 receiv$3 forward$3) near5 policy near5 algorithms) and (((access near1 point) AP) with server)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/18 18:20
S22	109	rhee near1 wonjong	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/21 13:24
S23	10	(rhee near1 wonjong) and policy	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/21 13:30
S24	58484	(H04L7/00,0004 H04L12/00,14,16,24,2414,2415,2417-2419,2424-2426,2428-2433,2439,244-2442,2447,2464,2465,2468-247,2472,2473,2476,2478,26,2602,2618,2634-2642,2668-2678,2692 H04L41/00,06,08-0806,0813-0836,085-0859,0866-0869,50-5016,5035,5038 H04L43/00,04,08-0817,0876-10,16 H04L47/00,10,11,12,28,29,32).cpc.	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/21 15:17
S25	25	((transmit$3 send$3 receiv$3 forward$3) near5 policy near5 algorithms) and S24	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/21 15:17
S26	41	(rhee near1 wonjong) and S24	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/21 15:18
S27	1	"7840220".pn.	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/21 16:50
S28	1672280	adaptation algorithm	US-PGPUB; USPAT; EPO; JPO	OR	ON	2016/11/14 19:55
S29	5390	adaptation near1 algorithm	US-PGPUB; USPAT; EPO; JPO	OR	ON	2016/11/14 19:55
S30	394	(creat$3 generat$3 comput$3 calculat$3) near5 (adaptation near1 algorithm)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2016/11/14 19:56
S31	0	((creat$3 generat$3 comput$3 calculat$3) near5 (adaptation near1 algorithm)) with policy	US-PGPUB; USPAT; EPO; JPO	OR	ON	2016/11/14 19:56
S32	5	((creat$3 generat$3 comput$3 calculat$3)	US-	OR	ON	2016/11/14

		near5 (adaptation near1 algorithm)) same2 policy	PGPUB; USPAT; EPO; JPO			19:56
S33	13	(rhee near1 wonjong) and policy	US-PGPUB; USPAT; EPO; JPO	OR	ON	2016/11/16 17:17
S34	2862	(generat$3 creat$3 develop$3) near10 RSSI	US-PGPUB; USPAT; EPO; JPO	OR	ON	2016/11/16 17:18
S35	361	((generat$3 creat$3 develop$3) near10 RSSI) with ((observ$3 collect$3 obtain$3 receiv$3 detect$3) near5 (data status information state))	US-PGPUB; USPAT; EPO; JPO	OR	ON	2016/11/16 17:19
S36	0	((generat$3 creat$3 develop$3) near10 RSSI) with ((observ$3 collect$3 obtain$3 receiv$3 detect$3) near5 (data status information state)) with policy	US-PGPUB; USPAT; EPO; JPO	OR	ON	2016/11/16 17:19
S37	4	((generat$3 creat$3 develop$3) near10 RSSI) with ((observ$3 collect$3 obtain$3 receiv$3 detect$3) near5 (data status information state)) same2 policy	US-PGPUB; USPAT; EPO; JPO	OR	ON	2016/11/16 17:20
S38	5394	adaptation near1 algorithm	US-PGPUB; USPAT; EPO; JPO	OR	ON	2016/11/16 17:20
S39	2	S35 and S38	US-PGPUB; USPAT; EPO; JPO	OR	ON	2016/11/16 17:20
S40	5784	adaptation near1 algorithm	US-PGPUB; USPAT; EPO; JPO	OR	ON	2017/12/20 14:02
S41	451	(transmit$4 send$3 receiv$3 forward$3 push$3) near5 (adaptation near1 algorithm)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2017/12/20 14:03
S42	4	"7840220".pn. "2007136337"	US-PGPUB; USPAT; EPO; JPO	OR	ON	2017/12/20 15:43
S43	46	(policy near7 algorithm) and (communication near5 algorithm) and WIFI	US-PGPUB; USPAT; EPO; JPO	OR	ON	2017/12/20 21:13
S44	0	S43 and S41	US-	OR	ON	2017/12/20

			PGPUB; USPAT; EPO; JPO			21:13
S51	33	("2006/0187885").URPN.	USPAT	OR	OFF	2018/10/19 20:09
S52	10158	monitor$3 near7 (signal near1 strength)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2018/10/19 23:07
S53	86958	(H04L7/00,0004 H04L41/00,06,08-0806,0813-0836,085-0859,0866-0869,50-5016,5035,5038 H04L43/00,04,08-0817,0876-10,16 H04L47/00,10,11,12,28,29,32).cpc.	US-PGPUB; USPAT; EPO; JPO	OR	ON	2018/10/19 23:08
S54	335	S52 and S53	US-PGPUB; USPAT; EPO; JPO	OR	ON	2018/10/19 23:08
S55	38	("4161628" | "4229734" | "4279032" | "4430788" | "4558358" | "4694453" | "4730302" | "4799211" | "4816825" | "4860001" | "4890278" | "4896315" | "4926162" | "5048009" | "5115199").PN. OR ("5198805").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2018/10/19 23:11
S56	316	(monitor$3 near7 (signal near1 strength)) and (dynamic$4 near5 adapt$3)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2018/10/19 23:27
S57	58	(monitor$3 near7 (signal near1 strength)) and (dynamic$4 near5 adapt$5) not S56	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2018/10/19 23:33
S58	5	("2009/0059872").URPN.	USPAT	OR	OFF	2018/10/19 23:51
S59	1	("2012/0077533").URPN.	USPAT	OR	OFF	2018/10/19 23:54
S60	839	(monitor$3 near7 (signal near1 strength)) and (dynamic$4 near5 (adapt$5 chang$3 modif$3)) not (S56 S57)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2018/10/19 23:57
S61	433	(monitor$3 near7 (signal near1 strength)) and (dynamic$4 near5 (adapt$5 chang$3 modif$3)) and @AD<="20111110" not (S56 S57)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2018/10/20 00:04
S62	15	("2004/0223470").URPN.	USPAT	OR	OFF	2018/10/20 00:09
S63	31	remote$2 near3 manag$5 near3 QOS	USPAT	OR	OFF	2018/10/20 00:15
S64	6276	S52 and @AD<="20111110"	US-PGPUB; USPAT; EPO;	OR	OFF	2018/10/20 00:20

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			JPO			
S65	1349	RSSI and S64	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2018/10/20 00:21
S66	15	("2004/0223470").URPN.	USPAT	OR	OFF	2018/10/20 00:33
S67	89	("2007/0082677").URPN.	USPAT	OR	OFF	2018/10/20 00:40
S71	20	("20030031180" | "20030076784" | "20050261915" | "20060126613" | "20060187885" | "20070153807" | "20080186873" | "20090055900" | "20100290465" | "20110013529" | "20110110359" | "20110182182" | "20110273979" | "20120294310" | "5970064" | "5974106" | "6430612" | "7840220" | "8520586" | "8880666").PN.	US-PGPUB; USPAT	OR	OFF	2018/10/20 23:05
S72	1	("20120151540").PN.	US-PGPUB; USPAT	OR	OFF	2018/10/20 23:23
S73	7	("20160315976" | "20180248984" | "6469982" | "6618356" | "6678247" | "6680907" | "7864669").PN.	US-PGPUB; USPAT	OR	OFF	2018/10/21 00:11
S74	3178	(monitor$3 with ((real near1 time) real-time)) and (parameter with algorithm)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2019/01/27 14:58
S75	56	(monitor$3 with ((real near1 time) real-time)) and (parameter with algorithm) and (policy with (rule condition))	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2019/01/27 14:59
S83	2	"13995901"	US-PGPUB; USPAT; EPO; JPO	OR	ON	2019/01/27 23:14
S84	3	("10057080" | "20160261490" | "8126011").PN.	US-PGPUB; USPAT	OR	ON	2019/07/26 17:45
S85	3	("20080186873" | "6430612" | "9819595").PN.	US-PGPUB; USPAT	OR	ON	2019/07/26 17:46
S86	238	(network near5 monitor$3) and (policy with (histor$4 near5 data)) and (communication near4 performance)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2019/07/26 17:56
S87	94363	(H04L7/00,0004 H04L41/00,06,08-0806,0813-0836,085-0859,0866-0869,50-5016,5035,5038 H04L43/00,04,08-0817,0876-10,16 H04L47/00,10,11,12,28,29,32).cpc.	US-PGPUB; USPAT; EPO; JPO	OR	ON	2019/07/26 17:56
S88	68	S86 and S87	US-PGPUB; USPAT;	OR	ON	2019/07/26 17:56

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			EPO; JPO			
S97	111342	monitor$3 near3 ((real near1 time) real-time)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2019/12/10 19:44
S98	911536	(improv$3 increas$3) near5 (service qos quality)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2019/12/10 19:47
S99	256602	(histor$4 near4 data)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2019/12/10 19:47
S100	4558	S97 and S98 and S99	US-PGPUB; USPAT; EPO; JPO	OR	ON	2019/12/10 19:47
S101	15642	((improv$3 increas$3) near5 (service qos quality)) with (policy rules configuration)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2019/12/10 19:48
S102	228	S97 and S99 and S101	US-PGPUB; USPAT; EPO; JPO	OR	ON	2019/12/10 19:48
S103	891108	(chang$3 updat$3 upgrad$3 transmit$4 receiv$3 forward$3 sent) near5 (policy rules configuration)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2019/12/10 20:36
S104	7014	S97 and S99 and S103	US-PGPUB; USPAT; EPO; JPO	OR	ON	2019/12/10 20:37
S105	911536	((improv$3 increas$3) near5 (service qos quality))	US-PGPUB; USPAT; EPO; JPO	OR	ON	2019/12/10 20:37
S106	2510	S104 and S105	US-PGPUB; USPAT; EPO; JPO	OR	ON	2019/12/10 20:38
S107	98439	(H04L7/00,0004 H04L41/00,06,08-0806,0813-0836,085-0859,0866-0869,50-5016,5035,5038 H04L43/00,04,08-0817,0876-10,16 H04L47/00,10,11,12,28,29,32).cpc.	US-PGPUB; USPAT; EPO; JPO	OR	ON	2019/12/10 20:38
S108	724	S106 and S107	US-PGPUB; USPAT;	OR	ON	2019/12/10 20:38

Charter Communications, Inc.
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			EPO; JPO			
S109	22274817	@AD<="20111110"	US-PGPUB; USPAT; EPO; JPO	OR	ON	2019/12/10 20:44
S110	191	S108 and S109	US-PGPUB; USPAT; EPO; JPO	OR	ON	2019/12/10 20:45
S111	6	("20030031180" | "20060126613" | "20080186873" | "20090147697" | "20110110359" | "20140304408").PN.	US-PGPUB; USPAT	OR	ON	2020/02/22 06:04
S112	144	(interference noise) with ((send$3 transmit$4 push$3 forward$3) near5 policy)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/02/22 06:07
S113	1248	((send$3 transmit$4 push$3 forward$3) near7 (interference noise)) and ((send$3 transmit$4 push$3 forward$3) near5 policy)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/02/22 06:18
S114	1119	((send$3 transmit$4 push$3 forward$3) near7 (interference noise)) and ((send$3 transmit$4 push$3 forward$3) near5 policy) not S112	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/02/22 06:18
S115	100577	(H04L7/00,0004 H04L41/00,06,08-0806,0813-0836,085-0859,0866-0869,50-5016,5035,5038 H04L43/00,04,08-0817,0876-10,16 H04L47/00,10,11,12,28,29,32).cpc.	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/02/22 06:18
S116	115	S114 and S115	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/02/22 06:19
S117	54	((avoid$3 reschedul$3) near3 (send$3 transmit$4 push$3 forward$3) near7 (interference noise)) and ((send$3 transmit$4 push$3 forward$3) near5 policy) not (S112 S116)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/02/22 06:22

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L2	118	rhee near1 wonjong	US-PGPUB; USPAT	OR	ON	2020/02/23 09:12
L3	1101	(policy with algorithm).clm.	US-PGPUB; USPAT	OR	ON	2020/02/23 09:12
L4	1	2 and 3	US-PGPUB; USPAT	OR	ON	2020/02/23 09:12

L5	119468	((transmission near1 control$4) (communication near1 algorithm) policy).clm.	US-PGPUB; USPAT	OR	ON	2020/02/23 09:13
L6	8	2 and 5	US-PGPUB; USPAT	OR	ON	2020/02/23 09:13
S45	100	rhee near1 wonjong	US-PGPUB; USPAT	OR	ON	2017/12/20 20:54
S46	889	(policy with algorithm).clm.	US-PGPUB; USPAT	OR	ON	2017/12/20 20:54
S47	1	S45 and S46	US-PGPUB; USPAT	OR	ON	2017/12/20 20:54
S48	42097	((transmission near1 control$4) (communication near1 algorithm)).clm.	US-PGPUB; USPAT	OR	ON	2017/12/20 20:55
S49	13	S46 and S48	US-PGPUB; USPAT	OR	ON	2017/12/20 20:55
S50	5	S48 and S45	US-PGPUB; USPAT	OR	ON	2017/12/20 20:56
S68	104	rhee near1 wonjong	US-PGPUB; USPAT	OR	ON	2018/10/20 02:52
S69	106792	((transmission near1 control$4) (communication near1 algorithm) policy).clm.	US-PGPUB; USPAT	OR	ON	2018/10/20 02:53
S70	7	S68 and S69	US-PGPUB; USPAT	OR	ON	2018/10/20 02:53
S76	105	rhee near1 wonjong	US-PGPUB; USPAT	OR	ON	2019/01/27 14:41
S77	7741	(monitor$3 with real-time).clm.	US-PGPUB; USPAT	OR	ON	2019/01/27 14:55
S78	2	S76 and S77	US-PGPUB; USPAT	OR	ON	2019/01/27 14:55
S79	37017	(monitor$3 with parameter).clm.	US-PGPUB; USPAT	OR	ON	2019/01/27 14:56
S80	4	S76 and S79	US-PGPUB; USPAT	OR	ON	2019/01/27 14:56
S81	3094	(policy and algorithm).clm.	US-PGPUB; USPAT	OR	ON	2019/01/27 14:57
S82	1	S76 and S81	US-PGPUB; USPAT	OR	ON	2019/01/27 14:57
S89	110	rhee near1 wonjong	US-PGPUB; USPAT	OR	ON	2019/07/26 17:46

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S90	25771	(network near3 monitor$3).clm.	US-PGPUB; USPAT	OR	ON	2019/07/26 17:50
S91	1	S89 and S90	US-PGPUB; USPAT	OR	ON	2019/07/26 17:50
S92	1397	(policy and (histor$4 near4 data)).clm.	US-PGPUB; USPAT	OR	ON	2019/07/26 17:52
S94	1	S92 and S89	US-PGPUB; USPAT	OR	ON	2019/07/26 17:52
S95	7800	(communication near5 performance).clm.	US-PGPUB; USPAT	OR	ON	2019/07/26 17:53
S96	8	S89 and S95	US-PGPUB; USPAT	OR	ON	2019/07/26 17:53

2/23/2020 9:14:07 AM
C:\Users\bgrijalva\Documents\EAST\Workspaces\14356581.wsp

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 14/356,581	Filing Date 05/06/2014	☐ To be Mailed

ENTITY: ☑ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

	(Column 1)	(Column 2)			
FOR	NUMBER FILED	NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $80 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $420 =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).				
☐ 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	

APPLICATION AS AMENDED - PART II

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT	01/29/2020	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 26	Minus	** 26	= 0		x $100 =	0
	Independent (37 CFR 1.16(h))	* 3	Minus	*** 3	= 0		x $460 =	0
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	0

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=		x $0 =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		x $0 =	
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.	LIE
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".	/DONNA D SMALLS LOGAN/
*** 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.

Doc code: RCEX
Doc description: Request for Continued Examination (RCE)

PTO/SB/30EFS (07-09)
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REQUEST FOR CONTINUED EXAMINATION(RCE)TRANSMITTAL
(Submitted Only via EFS-Web)

Application Number	14356581	Filing Date	2014-05-06	Docket Number (if applicable)	20145-054US	Art Unit	2446
First Named Inventor	Wonjong Rhee			Examiner Name	Boris D. Grijalva Lobos		

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. The Instruction Sheet for this form is located at WWW.USPTO.GOV

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).

☒ 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.

☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____

☐ Other _____

☒ Enclosed

☒ Amendment/Reply

☒ Information Disclosure Statement (IDS)

☐ Affidavit(s)/ Declaration(s)

☐ Other _____

MISCELLANEOUS

☐ 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)

☐ Other _____

FEES

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

☒ The Director is hereby authorized to charge any underpayment of fees, or credit any overpayments, to Deposit Account No 502776

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

☒ Patent Practitioner Signature

Applicant Signature

PTO/SB/30EFS (07-09)
Approved for use through 07/31/2012. OMB 0651-0031
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Signature of Registered U.S. Patent Practitioner			
Signature	/Ali Uyanik/	Date (YYYY-MM-DD)	2020-01-28
Name	Ali Uyanik	Registration Number	67080

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 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.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

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

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

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

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

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

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

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

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

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

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

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

PTO/SB/22 (03-13)
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PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a)

Docket Number (Optional): 20145-054US

Application Number: 14/356,581

Filed: 05-06-2014

For: METHOD, APPARATUS, AND SYSTEM FOR OPTIMIZING PERFORMANCE OF A COMMUNICATION UNIT BY A REMOTE SERVER

Art Unit: 2446

Examiner: Grijalva Lobos, Boris D.

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	Micro Entity Fee	
☐	One month (37 CFR 1.17(a)(1))	$200	$100	$50	$
☐	Two months (37 CFR 1.17(a)(2))	$600	$300	$150	$
☑	Three months (37 CFR 1.17(a)(3))	$1,400	$700	$350	$ 1400
☐	Four months (37 CFR 1.17(a)(4))	$2,200	$1,100	$550	$
☐	Five months (37 CFR 1.17(a)(5))	$3,000	$1,500	$750	$

☐ Applicant asserts small entity status. See 37 CFR 1.27.

☐ Applicant certifies micro entity status. See 37 CFR 1.29.
Form PTO/SB/15A or B or equivalent must either be enclosed or have been submitted previously.

☐ 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 50-2776.

☐ Payment made via EFS-Web.

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.

I am the

☐ applicant/inventor.

☐ assignee of record of the entire interest. See 37 CFR 3.71. 37 CFR 3.73(b) statement is enclosed (Form PTO/SB/96).

☑ attorney or agent of record. Registration number 67,080.

☐ attorney or agent acting under 37 CFR 1.34. Registration number _____.

/Ali Uyanik/	January 28, 2020
Signature	Date
Ali Uyanik	650-353-3786
Typed or printed name	Telephone Number

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. 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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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.
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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:	14356581
Filing Date:	06-May-2014
Title of Invention:	METHOD, APPARATUS, AND SYSTEM FOR OPTIMIZING PERFORMANCE OF A COMMUNICATION UNIT BY A REMOTE SERVER
First Named Inventor/Applicant Name:	Wonjong Rhee
Filer:	Michael V. North/Domarina Alkhas
Attorney Docket Number:	20145-054US

Filed as Large Entity

Filing Fees for U.S. National Stage under 35 USC 371

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($)
Extension - 3 months with $0 paid	1253	1	1400	1400
Miscellaneous:				
RCE- 2ND AND SUBSEQUENT REQUEST	1820	1	1900	1900
		Total in USD ($)		**3300**

Electronic Acknowledgement Receipt

EFS ID:	38426486
Application Number:	14356581
International Application Number:	
Confirmation Number:	4319
Title of Invention:	METHOD, APPARATUS, AND SYSTEM FOR OPTIMIZING PERFORMANCE OF A COMMUNICATION UNIT BY A REMOTE SERVER
First Named Inventor/Applicant Name:	Wonjong Rhee
Customer Number:	146571
Filer:	Michael V. North/Domarina Alkhas
Filer Authorized By:	Michael V. North
Attorney Docket Number:	20145-054US
Receipt Date:	29-JAN-2020
Filing Date:	06-MAY-2014
Time Stamp:	01:07:22
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$3300
RAM confirmation Number	E20201S208028921
Deposit Account	502776
Authorized User	Domarina Alkhas
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: 37 CFR 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		054US_RCE_Resp.pdf	56194 ce5e858cfc1a87a777ad4dd14e406b2dd1eb3993	yes	9
	Multipart Description/PDF files in .zip description				
	Document Description		**Start**	**End**	
	Request for Continued Examination (RCE)		1	1	
	Claims		2	7	
	Applicant Arguments/Remarks Made in an Amendment		8	9	
Warnings:					
Information:					
2	Transmittal Letter	054US_SIDS_Trans.pdf	27387 efeb847ee14e0b330e7a8596c804f6a007ed93d2	no	3
Warnings:					
Information:					
3	Information Disclosure Statement (IDS) Form (SB08)	054US_SIDS_SB08.pdf	613142 a5851a55f4ea1b96d6ea2a9f358ccda4a4d8425a	no	5
Warnings:					
Information:					
4	Foreign Reference	054US_SIDS_FR1.pdf	4674890 57c3bfa7e821bb52cc28ed9c40fc44a9e601ae0d	no	44
Warnings:					
Information:					
5	Foreign Reference	054US_SIDS_FR2.pdf	4962376 f085b46a8d4776a48a76db9b4e837026804519b	no	59

Warnings:					
Information:					
6	Foreign Reference	054US_SIDS_FR3.pdf	4014020 bdf856452f6a2bcf12bd72d6886b04853210f0e1	no	51
Warnings:					
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7	Non Patent Literature	054US_SIDS_NPL1.pdf	169654 191dfc41570c86adda83476d1b703315b3eb656c	no	7
Warnings:					
Information:					
8	Non Patent Literature	054US_SIDS_NPL2.pdf	251314 441d183db752f3045c4fcd7565cb48b71d8ef240	no	9
Warnings:					
Information:					
9	Non Patent Literature	054US_SIDS_NPL3.pdf	650265 ecd27c0d02eeec066410a7e6042dadc2aec6368e	no	4
Warnings:					
Information:					
10	Non Patent Literature	054US_SIDS_NPL4.pdf	121176 f05de26a2832696e2a987ab32619e7059e935544	no	6
Warnings:					
Information:					
11	Non Patent Literature	054US_SIDS_NPL5.pdf	220427 ab771fe7d9341707379c823914600b84b14afcd6	no	11
Warnings:					
Information:					
12	Non Patent Literature	054US_SIDS_NPL6.pdf	158940 eadd8052740c41f5775d1c7292177d308731b95a	no	3
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Information:					

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Warnings:					
Information:					
14	Non Patent Literature	054US_SIDS_NPL8.pdf	124737 a1ee47effdc25d2c1bdb0befddcc64585ace2cb1	no	4
Warnings:					
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15	Non Patent Literature	054US_SIDS_NPL9.pdf	1051777 a773cd33bab97a481334a3f4f2444f6214f15a8a	no	9
Warnings:					
Information:					
16	Non Patent Literature	054US_SIDS_NPL10.pdf	232413 15b714744df03787673be5555147f1c9202f09a7	no	5
Warnings:					
Information:					
17	Request for Continued Examination (RCE)	054US_RCE3.pdf	697604 d596eb22f29e5a36400476d108cf51d1aaf2027b	no	3
Warnings:					
Information:					
18	Extension of Time	054US_Pet_ExtTime.pdf	188363 74a4a87900590fb501da3fa7f272670115985391	no	2
Warnings:					
Information:					
19	Fee Worksheet (SB06)	fee-info.pdf	32919 54e1a57e51f2025d3a86dca84363866d36f51679	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	18341785		

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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.

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Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (01-10)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99**)		
	Application Number	14356581
	Filing Date	2014-05-06
	First Named Inventor	Wonjong Rhee
	Art Unit	2446
	Examiner Name	Boris D. Grijalva Lobos
	Attorney Docket Number	20145-054US

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
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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
	1	20030031180	A1	2003-02-13	Datta et al.	
	2	20060126613	A1	2006-06-15	Zweig	
	3	20080186873	A1	2008-08-07	Pujet et al.	
	4	20090147697	A1	2009-06-11	Malik et al.	
	5	20110110359	A1	2011-05-12	Cooke et al.	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
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	Art Unit	2446
	Examiner Name	Boris D. Grijalva Lobos
	Attorney Docket Number	20145-054US

	6	20140304408	A1	2014-10-09	Rhee	

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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	2006091391	WO	A2	2006-08-31	INTERDIGITAL TECHNOLOGY CORPORATION		
	2	2007116411	WO	A1	2007-10-18	Link Fusion Ltd.		
	3	2013070232	WO	A1	2013-05-16	ASSIA INC.		

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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]
	1	First Office Action for Indian Patent Application No. 4205/CHENP/2014 [Attorney Docket No. 20145-055IN] mailed on March 22, 2019 (7 pgs).	X
	2	Response to the First Office Action for Indian Patent Application No. 4205/CHENP/2014 [Attorney Docket No. 20145-055IN] mailed on September 20, 2019, (9 pgs).	☐
	3	Third Office Action for Canadian Patent Application No. 2,855,461 [Attorney Docket No. 20145-055CA] mailed on July 30, 2019 (4 pgs).	☐

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
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	Filing Date	2014-05-06
	First Named Inventor	Wonjong Rhee
	Art Unit	2446
	Examiner Name	Boris D. Grijalva Lobos
	Attorney Docket Number	20145-054US

	4	Response to the Third Office Action for Canadian Patent Application No. 2,855,461 [Attorney Docket No. 20145-055CA] mailed on August 20, 2019 (6 pgs).	☐
	5	First Office Action for Chinese Patent Application No. 201180075399.4 [Attorney Docket No. 20145-054CN], mailed on June 11, 2019 (11 pgs).	☐
	6	Response to the First Office Action for Chinese Patent Application No. 201180075399.4 [Attorney Docket No. 20145-054CN], mailed on July 15, 2019 (11 pgs).	☐
	7	Notice of Allowance for Australian Patent Application No. 2018200787 [Attorney Docket No. 055AUD2], mailed on October 21, 2019 (3 pgs).	☐
	8	Exam Report for Australian Patent Application No. 2018200787 [Attorney Docket No. 055AUD2], mailed on October 22, 2019 (4 pgs).	☐
	9	Notice of Allowance for the US Patent Application No. 15/809,823 [Attorney Docket No. 20145-055USC], mailed on August 6, 2019 (9 pgs).	☐
	10	Cisco Systems, "IOS NAT Load-Balancing for Two ISP Connections", Document ID: 100658, dated February 22, 2008. Available from the Internet, <URL:https://www.cisco.com/c/en/us/support/docs/ip/network-address-translation-nat/100658-ios-nat-load-balancing-2isp.html>, (5 pgs).	☐

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Examiner Signature		Date Considered	

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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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	First Named Inventor	Wonjong Rhee
	Art Unit	2446
	Examiner Name	Boris D. Grijalva Lobos
	Attorney Docket Number	20145-054US

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	/Michael V. North/	Date (YYYY-MM-DD)	2020-01-28
Name/Print	Michael V. North	Registration Number	46,963

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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.

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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.

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

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
31 August 2006 (31.08.2006)

PCT

(10) International Publication Number
WO 2006/091391 A2

(51) International Patent Classification:
H04Q 7/00 (2006.01)

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PCT/US2006/004618

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(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/655,770 23 February 2005 (23.02.2005) US
11/240,146 30 September 2005 (30.09.2005) US

(71) Applicant *(for all designated States except US)*: **INTERDIGITAL TECHNOLOGY CORPORATION** [US/US]; 300 Delaware Avenue, Suite 527, Wilmington, Delaware 19801 (US).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **ROY, Vincent** [CA/CA]; 6254 De La Roche, Montreal, Québec H2S 2E1 (CA). **CAVE, Christopher** [CA/CA]; 63 Place Chambord, Candiac, Québec J5R 4W7 (CA).

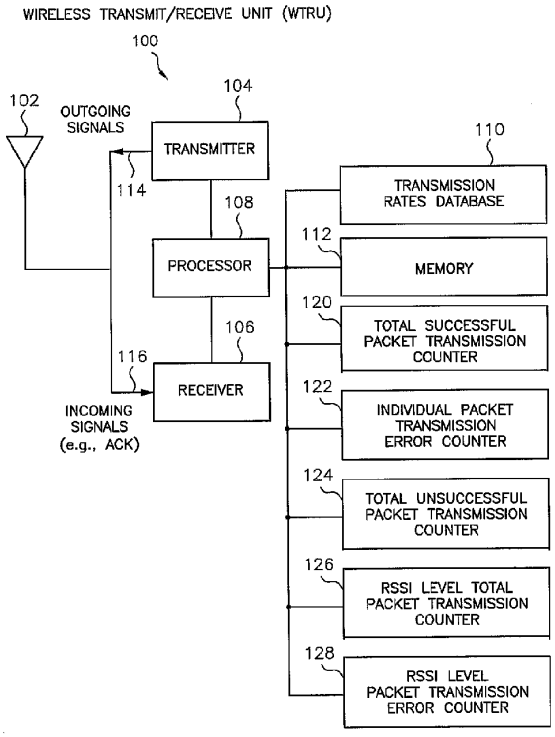
(74) Agent: **BALLARINI, Robert, J.**; Volpe and Koenig, P.C., United Plaza, Suite 1600, 30 South 17th Street, Philadelphia, PA 19103 (US).

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

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[Continued on next page]

(54) Title: WIRELESS COMMUNICATION METHOD AND APPARATUS FOR DYNAMICALLY ADAPTING PACKET TRANSMISSION RATES



(57) Abstract: A method and apparatus for use by a first transceiver, (e.g., wireless transmit/receive unit (WTRU), access point (AP), node) for adjusting the transmission rate of packets transmitted to a second transceiver based on signals the first transceiver receives from the second transceiver. In one embodiment, a transmission packet error rate (Tx PER) process is used to adjust the packet transmission rate. In another embodiment, a relative signal strength indicator (RSSI)-based process is used to determine the RSSI of packets received at the first transceiver from the second transceiver for adjusting the packet transmission rate. In another embodiment, transmission quality indicators are measured at the second transceiver and are sent to the first transceiver, which derives a new packet transmission rate therefrom. The Tx PER and RSSI-based processes may be used individually, in combination, or in conjunction with other processes.

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[0001] WIRELESS COMMUNICATION METHOD AND APPARATUS FOR DYNAMICALLY ADAPTING PACKET TRANSMISSION RATES

[0002] FIELD OF INVENTION

[0003] The present invention is related to data transmission in a wireless communication system. More particularly, the present invention is related to dynamically adapting packet transmission rates in response to varying fading conditions.

[0004] BACKGROUND

[0005] Wireless communication systems, such as wireless local area networks (WLANs), are well known in the art. Generally, such systems comprise transceivers, (i.e., communication stations, (STAs)), which transmit and receive wireless communication signals between each other. Depending upon the type of system, transceivers may take the form of an access point (AP), a wireless transmit/receive unit (WTRU), a node or the like.

[0006] Figure 1 shows a conventional wireless communication system 10 in which an AP 12 provides communication services to a plurality of WTRUs 14. The AP 12 can communicate with a network 18 through an optional access controller (AC) 16, thereby providing additional network services to the WTRUs 14, such as access to the Internet or a public service telephone network (PSTN). Alternatively, the AP 12 can communicate directly with the network 18 without going through the AC 16.

[0007] Ideally, all connections within the system 10 should operate at the highest achievable transmission rate in order to maximize performance and overall system capacity. However, it is not always possible to achieve acceptable quality at higher data rates, since they require relatively higher signal-to-noise ratios (SNRs) at the receiver.

[0008] This creates a situation where it would be beneficial to adjust the rate at which packets are transmitted, depending on the SNR conditions that are perceived by a transceiver that receives the packet. However, system 10 does not provide a mechanism to transfer perceived channel quality in terms of received signal power, SNR or packet error rate (PER) to the source of the

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packets. Thus, the basis for decisions for adjusting the transmission rate of the AP 12 and the WTRUs 14 in the system 10 is limited to local transmission conditions.

[0009] SUMMARY

[0010] The present invention is related to a method and apparatus for use by a first transceiver, (e.g., WTRU, AP, node or the like), for adjusting the transmission rate of packets transmitted to a second transceiver based on signals the first transceiver receives from the second transceiver. In one embodiment, a transmission PER (Tx PER) process is used to adjust the packet transmission rate. In another embodiment, a relative signal strength indicator (RSSI)-based process is used whereby the RSSI of packets received at the first transceiver from the second transceiver is used to adjust the packet transmission rate. In another embodiment, transmission quality indicators are measured at the second transceiver and are sent to the first transceiver, which derives a new packet transmission rate based on the quality indicators. Optionally, the second transceiver determines a preferred packet transmission rate and sends it to the first transceiver, which adjusts its packet transmission rate accordingly.

[0011] Although two different processes, (i.e., a Tx PER process and an RSSI-bases process), for determining a packet transmission rate are disclosed herein, these processes may be used individually, used in conjunction with each other, or used in conjunction with other processes.

[0012] In accordance with the present invention, a transceiver selects a preferred data transmission rate from among several available rates, based on measurements made at the transceiver. Those measurements are the received signal strength (Rx power) of packets received at the transceiver, and the Tx PER of signals transmitted by the transceiver, which can be inferred by assuming that a packet is in error every time its corresponding acknowledgment (ACK) is not received from another transceiver. The transceiver can quickly establish the best data transmission rate available while maintaining an acceptable quality of service (QoS). The transceiver can

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thereafter adapt its transmission rate in response to changing fading conditions.

[0013] BRIEF DESCRIPTION OF THE DRAWINGS

[0014] A more detailed understanding of the invention may be had from the following description, given by way of example and to be understood in conjunction with the accompanying drawings wherein:

[0015] Figure 1 shows a conventional wireless communication system;

[0016] Figure 2 is an exemplary block diagram of a WTRU configured in accordance with the present invention;

[0017] Figure 3 is a flow diagram of an overall rate adaptation process implemented in accordance with the present invention;

[0018] Figure 4 is a flow diagram of a Tx PER-based process of the overall rate adaptation process of Figure 3;

[0019] Figure 5 is a flow diagram of an RSSI training process of the overall rate adaptation process of Figure 3;

[0020] Figure 6 is a flow diagram of an alternate embodiment of an RSSI training process of the overall rate adaptation process of Figure 3; and

[0021] Figure 7 is an example of an alternative RSSI training process of the overall rate adaptation process of Figure 3.

[0022] TABLE OF ACRONYMS

ACK	Acknowledgment Signal
AP	Access Point
BS	Base Station
CS	Client Station
CTS	Clear to Send
MAC	Media Access Control
NF	Noise Figure
PER	Packet Error Rate
Pwr	Power
QoS	Quality of Service
RSSI	Received Signal Strength Indicator
RTS	Request to Send
Rx	Receive
SNR	Signal-to-Noise Ratio
STA	Station

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STA Tx	Transmitting Station
STA Rx	Receiving Station
Tx	Transmit
TxPwr	Transmit Power
WLAN	Wireless Local Area Network

TABLE 1

[0023] DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0024] The term AP as used hereinafter includes, but is not limited to, a base station, a Node B, a site controller, a wireless router or any other interfacing device in a wireless environment that provides WTRUs with wireless access to a network with which the AP is associated.

[0025] The term WTRU as used hereinafter includes, but is not limited to, a client station (CS), user equipment (UE), station (STA), mobile station, fixed or mobile subscriber unit, pager, or any other type of user device capable of operating in a wireless environment. Such WTRUs include personal communication devices, such as phones, video phones, and Internet ready phones that have network connections. In addition, WTRUs include portable personal computing devices, such as PDAs and notebook computers with wireless modems that have similar network capabilities. WTRUs that are portable or can otherwise change location are referred to as mobile units.

[0026] A wireless connection as used hereinafter is defined as a wireless communication between a pair of nodes that can transmit packets to, and receive packets from, each other. Each wireless connection comprises a pair of nodes wherein the roles of the transmitter and receiver of packets are switched back and forth in time between the nodes. For example, a wireless communication system operating in infrastructure mode where two WTRUs are communicating with a single AP consists of two wireless connections. A rate control process should reside in each transmitting node, whose purpose is to determine the optimal rate at which each packet is transmitted for each active wireless connection.

[0027] Preferably, the circuitry implementing the various transmitter and receiver functionality described herein may be incorporated on a single integrated circuit, such as an application specific integrated circuit (ASIC).

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However, the circuitry can also be readily implemented using multiple discrete components, and/or separate integrated circuits.

[0028] The specific transmitter and receiver configurations described herein are provided as examples only and not as limitations. Other variations and modifications consistent with the invention will be recognized by those of ordinary skill in the art.

[0029] The present invention is a novel apparatus and method that allows a transceiver, (i.e., a WTRU, AP, node), engaged in one or multiple wireless connections to dynamically adapt its transmission rate according to the time-varying propagation conditions of each wireless channel. In order to do so, the present invention relies on two processes to determine a preferred transmission rate, depending upon the availability and validity of certain measurements. In the first process, referred to herein as the Tx PER-based process, the Tx PER is used to determine the best transmission rate. Alternatively, the best transmission rate is determined based on the RSSI or other metric of received packets related to their Rx power, correlated with the Tx PER of transmitted packets. The RSSI is correlated with the Tx PER in a process referred to herein as the RSSI training process. Although the RSSI is used in the description of the preferred embodiment of the RSSI training process, alternative embodiments could use other metrics, such as a SNR.

[0030] Figure 2 is an exemplary block diagram of a WTRU 100 configured in accordance with the present invention. The same exemplary configuration disclosed herein for the WTRU 100 may also be incorporated in an AP. The WTRU 100 includes at least one antenna 102, a transmitter 104, a receiver 106, a processor 108, a transmission rates database 110, and a memory 112. The transmitter 104 is configured to send outgoing signals 114 via the antenna 102 at a transmission rate selected from a plurality of available transmission rates, which are stored in transmission rates database 110. The receiver 106 is configured to receive incoming signals 116 from the antenna 102. The processor 108 is coupled to the transmitter 104, the receiver 106, the transmission rates database 110 and the memory 112. The processor 108 selects a transmission rate from the transmission rates database 110 and

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changes the current transmission rate of the transmitter 104 to the selected rate. This selection can be based upon an evaluation of the incoming signals 114, upon an evaluation of both the incoming signals 114 and the outgoing signals 116, or it can be based upon a rate command received at the receiver 106. The memory 112 is used to store data with respect to the incoming signals 116 and/or outgoing signals 114, and/or with respect to rate commands received at the receiver 106. The processor 108 is configured to process the data stored in the memory 112, and store the results of the processed data in the memory 112 for future access to select and change the transmission rate of the transmitter 104.

[0031] The WTRU 100 further includes a plurality of packet transmission counters including a total successful packet transmission counter 120, an individual packet transmission error counter 122, a total unsuccessful packet transmission counter 124, an RSSI level total packet transmission counter 126, and an RSSI level packet transmission error counter 128. The functions of the packet transmission counters 120, 122, 124, 126 and 128 may be implemented by one or more of a database, a processor, software, or the like, on an individual basis or as a maintained set. For example, a plurality of sets of the packet transmission counters 120, 122, 124, 126 and 128 and associated measurements may be maintained to individually control the packet transmission rate associated with each STA, AP, WTRU or the like that the WTRU 100 communicates with over a particular communication link.

[0032] Before describing the processes implemented by the present invention, it is advantageous to define several terms, as listed in the following table, Table 2. Although the processes of the present invention will be described in these terms, it should be understood that it is not necessary to employ these terms; rather, the terms are simply a convenient way to describe aspects of the processes. In an implementation, parameters can be stored in memory and updated as needed, or can be maintained and updated in any appropriate manner.

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Parameter	Description	Example
Maximum Duration	The maximum duration for which a measurement or command from the node to which the transmitter is sending a packet is valid. The Maximum Duration parameter should preferably be representative of the coherence time of the channel. The received packet can be any type, (e.g., DATA, ACK, RTS, CTS, or the like).	100 ms
Allowable Rates	A list of the rates a transmitter is able to support, sorted in ascending order. The Allowable Rates can be represented by a vector stored in a memory, wherein each position of the vector corresponds to a particular rate.	[6,9,12,18,24,36,48, 54] Mbps for IEEE 802.11a
Default Rate	The rate that should be used by the transmitter when rate control is initialized. This can be represented by the initial index of an Allowable Rates vector.	8 (indicates the default rate is the 8th highest supported rate, e.g., 54 Mbps in an 802.11a system)
Current Rate	The rate to be used by the transmitter to send the next packet. This can be represented by the current index of an Allowable Rates vector.	5 (indicates the next packet will be transmitted at the 5th highest supported rate, e.g., 24 Mbps in an 802.11a system)
Maximum Rate Index	The number of different transmission rates supported.	8
Rate Down Trigger	A predetermined pattern or plan of adjusting the transmission rate in response to successive transmission errors which indicates, for each retransmission attempt, if the transmission rate should be decreased, and if so by how many rate levels it should be decreased. The pattern can be stored as a vector. For example, in an IEEE 802.11a system, [0,0,1,1,2,2,1,0] means that a WTRU operating at 54 Mbps would not decrease its transmission rate until the third retransmission (i.e., after three errors), at which time the transmission rate would be decreased by one level to 48 Mbps. If an error results, the rate would be decreased by one more level at the fourth retransmission to 36 Mbps, and thereafter by decrements of two levels for the 5th (to 18 Mbps) and 6th retransmissions (to 9 Mbps), and then by one level (to 6 Mbps, the lowest supported rate).	[0,0,1,1,2,2,1,0]
Rate Increase Ratio	The maximum allowable ratio of unsuccessful to successful packet transmissions.	0.10

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Parameter	Description	Example
Packets Needed For Rate Increase	Minimum number of packets which must have been transmitted since the last rate change, in order to permit a transmission rate increase.	10
Good Packet Count	Number of successful packet transmissions to a particular WTRU. This count is reinitialized to zero after a rate change is implemented.	
Bad Packet Count	Number of unsuccessful packet transmissions to a particular WTRU. This count is reinitialized to zero after a rate change is implemented.	
Retry Count	Number of unsuccessful transmission attempts for a given packet. This count is reinitialized to zero when the packet is successfully transmitted.	

TABLE 2

[0033] Figure 3 is a flow diagram of an overall rate adaptation process 300 implemented in accordance with the present invention. The transmission rate is determined using either a Tx PER-based process or an RSSI-based process, implemented by the processor 108 in the WTRU 100 of Figure 2. The determination of which process to use is based on whether the RSSI-based process has been previously trained, and whether a valid RSSI measurement is available at a particular RSSI level. If so, the RSSI-based process is used to determine the transmission rate. Otherwise, the Tx PER-based process is used. In either case, packets are then transmitted at a rate determined by one of the processes, and the subsequent success or failure of packet transmissions is used to dynamically train the RSSI-based process and to adjust the transmission rate.

[0034] A valid RSSI measurement is defined as the RSSI measurement of a packet that was received within a predetermined duration, (herein designated the *Maximum Duration*), from a node to which the transmitter recently sent a packet. The *Maximum Duration is* representative of the coherence time of the channel. The received packet can be of any type, e.g., DATA, ACK, RTS, CTS, or the like.

[0035] As shown in Figure 3, the overall rate adaptation process 300 starts when a first station, (i.e., WTRU 100), prepares to transmit a packet for the first time to a second station for the first time by setting the packet transmission rate of the first station to a default rate (step 305). When the

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first station has a packet to transmit to the second station, (step 310), a determination is made as to whether there are any valid RSSI measurements available for any packets that were received from the second station within the last *Maximum Duration* time period (step 315).

[0036] If no packets were received within the duration period or if no such measurements are available for any received packets, a Tx PER-based process is invoked to determine the packet transmission rate of the first station, (step 320), which will be described in detail hereinafter.

[0037] However, if valid RSSI measurements are determined to be available in step 315, a determination of the RSSI level of the available valid RSSI measurement is performed (step 325). If, in step 325, valid RSSI measurements are determined to exist for more than one RSSI level, a representative RSSI level is determined. The representative RSSI level can be based on the most recent RSSI value, or can be a statistic, (such as an average), based on several RSSI values, or based on RSSI values in conjunction with other values. In step 330, a determination of whether the RSSI process has been trained at this RSSI level within the last *Maximum Duration* time period is made. If so, the packet transmission rate of the first station is set to the preferred rate for that RSSI level, as determined by the RSSI training process, (step 335), the packet is transmitted (step 340) and an RSSI training process is invoked, (step 345). The process 300 returns to step 310 when the first station has another packet to transmit to the second station. The success or failure of transmitted packets is used to dynamically update the preferred transmission rate indicated by the RSSI training process 345, as will be described below after the Tx PER process is described.

[0038] If, in step 330, it is determined that the RSSI process was not trained at this RSSI level within the last *Maximum Duration* time period, the Tx PER-based process is invoked in order to determine the packet transmission rate of the first station, (step 320). The packet is then transmitted (step 340) and an RSSI training process is invoked (step 345).

[0039] Figure 4 is a flow diagram of the Tx PER-based process 320 of the overall rate adaptation process 300 of Figure 3. In general, according to the

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Tx PER-based process 320, the transmitter 104 of the WTRU 100 of Figure 2 adjusts its packet transmission rate by reacting to transmission events it experiences when transmitting to a receiving node.

[0040] If the transmitter 104 of the WTRU 100 of Figure 2 experiences successive packet transmission errors, its packet transmission rate is reduced according to a predetermined plan or pattern, herein designated as a Rate Down Trigger. The Rate Down Trigger can be a vector stored in the memory 112 in the WTRU 100 of Figure 2. The Rate Down Trigger indicates, after each successive packet transmission error, whether the packet transmission rate should be reduced before the next packet retransmission attempt, and if so by how much. The indicated rate reduction, if any, is then implemented. The packet transmission rate is reduced in this manner until a packet is successfully transmitted, or until the packet transmission rate is reduced to a predetermined minimum packet transmission rate.

[0041] For example, if the WTRU 100 is configured for use in an IEEE 802.11a system, the supported packet transmission rates, sorted in ascending ordered steps, (i.e., levels of supported packet transmission rates), are 6, 9, 12, 18, 24, 36, 48 and 54 Mbps. In that case, a Rate Down Trigger vector of [0,0,1,1,2,2,1,0] indicates that the WTRU 100 would not reduce its packet transmission rate until after third retransmission attempt, (i.e., after three transmission errors for a particular packet), at which point the packet transmission rate would be reduced by one step. Accordingly, if the WTRU 100 is operating at 54 Mbps after a third transmission error, the transmission rate would be reduced by one step to 48 Mbps, and the packet would be retransmitted again. If a transmission error still results, the rate would then be reduced by one more step for the fourth retransmission to 36 Mbps, then reduced by two more steps for each of the 5th (to 18 Mbps) and 6th retransmissions (to 9 Mbps), and then by one step (to 6 Mbps, the lowest supported rate).

[0042] If, on the other hand, the transmitter 104 of the WTRU 100 experiences consistently successful transmissions, the transmission rate of the transmitter 104 is increased in accordance with the Tx PER-based process

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320. In that case, the transmission rate is increased to the next supported step when the Tx PER experienced by the transmitter 104 drops below a certain threshold for a sufficient number of packets transmitted to a receiving node.

[0043] As shown in Figure 4, if an ACK is received, (step 405), the total successful packet transmission counter 120 in the WTRU 100 is incremented, and the individual packet transmission error counter 122 in the WTRU 100 is reset to zero, (step 430). These counters 120, 122 are used to determine whether the transmission rate should be increased, as will be described hereinafter.

[0044] If an ACK is not received at step 405, the total unsuccessful packet transmission counter 124 in the WTRU 100 is incremented, and the individual packet transmission error counter 122 is also incremented, (step 410). The Rate Down Trigger vector is examined to determine if the packet transmission rate should be reduced for the individual packet transmission error count value, and if so, by how many steps, (step 415). If the Rate Down Trigger indicates that the packet transmission rate should not be reduced, the same packet is prepared to be retransmitted. However, if the Rate Down Trigger indicates at step 415 that the packet transmission rate should be decreased by one or more steps, the packet transmission rate is reduced by the number of steps indicated by the Rate Down Trigger, and the total successful packet transmission counter 120 and the total unsuccessful packet transmission counter 124 are reset to zero, (step 420). The same packet is then prepared for retransmission at a packet transmission rate indicated by the Rate Down Trigger, (step 425). The Tx PER-based process 320 may be repeated during a communication session until either the packet transmission rate equals the lowest supported transmission rate, or until an ACK is received.

[0045] Requiring successive error events to be experienced before triggering a reduction in transmission rate results in a method that tends to discriminate error events caused by poor signal conditions from error events caused by packet collisions. It also allows a quicker rate reduction reaction

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time than criteria that consider an average of a number of packet error events, and provides additional transmission rate reductions when an already implemented rate reduction does not result in more reliable communications.

[0046] When an ACK is determined to have been received in response to a transmitted packet in step 405, the total successful packet transmission counter 120 is incremented and the individual packet transmission error counter 122 is reset to zero, (step 430). Then, it is determined whether a transmission rate increase is desirable. In general, the proportion of packet transmissions resulting in transmission errors increases as transmission rate increases. The preferred transmission rate is the highest supported rate that can be used while still achieving an acceptable quality of service. The quality of service can be expressed, for example, as a transmission packet error rate, or as the ratio of transmission errors to successful transmissions. A transmission rate increase is thus desirable if the transmitter experiences a lower ratio of transmission errors to successful transmissions than is needed to maintain an acceptable quality of service.

[0047] The Tx PER-based process 320 determines if a packet transmission rate increase is desirable by first summing the total successful packet transmission count and the total unsuccessful packet transmission count, (i.e., finding the total number of packet transmissions since transmissions began or since the last packet transmission rate change). This sum is compared to a threshold value, (herein designated as the Packets Needed For Rate Increase), (step 435). The Packets Needed For Rate Increase indicates the minimum number of packets that must have been transmitted since the last packet transmission rate change occurred for a rate increase to be permitted. If the sum is not greater than or equal to the Packets Needed For Rate Increase, no packet transmission rate adjustment is permitted, and the packet transmission rate is not increased.

[0048] If the sum of the total successful packet transmission count and the total unsuccessful packet transmission count is greater than or equal to the Packets Needed For Rate Increase, (step 435), the process 320 determines if a rate increase is warranted. A rate increase is warranted if the proportion

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of transmission failures is less than is allowed to maintain a desired QoS. The proportion of transmission failures can be indicated, for example, by determining the ratio of transmission failures to successful transmissions, or in any other appropriate manner. A packet transmission rate increase is determined to be warranted if the ratio of the total unsuccessful packet transmission count to the total successful packet transmission count is less than what is needed to maintain an acceptable QoS. The ratio needed to maintain an acceptable QoS is a threshold, (herein designated as the Rate Increase Ratio). If the ratio of the total unsuccessful packet transmission count to the total successful packet transmission count is determined at step 440 not to be less than the Rate Increase Ratio, a packet transmission rate increase is not warranted, and the packet transmission rate is not adjusted.

[0049] However, if the ratio of the total unsuccessful packet transmission count to the total successful packet transmission count is determined at step 440 to be less than the Rate Increase Ratio, the packet transmission rate is increased to the next higher step, (i.e., the next higher supported packet transmission rate), if one is available, and the total successful packet transmission counter 120 and the total unsuccessful packet transmission counter 124 are both reset to zero, (step 445). During a communication session, the process 25 may be repeated until either the maximum supported transmission rate is reached, or until an ACK is not received.

[0050] As communication proceeds between a first station (wherein the invention is implemented) and a second station, the RSSI process is dynamically trained at the first station. When the RSSI process is trained, it is preferably the RSSI process that determines the preferred transmission rate of the first station. The RSSI-based rate adaptation process adapts the packet transmission rate at which packets are sent by the first station to the second station by reacting to variations in the received power of packets received at the first station from the second station. In an exemplary embodiment, the received power is reflected in the measured RSSI of received

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packets; however an SNR or other metric related to the received power could also be used.

[0051] The RSSI-based process dynamically correlates the Tx PER of packets sent by the first station to the second station with the RSSI of packets received at the first station from the second station. This dynamic correlation is referred to herein as training the RSSI-based process. The correlation is done separately for each supported transmission rate used by the first station. It is helpful to divide into discrete levels the expected range of the power of the received signals. For example, if the expected range of received signal power is -97 dBm to -64 dBm, the range can be conveniently divided into levels separated by 3 dBm; e.g., -97 dBm to -94 dBm, -94 dBm to -91 dBm, ... -67 dBm to -64 dBm, for a total of 12 discrete power levels. Any received power less than -97 dBm can be grouped together into an additional power level, and any received power greater than -64 dBm can be grouped into yet another power level. It should be understood that the range from -97 to -64, the separation of the range into levels separated by 3 dBm, and the number 12 of discrete power levels are used only for illustration, and are not limitations.

[0052] The relationship between Tx PER and received packet RSSI is determined by collecting at the first station measurements and information for each packet sent from the first station to the second station and from the second station to the first station. Information collected regarding each packet sent from the first station to the second station includes the transmission rate at which the packet was sent, and whether the transmission was successful, (ACK received), or resulted in a transmission error, (ACK not received). From this information, the Tx PER is calculated at each transmission rate used.

[0053] Information collected regarding packets sent from the second station to the first station includes a measure of the signal strength of each received packet, (such as the RSSI), and the time the packet was received. An RSSI measurement is deemed valid only for a length of time designated the *Maximum Duration*. For RSSI training, it should be noted that all packet types can be used, (i.e. DATA, ACK, RTS, CTS, or the like). If more than one

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packet is received from the second station within the *Maximum Duration* period, the process can either use the RSSI from the last received packet, or calculate a statistic, (such as an average), based on several packets. The RSSI measurement of the ACK frame that acknowledged the transmitted packet in the case of a successful transmission is particularly relevant, due to the brief time elapsed between when a packet is sent and an ACK received. Therefore, in a first exemplary embodiment, only the RSSI of the ACK signal is used.

[0054] In this embodiment, the RSSI training process relates the RSSI of each ACK received with the transmission rate of the associated transmitted packet which is being acknowledged. If an ACK is received, its RSSI is measured and its RSSI level determined, and the packet transmission is attributed to that RSSI level at the transmission rate used. If no ACK is received, a transmission error is assumed. In that case, if the RSSI process was not used to choose the transmission rate, then the error is not attributed to any particular RSSI level. However, if the RSSI process was used to choose the transmission rate, then the RSSI level used to choose the transmission rate is identified, and the error is attributed to that RSSI level and transmission rate. A running total of the number of packets sent, and the number of transmission errors, is maintained for each RSSI level at each transmission rate. The Tx PER for each RSSI level and transmission rate is calculated by dividing the number of transmission errors by the number of packet transmissions for that RSSI level and transmission rate.

[0055] Figure 5 is a flow diagram of the RSSI training process 345 of the overall rate adaptation process 300 of Figure 3. The RSSI training process 345 begins after a packet is transmitted, with a determination of whether an RSSI training process was previously used to determine the packet transmission rate, (step 505). If not, a determination is made as to whether an ACK was received in response to a transmitter packet, (step 510). If, at step 510, it is determined that no ACK was received, then there is no way to attribute the transmission error to a particular RSSI level, and the RSSI training process 345 terminates. If, at step 510, it is determined that an ACK was received in response to the transmitted packet, the RSSI measurement of

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the ACK is retrieved from the memory 112 of the WTRU 100, the RSSI level is determined by the processor 108, and the RSSI level total packet transmission counter 126 is incremented for that RSSI level, (step 515).

[0056] If, at step 505, it is determined that the RSSI training process was previously used to determine the packet transmission rate, the RSSI level that was used by the RSSI training process to determine the transmission rate is identified, (step 520). It is then determined whether an ACK was received for the transmitted packet, (step 525). If it is determined at step 525 that an ACK was not received, both the RSSI level total packet transmission counter 126 and the RSSI level packet transmission error counter 128 are incremented for that RSSI level, (step 530). If it is determined at step 525 that an ACK was received, the RSSI measurement of the ACK is retrieved from the memory 112 of the WTRU 100, the RSSI level of the ACK is determined by the processor 108, and the RSSI level total packet transmission counter 126 is incremented for the RSSI level of the ACK, (step 535).

[0057] This information is used to calculate the Tx PER at each RSSI level, (step 540) for each transmission rate used. This information could be collected in a table, such as the following table, Table 3, which shows exemplary Tx PER vs. RSSI statistics for each of the transmission rates an exemplary STA uses to transmit packets.

Rx Power (dBm) (RSSI level)	**Tx PER for different Transmission rates**			
	Rate 1 (e.g. 1 Mbps)	Rate 2 (e.g. 2 Mbps)	...	Rate N (e.g. 54 Mbps)
-∞ to -97	1.00	1.00	...	1.00
-97 to -94	0.64	0.92	...	1.00
-94 to -91	0.22	0.47	...	1.00
-91 to -88	**0.07**	0.18	...	1.00
-88 to -85	0.01	**0.08**	...	0.95
...	...	...	...	...
-70 to -67	0.00	0.00	...	0.15
-67 to -64	0.00	0.00	...	**0.03**
-64 to ∞	0.00	0.00	...	0.00

TABLE 3

[0058] As shown in Figure 5, the Tx PER statistic of a given RSSI level and transmission rate is updated accordingly after each new packet

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transmission (step 540). If a packet was not received properly the first time it was transmitted and it was retransmitted, the second transmission is treated as a distinct packet transmission. In the event of a successful transmission, the database is updated using the RSSI measurement of the ACK frame, either alone or in combination with the RSSI that was used to determine the transmission rate. If multiple valid RSSI measurements are available, either the latest one, or a statistic, (such as an average of two or more of the most recent measurements), can be used to determine the RSSI level. However, it may be advantageous to use the RSSI measurement of the most recently received ACK, because of its close temporal proximity to the transmitted packet.

[0059] The RSSI-based process also uses as an input a desired target transmitted PER, or maximum allowed PER. The target transmitted PER can be the same for all transmission rates, or it can be different for different rates. For example, in Table 3, the maximum allowed Tx PER is set at 0.10 for all rates. Thus, the preferred transmission rate at any RSSI level is the highest transmission rate at that level with a Tx PER no greater than 0.10. For such a Tx PER to be valid, there must exist a sufficient number of measurements to establish such a PER.

[0060] The minimum number of packets received for an RSSI level that is required to establish a valid Tx PER should be a configurable number. For example, in order to establish a Tx PER no greater than 0.10, at least ten packets must have been received. Alternatively, a Tx PER is preferably deemed stable only after a preferred number of packets have been received equal to a desired multiple of the inverse of the Tx PER. For example, if the desired multiple is two and the target Tx PER value is 0.10 for a particular RSSI level and transmission rate, then in order for the Tx PER value to be deemed stable, at least 2 x (1/10) = 20 packets must be received at that RSSI level and transmission rate.

[0061] In Table 3, the values in bold indicate the preferred transmission rate for each RSSI level. For example, at the RSSI level of -88 dBm to -85 dBm, both Rate 1 (1 Mbps, with a PER of 0.01) and Rate 2 (2 Mbps, with a

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PER of 0.08) have a Tx PER lower than the maximum allowable value of 0.10. If the next higher rate (not shown) has a PER higher than the maximum allowed (e.g., 0.15) then the preferred transmission rate is Rate 2, which is the highest rate with a PER less than the maximum allowed. In the case where the RSSI is so low (e.g., anything less than -91 dBm in Table 3) that none of the supported rates gives a Tx PER statistic below the maximum allowed PER, then the RSSI-based process should preferably use a flag to indicate that no supported rate results in an acceptable Tx PER. In that case, the packet should not be transmitted, since sending the packet is more likely to result in a transmission error than is indicated by the target or maximum allowed PER. Alternatively, the preferred transmission rate can be set at the lowest supported rate before sending the packet. This information can be summarized as in the following table, Table 4.

Rx Power (dBm) (RSSI level)	Preferred Rate
-∞ to -97	None-Flag
-97 to -94	None-Flag
-94 to -91	None-Flag
-91 to -88	Rate 1
-88 to -85	Rate 2
...	...
-67 to -64	Rate N
-64 to ∞	Rate N

TABLE 4

[0062] As shown in Figure 5, after the Tx PER is calculated for an RSSI level and transmission rate, the preferred transmission rate for the RSSI level is also determined as described above, (step 540). After the transmission rate versus RSSI level statistics are obtained and determined to be stable for a particular RSSI level, the RSSI-based process is then used to adjust the transmission rate of a transmitter. Otherwise, the Tx PER-based process is invoked to determine the transmission rate.

[0063] Figure 6 is a flow diagram of an alternate RSSI training process 345' of the overall rate adaptation process 300 for which it is assumed that the transmitter power and the channel conditions remain substantially constant

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over time periods substantially equal to the *Maximum Duration* time period, as is commonly the case.

[0064] After a packet is transmitted, a determination is made as to whether an ACK was received for the transmitted packet, (step 605). If so, the RSSI measurement of the ACK signal is retrieved from the memory 112 of the WTRU 100, its RSSI level is determined, and the count of transmissions for the RSSI level is incremented, (step 610). The transmitted packet error rate (Tx PER) is then updated for the RSSI level, a determination is made if the Tx PER is stable for the RSSI level and, if so, the preferred packet transmission rate is updated for the RSSI level, (step 615).

[0065] If at step 605 it is determined that an ACK was not received for the transmitted packet, a determination is then made as to whether there are RSSI measurements available for any packets received from the second station within the last *Maximum Duration* time period, (step 620). If not, then there is no way to attribute the transmission error to a particular RSSI level, and the process 345' terminates. However, if it is determined at step 620 that there are one or more RSSI measurements available, the RSSI level of the measurements is determined. If more than one RSSI level is found at step 625, a representative RSSI level is determined, and the RSSI level total packet transmission counter 126 and the RSSI level packet transmission error counter 128 are incremented for the RSSI level. The Tx PER for the RSSI level is then updated, and a determination is made as to whether the Tx PER is stable for the RSSI level. If so, the preferred packet transmission rate for the RSSI level is updated (step 615).

[0066] It should be noted that the RSSI training processes 345 and 345' are ongoing processes. The Tx PER is updated according to Figure 5 or Figure 6 at the RSSI level of incoming packets following the transmission of every packet, or alternatively after the transmission of every N packets, even after an RSSI level is deemed "trained". Old statistics may be preferably deleted from the memory 112 after a significant period of time elapses, or using by maintaining in the memory only a preferred number of the most recent measurements, (e.g., 100). Alternatively, the RSSI statistics stored in the

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memory 112 may be periodically flushed-out whereby the RSSI training process 345 or 345' is restarted from scratch.

[0067] In an embodiment of the present invention shown in Figure 7, a first station transmitting to a second station adjusts its transmission rate in response to a rate command received from the second station. This embodiment involves taking measurements at the second station, determining therefrom a preferred rate, generating a rate command, sending the rate command to the first station, and implementing the preferred rate at the first station. Optionally, the measurements themselves can be sent to the first station, which determines therefrom a preferred transmission rate. The measurements used to determine the preferred rate can include link quality indicators and/or other measurements, such as the RSSI or SNR of signals received at the second station from the first station. The rate command from the second station to the first station is preferably located in a MAC header of a packet sent by the second station to the first station, but it can also be transmitted through other means, such as in a payload of a frame, or in one or more dedicated packets.

[0068] This implementation assumes that the second station has stored in memory the sensitivity, (e.g., SNR), needed to achieve a desired QoS, (e.g., PER), for each of the allowed transmission rates. The method by which this information is obtained by the second station can include pre-configuration, training, or the like, and is beyond the scope of this implementation of the invention.

[0069] For every packet that the second station receives from the first station, (including packets addressed to nodes other than the second station), the second station measures and stores in a memory the SNR of the packet and the time at which it was received. Thereafter, whenever the second station needs to send a packet to the first station, it checks its memory to see if it has received any packets from the first station within the last *Maximum Duration* period. If so, the second station generates a statistic from the SNR measurements (e.g. the average SNR of packets received within the last *Maximum Duration* period, or the most recent valid SNR, or the like) and

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compares it to the sensitivity figures stored in memory. The preferred rate is the highest rate for which the generated SNR statistic is better than the SNR needed to achieve the desired QoS. The second station then encodes the desired rate into a rate command, which it sends to the first station.

[0070] If the second station has not received packets from the first station in the last *Maximum Duration* period, the second station either sets the preferred transmission rate to a default rate; or to the last rate for which it had successfully received a packet; or to the rate indicated in the last rate command it sent to the first station. Alternatively, it can send a signal indicating the second station is not providing the transmission rate the first station should use, thus leaving to the first station the task of determining its transmission rate. The second station encodes the desired rate or signal into a rate command and sends it to the first station. The first station then stores in memory the latest rate command and the time it was received, and implements it when transmitting to the second station.

[0071] Figure 7 is a flowchart of a rate adaptation process 700 where transmission rate commands are generated at the second station and sent to the first station. When the first station has a packet to send to the second station, (step 705), it checks its memory 112 to see if it has received a valid rate command from the second station in the last *Maximum Duration* period, (step 710). If so, the first station sets its transmission rate in accordance with the latest rate command received, (step 715). If no valid rate command is available, the first station determines its own transmission rate as described above, (step 720). The packet is then transmitted, (step 725).

[0072] Although the features and elements of the present invention are described in the preferred embodiments in particular combinations, each feature or element can be used alone without the other features and elements, or in various other combinations with or without other features and elements of the present invention.

* * *

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CLAIMS

What is claimed is:

1. In a wireless communication system including a plurality of wireless transmit/receive units (WTRUs), a method for adjusting a packet transmission rate of a WTRU, the method comprising:

(a) a first one of the WTRUs determining a packet transmission rate for transmitting an available packet;

(b) the first WTRU transmitting the packet to a second one of the WTRUs at the transmission rate selected in step (a); and

(c) the first WTRU invoking a relative signal strength indicator (RSSI) training process based on the transmitted packet.

2. The method of claim 1 further comprising:

(d) the first WTRU determining whether or not there is at least one valid RSSI measurement available for at least one packet that was received from the second WTRU within a predetermined time period.

3. The method of claim 2 wherein if the determination of step (d) is positive, the method further comprising:

(e) the first WTRU determining the RSSI level of the at least one available RSSI measurement; and

(f) the first WTRU determining whether the RSSI level determined in step (e) was previously used by the RSSI training process within the predetermined time period.

4. The method of claim 3 wherein if the determination of step (f) is positive, the method further comprising:

(g) the first WTRU setting the packet transmission rate to a preferred packet transmission rate established for the RSSI level, as determined by the RSSI training process.

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5. The method of claim 2 wherein if the determination of step (d) is negative, the method further comprising:

(e) the first WTRU invoking a transmission packet error rate (PER)-based process to determine the packet transmission rate.

6. The method of claim 3 wherein if the determination of step (f) is negative, the method further comprising:

(g) the first WTRU invoking a transmission packet error rate (PER)-based process to determine the packet transmission rate.

7. The method of claim 1 wherein the RSSI training process comprises:

(i) if the second WTRU sent an acknowledgement (ACK) message to the first WTRU in response to receiving the packet transmitted by the first WTRU, the first WTRU determining the RSSI level of an RSSI measurement of the ACK message and incrementing a count of total packet transmissions for the RSSI level; and

(ii) the first WTRU updating a preferred packet transmission rate for the RSSI level.

8. In a wireless communication system including at least one access point (AP) and at least one wireless transmit/receive unit (WTRU), a method for adjusting a packet transmission rate of the AP, the method comprising:

(a) the AP determining a packet transmission rate for transmitting an available packet;

(b) the AP transmitting the packet to the WTRU at the transmission rate selected in step (a); and

(c) the AP invoking a relative signal strength indicator (RSSI) training process based on the transmitted packet.

9. The method of claim 8 further comprising:

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(d) the AP determining whether or not there is at least one valid RSSI measurement available for at least one packet that was received from the WTRU within a predetermined time period.

10. The method of claim 9 wherein if the determination of step (d) is positive, the method further comprising:

(e) the AP determining the RSSI level of the at least one valid RSSI measurement; and

(f) the AP determining whether the RSSI level determined in step (e) was previously used by the RSSI training process within the predetermined time period.

11. The method of claim 10 wherein if the determination of step (f) is positive, the method further comprising:

(g) the AP setting the packet transmission rate to a preferred packet transmission rate established for the RSSI level, as determined by the RSSI training process.

12. The method of claim 9 wherein if the determination of step (d) is negative, the method further comprising:

(e) the AP invoking a transmission packet error rate (PER)-based process to determine the packet transmission rate.

13. The method of claim 10 wherein if the determination of step (f) is negative, the method further comprising:

(g) the AP invoking a transmission packet error rate (PER)-based process to determine the packet transmission rate.

14. The method of claim 8 wherein the RSSI training process comprises:

(i) if the WTRU sent an acknowledgement (ACK) message to the AP in response to receiving the packet transmitted by the AP, the AP determining

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the RSSI level of an RSSI measurement of the ACK message and incrementing a count of total packet transmissions for the RSSI level; and

(ii) the AP updating a preferred packet transmission rate for the RSSI level.

15. An access point (AP) for adjusting a packet transmission rate, the AP comprising:

(a) a processor for determining the packet transmission rate of the AP; and

(b) a transmitter for transmitting a packet to a wireless transmit/receive unit (WTRU) at the rate determined by the processor, wherein the processor invokes a relative signal strength indicator (RSSI) training process on the packet and determines whether there is at least one RSSI measurement available for at least one packet that was received from the WTRU within a predetermined time period.

16. The AP of claim 15 wherein if there is at least one RSSI measurement available for at least one packet that was received from the WTRU within a predetermined time period, the processor determines the RSSI level of the at least one valid RSSI measurement and determines whether the RSSI level was previously used by the RSSI training process within the predetermined time period.

17. The AP of claim 15 wherein if there is not at least one RSSI measurement available for at least one packet that was received from the other WTRU within a predetermined time period, the processor invokes a transmission packet error rate (PER)-based process to determine the packet transmission rate.

18. The AP of claim 17 wherein if the RSSI level was not previously used by the RSSI training process within the predetermined time period, the

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processor invoking a transmission packet error rate (PER)-based process to determine the packet transmission rate.

19. The AP of claim 17 wherein if the RSSI level was previously used by the RSSI training process within the predetermined time period, the processor sets the packet transmission rate to a preferred level established for the RSSI level, as determined by the RSSI training process.

20. The AP of claim 15 wherein if the WTRU sent an acknowledgement (ACK) message in response to receiving the packet transmitted by the AP, the processor determines the RSSI level of an RSSI measurement of the ACK message, increments a count of transmissions for the RSSI level, and updates a preferred packet transmission rate for the RSSI level.

21. The AP of claim 15 wherein if an acknowledgement (ACK) message to the packet is not received by the AP in response to transmitting the packet, the processor determines whether there are any RSSI measurements available for any packets received from the second WTRU within the predetermined time period, and if so determines an RSSI level of said packets, and increments a count of total transmissions and a count of errors for the RSSI level, and updates a preferred packet transmission rate for the RSSI level.

22. An integrated circuit (IC) incorporated in a transceiver for adjusting the transceiver's packet transmission rate, the IC comprising:

(a) a processor for determining the packet transmission rate of the transceiver;

(b) a transmitter for transmitting a packet to another transceiver at the rate determined by the processor, wherein the processor invokes a relative signal strength indicator (RSSI) training process on the packet and determines whether there is at least one RSSI measurement available for at

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least one packet that was received from the other transceiver within a predetermined time period.

23. The IC of claim 22 wherein if there is at least one valid RSSI measurement available for at least one packet that was received from the other transceiver within a predetermined time period, the processor determines the RSSI level of the at least one valid RSSI measurement and determines whether the RSSI level was previously used by the RSSI training process within the predetermined time period.

24. The IC of claim 22 wherein if there is not at least one RSSI measurement available for at least one packet that was received from the other transceiver within a predetermined time period, the processor invokes a transmission packet error rate (PER)-based process to determine the packet transmission rate.

25. The IC of claim 24 wherein if the RSSI level was not previously used by the RSSI training process within the predetermined time period, the processor invokes a transmission packet error rate (PER)-based process to determine the packet transmission rate.

26. The IC of claim 24 wherein if the RSSI level was previously used by the RSSI training process within the predetermined time period, the processor sets the packet transmission rate to a preferred level established for the RSSI level, as determined by the RSSI training process.

27. The IC of claim 22 wherein if the other transceiver sent an acknowledgement (ACK) message in response to receiving the packet, the processor determines the RSSI level of an RSSI measurement of the ACK message, increments a count of transmissions for the RSSI level, and updates a preferred packet transmission rate for the RSSI level.

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28. The IC of claim 22 wherein if an acknowledgement (ACK) message to the packet is not received by the transceiver in response to transmitting the packet, the processor determines the RSSI level of an RSSI measurement of the ACK message, and updates a preferred packet transmission rate for the RSSI level.

29. A wireless transmit/receive unit (WTRU) for adjusting a packet transmission rate of packets the WTRU transmits via an antenna, the WTRU comprising:

(a) a transmitter for transmitting to a node at least one packet at a particular packet transmission rate;

(b) a receiver for receiving an acknowledgement (ACK) signal from the node that receives and acknowledges receipt of the at least one packet;

(c) a processor in communication with the transmitter and the receiver;

(d) a memory in communication with the processor;

(e) a transmission rates database in communication with the processor; and

(f) a plurality of packet transmission counters in communication with the processor.

30. The WTRU of claim 29 wherein the particular packet transmission rate is initially set to a default rate.

31. The WTRU of claim 29 wherein the packet transmission counters include a total successful packet transmission counter and an individual packet transmission error counter.

32. The WTRU of claim 31 wherein the total successful packet transmission counter is incremented when the receiver receives an ACK from the node.

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33. The WTRU of claim 32 wherein the individual packet transmission error counter is reset to zero when the receiver receives an ACK from the node.

34. The WTRU of claim 33 wherein the packet transmission counters further include a total unsuccessful packet transmission counter, and the processor determines whether to adjust the particular packet transmission rate based on the sum of a first count value of the total successful packet transmission counter and a second count value of the total unsuccessful packet transmission counter.

35. The WTRU of claim 34 wherein the particular packet transmission rate is increased if the sum is greater than equal to a predetermined number of packets need for a packet transmission rate increase.

36. The WTRU of claim 35 wherein the particular packet transmission rate is increased if the ratio of the second count value over the first count value is less than a predetermined packet transmission rate increase ratio.

37. The WTRU of claim 29 wherein the packet transmission counters include a total unsuccessful packet transmission counter and an individual packet transmission error counter.

38. The WTRU of claim 37 wherein the total unsuccessful packet transmission counter and the individual packet transmission error counter are incremented when the receiver does not receive an ACK from the node after transmitting the at least one packet to the node.

39. The WTRU of claim 38 wherein the particular packet transmission rate is reduced by one or more supported rate steps designated

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in the transmission rates database based on a count value of the individual packet transmission error counter.

40. The WTRU of claim 29 wherein the packet transmission counters include a received signal strength indicator (RSSI) level total packet transmission counter.

41. The WTRU of claim 40 wherein an RSSI measurement of an ACK received from the node after transmitting the at least one packet to the node is retrieved from the memory if an RSSI training process was not previously used to determine the particular packet transmission rate, the RSSI measurement is determined by the processor and the RSSI level total packet transmission counter for the RSSI level is incremented.

42. The WTRU of claim 41 wherein a packet error rate (PER) for the RSSI level is updated in the memory and, if the PER is stable, a preferred packet transmission rate for the RSSI level is also updated in the memory.

43. The WTRU of claim 40 wherein an RSSI measurement of an ACK received from the node after transmitting the at least one packet to the node is retrieved from the memory if an RSSI training process was previously used to determine the particular packet transmission rate, the RSSI measurement is determined by the processor and the RSSI level total packet transmission counter for the RSSI level is incremented.

44. The WTRU of claim 43 wherein a packet error rate (PER) for the RSSI level is updated in the memory and, if the PER is stable, a preferred packet transmission rate for the RSSI level is also updated in the memory.

45. The WTRU of claim 40 wherein the RSSI level total packet transmission counter for the RSSI level is incremented if an RSSI training process was previously used to determine the particular packet transmission

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rate, and after transmitting the at least one packet to the node without receiving an ACK from the node.

46. The WTRU of claim 45 wherein a packet error rate (PER) for the RSSI level is updated in the memory and, if the PER is stable, a preferred packet transmission rate for the RSSI level is also updated in the memory.

47. The WTRU of claim 29 wherein the packet transmission counters include a received signal strength indicator (RSSI) level total packet transmission counter and an RSSI level packet transmission error counter.

48. The WTRU of claim 47 wherein an RSSI measurement of an ACK received from the node after transmitting the at least one packet to the node is retrieved from the memory, and the RSSI level total packet transmission counter for the RSSI level is incremented for the RSSI level of the ACK.

49. The WTRU of claim 47 wherein if the at least one packet is transmitted to the node without receiving an ACK from the node, a determination is made as to whether there are any RSSI measurements available for any packets received from the node within a last maximum duration time period, and if so, the RSSI level of the measurements is determined and the RSSI level total packet transmission counter and the RSSI level packet transmission error counter are incremented.

50. The WTRU of claim 49 wherein a packet error rate (PER) for the RSSI level is updated in the memory and, if the PER is stable, a preferred packet transmission rate for the RSSI level is also updated in the memory.

51. The WTRU of claim 29 wherein the WTRU sets the particular packet transmission rate based on a rate command received from the node, and transmits packets based on the received rate command.

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52. An integrated circuit (IC) incorporated in a wireless transmit/receive unit (WTRU), the IC for adjusting a packet transmission rate of packets the WTRU transmits via an antenna, the IC comprising:

(a) a transmitter for transmitting to a node at least one packet at a particular packet transmission rate;

(b) a receiver for receiving an acknowledgement (ACK) signal from the node that receives and acknowledges receipt of the at least one packet;

(c) a processor in communication with the transmitter and the receiver;

(d) a memory in communication with the processor;

(e) a transmission rates database in communication with the processor; and

(f) a plurality of packet transmission counters in communication with the processor.

53. The IC of claim 52 wherein the particular packet transmission rate is initially set to a default rate.

54. The IC of claim 52 wherein the packet transmission counters include a total successful packet transmission counter and an individual packet transmission error counter.

55. The IC of claim 54 wherein the total successful packet transmission counter is incremented when the receiver receives an ACK from the node.

56. The IC of claim 55 wherein the individual packet transmission error counter is reset to zero when the receiver receives an ACK from the node.

57. The IC of claim 56 wherein the packet transmission counters further include a total unsuccessful packet transmission counter, and the processor determines whether to adjust the particular packet transmission

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rate based on the sum of a first count value of the total successful packet transmission counter and a second count value of the total unsuccessful packet transmission counter.

58. The IC of claim 57 wherein the particular packet transmission rate is increased if the sum is greater than equal to a predetermined number of packets need for a packet transmission rate increase.

59. The IC of claim 58 wherein the particular packet transmission rate is increased if the ratio of the second count value over the first count value is less than a predetermined packet transmission rate increase ratio.

60. The IC of claim 52 wherein the packet transmission counters include a total unsuccessful packet transmission counter and an individual packet transmission error counter.

61. The IC of claim 60 wherein the total unsuccessful packet transmission counter and the individual packet transmission error counter are incremented when the receiver does not receive an ACK from the node after transmitting the at least one packet to the node.

62. The IC of claim 61 wherein the particular packet transmission rate is reduced by one or more supported rate steps designated in the transmission rates database based on a count value of the individual packet transmission error counter.

63. The IC of claim 52 wherein the packet transmission counters include a received signal strength indicator (RSSI) level total packet transmission counter.

64. The IC of claim 63 wherein an RSSI measurement of an ACK received from the node after transmitting the at least one packet to the node is

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retrieved from the memory if an RSSI training process was not previously used to determine the particular packet transmission rate, the RSSI measurement is determined by the processor and the RSSI level total packet transmission counter for the RSSI level is incremented.

65. The IC of claim 64 wherein a packet error rate (PER) for the RSSI level is updated in the memory and, if the PER is stable, a preferred packet transmission rate for the RSSI level is also updated in the memory.

66. The IC of claim 63 wherein an RSSI measurement of an ACK received from the node after transmitting the at least one packet to the node is retrieved from the memory if an RSSI training process was previously used to determine the particular packet transmission rate, the RSSI measurement is determined by the processor and the RSSI level total packet transmission counter for the RSSI level is incremented.

67. The IC of claim 66 wherein a packet error rate (PER) for the RSSI level is updated in the memory and, if the PER is stable, a preferred packet transmission rate for the RSSI level is also updated in the memory.

68. The IC of claim 63 wherein the RSSI level total packet transmission counter for the RSSI level is incremented if an RSSI training process was previously used to determine the particular packet transmission rate, and after transmitting the at least one packet to the node without receiving an ACK from the node.

69. The IC of claim 68 wherein a packet error rate (PER) for the RSSI level is updated in the memory and, if the PER is stable, a preferred packet transmission rate for the RSSI level is also updated in the memory.

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70. The IC of claim 52 wherein the packet transmission counters include a received signal strength indicator (RSSI) level total packet transmission counter and an RSSI level packet transmission error counter.

71. The IC of claim 70 wherein an RSSI measurement of an ACK received from the node after transmitting the at least one packet to the node is retrieved from the memory, and the RSSI level total packet transmission counter for the RSSI level is incremented for the RSSI level of the ACK.

72. The IC of claim 70 wherein if the at least one packet is transmitted to the node without receiving an ACK from the node, a determination is made as to whether there are any RSSI measurements available for any packets received from the node within a last maximum duration time period, and if so, the RSSI level of the measurements is determined and the RSSI level total packet transmission counter and the RSSI level packet transmission error counter are incremented.

73. The IC of claim 72 wherein a packet error rate (PER) for the RSSI level is updated in the memory and, if the PER is stable, a preferred packet transmission rate for the RSSI level is also updated in the memory.

74. The IC of claim 52 wherein the IC sets the particular packet transmission rate based on a rate command received from the node, and transmits packets based on the received rate command.

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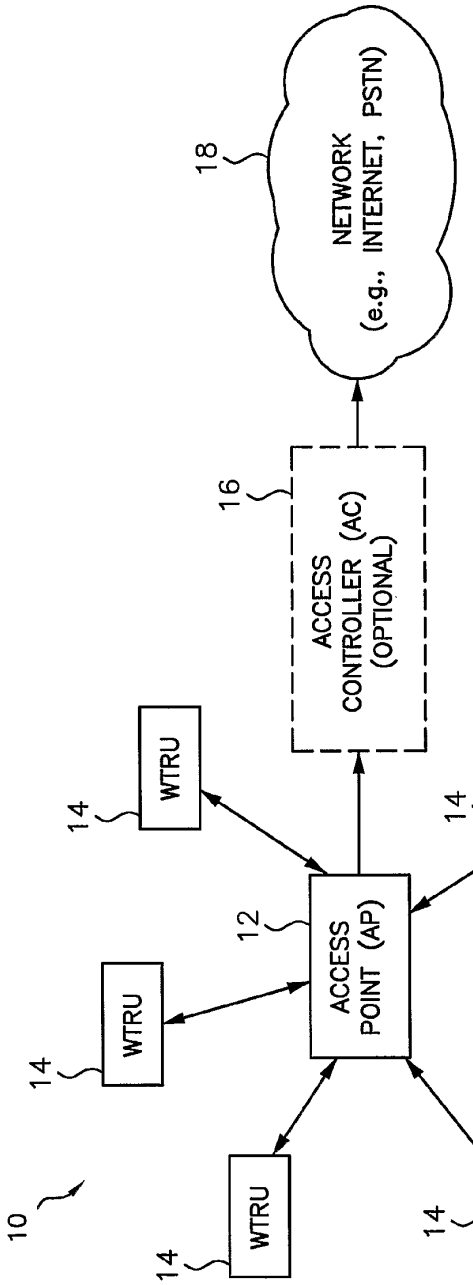


FIG. 1
(Prior Art)

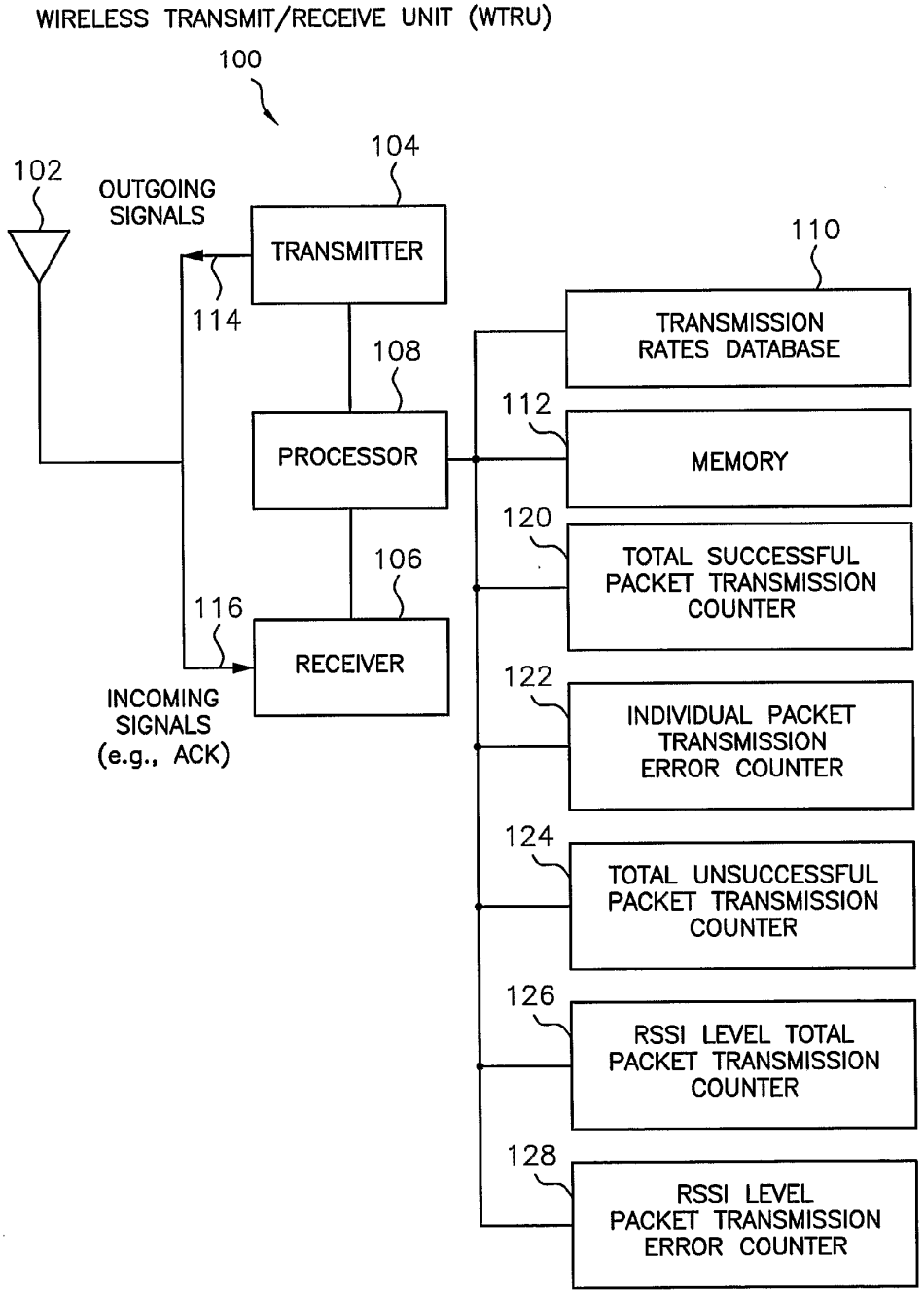

WIRELESS TRANSMIT/RECEIVE UNIT (WTRU)
100
102
OUTGOING SIGNALS
104
TRANSMITTER
114
108
PROCESSOR
106
116
RECEIVER
INCOMING SIGNALS (e.g., ACK)
110
TRANSMISSION RATES DATABASE
112
MEMORY
120
TOTAL SUCCESSFUL PACKET TRANSMISSION COUNTER
122
INDIVIDUAL PACKET TRANSMISSION ERROR COUNTER
124
TOTAL UNSUCCESSFUL PACKET TRANSMISSION COUNTER
126
RSSI LEVEL TOTAL PACKET TRANSMISSION COUNTER
128
RSSI LEVEL PACKET TRANSMISSION ERROR COUNTER

FIG. 2

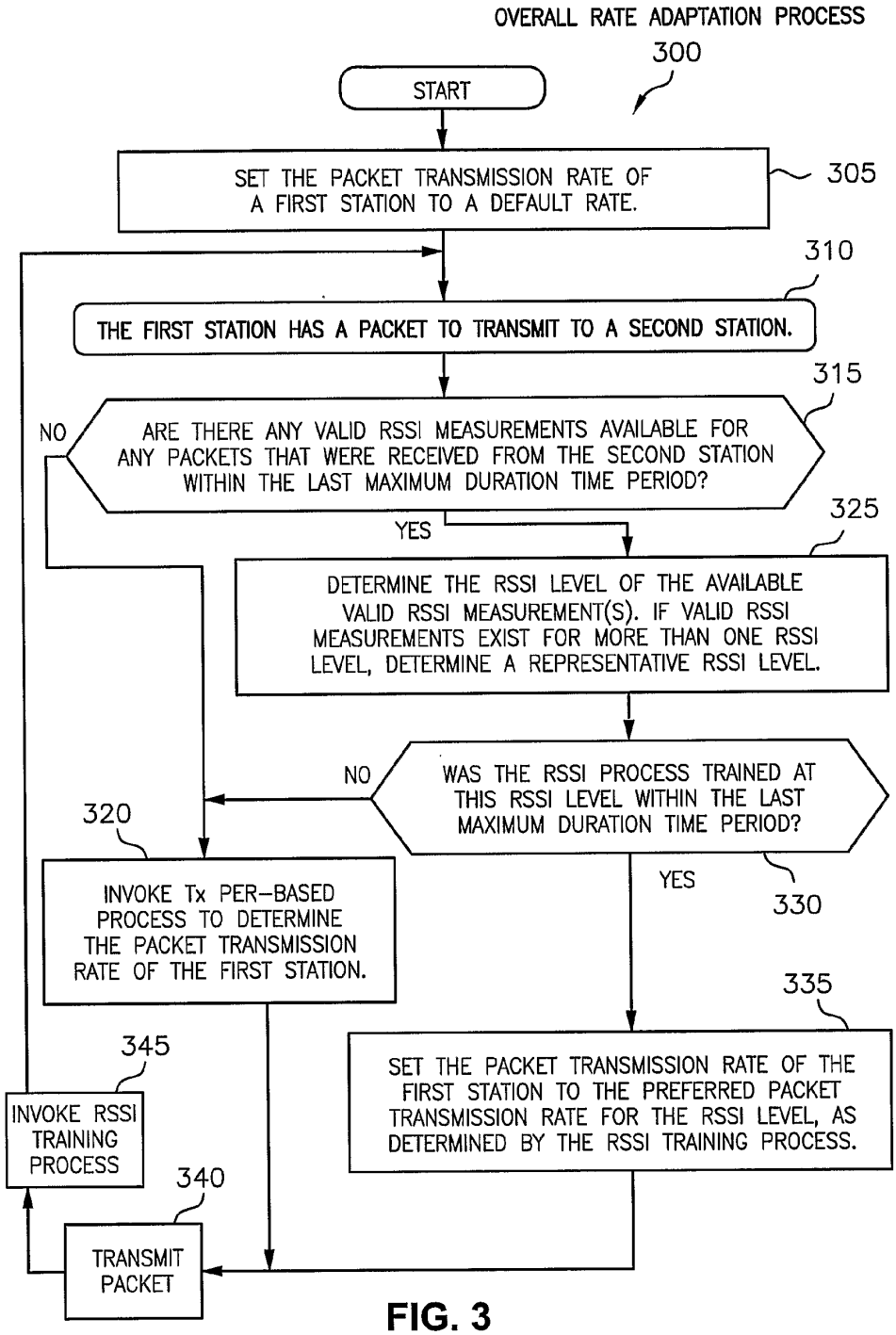

OVERALL RATE ADAPTATION PROCESS
300
START
SET THE PACKET TRANSMISSION RATE OF A FIRST STATION TO A DEFAULT RATE.
305
310
THE FIRST STATION HAS A PACKET TO TRANSMIT TO A SECOND STATION.
315
NO
ARE THERE ANY VALID RSSI MEASUREMENTS AVAILABLE FOR ANY PACKETS THAT WERE RECEIVED FROM THE SECOND STATION WITHIN THE LAST MAXIMUM DURATION TIME PERIOD?
YES
325
DETERMINE THE RSSI LEVEL OF THE AVAILABLE VALID RSSI MEASUREMENT(S). IF VALID RSSI MEASUREMENTS EXIST FOR MORE THAN ONE RSSI LEVEL, DETERMINE A REPRESENTATIVE RSSI LEVEL.
NO
WAS THE RSSI PROCESS TRAINED AT THIS RSSI LEVEL WITHIN THE LAST MAXIMUM DURATION TIME PERIOD?
320
YES
330
INVOKE Tx PER-BASED PROCESS TO DETERMINE THE PACKET TRANSMISSION RATE OF THE FIRST STATION.
335
SET THE PACKET TRANSMISSION RATE OF THE FIRST STATION TO THE PREFERRED PACKET TRANSMISSION RATE FOR THE RSSI LEVEL, AS DETERMINED BY THE RSSI TRAINING PROCESS.
345
INVOKE RSSI TRAINING PROCESS
340
TRANSMIT PACKET

FIG. 3

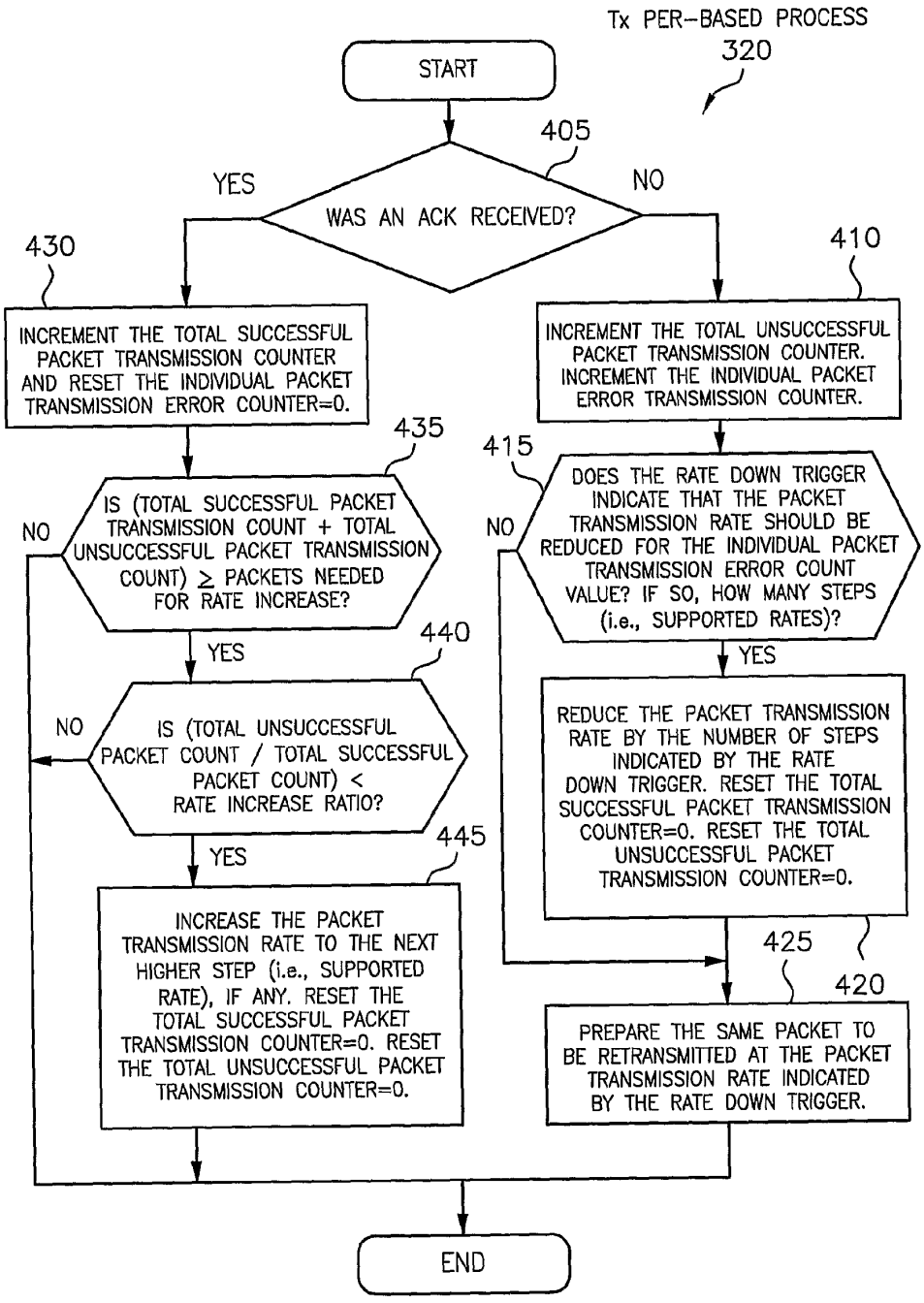

Tx PER-BASED PROCESS
320
START
405
WAS AN ACK RECEIVED?
YES
NO
430
INCREMENT THE TOTAL SUCCESSFUL PACKET TRANSMISSION COUNTER AND RESET THE INDIVIDUAL PACKET TRANSMISSION ERROR COUNTER=0.
410
INCREMENT THE TOTAL UNSUCCESSFUL PACKET TRANSMISSION COUNTER. INCREMENT THE INDIVIDUAL PACKET ERROR TRANSMISSION COUNTER.
435
IS (TOTAL SUCCESSFUL PACKET TRANSMISSION COUNT + TOTAL UNSUCCESSFUL PACKET TRANSMISSION COUNT) ≥ PACKETS NEEDED FOR RATE INCREASE?
NO
YES
415
DOES THE RATE DOWN TRIGGER INDICATE THAT THE PACKET TRANSMISSION RATE SHOULD BE REDUCED FOR THE INDIVIDUAL PACKET TRANSMISSION ERROR COUNT VALUE? IF SO, HOW MANY STEPS (i.e., SUPPORTED RATES)?
NO
YES
440
IS (TOTAL UNSUCCESSFUL PACKET COUNT / TOTAL SUCCESSFUL PACKET COUNT) < RATE INCREASE RATIO?
NO
YES
445
INCREASE THE PACKET TRANSMISSION RATE TO THE NEXT HIGHER STEP (i.e., SUPPORTED RATE), IF ANY. RESET THE TOTAL SUCCESSFUL PACKET TRANSMISSION COUNTER=0. RESET THE TOTAL UNSUCCESSFUL PACKET TRANSMISSION COUNTER=0.
REDUCE THE PACKET TRANSMISSION RATE BY THE NUMBER OF STEPS INDICATED BY THE RATE DOWN TRIGGER. RESET THE TOTAL SUCCESSFUL PACKET TRANSMISSION COUNTER=0. RESET THE TOTAL UNSUCCESSFUL PACKET TRANSMISSION COUNTER=0.
425
420
PREPARE THE SAME PACKET TO BE RETRANSMITTED AT THE PACKET TRANSMISSION RATE INDICATED BY THE RATE DOWN TRIGGER.
END

FIG. 4

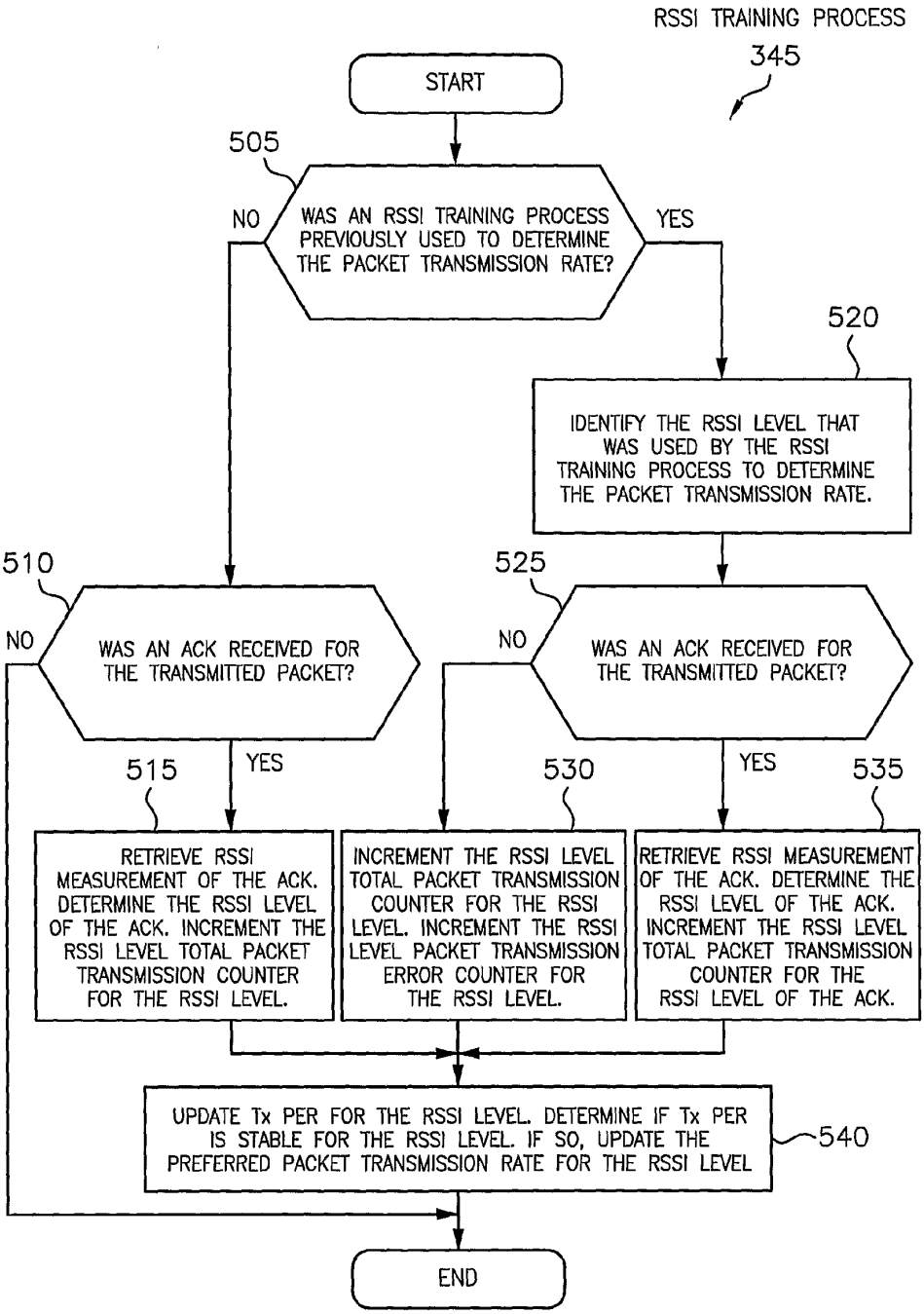

RSSI TRAINING PROCESS
345
START
505
NO
WAS AN RSSI TRAINING PROCESS PREVIOUSLY USED TO DETERMINE THE PACKET TRANSMISSION RATE?
YES
520
IDENTIFY THE RSSI LEVEL THAT WAS USED BY THE RSSI TRAINING PROCESS TO DETERMINE THE PACKET TRANSMISSION RATE.
510
NO
WAS AN ACK RECEIVED FOR THE TRANSMITTED PACKET?
525
NO
WAS AN ACK RECEIVED FOR THE TRANSMITTED PACKET?
515
YES
530
YES
535
RETRIEVE RSSI MEASUREMENT OF THE ACK. DETERMINE THE RSSI LEVEL OF THE ACK. INCREMENT THE RSSI LEVEL TOTAL PACKET TRANSMISSION COUNTER FOR THE RSSI LEVEL.
INCREMENT THE RSSI LEVEL TOTAL PACKET TRANSMISSION COUNTER FOR THE RSSI LEVEL. INCREMENT THE RSSI LEVEL PACKET TRANSMISSION ERROR COUNTER FOR THE RSSI LEVEL.
RETRIEVE RSSI MEASUREMENT OF THE ACK. DETERMINE THE RSSI LEVEL OF THE ACK. INCREMENT THE RSSI LEVEL TOTAL PACKET TRANSMISSION COUNTER FOR THE RSSI LEVEL OF THE ACK.
UPDATE Tx PER FOR THE RSSI LEVEL. DETERMINE IF Tx PER IS STABLE FOR THE RSSI LEVEL. IF SO, UPDATE THE PREFERRED PACKET TRANSMISSION RATE FOR THE RSSI LEVEL
540
END

FIG. 5

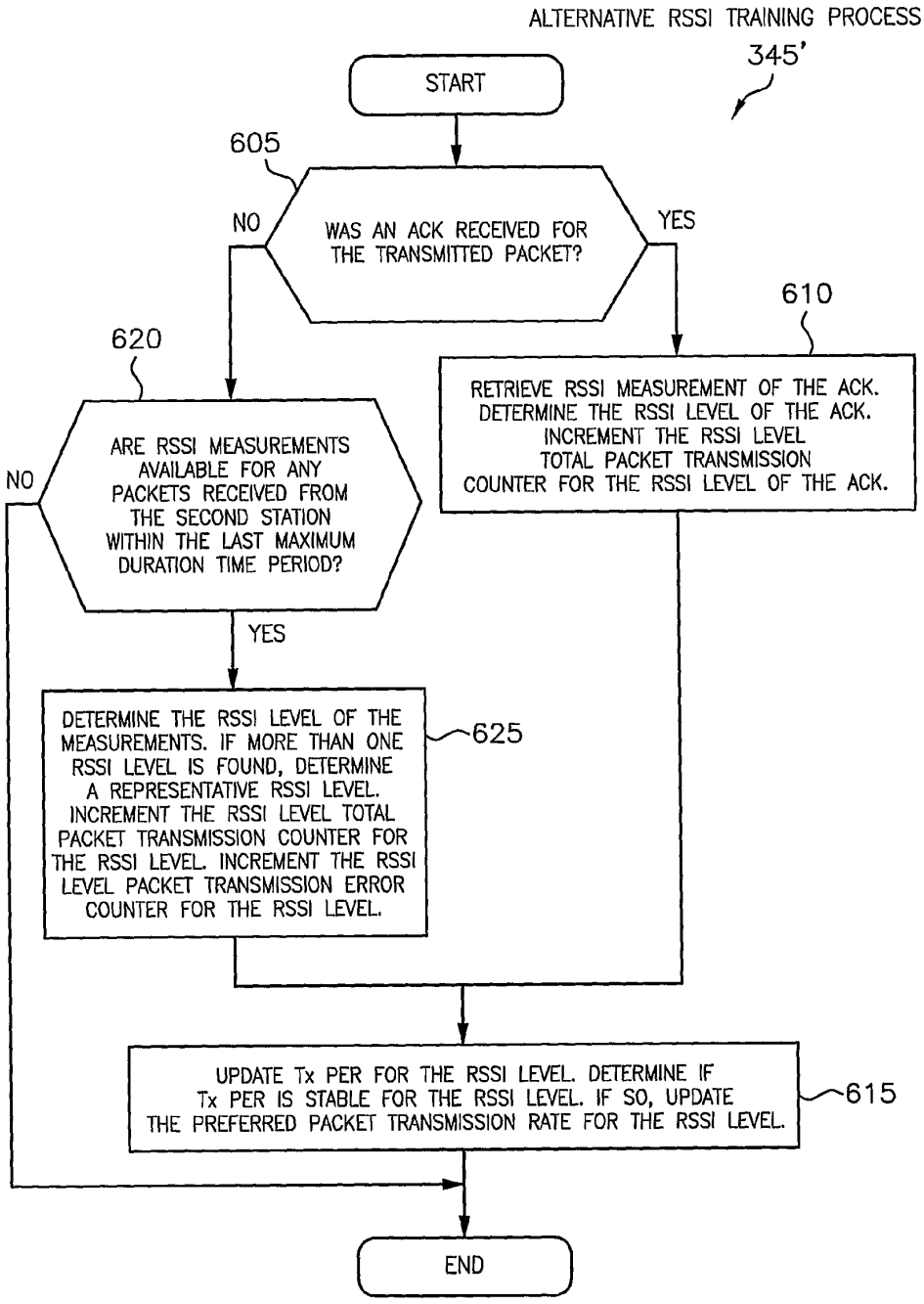

ALTERNATIVE RSSI TRAINING PROCESS
345'
START
605
WAS AN ACK RECEIVED FOR THE TRANSMITTED PACKET?
NO
YES
610
RETRIEVE RSSI MEASUREMENT OF THE ACK. DETERMINE THE RSSI LEVEL OF THE ACK. INCREMENT THE RSSI LEVEL TOTAL PACKET TRANSMISSION COUNTER FOR THE RSSI LEVEL OF THE ACK.
620
ARE RSSI MEASUREMENTS AVAILABLE FOR ANY PACKETS RECEIVED FROM THE SECOND STATION WITHIN THE LAST MAXIMUM DURATION TIME PERIOD?
NO
YES
DETERMINE THE RSSI LEVEL OF THE MEASUREMENTS. IF MORE THAN ONE RSSI LEVEL IS FOUND, DETERMINE A REPRESENTATIVE RSSI LEVEL. INCREMENT THE RSSI LEVEL TOTAL PACKET TRANSMISSION COUNTER FOR THE RSSI LEVEL. INCREMENT THE RSSI LEVEL PACKET TRANSMISSION ERROR COUNTER FOR THE RSSI LEVEL.
625
UPDATE Tx PER FOR THE RSSI LEVEL. DETERMINE IF Tx PER IS STABLE FOR THE RSSI LEVEL. IF SO, UPDATE THE PREFERRED PACKET TRANSMISSION RATE FOR THE RSSI LEVEL.
615
END

FIG. 6

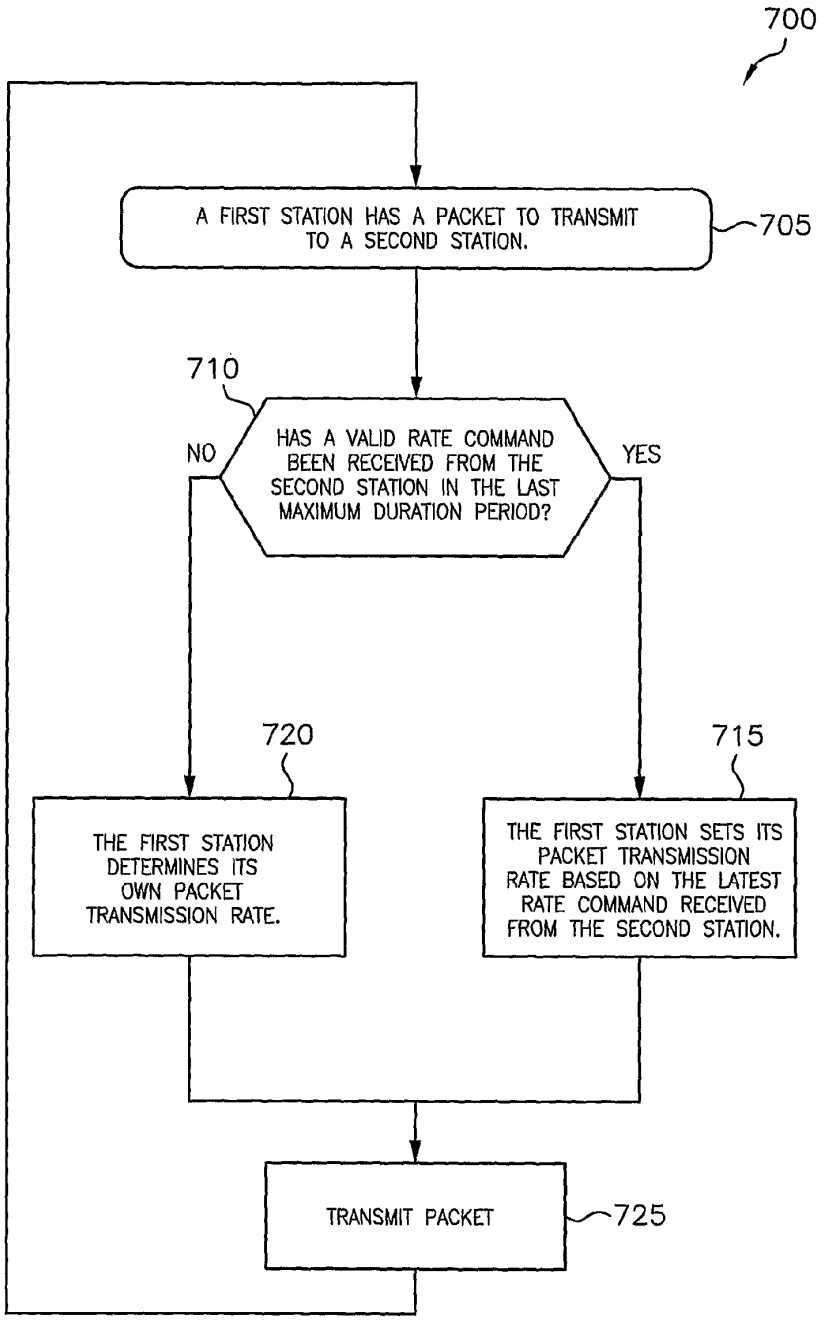

700
A FIRST STATION HAS A PACKET TO TRANSMIT TO A SECOND STATION.
705
710
HAS A VALID RATE COMMAND BEEN RECEIVED FROM THE SECOND STATION IN THE LAST MAXIMUM DURATION PERIOD?
NO
YES
720
THE FIRST STATION DETERMINES ITS OWN PACKET TRANSMISSION RATE.
715
THE FIRST STATION SETS ITS PACKET TRANSMISSION RATE BASED ON THE LATEST RATE COMMAND RECEIVED FROM THE SECOND STATION.
TRANSMIT PACKET
725

FIG. 7

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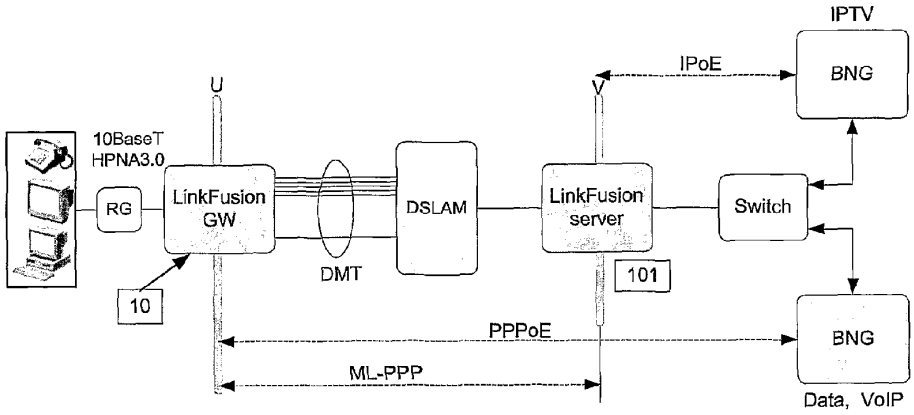
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(54) **Title:** METHOD AND APPARATUS FOR PROVISIONING ENSURED QoS TRIPLE PLAY SERVICES OVER EXISTING COPPER INFRASTRUCTURE



(57) **Abstract:** Method and system for providing Triple Play services with assured QoS by Telecommunication companies to subscribers in MDU/MTU over existing unshielded copper infrastructure in the local loop. All the bandwidth available on the xDSL lines is aggregated to form a manageable broadband link from all or a part of the telephone lines that are routed to the building and enabled to be used as xDSL lines. The wideband services are provisioned to subscribers using the manageable broadband link, by performing statistical multiplexing and Dynamic Resource Allocation. The delivery of the multicast content such as video broadcasting is extended to reach the building and then the broadband services are distributed to each subscriber using standard based in-building distribution.

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METHOD AND APPARATUS FOR PROVISIONING ENSURED QoS TRIPLE PLAY SERVICES OVER EXISTING COPPER INFRASTRUCTURE

Field of the invention

The present invention relates to the field of providing digital data and content over a data communication network. More particularly, the present invention proposes a method and apparatus for provisioning of triple play services with ensured QoS to subscribers, over existing copper infrastructure.

Background of the invention

While the delivery of combined voice and data has become widespread in the recent years, effective addition of video has been a barrier to completion of the true triple play for several reasons. First, outdated, inefficient video compression algorithms greatly exceed available bandwidth; second, bandwidth in the access networks has been insufficient for even compressed video; and third, the vast majority of today's Customer Premises Equipment (CPE) is unable to handle the service segmentation and quality of service (QoS) requirements that are crucial for voice and video services. Significant advances in video compression technology make IPTV-based video services, such as Video-On-Demand (VOD), not only practical, but highly desirable. These IPTV-based video services include improved content selection and navigation, no-delay channel changes, VOD and promotions tailored to a subscriber's viewing habits and preferences, and connection to other IP devices and content, such as photographs, music, games, or video contents located anywhere on the subscriber's network.

Depending on compression technology used, each channel received from a service provider video server or distribution point needs as much as 3-4 Mb/s of bandwidth for standard definition TV (SDTV) and 9-12 Mb/s for High definition TV (HDTV). Broadcast video channels are multicast in nature. If handled properly by the network infrastructure, the amount of total bandwidth multicast video consumes between the headend (the control center of a television system, where broadcast signals are received and distributed) and RT (Remote Terminal) can be minimized. In addition, video services such as Video on Demand (VOD) are unicast in nature, i.e., requiring individual bandwidth streams from the headend to the subscriber.

A Triple Play service bundles high-speed Internet access, television (TV broadcast or Video on Demand) and telephone service over a single broadband connection. As competition between Multiple System Operators (a.k.a., Cable Operators) and Incumbent Local Exchange Carriers (ILECs) over subscribers increases, the ability to offer a Triple Play package that bundles voice, video, and data services is a dominant factor that determines the consumer's final choice. Triple Play service also allows ILECs' and CLECs to expand beyond their traditional voice services. True Triple Play services used concurrently by family members in one household require networks that can support higher quality at super-broadband speeds. They may include Point to Point like VOD (specifically requested by one person), (Point to Multipoint) like broadcasting to multiple users Television over IP, or gaming (Multipoint to Multipoint). Other services sometimes require a constant bit rate connection (like an audio stream), a bit rate that can vary within limits (like streaming video content), or a bursting data rate (like a query on a web page or file download).

Solutions such as Fiber-To-The-Home (FTTH) provide the required bandwidth but require high costs (high upfront investment with long return on investment). VDSL can provide high bandwidth but is highly limited by the loop length. ADSL2 and ADSL2+ significantly boost the bandwidth, but practically cannot serve more than one TV channel and do not support the large bandwidth required for High-Definition Television (HDTV).

Fixed Wireless Access technologies like WiMax might also be able to realize the same speeds. However, the number of end-users sharing the wireless channel capacity is limited.

ADSL doesn't offer sufficient downstream bandwidth over long enough distances to be able to reach all customers. Specifically, ADSL cannot deliver 8 Mbps beyond 6,000 to 8,000 feet. Many Telco customers are 12,000 to 18,000 feet from the nearest RT. ADSL2/2+ increase ADSL bandwidth but only for shorter distances. Therefore, their effective bandwidth is limited.

VDSL provides a lot of bandwidth, but over very short distances—3,000 to 4,000 feet and requires Fiber To The Curb (FTTC). Therefore, Telco companies are required to relocate the serving areas to approximately 4,000 feet between subscribers and RTs (the DSLAM – DSL Access Multiplexer) in order to use VDSL. This of course is costly.

All the methods described above have not yet provided satisfactory solutions to the problem of allowing Telco companies - ILECs and CLECs to

provide cost effective triple play services to their subscribers, while ensuring voice and video quality.

It is therefore an object of the present invention to allow Telco companies – ILECs and CLECs providing triple play services to their subscribers, using their existing access network infrastructure, while ensuring voice and video quality.

It is another object of the present invention to allow Telco companies – ILECs and CLECs providing triple play services to their subscribers, using their existing access network infrastructure, while ensuring individual service quality and priority, especially quality-sensitive voice and video services.

It is a further object of the present invention to allow Telco companies – ILECs and CLECs providing triple play services to their subscribers, using their existing access network infrastructure, while provisioning the unique requirements of each service

It is still an object of the present invention to allow Telco companies – ILECs and CLECs providing triple play services to their subscribers, using their existing access network infrastructure, while allowing management and support of the individual services once they are provisioned.

It is yet an object of the present invention to allow Telco companies – ILECs and CLECs providing triple play services to their subscribers, using their existing access network infrastructure, in a scalable manner that does not require upfront investments.

It is yet another object of the present invention to allow Telco companies – ILECs and CLECs providing triple play services to their subscribers, over existing copper lines, at High quality with no need to upgrade the existing infrastructure.

Other objects and advantages of the invention will become apparent as the description proceeds.

Summary of the invention

The present invention is directed to a method for providing broadband services (such as Triple Play services) with assured QoS by Telecommunication companies (e.g., ILECs, CLECs, Service Providers or ISPs) to subscribers in a site (e.g., - apartment buildings, office buildings, Multi Dwelling Units (MDUs), Multi Tenant Units (MTUs) or a campus deployment) over existing unshielded copper infrastructure in the local loop, according to which all the bandwidth available on the xDSL lines is aggregated to form a manageable broadband link from all or a part of the telephone lines that are routed to the site and enabled to be used as xDSL lines. The wideband services are provisioned to subscribers using the manageable broadband link, by performing statistical multiplexing and Dynamic Resource Allocation. The delivery of the multicast content (particularly video broadcasting), intended for simultaneous use by different subscribers, is extended to reach the site and then the broadband services are distributed to each subscriber using standard based in-building distribution.

Preferably, the available bandwidth on the xDSL lines is aggregated using ML-PPP protocol. In this case, whenever the ML-PPP is implemented via the U interface at the system side, the BRAS that supports ML-PPP is used

as the ML-PPP termination (i.e., ML-PPP implementation at the network side) for the subscriber's data traffic. If the BRAS does not support ML-PPP or if a BRAS independent ML-PPP implementation is desired, a dedicated server is used for supporting the ML-PPP termination at the network side of the subscriber's data traffic.

Whenever the network architecture for providing broadband services complies with TR-101, a dedicated server that resides in the aggregation network over the V interface is used for forming a broadband ML-PPP between the V and U interfaces, based on multiple links of PPPoE. The formed broadband ML-PPP may be used for transferring data and voice. The IPTV video streaming, received by the server as an IPoE streaming, is then transferred in an appropriate protocol through the broadband ML-PPP.

The broadband services may be provisioned based on statistical multiplexing, according to different subscribers' and services' profiles at any given instance and on a corresponding dynamic resources allocation. Preferably, the multicast streaming is extended until reaching the site and then splitting the streaming via the in-building distribution.

The wideband services may be distributed among the subscribers in the site via Ethernet/LAN cables, Coax cables, Home PNA-3.0, PowerLine, using wireless communication or any combination thereof. Additional Functions like QoS Management, Resource Scheduling, Multicasting, Remote Configuration and Management, Authentication, Security, Policy Management, SLA Management, Redundancy, Admission Control, Traffic Accounting and Monitoring, Traffic Filtering, Billing Mediation, Broadcast

Buffering, File Cashing or any combination thereof may also be provided along with the broadband services.

The available bandwidth on the xDSL lines may be aggregated using one of the G.998 series of ITU-T Recommendations.

The provisioning of broadband services may comply with recommendations of the DSL Forum standards and different network architectures included therein, particularly as defined in TR-25, TR-58, TR-59, TR-94 and TR-101.

The present invention is also directed to a system for providing broadband services with assured QoS by Telecommunication companies to subscribers in a site over existing unshielded copper infrastructure in the local loop, that comprises:

a) circuitry and software for aggregating all the bandwidth available on all or a part of the telephone lines that are routed to the site and enabled to be used as xDSL lines, to form at least one manageable broadband link;

b) software for performing statistical multiplexing;

c) circuitry and software for performing Dynamic Resource Allocation;

d) circuitry and software for extending the delivery of the multicast content intended for simultaneous use by different subscribers, particularly video broadcasting, to reach the site; and

e) circuitry and software for in-building distribution of the broadband services to each subscriber.

If the available bandwidth on the xDSL lines is aggregated using ML-PPP protocol, the system includes a BRAS that supports ML-PPP as the ML-PPP termination for the subscriber's data traffic at the network side.

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Alternatively, the system may further include a dedicated server for supporting the ML-PPP termination at the network side of the subscriber's data traffic, whenever the BRAS does not support ML-PPP or whenever a BRAS independent ML-PPP implementation is desired. Also, a dedicated server that resides in the aggregation network over the V interface may be included, for forming a broadband ML-PPP between the V and U interfaces, whenever the network architecture for providing broadband services complies with TR-101.

Preferably, the system comprises circuitry and software for extending multicast streaming until reaching the site and circuitry for splitting the streaming via the in-building distribution, as well as circuitry and associated software for providing the above additional functions.

Brief Description of the Drawings

The above and other characteristics and advantages of the invention will be better understood through the following illustrative and non-limitative detailed description of preferred embodiments thereof, with reference to the appended drawings, in which:

- Fig. 1 schematically illustrates the general architecture of the proposed solution, according to a preferred embodiment of the invention;
- Fig. 2 schematically illustrates an exemplary concept of the proposed solution, according to a preferred embodiment of the invention;
- Fig. 3 schematically illustrates the platform implemented for in-building service distribution options, according to a preferred embodiment of the invention;
- Fig. 4A schematically illustrates the architecture for provisioning triple play services to subscribers with in-building distribution over existing copper infrastructure, according to a preferred embodiment of the invention;

- Fig. 4B schematically illustrates the architecture for provisioning triple play services to subscribers with in-building distribution over Ethernet cables, according to a preferred embodiment of the invention;
- Fig. 4C schematically illustrates the architecture for provisioning triple play services to subscribers with wireless in-building distribution, according to a preferred embodiment of the invention;
- Fig. 5 is a block diagram of the system for provisioning triple play services with ensured QoS to subscribers over existing copper infrastructure, according to a preferred embodiment of the invention;
- Fig. 6 (prior art) schematically illustrates the process of DSL Bonding with ML-PPP;
- Fig. 7A (prior art) schematically illustrates a Multi Service Reference Model taken from TR-58;
- Fig. 7B (prior art) schematically illustrates a High Level Architectural Reference Model taken from TR-59;
- Fig. 7C schematically illustrates the a network architecture that includes a specific server that is installed in the network to perform the BRAS functionalities related to the ML-PPP termination, according to a preferred embodiment of the invention;
- Fig. 7D (prior art) depicts the network architecture considered in TR-101;
- Fig. 8A (prior art) illustrates the protocol stacks at the U interface;
- Fig. Fig. 8B (prior art) illustrates the protocol stacks at the V interface;
- Fig. 9 (prior art) illustrates a common network topology when using TR-101; and
- Fig. 10 illustrates Multi Edge network architecture, according to a preferred embodiment of the invention.

Detailed description of the invention

The present invention proposes a method and system for providing residential and commercial Triple Play broadband services by Telecommunication companies (ILECs, CLECs) or service providers to apartment buildings - Multi Dwelling Units (MDU), office buildings – Multi Tenant Units (MTU), condominiums, and other campus deployments over the existing copper infrastructure.

The system proposed by the present invention combines implementation of all the functions needed to deliver these services, so as to fulfill the requirements which are essential to provide high quality Triple Play services. These requirements include: Bandwidth, QoS management, Availability and Security, in addition to other highly desirable requirements to provide efficient and profitable services. It can meet all of these requirements in a single appliance located adjacent to the Network Interface Unit (NIU/NID) – the MDF - of each building (before the Demarcation Point).

The proposed system serves as a platform that performs the following functions: Bandwidth Aggregation, Statistical Multiplexing, Resource Scheduling, Multicasting, QoS Management, In Building Distribution, Admission Control, Remote Management, Authentication, Redundancy (High Availability), Policy Management, Security, SLA Management and optionally: Traffic Accounting and Monitoring, , Traffic Filtering, Billing Mediation.

The system utilizes part or all of the existing copper twisted pair telephone lines, routed to an MDU, as bonded DSL links, while aggregating all their available bandwidth to form one "Fat Pipe". The formed broad bandwidth

"Fat pipe" is than used for the provisioning of the Triple Play services based on Statistical Multiplexing, Dynamic Resource Allocation, and Multicasting. In building distribution is performed, based on Standards, such as: Home PNA3.0 or PowerLine, or LAN Cable, or Coax, or Wireless. The combination of all this functions with the way in which all the Twisted Copper Pairs routed to the building are used to achieve the required bandwidth, the dynamic allocation and the statistical multiplexing of the available resources, the Multicasting, the QoS, Policy and SLA management and the remote configuration combined with all the other functions enable Telco companies to deliver high quality Triple Play services using their existing network, maintaining and preserving their installed base of unshielded twisted pair in the local loop.

The system proposed by the present invention allows ILECs to deliver True Triple Play to Multi Dwelling Units (MDUs) over existing copper lines at High quality, without a need to replace or even upgrade the infrastructure and at a far lower cost than any other known alternative (such as FTTH, FTTC/VDSL FTTB/VDSL etc.). ILECs can provide multi-channel TV, HDTV, VOD, ultra-high-speed data and VoIP over their existing installed base of unshielded twisted pairs in the local loop.

In order to deliver commercial Triple Play services acceptable Quality of Service requirements must be met. By deploying such highly integrated systems, service providers can expand their offerings easily and cost effectively, better manage and control traffic, and accelerate the delivery of triple play services. The end result is a quicker time to market and an assured user experience of Triple Play services over the existing copper infrastructure.

The proposed platform performs the following functions: Bandwidth Aggregation, Statistical Multiplexing, Resource Scheduling, Multicasting, QoS Management, In Building Distribution, Admission Control, Remote Management, Authentication, Redundancy (High Availability), Policy Management, Security, SLA Management and optionally: Traffic Accounting and Monitoring, , Traffic Filtering, Billing Mediation.

Fig. 1 schematically illustrates the general architecture of the proposed solution, according to a preferred embodiment of the invention. The system 10 that is installed in the building aggregates the bandwidth of all incoming DSL lines into a wideband link and it's bandwidth is then dynamically allocated.

Fig. 2 schematically illustrates the concept of the proposed solution, according to a preferred embodiment of the invention. The incoming lines may be ADSL lines, ADSL2 lines, and ADSL2+ lines or a combination of these lines.

System 10 performs bandwidth aggregation from all incoming lines. For a building consisting of n apartments there are at least n telephone lines (copper twisted pairs) already installed by the Telco company (ILEC) in order to provide Plain Old Telephone Service (POTS). These n lines terminate in a Network Interface Unit or Device (NIU/NID) the MDF in the building. From the MDF cabinet, each copper pair is routed to an apartment and terminated by a telephone set.

Each telephone line can be enabled to be a DSL line to carry digital data, in addition to the circuit switch telephone voice. DSL is a family of technologies that provide digital data transmission over the wires used in

the "last mile" of a local telephone network. The most common DSL technology is ADSL. ADSL standard can (theoretically) deliver 8 Mbit/s over about 2 km (1¼ miles) of unshielded twisted pair copper wire. All the available bandwidth is aggregated from all or part of the lines rolled out to the building as DSL enabled links, into one broad manageable link of a bandwidth equal to n times each DSL line bandwidth. Several known techniques may be used to implement the bandwidth aggregation (these techniques are sometimes called "Loop Bonding") and will be described below.

After the DSL loops have been bonded, the resultant aggregated link is used for the provisioning of the wideband services, including true Triple Play, to the various customers in the building based on Statistical Multiplexing and Dynamic Resource Allocation. In this manner, the required bandwidth for such service can be achieved based on the following logical assumptions:

- first, not all households are necessarily customers of the service.
- second, not all users use the service simultaneously
- third, not all connected users consume the same service concomitantly (Web browsing, file downloading, watching TV broadcast, VoIP conversation, etc.) .
- fourth, part of the data is delivered in bursts;
- fifth: the managed resources are allocated to subscribers dynamically.

The system proposed by the present invention can save bandwidth also when video content is delivered by multicasting. Multicast is the delivery of video streams (video broadcast channels) to a group of destinations simultaneously using the most efficient strategy to deliver the video streams over each link of the network only once, creating copies only when

the links to the destinations split. Significant part of the traffic is expected to be IPTV broadcast. During multicasting, only one stream is required for multiple audience of the same broadcast. Usually Multicast is brought all the way from the video server, located at the service provider to the DSL aggregation point (the DSLAM- DSL Access Multiplexer) and then is split to each individual subscriber. System 10 extends the multicasting to the MDU, while splitting the streams through the "In Building Distribution" as described below. This saves precious bandwidth in the last mile, which is the most critical part and bottle neck of the network - the access network.

The proposed system is located adjacent to the building MDF, as shown in Fig. 4A. In building service distribution to each apartment, as shown in Fig. 3 is implemented based on one of the following methods: LAN cable – CAT5; Coax; HPNA 3.0 standard; PowerLine; Wireless.

Service Example

The following service example describes an MDU of a building with 50 apartments. There are at least 50 telephone lines which can be used as DSL enabled links, Either ADSL ADSL2 ADSL2+ or any combination of them. It is assumed that the service provider has a relatively high penetration level of 40%, i.e., the service provider has 20 subscribers (customers) in this building. It is also assumed that only 36 copper lines (out of the 50 available) are used as ADSL links. Each link provides 5Mb/s data rate (for short enough loop length the standard can reach 8Mb/s). After bonding all these links and aggregating all the available bandwidth, system 10 forms one broad pipe of (36x5) 180Mb/s, as shown in Table I. If more bandwidth is needed more links can be added to the "pipe" (the 50-36=14 unused lines) and if and when ADSL2/2+ will be available, broader bandwidth pipes can be formed by simply reconfiguring system 10.

Table I

	No of tenants	DSL lines	ADSL	ADSL2	ADSL2+	% penetration	No of Sub.
	50	36	36	0	0	40	20
BW (aver. Per line)			5	0	0		
BW			180	0	0		
Total BW							100

The following example describes a service scenario for such MDU in a typical demand. In this example 43 users (at the 20 households which are subscribers of the wideband service) are served as follows:

17 users are watching 6 High Definition TV broadcast channels.

5 users are watching 2 Standard Definition TV broadcast channels.

2 users are watching High Definition Video on Demand.

5 users are making VoIP calls

10 users are surfing the Web.

To provide this service demand a total bandwidth of 109Mb/s is required out of the 180Mb/s available, as shown in Table II.

Table II

Service	TV Broadcast	BC1	BC 2	BC3	BC4	BC5	BC6	SD1	SD2	VoD (HDTV)	VoIP	Internet	Users	Sub. (hh)
Sub. Per service	22									2	5	20	43	20
HDTV Broadcast		6	4	3	2	1	1							
SDTV Broadcast								3	2					
Total Allocated BW		12	12	12	12	12	12	4	4	24	1	4		109
Total Available BW														180

The following additional example describes a service scenario for such MDU in an extreme demand. In this example, 67 users (at the 20 households which are subscribers of the wideband service) are served as follows:

24 users are watching 6 High Definition TV broadcast channels.

5 users are watching 2 standard Definition TV broadcast channels.

4 users are watching High Definition Video on Demand.

15 users are making VoIP calls

20 users are surfing the Web.

To provide this service demand a total bandwidth of 140Mb/s is required out of the 180Mb/s available, as shown in Table III.

Table III

Service	TV Broadcast	BC1	BC 2	BC3	BC4	BC5	BC6	SD1	SD2	VoD (HDTV)	VoIP	Internet	Users	Sub. (hh)
Sub. Per service	28									4	15	20	67	20
HDTV Broadcast		8	5	4	3	2	1							
SDTV Broadcast								3	2					
Total Allocated BW		12	12	12	12	12	12	4	4	48	4	8		140
Total Available BW														180

It is assumed that 12Mb/s is required for HDTV channel though 9-10Mb/s is sufficient for MPEG4. There is still additional 40Mb/b margin left to fulfill even higher demand. For even more extreme cases there are still (50-36) 14 more unused lines that can be added by the service provider as required to provide for additional (5x14) 70Mb/s to this particular MDU. For even more extreme cases, (which are very rare with extremely low probability to happen), exceeding the available resources, the "Admission Control" (see below) comes into action according to its algorithms and the service provider policy.

Other requirements essential for the successful delivery of the service are also fulfilled by system 10, which functions as a platform, on which all these requirements are met while providing prominent advantages.

The platform implemented by system 10 is located adjacent to the building MDF, as shown in Fig. 3. In building service distribution to each apartment is implemented based on one of the following methods: LAN cable – CAT5; Coax; HPNA 3.0 standard; PowerLine; Wireless. The terminal devices that

may consume the broadband service may include a PC 301, a home server 302, a TV STB 303, a PDA 304, a gaming console 305, a VOIP phone 306, a security camera 307 or a Home Network sharing device 308.

Fig. 4A schematically illustrates the architecture for provisioning triple play services to subscribers with in-building distribution over existing copper infrastructure, according to a preferred embodiment of the invention.

Fig. 4B schematically illustrates the architecture for provisioning triple play services to subscribers with in-building distribution over Ethernet cables, according to a preferred embodiment of the invention.

Fig. 4C schematically illustrates the architecture for provisioning triple play services to subscribers with wireless in-building distribution, according to a preferred embodiment of the invention.

Fig. 5 is a block Diagram of the system for provisioning triple play services with ensured QoS to subscribers over existing copper infrastructure, according to a preferred embodiment of the invention.

System 10 provides the required bandwidth by combining the traditional copper telephone lines, used for DSL, to form one broad, manageable data pipe. This is accomplished by one of the following ways:

Several DSL Forum protocol models for accessing data networks utilize the Point-to-Point Protocol (PPP) to carry packets over the "U" interface (described with respect to Figs. 7A to 7C below). Because of the widespread use of PPP, Multi Link PPP (ML-PPP) can be used for DSL Bonding. ML-PPP as defined in RFC 1990 can be used to combine multiple PPP links into a single virtual bundle. At the transmitting side, ML-PPP takes a PPP

packet, optionally fragments it and generates a new ML-PPP header. Each resulting fragment (or a whole packet) is transmitted across a separate physical link. At the receiving side, the per-fragment headers are used to reconstruct the complete packets. This process is represented schematically in Fig. 6.

The Multi Link PPP (MLPPP) protocol has the following advantages regarding DSL link bandwidth aggregation method (DSL bonding):

- Standard well known widely used protocol
- Capable of asymmetric operation over ADSL, ADSL2, ADSL2+ and VDSL
- Allows routing of delay sensitive traffic over a single link via PPP, bypassing the ML-PPP bundle and an associated delay in ML-PPP processing
- When implemented with multi-class extensions, provides additional support for traffic of different priorities or classes.
- Provides the flexibility to the distribution of fragments to links and therefore, freedom to accommodate links of different bandwidth, thereby supporting dynamic link rate changes.

The proposed solution fully complies with recommendations of the DSL Forum standards, in particular as defined in the following Technical Reports (TRs):

- **TR-25** - Core Network Architecture Recommendations for Access to Legacy Data Networks over ADSL
- **TR-58** - Multi-Service Architecture & Framework Requirements
- **TR-59** - DSL Evolution – Architecture Requirements for the Support of QoS-Enabled IP Services

- **TR-94** - Multi-Service Delivery Framework for Home Networks
- **TR-101** - Migration to Ethernet-Based DSL Aggregation

Fig. 7A (prior art) schematically illustrates a Multi Service Reference Model taken from TR-58.

Fig. 7B (prior art) schematically illustrates a High Level Architectural Reference Model taken from TR-59.

The ML-PPP is implemented via the U interface at the system side (The U interface protocol stacks are specified below).

At the network side, The ML-PPP is implemented at the Broadband Remote Access Server (BRAS). The BRAS is the aggregation point for the subscriber's data traffic. It provides aggregation capabilities (e.g., IP, PPP, ATM) between the Regional/Access Network and the NSP or ASP. In addition to aggregation, it is also the "injection point" for policy management and IP QoS in the Regional/Access Networks.

Commercial BRAS implementations can support the MLPPP protocol. All is needed in this case at the network side for the above network architecture is to configure the BRAS for MLPPP. Thus, system 10 in this case is single sided single box solution that does not require any changes in the network topology (except BRAS configuration for ML-PPP).

There might be cases in which ML-PPP configuration in the BRAS is not possible or is not desirable or cases in which an independent solution or system testing is desirable. For such cases, a specific server 701 can be

installed in the network to perform the BRAS functionalities related to the ML-PPP implementation, as depicted in Fig. 7C. This solution is carried out by software and there is no need for the BRAS to support ML-PPP.

DSL Forum TR-101 outlines how an ATM aggregation network can be migrated to an Ethernet based aggregation network in the context of TR-25 and TR-59 based architectures. The TR-101 provides an architectural/topological model of such an Ethernet based aggregation network that supports the business requirements in TR-058. It describes requirements for protocol translation and interworking, QoS, multicast, security, and OAM for a DSL aggregation network.

TR-101 defines a new access network topology where the connectivity between the Access Node and the Broadband Network Gateway is Ethernet based rather than ATM. Access nodes can be directly connected or can go through an aggregation layer(s) before reaching the Broadband Network Gateway.

TR-059 based architectures assume a single Broadband Network Gateway (e.g., BRAS) where user services are performed. TR-101, however, recognizes the potential for service segregation. Some applications, such as video, may have specific enough requirements from the network that they are best optimized separately from other types of traffic. The architecture described in TR-101 supports the possibility for a dual Broadband Network Gateway (BNG) scenario when required for video optimization. When used, the BNG dedicated to video is denoted as the 'video BNG'. Such an approach may have additional complexities not present with a single BRAS/BNG arrangement described in TR-059. This is most notable with respect to traffic/bandwidth management and the resulting network efficiency, as well

as the additional operations overhead. Furthermore, in dual node architectures, it is not mandated that both BNGs support all of the requirements detailed in TR-101. Specifically, the video BNG may not implement subscriber management functions (e.g., PPP termination, per user QoS), provided that these functions are likely to be performed by the other BNG. Fig. 7D (prior art) depicts the network architecture considered in TR-101. The fundamental changes from current deployment architectures are:

- V interface that supports Ethernet as the transport protocol with no ATM present.
- An Ethernet aggregation network
- The possibility of dual Broadband Network Gateways
- Higher bit rate services (e.g. by supporting Access Nodes nearer the end-user)
- Higher network availability (in support of application and business customer needs)
- U interface that could support direct Ethernet framing over DSL.

Similar to the TR-059 architecture, the architecture depicted in Fig. 7D uses a Broadband Network Gateway for providing IP QoS down to the user level. TR-059 also supported legacy ATM services that may not have traversed the BNG. Similarly, the architecture described within this document (TR-101) also enables services to be injected into the network without going through a single Broadband Network Gateway.

Fig. 8A (prior art) illustrates the protocol stacks at the U interface.

Option 'a' is denoted IPoEoATM and option 'b' is denoted PPPoEoATM. Option 'c' is denoted IPoA and option 'd' is denoted PPPoA.

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Options 'e' and 'f' represent those scenarios when the access loop supports direct Ethernet encapsulation and are referred to as IPoE and PPPoE.

Similarly, Option 'g' represents a pure Ethernet service where there is no visibility above layer 2. Both options 'a' and 'e' are commonly referred to as **IPoE** and options 'b' and 'f' are referred to as **PPPoE**.

Those options where Ethernet is included in the protocol stack may also include 802.1Q headers to carry Virtual LAN (VLAN) tags and priority markings.

The PPP is the protocol that allows the carriers to connect the customers to different ISP's/CSP's and allow them to authenticate the customers via Remote Authentication Dial-In User Service (RADIUS) protocol and provide them with the services they are paying for through Lightweight Directory Access Protocol (LDAP) database in the back office.

Fig. 8B (prior art) illustrates the protocol stacks at the V interface.

DSL Forum's TR-101 defines the network topologies for supporting multiple services using Ethernet networks. Unlike its predecessor, TR-101 does not mandate a single topology but rather allows several variations. One new alternative is support for IP over Ethernet (IPoE) encapsulation. IPoE extends several LAN-based protocols, including Dynamic Host Configuration Protocol (DHCP, which is a communications protocol that lets network administrators centrally manage and automate the assignment of Internet Protocol (IP) addresses in an organization's network) to allow using a broadband network.

Fig. 9 (prior art) illustrates a common network topology when using TR-101. TR-101 does not advocate using IPoE over PPPoE, but rather allows

the broadband provider to select when to use each alternative. Since DHCP was designed for use on a shared LAN, its capabilities complies with the requirements for sending common data traffic to many users. Traditional broadcast television is an example of this case. As a result, IPoE/DHCP is typically used for delivering IPTV data traffic. In contrast, PPPoE more closely meets the needs of point-to-point broadband connections such as data and VoIP, since it was designed to support this environment. Broadband networks have been using PPP for many years, while DHCP is a recent entrant into this market. Today, existing unicast services are offered using PPP and there is little impetus to move away from using it. In fact, many broadband service providers prefer to stick with PPPoE, since it is more functional and mature than IPoE/DHCP, eliminates the need to retrain operations personnel, and lowers the risk of adding new subscribers and services. The most common broadband implementation, therefore, is to use IPoE/DHCP to support TV and other services across the broadband network to the Set-Top-Box (STB, which is a device that converts signals to be viewable images on TV), while using PPPoE to support services to other devices such as PCs and VoIP phones. Businesses receive all broadband services typically via PPP while residential subscribers receive services via both technologies.

The solution proposed by the present invention can also be adjusted to be used by multiple edge routers. Many organizations would like to use the same simple edge switch and DSLAM access networks, but manage the services separately in the metro network using different edge routers. This is most common if another organization (either another group within the same broadband service provider or a contracted third party) provides the IP video services. This scenario is depicted in Fig. 9.

Fig. 10 illustrates a Multi Edge Network architecture, according to a preferred embodiment of the invention. At the side of system 10, the architecture is similar to all other cases. At the network side, one or more servers 101 are installed in the Aggregation Network. The higher in the aggregation hierarchy the less servers are needed per DSLAMs served by each server 101 (thereby reducing the system per subscriber cost, at the expense of less redundancy).

The server 101 is configured to create ML-PPP data pipe between system 10 (at the U interface) and server 101 (at the V interface). Such a data pipe is created per each system 10 in the network. In addition, server 101 receives the IPTV streaming video reaching it as IPoE, and transfers it to the respective destination in an appropriate protocol through ML-PPP data pipe, in addition to the VoIP and the data traffic.

When building an IPTV-capable broadband network, one important issue is VLAN design. VLANs limit the broadcast domain, potentially ensuring that subscribers cannot see each other's information and reducing network traffic. VLANs allow the network to logically segment the network into multiple communities by "tagging" each packet with a field which identifies packet ownership. VLAN usage is standardized as IEEE 802.1Q, and are sometimes called "VLAN tags" or "Q-tags". There are two fundamental VLAN design options:

1. Customer VLAN: In this model, there is a dedicated VLAN for each subscriber. This is also called the 1:1 model since there is one VLAN per subscriber.

2. Service VLAN: In this model, there is a dedicated VLAN for each service. This is also called the N:1 model since multiple subscribers share each VLAN.

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System 10 can be adopted for each of the two fundamental VLAN design options.

In addition, system 10 can be configured to support other possible Loop bonding techniques that are used to implement DSL bonding according to the G.998 series of ITU-T Recommendations, which simply increases the data rate in proportion to the number of bonded lines. Two bonded lines will double the data rate for both upstream and downstream. Likewise three bonded lines will triple the data upstream and downstream rate, and so on. This is independent of the DSL technology (ADSL, VDSL etc.). The following three different types of bonding offer multiplexing of various service data streams (Ethernet, ATM, TDM) over multiple DSL links:

Recommendation G.998.1 'ATM-based multi-pair bonding' describes a method for bonding of multiple digital subscriber lines (DSL) to transport an ATM payload beyond the rate/reach capability of a single DSL loop.

The bonding protocol allows the bonding of 2-32 loops (copper wire pairs) and supports dynamic removal and restoration of pairs without human intervention. The maximum one-way bonding delay will not exceed 2 ms.

Recommendation G.998.2 'Ethernet-based multi-pair bonding' describes a method for bonding of multiple digital subscriber lines (DSL) for Ethernet transport. This Recommendation builds on the IEEE 802.3ah-2004 methods and extends Ethernet transport over other xDSL technologies, including ADSL.

Recommendation G.998.3 'multi-pair bonding using time-division inverse multiplexing' describes a method for bonding of multiple Digital Subscriber Lines (DSLs) using Time-Division Inverse Multiplexing (TDIM). This Recommendation uses IEEE 802.3ah handshake for pair discovery,

parameter negotiation and setup. It allows the hitless addition and removal of pairs and the fast removal of a pair upon pair failure.

In addition to bandwidth aggregation and dynamic resource allocation, system 10 is configured to provide Quality of Service (QoS) management. The QoS implementation allows delivery of high-priority video and premium data traffic. The use of hierarchical scheduling for QoS allows bandwidth management between requests for a single end user and controlled bandwidth distribution between different user types.

When sharing network resources with other services, most services also needs some form of 'Quality of Service', in order to ensure the quality of the service can be what the end-user expects. Requirements on the network to support Quality of Service differ from service to service. For example a telephony service will have more stringent quality of service requirements then a more 'general' Internet access service (browsing websites). Usually the following "Quality of Service parameters" are used to express how the network can support a certain quality to a service (telephony, video, or internet):

Delay/Delay Variations (Jitter): Services that have to be delivered almost 'real-time' (like the VoIP telephony service) often have more stringent requirements regarding the delay and variation in delay than non Real-Time services (like file downloads). A VOD service is less susceptible to delay, since often the video stream is 'buffered' for several seconds in the player in order to be able to adjust hick-ups in the network.

Packet Loss: A low packet loss is usually more important for services that cannot retransmit their information when it was in error. This is the case with most of the 'real-time' services which do not have the time to do this (if they retransmit an erroneous packet the retransmission will come most likely to late to use, since that video or audio segment has already passed).

In order to make sure that delay (variation) and packet loss requirements can be fulfilled for specific traffic flows under network congestion conditions, system 10 implements "Quality of Service mechanisms". These mechanisms consist of implementing the tagging (marking) of certain types of traffic (e.g. voice- or internet-traffic) and using this to serve e.g., voice traffic with a higher priority than the internet traffic (which has to wait a bit longer than the voice-traffic to be transmitted).

The traditional packet scheduling mechanism on the Internet has been first-in, first-out (FIFO) scheduling, by which packets are transmitted in the same order in which they arrive in the output queue. FIFO is simple and easy to implement but cannot differentiate between multiple data flows; hence, FIFO cannot allocate specific performance bounds for a flow, or prioritize one flow over the others.

Weighted Fair Queuing (WFQ) is a scheduling discipline, according to which flow differentiation occurs in scheduling. In WFQ, each flow or traffic class is assigned a weight, and the rate at which a flow or a traffic class is serviced is proportional to its assigned weight. WFQ provides prioritization among unequally weighted traffic flows and fairness and protection among equally weighted traffic flows as per the max-min fair-share allocation scheme.

Packet dynamics in a network can make the network prone to occasional or constant congestion. At times when a network doesn't see traffic congestion, any scheduling scheme works, because no queues build. When some network congestion exists, however, queues build upon, and the scheduling mechanism determines the order in which the packets in the queue are serviced.

For the scheduling algorithm to deliver QoS, at a minimum it needs to be able to differentiate among the different packets in the queue and know

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each packet's service level. Such a scheduling algorithm should allow guarantees on performance bounds by allocating resources on a flow basis and/or by prioritizing one flow over the other. In addition, a scheduling algorithm is needed that provides fairness and protection among the flows with the same priority, such as all best-effort traffic flows.

Security in general is important for services that carry some privacy sensitive information (like the content of a telephone conversation or home banking), or content that has a certain commercial value (like on demand movies). These services need some level of protection so that only the intended recipient can receive and use this information. This type of security is usually implemented on a 'higher level' than by the network itself, often this is done by the (service related) client and server (like a software player or set top box for the on demand video). Network level security consists of more general security functions like some sort of "traffic separation" between different users by means of port based traffic switching or Virtual LANs and/or the possibility to 'bulk encrypt" all the traffic between user and central office. The segregation of traffic function is often used to make sure that traffic of customers served by one Service Provider do not interfere with the traffic generated by customers of a different Service Provider and is especially important for "open broadband networks" which give access to multiple Service Providers.

Most current internet-based services have low availability requirements as they are often free of charge and do not perform 'critical' services. However, this situation is changing as the existing services such as telephony and broadcast TV will also be offered over the Internet (Voice over IP, Digital TV over IP) via the different types of broadband networks. For these services often the user will have to pay a fee and has an expectation that

the availability is similar as the service that was offered in the 'traditional' way. The uninterrupted availability and reliability is provided by system 10 using its built-in redundancy.

Policy management allows operators to establish subscriber and service parameters that dynamically provide access to a choice of service levels, as well as a mechanism to better manage and bill for these services. System 10 supports dynamic, network control, according to policy, thereby helping service providers to deliver highly customized business and consumer broadband services while reducing total cost of network ownership. Policies can be created to account for a wide range of user and service attributes, such as user identity, user location, user service level, time of day, available network resources, or network-use restrictions.

In order to provide any predictability or guarantee for transport QoS, there must be some end-to-end control of how much traffic is allowed into each IP QoS service class. Even a strict priority queue does not provide guaranteed service if too much traffic is entered into it. This is why resource based admission control is required. The ability to deny a session by means of admission control is a powerful tool for the service provider. Some of the benefits provided are:

If there are n sessions in a service and session n+1 is denied, based on resource based admission control, the quality of the n established sessions is consistently protected. If an additional session n+1 is admitted, the service provider would risk facing n+1 unsatisfied subscribers who pay a premium fee for a guaranteed QoS service which in essence, is being degraded by faulty admissions.

Resource based admission control relates to bandwidth management (as bandwidth is the resource being controlled). An admission control function should combine policy based and resource based admission control. There

can be a range of non-resource based policies in place to support sophisticated business models of the service provider. Admission control decisions are combined policy based and resource based decisions.

System 10 can significantly reduce service providers' operational expenses by enabling automatic connection, configuration, and provisioning of initial broadband services, as well as allowing subscriber self-provisioning for adding new services or changing existing services once they have become a broadband customer. It allows provider staff at a central location to manage quality-sensitive triple play services such as VoIP and video. It automates a variety of tasks, thereby saving significant amounts of human hours, including management of: centralized Virtual Private Network (VPN, which is a network that uses a public telecommunication infrastructure, such as the Internet, to provide remote offices or individual users with secure access to their organization's network), firewall, firmware, and configuration administration, real time single-device management and automated tasks for mass CPE, new service provision and integration with provider billing systems.

System 10 simplifies provisioning and management of all IP-based services and devices at the customer premises for reduced errors and lower operational costs.

System 10 can also deliver differentiated service levels to different classes of subscribers and price them accordingly based on SLA, e.g., premium service or service packages.

System 10 can (optionally) monitor filter and prevent or block users' access to unsuitable content. When the filter is activated, users cannot open or link to sites that the filtering rules recognize as unsuitable. (e.g., pornographic sites). Filtering of incoming and outgoing email can also be provided. Since

different groups of users may require different filtering, System 10 enables the tailoring of individual subscriber's requirements. System 10 can also manage attempted access to blocked resources or emails containing inappropriate language or material. For example, if a keyword matching/blocking algorithm identifies a match, it might either not display the offending page or email at all or display it but with the offending content obscured or stripped out.

IP traffic accounting and network monitoring makes it easy to count custom IP packets and troubleshoot problems saving network administration efforts. It captures all, but count only useful data. It creates counting rules for a single host, for a subnet, for a specific group of hosts, it supports a traffic accounting per any IP protocol with splitting traffic per port numbers. It allows real-time visualization of traffic activity on graphic charts. The traffic counters or the custom packet headers can be stored in a database, thereby providing the ability to build various traffic reports or traffic traces per month or/and per day.

System 10 can also provide authentication services that are required for authorizing a service provider administrator to access all the remote configuration functions as described above. In addition authentication is required to let authorized subscribers to access data which is relevant to them.

Since software can generate traffic volume statistics based on the number and origin of the records passing through it, those statistics could then be used for capacity planning or as part of a network monitoring procedure, as well as Billing Mediation, used to convert one type of data to another, for billing purposes. It is used to process IP Detail Record (IPDR) which provides information about IP-based service usage

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Video streaming applications typically employ large buffers (between 30 seconds and several minutes) at the receiving end. This helps avoiding any delay, jitter or packet loss. As long as the required bandwidth is guaranteed, the receiving application should be able to effectively deal with any other QoS requirements. System 10 can provide file cashing, so as to obtain more efficient access to frequently-visited Internet pages by holding them in local memory.

The above examples and description have of course been provided only for the purpose of illustration, and are not intended to limit the invention in any way. As will be appreciated by the skilled person, the invention can be carried out in a great variety of ways, employing more than one technique from those described above, all without exceeding the scope of the invention.

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Claims:

1. Method for providing broadband services with assured QoS by Telecommunication companies to subscribers in a site over existing unshielded copper infrastructure in the local loop, comprising:

a) forming at least one manageable broadband link from all or a part of the telephone lines that are routed to said site and enabled to be used as xDSL lines, by aggregating all the bandwidth available on said xDSL lines;

b) provisioning said wideband services using said manageable broadband link to subscribers, by performing:

b.1) statistical multiplexing;

b.2) Dynamic Resource Allocation;

c) extending the delivery of the multicast content intended for simultaneous use by different subscribers, particularly video broadcasting, to reach said site; and

d) performing in-building distribution of said broadband services to each subscriber.

2. Method according to claim 1, wherein the broadband services include Triple Play.

3. Method according to claim 1, wherein the site is selected from the following group:

- apartment buildings;
- office buildings;
- Multi Dwelling Units (MDUs);
- Multi Tenant Units (MTUs);
- a campus deployment.

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4. Method according to claim 1, wherein telecommunication companies include:

- ILECs;

- CLECs;

- Service Providers;

- ISPs

5. Method according to claim 1, wherein the available bandwidth on the xDSL lines is aggregated using ML-PPP protocol.

6. Method according to claim 5, wherein whenever the ML-PPP is implemented via the U interface at the system side, the BRAS that supports ML-PPP is used as the ML-PPP termination for the subscriber's data traffic at the network side.

7. Method according to claim 6, wherein whenever the BRAS does not support ML-PPP or whenever a BRAS independent ML-PPP implementation is desired, a dedicated server is used for supporting the ML-PPP termination at the network side of the subscriber's data traffic.

8. Method according to claim 5, wherein whenever the network architecture for providing broadband services complies with TR-101, a dedicated server residing in the aggregation network over the V interface is used for forming a broadband ML-PPP between the V and U interfaces, based on multiple links of PPPoE.

9. Method according to claim 8, wherein the formed broadband ML-PPP is used for transferring data and voice.

10. Method according to claim 8, wherein the formed broadband ML-PPP is used for receiving the IPTV video streaming based on IPoE and for transferring the video streaming in an appropriate protocol over said broadband ML-PPP.

11. Method according to claim 1, wherein the broadband services are provisioned based on statistical multiplexing, according to different subscribers' and services' profiles at any given instance and on a corresponding dynamic resources allocation.

12. Method according to claim 1, wherein multicast streaming is extended until reaching the site and then splitting said streaming via the in-building distribution.

13. Method according to claim 1, wherein the wideband services are distributed among the subscribers in the site via one of the following means:

- Ethernet/LAN cables;
- Coax cable;
- Home PNA-3.0
- PowerLine;
- wireless communication; or
- any combination thereof.

14. Method according to claim 1, further comprising providing one or more of the following functions along with the broadband services:

- QoS Management;

- Resource Scheduling;
- Multicasting;
- Remote Configuration and Management;
- Authentication;
- Security;
- Policy Management;
- SLA Management;
- Redundancy;
- Admission Control;
- Traffic Accounting and Monitoring;
- Traffic Filtering;
- Billing Mediation;
- Broadcast Buffering;
- File Cashing; and
- any combination thereof.

15. Method according to claim 1, wherein the available bandwidth on the xDSL lines is aggregated using one of the G.998 series of ITU-T Recommendations.

16. Method according to claim 1, wherein the provisioning of broadband services complies with recommendations of the DSL Forum standards and different network architectures included therein, particularly as defined in the following Technical Reports (TRs):

- TR-25;
- TR-58;
- TR-59;

- TR-94;
- TR-101

17. System for providing broadband services with assured QoS by Telecommunication companies to subscribers in a site over existing unshielded copper infrastructure in the local loop, comprising:

a) circuitry and software for aggregating all the bandwidth available on all or a part of the telephone lines that are routed to said site and enabled to be used as xDSL lines, to form at least one manageable broadband link;

b) software for performing statistical multiplexing;

c) circuitry and software for performing Dynamic Resource Allocation;

d) circuitry and software for extending the delivery of the multicast content intended for simultaneous use by different subscribers, particularly video broadcasting, to reach said site; and

e) circuitry and software for in-building distribution of said broadband services to each subscriber.

18. System according to claim 17, in which the broadband services include Triple Play.

19. System according to claim 17, in which the site is selected from the following group:

- apartment buildings;
- office buildings;
- Multi Dwelling Units (MDUs);
- Multi Tenant Units (MTUs);
- a campus deployment.

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20. System according to claim 17, in which the telecommunication companies include:

- ILECs;

- CLECs;

- Service Providers;

- ISPs

21. System according to claim 17, in which the available bandwidth on the xDSL lines is aggregated using ML-PPP protocol.

22. System according to claim 21, including a BRAS that supports ML-PPP as the ML-PPP termination for the subscriber's data traffic at the network side.

23. System according to claim 22, further including a dedicated server for supporting the ML-PPP termination at the network side of the subscriber's data traffic, whenever the BRAS does not support ML-PPP or whenever a BRAS independent ML-PPP implementation is desired.

24. System according to claim 21, further including a dedicated server that resides in the aggregation network over the V interface, for forming a broadband ML-PPP between the V and U interfaces, whenever the network architecture for providing broadband services complies with TR-101.

25. System according to claim 17, comprising circuitry and software for extending multicast streaming until reaching the site and circuitry for splitting said streaming via the in-building distribution.

26. System according to claim 17, in which the wideband services are distributed among the subscribers in the site via one of the following means:

- Ethernet/LAN cables;
- Coax cable;
- Home PNA-3.0
- PowerLine;
- wireless communication; or
- any combination thereof.

27. System according to claim 17, further comprising circuitry and associated software for providing one or more of the following functions along with the broadband services:

- QoS Management;
- Resource Scheduling;
- Multicasting;
- Remote Configuration and Management;
- Authentication;
- Security;
- Policy Management;
- SLA Management;
- Redundancy;
- Admission Control;
- Traffic Accounting and Monitoring;
- Traffic Filtering;
- Billing Mediation;
- Broadcast Buffering;

- File Cashing; and

- any combination thereof.

28. System according to claim 17, in which the available bandwidth on the xDSL lines is aggregated using one of the G.998 series of ITU-T Recommendations.

29. System according to claim 17, in which the provisioning of broadband services complies with recommendations of the DSL Forum standards and different network architectures included therein, particularly as defined in the following Technical Reports (TRs):

- TR-25;

- TR-58;

- TR-59;

- TR-94;

- TR-101

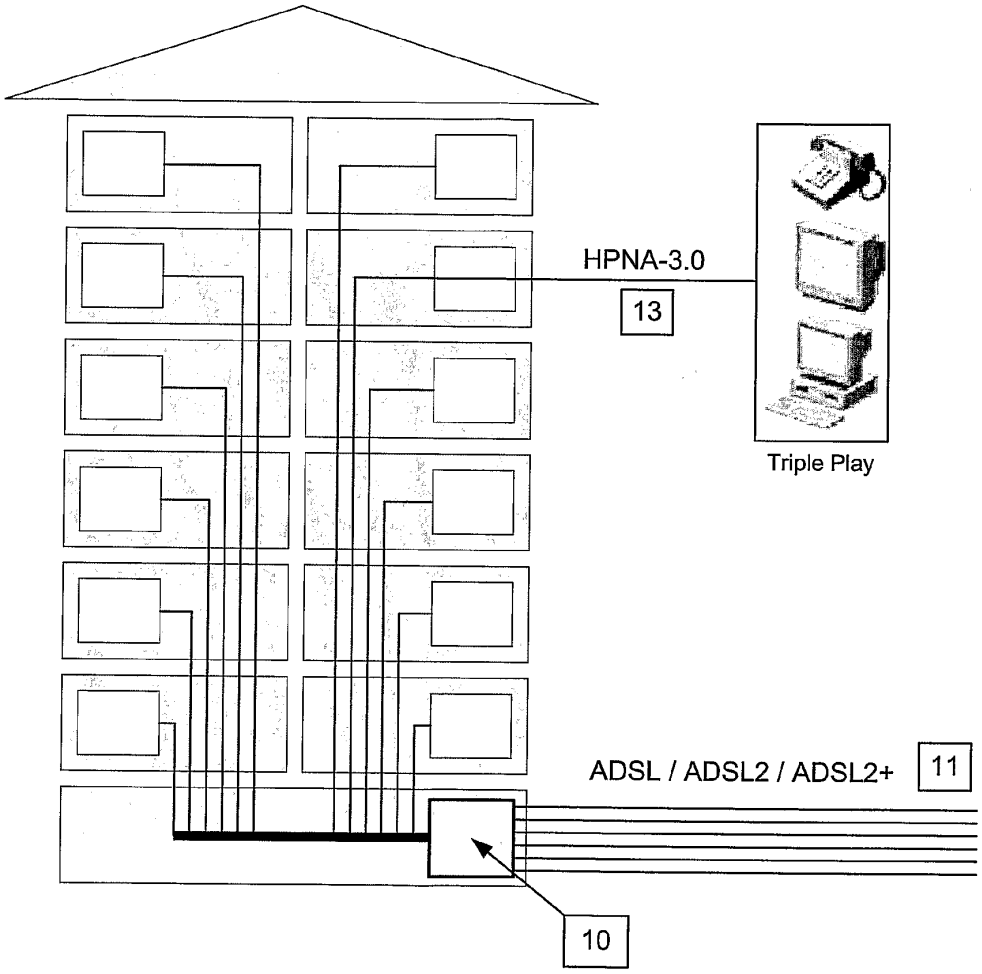


Fig. 1

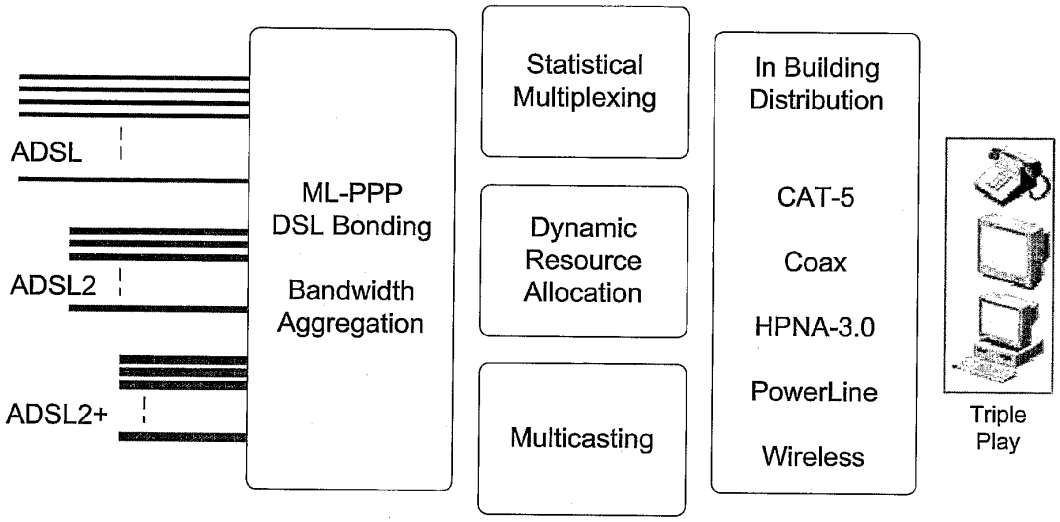

ADSL
ADSL2
ADSL2+
ML-PPP
DSL Bonding
Bandwidth
Aggregation
Statistical
Multiplexing
Dynamic
Resource
Allocation
Multicasting
In Building
Distribution
CAT-5
Coax
HPNA-3.0
PowerLine
Wireless
Triple
Play

Fig. 2

3/15

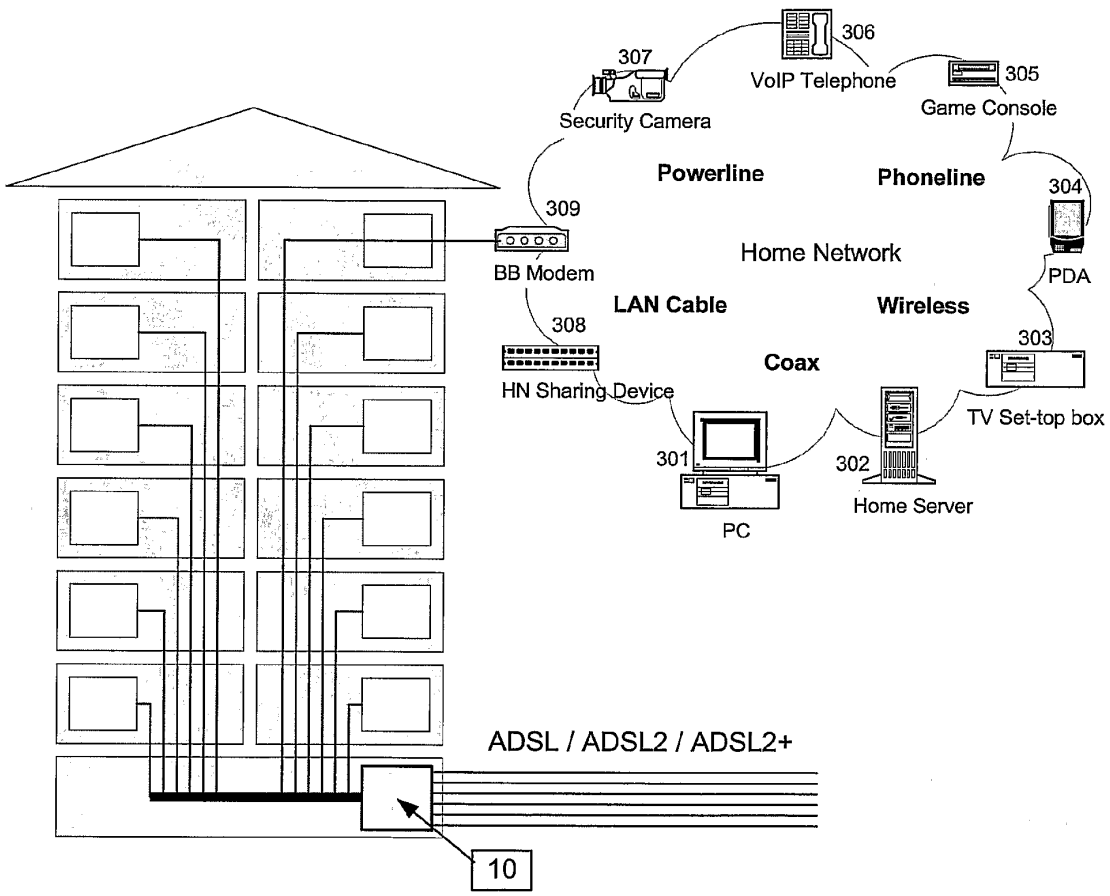

306
VoIP Telephone
307
Security Camera
305
Game Console
Powerline
Phoneline
304
309
Home Network
PDA
BB Modem
LAN Cable
Wireless
308
303
Coax
HN Sharing Device
TV Set-top box
301
302
Home Server
PC
ADSL / ADSL2 / ADSL2+
10

Fig. 3

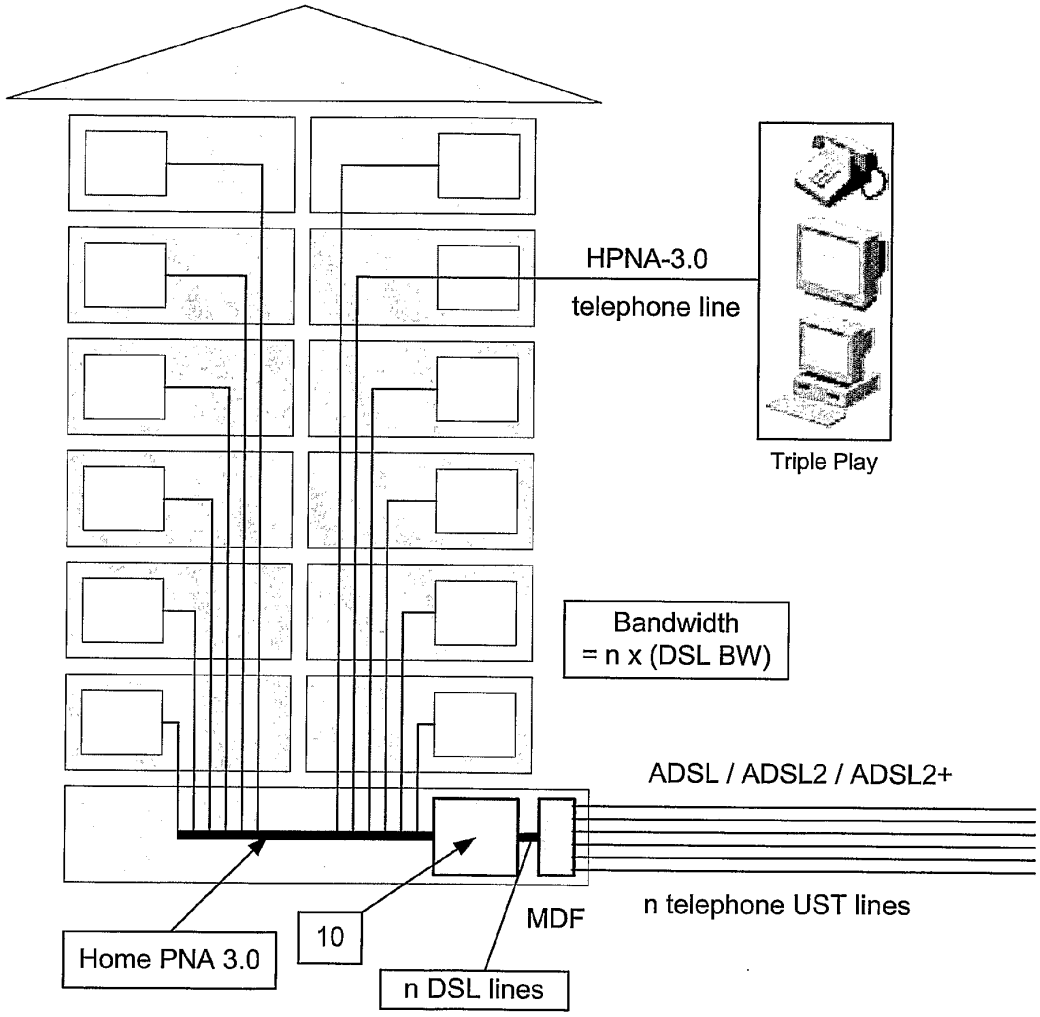

HPNA-3.0
telephone line
Triple Play
Bandwidth
= n x (DSL BW)
ADSL / ADSL2 / ADSL2+
n telephone UST lines
MDF
10
Home PNA 3.0
n DSL lines

Fig. 4A

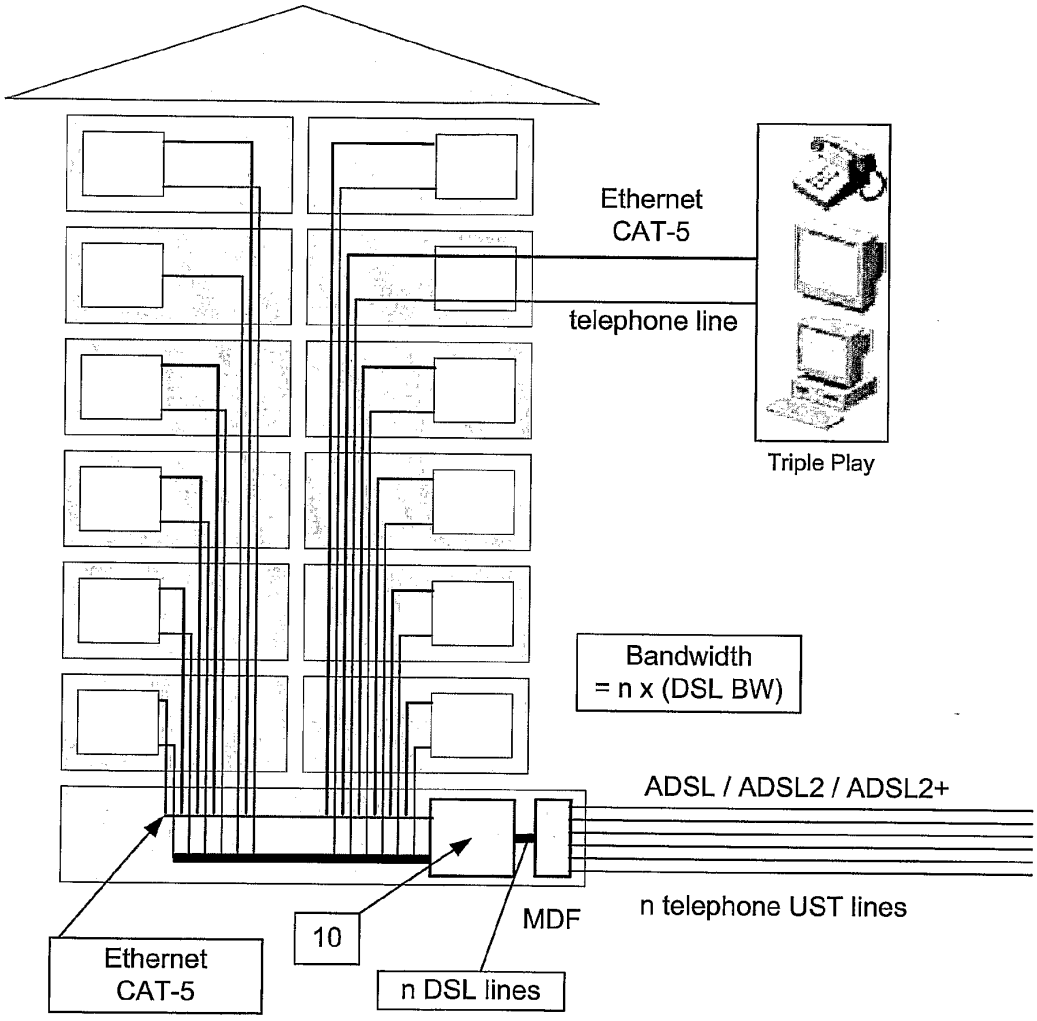

Ethernet
CAT-5
telephone line
Triple Play
Bandwidth
= n x (DSL BW)
ADSL / ADSL2 / ADSL2+
n telephone UST lines
MDF
10
Ethernet
CAT-5
n DSL lines

Fig. 4B

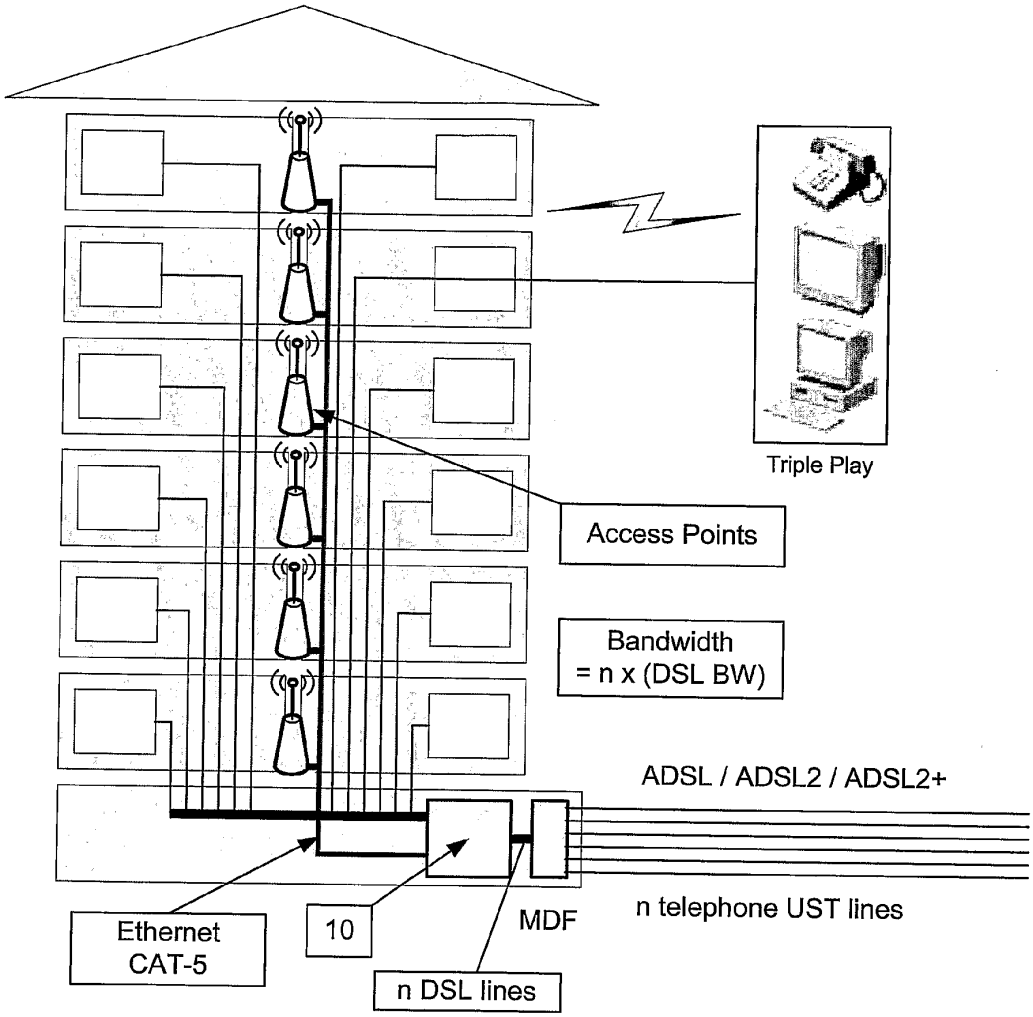

Triple Play
Access Points
Bandwidth
= n x (DSL BW)
ADSL / ADSL2 / ADSL2+
n telephone UST lines
MDF
Ethernet
CAT-5
10
n DSL lines

Fig. 4C

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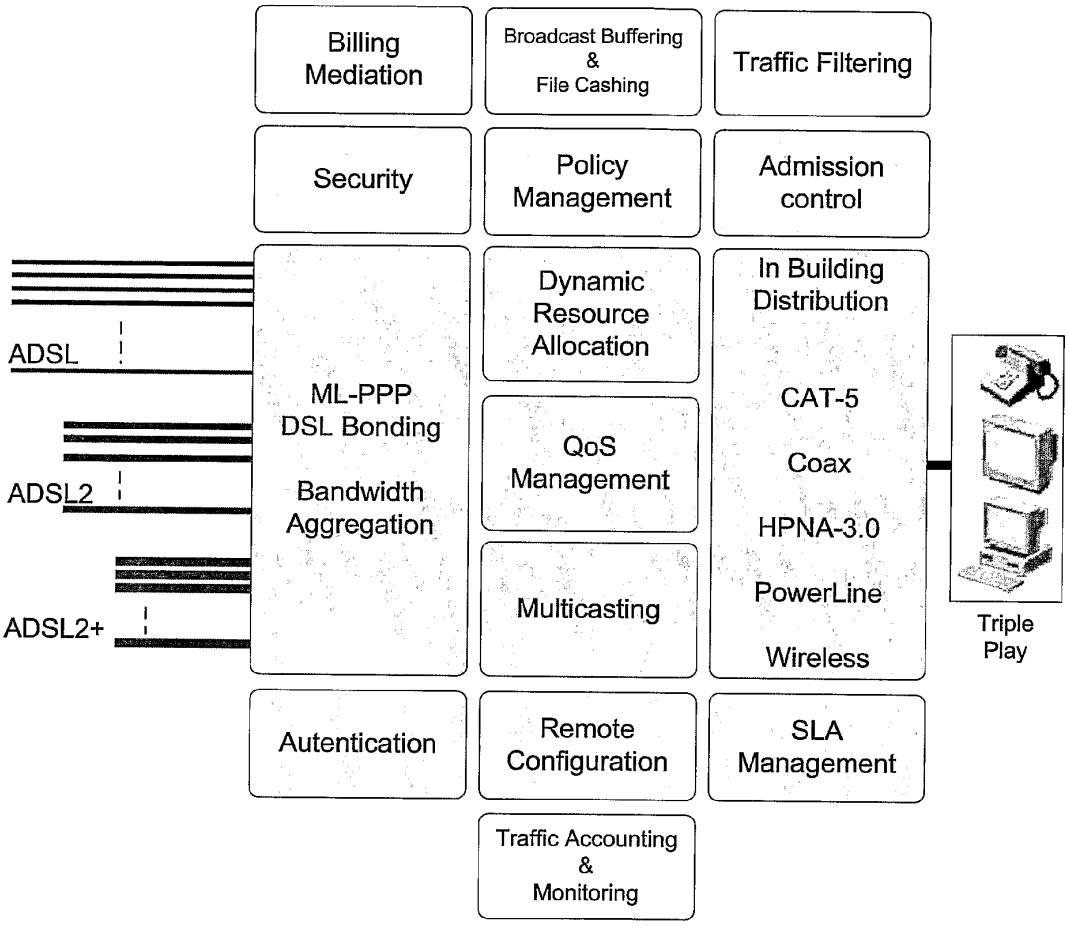

Billing Mediation
Broadcast Buffering & File Cashing
Traffic Filtering
Security
Policy Management
Admission control
ADSL
ADSL2
ADSL2+
ML-PPP DSL Bonding
Bandwidth Aggregation
Dynamic Resource Allocation
QoS Management
Multicasting
In Building Distribution
CAT-5
Coax
HPNA-3.0
PowerLine
Wireless
Triple Play
Autentication
Remote Configuration
SLA Management
Traffic Accounting & Monitoring

Fig. 5

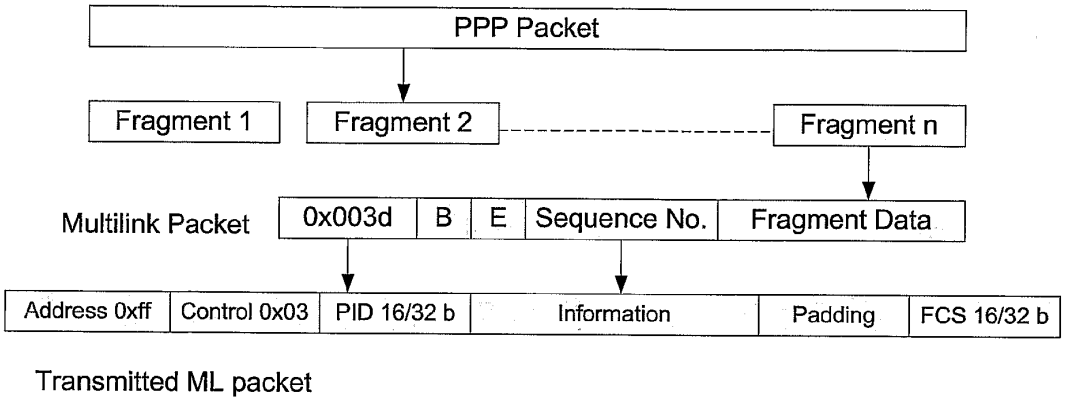

PPP Packet
Fragment 1
Fragment 2
Fragment n
Multilink Packet
0x003d
B
E
Sequence No.
Fragment Data
Address 0xff
Control 0x03
PID 16/32 b
Information
Padding
FCS 16/32 b
Transmitted ML packet

Fig. 6

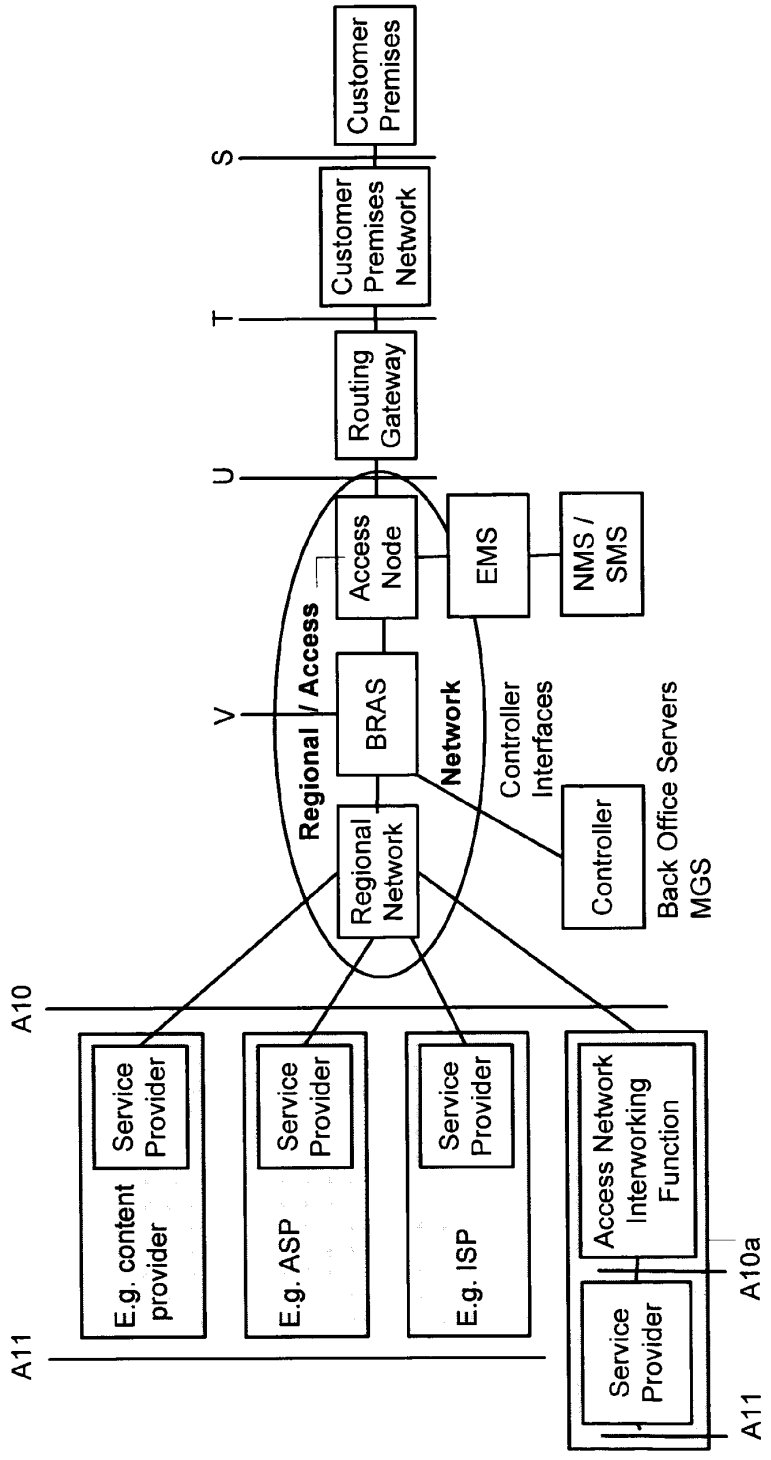


Fig. 7A

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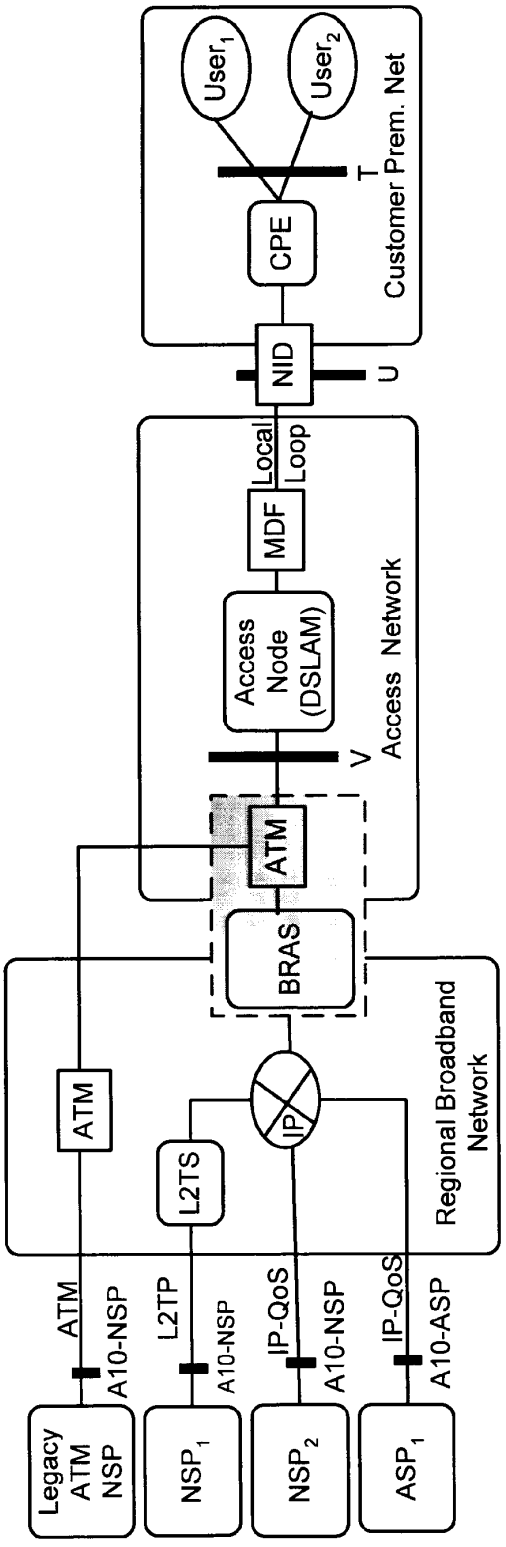


Fig. 7B

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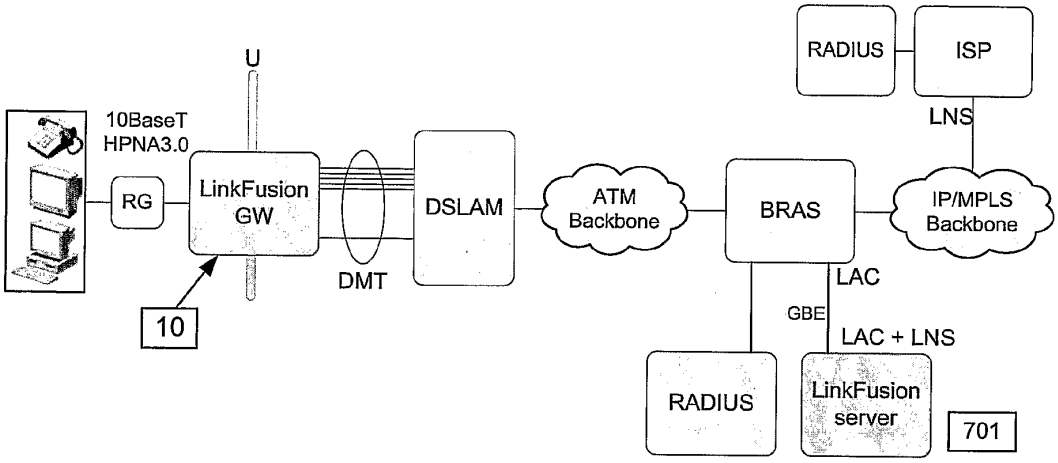

RADIUS
ISP
LNS
U
10BaseT
HPNA3.0
RG
LinkFusion
GW
DMT
DSLAM
ATM
Backbone
BRAS
IP/MPLS
Backbone
LAC
GBE
LAC + LNS
10
RADIUS
LinkFusion
server
701

Fig. 7C

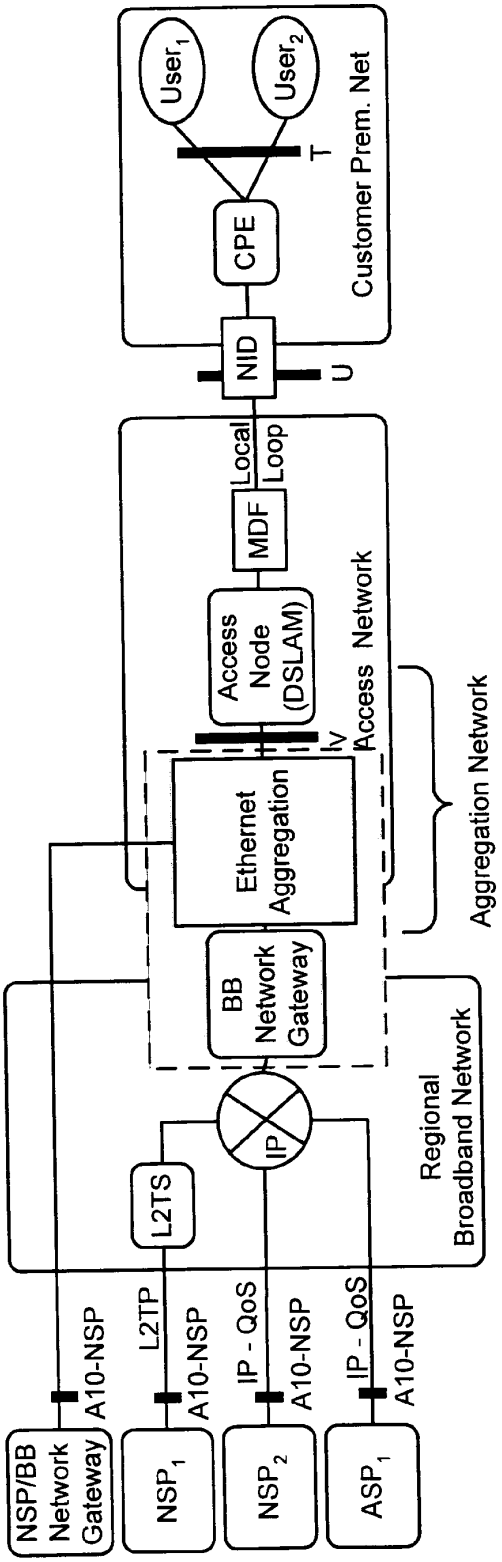


Fig. 7D

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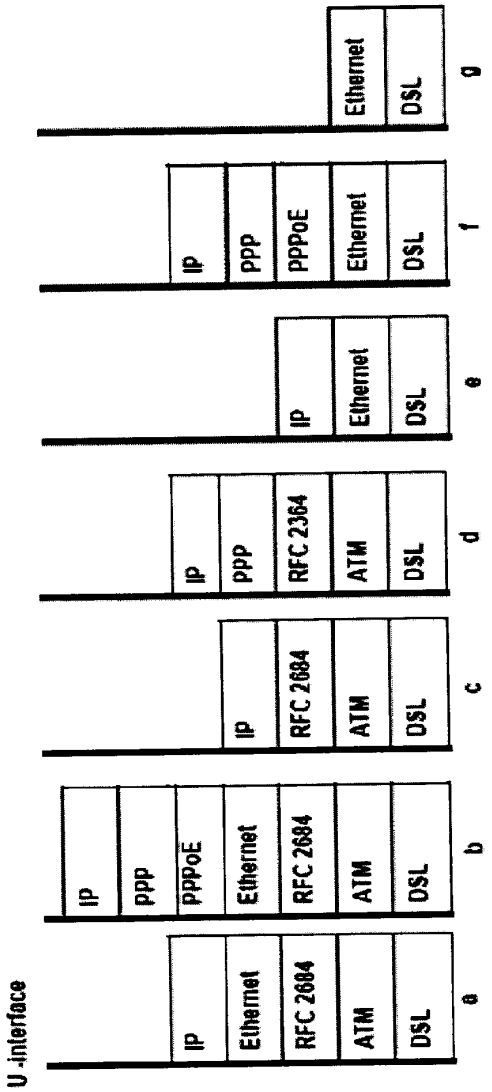


Fig. 8A

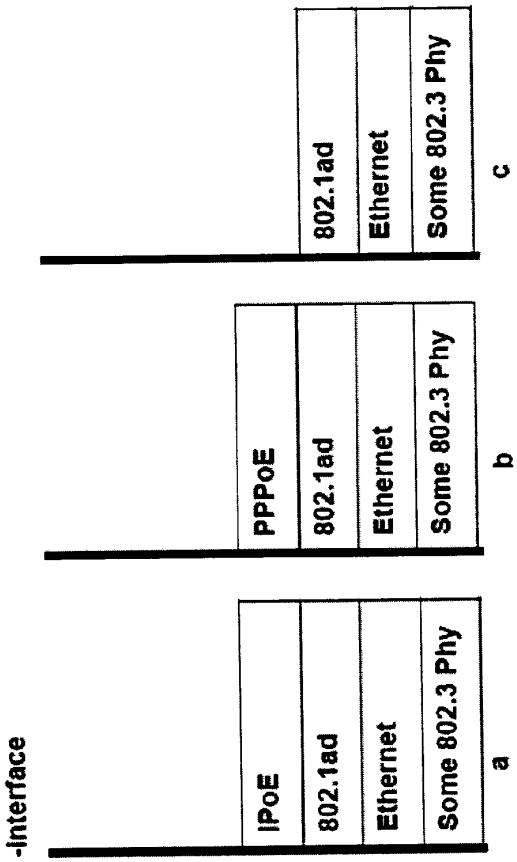


Fig. 8B

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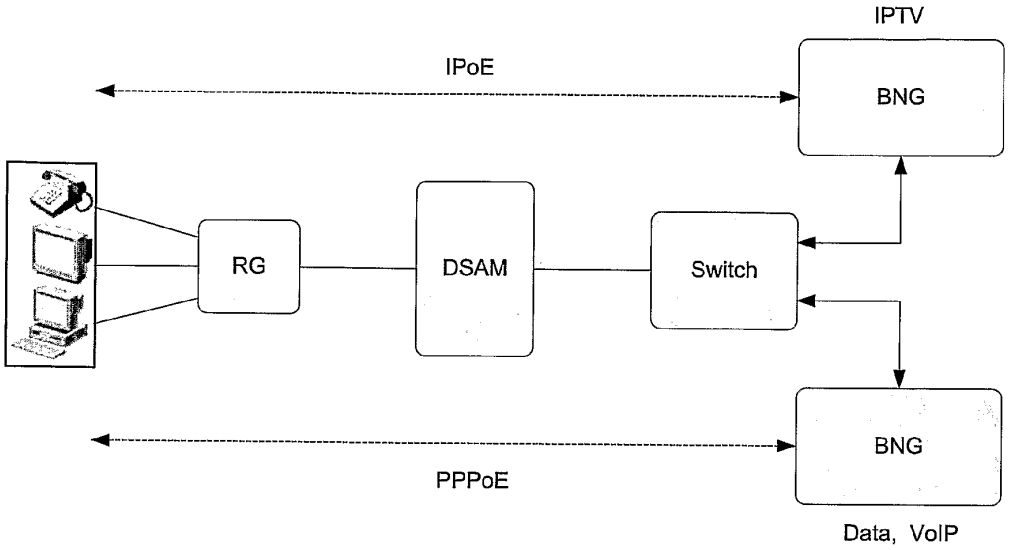


Fig. 9

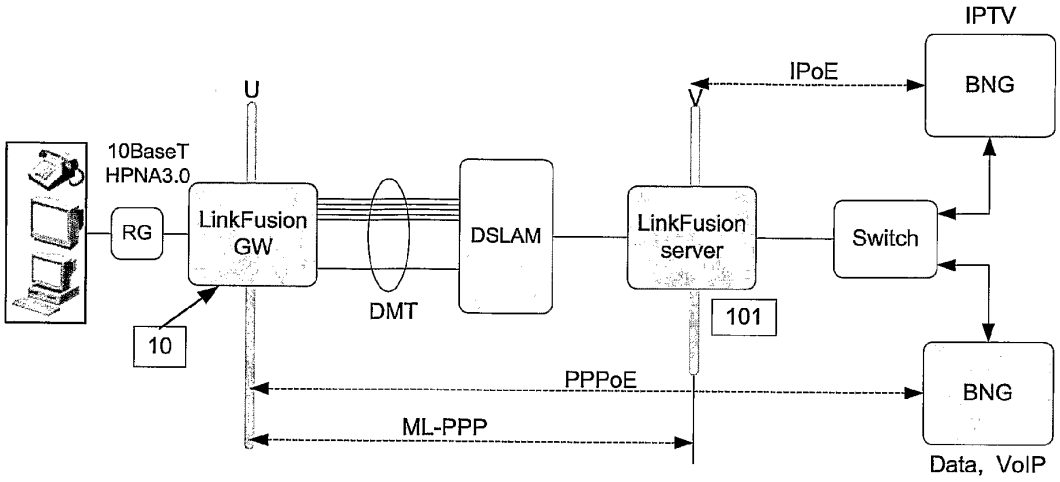

IPTV
IPoE
BNG
U
V
10BaseT
HPNA3.0
RG
LinkFusion
GW
DSLAM
LinkFusion
server
Switch
DMT
101
10
PPPoE
BNG
ML-PPP
Data, VoIP

Fig. 10

INTERNATIONAL SEARCH REPORT

International application No
PCT/IL2007/000470

A. CLASSIFICATION OF SUBJECT MATTER
INV. H04L12/28 H04L12/56 H04L29/06 H04M11/06 H04L12/18

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
H04L 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)
EPO-Internal, INSPEC, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2003/108063 A1 (JOSEPH MOSES S [US] ET AL) 12 June 2003 (2003-06-12) abstract figure 2 paragraph [0041] paragraphs [0046] - [0052] paragraphs [0055], [0057] paragraphs [0072] - [0078]	1-29
Y	EP 1 134 932 A1 (CIT ALCATEL [FR]) 19 September 2001 (2001-09-19) abstract paragraphs [0001] - [0003] paragraphs [0008] - [0010] paragraphs [0024] - [0026]	1-29

-/--

[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
29 August 2007	06/09/2007

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	Bonnet, Jérôme

Form PCT/ISA/210 (second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

International application No
PCT/IL2007/000470

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 1 094 646 A2 (VIRTUAL ACCESS IRELAND LTD [IE] VIRTUAL ACCESS TECHNOLOGY LTD [IE]) 25 April 2001 (2001-04-25) abstract figure 16 paragraphs [0119] - [0151]	1-29
A	SIF M ET AL: "OPTIMIZING THE BROADBAND AGGREGATION NETWORK FOR TRIPLE PLAY SERVICES : The aggregation network needs to be optimized and versatile to meet the combined demands of voice, video and high-speed Internet services" ALCATEL TELECOMMUNICATIONS REVIEW, ALCATEL, PARIS CEDEX, FR, October 2004 (2004-10), XP007010170 ISSN: 1267-7167 the whole document	1-29

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/IL2007/000470

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2003108063 A1	12-06-2003	NONE	
EP 1134932 A1	19-09-2001	AT 318036 T	15-03-2006
		DE 60026006 T2	27-07-2006
		ES 2253195 T3	01-06-2006
		US 2002010782 A1	24-01-2002
EP 1094646 A2	25-04-2001	AT 347223 T	15-12-2006
		DE 60032096 T2	05-07-2007
		GB 2362539 A	21-11-2001
		JP 2001197082 A	19-07-2001

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(26) Publication Language: English

(71) Applicant *(for all designated States except US)*: **ASSIA, INC.** [US/US]; 333 Twin Dolphin Drive, Redwood City, CA 94065 (US).

(72) Inventor; and

(75) Inventor/Applicant *(for US only)*: **RHEE, Wonjong** [KR/US]; 235 Berry Street, #606, San Francisco, CA 94158 (US).

(74) Agents: **VINCENT, Lester, J.** et al.; Blakely, Sokoloff, Taylor & Zafman LLP, 1279 Oakmead Parkway, Sunnyvale, CA 94085-4040 (US).

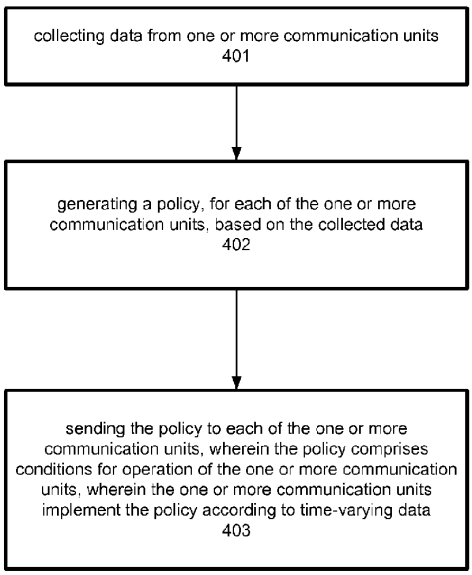
(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, 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, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

[Continued on next page]

(54) Title: METHOD, APPARATUS, AND SYSTEM FOR OPTIMIZING PERFORMANCE OF A COMMUNICATION UNIT BY A REMOTE SERVER

FIG. 4



(57) Abstract: Described herein are apparatus, system, and method for optimizing performance of one or more communication units by a remote server. The method comprises: collecting data from the one or more communication units; generating a policy, for each of the one or more communication units, based on the collected data; and sending the policy to each of the one or more communication units, wherein the policy comprises conditions for operation of the one or more communication units, wherein the one or more communication units implement the policy according to time- varying data. The system comprises: one or more communication units; and a server operable to communicate with the one or more communication units, wherein the server comprises: a memory; and a processor, coupled to the memory, and operable to perform the method discussed above.

WO 2013/070232 A1

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Declarations under Rule 4.17:

— *of inventorship (Rule 4.17(iv))*

Published:

— *with international search report (Art. 21(3))*

METHOD, APPARATUS, AND SYSTEM FOR OPTIMIZING PERFORMANCE OF A COMMUNICATION UNIT BY A REMOTE SERVER

FIELD OF THE INVENTION

[0001] Embodiments of the invention relate generally to the field of communication systems. More particularly, embodiments of the invention relate to method, apparatus, and system for optimizing performance of a communication unit by a remote server.

BACKGROUND

[0002] **Fig. 1** is an exemplary prior art communication system (CS) 100 with an access point (AP) 101 and one or more wireless stations $102_{1\text{-}N}$. The AP 101 exchanges user data with the one or more stations $102_{1\text{-}N}$ over wireless channels indicated by the arrows. The characteristics of the wireless channels and noise/interference are not constant and vary rapidly over time. For example, noise and interference levels from nearby noise/interference sources rapidly changes that cause the characteristics of the wireless environment to change. To cope with such rapid changes in the noise and interference levels, the CS 100 adapts transmission strategies to enhance performance of CS 100. One such known strategy is Adaptation Algorithm. The term "Adaptation Algorithm" herein refers to time-varying and environment-change-dependent transmission or control strategies for a CS. The adaptation algorithm is implemented in the AP 101 that adapts the wireless channels and noise/interference for communication with the one or more stations $102_{1\text{-}N}$.

[0003] For instance, the transmission rate of Institute of Electrical and Electronics Engineer (IEEE) 802.11g standard based WiFi communication system is rapidly adapted between 6Mbps and 54Mbps depending on the link quality and the rate selection method (also known as the rate adaptation algorithm) implemented in the WiFi communication system. Such rate adaptation algorithm within the WiFi communication system uses real-time data that are collected by the AP 101 of the WiFi communication system itself as an input to the adaptation algorithm 103, and a rate change in the link occurs when the real-time data meets a pre-defined criteria.

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[0004] A possible rate adaptation algorithm 103 is to change transmission rate of signals by the AP 101 within the WiFi communication system when the measured RSSI (Received Signal Strength Indication) becomes too large or too small for the current rate in use. Another possible adaptation algorithm 103 is to increase the transmission rate of signals by the AP 101 whenever packets are successfully received by the AP 101 and/or the one or more stations $102_{1\text{-}N}$ for M (e.g., 3) times and decrease rate whenever packets are unsuccessfully received for P (e.g., 2) times. While such adaptation algorithms 103 are required for WiFi communication systems to function properly, the rules and thresholds used by the methods are decided by a system designer of the WiFi communication system. Furthermore, a specific adaptation algorithm 103 is included in the firmware and loaded to the WiFi communication system. Hence, the adaption algorithm 103 is static in nature.

[0005] Therefore, the actual performance of the rate adaptation algorithm 103 is dependent on the assumptions made by the designer of the WiFi communication system. These assumptions may be static assumptions that do not change over time. The designer's assumptions, however, may be quite different from the actual operational environments and the WiFi communication system 100 may suffer from low performance due to non-ideal design of the static adaptation algorithm 103.

[0006] The impact of such differences in the assumptions can be significant in a large-scale deployment where many communication devices, such as AP's, independently operate. In such a deployment, every single communication environment is unique and the best adaptation method for each environment can be quite dependent on its own environment.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] Embodiments of the invention will be understood more fully from the detailed description given below and from the accompanying drawings of various embodiments of the invention, which, however, should not be taken to limit the invention to the specific embodiments, but are for explanation and understanding only.

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[0008] **Fig. 1** is a high level system of a typical communication system using a static adaptive algorithm.

[0009] **Fig. 2** is a system for optimizing performance of a WiFi communication system by a remote server, according to one embodiment of the invention.

[0010] **Fig. 3** is a system for optimizing performance of a Digital Subscriber Line (DSL) communication system by a remote server, according to one embodiment of the invention.

[0011] **Fig. 4** is a method performed by a remote server for optimizing performance of the communication system by the remote server, according to one embodiment of the invention.

[0012] **Fig. 5** is a method performed by the communication system for optimizing performance of the communication system by the remote server, according to one embodiment of the invention.

[0013] **Fig. 6** is a processor-based system having machine-readable storage medium with computer executable instructions for optimizing performance of the communication system by the remote server, according to one embodiment of the invention.

SUMMARY OF THE INVENTION

[0014] The following presents a simplified summary of the embodiments of the invention in order to provide a basic understanding of some aspects of the embodiments. This summary is not an extensive overview of the embodiments of the invention. It is intended to neither identify key or critical elements of the embodiments nor delineate the scope of the embodiments. Its sole purpose is to present some concepts of the embodiments of the invention in a simplified form as a prelude to the more detailed description that is presented later.

[0015] Embodiments of the invention relate to method, apparatus, and system for optimizing performance of a communication unit by a remote server. In one embodiment, the method for optimizing performance of one or more communication units by a remote server, comprises: collecting data from the one or more communication units; generating a policy, for each of the one or more communication units, based on the collected data; and sending the policy to each of

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the one or more communication units, wherein the policy comprises conditions for operation of the one or more communication units, wherein the one or more communication units implement the policy according to time-varying data.

[0016] In one embodiment, the system includes a machine-readable storage medium having computer executable instructions stored thereon that when executed cause a processor of a remote server to perform the method for optimizing performance of one or more communication units by the remote server.

[0017] In one embodiment, the communications system comprises a WiFi Access Point or a Digital Subscriber Line Access Multiplexer (DSLAM) to perform a method for optimizing performance of one or more communication units coupled to the WiFi Access Point or the DSLAM. In one such embodiment, the method comprises: sending data from one or more communication units to a remote server; receiving a policy from the remote server, wherein the policy comprises conditions for operation of the one or more communication units; and executing the policy by implementing one of first and second algorithms based on the conditions and time-varying data.

[0018] In one embodiment, the system includes a machine-readable storage medium having computer executable instructions stored thereon that, when executed, cause a processor, of the WiFi Access Point or the DSLAM, to perform the method for optimizing performance of one or more communication units discussed above.

[0019] In one embodiment, the apparatus comprises: a memory; and a processor, coupled to the memory, and operable to: analyze data from one or more communication units; generate a policy, for each of the one or more communication units, based on the collected data; and send the policy to each of the one or more communication units, wherein the policy comprises conditions for operation of the one or more communication units, wherein the one or more communication units implement the policy according to time-varying data.

[0020] In one embodiment, the system comprises: one or more communication units; and a server operable to communicate with the one or more communication units, wherein the server comprises: a memory; and a processor, coupled to the memory, and operable to: analyze data from the one or more

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communication units; generate a policy, for each of the one or more communication units, based on the collected data; and send the policy to each of the one or more communication units, wherein the policy comprises conditions for operation of the one or more communication units, wherein the one or more communication units implement the policy according to time-varying data.

[0021] In one embodiment, the communication unit comprises: a transmitter to send data to a remote server; a receiver to receive a policy from the remote server, wherein the policy comprises conditions for operation of the communication unit; and a processor to execute the policy by implementing one of first and second algorithms based on the conditions and time-varying data.

[0022] The embodiments of the invention are not limited to DSL or WiFi communication systems of the examples and embodiments above, but apply to any communication system that needs to run/execute adaptation algorithms (also called algorithms) to cope with real-time variations in link channel, noise, interference, and other factors that affect the communication performance. The policy generated by the remote server can be a result of analyzing hundreds (or even millions) of similarly situated communication units, or any other expert knowledge made available to the remote server. Generally, a communication unit does not have the processing power, storage space, or access to large amounts of data to generate the best policy to achieve optimal performance efficiency. Furthermore, a communication unit typically does not have access to historical data related to communications with other stations. Additionally, communication units may lose history data when there is power outage or user-initiated power cycling. The remote server resolves the above problems and provides an optimum policy for the communication units to use that can be based on analysis of a large amount of operational data of the communication units and other similarly situated communication units or any other expert knowledge.

[0023] While the summary of the invention has been described in conjunction with specific embodiments thereof, many alternatives, modifications and variations of such embodiments will be apparent to those of ordinary skill in the art in light of the following description. The embodiments of the invention are

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intended to embrace all such alternatives, modifications, and variations as to fall within the broad scope of the appended claims.

[0024] The following description and the annexed drawings set forth in detail certain illustrative aspects of the embodiments of the invention. These aspects, however, are only indicative of the various ways in which the principles of the embodiments of the invention may be employed. The embodiments of the invention are intended to embrace all equivalents in the form of alternatives, modifications, and variations that fall within the broad scope of the appended claims. Other advantages and novel features of the embodiments of the invention will become apparent from the following detailed description of the embodiments of the invention when considered in conjunction with the drawings.

DETAILED DESCRIPTION

[0025] Embodiments of the invention relate to method, apparatus, and system for optimizing performance of a communication unit by a remote server. As mentioned in the background section, the actual performance of the communication unit could be dependent on the assumptions made by the designer of the communication system. In one example, as provided in the background section, the actual performance of the WiFi rate adaptation algorithm is dependent on the assumptions made by the designer of the WiFi communication system. These assumptions may be static assumptions that do not change over time. The designer's assumptions, however, may be quite different from the actual operational environments and a WiFi communication system might suffer from low performance due to non-ideal design of the adaptation algorithm.

[0026] To overcome the above problem, the embodiments herein describe a method, system and apparatus that analyzes real-time and history of operational data related to a communication system and provides rules and conditions for the communication system to improve its performance. The rules and conditions specify the characteristics of the real-time and historical operational data such that the communication unit can select and use the most desired adaptation algorithm to use. In one embodiment, a remote server (also called an optimization center) is operable to collect and process large amounts of data related to the communication system and determine rules and conditions for the communication system that will

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improve the performance of the communication system. In one embodiment, the remote server collects data periodically and provides updated rules and conditions periodically for the communication system to adapt so that it may improve its performance. The embodiments herein are not limited to a communication system but can be used for any type of communication system that needs to be updated over time to improve its performance to changing environments.

[0027] The term "performance" herein refers to a combination of factors including data rate, throughput, power consumption, power, error rate, latency, jitter, etc. Improving performance of the communication system includes increasing data rate, throughput, reducing error rate and latency, improving jitter, power consumption, etc for the communicating system.

[0028] The technical effect of the embodiments discussed herein is the improvement of performance of a communication system (e.g., WiFi, Digital Subscriber Line (DSL), etc) by providing the communication system with rules and conditions that were previously not conceivable by the communication system due to lack of information and processing power needed to generate the rules and conditions. In one embodiment, a dedicated server (also referred as "remote server" or "optimization center") may be used to collect operational data related to the communication system, where the operational data may not be accessible or storable by the communication system itself (e.g., data from other communication units or old data that cannot be stored due to memory limitations) process the operational data and provide rules and conditions that when adapted by the communication system causes the performance of the communication system to improve.

[0029] For example, the remote server is operable to perform a statistical analysis of hundreds (or even millions) of communication systems working in a similar environment as the communication system of interest. In one embodiment, the remote server is operable to indicate to the communication system of interest how it can improve its overall performance, for example, by aggressively choosing higher transmission rates as opposed to conservatively choosing lower transmission rates.

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[0030] In one embodiment, when the WiFi communication system has the capability to decode and execute a pre-defined pseudo-code, the remote server can consider many more algorithms that are known to it and send the rules and/or conditions for the algorithm to be used by communication units. For example, the remote server develops a pseudo-code for the communication unit to execute so that it may improve its communication performance. In one embodiment, the pseudo-code is stored in the memory of the communication unit, example memory of an Access Point. The pseudo-code may be coded in any software coding language that is executable by the communication unit, example by a processor of the Access Point. In one embodiment, as the remote server becomes aware of newer and better algorithms, it enforces some of the communication systems to use one of them by sending a proper pseudo-code to the communication units of the communication system.

[0031] In the following description, numerous details are discussed to provide a more thorough explanation of embodiments of the present invention. It will be apparent, however, to one skilled in the art, that embodiments of the present invention may be practiced without these specific details. In other instances, well-known structures and devices are shown in block diagram form, rather than in detail, in order to avoid obscuring embodiments of the present invention.

[0032] Note that in the corresponding drawings of the embodiments, signals are represented with lines. Some lines may be thicker, to indicate more constituent signal paths, and/or have arrows at one or more ends, to indicate primary information flow direction. Such indications are not intended to be limiting. Rather, the lines are used in connection with one or more exemplary embodiments to facilitate easier understanding of a circuit or a logical unit. Any represented signal, as dictated by design needs or preferences, may actually comprise one or more signals that may travel in either direction and may be implemented with any suitable type of signal scheme.

[0033] In the following description and claims, the term "coupled" and its derivatives may be used. The term "coupled" herein refers to two or more elements which are in direct contact (physically, electrically, magnetically, optically, etc.).

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The term "coupled" herein may also refer to two or more elements that are not in direct contact with each other, but still cooperate or interact with each other.

[0034] As used herein, unless otherwise specified the use of the ordinal adjectives "first," "second," and "third," etc., to describe a common object, merely indicate that different instances of like objects are being referred to, and are not intended to imply that the objects so described must be in a given sequence, either temporally, spatially, in ranking or in any other manner.

[0035] **Fig. 2** is a system 220 for optimizing performance of a WiFi communication system 200 by a remote server 204, according to one embodiment of the invention. In one embodiment, the communication system 200 is similar to the communication system of **Fig. 1**, but is operable to communicate with the remote server 204 (interchangeably referred to as an optimization center). In one embodiment, the WiFi communication system 200 includes an Access Point (AP) 201 which comprises a processor 209, memory 210, and an adaptation algorithm 203 (which may be stored in the memory 210). In one embodiment, the AP 201 is operable to communicate with one or more stations $202_{1\text{-}N}$, where N is an integer equal to or greater than 1, by WiFi signals $211_{1\text{-}N}$. The term "adaptation algorithm" is interchangeably referred to as "algorithm."

[0036] While the embodiment of **Fig. 2** illustrates a WiFi communication system 200 with a single AP 201, multiple APs may be used in the WiFi communication system 200 which are operable to communicate with the remote server 204 via the Communication Channel 208. In the embodiments discussed herein the remote server 204 is not part of the communication system 200. In such an embodiment, the communication channel may be one of: the Internet, a TR-069 (Technical Report 069) compatible communications protocol; a Transmission Control Protocol/Internet Protocol (TCP/IP) communications protocol; a Simple Network Management Protocol (SNMP) communications protocol; an out-of-band telephone line protocol; a Digital Subscriber Line Ethernet over Coax (DSL EOC) communications protocol; a cable control channel communications protocol; a powerline control channel communications protocol; a Command Line protocol (CLI); via a wireless device; or via a mobile device.

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[0037] In one embodiment, the logic unit representing AP 201 and/or the stations $202_{1\text{-}N}$ can be at least one of the following communication units: a base station; a wireless Local Area Network (LAN) device; a DSLAM; a gateway; a performance enhancement device; a Digital Subscriber Line (DSL) Customer Premises Equipment (CPE) modem; an in-home powerline device; a Home Phoneline Network Alliance (HPNA) based device; an in-home coax distribution device; a G.hn (Global Home Networking Standard) compatible device; an in-home metering communication device; an in-home appliance communicatively interfaced with the LAN; a wireless femtocell base station; a wireless WiFi compatible base station; a wireless mobile device repeater; a wireless mobile device base station; a set-top box (STB)/set-top unit (STU) customer electronics device; an Internet Protocol (IP) enabled television; an IP enabled media player; an IP enabled gaming console; an Ethernet gateway; a computing device connected to the LAN; an Ethernet connected computer peripheral device; an Ethernet connected router; an Ethernet connected wireless bridge; an Ethernet connected network bridge; and an Ethernet connected network switch.

[0038] In one embodiment, the remote server 204 is operable to communicate with the AP 201 and/or with any or all of the stations $202_{1\text{-}N}$ via the communication Channel 208. In one embodiment the remote server 204 is a cloud server. In one embodiment, the remote server 204 comprises a processor 206, which may be one or more processors, a memory 207 for storing processor executable instructions, and a database 205 to manage data related to the communication system 200.

[0039] In one embodiment, the remote server 204 performs a method for optimizing performance of one or more communication units including the AP 201 and the stations $202_{1\text{-}N}$. In one embodiment, the remote server 204 is operable to collect data from the one or more communication units (AP 201 and/or the stations $202_{1\text{-}N}$). In one embodiment, the remote server 204 periodically collects data from the one or more communication units. The term "periodically" herein refers to regular intervals e.g., once a day, morning and evening of every day, etc.

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[0040] In one embodiment, the remote server 204 is operable to generate a policy, for each of the one or more communication units (AP 201 and/or the stations 202_{1-N}) based on the collected data. In one embodiment, the remote server 204 is operable to transmit/send the policy to each of the one or more communication units (AP 201 and/or the stations 202_{1-N}). The policy generated by the remote server 204 is a result of analyzing hundreds (or even millions) of similarly situated communication units. Generally, an AP does not have the processing power, storage space, or access to large amounts of data to generate the best policy to achieve optimal performance efficiency. Furthermore, an AP does not have access to historical data related to communication with other stations. Additionally, APs may lose data when there is power outage or user-initiated power cycling. The remove server 204 resolves the above problems and provides an optimum policy for the AP 201 to use based on analysis of large amount of operational data of the communication system 200 and other similarly situated communication systems.

[0041] Examples of similarly situated communication systems include communications systems having similar communication units. For example, an AP with same power, speed, and brand, and operating with similar (i.e., within 10%) number of stations. Similarly situated communication systems also include communications systems in different geographical areas.

[0042] In one embodiment, the remote server 204 transmits/sends the policy to each of the one or more communication units (AP 201 and/or the stations 202_{1-N}) periodically. For example, the remote server 204 may transmit/send the policy to each of the one or more communication units (AP 201 and/or the stations 202_{1-N}) when the bandwidth usage of the AP 201 is low (e.g., the AP 201 is operating less than 50% of its capacity to serve communication units) so that it may implement the new policy sent by the remote server 204.

[0043] In one embodiment, the policy comprises rules and/or conditions for operation of the one or more communication units (AP 201 and/or the stations 202_{1-N}). For example, the policy comprises first and second algorithms for adapting the AP 201 to improve its performance. In one embodiment, the one or more communication units (AP 201 and/or the stations 202_{1-N}) implement the policy

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according to time-varying data. In one embodiment, the time-varying data comprises location information, current time, and operational data of the one or more communication units (AP 201 and/or the stations 202_{1-N}). In one embodiment, the location information is determined from a Global Positioning System (GPS) device or setup. The embodiments herein are not limited to two algorithms, but any number of algorithms may be used.

[0044] In one embodiment, the communication unit (AP 201 and/or the stations 202_{1-N}) comprises a transmitter to send data to the remote server 204; a receiver to receive a policy from the remote server 204; and a processor to execute the policy by implementing one of first and second algorithms based on the conditions and time-varying data. The communication units generally do not have the capability in terms of processing resources, access to historical operational data, access to operational data of other similarly situated communication units, etc. Therefore, the prior art communication units cannot use such information for improving their performance. The transmitter discussed above provides data to a central location, i.e. the remote server 204, that has the capability in terms of processing resources, access to historical operational data, access to operational data of other similarly situated communication units, etc, so that it may use such information generate rules and conditions for operating the communication units with enhanced performance. These rules and conditions were previously not conceivable by the communication system (e.g., communication system of **Fig. 1**) due to lack of information and processing power needed to generate the rules and conditions. The remote server 204, after computing the rules and conditions, provides the rules and conditions to the processors of the communication units, wherein the processors executes their respective policies by implementing one of first and second algorithms based on the rules and/or conditions and time-varying data.

[0045] In one embodiment, the one or more communication units (AP 201 and/or the stations 202_{1-N}) are operable to receive the policy along with one of the first and second algorithms based on the conditions and/or the time-varying data, wherein the first and second algorithms did not exist in the one or more

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communication units (AP 201 and/or the stations 202_{1-N}) prior to being provided by the remove server 204. In such an embodiment, the remote server 204 installs a new algorithm 203 in the AP 201, where the new algorithm is executed by the processor 209 of the AP 201.

[0046] In one embodiment, the one or more communication units (AP 201 and/or the stations 202_{1-N}) are operable to receive the policy and implement one of first and second algorithms based on the rule and/or conditions and/or the time-varying data, wherein the first and second algorithms previously existed in the one or more communication units (AP 201 and/or the stations 202_{1-N}). In such an embodiment, the remote server provides recommendations to the communication units (AP 201 and/or the stations 202_{1-N}) to use either the first or second algorithm so the communication system 200 may improve its performance.

[0047] The conditions may include at least one of: choice of selecting one of the first or second algorithms based on current SNIR (Signal to Noise and Interference Ratio); choice of selecting one of the first or second algorithms based on current time; choice of selecting one of the first or second algorithms based on operational data of the one or more communication units; and choice of selecting one of the first or second algorithms based on location information. In other embodiments, other conditions may be used in conjunction or absence to the above listed conditions. The rules may include equations, when executed in the algorithms, will change how the conditions are evaluated by the algorithms.

[0048] In one embodiment, the remote server 204 generates the policy by performing analysis on the collected data, wherein the collected data comprises operational information and historical data about each of the one or more communication units. In one embodiment, the remote server 204 applies the analysis to generate conditions for when to implement one of the first and second algorithms. In one embodiment, the remote server 204 generates the policy by generating a pseudo-code or code for an adaption algorithm to be executed on the one or more communication units (AP 201 and/or the stations 202_{1-N}).

[0049] In one embodiment, the first algorithm comprises: monitoring received signal strength indication (RSSI); and adapting a data rate according to a

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mapping of the RSSI from a lookup table. In one embodiment, the second algorithm comprises: counting a first number of consecutive successful transmissions from the one or more communication units to other communication units; counting a second number of consecutive failed transmissions from the one or more communication units to other communication units; adjusting a data rate when the first number exceeds a first threshold; and adjusting the transfer rate when the second number exceeds a second threshold. In other embodiments, other algorithms may be used for first and second algorithms.

[0050] The following is an exemplary embodiment showing the process of determining an optimum algorithm by the remote server 204. In one embodiment, the remote server 204 selects one of the first or second algorithms for the communication units (AP 201 and/or the stations $202_{1\text{-}N}$) to achieve optimal performance efficiency for the communication system 200. In one embodiment, first algorithm determines data transmission rates for the communication units based on RSSI while the second algorithm determines data transmission rates based on a number of consecutive successful transmissions and on a number of consecutive failed transmissions. As mentioned above, in one embodiment, the communication units (AP 201 and/or the stations $202_{1\text{-}N}$) have the first and second algorithms previously stored, but do not know which algorithm is more efficiency for the communication system 200. In such an embodiment, the remote server 204 provides recommendations to the communication units about which algorithm to use.

[0051] In one embodiment, in the first algorithm the communication units (AP 201 and/or the stations $202_{1\text{-}N}$) monitor the RSSI in real-time and adapts their transmission rates according to the instantaneous RSSI value using a mapping table (Table 1) as shown below.

RSSI value	Rate
-92dBm or below	6Mbps
-92dBm~-90dBm	9Mbps
-90dBm~-88dBm	12Mbps

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-88dBm~-86dBm	18Mbps
-86dBm~-84dBm	24Mbps
-84dBm~-82dBm	36Mbps
-82dBm~-80dBm	48Mbps
-80dBm or above	54Mbps

Table 1: RSSI to rate mapping for first algorithm

[0052] Table 1 is only shown as an example and a person skilled in the art would realize that the communication units may use different rates for different RSSI values other than the ones shown above.

[0053] In one embodiment, the second algorithm for the communication units (AP 201 and/or the stations $202_{1\text{-}N}$) uses a higher data rate after K (e.g., 10) consecutive successful transmissions, and uses a lower data rate after M (e.g., 2) consecutive failed transmissions. In one embodiment, the communication units (AP 201 and/or the stations $202_{1\text{-}N}$) provide to the remove server 204 operational data including RSSI, SNR, rate used for transmitting a packet, corresponding result on successful packet delivery, and other relevant data collected in real-time. In one embodiment, communication units (AP 201 and/or the stations $202_{1\text{-}N}$) may accumulate such data within the communication units (AP 201 and/or the stations $202_{1\text{-}N}$) and then send the accumulated data to the remote server 204. In one embodiment, the data transmitted to the remote server 204 is non-real-time data because it is sent after some time (e.g., end of the day).

[0054] In one embodiment, the remote server 204 stores such data in its database 205 and performs a full analysis based on all the stored data and any other knowledge available at the remote server 204. In one embodiment, the other knowledge includes similar statistics, as those provided by the communication units (AP 201 and/or the stations $202_{1\text{-}N}$) to the remote server 204, from other similar communication units in other similar geographical localities.

[0055] In one embodiment, the remote server 204 determines the presence of intermittent high-power interference from other near-by WiFi systems. When

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other WiFis' high-power packets collide with the communication system 200's packet, the packet is lost regardless of the rate selection. In one embodiment, the remote server 204 determines that other noise or interference is never observed for the communication system 200, and concludes that it is best to adapt rates for the communication units (AP 201 and/or the stations $202_{1\text{-}N}$) as a function of channel strength, or RSSI, only. In such an embodiment, the remote server 204 sends a control signal to communication units (AP 201 and/or the stations $202_{1\text{-}N}$) asking the communication units (AP 201 and/or the stations $202_{1\text{-}N}$) to use the first algorithm all the time instead of the second algorithm.

[0056] In one embodiment, the remote server 204 determines that there is no high-power WiFi interference at all, but channel changes faster than typical static indoor wireless channel (possibly due to people moving around the AP 201). For example, the channel variation tends to be faster between noon and midnight. In such an embodiment, the remote server 204 concludes that it is best to use the second algorithm instead of the first algorithm by the communication units (AP 201 and/or the stations $202_{1\text{-}N}$). In one embodiment, the remote server 204 may determine optimum values for K and M to be used by the communication units (AP 201 and/or the stations $202_{1\text{-}N}$) in different times of the day. For example, K=10 and M=1 between noon and midnight; and K=20 and M=2 between midnight and noon.

[0057] In one embodiment, the remote server 204 sends a control signal to communication units (AP 201 and/or the stations $202_{1\text{-}N}$) asking communication units (AP 201 and/or the stations $202_{1\text{-}N}$) to use the second algorithm with the optimized K and M values depending on time in the day. In case the WiFi communication system 200 is not capable of changing the values of K and M as a function of time, the remote server 204 can send two control signals per day, one at noon and another at midnight.

[0058] In one embodiment, when the WiFi communication system 200 has the capability to decode and execute a pre-defined pseudo-code, the remote server 204 can consider many more algorithms that are known to it and send the rules and/or conditions for the algorithm to be used by communication units (AP 201

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and/or the stations 202_{1-N}). In one embodiment, the remote server 204 develops a pseudo-code for the communication unit to execute so that it may improve its communication performance. In one embodiment, the pseudo-code is stored in the memory of the communication unit, example memory 210 of the AP 201. The pseudo-code may be coded in any software coding language that is executable by the communication unit, example by the processor 209 of the AP 201. In one embodiment, as the remote server 204 becomes aware of newer and better algorithms, it enforces some of the communication systems to use one of them by sending a proper pseudo-code to the communication units (AP 201 and/or the stations 202_{1-N}) of the communication system 200.

[0059] **Fig. 3** is a system 320 for optimizing performance of a Digital Subscriber Line (DSL) communication system 300 by the remote server 204, according to one embodiment of the invention. The embodiment of **Fig. 3** is similar to the embodiment of **Fig. 2** in concept, but applicable for DSL systems. The embodiments of the invention are not limited to DSL or WiFi communication systems, but apply to any communication system that needs to run/execute adaptation algorithms (also called algorithms) to cope with real-time variations in link channel, noise, interference, and other factors that affect communication performance.

[0060] In one embodiment, the DSL communication system 320 comprises a Digital Subscriber Line Access Multiplexer (DSLAM) 301 that connects to one or more Customer Premises Equipment (CPEs) 302_{1-N} by means of DSL signals 304_{1-N}, where N is an integer equal to or greater than 1. In one embodiment, the remote server 204 performs a method for optimizing performance of the one or more communication units including the DSLAM 301 and the CPEs 302_{1-N}. In one embodiment, the remote server 204 is operable to collect operational data from the one or more communication units (DSLAM 301 and/or the CPE 302_{1-N}). In one embodiment, the remote server 204 periodically collects operational data from the one or more communication units.

[0061] In one embodiment, the operational data collected by the remote server 204 includes at least one of: band preference indication; margin cap mode

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indication; indication that margin per tone should be kept smaller than the maximum SNR (Signal to Noise Ratio) margin; service priorities pertaining to net data rate; service priorities pertaining to excess margin; service priorities pertaining to excess margin per tone; service priorities pertaining to delay; service priorities pertaining to impulse noise protection; indication of loading algorithms used with a first DSL system; indication of power allocation algorithms used with the first DSL system; maximum attainable data rate; current data rate; margin; channel attenuation per tone; average attenuation; quiet line noise per tone; active line noise per tone; SNR per tone; transmitted PSD per tone; downstream power back-off shaped parameters (DPBOSHAPED); upstream power back-off shaped parameters (UPBOSHAPED); echo response; band preference; margin cap mode; Forward Error Correction (FEC) count; code violation count; errored seconds; severely errored seconds; number of retraining count; current delay; error distributions; current impulse noise protection; or FEC and interleaving parameters. The above listed operational data is not an exclusive list. More operational data may be used by the remote server 204 to compute rules and/or conditions for the communication units.

[0062] In one embodiment, the remote server 204 collects configuration parameters associated with the one or more communication units. The configuration parameters include at least one of: maximum nominal power spectral density (MAXNOMPSD); maximum nominal aggregate transmit power (MAXNOMATP); power cutback (PCB); DPBOSHAPED; UPBOSHAPED; fine gains; gi; transmit spectral scaling factors; tssi; power spectral density mask (PSDMASK); power spectral density level; maximum received power (MAXRXPWR); upstream power "back-off" parameters (UPBOKLE); margin cap mode; carrier mask (CARMASK); minimum impulse noise protection (MININP); maximum delay (MAXDELAY); target margin (TARSNRM); minimum SNR margin (MINSNRM); maximum SNR margin (MAXSNRM); band preference indication (PREFBAND); target data rate; minimum data rate; maximum data rate; FEC and interleaving parameters; per tone bit cap (BCAP[n]); per tone target margin (TARSNRM[n]); reference noise (REFNOISE). The above listed configuration parameters is not an exclusive list. More configuration parameters

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may be used by the remote server 204 to compute rules and/or conditions for the communication units.

[0063] As discussed with reference to **Fig. 2**, the remote server 204 of **Fig. 3** is operable to generate a policy, for each of the one or more communication units (DSLAM 301 and/or the stations $302_{1\text{-}N}$), based on the collected operational data, according to one embodiment. In one embodiment, the remote server 204 is operable to transmit/send the policy to each of the one or more communication units (DSLAM 301 and/or the CPE $302_{1\text{-}N}$). The policy generated by the remote server 204 is a result of analyzing hundreds (or even millions) of similarly situated communication units. The DSLAM 301 does not have the processing power, storage space, or access to large amounts of data to generate the best policy to achieve optimal performance efficiency. Furthermore, DSLAM 301 does not have access to historical data related to communication with other CPEs connected to other DSLAMs. Additionally, DSLAM 301 may loose data when there is power outage or user-initiated power cycling. The remote server 204 resolves the above problems and provides an optimum policy for the DSLAM 301 to use based on analysis of large amount of operational data of the communication system 300 and other similarly situated communication systems. The optimum policy can be determined based on expert knowledge outside of the communication system where the expert knowledge can be obtained from lab testing, simulation or any other research methods. The policy can be adaptively modified even after the full deployment of the communication system, and hence does not suffer from limited knowledge that is used at the time of manufacturing the communication system. In the embodiments discussed herein the remote server 204 is not part of the communication system 300.

[0064] In one embodiment, when the DSL communication system 300 has the capability to decode and execute a pre-defined pseudo-code, the remote server 204 can consider many more algorithms that are known to it and send the rules and/or conditions for the algorithm to be used by communication units (DSLAM 301 and/or the CPEs $302_{1\text{-}N}$). In one embodiment, the remote server 204 develops a pseudo-code for the communication unit to execute so that it may improve its

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communication performance. In one embodiment, the pseudo-code is stored in the memory of the communication unit, example memory 310 of the DSLAM 301. The pseudo-code may be coded in any software coding language that is executable by the communication unit, example by the processor 309 of the DSLAM 301. In one embodiment, as the remote server 204 becomes aware of newer and better algorithms, it enforces some of the communication units to use one or more of them by sending a proper pseudo-code to the communication units (DSLAM 301 and/or the CPEs $302_{1\text{-}N}$) of the communication system 300.

[0065] Following is an exemplary embodiment of how the remote server 204 can improve the performance of a DSL system. In DSL systems, for example the system 300, downstream (DS) margin is an important line performance metric that can be monitored by CPEs $302_{1\text{-}N}$ in real-time. In general, a higher margin indicates an exponentially smaller chance of errors for the delivery of video or data packets over DSL links $304_{1\text{-}N}$. When the margin becomes very small, typically below 0dB, the link will experience errors that can cause serious impacts on packet delivery to the CPEs $302_{1\text{-}N}$. To prevent continuation of such an unreliable link quality over a long time, CPEs $302_{1\text{-}N}$ can initiate a retraining procedure and improve the operation conditions. The retraining procedure may take 20 to 60 seconds. In one embodiment, the above feature of DSL systems is implemented by CPEs $302_{1\text{-}N}$ monitoring DS margins and initializing a retraining process when the margin becomes below a pre-configured threshold value 'T.' Conventionally, 'T' is set to 0dB and controlled via the DSL line's profile.

[0066] The remote server 204 may collect operational and performance data of the DSL system 300, analyze the historical data (operational and performance data) associated with the DSL system 300, and determine the best estimated value of 'T' for each line and applies the value to each line.

[0067] The term "line" herein refers to a communication link (wired or wireless) between the DSLAM 301 and the corresponding CPE. The value of 'T' may be analyzed per-line basis by the remote server 204. Different values of 'T' can be applied by the remote server 204 to different DSL lines depending on their historical and environmental characteristics.

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[0068] Each CPE among the CPEs $302_{1\text{-}N}$ applies an algorithm to tune its performance. For example, the CPE applies a rule and/or condition to adapt the value of 'T' in real-time as a function of the real-time data (operational and performance) that is available in the corresponding CPE. The CPEs $302_{1\text{-}N}$ are operable to apply the following rules and conditions. If video traffic is observed by the CPE over the line for more than t_1 (e.g., 1 minute), then the CPE updates the value of 'T' to 'T_1' (e.g., 2dB). Such a rule allows the CPE to react fast on pixelization problems associated with video traffic. In this example, the conditions are the choice of 't_1' and 'T_1', while the rule is the "if, then" equation. Typically each retraining process of the CPE causes discontinuation/interruption of video and data services for a short time (e.g., 10~45 seconds), but such an interruption can be preferable to a persistent pixelization problem of the video traffic for several minutes or more. If no video traffic is observed by the CPE for more than 't_2' (e.g., 10 minutes) then the CPE updates the value of 'T' to 'T_2' (e.g., 0dB). In this example, the conditions are the choice of 't_2' and 'T_2,' while the rule is the "if, then" equation. This rule allows the CPE to reduce the chance of initiating a retraining process that can interrupt data traffic. Data service is more resilient to errors compared to video traffic, and the errors that can happen for a small margin (e.g., 0~2dB) are likely tolerable for data traffic.

[0069] The above example of the rule and/or condition involves real-time monitoring of the data of the DSL system 300 and real-time adaptation algorithm within the DSL system 300. In some embodiments, the data of the DSL system 300 may not be entirely in real-time but the data update may be frequent enough (e.g., 5 minutes) to behave like real-time data.

[0070] In one embodiment, the threshold values 't_1,' 't_2,' 'T_1' and 'T_2' used by the rules/conditions discussed above are not statically kept in the DSL system 300, but optimized by the remote server 204. In one embodiment, the CPE continues to keep its rule/condition, but the parameters of the rules, i.e. the threshold values (conditions) 't_1,' 't_2,' 'T_1' and 'T_2,' are updated in the CPEs $302_{1\text{-}N}$ by the remote server 204. In such an embodiment, the remote server 204 collects and

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analyzes historical operational data and any side information (e.g., data from other similarly situated DSL systems) that is available at the remote server 204.

[0071] Continuing with the exemplary embodiment discussed above, the remote server 204 will choose 'T_1'= 0dB for a DSL line if pixelization has hardly happened even for margins between 0 and 2dB in the historical operational data, but will choose 'T_1'= 4dB if pixelization always occurred and continued for several minutes for margins between 0 and 4B. Such long-term adaptation of the rules by remote server 204 allows the DSL system 300 to perform at its optimum ability under all circumstances. In one embodiment, the switching of modes discussed above happens in real-time or very frequently, but the update of threshold values or rules to be used by the CPEs $302_{1\text{-}N}$ happens at a much lower frequency. In one embodiment, the remote server transmits the updated policy (with new threshold values) to the DSL system 300 a once per day.

[0072] While the embodiments of **Fig. 3** are discussed in terms of margin and video traffic in the DSL system 300, the embodiments can be applied to any DSL or other communication system adaptation algorithm that reacts in real-time to other data parameters without changing the essence of the embodiments of the invention.

[0073] **Fig. 4** is a method 400 performed by a remote server for optimizing performance of a communication system, according to one embodiment of the invention. Although the blocks in the flowcharts with reference to **Fig 4** are shown in a particular order, the order of the actions can be modified. Thus, the illustrated embodiments can be performed in a different order, and some actions/blocks may be performed in parallel. The flow chart of **Fig. 4** is illustrated with reference to the embodiments of **Figs. 2-3**.

[0074] At block 401, the remote server 204 collects data (operational and/or performance data) from the one or more communication units. As discussed above, the communication units in **Fig. 2** are AP 201 and/or the stations $202_{1\text{-}N}$ while communication units in **Fig. 3** are DSLAM 301 and/or the CPE $302_{1\text{-}N}$. In one embodiment, the communication units are at least one of a base station; a wireless LAN device; a DSLAM; a gateway; a performance enhancement device; a DSL

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CPE modem; an in-home powerline device; a HPNA based device; an in-home coax distribution device; a G.hn (Global Home Networking Standard) compatible device; an in-home metering communication device; an in-home appliance communicatively interfaced with the LAN; a wireless femtocell base station; a wireless WiFi compatible base station; a wireless mobile device repeater; a wireless mobile device base station; a STB/STU customer electronics device; an IP enabled television; an IP enabled media player; an IP enabled gaming console; an Ethernet gateway; a computing device connected to the LAN; an Ethernet connected computer peripheral device; an Ethernet connected router; an Ethernet connected wireless bridge; an Ethernet connected network bridge; and an Ethernet connected network switch.

[0075] At block 402, the remote server 204 generates a policy, for each of the one or more communication units based on the collected data. As discussed above, the policy with reference to **Fig. 2** comprises first and second algorithms (also called adaptive algorithms). In one embodiment, the first algorithm comprises: monitoring received signal strength indication (RSSI); and adapting a transfer rate according to a mapping of the RSSI from a lookup table. In one embodiment, the second algorithm comprises: counting a first number of consecutive successful transmissions from the one or more communication units to other communication units; counting a second number of consecutive failed transmissions from the one or more communication units to other communication units; adjusting a transfer rate when the first number exceeds a first threshold; and adjusting the transfer rate when the second number exceeds a second threshold. In other embodiments, other algorithms may be used for first and second algorithms.

[0076] With reference to **Fig. 3**, the policy may comprise rules and conditions such as the threshold values 't_1,' 't_2,' 'T_1' and 'T_2' for the DSL system 300 and equations that use these threshold values. Other policies may be used for the above systems of **Figs. 2-3** and for other systems.

[0077] At block 403, the remote server 204 sends the policy to each of the one or more communication units, wherein the one or more communication units

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implement the policy according to time-varying data (data collected by the communication units of the communication systems).

[0078] **Fig. 5** is a method 500 performed by a communication system for optimizing performance of the communication system by a remote server, according to one embodiment of the invention. Although the blocks in the flowcharts with reference to **Fig 5** are shown in a particular order, the order of the actions can be modified. Thus, the illustrated embodiments can be performed in a different order, and some actions/blocks may be performed in parallel. The flow chart of **Fig. 5** is illustrated with reference to the embodiments of **Figs. 2-3**. So as to avoid repetitiveness, only the processes performed by the communication units are discussed.

[0079] At block 501, the one or more communication units send data to the remote server 204. The data may be operational data, performance data, or any other time-varying data. At block 502, the one or more communication units receive a policy generated by the remove server 204, wherein the policy comprises rules and/or conditions for operation of the one or more communication units. At block 503, the one or more communication units execute the policy sent by the remote server 204 to implement an algorithm based on the rules and/or conditions and time-varying data. As discussed above, the policy with reference to **Fig. 2** comprises first and second algorithms (also called adaptive algorithms). In one embodiment, the first algorithm comprises: monitoring received signal strength indication (RSSI); and adapting a transfer rate according to a mapping of the RSSI from a lookup table. In one embodiment, the second algorithm comprises: counting a first number of consecutive successful transmissions from the one or more communication units to other communication units; counting a second number of consecutive failed transmissions from the one or more communication units to other communication units; adjusting a transfer rate when the first number exceeds a first threshold; and adjusting the transfer rate when the second number exceeds a second threshold. In other embodiments, other algorithms may be used for first and second algorithms. With reference to **Fig. 3**, the policy may comprise rules and conditions

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such as the threshold values t_1, t_2, T_1 and T_2 for the DSL system 300. Other policies may be used for the above systems of **Figs. 2-3** and for other systems.

[0080] **Fig. 6** is a processor-based system 600 having machine-readable storage medium with computer executable instructions 604 for optimizing performance of the communication system by a remote server, according to one embodiment of the invention. Machine-readable storage medium is one of 207, 210, or 310 (collectively referred to as "207/201/310"). The computer/machine-readable/executable instructions are executed by a processor (e.g., processor 206 of the remote server, or processors 209 and 309 of the AP 201 or DSLAM 301 respectively). Elements of embodiments are also provided as a machine-readable medium for storing the computer-executable instructions (e.g., instructions to implement the flowcharts of **Figs. 4-5** and other processes discussed in the description).

[0081] In one embodiment, the processor-based system 600 further comprises a database 601 to store data used by the instructions 604. In one embodiment, the processor-based system includes a network interface 602 to communicate with other devices. In one embodiment, the components of the processor-based system 600 communicate with one another via a network bus 603.

[0082] The machine-readable storage medium 207/210/310 may include, but is not limited to, flash memory, optical disks, hard disk drive (HDD), Solid State Drive (SSD), CD-Read Only Memory (CD-ROMs), DVD ROMs, RAMs, EPROMs, EEPROMs, magnetic or optical cards, or other type of machine-readable media suitable for storing electronic or computer-executable instructions. For example, embodiments of the invention may be downloaded as a computer program (e.g., BIOS) which may be transferred from a remote computer (e.g., a server) to a requesting computer (e.g., a client) by way of data signals via a communication link (e.g., a modem or network connection).

[0083] Reference in the specification to "an embodiment," "one embodiment," "some embodiments," or "other embodiments" means that a particular feature, structure, or characteristic described in connection with the embodiments is included in at least some embodiments, but not necessarily all embodiments. The

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various appearances of "an embodiment," "one embodiment," or "some embodiments" are not necessarily all referring to the same embodiments. If the specification states a component, feature, structure, or characteristic "may," "might," or "could" be included, that particular component, feature, structure, or characteristic is not required to be included. If the specification or claim refers to "a" or "an" element, that does not mean there is only one of the elements. If the specification or claims refer to "an additional" element, that does not preclude there being more than one of the additional element.

[0084] While the invention has been described in conjunction with specific embodiments thereof, many alternatives, modifications and variations of such embodiments will be apparent to those of ordinary skill in the art in light of the foregoing description.

[0085] For example, the embodiments discussed above can apply to a communication system comprising a performance enhancement device. A performance enhancement device may comprise a signal conditioning device, a diagnostic and remedy guidance device, or a noise cancellation device. A noise cancellation device, among other things, acts to cancel noise and interference present on the DSL line, either autonomously or in conjunction with commands from the remote server. In one embodiment, the performance enhancement device is communicatively coupled to the remote server 204 via the Communication Channel 208. In such an embodiment, impulse noise cancellation feature of the performance enhancement device may be turned on and off based on the real-time observation of noise, and the actual algorithm for deciding on-off can be distributed where long-term thresholds/rules and conditions are calculated by the remote server 204 and transmitted to the performance enhancement device. In one embodiment, the remote server 204 forces the actual transition in the performance enhancement device as a function of real-time observation of the noise data.

[0086] Another alternative embodiment related to a WiFi system is described as follows. In a typical WiFi communication system, Carrier Sense Multiple Access (CSMA) protocol is used for multiple access. Due to the nature of wireless channel, some of the stations (clients) might not be able to hear each other while both can reach the AP with strong power. This phenomenon is known as

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Hidden Node problem. One way to resolve this problem is to schedule the data transmission using Request to Send (RTS) and Clear to Send (CTS) mechanisms. Such a use of RTS/CTS incurs overhead in channel usage, but prevents disastrous packet collisions by the two stations.

[0087] In one embodiment, the remote server 204 collects operational and performance data of the WiFi AP 201 (and other APs) and/or stations $202_{1\text{-}N}$. In one embodiment, the remote server 204 analyzes the historical data and determines the best value for each AP (on or off) and applies the value to each AP. In one embodiment, the value is analyzed per-AP by the remote server 204, and therefore different values can be applied to different APs depending on their data characteristics.

[0088] In one embodiment, each AP is operable to apply a rule with conditions to adapt RTS/CTS on/off in real-time as a function of real-time data available to the local AP. In one embodiment, the rule generated by remote server and made available in the AP is that if a large packet error rate is detected for more than t_1 (e.g., 1 minute), the AP turns on RTS/CTS. In one embodiment, the rule generated by remote server and made available in the AP is that if a large packet error rate is not detected for more than t_2 (e.g., 10 minutes), then the AP turns off RTS/CTS.

[0089] In the above embodiment, two or more operation modes are described in context of a local communication device (e.g., AP) selecting the operation mode to use in real-time. In one embodiment, the selection of the operation mode is a function of the real-time data that is locally available. In other embodiments, the data might not be in real-time but the data update may be frequent enough for this idea to consider the data as real-time.

[0090] In one embodiment, the rules and/or conditions e.g., the threshold values 't_1', and 't_2,' and equations applying them, are not statically kept as in AP, but optimized by the remote server 204. In one embodiment, the threshold values 't_1', and 't_2,' and/or the equations are updated by the remote server 204 using historical data and any side information that is available at the remote server side. In the above alternative embodiment, RTS/CTS was involved, however, the essence of the embodiments can be applied to any WiFi adaptation algorithm that reacts in

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real-time to other data parameters. WiFi adaptation algorithms include control of fragmentation, channels, association, etc.

[0091] The embodiments of the invention are intended to embrace all such alternatives, modifications, and variations as to fall within the broad scope of the appended claims.

[0092] An abstract is provided that will allow the reader to ascertain the nature and gist of the technical disclosure. The abstract is submitted with the understanding that it will not be used to limit the scope or meaning of the claims. The following claims are hereby incorporated into the detailed description, with each claim standing on its own as a separate embodiment.

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CLAIMS

We claim:

1. A method for optimizing performance of one or more communication units by a remote server, the method comprising:

collecting data from the one or more communication units;

generating a policy, for each of the one or more communication units, based on the collected data; and

sending the policy to each of the one or more communication units, wherein the policy comprises conditions for operation of the one or more communication units, wherein the one or more communication units implement the policy according to time-varying data.

2. The method of claim 1, wherein the policy further comprises first and second algorithms.

3. The method of claim 2, wherein the one or more communication units are operable to receive the policy and implement one of the first and second algorithms based on the conditions.

4. The method of claim 1, wherein the time-varying data comprises location information, current time, and/or operational data of the one or more communication units.

5. The method of claim 1, wherein the one or more communication units are operable to receive the policy and implement one of first and second algorithms based on the conditions, wherein the first and second algorithms previously existed in the one or more communication units.

6. The method of claim 1, wherein generating the policy comprises:

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generating a pseudo-code or code for an adaption algorithm to be executed on the one or more communication units.

7. The method of claim 1, wherein collecting data from the one or more communication units is performed periodically.

8. The method of claim 1, wherein the one or more communication units comprises at least one of:

an access point (AP);
a base station;
a wireless LAN device;
a DSLAM;
a gateway;
a performance enhancement device;
a Digital Subscriber Line (DSL) Customer Premises Equipment (CPE) modem;
an in-home powerline device;
a Home Phoneline Network Alliance (HPNA) based device;
an in-home coax distribution device;
a G.hn (Global Home Networking Standard) compatible device;
an in-home metering communication device;
an in-home appliance communicatively interfaced with the LAN;
a wireless femtocell base station;
a wireless WiFi compatible base station;
a wireless mobile device repeater;
a wireless mobile device base station;
a set-top box (STB)/set-top unit (STU) customer electronics device;
an Internet Protocol (IP) enabled television;
an IP enabled media player;
an IP enabled gaming console;
an Ethernet gateway;
a computing device connected to the LAN;

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an Ethernet connected computer peripheral device;
an Ethernet connected router;
an Ethernet connected wireless bridge;
an Ethernet connected network bridge; and
an Ethernet connected network switch.

9. The method of claim 1, wherein the conditions specify the characteristics of real-time and historical operational data for the one or more communication units to select and apply a most desired adaptation algorithm.

10. A machine-readable storage medium having computer executable instructions stored thereon that when executed cause a processor of a remote server to perform a method for optimizing performance of one or more communication units by the remote server, the method comprising:
collecting data from the one or more communication units;
generating a policy, for each of the one or more communication units, based on the collected data; and
sending the policy to each of the one or more communication units, wherein the policy comprises conditions for operation of the one or more communication units, wherein the one or more communication units implement the policy according to time-varying data.

11. The machine-readable storage medium of claim 10, wherein the policy further comprises first and second algorithms.

12. The machine-readable storage medium of claim 11, wherein the one or more communication units are operable to receive the policy and implement one of the first and second algorithms based on the conditions.

13. The machine-readable storage medium of claim 10, wherein the time-varying data comprises location information, current time, and/or operational data of the one or more communication units.

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14. The machine-readable storage medium of claim 10, wherein the one or more communication units are operable to receive the policy and implement one of first and second algorithms based on the conditions, wherein the first and second algorithms previously existed in the one or more communication units.

15. The machine-readable storage medium of claim 10, wherein generating the policy comprises:

generating a pseudo-code or code for an adaption algorithm to be executed on the one or more communication units.

16. The machine-readable storage medium of claim 10, wherein the conditions specify the characteristics of real-time and historical operational data for the one or more communication units to select and apply a most desired adaptation algorithm.

17. A method for optimizing performance of one or more communication units, the method comprising:

sending data from one or more communication units to a remote server;

receiving a policy from the remote server, wherein the policy comprises conditions for operation of the one or more communication units; and

executing the policy by implementing one of first and second algorithms based on the conditions and time-varying data.

18. The method of claim 17, wherein the time-varying data comprises location information, current time, and/or operational data of the one or more communication units.

19. The method of claim 17, wherein the first and second algorithms previously existed in the one or more communication units.

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20. The method of claim 17, wherein the policy further comprises the first and second algorithms.

21. The method of claim 20, wherein implementing one of the first and second algorithms based on the conditions and time-varying data comprises implementing one of the first and second algorithms provided with the policy.

22. The method of claim 17, wherein executing the policy comprises:

executing a pseudo-code or code for an adaption algorithm, the pseudo-code generated by the remote server.

23. The method of claim 17, wherein the remote server resides in a cloud.

24. The method of claim 17, wherein sending data from one or more communication units to the remote server is performed periodically.

25. The method of claim 17, wherein the one or more communication units comprises at least one of:

an access point (AP);
a base station;
a wireless LAN device;
a DSLAM;
a gateway;
a performance enhancement device;
a Digital Subscriber Line (DSL) Customer Premises Equipment (CPE) modem;
an in-home powerline device;
a Home Phoneline Network Alliance (HPNA) based device;
an in-home coax distribution device;
a G.hn (Global Home Networking Standard) compatible device;
an in-home metering communication device;

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an in-home appliance communicatively interfaced with the LAN;
a wireless femtocell base station;
a wireless WiFi compatible base station;
a wireless mobile device repeater;
a wireless mobile device base station;
a set-top box (STB)/set-top unit (STU) customer electronics device;
an Internet Protocol (IP) enabled television;
an IP enabled media player;
an IP enabled gaming console;
an Ethernet gateway;
a computing device connected to the LAN;
an Ethernet connected computer peripheral device;
an Ethernet connected router;
an Ethernet connected wireless bridge;
an Ethernet connected network bridge; and
an Ethernet connected network switch.

26. The method of claim 17, wherein the conditions specify the characteristics of real-time and historical operational data for the one or more communication units to select and apply a most desired adaptation algorithm.

27. A machine-readable storage medium having computer executable instructions stored thereon that when executed cause a processor to perform a method for optimizing performance of one or more communication units, the method comprising:

sending data from one or more communication units to a remote server;

receiving a policy from the remote server, wherein the policy comprises conditions for operation of the one or more communication units; and

executing the policy by implementing one of first and second algorithms based on the conditions and time-varying data.

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28. The machine-readable storage medium of claim 27, wherein executing the policy comprises:

executing a pseudo-code or code for an adaption algorithm, the pseudo-code generated by the remote server.

29. The machine-readable storage medium of claim 27, wherein the time-varying data comprises location information, current time, and/or operational data of the one or more communication units.

30. The machine-readable storage medium of claim 27, wherein the first and second algorithms previously existed in the one or more communication units.

31. The machine-readable storage medium of claim 27, wherein the policy further comprises the first and second algorithms.

32. The machine-readable storage medium of claim 31, wherein implementing one of the first and second algorithms based on the conditions and time-varying data comprises implementing one of the first and second algorithms provided with the policy.

33. The machine-readable storage medium of claim 27, wherein the conditions specify the characteristics of real-time and historical operational data for the one or more communication units to select and apply a most desired adaptation algorithm.

34. An apparatus comprising:

a memory; and

a processor, coupled to the memory, and operable to:

analyze data from one or more communication units;

generate a policy, for each of the one or more communication

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units, based on the collected data; and

send the policy to each of the one or more communication units, wherein the policy comprises conditions for operation of the one or more communication units, wherein the one or more communication units implement the policy according to time-varying data.

35. The apparatus of claim 34, wherein the policy further comprises first and second algorithms.

36. The apparatus of claim 35, wherein the one or more communication units are operable to receive the policy and implement one of the first and second algorithms based on the conditions.

37. The apparatus of claim 34, wherein the one or more communication units are operable to receive the policy and implement one of the first and second algorithms based on the conditions and the time-varying data.

38. The apparatus of claim 37, wherein the time-varying data comprises location information, current time, and operational data of the one or more communication units.

39. The apparatus of claim 34, wherein the one or more communication units are operable to receive the policy and implement one of first and second algorithms based on the conditions, wherein the first and second algorithms previously existed in the one or more communication units.

40. The apparatus of claim 34, wherein the processor is operable to generate the policy by performing a method comprising generating a pseudo-code or code for an adaption algorithm to be executed on the one or more communication units.

41. The apparatus of claim 34, wherein processor to collect data periodically for

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analysis from the one or more communication units.

42. The apparatus of claim 34, wherein the one or more communication units comprise at least one of:

an access point (AP);

a base station;

a wireless LAN device;

a DSLAM;

a gateway;

a performance enhancement device;

a Digital Subscriber Line (DSL) Customer Premises Equipment (CPE) modem;

an in-home powerline device;

a Home Phoneline Network Alliance (HPNA) based device;

an in-home coax distribution device;

a G.hn (Global Home Networking Standard) compatible device;

an in-home metering communication device;

an in-home appliance communicatively interfaced with the LAN;

a wireless femtocell base station;

a wireless WiFi compatible base station;

a wireless mobile device repeater;

a wireless mobile device base station;

a set-top box (STB)/set-top unit (STU) customer electronics device;

an Internet Protocol (IP) enabled television;

an IP enabled media player;

an IP enabled gaming console;

an Ethernet gateway;

a computing device connected to the LAN;

an Ethernet connected computer peripheral device;

an Ethernet connected router;

an Ethernet connected wireless bridge;

an Ethernet connected network bridge; and

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an Ethernet connected network switch.

43. The apparatus of claim 34, wherein the conditions specify the characteristics of real-time and historical operational data for the one or more communication units to select and apply a most desired adaptation algorithm.

44. A system comprising:

one or more communication units; and

a server operable to communicate with the one or more communication units, wherein the server comprises:

a memory; and

a processor, coupled to the memory, and operable to:

analyze data from the one or more communication units;

generate a policy, for each of the one or more communication units, based on the collected data; and

send the policy to each of the one or more communication units, wherein the policy comprises conditions for operation of the one or more communication units, wherein the one or more communication units implement the policy according to time-varying data.

45. The system of claim 44, wherein the policy further comprises first and second algorithms.

46. The system of claim 44, wherein the one or more communication units are operable to receive the policy and implement one of the first and second algorithms based on the conditions.

47. The system of claim 44, wherein the time-varying data comprises location information, current time, and/or operational data of the one or more

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communication units.

48. The system of claim 44, wherein the one or more communication units are operable to receive the policy and implement one of first and second algorithms based on the conditions, wherein the first and second algorithms previously existed in the one or more communication units.

49. The system of claim 44, wherein the processor is operable to generate the policy by performing a method comprising generating a pseudo-code or code for an adaption algorithm to be executed on the one or more communication units.

50. The system of claim 44, wherein processor to collect data periodically for analysis from the one or more communication units.

51. The system of claim 44, wherein the one or more communication units comprise at least one of:

an access point (AP);
a base station;
a wireless LAN device;
a DSLAM;
a gateway;
a performance enhancement device;
a Digital Subscriber Line (DSL) Customer Premises Equipment (CPE) modem;
an in-home powerline device;
a Home Phoneline Network Alliance (HPNA) based device;
an in-home coax distribution device;
a G.hn (Global Home Networking Standard) compatible device;
an in-home metering communication device;
an in-home appliance communicatively interfaced with the LAN;
a wireless femtocell base station;

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a wireless WiFi compatible base station;
a wireless mobile device repeater;
a wireless mobile device base station;
a set-top box (STB)/set-top unit (STU) customer electronics device;
an Internet Protocol (IP) enabled television;
an IP enabled media player;
an IP enabled gaming console;
an Ethernet gateway;
a computing device connected to the LAN;
an Ethernet connected computer peripheral device;
an Ethernet connected router;
an Ethernet connected wireless bridge;
an Ethernet connected network bridge; and
an Ethernet connected network switch.

52. The system of claim 44, wherein the conditions specify the characteristics of real-time and historical operational data for the one or more communication units to select and apply a most desired adaptation algorithm.

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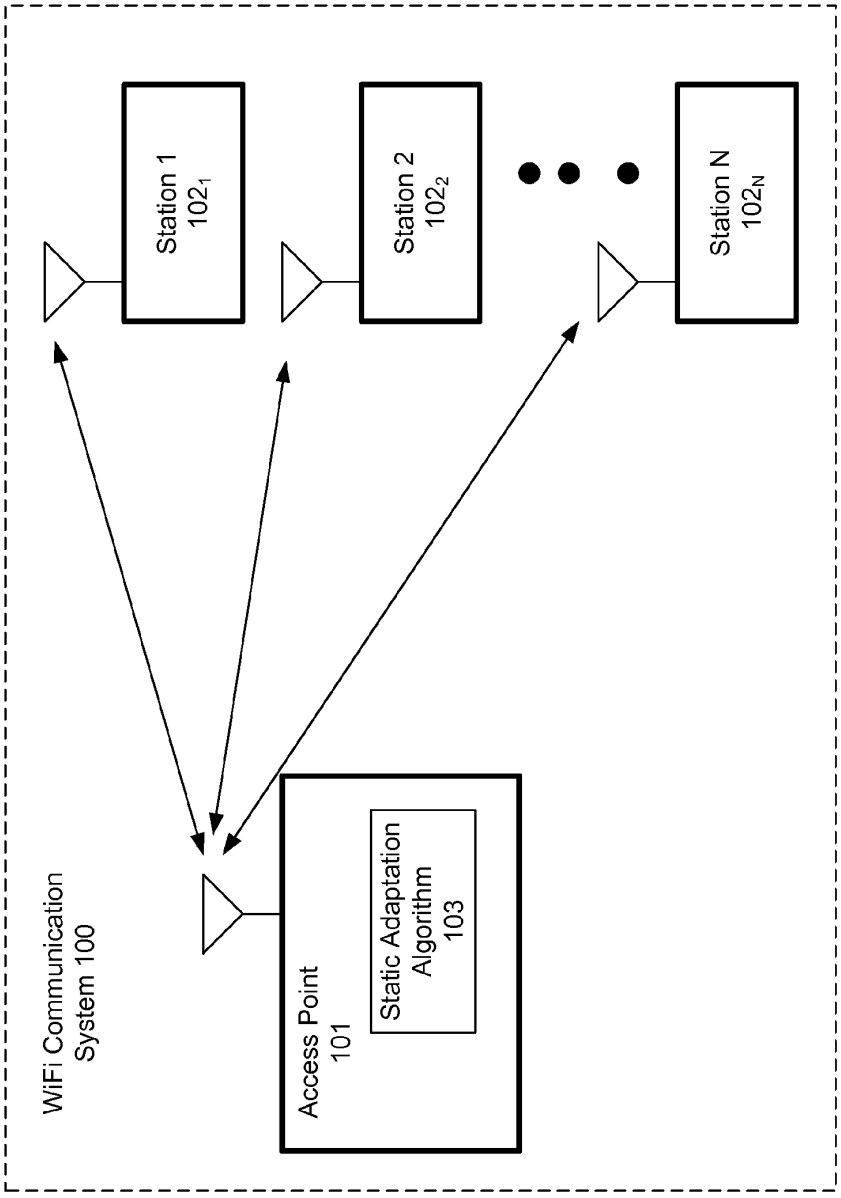


FIG. 1 (prior Art)

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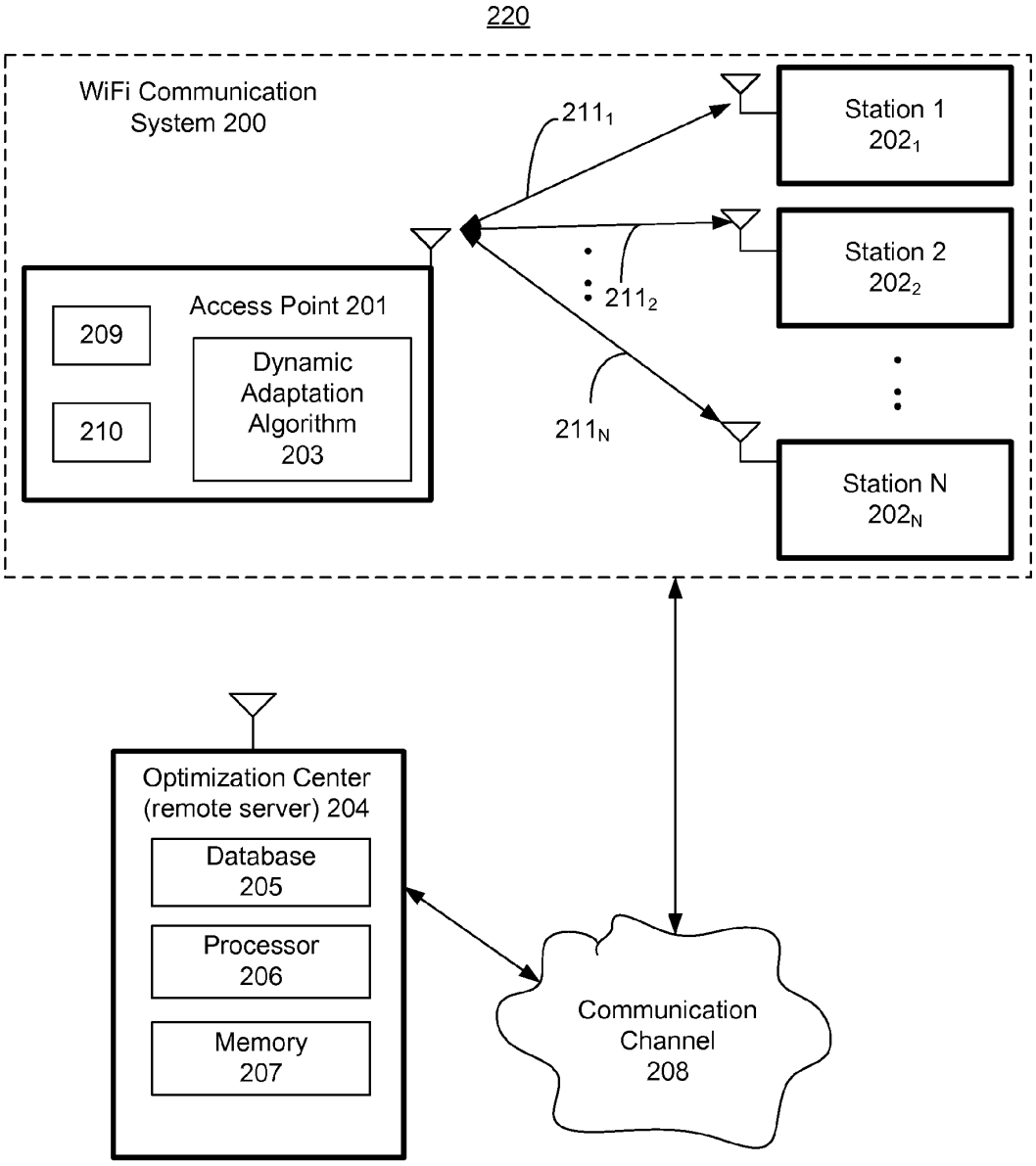


FIG. 2

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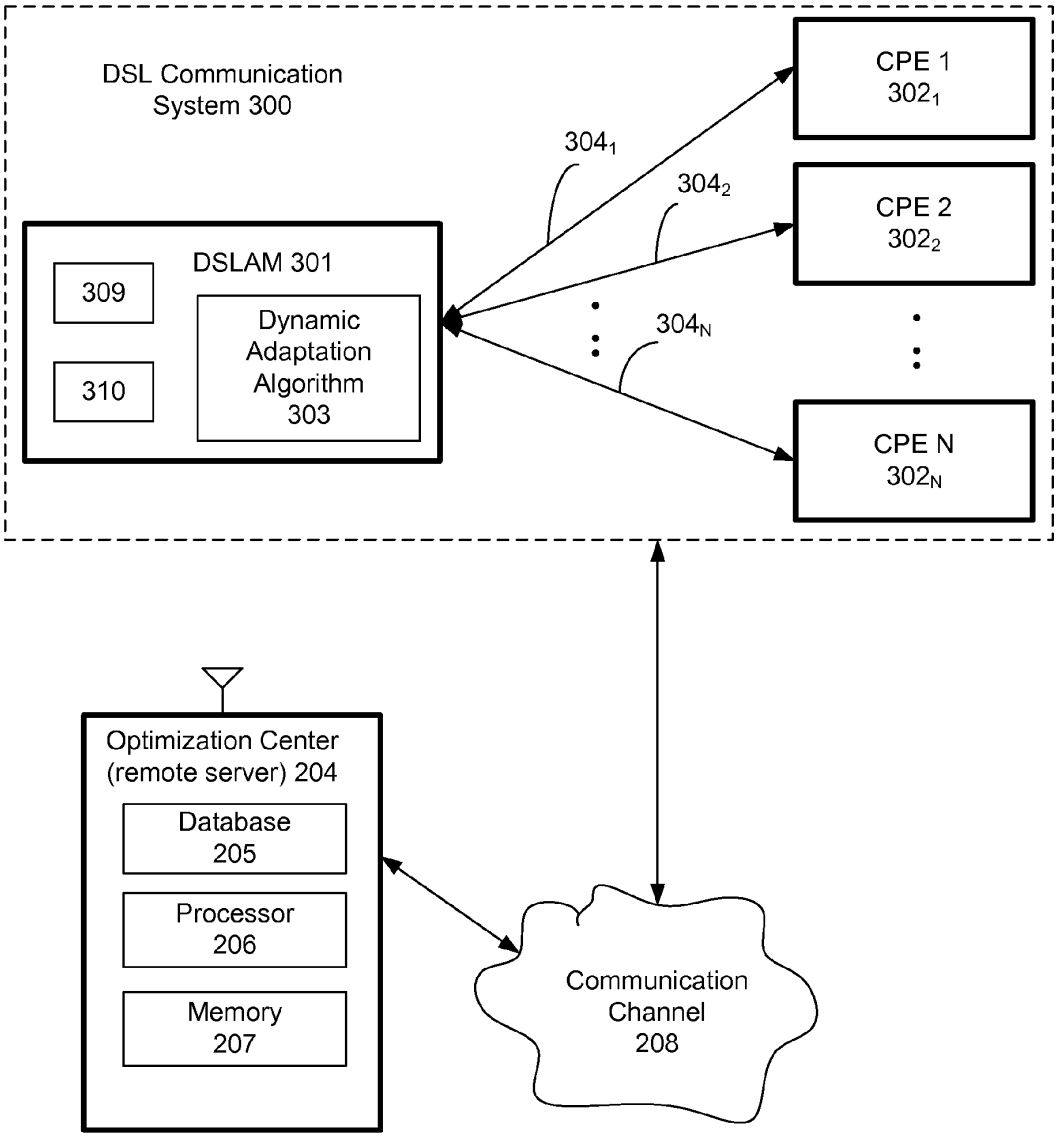


FIG. 3

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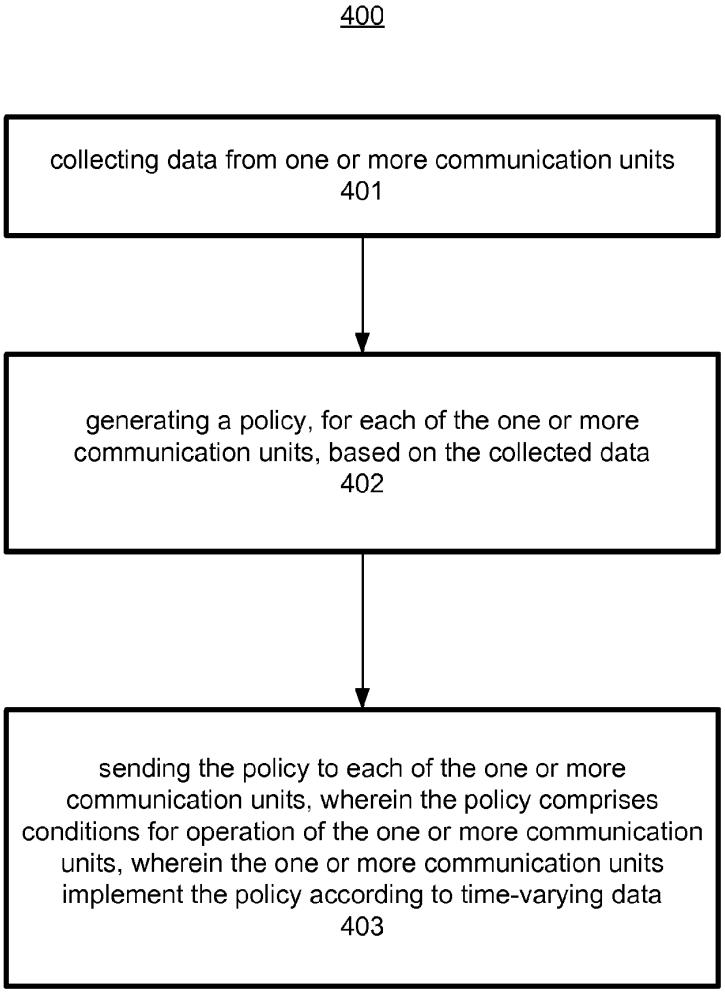


FIG. 4

Charter Communications, Inc.
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Page #370

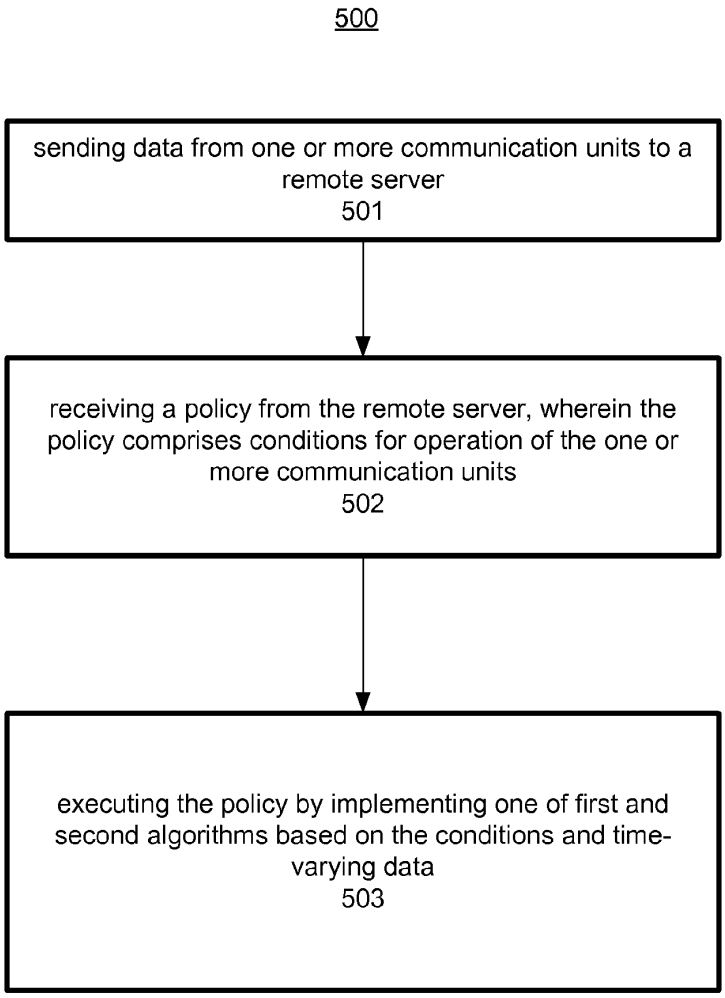


FIG. 5

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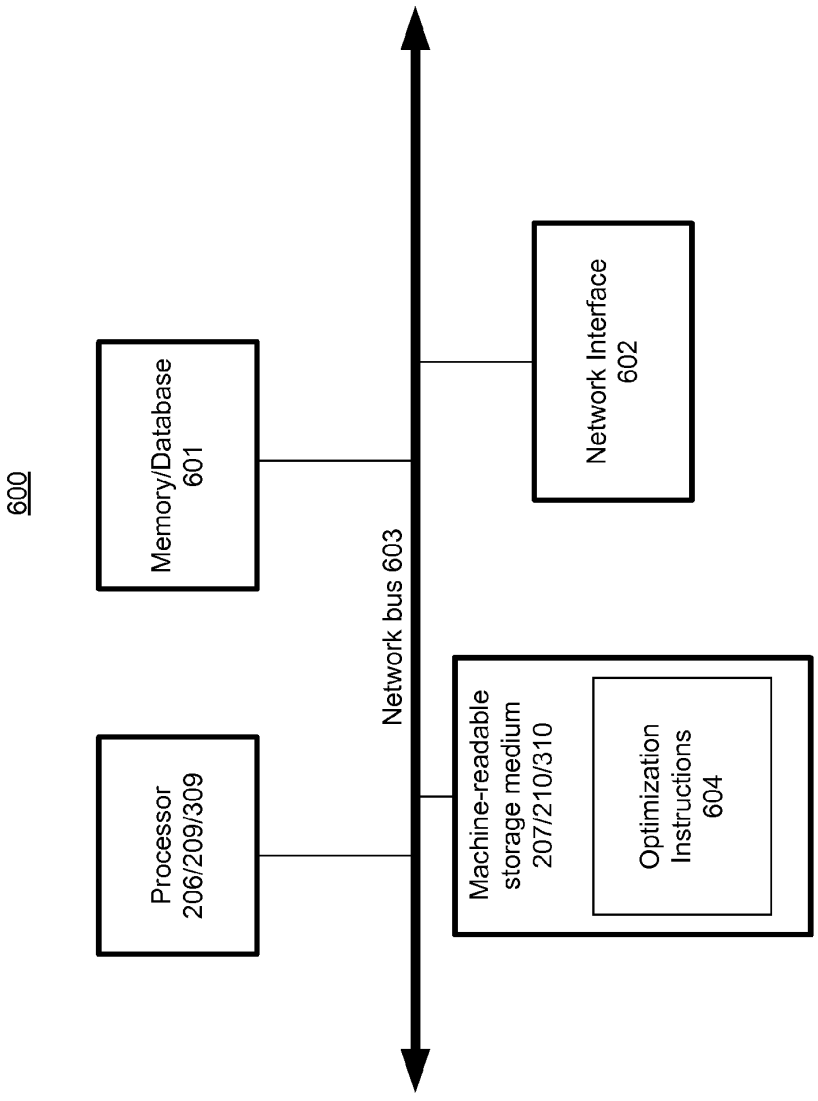


FIG. 6

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Page #372

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2011/060265

A. CLASSIFICATION OF SUBJECT MATTER
INV. H04L1/00 H04L1/20
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)
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 practicable, search terms used)
EPO-Internal, WPI Data, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2007/136337 A2 (ERICSSON TELEFON AB L M [SE]) 29 November 2007 (2007-11-29) page 2, lines 7-9,19-24 page 4, lines 27-35 page 5, lines 7-18,23-25 page 5, line 32 - page 6, line 2 page 6, lines 17-22 page 7, lines 9-12,28-30 page 8, lines 17-37 page 12, lines 1-5 page 16, lines 21-28 claim 39 figure 1 -/--	1-5, 7-14, 16-21, 23-25, 27, 29-39, 41-48, 50-52

[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 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
13 June 2012	21/06/2012

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	Meister, Mark

Form PCT/ISA/210 (second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2011/060265

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.

X	US 7 840 220 B1 (MITCHELL JAMES P [US]) 23 November 2010 (2010-11-23)	1-5, 7-14, 16-21, 23-27, 29-39, 41-48, 50-52
	column 5, lines 13-31 column 5, line 62 - column 6, line 47 column 6, line 54 - column 7, line 6 column 7, line 19 - column 8, line 11 figures 2,3	

A	WO 2011/079612 A1 (ZTE CORP [CN]; ZHANG QINGHONG [CN]; LI HANG [CN]) 7 July 2011 (2011-07-07) the whole document	1-52
L	-& EP 2 426 983 A1 (ZTE CORP [CN]) 7 March 2012 (2012-03-07) paragraphs [0004] - [0010] paragraphs [0012], [0013] paragraphs [0020] - [0024] paragraph [0026] paragraphs [0034] - [0036] figure 1	1-52

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/US2011/060265

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2007136337 A2	29-11-2007	CN 101449503 A	03-06-2009
		EP 2020111 A2	04-02-2009
		JP 2009538559 A	05-11-2009
		TW 200805931 A	16-01-2008
		US 2007275665 A1	29-11-2007
		US 2010183064 A1	22-07-2010
		US 2011105046 A1	05-05-2011
		WO 2007136337 A2	29-11-2007
US 7840220 B1	23-11-2010	NONE	
WO 2011079612 A1	07-07-2011	AU 2010338867 A1	22-12-2011
		CN 101765161 A	30-06-2010
		EP 2426983 A1	07-03-2012
		WO 2011079612 A1	07-07-2011
EP 2426983 A1	07-03-2012	AU 2010338867 A1	22-12-2011
		CN 101765161 A	30-06-2010
		EP 2426983 A1	07-03-2012
		WO 2011079612 A1	07-07-2011

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appl. No.	:	14/356,581	Confirmation No.	: 4319
Inventor	:	Wonjong Rhee		
Filing Date	:	May 06, 2014		
Title	:	METHOD, APPARATUS, AND SYSTEM FOR OPTIMIZING PERFORMANCE OF A COMMUNICATION UNIT BY A REMOTE SERVER		
Art Unit	:	2446		
Examiner	:	Grijalva Lobos, Boris D.		
Docket No.	:	20145-054US		
Customer No.	:	146571		

CERTIFICATE OF MAILING (37 CFR §1.8)

I hereby certify, pursuant to 37 CFR §1.8, that this correspondence is being electronically transmitted to the United States Patent and Trademark Office via EFS-Web addressed to: Mail Stop RCE, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on the date shown below:

Dated: January 28, 2020 By: /Domarina Alkhas/
Domarina Alkhas

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

RESPONSE TO FINAL OFFICE ACTION AND REQUEST FOR CONTINUED EXAMINATION (RCE) UNDER 37 CFR 1.114

Examiner Grijalva Lobos:

This paper is responsive to the Final Office Action dated August 1, 2019, and having a shortened statutory response period expiring November 1, 2019. Applicant respectfully request further examination and reconsideration in view of the amendments and remarks set forth below. A petition requesting a 3-months extension of time accompanies this paper which is being filed on or before its current due date of February 1, 2020.

Amendments to the Claims are reflected in the Listing of Claims which begins on page 2 of this paper.

Remarks/Arguments begin on page 8 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 the Claims:

1. (Currently amended) A method for improving performance of one or more communication units, the method comprising:

receiving, by a server, from network monitoring devices that monitor, in real-time, data associated with an operation of two or more communication units located in different geographical areas, the data comprising a parameter;

processing, by the server, at least one of the data and historical data;

based on the processed data, determining a policy for at least one of the two or more communication units; and

in response to the server detecting the absence of an interference or noise from nearby wireless channels, communicating the policy, by the server, via a network, to at least one or more communication units that, in response to receiving the policy, implements one or more algorithms that use the parameter and at least a rule or a condition for the one or more communication units to improve a performance of the one or more communication units.

2. (Cancelled)

3. (Previously presented) The method of claim 1, wherein the data further comprises determining a received signal strength indication.

4. (Previously presented) The method of claim 1, further comprising, based on a change in the operation, updating the policy.

5. (Currently amended) The method of claim 1, wherein determining the policy comprises selecting the policy from a set of policies that are stored on the one or more communication units.

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6. (Cancelled)

7. (Cancelled).

8. (Previously presented) The method of claim 1, wherein the one or more communication units comprise at least one of:

an access point (AP);

a base station;

a wireless LAN device;

a DSLAM;

a gateway;

a performance enhancement device;

a Digital Subscriber Line (DSL) Customer Premises Equipment (CPE) modem;

an in-home powerline device;

a Home Phoneline Network Alliance (HPNA) based device;

an in-home coax distribution device;

a G.hn (Global Home Networking Standard) compatible device;

an in-home metering communication device;

an in-home appliance communicatively interfaced with the LAN;

a wireless femtocell base station;

a wireless WiFi compatible base station;

a wireless mobile device repeater;

a wireless mobile device base station;

a set-top box (STB)/set-top unit (STU) customer electronics device;

an Internet Protocol (IP) enabled television;

an IP enabled media player;

an IP enabled gaming console;

an Ethernet gateway;

a computing device connected to the LAN;

an Ethernet connected computer peripheral device;

an Ethernet connected router;

an Ethernet connected wireless bridge;

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an Ethernet connected network bridge; or

an Ethernet connected network switch.

9. (Canceled)

10. (Currently amended) A non-transitory machine-readable storage medium having computer executable instructions stored thereon that when executed cause a processor of a server to perform a method for improving performance of one or more communication units, the method comprising:

receiving from network monitoring devices that monitor, in real-time, data associated with an operation of two or more communication units located in different geographical areas, the data comprising a parameter;

processing at least one of the data and historical data;

determining by the server, a policy for each of the one or more communication units, based on the processed data; and

in response to the server detecting the absence of an interference or noise from nearby wireless channels, communicating, via a network, the policy to two or more communication units that, in response to receiving the policy, implements one or more algorithms based on at least a rule or a condition to improve a performance of the one or more communication units.

11. (Cancelled)

12. (Previously presented) The non-transitory machine-readable storage medium of claim 10, wherein processing comprises storing at least one of the data and the historical data in a memory device.

13. (Previously presented) The non-transitory machine-readable storage medium of claim 10, wherein determining the policy comprises determining a condition for communicating the policy.

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14. (Previously presented) The non-transitory machine-readable storage medium of claim 10, wherein the data further comprises determining a received signal strength.

15. (Previously presented) The non-transitory machine-readable storage medium of claim 10, further comprising updating the parameter based on a change in the operation to update the policy.

16. (Previously presented) The non-transitory machine-readable storage medium of claim 10, wherein determining the policy comprises selecting the policy from a set of policies.

17. – 33. (Cancelled)

34. (Currently amended) An apparatus comprising:

a memory; and

a processor, coupled to the memory, and operable to:

receive, from ~~a~~ network monitoring devices that monitor, in real-time, data associated with an operation of two or more communication units located in different geographical areas, the data comprising a parameter;

analyze at least one of the data and historical data;

based on the analyzed data, determine a policy for at least one of the two or more communication units; and

in response to the server detecting the absence of an interference or noise from nearby wireless channels, communicate the policy, via a network that is communicatively coupled to the processor, to at least one or more communication units that, in response to receiving the policy, implements one or more algorithms based on at least a rule or a condition to improve a performance of the one or more communication units.

35. (Cancelled)

36. (Previously presented) The apparatus of claim 34, wherein the network monitoring devices determine a received signal strength.

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37. (Previously presented) The apparatus of claim 34, wherein determining the policy comprises selecting the policy from a set of policies and updating the parameter.

38. – 52. (Cancelled)

53. (Previously presented) The method of claim 1, wherein processing comprises storing at least one of the data and historical data in a memory.

54. (Previously presented) The method of claim 4, wherein updating the policy comprises updating the parameter.

55. (Cancelled)

56. (Previously presented) The method of claim 34, wherein processing comprises storing at least one of the data and the historical data in the memory.

57. (Previously presented) The method of claim 34, wherein determining the policy comprises determining a condition for communicating the policy.

58. (Previously presented) The method of claim 1, wherein the data further comprises time-varying data.

59. (Previously presented) The method of claim 1, wherein the server performs an analysis of at least one of the data and historical data.

60. (Previously presented) The method of claim 59, wherein the analysis comprises a statistical analysis of at least one of the data and historical data.

61. (Previously presented) The method of claim 10, wherein the data further comprises time-varying data.

62. (Previously presented) The method of claim 10, wherein the server performs an analysis of at least one of the data and historical data.

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63. (Previously presented) The method of claim 62, wherein the analysis comprises a statistical analysis of at least one of the data and historical data.

64. (Previously presented) The method of claim 34, wherein the data further comprises time-varying data.

65. (Previously presented) The method of claim 34, wherein the server performs an analysis of at least one of the data and historical data.

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REMARKS

Claims 1, 3-5, 8, 10, 12-16, 34, 36-37, and 53-65 were presented for examination. All pending claims were rejected by the Examiner in a Final Office Action (hereinafter, "Office Action").

In response, Applicant hereby files this RCE under 37 CFR 1.114 amending claims 1, 5, 10, and 34. Support for the claim amendments may be found, e.g., in paragraph 55.

Applicant respectfully request reconsideration in light of the amendments to the claims and the below remarks.

I. Interview Summary

Applicant thanks Examiner Grijalva Lobos for the courtesy of a telephone interview on January 22, 2020. During this interview, the Examiner and the Applicant discussed proposed amendments that the Examiner confirmed overcome the current rejections.

In light of the agreement reached during the interview, Applicant hereby amends claims 1, 5, 10, and 34 and respectfully requests that all rejections be withdrawn.

II. Conclusion

Because the cited documents, separately and in combination, fail to teach or suggest at least one claim element for each of the pending claims, Applicant respectfully requests removal of the rejections of claims, claims 11, 3-5, 8, 10, 12-16, 34, 36-37, and 53-65.

Applicant notes that at least some of the claims include additional claim elements that are missing from the cited documents; however, additional reasons and responses to additional rejections for the independent and dependent claims are not presented in order to avoid unnecessary and/or cumulative arguments. However, Applicant reserves the right to challenge any assertions made by the Examiner in the Office Action that are not herein addressed, including but not limited to, the right to challenge that one or more of the cited documents were valid references. It shall also be noted that the absence of any discussion about one or more of the rejections is in no way an acceptance by acquiescence by the Applicant.

The Commissioner is hereby authorized to charge any fees which may be due, and to credit any overpayment of fees, to Deposit Account No. 50-2776.

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Should the Examiner believe that a telephone conference would expedite the prosecution of this application, the undersigned can be reached at 650-353-3786.

Respectfully submitted,

Date: January 28, 2020

By: /Ali Uyanik/
Ali Uyanik
Reg. No. 67,080

NORTH WEBER & BAUGH LLP
3260 Hillview Avenue
Palo Alto, CA 94304
Tel.: (650) 353-3786
Fax: (650) 856-0542
auyanik@northweber.com

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Exhibit 1006
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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s)	:	Wonjong Rhee	Confirmation No.:	4319
Appl. No.	:	14/356,581		
Filing Date	:	2014-05-06		
Title	:	METHOD, APPARATUS, AND SYSTEM FOR OPTIMIZING PERFORMANCE OF A COMMUNICATION UNIT BY A REMOTE SERVER		
Art Unit	:	2446		
Examiner	:	GRIJALVA LOBOS, BORIS D		
Docket No.	:	20145-054US		
Customer No.	:	146571		

CERTIFICATE OF MAILING (37 CFR §1.8)

I hereby certify, pursuant to 37 CFR §1.8, that this correspondence is being electronically transmitted via EFS-Web addressed to Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on the date shown below:

Date: January 28, 2020 By: /Domarina Alkhas/
Domarina Alkhas

INFORMATION DISCLOSURE STATEMENT

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

Dear Examiner GRIJALVA LOBOS:

Filed herewith, in accordance with the provisions of 37 CFR §§ 1.56 and 1.97–1.98, listing various references for consideration by the Examiner, is an Information Disclosure Statement ("IDS").

The filing of this IDS shall not be construed as a representation that a search has been made, or regarding the completeness of the list of references, or that no other material information exists. Furthermore, the filing of this IDS shall not be construed as a representation that inclusion of a reference in this list is an admission that it is prior art or is pertinent to this application, or as an admission that the information listed is, or may be considered to be, material to the patentability of the above referenced application. The filing of this IDS shall not be construed in any manner as an admission against interest.

Charter Communications, Inc.
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Page #385

This IDS is being filed:

☐ within three months of the filing date of a national application, other than a continued prosecution application under § 1.53(d);

☐ within three months of the date of entry of the national stage as set forth in § 1.491 in an international application;

☐ before the mailing of a first Office Action on the merits;

☒ before the mailing of a first Office Action after the filing of a request for continued examination under § 1.114;

☐ after three months of the filing date or entry into the national stage or after the mailing of a first Office action on the merits, but before the mailing date of any final action under § 1.113, a notice of allowance under §1.311, or an action that otherwise closes prosecution in the application;

AND

☐ enclosed herein is the fee set forth in 37 CFR § 1.17(p);

OR

☐ Applicant certifies pursuant to 37 CFR § 1.97(e):

☐ That each item of information contained in the information disclosure statement was first cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this information disclosure statement;

OR

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

☐ on or before the payment of the issue fee but after the mailing of a final action under § 1.113, a notice of allowance under §1.311, or an action that otherwise closes prosecution in the application;

AND

☐ enclosed herein is the fee set forth in 37 CFR § 1.17(p);

AND

☐ Applicant certifies pursuant to 37 CFR § 1.97(e):

☐ That each item of information contained in the information disclosure statement was first cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this information disclosure statement;

OR

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

☒ Applicant submits that the enclosed Information Disclosure Statement is timely; therefore, no fee is required.

☒ Except as provided for under 37 CFR § 1.98(a)(2), Applicant has enclosed a copy of each listed reference.

☐ The above referenced application relies upon Application No. _____, filed _____ for an earlier effective filing date under 35 U.S.C. 120. Although, pursuant to 37 CFR § 1.98(d), the references submitted herein are not required to be submitted for the Examiner to consider them, Applicant submits the references herein so that the information will be printed on the patent issuing from this application.

☐ Pursuant to 37 CFR § 1.704(d), Applicant certifies that each of the references cited herein were first cited in a communication from a foreign patent office in a counterpart application and that this communication was not received by any individual designated in 37 CFR § 1.56(c) more than thirty days prior to the filing of this Information Disclosure Statement.

Consideration of the listed references and favorable action are requested. If any additional fees are due in connection with the filing of this Information Disclosure Statement, the Commissioner is hereby authorized to charge such fees to Deposit Account 50-2776.

Respectfully submitted,

Date: January 28, 2020

By: /Michael V. North/
Michael V. North
Reg. No. 46,963

Charter Communications, Inc.
Exhibit 1006
Page #387

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/356,581	05/06/2014	Wonjong Rhee	20145-054US	4319

146571 7590 01/28/2020

North Weber & Baugh LLP - ASSIA
3260 Hillview Avenue, 1st Floor
Palo Alto, CA 94304

EXAMINER	
GRIJALVA LOBOS, BORIS D	

ART UNIT	PAPER NUMBER
2446	

NOTIFICATION DATE	DELIVERY MODE
01/28/2020	ELECTRONIC

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.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

docket1@northweber.com

Applicant-Initiated Interview Summary	**Application No.** 14/356,581	**Applicant(s)** Rhee, Wonjong	
	Examiner BORIS D GRIJALVA LOBOS	**Art Unit** 2446	**AIA (FITF) Status** No

All participants (applicant, applicants representative, PTO personnel):

(1) BORIS D. GRIJALVA LOBOS. (3) _____.

(2) ALI UYANIK (67080). (4) _____.

Date of Interview: 22 January 2020.

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.

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...)

Applicant's representative and examiner discussed potential amendments to the claims. The examiner agreed that proposed amendments directed to paragraph [0055] of the specification overcome all of the currently applied references. Further search and/or consideration would be necessary.
.

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

/BORIS D GRIJALVA LOBOS/ Examiner, Art Unit 2446	

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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 examiners 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 applicants 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 applicants 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 examiners 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 examiners initials.

UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/356,581	05/06/2014	Wonjong Rhee	20145-054US	4319

146571 7590 12/16/2019

North Weber & Baugh LLP - ASSIA
3260 Hillview Avenue, 1st Floor
Palo Alto, CA 94304

EXAMINER	
GRIJALVA LOBOS, BORIS D	

ART UNIT	PAPER NUMBER
2446	

NOTIFICATION DATE	DELIVERY MODE
12/16/2019	ELECTRONIC

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.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

docket1@northweber.com

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Advisory Action Before the Filing of an Appeal Brief	**Application No.** 14/356,581	**Applicant(s)** Rhee, Wonjong	
	Examiner BORIS D GRIJALVA LOBOS	**Art Unit** 2446	**AIA (FITF) Status** No

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

THE REPLY FILED 29 November 2019 FAILS TO PLACE THIS APPLICATION IN CONDITION FOR ALLOWANCE.

NO NOTICE OF APPEAL FILED

1. ☑ The reply was filed after a final rejection. No Notice of Appeal has been filed. To avoid abandonment of this application, applicant must timely file one of the following replies: (1) an amendment, affidavit, or other evidence, which places the application in condition for allowance; (2) a Notice of Appeal (with appeal fee) in compliance with 37 CFR 41.31; or (3) a Request for Continued Examination (RCE) in compliance with 37 CFR 1.114 if this is a utility or plant application. Note that RCEs are not permitted in design applications. The reply must be filed within one of the following time periods:
   a) ☑ The period for reply expires 3 months from the mailing date of the final rejection.
   b) ☐ The period for reply expires on: (1) the mailing date of this Advisory Action; or (2) the date set forth in the final rejection, whichever is later. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of the final rejection.
   c) ☐ A prior Advisory Action was mailed more than 3 months after the mailing date of the final rejection in response to a first after-final reply filed within 2 months of the mailing date of the final rejection.The current period for reply expires ____ months from the mailing date of *the prior Advisory Action* or SIX MONTHS from the mailing date of the final rejection, whichever is earlier.
   Examiner Note: If box 1 is checked, check either box (a), (b) or (c). ONLY CHECK BOX (b) WHEN THIS ADVISORY ACTION IS THE FIRST RESPONSE TO APPLICANTS FIRST AFTER-FINAL REPLY WHICH WAS FILED WITHIN TWO MONTHS OF THE FINAL REJECTION. ONLY CHECK BOX (c) IN THE LIMITED SITUATION SET FORTH UNDER BOX (c). See MPEP 706.07(f).

Extensions of time may be obtained under 37 CFR 1.136(a). The date on which the petition under 37 CFR 1.136(a) and the appropriate extension fee have been filed is the date for purposes of determining the period of extension and the corresponding amount of the fee. The appropriate extension fee under 37 CFR 1.17(a) is calculated from: (1) the expiration date of the shortened statutory period for reply originally set in the final Office action; or (2) as set forth in (b) or (c) above, if checked. Any reply received by the Office later than three months after the mailing date of the final rejection, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

NOTICE OF APPEAL

2. ☐ The Notice of Appeal was filed on _____. A brief in compliance with 37 CFR 41.37 must be filed within two months of the date of filing the Notice of Appeal (37 CFR 41.37(a)), or any extension thereof (37 CFR 41.37(e)), to avoid dismissal of the appeal. Since a Notice of Appeal has been filed, any reply must be filed within the time period set forth in 37CFR 41.37(a).

AMENDMENTS

3. ☑ The proposed amendments filed after a final rejection, but prior to the date of filing a brief, will not be entered because
   a) ☑ They raise new issues that would require further consideration and/or search (see NOTE below);
   b) ☐ They raise the issue of new matter (see NOTE below);
   c) ☐ They are not deemed to place the application in better form for appeal by materially reducing or simplifying the issues for appeal; and/or
   d) ☐ They present additional claims without canceling a corresponding number of finally rejected claims.
   NOTE: See Continuation Sheet (See 37CFR 1.116 and 41.33(a)).
4. ☐ The amendments are not in compliance with 37CFR 1.121. See attached Notice of Non-Compliant Amendment (PTOL-324).
5. ☐ Applicants reply has overcome the following rejection(s): _____
6. ☐ Newly proposed or amended claim(s) _____ would be allowable if submitted in a separate, timely filed amendment canceling the non-allowable claim(s).
7. ☑ For purposes of appeal, the proposed amendment(s):(a) ☑ will not be entered, or (b) ☐ will be entered, and an explanation of how the new or amended claims would be rejected is provided below or appended.

AFFIDAVIT OR OTHER EVIDENCE

8. ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____
9. ☐ The affidavit or other evidence filed after final action, but before or on the date of filing a Notice of Appeal will not be entered because applicant failed to provide a showing of good and sufficient reasons why the affidavit or other evidence is necessary and was not earlier presented. See 37 CFR 1.116(e).
10. ☐ The affidavit or other evidence filed after the date of filing the Notice of Appeal, but prior to the date of filing a brief, will not be entered because the affidavit or other evidence failed to overcome all rejections under appeal and/or appellant fails to provide a showing of good and sufficient reasons why it is necessary and was not earlier presented. See 37 CFR 41.33(d)(1).
11. ☐ The affidavit or other evidence is entered. An explanation of the status of the claims after entry is below or attached.

REQUEST FOR RECONSIDERATION/OTHER

12. ☑ The request for reconsideration has been considered but does NOT place the application in condition for allowance because: See Continuation Sheet.
13. ☐ Note the attached Information *Disclosure Statement*(s). (PTO/SB/08) Paper No(s). _____
14. ☑ Other: PTO-2323, PTO-892.

STATUS OF CLAIMS

15. The status of the claim(s) is (or will be) as follows:
    Claim(s) allowed:_____.
    Claim(s) objected to:_____.
    Claim(s) rejected:1,3-5,8,10,12-16,34,36-37,53-54 and 56-65.
    Claim(s) withdrawn from consideration:_____.

/B.D.G/ Examiner, Art Unit 2446	/BRIAN J. GILLIS/ Supervisory Patent Examiner, Art Unit 2446

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Continuation of 3. NOTE: The proposed amendments change the scope of the claims and a new search and/or consideration is required

Continuation of REQUEST FOR RECONSIDERATION/OTHER 12. The request for reconsideration has been considered but does NOT place the application in condition for allowance because: Although the amendments are sufficient to overcome the references cited on the Final Rejection, dated 8/1/2019, an updated search revealed that monitoring in real time was disclosed in the art prior to the filing date of the invention in the field of optimization of device performance (see, for example, Stanwood et al. (US 2011/0267951 A1), p[0096], [0100], and [0107]; and additional references cited in PTO-892). Further consideration of references is necessary to determine patentability of the invention.

Notice of References Cited	Application/Control No. 14/356,581	Applicant(s)/Patent Under Reexamination Rhee, Wonjong	
	Examiner BORIS D GRIJALVA LOBOS	Art Unit 2446	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-20070180490-A1	08-2007	Renzi; Silvio J.	G06F21/577	726/1
*	B	US-20100153377-A1	06-2010	Rajan; Palaniswamy	G06F16/24575	707/723
*	C	US-20120089664-A1	04-2012	Igelka; Or	G06F9/5083	709/203
*	D	US-20110314145-A1	12-2011	Raleigh; Gregory G.	H04L63/08	709/224
*	E	US-8355316-B1	01-2013	Lushear; Brian D.	H04L43/0817	370/217
*	F	US-20040221296-A1	11-2004	Ogielski, Andrew T.	H04L41/00	719/313
*	G	US-20050114501-A1	05-2005	Raden, Gary P.	H04L43/14	709/224
*	H	US-20050132044-A1	06-2005	Guingo, Pierrick	H04L41/5009	709/225
*	I	US-20080098454-A1	04-2008	Toh; Soon Seah	H04L41/0622	726/1
*	J	US-20080219239-A1	09-2008	Bell; Ray	H04L12/4625	370/351
*	K	US-20090075648-A1	03-2009	Reed; Keith	H04L41/0816	455/424
*	L	US-20110267951-A1	11-2011	Stanwood; Kenneth	H04L41/5022	370/235
	M					

FOREIGN PATENT DOCUMENTS

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

NON-PATENT DOCUMENTS

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

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

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AFCP 2.0 Decision

Application No.	Applicant(s)	
14/356,581	Rhee, Wonjong	
Examiner	**Art Unit**	**AIA (FITF) Status**
BORIS D GRIJALVA LOBOS	2446	No

This is in response to the After Final Consideration Pilot request filed 29 November 2019.

1. **Improper Request** – The AFCP 2.0 request is improper for the following reason(s) and the after final amendment submitted with the request will be treated under pre-pilot procedure.

   ☐ An AFCP 2.0 request form PTO/SB/434 (or equivalent document) was not submitted.

   ☐ A non-broadening amendment to at least one independent claim was not submitted.

   ☐ The request is not the first proper AFCP 2.0 request submitted in response to the most recent final rejection.

   ☐ Other: _____

2. **Proper Request**

   A. After final amendment submitted with the request will not be treated under AFCP 2.0.
   The after final amendment cannot be reviewed and a search conducted within the guidelines of the pilot program.

   ☐ The after final amendment will be treated under pre-pilot procedure.

   B. Updated search and/or completed additional consideration.
   The examiner performed an updated search and/or completed additional consideration of the after final amendment within the time authorized for the pilot program. The result(s) of the updated search and/or completed additional consideration are:

   ☐ 1. All of the rejections in the most recent final Office action are overcome and a Notice of Allowance is issued herewith.

   ☐ 2. The after final amendment would not overcome all of the rejections in the most recent final Office action . See attached interview summary for further details.

   ☐ 3. The after final amendment was reviewed, and it raises a new issue(s). See attached interview summary for further details.

   ☐ 4. The after final amendment raises new issues, but would overcome all of the rejections in the most recent final Office action. A decision on determining allowability could not be made within the guidelines of the pilot. See attached interview summary for further details, including any newly discovered prior art.

   ☑ 5. Other: See Continuation Sheet

   Examiner Note: Please attach an interview summary when necessary as described above.

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Continuation of Proper Request- B. 5. Other: The after final amendment raises new issues, but would overcome all of the rejections in the most recent final Office action. A preliminary search of the prior art revealed references that may be pertinent to the invention (see PTO-892) and a decision on determining allowability could not be made within the guidelines of the pilot.

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14/356,581	Rhee, Wonjong
	Examiner	Art Unit
	BORIS D GRIJALVA LOBOS	2446

CPC - Searched*		
Symbol	**Date**	**Examiner**
H04L7/00,0004	12/21/2015	BGL
H04L12/00,14,16,24,2414,2415,2417-2419,2424-2426,2428-2433,2439,244-2442,2447,2464,2465,2468-247,2472,2473,2476,2478,26,2602,2618,2634-2642,2668-2678,2692	12/21/2015	BGL
H04L41/00,06,08-0806,0813-0836,085-0859,0866-0869,50-5016,5035,5038	12/21/2015	BGL
H04L43/00,04,08-0817,0876-10,16	12/21/2015	BGL
H04L47/00,10,11,12,28,29,32	12/21/2015	BGL
H04L7/00,0004 H04L41/00,06,08-0806,0813-0836,085-0859,0866-0869,50-5016,5035,5038 H04L43/00,04,08-0817,0876-10,16 H04L47/00,10,11,12,28,29,32	10/21/2018	BGL
H04L7/00,0004 H04L41/00,06,08-0806,0813-0836,085-0859,0866-0869,50-5016,5035,5038 H04L43/00,04,08-0817,0876-10,16 H04L47/00,10,11,12,28,29,32	07/26/2019	BGL

CPC Combination Sets - Searched*		
Symbol	**Date**	**Examiner**

US Classification - Searched*			
Class	**Subclass**	**Date**	**Examiner**

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

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Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14/356,581	Rhee, Wonjong
	Examiner	Art Unit
	BORIS D GRIJALVA LOBOS	2446

Search Notes		
Search Notes	**Date**	**Examiner**
EAST Inventor Name Search Performed	12/21/2015	BGL
EAST Text Limited Classification Search Performed (see attached search notes)	12/21/2015	BGL
EAST Text Search Performed (see attached search notes)	12/21/2015	BGL
EAST Inventor Name Search Performed	11/16/2016	BGL
EAST Text Search Performed	11/16/2016	BGL
Updated EAST Text Search (see attached search notes)	12/20/2017	BGL
Updated EAST Inventor Name Search (see attached search notes)	12/20/2017	BGL
Updated EAST Inventor Name Search (see attached search notes)	10/21/2018	BGL
Updated EAST Text Limited Classification Search (see attached search notes)	10/21/2018	BGL
Updated EAST Text Search (see attached search notes)	10/21/2018	BGL
GOOGLE Search Performed	10/21/2018	BGL
Updated EAST Inventor Name Search (see attached search notes)	01/28/2019	BGL
Updated EAST Text Search (see attached search notes)	01/28/2019	BGL
Google search performed	01/28/2019	BGL
Updated EAST Inventor Name Search (see attached search notes)	07/26/2019	BGL
Updated EAST Text Limited Classification Search (see attached search notes)	07/26/2019	BGL
Updated EAST Text Limited Classification Search (see attached search notes)	12/10/2019	BGL
Updated EAST Text Search (see attached search notes)	12/10/2019	BGL

Interference Search			
US Class/CPC Symbol	**US Subclass/CPC Group**	**Date**	**Examiner**

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EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	111342	monitor$3 near3 ((real near1 time) real-time)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2019/12/10 19:44
L2	911536	(improv$3 increas$3) near5 (service qos quality)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2019/12/10 19:47
L3	256602	(histor$4 near4 data)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2019/12/10 19:47
L4	4558	1 and 2 and 3	US-PGPUB; USPAT; EPO; JPO	OR	ON	2019/12/10 19:47
L5	15642	((improv$3 increas$3) near5 (service qos quality)) with (policy rules configuration)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2019/12/10 19:48
L6	228	1 and 3 and 5	US-PGPUB; USPAT; EPO; JPO	OR	ON	2019/12/10 19:48
L11	891108	(chang$3 updat$3 upgrad$3 transmit$4 receiv$3 forward$3 sent) near5 (policy rules configuration)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2019/12/10 20:36
L13	7014	1 and 3 and 11	US-PGPUB; USPAT; EPO; JPO	OR	ON	2019/12/10 20:37
L14	911536	((improv$3 increas$3) near5 (service qos quality))	US-PGPUB; USPAT; EPO; JPO	OR	ON	2019/12/10 20:37
L15	2510	13 and 14	US-PGPUB; USPAT; EPO; JPO	OR	ON	2019/12/10 20:38

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L16	98439	(H04L7/00,0004 H04L41/00,06,08-0806,0813-0836,085-0859,0866-0869,50-5016,5035,5038 H04L43/00,04,08-0817,0876-10,16 H04L47/00,10,11,12,28,29,32).cpc.	US-PGPUB; USPAT; EPO; JPO	OR	ON	2019/12/10 20:38
L17	724	15 and 16	US-PGPUB; USPAT; EPO; JPO	OR	ON	2019/12/10 20:38
L20	22274817	@AD< = "20111110"	US-PGPUB; USPAT; EPO; JPO	OR	ON	2019/12/10 20:44
L21	191	17 and 20	US-PGPUB; USPAT; EPO; JPO	OR	ON	2019/12/10 20:45
S1	1026	((access near1 point) (base near1 station) (wireless near1 LAN near1 device) (DSLAM) (gateway) (performance near1 device) DSL CPE (customer near1 premises near1 equipment) modem (in-home near1 powerline) (in-home coax) (HPNA) (metering near1 device) (LAN near3 appliance) (femtocell) (wifi near1 base) (repeater) STB STU (IP near2 TV) (IP near2 media near1 device) (gam$3 near1 console) gateway device computer router bridge switch) with ((transmit$4 send$3 forward$3 receiv$3) near5 policy) with operation	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/16 12:31
S2	84	((access near1 point) (base near1 station) (wireless near1 LAN near1 device) (DSLAM) (gateway) (performance near1 device) DSL CPE (customer near1 premises near1 equipment) modem (in-home near1 powerline) (in-home coax) (HPNA) (metering near1 device) (LAN near3 appliance) (femtocell) (wifi near1 base) (repeater) STB STU (IP near2 TV) (IP near2 media near1 device) (gam$3 near1 console) gateway device computer router bridge switch) with ((transmit$4 send$3 forward$3 receiv$3) near5 policy) with operation with (location time)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/16 12:48
S3	26692	RSSI	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/16 15:31
S4	1040	monitor$3 near3 RSSI	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/16 15:32
S6	0	(monitor$3 near3 RSSI) with (adjust$3 near3 rate)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/16 15:32

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S7	8	((transmit$3 send$3 receiv$3 forward$3 monitor$3) near3 RSSI) with (adjust$3 near3 rate)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/16 15:33
S8	26	((send$3 transmit$4 receiv$3 forward$3) near5 conditions near3 operation) with ((access near1 point) AP)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/17 18:26
S9	4998	adaptation near1 algorithm	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/17 18:58
S10	3	(adaptation near1 algorithm) with ((real near1 time) real-time) with historical	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/17 18:58
S11	1	"14356581"	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/17 20:14
S12	0	((send$3 transmit$4 forward$3 receiv$3) near3 policy) near20 RSSI	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/17 20:39
S13	0	((send$3 transmit$4 forward$3 receiv$3) near3 policy) with RSSI	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/17 20:39
S14	31	((send$3 transmit$4 forward$3 receiv$3) near7 policy) with RSSI	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/17 20:39
S15	1	(policy near1 server) with RSSI	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/17 20:59
S16	26	(policy near1 server) same2 RSSI	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/17 20:59
S17	0	((transmit$3 send$3 receiv$3 forward$3) near5 policy near5 algorithms) with RSSI	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/18 18:19
S18	178	((transmit$3 send$3 receiv$3 forward$3) near5 policy near5 algorithms)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/18 18:19

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S19	1	((transmit$3 send$3 receiv$3 forward$3) near5 policy near5 algorithms) and RSSI	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/18 18:19
S20	2	((transmit$3 send$3 receiv$3 forward$3) near5 policy near5 algorithms) with AP	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/18 18:20
S21	7	((transmit$3 send$3 receiv$3 forward$3) near5 policy near5 algorithms) and (((access near1 point) AP) with server)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/18 18:20
S22	109	rhee near1 wonjong	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/21 13:24
S23	10	(rhee near1 wonjong) and policy	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/21 13:30
S24	58484	(H04L7/00,0004 H04L12/00,14,16,24,2414,2415,2417-2419,2424-2426,2428-2433,2439,244-2442,2447,2464,2465,2468-247,2472,2473,2476,2478,26,2602,2618,2634-2642,2668-2678,2692 H04L41/00,06,08-0806,0813-0836,085-0859,0866-0869,50-5016,5035,5038 H04L43/00,04,08-0817,0876-10,16 H04L47/00,10,11,12,28,29,32).cpc.	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/21 15:17
S25	25	((transmit$3 send$3 receiv$3 forward$3) near5 policy near5 algorithms) and S24	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/21 15:17
S26	41	(rhee near1 wonjong) and S24	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/21 15:18
S27	1	"7840220".pn.	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/21 16:50
S28	1672280	adaptation algorithm	US-PGPUB; USPAT; EPO; JPO	OR	ON	2016/11/14 19:55
S29	5390	adaptation near1 algorithm	US-PGPUB; USPAT; EPO; JPO	OR	ON	2016/11/14 19:55
S30	394	(creat$3 generat$3 comput$3 calculat$3)	US-	OR	ON	2016/11/14

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		near5 (adaptation near1 algorithm)	PGPUB; USPAT; EPO; JPO			19:56
S31	0	((creat$3 generat$3 comput$3 calculat$3) near5 (adaptation near1 algorithm)) with policy	US-PGPUB; USPAT; EPO; JPO	OR	ON	2016/11/14 19:56
S32	5	((creat$3 generat$3 comput$3 calculat$3) near5 (adaptation near1 algorithm)) same2 policy	US-PGPUB; USPAT; EPO; JPO	OR	ON	2016/11/14 19:56
S33	13	(rhee near1 wonjong) and policy	US-PGPUB; USPAT; EPO; JPO	OR	ON	2016/11/16 17:17
S34	2862	(generat$3 creat$3 develop$3) near10 RSSI	US-PGPUB; USPAT; EPO; JPO	OR	ON	2016/11/16 17:18
S35	361	((generat$3 creat$3 develop$3) near10 RSSI) with ((observ$3 collect$3 obtain$3 receiv$3 detect$3) near5 (data status information state))	US-PGPUB; USPAT; EPO; JPO	OR	ON	2016/11/16 17:19
S36	0	((generat$3 creat$3 develop$3) near10 RSSI) with ((observ$3 collect$3 obtain$3 receiv$3 detect$3) near5 (data status information state)) with policy	US-PGPUB; USPAT; EPO; JPO	OR	ON	2016/11/16 17:19
S37	4	((generat$3 creat$3 develop$3) near10 RSSI) with ((observ$3 collect$3 obtain$3 receiv$3 detect$3) near5 (data status information state)) same2 policy	US-PGPUB; USPAT; EPO; JPO	OR	ON	2016/11/16 17:20
S38	5394	adaptation near1 algorithm	US-PGPUB; USPAT; EPO; JPO	OR	ON	2016/11/16 17:20
S39	2	S35 and S38	US-PGPUB; USPAT; EPO; JPO	OR	ON	2016/11/16 17:20
S40	5784	adaptation near1 algorithm	US-PGPUB; USPAT; EPO; JPO	OR	ON	2017/12/20 14:02
S41	451	(transmit$4 send$3 receiv$3 forward$3 push$3) near5 (adaptation near1 algorithm)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2017/12/20 14:03
S42	4	"7840220".pn. "2007136337"	US-	OR	ON	2017/12/20

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			PGPUB; USPAT; EPO; JPO			15:43
S43	46	(policy near7 algorithm) and (communication near5 algorithm) and WIFI	US-PGPUB; USPAT; EPO; JPO	OR	ON	2017/12/20 21:13
S44	0	S43 and S41	US-PGPUB; USPAT; EPO; JPO	OR	ON	2017/12/20 21:13
S51	33	("2006/0187885").URPN.	USPAT	OR	OFF	2018/10/19 20:09
S52	10158	monitor$3 near7 (signal near1 strength)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2018/10/19 23:07
S53	86958	(H04L7/00,0004 H04L41/00,06,08-0806,0813-0836,085-0859,0866-0869,50-5016,5035,5038 H04L43/00,04,08-0817,0876-10,16 H04L47/00,10,11,12,28,29,32).cpc.	US-PGPUB; USPAT; EPO; JPO	OR	ON	2018/10/19 23:08
S54	335	S52 and S53	US-PGPUB; USPAT; EPO; JPO	OR	ON	2018/10/19 23:08
S55	38	("4161628" | "4229734" | "4279032" | "4430788" | "4558358" | "4694453" | "4730302" | "4799211" | "4816825" | "4860001" | "4890278" | "4896315" | "4926162" | "5048009" | "5115199").PN. OR ("5198805").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2018/10/19 23:11
S56	316	(monitor$3 near7 (signal near1 strength)) and (dynamic$4 near5 adapt$3)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2018/10/19 23:27
S57	58	(monitor$3 near7 (signal near1 strength)) and (dynamic$4 near5 adapt$5) not S56	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2018/10/19 23:33
S58	5	("2009/0059872").URPN.	USPAT	OR	OFF	2018/10/19 23:51
S59	1	("2012/0077533").URPN.	USPAT	OR	OFF	2018/10/19 23:54
S60	839	(monitor$3 near7 (signal near1 strength)) and (dynamic$4 near5 (adapt$5 chang$3 modif$3)) not (S56 S57)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2018/10/19 23:57
S61	433	(monitor$3 near7 (signal near1 strength)) and (dynamic$4 near5 (adapt$5 chang$3 modif$3)) and @AD<="20111110" not (S56	US-PGPUB; USPAT;	OR	OFF	2018/10/20 00:04

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		S57)	EPO; JPO			
S62	15	("2004/0223470").URPN.	USPAT	OR	OFF	2018/10/20 00:09
S63	31	remote$2 near3 manag$5 near3 QOS	USPAT	OR	OFF	2018/10/20 00:15
S64	6276	S52 and @AD<="20111110"	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2018/10/20 00:20
S65	1349	RSSI and S64	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2018/10/20 00:21
S66	15	("2004/0223470").URPN.	USPAT	OR	OFF	2018/10/20 00:33
S67	89	("2007/0082677").URPN.	USPAT	OR	OFF	2018/10/20 00:40
S71	20	("20030031180" | "20030076784" | "20050261915" | "20060126613" | "20060187885" | "20070153807" | "20080186873" | "20090055900" | "20100290465" | "20110013529" | "20110110359" | "20110182182" | "20110273979" | "20120294310" | "5970064" | "5974106" | "6430612" | "7840220" | "8520586" | "8880666").PN.	US-PGPUB; USPAT	OR	OFF	2018/10/20 23:05
S72	1	("20120151540").PN.	US-PGPUB; USPAT	OR	OFF	2018/10/20 23:23
S73	7	("20160315976" | "20180248984" | "6469982" | "6618356" | "6678247" | "6680907" | "7864669").PN.	US-PGPUB; USPAT	OR	OFF	2018/10/21 00:11
S74	3178	(monitor$3 with ((real near1 time) real-time)) and (parameter with algorithm)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2019/01/27 14:58
S75	56	(monitor$3 with ((real near1 time) real-time)) and (parameter with algorithm) and (policy with (rule condition))	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2019/01/27 14:59
S83	2	"13995901"	US-PGPUB; USPAT; EPO; JPO	OR	ON	2019/01/27 23:14
S84	3	("10057080" | "20160261490" | "8126011").PN.	US-PGPUB; USPAT	OR	ON	2019/07/26 17:45
S85	3	("20080186873" | "6430612" | "9819595").PN.	US-PGPUB; USPAT	OR	ON	2019/07/26 17:46
S86	238	(network near5 monitor$3) and (policy with (histor$4 near5 data)) and (communication	US-PGPUB;	OR	ON	2019/07/26 17:56

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		near4 performance)	USPAT; EPO; JPO			
S87	94363	(H04L7/00,0004 H04L41/00,06,08-0806,0813-0836,085-0859,0866-0869,50-5016,5035,5038 H04L43/00,04,08-0817,0876-10,16 H04L47/00,10,11,12,28,29,32).cpc.	US-PGPUB; USPAT; EPO; JPO	OR	ON	2019/07/26 17:56
S88	68	S86 and S87	US-PGPUB; USPAT; EPO; JPO	OR	ON	2019/07/26 17:56

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S45	100	rhee near1 wonjong	US-PGPUB; USPAT	OR	ON	2017/12/20 20:54
S46	889	(policy with algorithm).clm.	US-PGPUB; USPAT	OR	ON	2017/12/20 20:54
S47	1	S45 and S46	US-PGPUB; USPAT	OR	ON	2017/12/20 20:54
S48	42097	((transmission near1 control$4) (communication near1 algorithm)).clm.	US-PGPUB; USPAT	OR	ON	2017/12/20 20:55
S49	13	S46 and S48	US-PGPUB; USPAT	OR	ON	2017/12/20 20:55
S50	5	S48 and S45	US-PGPUB; USPAT	OR	ON	2017/12/20 20:56
S68	104	rhee near1 wonjong	US-PGPUB; USPAT	OR	ON	2018/10/20 02:52
S69	106792	((transmission near1 control$4) (communication near1 algorithm) policy).clm.	US-PGPUB; USPAT	OR	ON	2018/10/20 02:53
S70	7	S68 and S69	US-PGPUB; USPAT	OR	ON	2018/10/20 02:53
S76	105	rhee near1 wonjong	US-PGPUB; USPAT	OR	ON	2019/01/27 14:41
S77	7741	(monitor$3 with real-time).clm.	US-PGPUB; USPAT	OR	ON	2019/01/27 14:55
S78	2	S76 and S77	US-PGPUB; USPAT	OR	ON	2019/01/27 14:55
S79	37017	(monitor$3 with parameter).clm.	US-PGPUB; USPAT	OR	ON	2019/01/27 14:56
S80	4	S76 and S79	US-	OR	ON	2019/01/27

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			PGPUB; USPAT			14:56
S81	3094	(policy and algorithm).clm.	US-PGPUB; USPAT	OR	ON	2019/01/27 14:57
S82	1	S76 and S81	US-PGPUB; USPAT	OR	ON	2019/01/27 14:57
S89	110	rhee near1 wonjong	US-PGPUB; USPAT	OR	ON	2019/07/26 17:46
S90	25771	(network near3 monitor$3).clm.	US-PGPUB; USPAT	OR	ON	2019/07/26 17:50
S91	1	S89 and S90	US-PGPUB; USPAT	OR	ON	2019/07/26 17:50
S92	1397	(policy and (histor$4 near4 data)).clm.	US-PGPUB; USPAT	OR	ON	2019/07/26 17:52
S94	1	S92 and S89	US-PGPUB; USPAT	OR	ON	2019/07/26 17:52
S95	7800	(communication near5 performance).clm.	US-PGPUB; USPAT	OR	ON	2019/07/26 17:53
S96	8	S89 and S95	US-PGPUB; USPAT	OR	ON	2019/07/26 17:53

12/ 10/ 2019 9:50:28 PM
C:\ Users\ bgrijalva\ Documents\ EAST\ Workspaces\ 14356581.wsp

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DO NOT ENTER: /B.D.G/

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appl. No.	:	14/356,581	Confirmation No.	: 4319
Inventor	:	Wonjong Rhee		
Filing Date	:	May 06, 2014		
Title	:	METHOD, APPARATUS, AND SYSTEM FOR OPTIMIZING PERFORMANCE OF A COMMUNICATION UNIT BY A REMOTE SERVER		
Art Unit	:	2446		
Examiner	:	Grijalva Lobos, Boris D.		
Docket No.	:	20145-054US		
Customer No.	:	146571		

CERTIFICATE OF MAILING (37 CFR §1.8)

I hereby certify, pursuant to 37 CFR §1.8, that this correspondence is being electronically transmitted to the United States Patent and Trademark Office via EFS-Web addressed to: Mail Stop Non-Fee Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on the date shown below:

Dated: November 29, 2019 By: /Domarina Alkhas/
Domarina Alkhas

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

AFTER FINAL CONSIDERATION PILOT (AFCP) 2.0 SUBMISSION

IN RESPONSE TO FINAL OFFICE ACTION

Examiner Grijalva Lobos:

This Amendment is in response to the Final Office Action dated August 1, 2019, and having a shortened statutory response period expiring November 1, 2019. A petition requesting a 1-month extension of time accompanies this paper which is being filed on or before its current due date of December 1, 2019. The Applicant respectfully submits a response based on After Final Consideration Pilot 2.0 (AFCP 2.0) and requests further examination and reconsideration in view of the amendments and remarks set forth below.

Amendments to the Claims are reflected in the Listing of Claims which begins on page **2** of this paper.

Remarks/Arguments begin on page **8** of this paper.

DO NOT ENTER: /B.D.G/

Doc Code: A.NE.AFCP
Document Description: After Final Consideration Pilot Program Request

PTO/SB/434 (05-13)

CERTIFICATION AND REQUEST FOR CONSIDERATION UNDER THE AFTER FINAL CONSIDERATION PILOT PROGRAM 2.0

Practitioner Docket No.:	Application No.:	Filing Date:
20145-054US	14/356,581	05-06-2014
First Named Inventor:	**Title:**	
Wonjong Rhee	METHOD, APPARATUS, AND SYSTEM FOR OPTIMIZING PERFORMANCE OF A COMMUNICATION UNIT BY A REMOTE SERVER	

APPLICANT HEREBY CERTIFIES THE FOLLOWING AND REQUESTS CONSIDERATION UNDER THE AFTER FINAL CONSIDERATION PILOT PROGRAM 2.0 (AFCP 2.0) OF THE ACCOMPANYING RESPONSE UNDER 37 CFR 1.116.

1. The above-identified application is (i) an original utility, plant, or design nonprovisional application filed under 35 U.S.C. 111(a) [a continuing application (*e.g.*, a continuation or divisional application) is filed under 35 U.S.C. 111(a) and is eligible under (i)], or (ii) an international application that has entered the national stage in compliance with 35 U.S.C. 371(c).
2. The above-identified application contains an outstanding final rejection.
3. Submitted herewith is a response under 37 CFR 1.116 to the outstanding final rejection. The response includes an amendment to at least one independent claim, and the amendment does not broaden the scope of the independent claim in any aspect.
4. This certification and request for consideration under AFCP 2.0 is the only AFCP 2.0 certification and request filed in response to the outstanding final rejection.
5. Applicant is willing and available to participate in any interview requested by the examiner concerning the present response.
6. This certification and request is being filed electronically using the Office's electronic filing system (EFS-Web).
7. Any fees that would be necessary consistent with current practice concerning responses after final rejection under 37 CFR 1.116, *e.g.*, extension of time fees, are being concurrently filed herewith. [There is no additional fee required to request consideration under AFCP 2.0.]
8. By filing this certification and request, applicant acknowledges the following:

- Reissue applications and reexamination proceedings are not eligible to participate in AFCP 2.0.
- The examiner will verify that the AFCP 2.0 submission is compliant, *i.e.*, that the requirements of the program have been met (see items 1 to 7 above). For compliant submissions:
  - The examiner will review the response under 37 CFR 1.116 to determine if additional search and/or consideration (i) is necessitated by the amendment and (ii) could be completed within the time allotted under AFCP 2.0. If additional search and/or consideration is required but cannot be completed within the allotted time, the examiner will process the submission consistent with current practice concerning responses after final rejection under 37 CFR 1.116, *e.g.*, by mailing an advisory action.
  - If the examiner determines that the amendment does not necessitate additional search and/or consideration, or if the examiner determines that additional search and/or consideration is required and could be completed within the allotted time, then the examiner will consider whether the amendment places the application in condition for allowance (after completing the additional search and/or consideration, if required). If the examiner determines that the amendment does not place the application in condition for allowance, then the examiner will contact the applicant and request an interview.
    - The interview will be conducted by the examiner, and if the examiner does not have negotiation authority, a primary examiner and/or supervisory patent examiner will also participate.
    - If the applicant declines the interview, or if the interview cannot be scheduled within ten (10) calendar days from the date that the examiner first contacts the applicant, then the examiner will proceed consistent with current practice concerning responses after final rejection under 37 CFR 1.116.

Signature	Date
/Michael V. North/	November 29, 2019
Name (Print/Typed) Michael V. North	**Practitioner Registration No.** 46,963

***Note**: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. Submit multiple forms if more than one signature is required, see below*.*

[✓] * Total of 1 forms are submitted.

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.

PTO/SB/22 (03-13)
Approved for use through 3/31/2013. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a)

Docket Number (Optional): 20145-054US

Application Number: 14/356,581

Filed: 05-06-2014

For: METHOD, APPARATUS, AND SYSTEM FOR OPTIMIZING PERFORMANCE OF A COMMUNICATION UNIT BY A REMOTE SERVER

Art Unit: 2446

Examiner: Grijalva Lobos, Boris D.

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	Micro Entity Fee	
☑	One month (37 CFR 1.17(a)(1))	$200	$100	$50	$ 200
☐	Two months (37 CFR 1.17(a)(2))	$600	$300	$150	$
☐	Three months (37 CFR 1.17(a)(3))	$1,400	$700	$350	$
☐	Four months (37 CFR 1.17(a)(4))	$2,200	$1,100	$550	$
☐	Five months (37 CFR 1.17(a)(5))	$3,000	$1,500	$750	$

☐ Applicant asserts small entity status. See 37 CFR 1.27.

☐ Applicant certifies micro entity status. See 37 CFR 1.29.
Form PTO/SB/15A or B or equivalent must either be enclosed or have been submitted previously.

☐ 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 50-2776.

☐ Payment made via EFS-Web.

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.

I am the

☐ applicant/inventor.

☐ assignee of record of the entire interest. See 37 CFR 3.71. 37 CFR 3.73(b) statement is enclosed (Form PTO/SB/96).

☑ attorney or agent of record. Registration number 67,080.

☐ attorney or agent acting under 37 CFR 1.34. Registration number _____.

/Ali Uyanik/	November 29, 2019
Signature	Date
Ali Uyanik	650-353-3786
Typed or printed name	Telephone Number

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

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

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

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

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
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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.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appl. No.	:	14/356,581	Confirmation No.	: 4319
Inventor	:	Wonjong Rhee		
Filing Date	:	May 06, 2014		
Title	:	METHOD, APPARATUS, AND SYSTEM FOR OPTIMIZING PERFORMANCE OF A COMMUNICATION UNIT BY A REMOTE SERVER		
Art Unit	:	2446		
Examiner	:	Grijalva Lobos, Boris D.		
Docket No.	:	20145-054US		
Customer No.	:	146571		

CERTIFICATE OF MAILING (37 CFR §1.8)

I hereby certify, pursuant to 37 CFR §1.8, that this correspondence is being electronically transmitted to the United States Patent and Trademark Office via EFS-Web addressed to: Mail Stop Non-Fee Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on the date shown below:

Dated: November 29, 2019 By: /Domarina Alkhas/
Domarina Alkhas

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

AFTER FINAL CONSIDERATION PILOT (AFCP) 2.0 SUBMISSION

IN RESPONSE TO FINAL OFFICE ACTION

Examiner Grijalva Lobos:

This Amendment is in response to the Final Office Action dated August 1, 2019, and having a shortened statutory response period expiring November 1, 2019. A petition requesting a 1-month extension of time accompanies this paper which is being filed on or before its current due date of December 1, 2019. The Applicant respectfully submits a response based on After Final Consideration Pilot 2.0 (AFCP 2.0) and requests further examination and reconsideration in view of the amendments and remarks set forth below.

Amendments to the Claims are reflected in the Listing of Claims which begins on page **2** of this paper.

Remarks/Arguments begin on page **8** 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 the Claims:

1. (Currently amended) A method for improving performance of one or more communication units, the method comprising:

receiving, by a server, from network monitoring devices that monitor[[,]] in real-time[[,]] data associated with an operation of two or more communication units located in different geographical areas, the data comprising a parameter;

processing, by the server, at least one of the data and historical data;

based on the processed data, determining a policy for at least one of the two or more communication units; and

communicating the policy, by the server, via a network, to at least one or more communication units that, in response to receiving the policy, implements one or more algorithms that use the parameter and at least a rule or a condition for the one or more communication units to improve a performance of the one or more communication units.

2. (Cancelled)

3. (Previously presented) The method of claim 1, wherein the data further comprises determining a received signal strength indication.

4. (Previously presented) The method of claim 1, further comprising, based on a change in the operation, updating the policy.

5. (Currently amended) The method of claim 1, wherein determining the policy comprises selecting the policy from a set of policies that are stored on the one or more communication units.

6. (Cancelled)

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7. (Cancelled).

8. (Previously presented) The method of claim 1, wherein the one or more communication units comprise at least one of:

an access point (AP);

a base station;

a wireless LAN device;

a DSLAM;

a gateway;

a performance enhancement device;

a Digital Subscriber Line (DSL) Customer Premises Equipment (CPE) modem;

an in-home powerline device;

a Home Phoneline Network Alliance (HPNA) based device;

an in-home coax distribution device;

a G.hn (Global Home Networking Standard) compatible device;

an in-home metering communication device;

an in-home appliance communicatively interfaced with the LAN;

a wireless femtocell base station;

a wireless WiFi compatible base station;

a wireless mobile device repeater;

a wireless mobile device base station;

a set-top box (STB)/set-top unit (STU) customer electronics device;

an Internet Protocol (IP) enabled television;

an IP enabled media player;

an IP enabled gaming console;

an Ethernet gateway;

a computing device connected to the LAN;

an Ethernet connected computer peripheral device;

an Ethernet connected router;

an Ethernet connected wireless bridge;

an Ethernet connected network bridge; or

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an Ethernet connected network switch.

9. (Canceled)

10. (Currently amended) A non-transitory machine-readable storage medium having computer executable instructions stored thereon that when executed cause a processor of a server to perform a method for improving performance of one or more communication units, the method comprising:

receiving from network monitoring devices that monitor[[,]] in real-time[[,]] data associated with an operation of two or more communication units located in different geographical areas, the data comprising a parameter;

processing at least one of the data and historical data;

determining by the server, a policy for each of the one or more communication units, based on the processed data; and

communicating, via a network, the policy to two or more communication units that, in response to receiving the policy, implements one or more algorithms based on at least a rule or a condition to improve a performance of the one or more communication units.

11. (Cancelled)

12. (Previously presented) The non-transitory machine-readable storage medium of claim 10, wherein processing comprises storing at least one of the data and the historical data in a memory device.

13. (Previously presented) The non-transitory machine-readable storage medium of claim 10, wherein determining the policy comprises determining a condition for communicating the policy.

14. (Previously presented) The non-transitory machine-readable storage medium of claim 10, wherein the data further comprises determining a received signal strength.

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15. (Previously presented) The non-transitory machine-readable storage medium of claim 10, further comprising updating the parameter based on a change in the operation to update the policy.

16. (Previously presented) The non-transitory machine-readable storage medium of claim 10, wherein determining the policy comprises selecting the policy from a set of policies.

17. – 33. (Cancelled)

34. (Currently amended) An apparatus comprising:

a memory; and

a processor, coupled to the memory, and operable to:

receive, from ~~a~~ network monitoring devices that monitor[[,]] in real-time[[,]] data associated with an operation of two or more communication units located in different geographical areas, the data comprising a parameter;

analyze at least one of the data and historical data;

based on the analyzed data, determine a policy for at least one of the two or more communication units; and

communicate the policy, via a network that is communicatively coupled to the processor, to at least one or more communication units that, in response to receiving the policy, implements one or more algorithms based on at least a rule or a condition to improve a performance of the one or more communication units.

35. (Cancelled)

36. (Previously presented) The apparatus of claim 34, wherein the network monitoring devices determine a received signal strength.

37. (Previously presented) The apparatus of claim 34, wherein determining the policy comprises selecting the policy from a set of policies and updating the parameter.

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38. – 52. (Cancelled)

53. (Previously presented) The method of claim 1, wherein processing comprises storing at least one of the data and historical data in a memory.

54. (Previously presented) The method of claim 4, wherein updating the policy comprises updating the parameter.

55. (Cancelled)

56. (Previously presented) The method of claim 34, wherein processing comprises storing at least one of the data and the historical data in the memory.

57. (Previously presented) The method of claim 34, wherein determining the policy comprises determining a condition for communicating the policy.

58. (Previously presented) The method of claim 1, wherein the data further comprises time-varying data.

59. (Previously presented) The method of claim 1, wherein the server performs an analysis of at least one of the data and historical data.

60. (Previously presented) The method of claim 59, wherein the analysis comprises a statistical analysis of at least one of the data and historical data.

61. (Previously presented) The method of claim 10, wherein the data further comprises time-varying data.

62. (Previously presented) The method of claim 10, wherein the server performs an analysis of at least one of the data and historical data.

63. (Previously presented) The method of claim 62, wherein the analysis comprises a statistical analysis of at least one of the data and historical data.

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64. (Previously presented) The method of claim 34, wherein the data further comprises time-varying data.

65. (Previously presented) The method of claim 34, wherein the server performs an analysis of at least one of the data and historical data.

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REMARKS

Claims 1, 3-5, 8, 10, 12-16, 34, 36-37, and 53-65 were presented for examination. All pending claims were rejected by the Examiner in the present Non-Final Office Action (hereinafter, "Office Action"). Applicant thanks the Examiner for withdrawing the rejection under 35 U.S.C. 101.

Applicant hereby amends claims 1, 5, 10, and 34. Support for the claim amendments may be found, e.g., in paragraph 50. Applicant respectfully request reconsideration in light of the amendments to the claims and the below remarks.

I. Interview Summary

Applicant thanks Examiner Grijalva Lobos for the courtesy of a telephone interview on August 19, 2019. During this interview, Applicant argued 1) that the switches in *Clark* are not designed for and not capable of performing any type of data analysis—whether in ***real-time*** or otherwise; 2) the switches in *Clark* collect data in "intervals" or "when the status data becomes available through normal internal data dumps," which cannot be reasonable interpreted as ***real-time***. *See Clark*, col 10, ln 58-64; and 3) Applicant objected to the double patenting rejection.

In addition, Applicant's representative proposed amendments to clarify the claim language that the Examiner confirmed overcome the current rejections.

In light of the agreement reached during the interview, Applicant hereby amends claims 1, 5, 10, and 34 and respectfully requests that the current rejections be withdrawn.

II. Conclusion

Because the cited documents, separately and in combination, fail to teach or suggest at least one claim element for each of the pending claims, Applicant respectfully requests removal of the rejections of claims, claims 11, 3-5, 8, 10, 12-16, 34, 36-37, and 53-65.

Applicant notes that at least some of the claims include additional claim elements that are missing from the cited documents; however, additional reasons and responses to additional rejections for the independent and dependent claims are not presented in order to avoid unnecessary and/or cumulative arguments. However, Applicant reserves the right to challenge any assertions made by the Examiner in the Office Action that are not herein addressed, including but not limited to, the right to challenge that one or more of the cited documents were

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valid references. It shall also be noted that the absence of any discussion about one or more of the rejections is in no way an acceptance by acquiescence by the Applicant.

The Commissioner is hereby authorized to charge any fees which may be due, and to credit any overpayment of fees, to Deposit Account No. 50-2776.

Should the Examiner believe that a telephone conference would expedite the prosecution of this application, the undersigned can be reached at 650-353-3786.

Respectfully submitted,

Date: November 29, 2019

By: /Ali Uyanik/
Ali Uyanik
Reg. No. 67,080

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Electronic Patent Application Fee Transmittal

Application Number:	14356581
Filing Date:	06-May-2014
Title of Invention:	METHOD, APPARATUS, AND SYSTEM FOR OPTIMIZING PERFORMANCE OF A COMMUNICATION UNIT BY A REMOTE SERVER
First Named Inventor/Applicant Name:	Wonjong Rhee
Filer:	Michael V. North/Domarina Alkhas
Attorney Docket Number:	20145-054US

Filed as Large Entity

Filing Fees for U.S. National Stage under 35 USC 371

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($)
Extension - 1 month with $0 paid	1251	1	200	200
Miscellaneous:				
		Total in USD ($)		**200**

Electronic Acknowledgement Receipt

EFS ID:	37890658
Application Number:	14356581
International Application Number:	
Confirmation Number:	4319
Title of Invention:	METHOD, APPARATUS, AND SYSTEM FOR OPTIMIZING PERFORMANCE OF A COMMUNICATION UNIT BY A REMOTE SERVER
First Named Inventor/Applicant Name:	Wonjong Rhee
Customer Number:	146571
Filer:	Michael V. North/Domarina Alkhas
Filer Authorized By:	Michael V. North
Attorney Docket Number:	20145-054US
Receipt Date:	29-NOV-2019
Filing Date:	06-MAY-2014
Time Stamp:	21:11:59
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$200
RAM confirmation Number	E2019ASL12298941
Deposit Account	502776
Authorized User	Domarina Alkhas
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: 37 CFR 1.17 (Patent application and reexamination processing fees) 37 CFR 1.19 (Document supply fees)	

37 CFR 1.20 (Post Issuance fees)

37 CFR 1.21 (Miscellaneous fees and charges)

37 CFR 1.492 (National application filing, search, and examination fees)

37 CFR 1.492(a) (Basic national fee only)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	After Final Consideration Program Request	054US_SB0434.pdf	226801 7af6a075dfd8725a8c07c575e637d552dc29c50a	no	2
Warnings:					
Information:					
2	Extension of Time	054US_Petition_ExtTime.pdf	187738 666d7810f436216b6e8b6db604b50361ccba4d72	no	2
Warnings:					
Information:					
3		054US_FOAR.pdf	58598 d20bdee0aa942d6f40b6cee0b03bf55b9f350aae	yes	9

Multipart Description/PDF files in .zip description

Document Description	Start	End
After Final Consideration Program Request	1	1
Claims	2	7
Applicant Arguments/Remarks Made in an Amendment	8	9

Warnings:					
Information:					
4	Fee Worksheet (SB06)	fee-info.pdf	31205 afd2d16a0045e5a48f1f1633ac33a705655cb559	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	504342		

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/06 (09-11)
Approved for use through 1/31/2014. 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 14/356,581	Filing Date 05/06/2014	☐ To be Mailed

ENTITY: ☑ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $80 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $420 =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).				
☐ 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	

APPLICATION AS AMENDED - PART II

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT	11/29/2019	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 26	Minus	** 26	= 0		x $100 =	0
	Independent (37 CFR 1.16(h))	* 3	Minus	*** 3	= 0		x $460 =	0
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	0

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=		x $0 =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		x $0 =	
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.	LIE
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".	/VIOLA D ROGERS/
*** 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.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/356,581	05/06/2014	Wonjong Rhee	20145-054US	4319

146571 7590 08/23/2019
North Weber & Baugh LLP - ASSIA
3260 Hillview Avenue, 1st Floor
Palo Alto, CA 94304

EXAMINER	
GRIJALVA LOBOS, BORIS D	

ART UNIT	PAPER NUMBER
2446	

NOTIFICATION DATE	DELIVERY MODE
08/23/2019	ELECTRONIC

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.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

docket1@northweber.com

Applicant-Initiated Interview Summary	**Application No.** 14/356,581	**Applicant(s)** Rhee, Wonjong	
	Examiner BORIS D GRIJALVA LOBOS	**Art Unit** 2446	**AIA (FITF) Status** No

All participants (applicant, applicants representative, PTO personnel):

(1) BORIS D. GRIJALVA LOBOS. (3) _____.

(2) ALI UYANIK (67080). (4) _____.

Date of Interview: 19 August 2019.

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.

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...)

The examiner and applicant's representative discussed potential amendments to the claims to clarify certain aspects of the claimed subject matter. Additionally, certain features of paragraph [0050] of the specification as filed were discussed..

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

/B.D.G/ Examiner, Art Unit 2446	/Tauqir Hussain/ Primary Examiner, Art Unit 2446

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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 examiners 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 applicants 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 applicants 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 examiners 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 examiners initials.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: **Wonjong Rhee**	Examiner: **Grijalva Lobos, Boris D.**
Application No.: 14/356,581	Art Group: 2446
Filed: 06 May 2014	Confirmation No.: 4319
For: METHOD, APPARATUS, AND SYSTEM FOR OPTIMIZING PERFORMANCE OF A COMMUNICATION UNIT BY A REMOTE SERVER	Docket No.: 20145-054US

AGENDA FOR PHONE INTERVIEW

Examiner Grijalva Lobos:

This paper is an outline for our phone interview on Monday August 19, 2019 at 2:00 PM (EST) to discuss the rejections concerning the above-mentioned patent application.

Applicant's Notes

1) The switches in *Clark* are not designed for and not capable of performing any type of data analysis—whether in ***real-time*** or otherwise.
2) In addition, the switches in *Clark* collect data in "intervals" or "when the status data becomes available through normal internal data dumps," which cannot be reasonable interpreted as ***real-time***. *See Clark*, col 10, ln 58-64.
3) Applicant objects to the double patenting rejection.

Respectfully submitted,

Date: August 17, 2019

By: / Ali Uyanik /
Ali Uyanik
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Grijalva Lobos, Boris

From: Ali Uyanik <auyanik@northweber.com>
Sent: Saturday, August 17, 2019 7:23 PM
To: Grijalva Lobos, Boris
Cc: Nita Miller; Michael North
Subject: RE: Application No.: 14/356,581
Attachments: 054US Agenda.pdf

Please see attached.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/356,581	05/06/2014	Wonjong Rhee	20145-054US	4319

146571 7590 08/01/2019

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EXAMINER	
GRIJALVA LOBOS, BORIS D	

ART UNIT	PAPER NUMBER
2446	

NOTIFICATION DATE	DELIVERY MODE
08/01/2019	ELECTRONIC

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.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

docket1@northweber.com

Office Action Summary	**Application No.** 14/356,581	**Applicant(s)** Rhee, Wonjong	
	Examiner BORIS D GRIJALVA LOBOS	**Art Unit** 2446	**AIA (FITF) Status** No

-- 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 MONTHS 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 7/26/2019.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

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) 1,4,8,10,12-13,15,34,53-54,56-59,61-62 and 64-65 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) _____ is/are rejected.

8) ☐ Claim(s) _____ is/are objected to.

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

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to **PPHfeedback@uspto.gov.**

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).

Priority under 35 U.S.C. § 119

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

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)).

** 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) ☑ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date 6/6/2019, 2/26/2019.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.

4) ☐ Other: _____.

Charter Communications, Inc.
Exhibit 1006
Page #434

DETAILED ACTION

Notice of Pre-AIA or AIA Status

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

Information Disclosure Statement

The information disclosure statements submitted on 2/26/2019 and 6/6/2019 are being considered by the examiner.

Response to Amendment

This Office action is in response to amendments filed on 4/30/2019.

Claims 1, 3, 10, 14, 34, and 36 have been amended.

Claims 58-65 have been added.

Claims 2, 6-7, 9, 11, 17-33, 35, 38-52, and 55 have been cancelled.

Claims 1, 3-5, 8, 10, 12-16, 34, 36-37, 53-54, and 56-65 are pending.

Response to Arguments

a) In page 8, of the response filed, applicant argues that the proposed amendments overcome the current rejections.

In response to argument (a), applicant's arguments with respect to claims 1, 3-5, 8, 53-54, and 58-60 have been considered but are moot because the arguments do not apply to any of the references being used in the current rejection.

The remaining claims were not amended in the same manner as claim 1 and do not overcome all previously used references.

New grounds of rejection have been necessitated by amendment.

b) In page 8, of the response filed, applicant argues that in Clark et al. (US 5970064 A, hereinafter Clark), "the switches [...] are not designed for and not capable of performing any type of

data analysis-whether in real-time or otherwise" and therefore Clark cannot be relied upon as teaching or disclosing the limitations.

In response to argument (b), the examiner respectfully disagrees. The limitations do not require "switches" to perform data analysis. Instead, the limitations recite "a server" and "processing, by the server, at least one of the data and historical data", the data being received by the server "in real-time" (see also paragraph [0029] of present application, as published, "the remote server is operable to perform a statistical analysis"). In paragraph [0080] of the present application, as published, the "server" is described as a general computer device (that is, a device including a "processor" that executes instructions stored in "machine-readable storage" to perform the functions of the server.

In Clark, a "network controller" collects (col. 10, lines 52-55) and processes information (col. 12, lines 24-31) from the network switches. The network controller of Clark is a computer device including a processor and memory (see col. 11, lines 11-44).

Claim Interpretation

Claim 1 recites the limitations "receiving […] from network monitoring devices […] data associated with […] two or more communication units".

The specification, as filed, does not recite "monitoring devices" in any one paragraph. However, paragraph [0051] does disclose that communication units (AP 201 and/or the stations 202(1)-202(n) of Fig. 2) monitor performance. Therefore, the examiner interprets the monitoring devices as referring to the "communication units". That is, the communication units of claim 1 monitor their own performance, transmit data to the server, and receive, from the server, a policy.

Double Patenting

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 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., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); *In 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 nonstatutory double patenting provided the reference application or patent either is shown to be commonly owned with the examined application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement. See MPEP § 717.02 for applications subject to examination under the first inventor to file provisions of the AIA as explained in MPEP § 2159. See MPEP §§ 706.02(l)(1) - 706.02(l)(3) for applications not subject to examination under the first inventor to file provisions of the AIA. A terminal disclaimer must be signed in compliance with 37 CFR 1.321(b).

The USPTO Internet website contains terminal disclaimer forms which may be used. Please visit www.uspto.gov/patent/patents-forms. The filing date of the application in which the form is filed determines what form (e.g., PTO/SB/25, PTO/SB/26, PTO/AIA/25, or PTO/AIA/26) should be used. A web-based eTerminal Disclaimer may be filled out completely online using web-screens. An eTerminal Disclaimer that meets all requirements is auto-processed and approved immediately upon submission. For more information about eTerminal Disclaimers, refer to www.uspto.gov/patents/process/file/efs/guidance/eTD-info-I.jsp.

Claim 1, 10, and 34 are rejected on the ground of nonstatutory double patenting as being unpatentable over claim 1 of U.S. Patent No. 10171298 in view of Clark (US 5970064 A). For example:

14356581		10171298	
Claims	**Description**	**Claims**	**Description**
1	A method for improving performance of one or more communication units, the method comprising:	1	A Digital Subscriber Line (DSL) customer premises equipment (CPE) Management Center (CMC) coupled to a Broadband network, the CMC comprising:
	receiving, by a server, from network monitoring devices that monitor, in real-time, data associated with an operation		a data collection module, communicatively coupled to at least one DSL CPE device, to receive information from the CPE device regarding operation of the at least one DSL CPE device, wherein the information is to be received on a: periodic basis, on-demand basis, or in real-time basis;
	of two or more communication units located in different geographical areas,		
	the data comprising a parameter; processing, by the server, at least one of the data and historical data; based on the processed data, determining a policy for at least one of the two or more communication units; and		an analysis module coupled to the data collection module to analyze the received information, wherein the CMC is to determine one or more line parameter values associated with a central office imposed (CO-imposed) line constraint, and wherein the analysis module is to determine to what extent range of the one or more parameter values can be changed within the CO-imposed line constraints; and
	communicating the policy, by the server, via a network, to at least one or more communication units that, in response to receiving the policy implementes one or more algorithms that use the parameter and at least a rule or a condition		a command signal generation module coupled to the analysis module to receive analysis results and to generate a corresponding command signal for transmission to the at least one DSL CPE device to modify the at least one DSL CPE device operation within the CO-imposed line constraints based on the analysis, wherein the CMC is able to modify an operation of the at least one DSL CPE device independent of management on a CO side of the Broadband network, and wherein the CMC is capable to be afforded for collecting operational data without control over operation of a digital subscriber line access multiplexer (DSLAM) coupled to the at least one DSL CPE device.
	for the one or more communication units to improve a performance of the one or more communication units.		

US Patent No. 10171298 B2 does not disclose that the data is associated with an operation of two or more communication units located in different geographical areas; and that the algorithm is to improve a performance of the one or more communication units.

Clark discloses that the data is associated with an operation of two or more communication units located in different geographical areas **(col. 12, lines 21-23, discloses that the information is information associated with the operation of multiple nodes (see also col. 12, lines 61-65, QoS information is also transmitted); see Fig. 3, and col. 6, 9-30, discloses that switches are physical devices located at different locations)**; and

that the algorithm is to improve a performance of the one or more communication units **(col. 12, lines 17-20, discloses improving performance of communication units in response to performing the steps described)**.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify US Patent No. 10171298 B2 in view of Clark so that the data is associated with an operation of two or more communication units located in different geographical areas; and that the algorithm is to improve a performance of the one or more communication units.

One of ordinary skill in the art would have been motivated because it would prevent loss of data due to overloading (Clark, implied, col. 2, lines 21-41).

14356581		10171298	
Claims	Description	Claims	Description
10	A non-transitory machine-readable storage medium having computer executable instructions stored thereon that when executed cause a processor to perform a method for improving performance of one or more communication units, the method comprising:	1	A Digital Subscriber Line (DSL) customer premises equipment (CPE) Management Center (CMC) coupled to a Broadband network, the CMC comprising:
	receiving, from network monitoring devices, in real time, data associated with an operation		a data collection module, communicatively coupled to at least one DSL CPE device, to receive information from the CPE device regarding operation of the at least one DSL CPE device, wherein the information is to be received on a: periodic basis, on-demand basis, or in real-time basis;
	of two or more communication units located in different geographical areas,		
	the data comprising a parameter; processing at least one of the data and historical data; determining a policy for each of the one or more communication units,		an analysis module coupled to the data collection module to analyze the received information, wherein the CMC is to determine one or more line parameter values associated with a central office imposed (CO-imposed) line constraint, and wherein the analysis module is to determine to what extent range of the one or more parameter values can be changed within the CO-imposed line constraints; and
	based on the processed data, communicating, via a network, the policy to two or more communication units that, in response to receiving the policy implements one or more algorithms based on at least a rule or a condition		a command signal generation module coupled to the analysis module to receive analysis results and to generate a corresponding command signal for transmission to the at least one DSL CPE device to modify the at least one DSL CPE device operation within the CO-imposed line constraints based on the analysis, wherein the CMC is able to modify an operation of the at least one DSL CPE device independent of management on a CO side of the Broadband network, and wherein the CMC is capable to be afforded for collecting operational data without control over operation of a digital subscriber line access multiplexer (DSLAM) coupled to the at least one DSL CPE device.
	to improve a performance of the one or more communication units.		

US Patent No. 10171298 B2 does not disclose that the data is associated with an operation of two or more communication units located in different geographical areas; and that the algorithm is to improve a performance of the one or more communication units.

Clark discloses that the data is associated with an operation of two or more communication units located in different geographical areas **(col. 12, lines 21-23, discloses that the information is information associated with the operation of multiple nodes (see also col. 12, lines 61-65, QoS information is also transmitted); see Fig. 3, and col. 6, 9-30, discloses that switches are physical devices located at different locations)**; and

that the algorithm is to improve a performance of the one or more communication units **(col. 12, lines 17-20, discloses improving performance of communication units in response to performing the steps described)**.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify US Patent No. 10171298 B2 in view of Clark so that the data is associated with an operation of two or more communication units located in different geographical areas; and that the algorithm is to improve a performance of the one or more communication units.

One of ordinary skill in the art would have been motivated because it would prevent loss of data due to overloading (Clark, implied, col. 2, lines 21-41).

14356581			**10171298**	
Claims	**Description**		**Claims**	**Description**
34	An apparatus comprising: a memory; and a processor, coupled to the memory, and operable to:		**1**	A Digital Subscriber Line (DSL) customer premises equipment (CPE) Management Center (CMC) coupled to a Broadband network, the CMC comprising:
	receive, from network monitoring devices that monitor, in real-time, data associated with an operation of two or more communication units			a data collection module, communicatively coupled to at least one DSL CPE device, to receive information from the CPE device regarding operation of the at least one DSL CPE device, wherein the information is to be received on a: periodic basis, on-demand basis, or in real-time basis;
	located in different geographical areas,			
	the data comprising a parameter; analyze at least one of the data and historical data; based on the analyzed data, determine a policy for at least one of the two or more communication units; and			an analysis module coupled to the data collection module to analyze the received information, wherein the CMC is to determine one or more line parameter values associated with a central office imposed (CO-imposed) line constraint, and wherein the analysis module is to determine to what extent range of the one or more parameter values can be changed within the CO-imposed line constraints; and
	communicate the policy, via a network that is communicatively coupled to the processor, to at least one or more communication units that in response to receiving the policy implements one or more algorithms based on at least a rule or a condition			a command signal generation module coupled to the analysis module to receive analysis results and to generate a corresponding command signal for transmission to the at least one DSL CPE device to modify the at least one DSL CPE device operation within the CO-imposed line constraints based on the analysis, wherein the CMC is able to modify an operation of the at least one DSL CPE device independent of management on a CO side of the Broadband network, and wherein the CMC is capable to be afforded for collecting operational data without control over operation of a digital subscriber line access multiplexer (DSLAM) coupled to the at least one DSL CPE device.
	to improve a performance of the one or more communication units.			

US Patent No. 10171298 B2 does not disclose that the data is associated with an operation of two or more communication units located in different geographical areas; and that the algorithm is to improve a performance of the one or more communication units.

Clark discloses that the data is associated with an operation of two or more communication units located in different geographical areas **(col. 12, lines 21-23, discloses that the information is information associated with the operation of multiple nodes (see also col. 12, lines 61-65, QoS information is also transmitted); see Fig. 3, and col. 6, 9-30, discloses that switches are physical devices located at different locations)**; and

that the algorithm is to improve a performance of the one or more communication units **(col. 12, lines 17-20, discloses improving performance of communication units in response to performing the steps described)**.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify US Patent No. 10171298 B2 in view of Clark so that the data is associated with an operation of two or more communication units located in different geographical areas; and that the algorithm is to improve a performance of the one or more communication units.

One of ordinary skill in the art would have been motivated because it would prevent loss of data due to overloading (Clark, implied, col. 2, lines 21-41).

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112(a):

> (a) IN GENERAL.—The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor or joint inventor of carrying out the invention.

The following is a quotation of the first paragraph of pre-AIA 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 3 and 14 rejected under 35 U.S.C. 112(a) or 35 U.S.C. 112 (pre-AIA), first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor or a joint inventor, or for pre-AIA the inventor(s), at the time the application was filed, had possession of the claimed invention.

Regarding claim 3, the limitations recite "the data further comprises determining a received signal strength indication". The specification, as filed, does not provide support for data that comprises "determining a received signal strength indication" and therefore the limitations include new matter.

Regarding claim 14, the limitations are similar in scope to those of claim 3 and therefore claim 14 is rejected for the same reasons as set forth in claim 3, above.

The following is a quotation of 35 U.S.C. 112(b):

> (b) CONCLUSION.—The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the inventor or a joint inventor regards as the invention.

The following is a quotation of 35 U.S.C. 112 (pre-AIA), second paragraph:

> 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.

Claims 3 and 14 are rejected under 35 U.S.C. 112(b) or 35 U.S.C. 112 (pre-AIA), second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the inventor or a joint inventor, or for pre-AIA the applicant regards as the invention.

Regarding claim 3, the limitations recite "the data further comprises determining a received signal strength indication". It's unclear how data can comprise an action that is performed.

For examination purposes, the examiner has interpreted the limitation as "wherein the data further comprises a received signal strength indication". Support for this interpretation can be found in paragraph [0053] of the specification.

Claim Rejections - 35 USC § 101

Claim rejections under 35 U.S.C. 101 are withdrawn.

Claim Rejections - 35 USC § 102

In the event the determination of the status of the application as subject to AIA 35 U.S.C. 102 and 103 (or as subject to pre-AIA 35 U.S.C. 102 and 103) is incorrect, any correction of the statutory basis for the rejection will not be considered a new ground of rejection if the prior art relied upon, and the rationale supporting the rejection, would be the same under either status.

The following is a quotation of the appropriate paragraphs of pre-AIA 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.

Claim(s) 10, 12-13, 15, 34, 56-57, 61-62, and 64-65 is/are rejected under pre-AIA 35 U.S.C. 102(b) as being anticipated by Clark et al. (US 5970064 A, hereinafter Clark).

Regarding claim 10, Clark discloses a non-transitory machine-readable storage medium having computer executable instructions stored thereon that when executed cause a processor of a server to perform a method for improving performance of one or more communication units **(col. 11, lines 11-44, discloses a computer device including a memory with instructions to be executed by a processor to execute a process at a network controller; col. 12, lines 17-20, discloses improving performance of communication units in response to performing steps by the network controller)**, the method comprising:

receiving, from network monitoring devices that monitor **(col. 12, lines 21-22, discloses collecting information; col. 10, lines 52-55, discloses that the information is collected by the network controller from each switch in a network (see also Fig. 7, each switch transmits the information))**,

in real time **(col. 10, lines 52-55, discloses that the data transmitted to the network controller is current information)**,

data associated with an operation of two or more communication units **(col. 12, lines 21-23, discloses that the information is information associated with the operation of multiple nodes (see also col. 12, lines 61-65, QoS information is also transmitted))**

located in different geographical areas **(see Fig. 3, and col. 6, 9-30, discloses that switches are physical devices located at different locations)**,

the data comprising a parameter **(col. 12, lines 21-23, discloses that the information includes admission policies (see also col. 12, lines 61-65, QoS information is also transmitted))**;

processing at least one of the data and historical data **(col. 12, lines 24-31, discloses processing the collected information)**;

determining a policy for each of the one or more communication units, based on the processed data **(col. 12, lines 24-31, discloses producing, as a result of the processing, at least one policy to be implemented by the nodes)**; and

communicating, via a network, the policy to two or more communication units **(col. 13, lines 6-10, discloses distributing the one or more policies; col. 6, lines 20-21, discloses that the network controller is connected to switches via a network)**

that, in response to receiving the policy implements one or more algorithms based on at least a rule or a condition **(col. 17, line 54-65, discloses selecting, in response to receiving policy data, a decision table, based on a condition)**

to improve a performance of the one or more communication units **(col. 12, lines 17-20, discloses improving performance of communication units in response to performing the steps described)**.

Regarding claim 12, Clark discloses the non-transitory machine-readable storage medium of claim 10, wherein processing comprises storing at least one of the data and the historical data in a memory of the device **(col. 12, lines 55-58, discloses that the network controller collects the information)**.

Regarding claim 13, Clark discloses the non-transitory machine-readable storage medium of claim 10, wherein determining the policy comprises determining a condition for communicating the policy **(col. 13, line 6-10, discloses that the policies are transmitted once the policies are determined)**.

Regarding claim 15, Clark discloses the non-transitory machine-readable storage medium of claim 10, further comprising updating the parameter based on a change in the operation to update the policy **(col. 12, lines 21-23, discloses that the information includes admission policies (see also col. 12, lines 61-65, QoS information is also transmitted); Fig. 10 discloses that the method steps are repeated (element 1006 points back to 1000), and current parameters are obtained in each iteration (element 1002), which results in new policy (element 1004))**.

Regarding claim 34, Clark discloses an apparatus comprising:

a memory; and a processor, coupled to the memory **(col. 11, lines 11-44, discloses a computer device including a memory with instructions to be executed by a processor to execute a process at a network controller; col. 12, lines 17-20, discloses improving performance of communication units in response to performing steps by the network controller)**, and operable to:

receive, from network monitoring devices that monitor **(col. 12, lines 21-22, discloses collecting information; col. 10, lines 52-55, discloses that the information is collected by the network controller from each switch in a network (see also Fig. 7, each switch transmits the information))**,

in real-time **(col. 10, lines 52-55, discloses that the data transmitted to the network controller is current information)**,

data associated with an operation of two or more communication units **(col. 12, lines 21-23, discloses that the information is information associated with the operation of multiple nodes (see also col. 12, lines 61-65, QoS information is also transmitted))**

located in different geographical areas **(see Fig. 3, and col. 6, 9-30, discloses that switches are physical devices located at different locations)**,

the data comprising a parameter **(col. 12, lines 21-23, discloses that the information includes admission policies (see also col. 12, lines 61-65, QoS information is also transmitted))**;

analyze at least one of the data and historical data **(col. 12, lines 24-31, discloses processing the collected information)**;

based on the analyzed data, determine a policy for at least one of the two or more communication units **(col. 12, lines 24-31, discloses producing, as a result of the processing, at least one policy to be implemented by the nodes)**; and

communicate the policy, via a network that is communicatively coupled to the processor, to at least one or more communication units **(col. 13, lines 6-10, discloses distributing the one or more policies; col. 6, lines 20-21, discloses that the network controller is connected to switches via a network)**

that in response to receiving the policy implements one or more algorithms based on at least a rule or a condition **(col. 17, line 54-65, discloses selecting, in response to receiving policy data, a decision table, based on a condition)**

to improve a performance of the one or more communication units **(col. 12, lines 17-20, discloses improving performance of communication units in response to performing the steps described)**.

Regarding claim 56, Clark discloses the method of claim 34, wherein processing comprises storing at least one of the data and the historical data in the memory **(col. 12, lines 55-58, discloses that the network controller collects the information)**.

Regarding claim 57, Clark discloses the method of claim 34, wherein determining the policy comprises determining a condition for communicating the policy **(col. 13, line 6-10, discloses that the policies are transmitted once the policies are determined)**.

Regarding claim 61, Clark discloses the method of claim 10, wherein the data further comprises time-varying data **(col. 12, lines 21-31, the collected information is "current" information, which is updated at a later point in time)**.

Regarding claim 62, Clark discloses the method of claim 10, wherein the server performs an analysis of at least one of the data and historical data **(col. 12, lines 21-31, the information is used by the network controller to create a new policy)**.

Regarding claim 64, Clark discloses the method of claim 34, wherein the data further comprises time-varying data **(col. 12, lines 21-31, the collected information is "current" information, which is updated at a later point in time)**.

Regarding claim 65, Clark discloses the method of claim 34, wherein the server performs an analysis of at least one of the data and historical data **(col. 12, lines 21-31, the information is used by the network controller to create a new policy)**.

Claim Rejections - 35 USC § 103

The following is a quotation of pre-AIA 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, 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.

Claim 1, 4-5, 8, 16, 37, 53-54, 58-60, and 63 is/are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Clark (US 5970064 A) in view of Roy (US 2006/0187885 A1).

Regarding claim 1, Clark discloses a method for improving performance of one or more communication units **(col. 12, lines 17-20, discloses improving performance of communication units)**, the method comprising:

receiving, by a server **(col. 12, lines 21-22, discloses collecting information; col. 10, lines 52-55, discloses that the information is collected by a network controller)**,

from network monitoring devices that monitor **(col. 10, lines 52-55, discloses that the information transmitted to the network controller is from each switch in a network (see also Fig. 7, each switch transmits the information))**,

in real-time **(col. 10, lines 52-55, discloses that the data transmitted to the network controller is current information)**,

data associated with an operation of two or more communication units **(col. 12, lines 21-23, discloses that the information is information associated with the operation of multiple nodes (see also col. 12, lines 61-65, QoS information is also transmitted))**

located in different geographical areas **(see Fig. 3, and col. 6, 9-30, discloses that switches are physical devices located at different locations)**,

the data comprising a parameter **(col. 12, lines 61-65, QoS information (i.e. a parameter) is also transmitted)**;

processing, by the server, at least one of the data and historical data **(col. 12, lines 24-31, discloses processing the collected information)**;

based on the processed data, determining a policy for at least one of the two or more communication units **(col. 12, lines 24-31, discloses producing, as a result of the processing, at least one policy to be implemented by the nodes)**

communicating the policy **(col. 13, lines 6-10, discloses distributing the one or more policies)**,

by the server **(col. 13, lines 6-10, discloses that the policies are distributed by the network controller)**,

via a network **(col. 13, lines 6-10, the policies are distributed from the network controller to the nodes)**,

to at least one or more communication units that **(col. 6, lines 20-21, discloses that the network controller is connected to switches via a network)**,

in response to receiving the policy implements one or more algorithms that use at least a rule or a condition for the one or more communication units **(col. 17, line 54-65, discloses selecting, in response to receiving policy data, a decision table, based on a condition and quality of service information)**

to improve a performance of the one or more communication units **(col. 12, lines 17-20, discloses improving performance of communication units in response to performing the steps described)**.

Clark does not disclose that the one or more algorithms use the parameter.

Roy discloses that data comprises a parameter and that the one or more algorithms use the parameter **(paragraph [0061] discloses a first station transmitting information to a second station, including a parameter (RSSI or SNR) and receiving, from the second station, a rate command (policy) indicating a preferred rate; paragraph [0031] discloses using an algorithm using the parameter (RSSI) and the preferred transmission rate (received from the second station))**.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Clark in view of Roy so that the one or more algorithms use the parameter.

One of ordinary skill in the art would have been motivated because adjusting the rate based on parameters would benefit connections (Roy, paragraphs [0005]-[0006].

Regarding claim 4, the combined system of Clark and Roy discloses the invention substantially as applied to claim 1, above, further comprising, based on a change in the operation, updating the policy **(Clark, col. 17, line 51, to col. 18, line 3, discloses updating the policy based on operational changes)**.

Regarding claim 5, the combined system of Clark and Roy discloses the invention substantially as applied to claim 1, above.

Clark does not disclose that determining the policy comprises selecting the policy from a set of policies.

Roy discloses that determining a policy comprises selecting the policy from a set of policies **(Fig. 3 discloses monitoring a node (elements 310-330), and based on monitored parameters, selecting one of two policies (elements 330, 320, and 335))**.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Clark in view of Roy so that determining a policy comprises selecting the policy from a set of policies.

One of ordinary skill in the art would have been motivated because predetermined policies improve processing time by not having to create policies from scratch.

Regarding claim 8, the combined system of Clark and Roy discloses the invention substantially as applied to claim 1, above, wherein the one or more communication units comprise at least one of: an access point (AP); a base station; a wireless LAN device; a DSLAM; a gateway; a performance enhancement device; a Digital Subscriber Line (DSL) Customer Premises Equipment (CPE) modem; an in-home powerline device; a Home Phoneline Network Alliance (HPNA) based device; an in-home coax distribution device; a G.hn (Global Home Networking Standard) compatible device; an in-home metering communication device; an in-home appliance communicatively interfaced with the LAN; a wireless

femtocell base station; a wireless WiFi compatible base station; a wireless mobile device repeater; a wireless mobile device base station; a set-top box (STB)/set-top unit (STU) customer electronics device; an Internet Protocol (IP) enabled television; an IP enabled media player; an IP enabled gaming console; an Ethernet gateway; a computing device connected to the LAN; an Ethernet connected computer peripheral device; an Ethernet connected router; an Ethernet connected wireless bridge; an Ethernet connected network bridge; or an Ethernet connected network switch **(Clark, col. 6, line 13, discloses that the nodes may be network switches)**.

Regarding claim 16, Clark discloses the non-transitory machine-readable storage medium of claim 10.

Clark does not disclose that determining the policy comprises selecting the policy from a set of policies.

Roy discloses that determining a policy comprises selecting the policy from a set of policies **(Fig. 3 discloses monitoring a node (elements 310-330), and based on monitored parameters, selecting one of two policies (elements 330, 320, and 335))**.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Clark in view of Roy so that determining a policy comprises selecting the policy from a set of policies.

One of ordinary skill in the art would have been motivated because predetermined policies improve processing time by not having to create policies from scratch.

Regarding claim 37, Clark discloses the apparatus of claim 34, wherein determining the policy comprises updating the parameter **(col. 12, lines 21-23, discloses that the information includes admission policies and what's updated is the admission policies (see col. 13, lines 10-12))**.

Clark does not disclose that determining the policy comprises selecting the policy from a set of policies.

Roy discloses that determining a policy comprises selecting the policy from a set of policies **(Fig. 3 discloses monitoring a node (elements 310-330), and based on monitored parameters, selecting one of two policies (elements 330, 320, and 335))**.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Clark in view of Roy so that determining a policy comprises selecting the policy from a set of policies.

One of ordinary skill in the art would have been motivated because predetermined policies improve processing time by not having to create policies from scratch.

Regarding claim 53, the combined system of Clark and Roy discloses the invention substantially as applied to claim 1, above, wherein processing comprises storing at least one of the data and historical data in a memory **(Clark, col. 12, lines 55-58, discloses that the network controller collects the information)**.

Regarding claim 54, Clark discloses the method of claim 4, wherein updating the policy comprises updating the parameter **(Clark, col. 12, lines 21-23, discloses that the information includes admission policies (see also col. 12, lines 61-65, QoS information is also transmitted); Fig. 10 discloses that the method steps are repeated (element 1006 points back to 1000), and current parameters are obtained in each iteration (element 1002), which results in new policy (element 1004))**.

Regarding claim 58, the combined system of Clark and Roy discloses the invention substantially as applied to claim 1, above, wherein the data further comprises time-varying data **(Clark, col. 12, lines 21-31, the collected information is "current" information, which is updated at a later point in time)**.

Regarding claim 59, the combined system of Clark and Roy discloses the invention substantially as applied to claim 1, above, wherein the server performs an analysis of at least one of the data and historical data **(Clark, col. 12, lines 21-31, the information is used by the network controller to create a new policy)**.

Regarding claim 60, Clark discloses the method of claim 59, wherein the analysis comprises a statistical analysis of at least one of the data and historical data **(Roy, paragraph [0061] discloses a computer device (second station) obtaining information regarding another device (first station) to determine a policy (preferred rate); paragraph [0063] discloses that the information is analyzed by creating statistics and comparing the statistics to other data)**.

Regarding claim 63, Clark discloses the method of claim 62.

Clark does not disclose that the analysis comprises a statistical analysis of at least one of the data and historical data.

Roy discloses that an analysis may comprise a statistical analysis of at least one of data and historical data **(paragraph [0061] discloses a computer device (second station) obtaining information regarding another device (first station) to determine a policy (preferred rate); paragraph [063] discloses that the information is analyzed by creating statistics and comparing the statistics to other data)**.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Clark in view of Roy for the analysis to comprise a statistical analysis of at least one of the data and historical data.

One of ordinary skill in the art would have been motivated because it would benefit connections on a system (Roy, implied, paragraphs [0005]-[0006]).

Claims 14-36 is/are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Clark (US 5970064 A) in view of Malik et al. (US 2009/0147697 A1, hereinafter Malik).

Regarding claim 14, Clark discloses the non-transitory machine-readable storage medium of claim 10.

Clark does not disclose that the data further comprises determining a received signal strength indication.

Malik discloses that the data further comprises determining a received signal strength indication **(paragraph [0025] discloses a first network element receiving from a second network element performance data related to communications between the second network element and a third network element of a plurality of elements (see paragraph [0018]); paragraph [0030] discloses that monitored parameters may include signal strength indicators; paragraphs [0046]-[0047] discloses transmitting new policies to node devices based on the monitoring)**.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Clark in view of Malik for the data to further comprise determining a received signal strength indication.

One of ordinary skill in the art would have been motivated because it would improve techniques for associating user devices with access points (Malik, paragraph [0003]).

Regarding claim 36, Clark discloses the apparatus of claim 34.

Clark does not disclose that the network monitoring devices determine a received signal strength.

Malik discloses monitoring devices that determine a received signal strength **(paragraph [0025] discloses a first network element receiving from a second network element performance data related to communications between the second network element and a third network element of a plurality of elements (see paragraph [0018]); paragraph [0030] discloses that monitored parameters may include signal strength indicators; paragraphs [0046]-[0047] discloses transmitting new policies to node devices based on the monitoring)**.

Therefore, it would have been obvious to one of ordinary skill in the art, at the time the invention was made, to modify Clark in view of Malik so that the network monitoring devices determine a received signal strength.

One of ordinary skill in the art would have been motivated because it would improve techniques for associating user devices with access points (Malik, paragraph [0003]).

Claim 3 is/are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Clark (US 5970064 A) in view of Roy (US 2006/0187885 A1), as applied to claim 1, above, and further in view of Malik (US 2009/0147697 A1).

Regarding claim 3, the combined system of Clark and Roy discloses the invention substantially as applied to claim 1, above.

The combined system of Clark and Roy does not disclose that the data further comprises determining a received signal strength indication.

Malik discloses that the data further comprises determining a received signal strength indication **(paragraph [0025] discloses a first network element receiving from a second network element performance data related to communications between the second network element and a third network element of a plurality of elements (see paragraph [0018]); paragraph [0030] discloses that monitored parameters may include signal strength indicators; paragraphs [0046]-[0047] discloses transmitting new policies to node devices based on the monitoring)**.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the combined system of Clark and Roy in view of Malik for the data to further comprise determining a received signal strength indication.

One of ordinary skill in the art would have been motivated because it would improve techniques for associating user devices with access points (Malik, paragraph [0003]).

Conclusion

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

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to BORIS D GRIJALVA LOBOS whose telephone number is (571)272-0767. The examiner can normally be reached on M-F 10:30AM to 6:30PM EST.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian Gillis can be reached on 571-272-7952. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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

/B.D.G/
Examiner, Art Unit 2446

/MICHAEL A KELLER/
Primary Patent Examiner, Art Unit 2446

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14/356,581	Rhee, Wonjong
	Examiner	Art Unit
	BORIS D GRIJALVA LOBOS	2446

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

CLAIMS

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

CLAIM		DATE								
Final	Original	12/21/2015	11/16/2016	12/20/2017	10/21/2018	01/27/2019	07/26/2019			
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	3	✓	✓	✓	✓	✓	✓			
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	42	-	-	-	-	-	-			

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Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14/356,581	Rhee, Wonjong
	Examiner	**Art Unit**
	BORIS D GRIJALVA LOBOS	2446

CLAIM		DATE								
Final	Original	12/21/2015	11/16/2016	12/20/2017	10/21/2018	01/27/2019	07/26/2019			
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	51	-	-	-	-	-	-			
	52	-	-	-	-	-	-			
	53				✓	✓	✓			
	54				✓	✓	✓			
	55				✓	-	-			
	56				✓	✓	✓			
	57				✓	✓	✓			
	58						✓			
	59						✓			
	60						✓			
	61						✓			
	62						✓			
	63						✓			
	64						✓			
	65						✓			

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Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14/356,581	Rhee, Wonjong
	Examiner	Art Unit
	BORIS D GRIJALVA LOBOS	2446

CPC - Searched*		
Symbol	**Date**	**Examiner**
H04L7/00,0004	12/21/2015	BGL
H04L12/00,14,16,24,2414,2415,2417-2419,2424-2426,2428-2433,2439,244-2442,2447,2464,2465,2468-247,2472,2473,2476,2478,26,2602,2618,2634-2642,2668-2678,2692	12/21/2015	BGL
H04L41/00,06,08-0806,0813-0836,085-0859,0866-0869,50-5016,5035,5038	12/21/2015	BGL
H04L43/00,04,08-0817,0876-10,16	12/21/2015	BGL
H04L47/00,10,11,12,28,29,32	12/21/2015	BGL
H04L7/00,0004 H04L41/00,06,08-0806,0813-0836,085-0859,0866-0869,50-5016,5035,5038 H04L43/00,04,08-0817,0876-10,16 H04L47/00,10,11,12,28,29,32	10/21/2018	BGL
H04L7/00,0004 H04L41/00,06,08-0806,0813-0836,085-0859,0866-0869,50-5016,5035,5038 H04L43/00,04,08-0817,0876-10,16 H04L47/00,10,11,12,28,29,32	07/26/2019	BGL

CPC Combination Sets - Searched*		
Symbol	**Date**	**Examiner**

US Classification - Searched*			
Class	**Subclass**	**Date**	**Examiner**

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

/B.D.G/ Examiner, Art Unit 2446	

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Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14/356,581	Rhee, Wonjong
	Examiner	Art Unit
	BORIS D GRIJALVA LOBOS	2446

Search Notes		
Search Notes	**Date**	**Examiner**
EAST Inventor Name Search Performed	12/21/2015	BGL
EAST Text Limited Classification Search Performed (see attached search notes)	12/21/2015	BGL
EAST Text Search Performed (see attached search notes)	12/21/2015	BGL
EAST Inventor Name Search Performed	11/16/2016	BGL
EAST Text Search Performed	11/16/2016	BGL
Updated EAST Text Search (see attached search notes)	12/20/2017	BGL
Updated EAST Inventor Name Search (see attached search notes)	12/20/2017	BGL
Updated EAST Inventor Name Search (see attached search notes)	10/21/2018	BGL
Updated EAST Text Limited Classification Search (see attached search notes)	10/21/2018	BGL
Updated EAST Text Search (see attached search notes)	10/21/2018	BGL
GOOGLE Search Performed	10/21/2018	BGL
Updated EAST Inventor Name Search (see attached search notes)	01/28/2019	BGL
Updated EAST Text Search (see attached search notes)	01/28/2019	BGL
Google search performed	01/28/2019	BGL
Updated EAST Inventor Name Search (see attached search notes)	07/26/2019	BGL
Updated EAST Text Limited Classification Search (see attached search notes)	07/26/2019	BGL

Interference Search			
US Class/CPC Symbol	**US Subclass/CPC Group**	**Date**	**Examiner**

/B.D.G/ Examiner, Art Unit 2446	

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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	14356581
Filing Date	2014-05-06
First Named Inventor	Wonjong Rhee
Art Unit	2446
Examiner Name	Boris D. Grijalva Lobos
Attorney Docket Number	20145-054US

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	6430612	B1	2002-08-06	Yoshio Iizuka	
	2	9819595	B2	2017-11-14	John Cioffi et al.	

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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
	1	20080186873	A1	2008-08-17	Nicolas Pujet et al.	

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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	2007116411	WO	A1	2007-10-18	Link Fusion Ltd.		

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	14356581
Filing Date	2014-05-06
First Named Inventor	Wonjong Rhee
Art Unit	2446
Examiner Name	Boris D. Grijalva Lobos
Attorney Docket Number	20145-054US

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	Extended European Search Report dated 2019-03-22, in European Patent Application No. 18211162.5 (Docket No. 055EPD) (9pgs).	
	2	2013 - 2014 Cisco Systems, Inc. "IOS NAT Load-Balancing for Two ISP Connections," 2008-02-22, Document ID: 100658, retrieved from the internet: URL: https://www.cisco.com/c/en/us/support/docs/ip/network-address-translation-nat/100658-ios-nat-load-balancing-2isp.pdf, retrieved 2019-03-12 (5pgs).	
	3	Office Action mailed 2019-03-28, in Australian Patent Application No. 2018200888 (Docket No. 055AUD2) (3pgs).	
	4	Non-Final Office Action mailed 2019-04-09, in US Patent Application No. 15/809,823, filed 2017-11-10 (Docket No. 055USC) (28pgs).	
	5	Communication Under Article 94(3) EPC dated 2018-12-07, in European Patent Application No. 11787994.0 (Docket No. 054EP) (4pgs).	

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

EXAMINER SIGNATURE

Examiner Signature	/BORIS D GRIJALVA LOBOS/	Date Considered	07/26/2019

*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. /B.D.G/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	14356581
Filing Date	2014-05-06
First Named Inventor	Wonjong Rhee
Art Unit	2446
Examiner Name	Boris D. Grijalva Lobos
Attorney Docket Number	20145-054US

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	/Michael North/	Date (YYYY-MM-DD)	2019-06-06
Name/Print	Michael North	Registration Number	46963

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

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

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

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /B.D.G/

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	3	("10057080" | "20160261490" | "8126011").PN.	US-PGPUB; USPAT	OR	ON	2019/07/26 17:45
L2	3	("20080186873" | "6430612" | "9819595").PN.	US-PGPUB; USPAT	OR	ON	2019/07/26 17:46
L11	238	(network near5 monitor$3) and (policy with (histor$4 near5 data)) and (communication near4 performance)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2019/07/26 17:56
L12	94363	(H04L7/00,0004 H04L41/00,06,08-0806,0813-0836,085-0859,0866-0869,50-5016,5035,5038 H04L43/00,04,08-0817,0876-10,16 H04L47/00,10,11,12,28,29,32).cpc.	US-PGPUB; USPAT; EPO; JPO	OR	ON	2019/07/26 17:56
L13	68	11 and 12	US-PGPUB; USPAT; EPO; JPO	OR	ON	2019/07/26 17:56
S1	1026	((access near1 point) (base near1 station) (wireless near1 LAN near1 device) (DSLAM) (gateway) (performance near1 device) DSL CPE (customer near1 premises near1 equipment) modem (in-home near1 powerline) (in-home coax) (HPNA) (metering near1 device) (LAN near3 appliance) (femtocell) (wifi near1 base) (repeater) STB STU (IP near2 TV) (IP near2 media near1 device) (gam$3 near1 console) gateway device computer router bridge switch) with ((transmit$4 send$3 forward$3 receiv$3) near5 policy) with operation	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/16 12:31
S2	84	((access near1 point) (base near1 station) (wireless near1 LAN near1 device) (DSLAM) (gateway) (performance near1 device) DSL CPE (customer near1 premises near1 equipment) modem (in-home near1 powerline) (in-home coax) (HPNA) (metering near1 device) (LAN near3 appliance) (femtocell) (wifi near1 base) (repeater) STB STU (IP near2 TV) (IP near2 media near1 device) (gam$3 near1 console) gateway device computer router bridge switch) with ((transmit$4 send$3 forward$3 receiv$3) near5 policy) with operation with (location time)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/16 12:48
S3	26692	RSSI	US-PGPUB; USPAT;	OR	ON	2015/12/16 15:31

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			EPO; JPO			
S4	1040	monitor$3 near3 RSSI	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/16 15:32
S6	0	(monitor$3 near3 RSSI) with (adjust$3 near3 rate)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/16 15:32
S7	8	((transmit$3 send$3 receiv$3 forward$3 monitor$3) near3 RSSI) with (adjust$3 near3 rate)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/16 15:33
S8	26	((send$3 transmit$4 receiv$3 forward$3) near5 conditions near3 operation) with ((access near1 point) AP)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/17 18:26
S9	4998	adaptation near1 algorithm	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/17 18:58
S10	3	(adaptation near1 algorithm) with ((real near1 time) real-time) with historical	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/17 18:58
S11	1	"14356581"	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/17 20:14
S12	0	((send$3 transmit$4 forward$3 receiv$3) near3 policy) near20 RSSI	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/17 20:39
S13	0	((send$3 transmit$4 forward$3 receiv$3) near3 policy) with RSSI	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/17 20:39
S14	31	((send$3 transmit$4 forward$3 receiv$3) near7 policy) with RSSI	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/17 20:39
S15	1	(policy near1 server) with RSSI	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/17 20:59
S16	26	(policy near1 server) same2 RSSI	US-PGPUB; USPAT;	OR	ON	2015/12/17 20:59

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			EPO; JPO			
S17	0	((transmit$3 send$3 receiv$3 forward$3) near5 policy near5 algorithms) with RSSI	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/18 18:19
S18	178	((transmit$3 send$3 receiv$3 forward$3) near5 policy near5 algorithms)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/18 18:19
S19	1	((transmit$3 send$3 receiv$3 forward$3) near5 policy near5 algorithms) and RSSI	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/18 18:19
S20	2	((transmit$3 send$3 receiv$3 forward$3) near5 policy near5 algorithms) with AP	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/18 18:20
S21	7	((transmit$3 send$3 receiv$3 forward$3) near5 policy near5 algorithms) and (((access near1 point) AP) with server)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/18 18:20
S22	109	rhee near1 wonjong	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/21 13:24
S23	10	(rhee near1 wonjong) and policy	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/21 13:30
S24	58484	(H04L7/00,0004 H04L12/00,14,16,24,2414,2415,2417-2419,2424-2426,2428-2433,2439,244-2442,2447,2464,2465,2468-247,2472,2473,2476,2478,26,2602,2618,2634-2642,2668-2678,2692 H04L41/00,06,08-0806,0813-0836,085-0859,0866-0869,50-5016,5035,5038 H04L43/00,04,08-0817,0876-10,16 H04L47/00,10,11,12,28,29,32).cpc.	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/21 15:17
S25	25	((transmit$3 send$3 receiv$3 forward$3) near5 policy near5 algorithms) and S24	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/21 15:17
S26	41	(rhee near1 wonjong) and S24	US-PGPUB; USPAT; EPO; JPO	OR	ON	2015/12/21 15:18
S27	1	"7840220".pn.	US-PGPUB; USPAT; EPO;	OR	ON	2015/12/21 16:50

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			JPO			
S28	1672280	adaptation algorithm	US-PGPUB; USPAT; EPO; JPO	OR	ON	2016/11/14 19:55
S29	5390	adaptation near1 algorithm	US-PGPUB; USPAT; EPO; JPO	OR	ON	2016/11/14 19:55
S30	394	(creat$3 generat$3 comput$3 calculat$3) near5 (adaptation near1 algorithm)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2016/11/14 19:56
S31	0	((creat$3 generat$3 comput$3 calculat$3) near5 (adaptation near1 algorithm)) with policy	US-PGPUB; USPAT; EPO; JPO	OR	ON	2016/11/14 19:56
S32	5	((creat$3 generat$3 comput$3 calculat$3) near5 (adaptation near1 algorithm)) same2 policy	US-PGPUB; USPAT; EPO; JPO	OR	ON	2016/11/14 19:56
S33	13	(rhee near1 wonjong) and policy	US-PGPUB; USPAT; EPO; JPO	OR	ON	2016/11/16 17:17
S34	2862	(generat$3 creat$3 develop$3) near10 RSSI	US-PGPUB; USPAT; EPO; JPO	OR	ON	2016/11/16 17:18
S35	361	((generat$3 creat$3 develop$3) near10 RSSI) with ((observ$3 collect$3 obtain$3 receiv$3 detect$3) near5 (data status information state))	US-PGPUB; USPAT; EPO; JPO	OR	ON	2016/11/16 17:19
S36	0	((generat$3 creat$3 develop$3) near10 RSSI) with ((observ$3 collect$3 obtain$3 receiv$3 detect$3) near5 (data status information state)) with policy	US-PGPUB; USPAT; EPO; JPO	OR	ON	2016/11/16 17:19
S37	4	((generat$3 creat$3 develop$3) near10 RSSI) with ((observ$3 collect$3 obtain$3 receiv$3 detect$3) near5 (data status information state)) same2 policy	US-PGPUB; USPAT; EPO; JPO	OR	ON	2016/11/16 17:20
S38	5394	adaptation near1 algorithm	US-PGPUB; USPAT; EPO; JPO	OR	ON	2016/11/16 17:20
S39	2	S35 and S38	US-PGPUB; USPAT; EPO;	OR	ON	2016/11/16 17:20

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			JPO			
S40	5784	adaptation near1 algorithm	US-PGPUB; USPAT; EPO; JPO	OR	ON	2017/12/20 14:02
S41	451	(transmit$4 send$3 receiv$3 forward$3 push$3) near5 (adaptation near1 algorithm)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2017/12/20 14:03
S42	4	"7840220".pn. "2007136337"	US-PGPUB; USPAT; EPO; JPO	OR	ON	2017/12/20 15:43
S43	46	(policy near7 algorithm) and (communication near5 algorithm) and WIFI	US-PGPUB; USPAT; EPO; JPO	OR	ON	2017/12/20 21:13
S44	0	S43 and S41	US-PGPUB; USPAT; EPO; JPO	OR	ON	2017/12/20 21:13
S51	33	("2006/0187885").URPN.	USPAT	OR	OFF	2018/10/19 20:09
S52	10158	monitor$3 near7 (signal near1 strength)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2018/10/19 23:07
S53	86958	(H04L7/00,0004 H04L41/00,06,08-0806,0813-0836,085-0859,0866-0869,50-5016,5035,5038 H04L43/00,04,08-0817,0876-10,16 H04L47/00,10,11,12,28,29,32).cpc.	US-PGPUB; USPAT; EPO; JPO	OR	ON	2018/10/19 23:08
S54	335	S52 and S53	US-PGPUB; USPAT; EPO; JPO	OR	ON	2018/10/19 23:08
S55	38	("4161628" | "4229734" | "4279032" | "4430788" | "4558358" | "4694453" | "4730302" | "4799211" | "4816825" | "4860001" | "4890278" | "4896315" | "4926162" | "5048009" | "5115199").PN. OR ("5198805").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2018/10/19 23:11
S56	316	(monitor$3 near7 (signal near1 strength)) and (dynamic$4 near5 adapt$3)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2018/10/19 23:27
S57	58	(monitor$3 near7 (signal near1 strength)) and (dynamic$4 near5 adapt$5) not S56	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2018/10/19 23:33

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S58	5	("2009/0059872").URPN.	USPAT	OR	OFF	2018/10/19 23:51
S59	1	("2012/0077533").URPN.	USPAT	OR	OFF	2018/10/19 23:54
S60	839	(monitor$3 near7 (signal near1 strength)) and (dynamic$4 near5 (adapt$5 chang$3 modif$3)) not (S56 S57)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2018/10/19 23:57
S61	433	(monitor$3 near7 (signal near1 strength)) and (dynamic$4 near5 (adapt$5 chang$3 modif$3)) and @AD<="20111110" not (S56 S57)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2018/10/20 00:04
S62	15	("2004/0223470").URPN.	USPAT	OR	OFF	2018/10/20 00:09
S63	31	remote$2 near3 manag$5 near3 QOS	USPAT	OR	OFF	2018/10/20 00:15
S64	6276	S52 and @AD<="20111110"	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2018/10/20 00:20
S65	1349	RSSI and S64	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2018/10/20 00:21
S66	15	("2004/0223470").URPN.	USPAT	OR	OFF	2018/10/20 00:33
S67	89	("2007/0082677").URPN.	USPAT	OR	OFF	2018/10/20 00:40
S71	20	("20030031180" | "20030076784" | "20050261915" | "20060126613" | "20060187885" | "20070153807" | "20080186873" | "20090055900" | "20100290465" | "20110013529" | "20110110359" | "20110182182" | "20110273979" | "20120294310" | "5970064" | "5974106" | "6430612" | "7840220" | "8520586" | "8880666").PN.	US-PGPUB; USPAT	OR	OFF	2018/10/20 23:05
S72	1	("20120151540").PN.	US-PGPUB; USPAT	OR	OFF	2018/10/20 23:23
S73	7	("20160315976" | "20180248984" | "6469982" | "6618356" | "6678247" | "6680907" | "7864669").PN.	US-PGPUB; USPAT	OR	OFF	2018/10/21 00:11
S74	3178	(monitor$3 with ((real near1 time) real-time)) and (parameter with algorithm)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2019/01/27 14:58
S75	56	(monitor$3 with ((real near1 time) real-time)) and (parameter with algorithm) and (policy with (rule condition))	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2019/01/27 14:59
S83	2	"13995901"	US-	OR	ON	2019/01/27

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			PGPUB; USPAT; EPO; JPO			23:14

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L3	110	rhee near1 wonjong	US-PGPUB; USPAT	OR	ON	2019/07/26 17:46
L4	25771	(network near3 monitor$3).clm.	US-PGPUB; USPAT	OR	ON	2019/07/26 17:50
L5	1	3 and 4	US-PGPUB; USPAT	OR	ON	2019/07/26 17:50
L6	1397	(policy and (histor$4 near4 data)).clm.	US-PGPUB; USPAT	OR	ON	2019/07/26 17:52
L8	1	6 and 3	US-PGPUB; USPAT	OR	ON	2019/07/26 17:52
L9	7800	(communication near5 performance).clm.	US-PGPUB; USPAT	OR	ON	2019/07/26 17:53
L10	8	3 and 9	US-PGPUB; USPAT	OR	ON	2019/07/26 17:53
S45	100	rhee near1 wonjong	US-PGPUB; USPAT	OR	ON	2017/12/20 20:54
S46	889	(policy with algorithm).clm.	US-PGPUB; USPAT	OR	ON	2017/12/20 20:54
S47	1	S45 and S46	US-PGPUB; USPAT	OR	ON	2017/12/20 20:54
S48	42097	((transmission near1 control$4) (communication near1 algorithm)).clm.	US-PGPUB; USPAT	OR	ON	2017/12/20 20:55
S49	13	S46 and S48	US-PGPUB; USPAT	OR	ON	2017/12/20 20:55
S50	5	S48 and S45	US-PGPUB; USPAT	OR	ON	2017/12/20 20:56
S68	104	rhee near1 wonjong	US-PGPUB; USPAT	OR	ON	2018/10/20 02:52
S69	106792	((transmission near1 control$4) (communication near1 algorithm) policy).clm.	US-PGPUB; USPAT	OR	ON	2018/10/20 02:53
S70	7	S68 and S69	US-PGPUB; USPAT	OR	ON	2018/10/20 02:53

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S76	105	rhee near1 wonjong	US-PGPUB; USPAT	OR	ON	2019/01/27 14:41
S77	7741	(monitor$3 with real-time).clm.	US-PGPUB; USPAT	OR	ON	2019/01/27 14:55
S78	2	S76 and S77	US-PGPUB; USPAT	OR	ON	2019/01/27 14:55
S79	37017	(monitor$3 with parameter).clm.	US-PGPUB; USPAT	OR	ON	2019/01/27 14:56
S80	4	S76 and S79	US-PGPUB; USPAT	OR	ON	2019/01/27 14:56
S81	3094	(policy and algorithm).clm.	US-PGPUB; USPAT	OR	ON	2019/01/27 14:57
S82	1	S76 and S81	US-PGPUB; USPAT	OR	ON	2019/01/27 14:57

7/ 26/ 2019 5:57:59 PM
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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	14356581
Filing Date	2014-05-06
First Named Inventor	Wonjong Rhee
Art Unit	2446
Examiner Name	Grijalva Lobos, Boris
Attorney Docket Number	20145-054US

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	8126011	B2	2012-02-28	EVANS, Paul Andrew	
	2	10057080	B2	2018-08-21	EVANS, Paul Andrew	

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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
	1	20160261490	A1	2016-09-08	EVANS, Paul Andrew	

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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	1652363	EP	B1	2012-08-08	Shared Band Limited		

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Examiner Name	Grijalva Lobos, Boris
Attorney Docket Number	20145-054US

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	14356581
Filing Date	2014-05-06
First Named Inventor	Wonjong Rhee
Art Unit	2446
Examiner Name	Grijalva Lobos, Boris
Attorney Docket Number	20145-054US

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Name/Print	Michael North	Registration Number	46963

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Examiner Name	Boris D. Grijalva Lobos
Attorney Docket Number	20145-054US

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	1	Extended European Search Report dated 2019-03-22, in European Patent Application No. 18211162.5 (Docket No. 055EPD) (9pgs).	
	2	2013 - 2014 Cisco Systems, Inc. "IOS NAT Load-Balancing for Two ISP Connections," 2008-02-22, Document ID: 100658, retrieved from the internet: URL: https://www.cisco.com/c/en/us/support/docs/ip/network-address-translation-nat/100658-ios-nat-load-balancing-2isp.pdf, retrieved 2019-03-12 (5pgs).	
	3	Office Action mailed 2019-03-28, in Australian Patent Application No. 2018200888 (Docket No. 055AUD2) (3pgs).	
	4	Non-Final Office Action mailed 2019-04-09, in US Patent Application No. 15/809,823, filed 2017-11-10 (Docket No. 055USC) (28pgs).	
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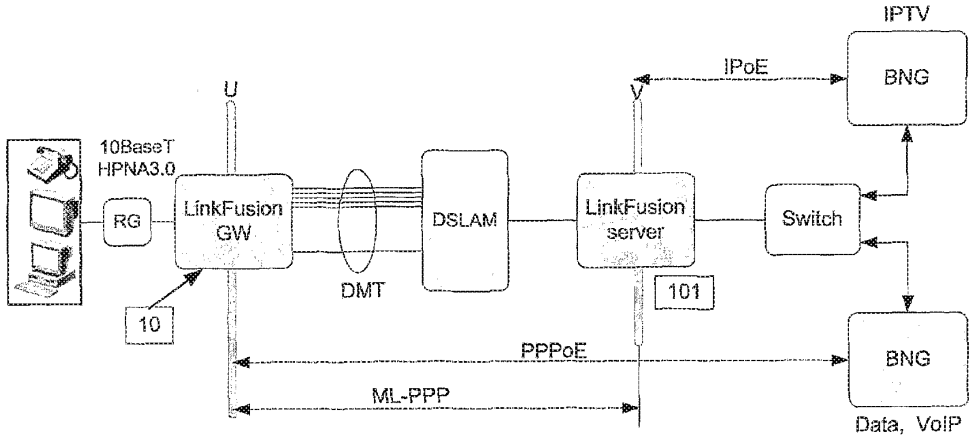
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(54) Title: METHOD AND APPARATUS FOR PROVISIONING ENSURED QoS TRIPLE PLAY SERVICES OVER EXISTING COPPER INFRASTRUCTURE



(57) Abstract: Method and system for providing Triple Play services with assured QoS by Telecommunication companies to subscribers in MDU/MTU over existing unshielded copper infrastructure in the local loop. All the bandwidth available on the xDSL lines is aggregated to form a manageable broadband link from all or a part of the telephone lines that are routed to the building and enabled to be used as xDSL lines. The wideband services are provisioned to subscribers using the manageable broadband link, by performing statistical multiplexing and Dynamic Resource Allocation. The delivery of the multicast content such as video broadcasting is extended to reach the building and then the broadband services are distributed to each subscriber using standard based in-building distribution.

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METHOD AND APPARATUS FOR PROVISIONING ENSURED QoS TRIPLE PLAY SERVICES OVER EXISTING COPPER INFRASTRUCTURE

Field of the invention

The present invention relates to the field of providing digital data and content over a data communication network. More particularly, the present invention proposes a method and apparatus for provisioning of triple play services with ensured QoS to subscribers, over existing copper infrastructure.

Background of the invention

While the delivery of combined voice and data has become widespread in the recent years, effective addition of video has been a barrier to completion of the true triple play for several reasons. First, outdated, inefficient video compression algorithms greatly exceed available bandwidth; second, bandwidth in the access networks has been insufficient for even compressed video; and third, the vast majority of today's Customer Premises Equipment (CPE) is unable to handle the service segmentation and quality of service (QoS) requirements that are crucial for voice and video services. Significant advances in video compression technology make IPTV-based video services, such as Video-On-Demand (VOD), not only practical, but highly desirable. These IPTV-based video services include improved content selection and navigation, no-delay channel changes, VOD and promotions tailored to a subscriber's viewing habits and preferences, and connection to other IP devices and content, such as photographs, music, games, or video contents located anywhere on the subscriber's network.

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Depending on compression technology used, each channel received from a service provider video server or distribution point needs as much as 3-4 Mb/s of bandwidth for standard definition TV (SDTV) and 9-12 Mb/s for High definition TV (HDTV). Broadcast video channels are multicast in nature. If handled properly by the network infrastructure, the amount of total bandwidth multicast video consumes between the headend (the control center of a television system, where broadcast signals are received and distributed) and RT (Remote Terminal) can be minimized. In addition, video services such as Video on Demand (VOD) are unicast in nature, i.e., requiring individual bandwidth streams from the headend to the subscriber.

A Triple Play service bundles high-speed Internet access, television (TV broadcast or Video on Demand) and telephone service over a single broadband connection. As competition between Multiple System Operators (a.k.a., Cable Operators) and Incumbent Local Exchange Carriers (ILECs) over subscribers increases, the ability to offer a Triple Play package that bundles voice, video, and data services is a dominant factor that determines the consumer's final choice. Triple Play service also allows ILECs' and CLECs to expand beyond their traditional voice services. True Triple Play services used concurrently by family members in one household require networks that can support higher quality at super-broadband speeds. They may include Point to Point like VOD (specifically requested by one person), (Point to Multipoint) like broadcasting to multiple users Television over IP, or gaming (Multipoint to Multipoint). Other services sometimes require a constant bit rate connection (like an audio stream), a bit rate that can vary within limits (like streaming video content), or a bursting data rate (like a query on a web page or file download).

Solutions such as Fiber-To-The-Home (FTTH) provide the required bandwidth but require high costs (high upfront investment with long return on investment). VDSL can provide high bandwidth but is highly limited by the loop length. ADSL2 and ADSL2+ significantly boost the bandwidth, but practically cannot serve more than one TV channel and do not support the large bandwidth required for High-Definition Television (HDTV).

Fixed Wireless Access technologies like WiMax might also be able to realize the same speeds. However, the number of end-users sharing the wireless channel capacity is limited.

ADSL doesn't offer sufficient downstream bandwidth over long enough distances to be able to reach all customers. Specifically, ADSL cannot deliver 8 Mbps beyond 6,000 to 8,000 feet. Many Telco customers are 12,000 to 18,000 feet from the nearest RT. ADSL2/2+ increase ADSL bandwidth but only for shorter distances. Therefore, their effective bandwidth is limited.

VDSL provides a lot of bandwidth, but over very short distances—3,000 to 4,000 feet and requires Fiber To The Curb (FTTC). Therefore, Telco companies are required to relocate the serving areas to approximately 4,000 feet between subscribers and RTs (the DSLAM – DSL Access Multiplexer) in order to use VDSL. This of course is costly.

All the methods described above have not yet provided satisfactory solutions to the problem of allowing Telco companies - ILECs and CLECs to

provide cost effective triple play services to their subscribers, while ensuring voice and video quality.

It is therefore an object of the present invention to allow Telco companies – ILECs and CLECs providing triple play services to their subscribers, using their existing access network infrastructure, while ensuring voice and video quality.

It is another object of the present invention to allow Telco companies – ILECs and CLECs providing triple play services to their subscribers, using their existing access network infrastructure, while ensuring individual service quality and priority, especially quality-sensitive voice and video services.

It is a further object of the present invention to allow Telco companies – ILECs and CLECs providing triple play services to their subscribers, using their existing access network infrastructure, while provisioning the unique requirements of each service

It is still an object of the present invention to allow Telco companies – ILECs and CLECs providing triple play services to their subscribers, using their existing access network infrastructure, while allowing management and support of the individual services once they are provisioned.

It is yet an object of the present invention to allow Telco companies – ILECs and CLECs providing triple play services to their subscribers, using their existing access network infrastructure, in a scalable manner that does not require upfront investments.

It is yet another object of the present invention to allow Telco companies – ILECs and CLECs providing triple play services to their subscribers, over existing copper lines, at High quality with no need to upgrade the existing infrastructure.

Other objects and advantages of the invention will become apparent as the description proceeds.

Summary of the invention

The present invention is directed to a method for providing broadband services (such as Triple Play services) with assured QoS by Telecommunication companies (e.g., ILECs, CLECs, Service Providers or ISPs) to subscribers in a site (e.g., - apartment buildings, office buildings, Multi Dwelling Units (MDUs), Multi Tenant Units (MTUs) or a campus deployment) over existing unshielded copper infrastructure in the local loop, according to which all the bandwidth available on the xDSL lines is aggregated to form a manageable broadband link from all or a part of the telephone lines that are routed to the site and enabled to be used as xDSL lines. The wideband services are provisioned to subscribers using the manageable broadband link, by performing statistical multiplexing and Dynamic Resource Allocation. The delivery of the multicast content (particularly video broadcasting), intended for simultaneous use by different subscribers, is extended to reach the site and then the broadband services are distributed to each subscriber using standard based in-building distribution.

Preferably, the available bandwidth on the xDSL lines is aggregated using ML-PPP protocol. In this case, whenever the ML-PPP is implemented via the U interface at the system side, the BRAS that supports ML-PPP is used

as the ML-PPP termination (i.e., ML-PPP implementation at the network side) for the subscriber's data traffic. If the BRAS does not support ML-PPP or if a BRAS independent ML-PPP implementation is desired, a dedicated server is used for supporting the ML-PPP termination at the network side of the subscriber's data traffic.

Whenever the network architecture for providing broadband services complies with TR-101, a dedicated server that resides in the aggregation network over the V interface is used for forming a broadband ML-PPP between the V and U interfaces, based on multiple links of PPPoE. The formed broadband ML-PPP may be used for transferring data and voice. The IPTV video streaming, received by the server as an IPoE streaming, is then transferred in an appropriate protocol through the broadband ML-PPP.

The broadband services may be provisioned based on statistical multiplexing, according to different subscribers' and services' profiles at any given instance and on a corresponding dynamic resources allocation. Preferably, the multicast streaming is extended until reaching the site and then splitting the streaming via the in-building distribution.

The wideband services may be distributed among the subscribers in the site via Ethernet/LAN cables, Coax cables, Home PNA-3.0, PowerLine, using wireless communication or any combination thereof. Additional Functions like QoS Management, Resource Scheduling, Multicasting, Remote Configuration and Management, Authentication, Security, Policy Management, SLA Management, Redundancy, Admission Control, Traffic Accounting and Monitoring, Traffic Filtering, Billing Mediation, Broadcast

Buffering, File Cashing or any combination thereof may also be provided along with the broadband services.

The available bandwidth on the xDSL lines may be aggregated using one of the G.998 series of ITU-T Recommendations.

The provisioning of broadband services may comply with recommendations of the DSL Forum standards and different network architectures included therein, particularly as defined in TR-25, TR-58, TR-59, TR-94 and TR-101.

The present invention is also directed to a system for providing broadband services with assured QoS by Telecommunication companies to subscribers in a site over existing unshielded copper infrastructure in the local loop, that comprises:

a) circuitry and software for aggregating all the bandwidth available on all or a part of the telephone lines that are routed to the site and enabled to be used as xDSL lines, to form at least one manageable broadband link;

b) software for performing statistical multiplexing;

c) circuitry and software for performing Dynamic Resource Allocation;

d) circuitry and software for extending the delivery of the multicast content intended for simultaneous use by different subscribers, particularly video broadcasting, to reach the site; and

e) circuitry and software for in-building distribution of the broadband services to each subscriber.

If the available bandwidth on the xDSL lines is aggregated using ML-PPP protocol, the system includes a BRAS that supports ML-PPP as the ML-PPP termination for the subscriber's data traffic at the network side.

Alternatively, the system may further include a dedicated server for supporting the ML-PPP termination at the network side of the subscriber's data traffic, whenever the BRAS does not support ML-PPP or whenever a BRAS independent ML-PPP implementation is desired. Also, a dedicated server that resides in the aggregation network over the V interface may be included, for forming a broadband ML-PPP between the V and U interfaces, whenever the network architecture for providing broadband services complies with TR-101.

Preferably, the system comprises circuitry and software for extending multicast streaming until reaching the site and circuitry for splitting the streaming via the in-building distribution, as well as circuitry and associated software for providing the above additional functions.

Brief Description of the Drawings

The above and other characteristics and advantages of the invention will be better understood through the following illustrative and non-limitative detailed description of preferred embodiments thereof, with reference to the appended drawings, in which:

- Fig. 1 schematically illustrates the general architecture of the proposed solution, according to a preferred embodiment of the invention;
- Fig. 2 schematically illustrates an exemplary concept of the proposed solution, according to a preferred embodiment of the invention;
- Fig. 3 schematically illustrates the platform implemented for in-building service distribution options, according to a preferred embodiment of the invention;
- Fig. 4A schematically illustrates the architecture for provisioning triple play services to subscribers with in-building distribution over existing copper infrastructure, according to a preferred embodiment of the invention;

- Fig. 4B schematically illustrates the architecture for provisioning triple play services to subscribers with in-building distribution over Ethernet cables, according to a preferred embodiment of the invention;
- Fig. 4C schematically illustrates the architecture for provisioning triple play services to subscribers with wireless in-building distribution, according to a preferred embodiment of the invention;
- Fig. 5 is a block diagram of the system for provisioning triple play services with ensured QoS to subscribers over existing copper infrastructure, according to a preferred embodiment of the invention;
- Fig. 6 (prior art) schematically illustrates the process of DSL Bonding with ML-PPP;
- Fig. 7A (prior art) schematically illustrates a Multi Service Reference Model taken from TR-58;
- Fig. 7B (prior art) schematically illustrates a High Level Architectural Reference Model taken from TR-59;
- Fig. 7C schematically illustrates the a network architecture that includes a specific server that is installed in the network to perform the BRAS functionalities related to the ML-PPP termination, according to a preferred embodiment of the invention;
- Fig. 7D (prior art) depicts the network architecture considered in TR-101;
- Fig. 8A (prior art) illustrates the protocol stacks at the U interface;
- Fig. Fig. 8B (prior art) illustrates the protocol stacks at the V interface;
- Fig. 9 (prior art) illustrates a common network topology when using TR-101; and
- Fig. 10 illustrates Multi Edge network architecture, according to a preferred embodiment of the invention.

Detailed description of the invention

The present invention proposes a method and system for providing residential and commercial Triple Play broadband services by Telecommunication companies (ILECs, CLECs) or service providers to apartment buildings - Multi Dwelling Units (MDU), office buildings – Multi Tenant Units (MTU), condominiums, and other campus deployments over the existing copper infrastructure.

The system proposed by the present invention combines implementation of all the functions needed to deliver these services, so as to fulfill the requirements which are essential to provide high quality Triple Play services. These requirements include: Bandwidth, QoS management, Availability and Security, in addition to other highly desirable requirements to provide efficient and profitable services. It can meet all of these requirements in a single appliance located adjacent to the Network Interface Unit (NIU/NID) – the MDF - of each building (before the Demarcation Point).

The proposed system serves as a platform that performs the following functions: Bandwidth Aggregation, Statistical Multiplexing, Resource Scheduling, Multicasting, QoS Management, In Building Distribution, Admission Control, Remote Management, Authentication, Redundancy (High Availability), Policy Management, Security, SLA Management and optionally: Traffic Accounting and Monitoring, , Traffic Filtering, Billing Mediation.

The system utilizes part or all of the existing copper twisted pair telephone lines, routed to an MDU, as bonded DSL links, while aggregating all their available bandwidth to form one "Fat Pipe". The formed broad bandwidth

"Fat pipe" is than used for the provisioning of the Triple Play services based on Statistical Multiplexing, Dynamic Resource Allocation, and Multicasting. In building distribution is performed, based on Standards, such as: Home PNA3.0 or PowerLine, or LAN Cable, or Coax, or Wireless. The combination of all this functions with the way in which all the Twisted Copper Pairs routed to the building are used to achieve the required bandwidth, the dynamic allocation and the statistical multiplexing of the available resources, the Multicasting, the QoS, Policy and SLA management and the remote configuration combined with all the other functions enable Telco companies to deliver high quality Triple Play services using their existing network, maintaining and preserving their installed base of unshielded twisted pair in the local loop.

The system proposed by the present invention allows ILECs to deliver True Triple Play to Multi Dwelling Units (MDUs) over existing copper lines at High quality, without a need to replace or even upgrade the infrastructure and at a far lower cost than any other known alternative (such as FTTH, FTTC/VDSL FTTB/VDSL etc.). ILECs can provide multi-channel TV, HDTV, VOD, ultra-high-speed data and VoIP over their existing installed base of unshielded twisted pairs in the local loop.

In order to deliver commercial Triple Play services acceptable Quality of Service requirements must be met. By deploying such highly integrated systems, service providers can expand their offerings easily and cost effectively, better manage and control traffic, and accelerate the delivery of triple play services. The end result is a quicker time to market and an assured user experience of Triple Play services over the existing copper infrastructure.

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The proposed platform performs the following functions: Bandwidth Aggregation, Statistical Multiplexing, Resource Scheduling, Multicasting, QoS Management, In Building Distribution, Admission Control, Remote Management, Authentication, Redundancy (High Availability), Policy Management, Security, SLA Management and optionally: Traffic Accounting and Monitoring, , Traffic Filtering, Billing Mediation.

Fig. 1 schematically illustrates the general architecture of the proposed solution, according to a preferred embodiment of the invention. The system 10 that is installed in the building aggregates the bandwidth of all incoming DSL lines into a wideband link and it's bandwidth is then dynamically allocated.

Fig. 2 schematically illustrates the concept of the proposed solution, according to a preferred embodiment of the invention. The incoming lines may be ADSL lines, ADSL2 lines, and ADSL2+ lines or a combination of these lines.

System 10 performs bandwidth aggregation from all incoming lines. For a building consisting of n apartments there are at least n telephone lines (copper twisted pairs) already installed by the Telco company (ILEC) in order to provide Plain Old Telephone Service (POTS). These n lines terminate in a Network Interface Unit or Device (NIU/NID) the MDF in the building. From the MDF cabinet, each copper pair is routed to an apartment and terminated by a telephone set.

Each telephone line can be enabled to be a DSL line to carry digital data, in addition to the circuit switch telephone voice. DSL is a family of technologies that provide digital data transmission over the wires used in

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the "last mile" of a local telephone network. The most common DSL technology is ADSL. ADSL standard can (theoretically) deliver 8 Mbit/s over about 2 km (1¼ miles) of unshielded twisted pair copper wire. All the available bandwidth is aggregated from all or part of the lines rolled out to the building as DSL enabled links, into one broad manageable link of a bandwidth equal to n times each DSL line bandwidth. Several known techniques may be used to implement the bandwidth aggregation (these techniques are sometimes called "Loop Bonding") and will be described below.

After the DSL loops have been bonded, the resultant aggregated link is used for the provisioning of the wideband services, including true Triple Play, to the various customers in the building based on Statistical Multiplexing and Dynamic Resource Allocation. In this manner, the required bandwidth for such service can be achieved based on the following logical assumptions:

- first, not all households are necessarily customers of the service.
- second, not all users use the service simultaneously
- third, not all connected users consume the same service concomitantly (Web browsing, file downloading, watching TV broadcast, VoIP conversation, etc.) .
- fourth, part of the data is delivered in bursts;
- fifth: the managed resources are allocated to subscribers dynamically.

The system proposed by the present invention can save bandwidth also when video content is delivered by multicasting. Multicast is the delivery of video streams (video broadcast channels) to a group of destinations simultaneously using the most efficient strategy to deliver the video streams over each link of the network only once, creating copies only when

the links to the destinations split. Significant part of the traffic is expected to be IPTV broadcast. During multicasting, only one stream is required for multiple audience of the same broadcast. Usually Multicast is brought all the way from the video server, located at the service provider to the DSL aggregation point (the DSLAM- DSL Access Multiplexer) and then is split to each individual subscriber. System 10 extends the multicasting to the MDU, while splitting the streams through the "In Building Distribution" as described below. This saves precious bandwidth in the last mile, which is the most critical part and bottle neck of the network - the access network.

The proposed system is located adjacent to the building MDF, as shown in Fig. 4A. In building service distribution to each apartment, as shown in Fig. 3 is implemented based on one of the following methods: LAN cable – CAT5; Coax; HPNA 3.0 standard; PowerLine; Wireless.

Service Example

The following service example describes an MDU of a building with 50 apartments. There are at least 50 telephone lines which can be used as DSL enabled links, Either ADSL ADSL2 ADSL2+ or any combination of them. It is assumed that the service provider has a relatively high penetration level of 40%, i.e., the service provider has 20 subscribers (customers) in this building. It is also assumed that only 36 copper lines (out of the 50 available) are used as ADSL links. Each link provides 5Mb/s data rate (for short enough loop length the standard can reach 8Mb/s). After bonding all these links and aggregating all the available bandwidth, system 10 forms one broad pipe of (36x5) 180Mb/s, as shown in Table I. If more bandwidth is needed more links can be added to the "pipe" (the 50-36=14 unused lines) and if and when ADSL2/2+ will be available, broader bandwidth pipes can be formed by simply reconfiguring system 10.

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Table I

	No of tenants	DSL lines	ADSL	ADSL2	ADSL2+	% penetration	No of Sub.
	50	36	36	0	0	40	20
BW (aver. Per line)			5	0	0		
BW			180	0	0		
Total BW							180

The following example describes a service scenario for such MDU in a typical demand. In this example 43 users (at the 20 households which are subscribers of the wideband service) are served as follows:

17 users are watching 6 High Definition TV broadcast channels.

5 users are watching 2 Standard Definition TV broadcast channels.

2 users are watching High Definition Video on Demand.

5 users are making VoIP calls

10 users are surfing the Web.

To provide this service demand a total bandwidth of 109Mb/s is required out of the 180Mb/s available, as shown in Table II.

Table II

Service	TV Broadcast	BC1	BC 2	BC3	BC4	BC5	BC6	SD1	SD2	VoD (HDTV)	VoIP	Internet	Users	Sub. (hh)
Sub. Per service	22									2	5	20	43	20
HDTV Broadcast		6	4	3	2	1	1							
SDTV Broadcast								3	2					
Total Allocated BW		12	12	12	12	12	12	4	4	24	1	4		109
Total Available BW														180

The following additional example describes a service scenario for such MDU in an extreme demand. In this example, 67 users (at the 20 households which are subscribers of the wideband service) are served as follows:

24 users are watching 6 High Definition TV broadcast channels.

5 users are watching 2 standard Definition TV broadcast channels.

4 users are watching High Definition Video on Demand.

15 users are making VoIP calls

20 users are surfing the Web.

To provide this service demand a total bandwidth of 140Mb/s is required out of the 180Mb/s available, as shown in Table III.

Table III

Service	TV Broadcast	BC1	BC 2	BC3	BC4	BC5	BC6	SD1	SD2	VoD (HDTV)	VoIP	Internet	Users	Sub. (hh)
Sub. Per service	28									4	15	20	67	20
HDTV Broadcast		8	5	4	3	2	1							
SDTV Broadcast								3	2					
Total Allocated BW		12	12	12	12	12	12	4	4	46	4	8		140
Total Available BW														180

It is assumed that 12Mb/s is required for HDTV channel though 9-10Mb/s is sufficient for MPEG4. There is still additional 40Mb/b margin left to fulfill even higher demand. For even more extreme cases there are still (50-36) 14 more unused lines that can be added by the service provider as required to provide for additional (5x14) 70Mb/s to this particular MDU. For even more extreme cases, (which are very rare with extremely low probability to happen), exceeding the available resources, the "Admission Control" (see below) comes into action according to its algorithms and the service provider policy.

Other requirements essential for the successful delivery of the service are also fulfilled by system 10, which functions as a platform, on which all these requirements are met while providing prominent advantages.

The platform implemented by system 10 is located adjacent to the building MDF, as shown in Fig. 3. In building service distribution to each apartment is implemented based on one of the following methods: LAN cable – CAT5; Coax; HPNA 3.0 standard; PowerLine; Wireless. The terminal devices that

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may consume the broadband service may include a PC 301, a home server 302, a TV STB 303, a PDA 304, a gaming console 305, a VOIP phone 306, a security camera 307 or a Home Network sharing device 308.

Fig. 4A schematically illustrates the architecture for provisioning triple play services to subscribers with in-building distribution over existing copper infrastructure, according to a preferred embodiment of the invention.

Fig. 4B schematically illustrates the architecture for provisioning triple play services to subscribers with in-building distribution over Ethernet cables, according to a preferred embodiment of the invention.

Fig. 4C schematically illustrates the architecture for provisioning triple play services to subscribers with wireless in-building distribution, according to a preferred embodiment of the invention.

Fig. 5 is a block Diagram of the system for provisioning triple play services with ensured QoS to subscribers over existing copper infrastructure, according to a preferred embodiment of the invention.

System 10 provides the required bandwidth by combining the traditional copper telephone lines, used for DSL, to form one broad, manageable data pipe. This is accomplished by one of the following ways:

Several DSL Forum protocol models for accessing data networks utilize the Point-to-Point Protocol (PPP) to carry packets over the "U" interface (described with respect to Figs. 7A to 7C below). Because of the widespread use of PPP, Multi Link PPP (ML-PPP) can be used for DSL Bonding. ML-PPP as defined in RFC 1990 can be used to combine multiple PPP links into a single virtual bundle. At the transmitting side, ML-PPP takes a PPP

packet, optionally fragments it and generates a new ML-PPP header. Each resulting fragment (or a whole packet) is transmitted across a separate physical link. At the receiving side, the per-fragment headers are used to reconstruct the complete packets. This process is represented schematically in Fig. 6.

The Multi Link PPP (MLPPP) protocol has the following advantages regarding DSL link bandwidth aggregation method (DSL bonding):

- Standard well known widely used protocol
- Capable of asymmetric operation over ADSL, ADSL2, ADSL2+ and VDSL
- Allows routing of delay sensitive traffic over a single link via PPP, bypassing the ML-PPP bundle and an associated delay in ML-PPP processing
- When implemented with multi-class extensions, provides additional support for traffic of different priorities or classes.
- Provides the flexibility to the distribution of fragments to links and therefore, freedom to accommodate links of different bandwidth, thereby supporting dynamic link rate changes.

The proposed solution fully complies with recommendations of the DSL Forum standards, in particular as defined in the following Technical Reports (TRs):

- **TR-25** - Core Network Architecture Recommendations for Access to Legacy Data Networks over ADSL
- **TR-58** - Multi-Service Architecture & Framework Requirements
- **TR-59** - DSL Evolution – Architecture Requirements for the Support of QoS-Enabled IP Services

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- **TR-94** - Multi-Service Delivery Framework for Home Networks
- **TR-101** - Migration to Ethernet-Based DSL Aggregation

Fig. 7A (prior art) schematically illustrates a Multi Service Reference Model taken from TR-58.

Fig. 7B (prior art) schematically illustrates a High Level Architectural Reference Model taken from TR-59.

The ML-PPP is implemented via the U interface at the system side (The U interface protocol stacks are specified below).

At the network side, The ML-PPP is implemented at the Broadband Remote Access Server (BRAS). The BRAS is the aggregation point for the subscriber's data traffic. It provides aggregation capabilities (e.g., IP, PPP, ATM) between the Regional/Access Network and the NSP or ASP. In addition to aggregation, it is also the "injection point" for policy management and IP QoS in the Regional/Access Networks.

Commercial BRAS implementations can support the MLPPP protocol. All is needed in this case at the network side for the above network architecture is to configure the BRAS for MLPPP. Thus, system 10 in this case is single sided single box solution that does not require any changes in the network topology (except BRAS configuration for ML-PPP).

There might be cases in which ML-PPP configuration in the BRAS is not possible or is not desirable or cases in which an independent solution or system testing is desirable. For such cases, a specific server 701 can be

installed in the network to perform the BRAS functionalities related to the ML-PPP implementation, as depicted in Fig. 7C. This solution is carried out by software and there is no need for the BRAS to support ML-PPP.

DSL Forum TR-101 outlines how an ATM aggregation network can be migrated to an Ethernet based aggregation network in the context of TR-25 and TR-59 based architectures. The TR-101 provides an architectural/topological model of such an Ethernet based aggregation network that supports the business requirements in TR-058. It describes requirements for protocol translation and interworking, QoS, multicast, security, and OAM for a DSL aggregation network.

TR-101 defines a new access network topology where the connectivity between the Access Node and the Broadband Network Gateway is Ethernet based rather than ATM. Access nodes can be directly connected or can go through an aggregation layer(s) before reaching the Broadband Network Gateway.

TR-059 based architectures assume a single Broadband Network Gateway (e.g., BRAS) where user services are performed. TR-101, however, recognizes the potential for service segregation. Some applications, such as video, may have specific enough requirements from the network that they are best optimized separately from other types of traffic. The architecture described in TR-101 supports the possibility for a dual Broadband Network Gateway (BNG) scenario when required for video optimization. When used, the BNG dedicated to video is denoted as the 'video BNG'. Such an approach may have additional complexities not present with a single BRAS/BNG arrangement described in TR-059. This is most notable with respect to traffic/bandwidth management and the resulting network efficiency, as well

as the additional operations overhead. Furthermore, in dual node architectures, it is not mandated that both BNGs support all of the requirements detailed in TR-101. Specifically, the video BNG may not implement subscriber management functions (e.g., PPP termination, per user QoS), provided that these functions are likely to be performed by the other BNG. Fig. 7D (prior art) depicts the network architecture considered in TR-101. The fundamental changes from current deployment architectures are:

- V interface that supports Ethernet as the transport protocol with no ATM present.
- An Ethernet aggregation network
- The possibility of dual Broadband Network Gateways
- Higher bit rate services (e.g. by supporting Access Nodes nearer the end-user)
- Higher network availability (in support of application and business customer needs)
- U interface that could support direct Ethernet framing over DSL.

Similar to the TR-059 architecture, the architecture depicted in Fig. 7D uses a Broadband Network Gateway for providing IP QoS down to the user level. TR-059 also supported legacy ATM services that may not have traversed the BNG. Similarly, the architecture described within this document (TR-101) also enables services to be injected into the network without going through a single Broadband Network Gateway.

Fig. 8A (prior art) illustrates the protocol stacks at the U interface.

Option 'a' is denoted IPoEoATM and option 'b' is denoted PPPoEoATM. Option 'c' is denoted IPoA and option 'd' is denoted PPPoA.

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Options 'e' and 'f represent those scenarios when the access loop supports direct Ethernet encapsulation and are referred to as IPoE and PPPoE.

Similarly, Option 'g' represents a pure Ethernet service where there is no visibility above layer 2. Both options 'a' and 'e' are commonly referred to as **IPoE** and options 'b' and 'f' are referred to as **PPPoE**.

Those options where Ethernet is included in the protocol stack may also include 802.1Q headers to carry Virtual LAN (VLAN) tags and priority markings.

The PPP is the protocol that allows the carriers to connect the customers to different ISP's/CSP's and allow them to authenticate the customers via Remote Authentication Dial-In User Service (RADIUS) protocol and provide them with the services they are paying for through Lightweight Directory Access Protocol (LDAP) database in the back office.

Fig. 8B (prior art) illustrates the protocol stacks at the V interface.

DSL Forum's TR-101 defines the network topologies for supporting multiple services using Ethernet networks. Unlike its predecessor, TR-101 does not mandate a single topology but rather allows several variations. One new alternative is support for IP over Ethernet (IPoE) encapsulation. IPoE extends several LAN-based protocols, including Dynamic Host Configuration Protocol (DHCP, which is a communications protocol that lets network administrators centrally manage and automate the assignment of Internet Protocol (IP) addresses in an organization's network) to allow using a broadband network.

Fig. 9 (prior art) illustrates a common network topology when using TR-101. TR-101 does not advocate using IPoE over PPPoE, but rather allows

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the broadband provider to select when to use each alternative. Since DHCP was designed for use on a shared LAN, its capabilities complies with the requirements for sending common data traffic to many users. Traditional broadcast television is an example of this case. As a result, IPoE/DHCP is typically used for delivering IPTV data traffic. In contrast, PPPoE more closely meets the needs of point-to-point broadband connections such as data and VoIP, since it was designed to support this environment. Broadband networks have been using PPP for many years, while DHCP is a recent entrant into this market. Today, existing unicast services are offered using PPP and there is little impetus to move away from using it. In fact, many broadband service providers prefer to stick with PPPoE, since it is more functional and mature than IPoE/DHCP, eliminates the need to retrain operations personnel, and lowers the risk of adding new subscribers and services. The most common broadband implementation, therefore, is to use IPoE/DHCP to support TV and other services across the broadband network to the Set-Top-Box (STB, which is a device that converts signals to be viewable images on TV), while using PPPoE to support services to other devices such as PCs and VoIP phones. Businesses receive all broadband services typically via PPP while residential subscribers receive services via both technologies.

The solution proposed by the present invention can also be adjusted to be used by multiple edge routers. Many organizations would like to use the same simple edge switch and DSLAM access networks, but manage the services separately in the metro network using different edge routers. This is most common if another organization (either another group within the same broadband service provider or a contracted third party) provides the IP video services. This scenario is depicted in Fig. 9.

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Fig. 10 illustrates a Multi Edge Network architecture, according to a preferred embodiment of the invention. At the side of system 10, the architecture is similar to all other cases. At the network side, one or more servers 101 are installed in the Aggregation Network. The higher in the aggregation hierarchy the less servers are needed per DSLAMs served by each server 101 (thereby reducing the system per subscriber cost, at the expense of less redundancy).

The server 101 is configured to create ML-PPP data pipe between system 10 (at the U interface) and server 101 (at the V interface). Such a data pipe is created per each system 10 in the network. In addition, server 101 receives the IPTV streaming video reaching it as IPoE, and transfers it to the respective destination in an appropriate protocol through ML-PPP data pipe, in addition to the VoIP and the data traffic.

When building an IPTV-capable broadband network, one important issue is VLAN design. VLANs limit the broadcast domain, potentially ensuring that subscribers cannot see each other's information and reducing network traffic. VLANs allow the network to logically segment the network into multiple communities by "tagging" each packet with a field which identifies packet ownership. VLAN usage is standardized as IEEE 802.1Q, and are sometimes called "VLAN tags" or "Q-tags". There are two fundamental VLAN design options:

1. Customer VLAN: In this model, there is a dedicated VLAN for each subscriber. This is also called the 1:1 model since there is one VLAN per subscriber.

2. Service VLAN: In this model, there is a dedicated VLAN for each service. This is also called the N:1 model since multiple subscribers share each VLAN.

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System 10 can be adopted for each of the two fundamental VLAN design options.

In addition, system 10 can be configured to support other possible Loop bonding techniques that are used to implement DSL bonding according to the G.998 series of ITU-T Recommendations, which simply increases the data rate in proportion to the number of bonded lines. Two bonded lines will double the data rate for both upstream and downstream. Likewise three bonded lines will triple the data upstream and downstream rate, and so on. This is independent of the DSL technology (ADSL, VDSL etc.). The following three different types of bonding offer multiplexing of various service data streams (Ethernet, ATM, TDM) over multiple DSL links:

Recommendation G.998.1 'ATM-based multi-pair bonding' describes a method for bonding of multiple digital subscriber lines (DSL) to transport an ATM payload beyond the rate/reach capability of a single DSL loop.

The bonding protocol allows the bonding of 2-32 loops (copper wire pairs) and supports dynamic removal and restoration of pairs without human intervention. The maximum one-way bonding delay will not exceed 2 ms.

Recommendation G.998.2 'Ethernet-based multi-pair bonding' describes a method for bonding of multiple digital subscriber lines (DSL) for Ethernet transport. This Recommendation builds on the IEEE 802.3ah-2004 methods and extends Ethernet transport over other xDSL technologies, including ADSL.

Recommendation G.998.3 'multi-pair bonding using time-division inverse multiplexing' describes a method for bonding of multiple Digital Subscriber Lines (DSLs) using Time-Division Inverse Multiplexing (TDIM). This Recommendation uses IEEE 802.3ah handshake for pair discovery,

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parameter negotiation and setup. It allows the hitless addition and removal of pairs and the fast removal of a pair upon pair failure.

In addition to bandwidth aggregation and dynamic resource allocation, system 10 is configured to provide Quality of Service (QoS) management. The QoS implementation allows delivery of high-priority video and premium data traffic. The use of hierarchical scheduling for QoS allows bandwidth management between requests for a single end user and controlled bandwidth distribution between different user types.

When sharing network resources with other services, most services also needs some form of 'Quality of Service', in order to ensure the quality of the service can be what the end-user expects. Requirements on the network to support Quality of Service differ from service to service. For example a telephony service will have more stringent quality of service requirements then a more 'general' Internet access service (browsing websites). Usually the following "Quality of Service parameters" are used to express how the network can support a certain quality to a service (telephony, video, or internet):

Delay/Delay Variations (Jitter): Services that have to be delivered almost 'real-time' (like the VoIP telephony service) often have more stringent requirements regarding the delay and variation in delay than non Real-Time services (like file downloads). A VOD service is less susceptible to delay, since often the video stream is 'buffered' for several seconds in the player in order to be able to adjust hick-ups in the network.

Packet Loss: A low packet loss is usually more important for services that cannot retransmit their information when it was in error. This is the case with most of the 'real-time' services which do not have the time to do this (if they retransmit an erroneous packet the retransmission will come most likely to late to use, since that video or audio segment has already passed).

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In order to make sure that delay (variation) and packet loss requirements can be fulfilled for specific traffic flows under network congestion conditions, system 10 implements "Quality of Service mechanisms". These mechanisms consist of implementing the tagging (marking) of certain types of traffic (e.g. voice- or internet-traffic) and using this to serve e.g., voice traffic with a higher priority than the internet traffic (which has to wait a bit longer than the voice-traffic to be transmitted).

The traditional packet scheduling mechanism on the Internet has been first-in, first-out (FIFO) scheduling, by which packets are transmitted in the same order in which they arrive in the output queue. FIFO is simple and easy to implement but cannot differentiate between multiple data flows; hence, FIFO cannot allocate specific performance bounds for a flow, or prioritize one flow over the others.

Weighted Fair Queuing (WFQ) is a scheduling discipline, according to which flow differentiation occurs in scheduling. In WFQ, each flow or traffic class is assigned a weight, and the rate at which a flow or a traffic class is serviced is proportional to its assigned weight. WFQ provides prioritization among unequally weighted traffic flows and fairness and protection among equally weighted traffic flows as per the max-min fair-share allocation scheme.

Packet dynamics in a network can make the network prone to occasional or constant congestion. At times when a network doesn't see traffic congestion, any scheduling scheme works, because no queues build. When some network congestion exists, however, queues build upon, and the scheduling mechanism determines the order in which the packets in the queue are serviced.

For the scheduling algorithm to deliver QoS, at a minimum it needs to be able to differentiate among the different packets in the queue and know

each packet's service level. Such a scheduling algorithm should allow guarantees on performance bounds by allocating resources on a flow basis and/or by prioritizing one flow over the other. In addition, a scheduling algorithm is needed that provides fairness and protection among the flows with the same priority, such as all best-effort traffic flows.

Security in general is important for services that carry some privacy sensitive information (like the content of a telephone conversation or home banking), or content that has a certain commercial value (like on demand movies). These services need some level of protection so that only the intended recipient can receive and use this information. This type of security is usually implemented on a 'higher level' than by the network itself, often this is done by the (service related) client and server (like a software player or set top box for the on demand video). Network level security consists of more general security functions like some sort of "traffic separation" between different users by means of port based traffic switching or Virtual LANs and/or the possibility to 'bulk encrypt" all the traffic between user and central office. The segregation of traffic function is often used to make sure that traffic of customers served by one Service Provider do not interfere with the traffic generated by customers of a different Service Provider and is especially important for "open broadband networks" which give access to multiple Service Providers.

Most current internet-based services have low availability requirements as they are often free of charge and do not perform 'critical' services. However, this situation is changing as the existing services such as telephony and broadcast TV will also be offered over the Internet (Voice over IP, Digital TV over IP) via the different types of broadband networks. For these services often the user will have to pay a fee and has an expectation that

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the availability is similar as the service that was offered in the 'traditional' way. The uninterrupted availability and reliability is provided by system 10 using its built-in redundancy.

Policy management allows operators to establish subscriber and service parameters that dynamically provide access to a choice of service levels, as well as a mechanism to better manage and bill for these services. System 10 supports dynamic, network control, according to policy, thereby helping service providers to deliver highly customized business and consumer broadband services while reducing total cost of network ownership. Policies can be created to account for a wide range of user and service attributes, such as user identity, user location, user service level, time of day, available network resources, or network-use restrictions.

In order to provide any predictability or guarantee for transport QoS, there must be some end-to-end control of how much traffic is allowed into each IP QoS service class. Even a strict priority queue does not provide guaranteed service if too much traffic is entered into it. This is why resource based admission control is required. The ability to deny a session by means of admission control is a powerful tool for the service provider. Some of the benefits provided are:

If there are n sessions in a service and session n+1 is denied, based on resource based admission control, the quality of the n established sessions is consistently protected. If an additional session n+1 is admitted, the service provider would risk facing n+1 unsatisfied subscribers who pay a premium fee for a guaranteed QoS service which in essence, is being degraded by faulty admissions.

Resource based admission control relates to bandwidth management (as bandwidth is the resource being controlled). An admission control function should combine policy based and resource based admission control. There

can be a range of non-resource based policies in place to support sophisticated business models of the service provider. Admission control decisions are combined policy based and resource based decisions.

System 10 can significantly reduce service providers' operational expenses by enabling automatic connection, configuration, and provisioning of initial broadband services, as well as allowing subscriber self-provisioning for adding new services or changing existing services once they have become a broadband customer. It allows provider staff at a central location to manage quality-sensitive triple play services such as VoIP and video. It automates a variety of tasks, thereby saving significant amounts of human hours, including management of: centralized Virtual Private Network (VPN, which is a network that uses a public telecommunication infrastructure, such as the Internet, to provide remote offices or individual users with secure access to their organization's network), firewall, firmware, and configuration administration, real time single-device management and automated tasks for mass CPE, new service provision and integration with provider billing systems.

System 10 simplifies provisioning and management of all IP-based services and devices at the customer premises for reduced errors and lower operational costs.

System 10 can also deliver differentiated service levels to different classes of subscribers and price them accordingly based on SLA, e.g., premium service or service packages.

System 10 can (optionally) monitor filter and prevent or block users' access to unsuitable content. When the filter is activated, users cannot open or link to sites that the filtering rules recognize as unsuitable. (e.g., pornographic sites). Filtering of incoming and outgoing email can also be provided. Since

different groups of users may require different filtering, System 10 enables the tailoring of individual subscriber's requirements. System 10 can also manage attempted access to blocked resources or emails containing inappropriate language or material. For example, if a keyword matching/blocking algorithm identifies a match, it might either not display the offending page or email at all or display it but with the offending content obscured or stripped out.

IP traffic accounting and network monitoring makes it easy to count custom IP packets and troubleshoot problems saving network administration efforts. It captures all, but count only useful data. It creates counting rules for a single host, for a subnet, for a specific group of hosts, it supports a traffic accounting per any IP protocol with splitting traffic per port numbers. It allows real-time visualization of traffic activity on graphic charts. The traffic counters or the custom packet headers can be stored in a database, thereby providing the ability to build various traffic reports or traffic traces per month or/and per day.

System 10 can also provide authentication services that are required for authorizing a service provider administrator to access all the remote configuration functions as described above. In addition authentication is required to let authorized subscribers to access data which is relevant to them.

Since software can generate traffic volume statistics based on the number and origin of the records passing through it, those statistics could then be used for capacity planning or as part of a network monitoring procedure, as well as Billing Mediation, used to convert one type of data to another, for billing purposes. It is used to process IP Detail Record (IPDR) which provides information about IP-based service usage

Video streaming applications typically employ large buffers (between 30 seconds and several minutes) at the receiving end. This helps avoiding any delay, jitter or packet loss. As long as the required bandwidth is guaranteed, the receiving application should be able to effectively deal with any other QoS requirements. System 10 can provide file cashing, so as to obtain more efficient access to frequently-visited Internet pages by holding them in local memory.

The above examples and description have of course been provided only for the purpose of illustration, and are not intended to limit the invention in any way. As will be appreciated by the skilled person, the invention can be carried out in a great variety of ways, employing more than one technique from those described above, all without exceeding the scope of the invention.

Claims:

1. Method for providing broadband services with assured QoS by Telecommunication companies to subscribers in a site over existing unshielded copper infrastructure in the local loop, comprising:

a) forming at least one manageable broadband link from all or a part of the telephone lines that are routed to said site and enabled to be used as xDSL lines, by aggregating all the bandwidth available on said xDSL lines;

b) provisioning said wideband services using said manageable broadband link to subscribers, by performing:

b.1) statistical multiplexing;

b.2) Dynamic Resource Allocation;

c) extending the delivery of the multicast content intended for simultaneous use by different subscribers, particularly video broadcasting, to reach said site; and

d) performing in-building distribution of said broadband services to each subscriber.

2. Method according to claim 1, wherein the broadband services include Triple Play.

3. Method according to claim 1, wherein the site is selected from the following group:

- apartment buildings;
- office buildings;
- Multi Dwelling Units (MDUs);
- Multi Tenant Units (MTUs);
- a campus deployment.

4. Method according to claim 1, wherein telecommunication companies include:

- ILECs;

- CLECs;

- Service Providers;

- ISPs

5. Method according to claim 1, wherein the available bandwidth on the xDSL lines is aggregated using ML-PPP protocol.

6. Method according to claim 5, wherein whenever the ML-PPP is implemented via the U interface at the system side, the BRAS that supports ML-PPP is used as the ML-PPP termination for the subscriber's data traffic at the network side.

7. Method according to claim 6, wherein whenever the BRAS does not support ML-PPP or whenever a BRAS independent ML-PPP implementation is desired, a dedicated server is used for supporting the ML-PPP termination at the network side of the subscriber's data traffic.

8. Method according to claim 5, wherein whenever the network architecture for providing broadband services complies with TR-101, a dedicated server residing in the aggregation network over the V interface is used for forming a broadband ML-PPP between the V and U interfaces, based on multiple links of PPPoE.

9. Method according to claim 8, wherein the formed broadband ML-PPP is used for transferring data and voice.

10. Method according to claim 8, wherein the formed broadband ML-PPP is used for receiving the IPTV video streaming based on IPoE and for transferring the video streaming in an appropriate protocol over said broadband ML-PPP.

11. Method according to claim 1, wherein the broadband services are provisioned based on statistical multiplexing, according to different subscribers' and services' profiles at any given instance and on a corresponding dynamic resources allocation.

12. Method according to claim 1, wherein multicast streaming is extended until reaching the site and then splitting said streaming via the in-building distribution.

13. Method according to claim 1, wherein the wideband services are distributed among the subscribers in the site via one of the following means:

- Ethernet/LAN cables;
- Coax cable;
- Home PNA-3.0
- PowerLine;
- wireless communication; or
- any combination thereof.

14. Method according to claim 1, further comprising providing one or more of the following functions along with the broadband services:

- QoS Management;

- Resource Scheduling;
- Multicasting;
- Remote Configuration and Management;
- Authentication;
- Security;
- Policy Management;
- SLA Management;
- Redundancy;
- Admission Control;
- Traffic Accounting and Monitoring;
- Traffic Filtering;
- Billing Mediation;
- Broadcast Buffering;
- File Cashing; and
- any combination thereof.

15. Method according to claim 1, wherein the available bandwidth on the xDSL lines is aggregated using one of the G.998 series of ITU-T Recommendations.

16. Method according to claim 1, wherein the provisioning of broadband services complies with recommendations of the DSL Forum standards and different network architectures included therein, particularly as defined in the following Technical Reports (TRs):

- TR-25;
- TR-58;
- TR-59;

- TR-94;
- TR-101

17. System for providing broadband services with assured QoS by Telecommunication companies to subscribers in a site over existing unshielded copper infrastructure in the local loop, comprising:

a) circuitry and software for aggregating all the bandwidth available on all or a part of the telephone lines that are routed to said site and enabled to be used as xDSL lines, to form at least one manageable broadband link;

b) software for performing statistical multiplexing;

c) circuitry and software for performing Dynamic Resource Allocation;

d) circuitry and software for extending the delivery of the multicast content intended for simultaneous use by different subscribers, particularly video broadcasting, to reach said site; and

e) circuitry and software for in-building distribution of said broadband services to each subscriber.

18. System according to claim 17, in which the broadband services include Triple Play.

19. System according to claim 17, in which the site is selected from the following group:

- apartment buildings;
- office buildings;
- Multi Dwelling Units (MDUs);
- Multi Tenant Units (MTUs);
- a campus deployment.

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20. System according to claim 17, in which the telecommunication companies include:

- ILECs;

- CLECs;

- Service Providers;

- ISPs

21. System according to claim 17, in which the available bandwidth on the xDSL lines is aggregated using ML-PPP protocol.

22. System according to claim 21, including a BRAS that supports ML-PPP as the ML-PPP termination for the subscriber's data traffic at the network side.

23. System according to claim 22, further including a dedicated server for supporting the ML-PPP termination at the network side of the subscriber's data traffic, whenever the BRAS does not support ML-PPP or whenever a BRAS independent ML-PPP implementation is desired.

24. System according to claim 21, further including a dedicated server that resides in the aggregation network over the V interface, for forming a broadband ML-PPP between the V and U interfaces, whenever the network architecture for providing broadband services complies with TR-101.

25. System according to claim 17, comprising circuitry and software for extending multicast streaming until reaching the site and circuitry for splitting said streaming via the in-building distribution.

26. System according to claim 17, in which the wideband services are distributed among the subscribers in the site via one of the following means:

- Ethernet/LAN cables;
- Coax cable;
- Home PNA-3.0
- PowerLine;
- wireless communication; or
- any combination thereof.

27. System according to claim 17, further comprising circuitry and associated software for providing one or more of the following functions along with the broadband services:

- QoS Management;
- Resource Scheduling;
- Multicasting;
- Remote Configuration and Management;
- Authentication;
- Security;
- Policy Management;
- SLA Management;
- Redundancy;
- Admission Control;
- Traffic Accounting and Monitoring;
- Traffic Filtering;
- Billing Mediation;
- Broadcast Buffering;

- File Cashing; and

- any combination thereof.

28. System according to claim 17, in which the available bandwidth on the xDSL lines is aggregated using one of the G.998 series of ITU-T Recommendations.

29. System according to claim 17, in which the provisioning of broadband services complies with recommendations of the DSL Forum standards and different network architectures included therein, particularly as defined in the following Technical Reports (TRs):

- TR-25;

- TR-58;

- TR-59;

- TR-94;

- TR-101

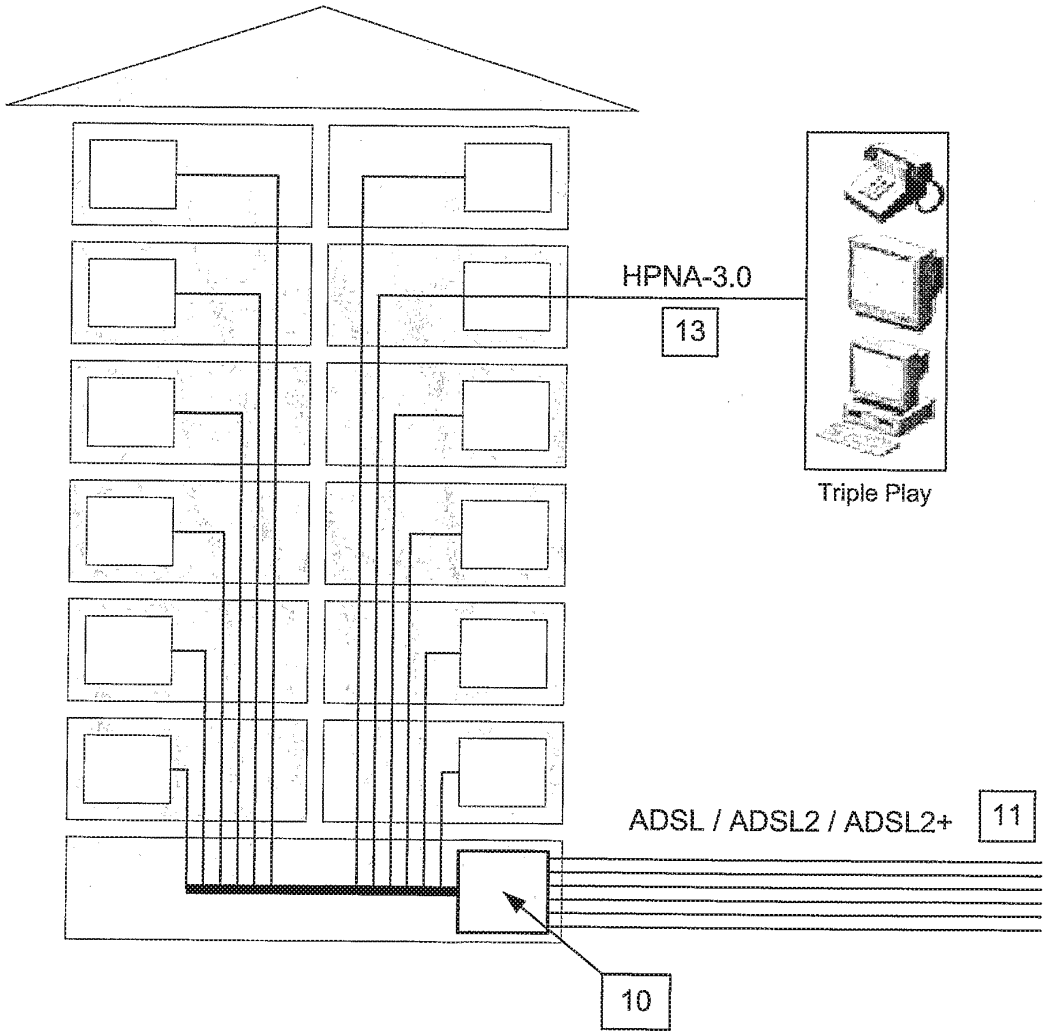


Fig. 1

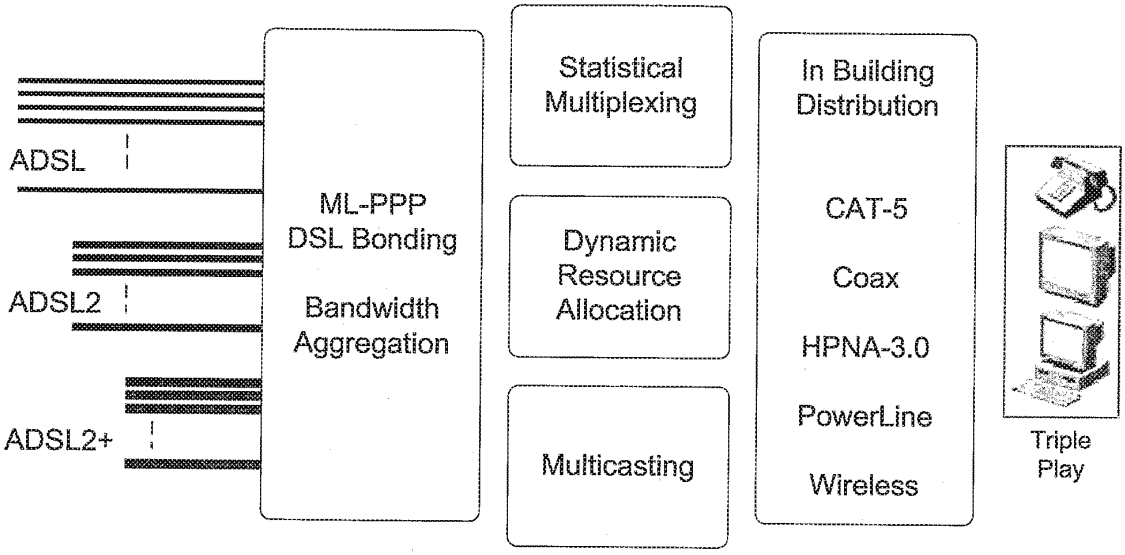

ADSL
ADSL2
ADSL2+
ML-PPP
DSL Bonding
Bandwidth
Aggregation
Statistical
Multiplexing
Dynamic
Resource
Allocation
Multicasting
In Building
Distribution
CAT-5
Coax
HPNA-3.0
PowerLine
Wireless
Triple
Play

Fig. 2

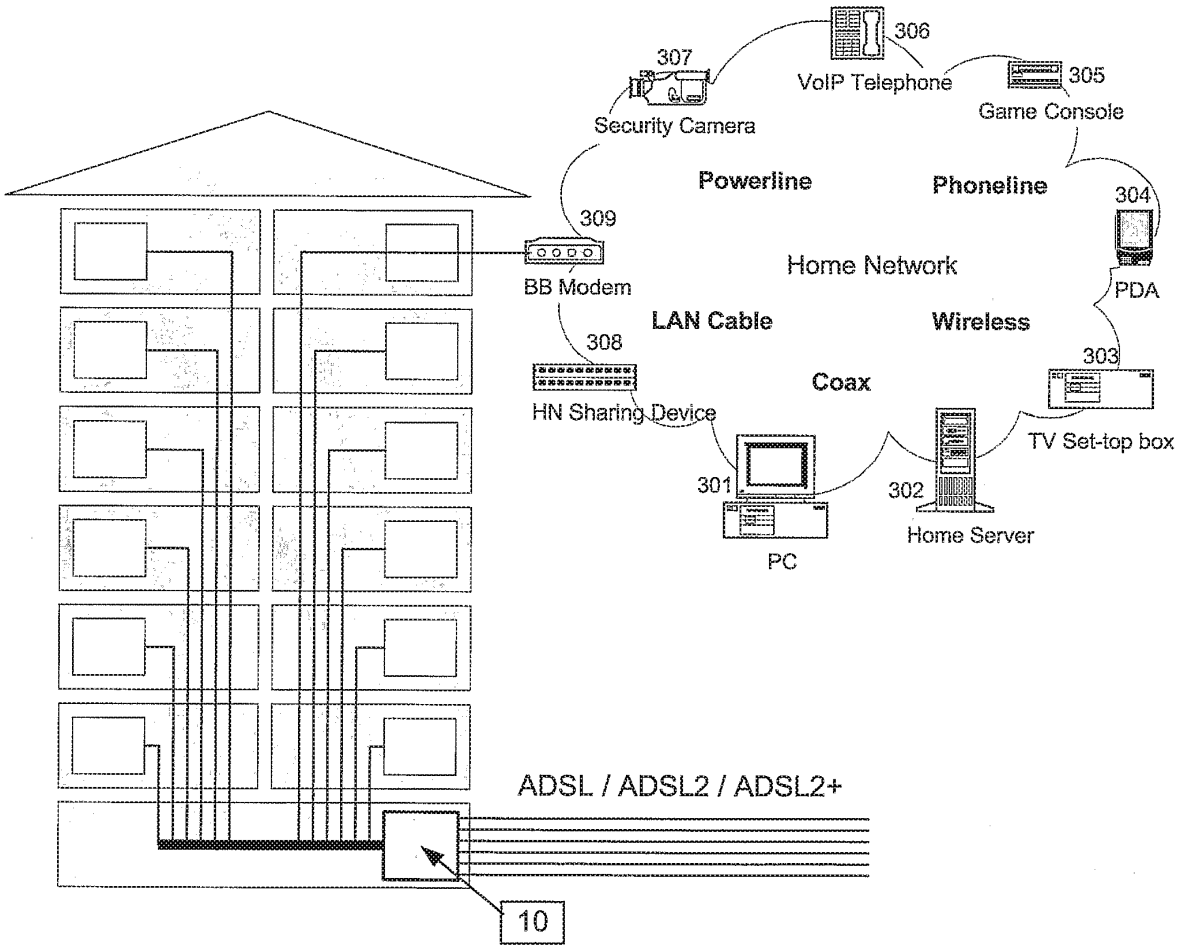

306
VoIP Telephone
307
Security Camera
305
Game Console
Powerline
Phoneline
304
309
Home Network
PDA
BB Modem
LAN Cable
Wireless
308
303
Coax
HN Sharing Device
TV Set-top box
301
302
Home Server
PC
ADSL / ADSL2 / ADSL2+
10

Fig. 3

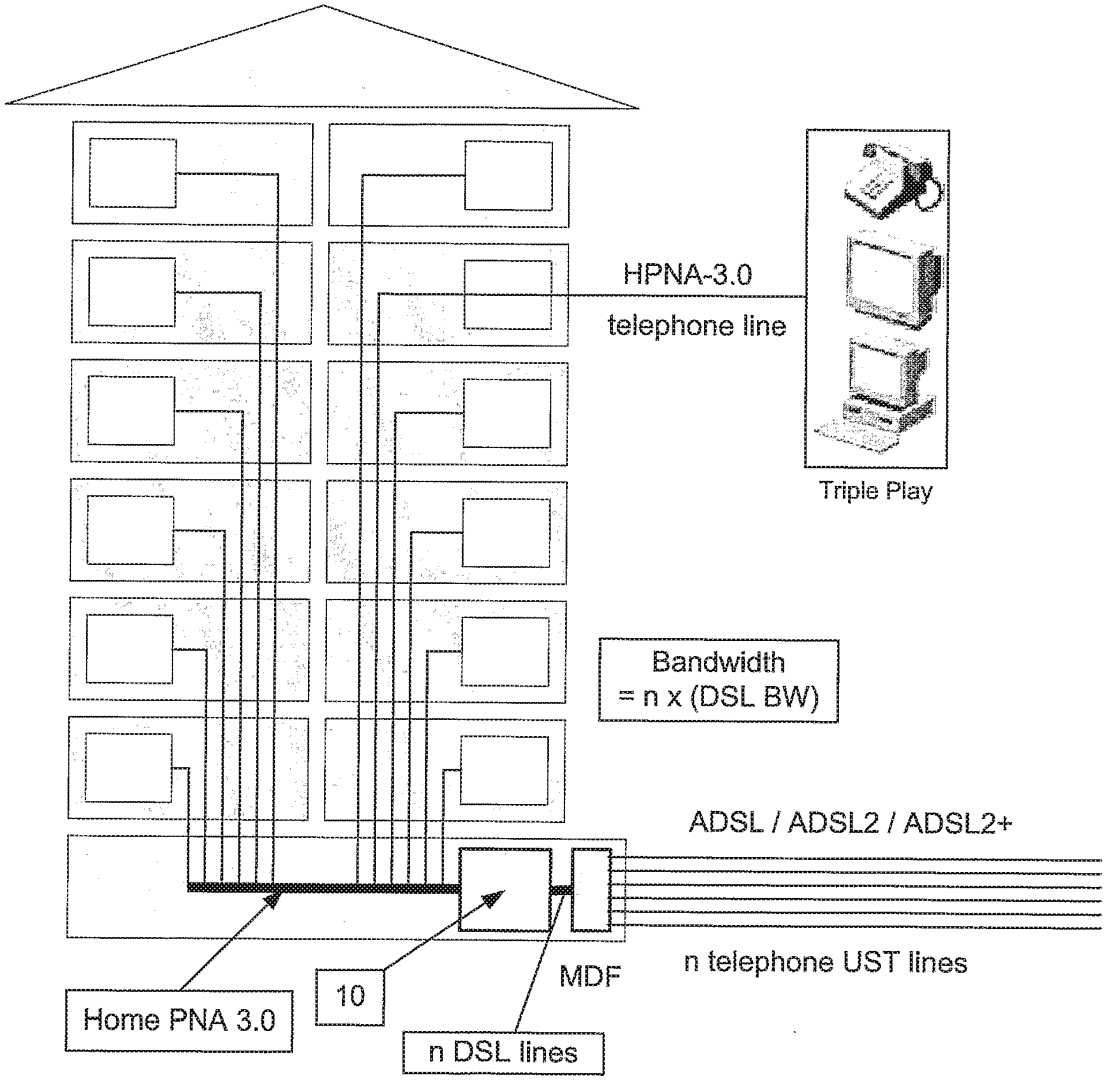

HPNA-3.0
telephone line
Triple Play
Bandwidth
= n x (DSL BW)
ADSL / ADSL2 / ADSL2+
n telephone UST lines
MDF
Home PNA 3.0
10
n DSL lines

Fig. 4A

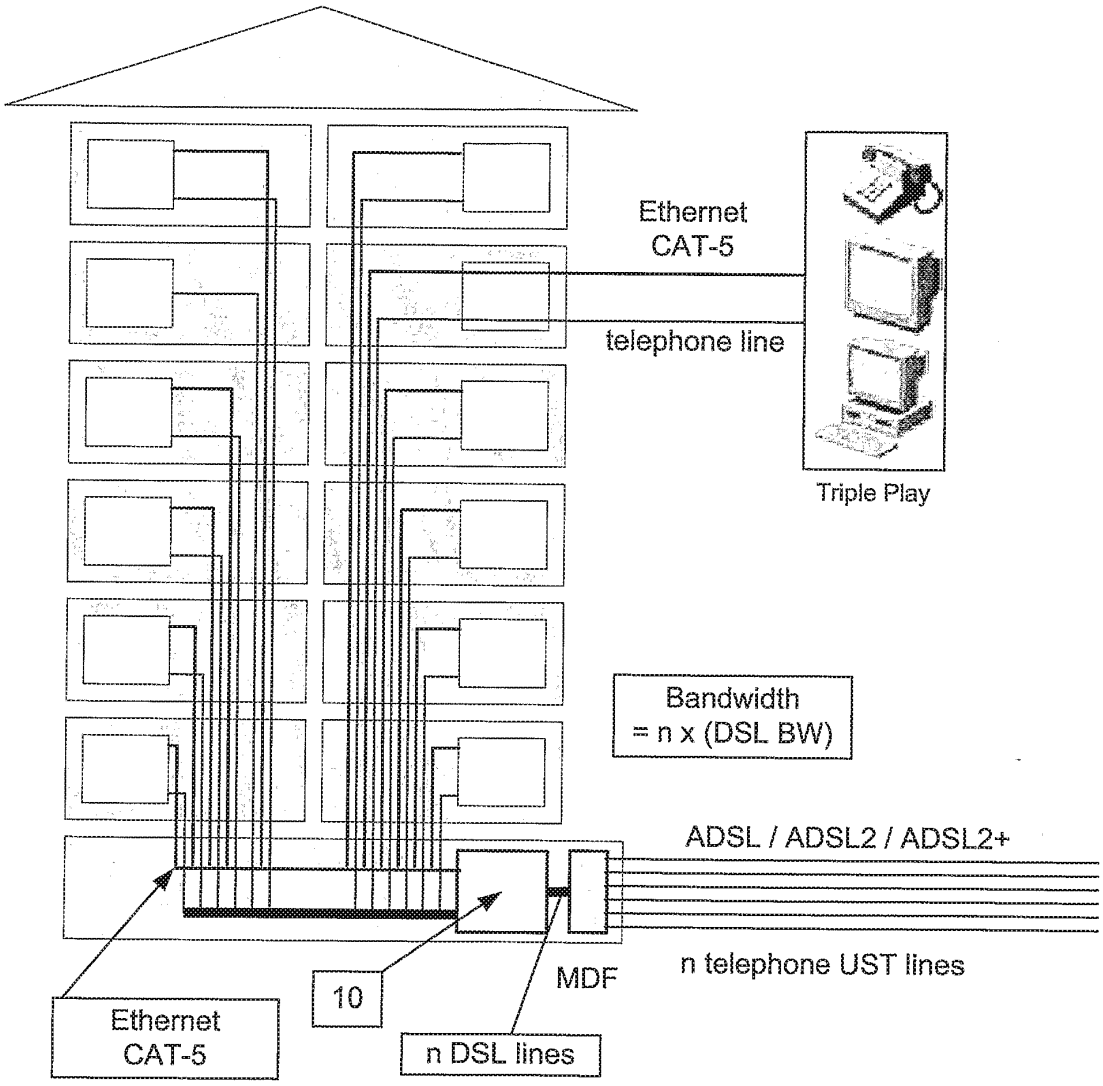

Ethernet
CAT-5
telephone line
Triple Play
Bandwidth
= n x (DSL BW)
ADSL / ADSL2 / ADSL2+
n telephone UST lines
MDF
10
Ethernet
CAT-5
n DSL lines

Fig. 4B

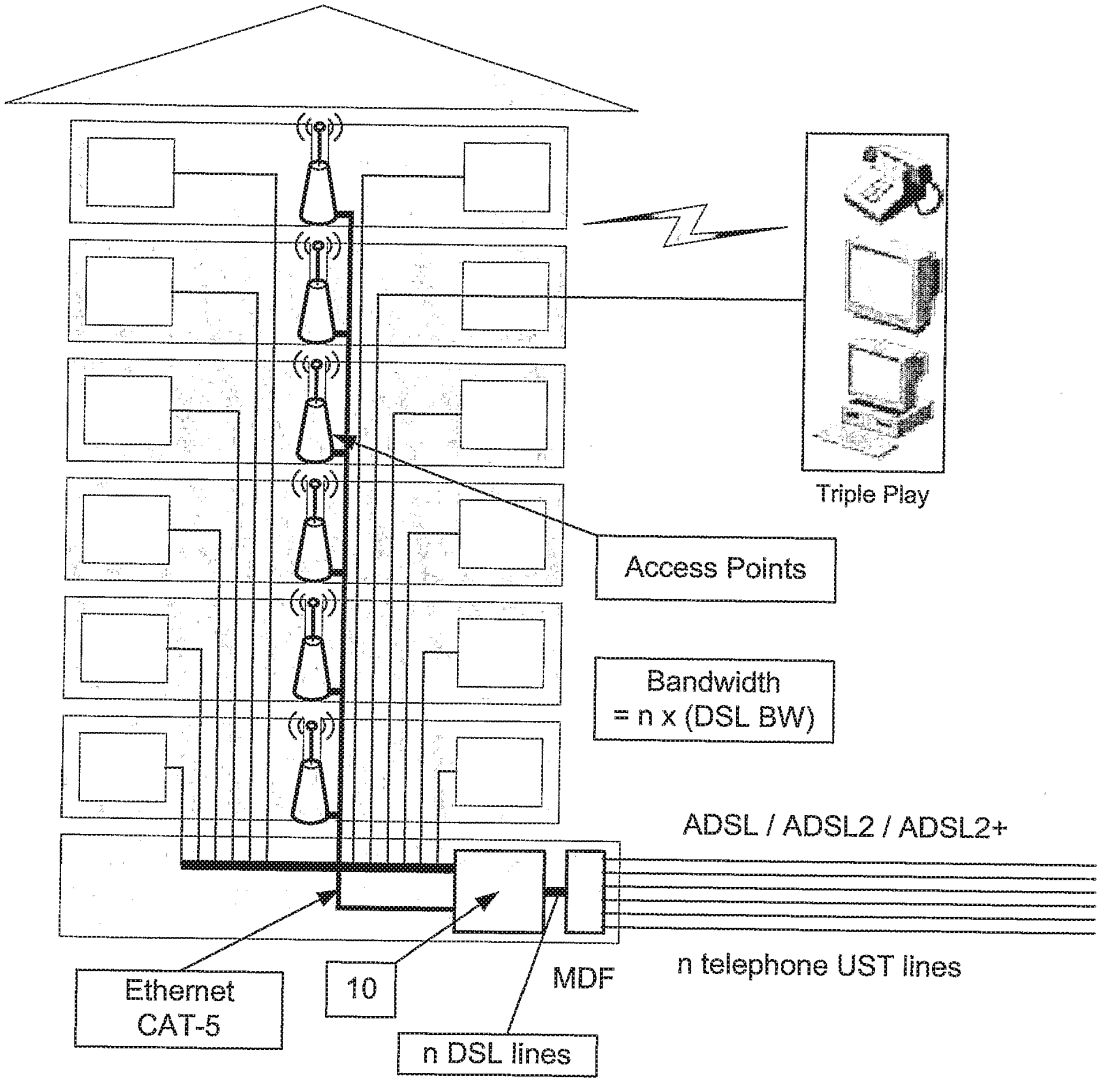

Triple Play
Access Points
Bandwidth
= n x (DSL BW)
ADSL / ADSL2 / ADSL2+
n telephone UST lines
MDF
Ethernet
CAT-5
10
n DSL lines

Fig. 4C

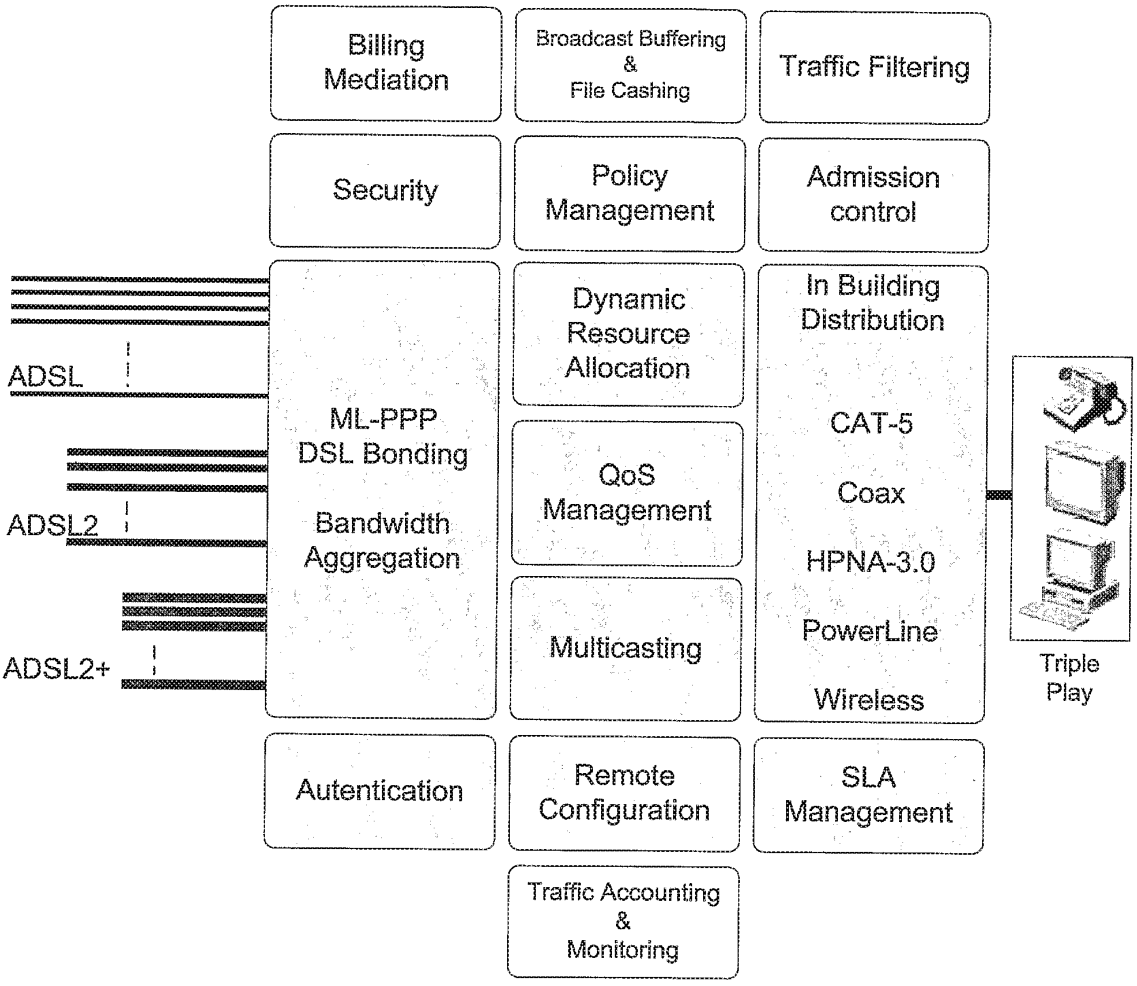
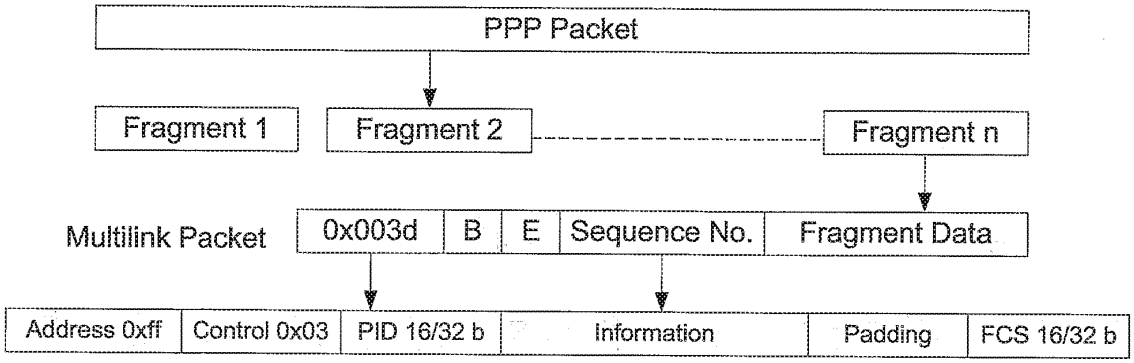

Billing Mediation
Broadcast Buffering & File Cashing
Traffic Filtering
Security
Policy Management
Admission control
ADSL
ADSL2
ADSL2+
ML-PPP DSL Bonding
Bandwidth Aggregation
Dynamic Resource Allocation
QoS Management
Multicasting
In Building Distribution
CAT-5
Coax
HPNA-3.0
PowerLine
Wireless
Triple Play
Autentication
Remote Configuration
SLA Management
Traffic Accounting & Monitoring

Fig. 5



Transmitted ML packet

Fig. 6

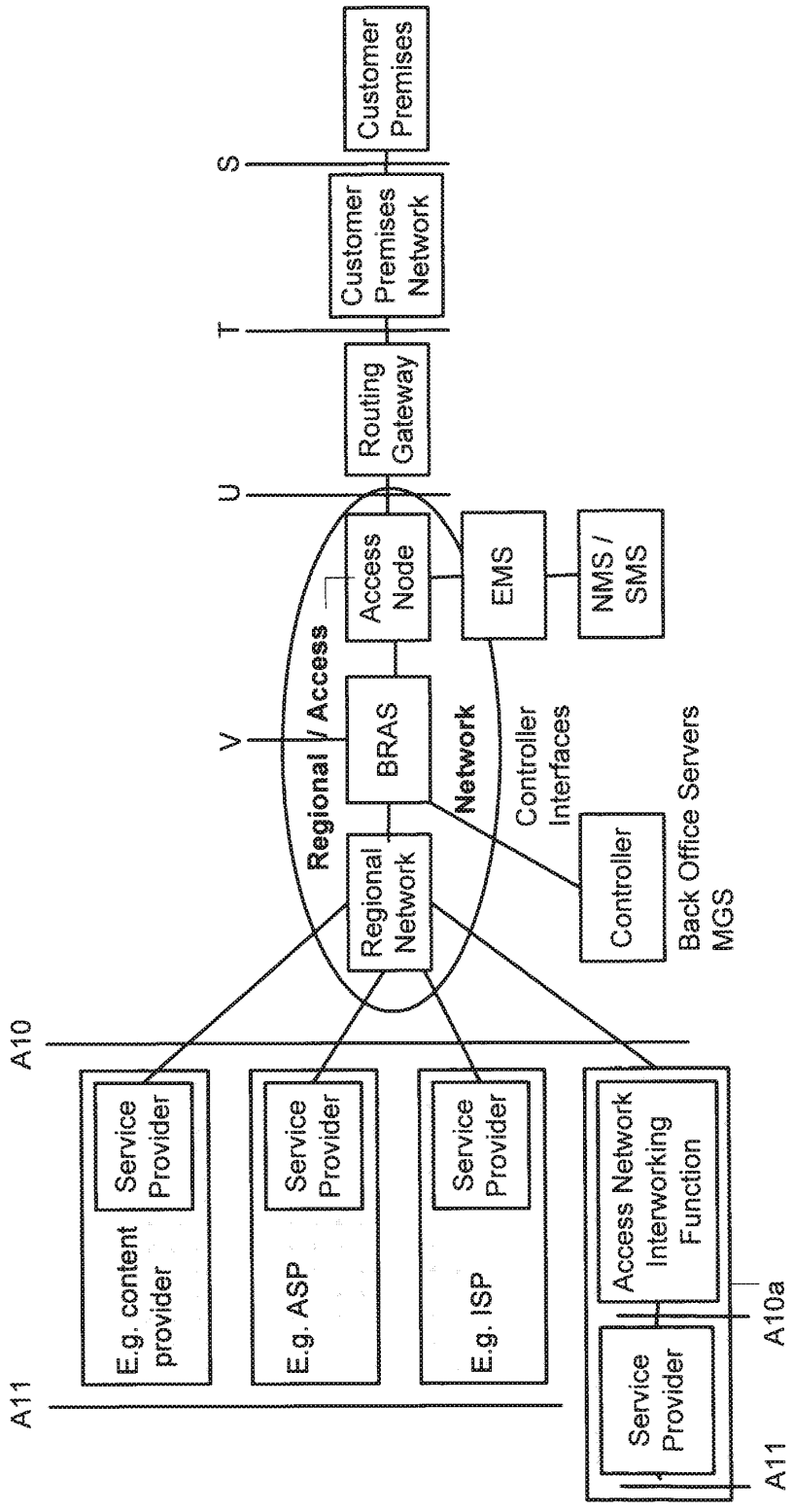


Fig. 7A

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Page #532

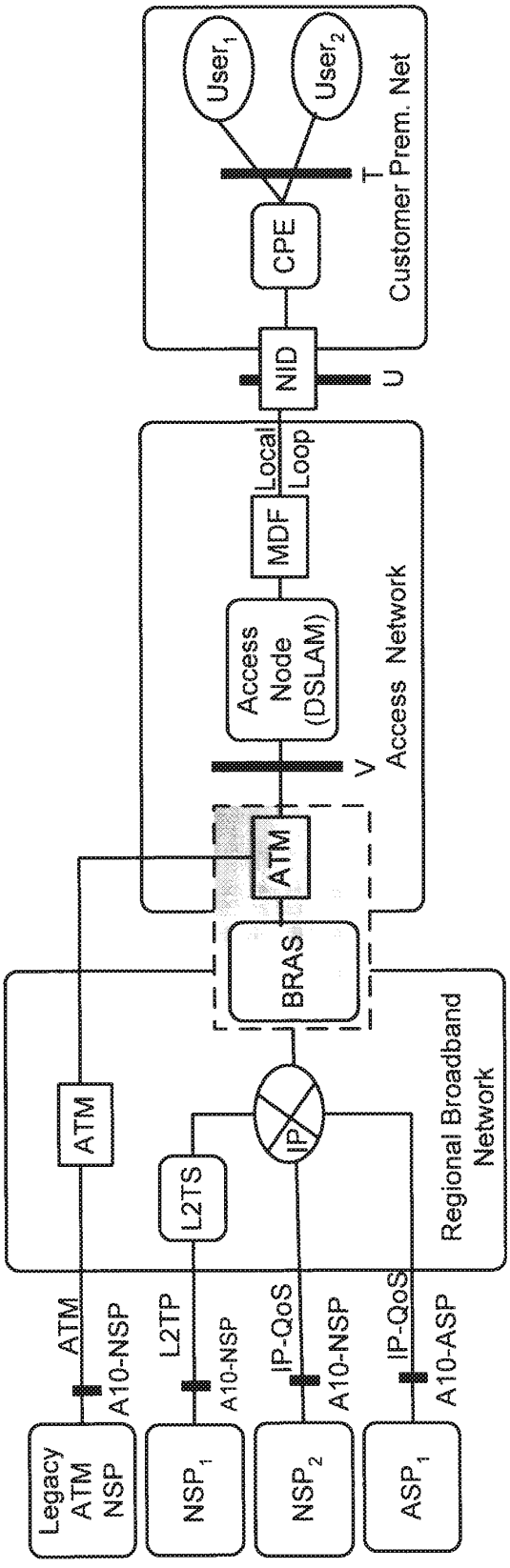


Fig. 7B

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Page #533

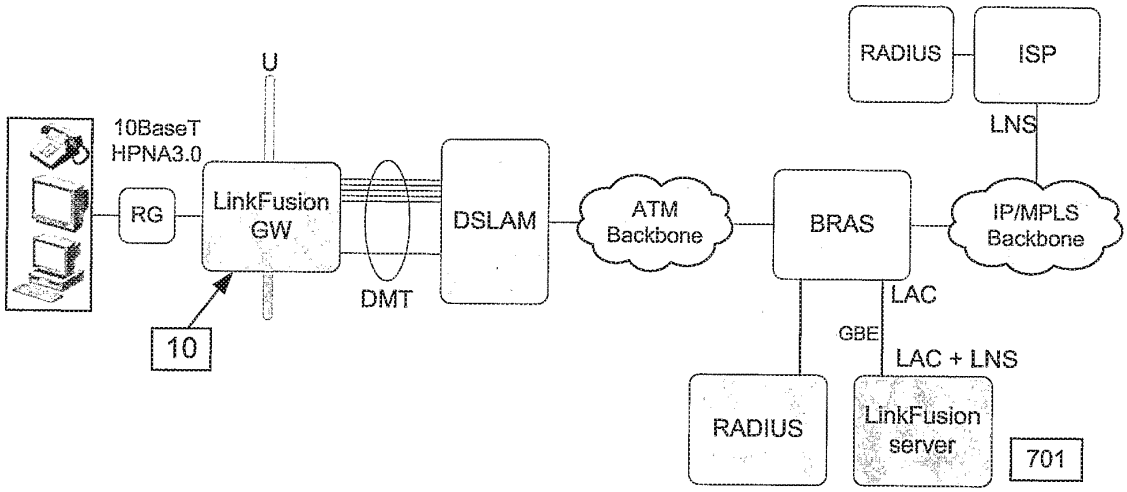

U
10BaseT
HPNA3.0
RG
LinkFusion
GW
DMT
DSLAM
ATM
Backbone
BRAS
RADIUS
ISP
LNS
IP/MPLS
Backbone
LAC
GBE
LAC + LNS
RADIUS
LinkFusion
server
701
10

Fig. 7C

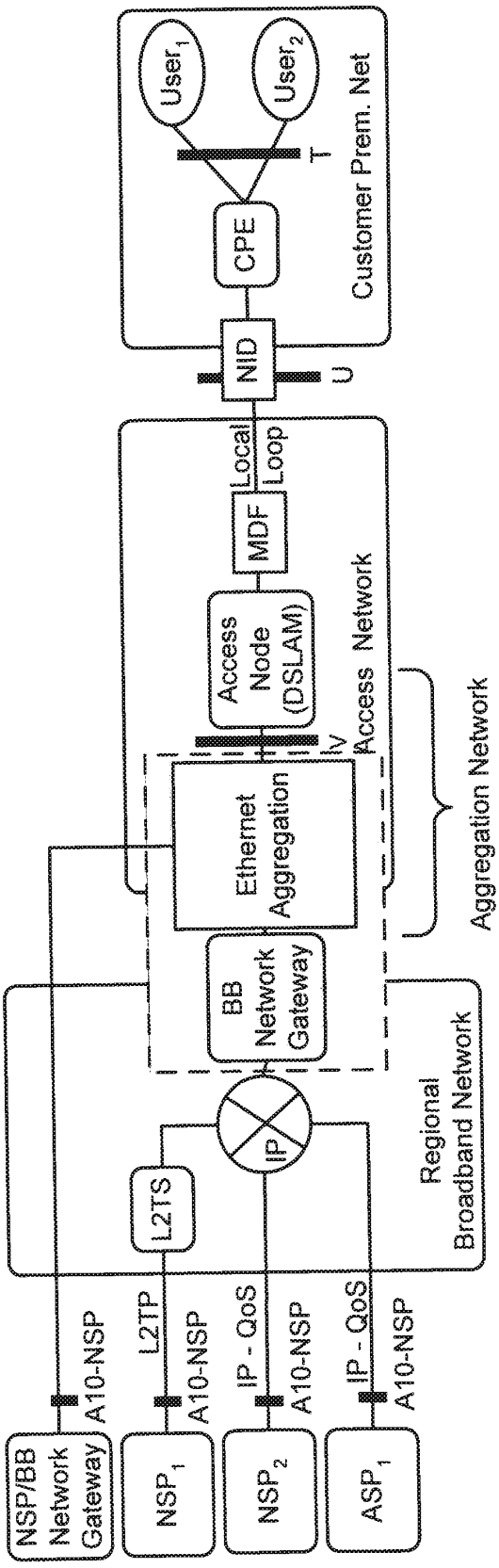


Fig. 7D

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Exhibit 1006
Page #535

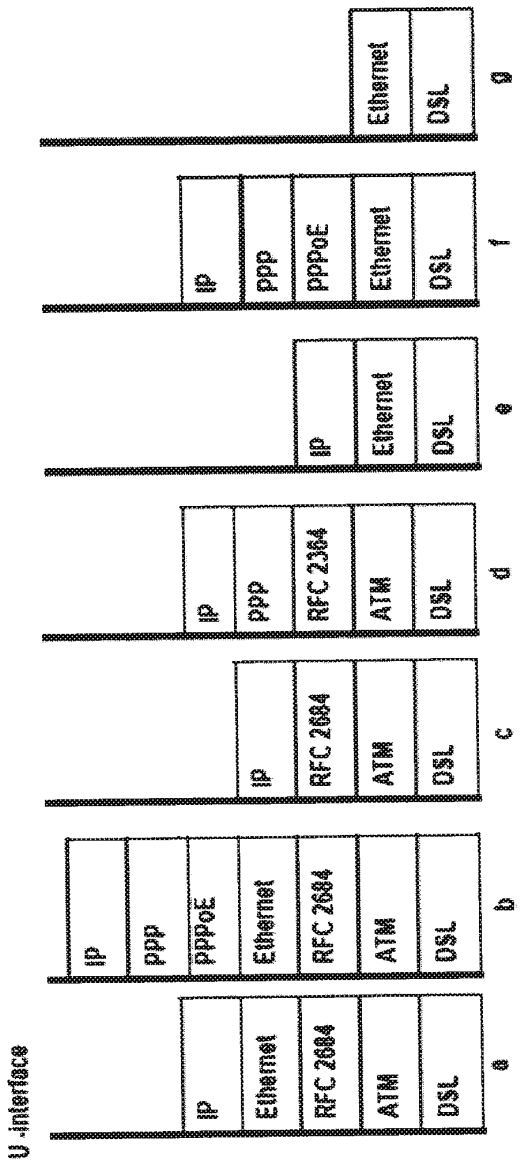


Fig. 8A

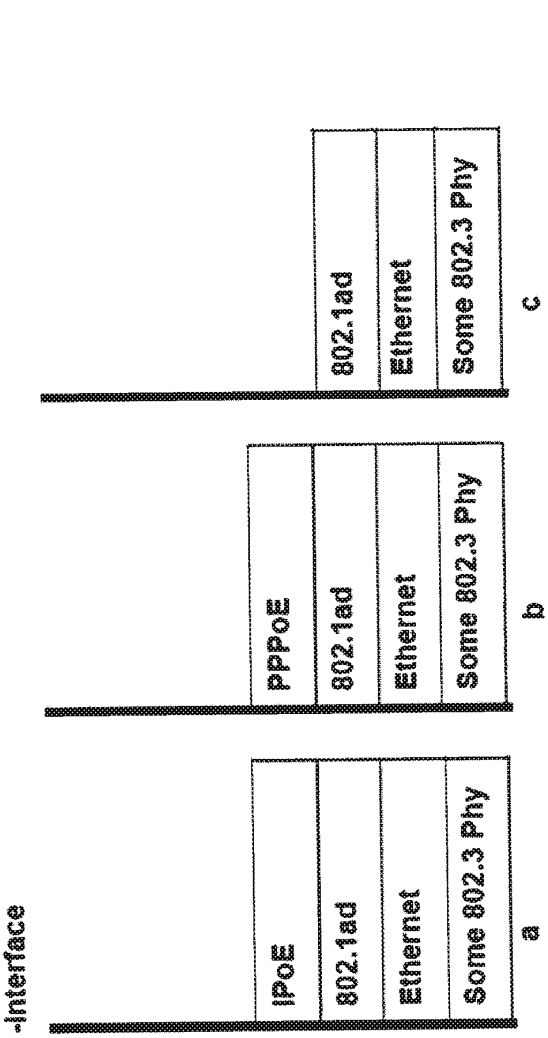


Fig. 8B

Charter Communications, Inc.
Exhibit 1006
Page #536

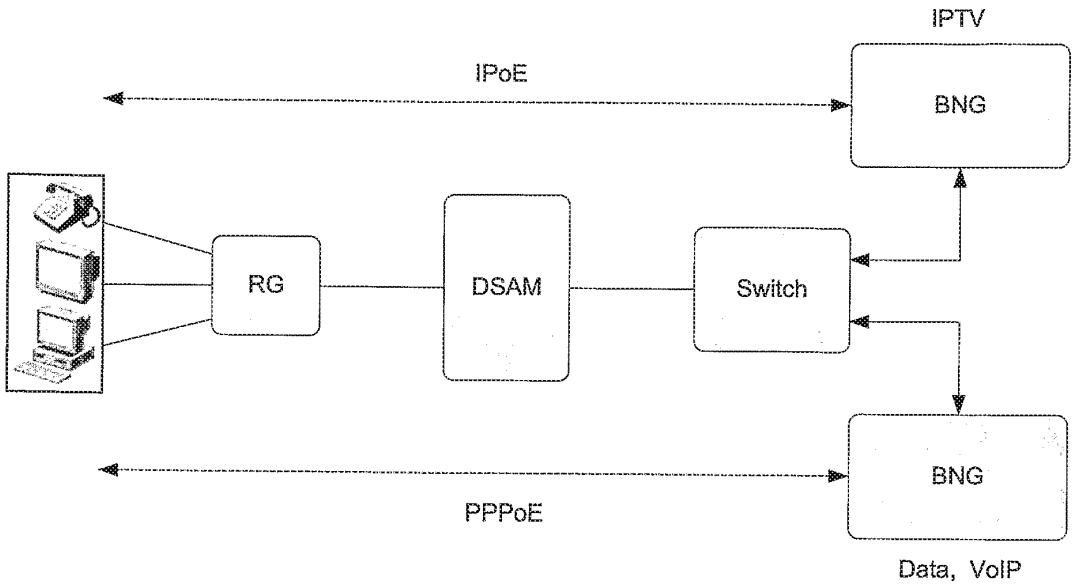


Fig. 9

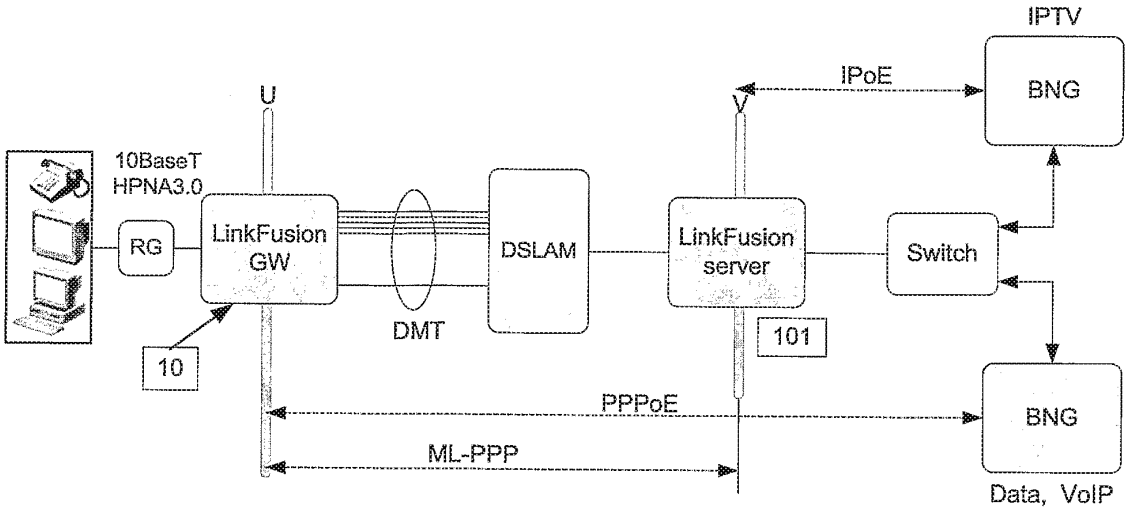

IPTV
IPoE
BNG
U
V
10BaseT
HPNA3.0
RG
LinkFusion
GW
DSLAM
LinkFusion
server
Switch
DMT
101
10
PPPoE
BNG
ML-PPP
Data, VoIP

Fig. 10

INTERNATIONAL SEARCH REPORT

International application No
PCT/IL2007/000470

A. CLASSIFICATION OF SUBJECT MATTER
INV. H04L12/28 H04L12/56 H04L29/06 H04M11/06 H04L12/18

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
H04L 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)
EPO-Internal, INSPEC, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2003/108063 A1 (JOSEPH MOSES S [US] ET AL) 12 June 2003 (2003-06-12) abstract figure 2 paragraph [0041] paragraphs [0046] - [0052] paragraphs [0055], [0057] paragraphs [0072] - [0078]	1-29
Y	EP 1 134 932 A1 (CIT ALCATEL [FR]) 19 September 2001 (2001-09-19) abstract paragraphs [0001] - [0003] paragraphs [0008] - [0010] paragraphs [0024] - [0026]	1-29

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[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
29 August 2007	06/09/2007

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	Bonnet, Jérôme

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Page #539

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 1 094 646 A2 (VIRTUAL ACCESS IRELAND LTD [IE] VIRTUAL ACCESS TECHNOLOGY LTD [IE]) 25 April 2001 (2001-04-25) abstract figure 16 paragraphs [0119] - [0151]	1-29
A	SIF M ET AL: "OPTIMIZING THE BROADBAND AGGREGATION NETWORK FOR TRIPLE PLAY SERVICES : The aggregation network needs to be optimized and versatile to meet the combined demands of voice, video and high-speed Internet services" ALCATEL TELECOMMUNICATIONS REVIEW, ALCATEL, PARIS CEDEX, FR, October 2004 (2004-10), XP007010170 ISSN: 1267-7167 the whole document	1-29

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2003108063 A1	12-06-2003	NONE	
EP 1134932 A1	19-09-2001	AT 318036 T	15-03-2006
		DE 60026006 T2	27-07-2006
		ES 2253195 T3	01-06-2006
		US 2002010782 A1	24-01-2002
EP 1094646 A2	25-04-2001	AT 347223 T	15-12-2006
		DE 60032096 T2	05-07-2007
		GB 2362539 A	21-11-2001
		JP 2001197082 A	19-07-2001

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Electronic Patent Application Fee Transmittal

Application Number:	14356581
Filing Date:	06-May-2014
Title of Invention:	METHOD, APPARATUS, AND SYSTEM FOR OPTIMIZING PERFORMANCE OF A COMMUNICATION UNIT BY A REMOTE SERVER
First Named Inventor/Applicant Name:	Wonjong Rhee
Filer:	Michael V. North/Nita Miller
Attorney Docket Number:	20145-054US

Filed as Large Entity

Filing Fees for U.S. National Stage under 35 USC 371

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($)
Miscellaneous:				
SUBMISSION- INFORMATION DISCLOSURE STMT	1806	1	240	240
		Total in USD ($)		**240**

Electronic Acknowledgement Receipt

EFS ID:	36223499
Application Number:	14356581
International Application Number:	
Confirmation Number:	4319
Title of Invention:	METHOD, APPARATUS, AND SYSTEM FOR OPTIMIZING PERFORMANCE OF A COMMUNICATION UNIT BY A REMOTE SERVER
First Named Inventor/Applicant Name:	Wonjong Rhee
Customer Number:	146571
Filer:	Michael V. North/Nita Miller
Filer Authorized By:	Michael V. North
Attorney Docket Number:	20145-054US
Receipt Date:	06-JUN-2019
Filing Date:	06-MAY-2014
Time Stamp:	14:12:04
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$240
RAM confirmation Number	060719INTEFSW14125200
Deposit Account	502776
Authorized User	Nita Miller
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: 37 CFR 1.17 (Patent application and reexamination processing fees) 37 CFR 1.19 (Document supply fees)	

37 CFR 1.20 (Post Issuance fees)

37 CFR 1.21 (Miscellaneous fees and charges)

37 CFR 1.492 (National application filing, search, and examination fees)

37 CFR 1.492(a) (Basic national fee only)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal Letter	054US_SIDS_Trans.pdf	28336 b022b86529f1026d23fe164b86052a22732f117f	no	3
Warnings:					
Information:					
2	Information Disclosure Statement (IDS) Form (SB08)	054US_SIDS_SB08.pdf	612689 6aa8f418f0d843264af303b811606fcb4d41243b	no	4
Warnings:					
Information:					
3	Foreign Reference	054US_SIDS_FR1.pdf	6625410 a76bc314738a83260db98ff755a24dab7643432a	no	59
Warnings:					
Information:					
4	Non Patent Literature	054US_SIDS_NPL1.pdf	841498 539303ed81475c837fcd74818754b9d0a67ecb12	no	9
Warnings:					
Information:					
5	Non Patent Literature	054US_SIDS_NPL2.pdf	483564 10bb7df26bf7812a0d2ab48426b1d0884fb55262	no	5
Warnings:					
Information:					
6	Non Patent Literature	054US_SIDS_NPL3.pdf	182171 c862e7b131194ea8423eb2042ab37e295c06201e	no	3
Warnings:					
Information:					

7	Non Patent Literature	054US_SIDS_NPL4.pdf	2303749 1b64fc0d44b23bc1117ddd9677285d5f5824b656	no	28
Warnings:					
Information:					
8	Fee Worksheet (SB06)	fee-info.pdf	30624 05413578c94e96a9006d31f9044190b7bf6401a4	no	2
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		Total Files Size (in bytes):	11108041		

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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
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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s)	:	Wonjong Rhee	Confirmation No.: 4319
Appl. No.	:	14/356,581	
Filing Date	:	2014-05-06	
Title	:	METHOD, APPARATUS, AND SYSTEM FOR OPTIMIZING PERFORMANCE OF A COMMUNICATION UNIT BY A REMOTE SERVER	
Art Unit	:	2446	
Examiner	:	Boris D. Grijalva Lobos	
Docket No.	:	20145-054US	

CERTIFICATE OF MAILING (37 CFR §1.8)

I hereby certify, pursuant to 37 CFR §1.8, that this correspondence is being electronically transmitted via EFS-Web addressed to Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on the date shown below:

Date: 2019-06-06 By: /Nita Miller/
Nita Miller

INFORMATION DISCLOSURE STATEMENT

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

SIR or MADAM:

Filed herewith, in accordance with the provisions of 37 CFR §§ 1.56 and 1.97–1.98, listing various references for consideration by the Examiner, is an Information Disclosure Statement ("IDS").

The filing of this IDS shall not be construed as a representation that a search has been made, or regarding the completeness of the list of references, or that no other material information exists. Furthermore, the filing of this IDS shall not be construed as a representation that inclusion of a reference in this list is an admission that it is prior art or is pertinent to this application, or as an admission that the information listed is, or may be considered to be, material to the patentability of the above referenced application. The filing of this IDS shall not be construed in any manner as an admission against interest.

This IDS is being filed:

Charter Communications, Inc.
Exhibit 1006
Page #547

☐ within three months of the filing date of a national application, other than a continued prosecution application under § 1.53(d);

☐ within three months of the date of entry of the national stage as set forth in § 1.491 in an international application;

☐ before the mailing of a first Office Action on the merits;

☐ before the mailing of a first Office Action after the filing of a request for continued examination under § 1.114;

☒ after three months of the filing date or entry into the national stage or after the mailing of a first Office action on the merits, but before the mailing date of any final action under § 1.113, a notice of allowance under §1.311, or an action that otherwise closes prosecution in the application;

AND

☒ enclosed herein is the fee set forth in 37 CFR § 1.17(p);

OR

☐ Applicant certifies pursuant to 37 CFR § 1.97(e):

☐ That each item of information contained in the information disclosure statement was first cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this information disclosure statement;

OR

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

☐ on or before the payment of the issue fee but after the mailing of a final action under § 1.113, a notice of allowance under §1.311, or an action that otherwise closes prosecution in the application;

AND

☐ enclosed herein is the fee set forth in 37 CFR § 1.17(p);

AND

☐ Applicant certifies pursuant to 37 CFR § 1.97(e):

☐ That each item of information contained in the information disclosure statement was first cited in a communication from a foreign patent office in a counterpart foreign application

Charter Communications, Inc.
Exhibit 1006
Page #548

not more than three months prior to the filing of this information disclosure statement;

OR

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

☒ Applicant submits that the enclosed Information Disclosure Statement is timely; therefore, no fee is required.

☒ Except as provided for under 37 CFR § 1.98(a)(2), Applicant has enclosed a copy of each listed reference.

☐ The above referenced application relies upon Application No. _____, filed _____, for an earlier effective filing date under 35 U.S.C. 120. Although, pursuant to 37 CFR § 1.98(d), the references submitted herein are not required to be submitted for the Examiner to consider them, Applicant submits the references herein so that the information will be printed on the patent issuing from this application.

☐ Pursuant to 37 CFR § 1.704(d), Applicant certifies that each of the references cited herein were first cited in a communication from a foreign patent office in a counterpart application and that this communication was not received by any individual designated in 37 CFR § 1.56(c) more than thirty days prior to the filing of this Information Disclosure Statement.

Consideration of the listed references and favorable action are requested. If any additional fees are due in connection with the filing of this Information Disclosure Statement, the Commissioner is hereby authorized to charge such fees to Deposit Account 50-2776.

Respectfully submitted,

Date: 2019-06-06

By: /Michael North/
Michael North
Reg. No. 46963

Customer No.
146571
UNITED STATES PATENT AND TRADEMARK OFFICE

Charter Communications, Inc.
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Page #549

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appl. No.	:	14/356,581	Confirmation No.: 4319
Inventor(s)	:	Wonjong Rhee	
Filing Date	:	2014-05-06	
Title	:	METHOD, APPARATUS, AND SYSTEM FOR OPTIMIZING PERFORMANCE OF A COMMUNICATION UNIT BY A REMOTE SERVER	
Art Unit	:	2446	
Examiner	:	Boris D. Grijalva Lobos	
Docket No.	:	20145-054US	

CERTIFICATE OF MAILING (37 CFR §1.8)

I hereby certify, pursuant to 37 CFR §1.8, that this correspondence is being electronically transmitted to the United States Patent and Trademark Office via EFS-Web addressed to: Mail Stop Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on the date shown below:

Dated: 2019-04-30 By: /Nita Miller/
Nita Miller

RESPONSE TO NON-FINAL OFFICE ACTION

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

Examiner Grijalva Lobos:

This paper is in response to the Non-Final Office Action mailed January 31, 2019 (hereinafter "Office Action"), and having a shortened statutory response period expiring April 30, 2019. Accordingly, this paper is timely filed. Applicant respectfully requests further examination and reconsideration in view of the Amendments and Remarks set forth below.

Amendments to the Claims are reflected in the complete Listing of Claims which begins at page **2** of this paper.

Remarks/Arguments begin on page **8** of this paper.

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Electronic Acknowledgement Receipt

EFS ID:	35880321
Application Number:	14356581
International Application Number:	
Confirmation Number:	4319
Title of Invention:	METHOD, APPARATUS, AND SYSTEM FOR OPTIMIZING PERFORMANCE OF A COMMUNICATION UNIT BY A REMOTE SERVER
First Named Inventor/Applicant Name:	Wonjong Rhee
Customer Number:	146571
Filer:	Michael V. North/Nita Miller
Filer Authorized By:	Michael V. North
Attorney Docket Number:	20145-054US
Receipt Date:	30-APR-2019
Filing Date:	06-MAY-2014
Time Stamp:	17:21:31
Application Type:	U.S. National Stage under 35 USC 371

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		054US_RNFOA.pdf	55012 6775bff4eb602304c5afe9848af2bc3f3e36e17c	yes	9

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Applicant Arguments/Remarks Made in an Amendment	8	9
	Claims	2	7
	Amendment/Req. Reconsideration-After Non-Final Reject	1	1
Warnings:			
Information:			
	Total Files Size (in bytes):	55012	

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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.

REMARKS

Claims 1, 3-5, 7-10, 12-16, 34, 36-37, and 53-57 were presented for examination. All pending claims were rejected by the Examiner in the Office Action. In response, Applicant hereby amends claims 1, 3, 14, 10, 34, and 36 and adds new claims 58-65. Support for the claim amendments may be found, e.g., in paragraphs 62 and 72. Applicant respectfully requests reconsideration in light of the amendments to the claims and the below remarks.

Applicant thanks Primary Examiner Tauqir Hussain for the courtesy of a telephone interview on April 25, 2019. During this interview, Applicant's representative proposed amendments that the Examiner confirmed overcome the current rejections. Applicant argued that the switches in *Clark* are not designed for and not capable of performing any type of data analysis—whether in ***real-time*** or otherwise.

Regarding the rejection under 35 U.S.C. 101, Applicant argued that claimed steps, such as ***communicating*** [a] ***policy... to at least one or more communication units***, cannot reasonably be interpreted as mental processes that could be performed by a human, because actions that ***improve a performance of the one or more communication units*** require networking equipment and, thus, cannot be practically applied in the mind.

In light of the agreement reached during the interview, Applicant hereby amends claims 1, 3, 14, 10, 34, and 36 to further clarify the present invention's limitation and respectfully requests that the current rejections be withdrawn.

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CONCLUSION

Because the cited documents, separately and in combination, fail to teach or suggest at least one claim element for each of the pending claims, Applicant respectfully requests removal of the rejections of claims 1, 3-5, 8-10, 12-16, 34, 36, 37, and 53-54, and 56-65.

Applicant notes that at least some of the claims include additional claim elements that are missing from the cited documents; however, additional reasons and responses to additional rejections for the independent and dependent claims are not presented in order to avoid unnecessary and/or cumulative arguments. However, Applicant reserves the right to challenge any assertions made by the Examiner in the Office Action that are not herein addressed, including but not limited to, the right to challenge that one or more of the cited documents were valid references. It shall also be noted that the absence of any discussion about one or more of the rejections is in no way an acceptance by acquiescence by the Applicant.

The Commissioner is hereby authorized to charge any fees which may be due, and to credit any overpayment of fees, to Deposit Account No. 50-2776.

Should the Examiner believe that a telephone conference would expedite the prosecution of this application, the undersigned can be reached at 650-353-3786.

Respectfully submitted,

Date: 2019-04-30

By: /Ali Uyanik/
Ali Uyanik
Reg. No. 67,080

Customer No.
146571
UNITED STATES PATENT & TRADEMARK OFFICE

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AMENDMENTS TO THE CLAIMS

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

Listing of the Claims:

1. (Currently amended) A method for improving performance of one or more communication units, the method comprising:

   receiving, by a server, from ~~a~~ network monitoring devices that monitor ~~device~~, in real-time, data associated with an operation of two or more communication units located in different geographical areas, the data comprising a parameter;

   processing, by the server, at least one of the data and historical data;

   based on the processed data, determining a policy for at least one ~~each~~ of the ~~one~~ two or more communication units; and

   communicating the policy, by the server, via a network, to at least one or more communication units that, in response to receiving the policy ~~implemented,~~ implements one or more algorithms ~~based on~~ that use the parameter and at least a rule or a condition for the one or more communication units to improve a performance of the one or more communication units.

2. (Cancelled)

3. (Currently amended) The method of claim 1, wherein the data further ~~monitoring~~ comprises determining a received signal strength indication.

4. (Previously presented) The method of claim 1, further comprising, based on a change in the operation, updating the policy.

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5. (Previously presented) The method of claim 1, wherein determining the policy comprises selecting the policy from a set of policies.

6-7. (Cancelled)

8. (Previously presented) The method of claim 1, wherein the one or more communication units comprise at least one of:

an access point (AP);

a base station;

a wireless LAN device;

a DSLAM;

a gateway;

a performance enhancement device;

a Digital Subscriber Line (DSL) Customer Premises Equipment (CPE) modem;

an in-home powerline device;

a Home Phoneline Network Alliance (HPNA) based device;

an in-home coax distribution device;

a G.hn (Global Home Networking Standard) compatible device;

an in-home metering communication device;

an in-home appliance communicatively interfaced with the LAN;

a wireless femtocell base station;

a wireless WiFi compatible base station;

a wireless mobile device repeater;

a wireless mobile device base station;

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a set-top box (STB)/set-top unit (STU) customer electronics device;

an Internet Protocol (IP) enabled television;

an IP enabled media player;

an IP enabled gaming console;

an Ethernet gateway;

a computing device connected to the LAN;

an Ethernet connected computer peripheral device;

an Ethernet connected router;

an Ethernet connected wireless bridge;

an Ethernet connected network bridge; or

an Ethernet connected network switch.

9. (Canceled)

10. (Currently amended) A non-transitory machine-readable storage medium having computer executable instructions stored thereon that when executed cause a processor of a server to perform a method for improving performance of one or more communication units, the method comprising:

receiving from ~~a~~ network monitoring devices that monitor ~~device~~, in real-time, data associated with an operation of two or more communication units located in different geographical areas, the data comprising a parameter;

processing at least one of the data and historical data;

determining by the server, a policy for each of the one or more communication units, based on the processed data; and

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communicating, via a network, the policy to two or more communication units that, in response to receiving the policy ~~implemented~~, implements one or more algorithms based on at least a rule or a condition to improve a performance of the one or more communication units.

11. (Cancelled)

12. (Previously presented) The non-transitory machine-readable storage medium of claim 10, wherein processing comprises storing at least one of the data and the historical data in a memory device.

13. (Previously presented) The non-transitory machine-readable storage medium of claim 10, wherein determining the policy comprises determining a condition for communicating the policy.

14. (Currently amended) The non-transitory machine-readable storage medium of claim 10, wherein the data further ~~monitoring~~ comprises determining a received signal strength.

15. (Previously presented) The non-transitory machine-readable storage medium of claim 10, further comprising updating the parameter based on a change in the operation to update the policy.

16. (Previously presented) The non-transitory machine-readable storage medium of claim 10, wherein determining the policy comprises selecting the policy from a set of policies.

17-33. (Cancelled)

34. (Currently amended) An apparatus comprising:

a memory; and

a processor, coupled to the memory, and operable to:

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receive, from ~~a~~ network monitoring devices that monitor ~~device~~, in real-time, data associated with an operation of two or more communication units located in different geographical areas, the data comprising a parameter;

analyze at least one of the data and historical data;

based on the analyzed data, determine a policy for at least one ~~each~~ of the ~~one~~ two or more communication units; and

communicate the policy, via a network that is communicatively coupled to the processor, to at least one or more communication units that, in response to receiving the policy ~~implemented~~, implements one or more algorithms based on at least a rule or a condition to improve a performance of the one or more communication units.

35. (Cancelled)

36. (Currently amended) The apparatus of claim 34, ~~further comprising a monitoring device coupled to the processor,~~ wherein the network monitoring ~~device determines~~ devices determine a received signal strength.

37. (Previously presented) The apparatus of claim 34, wherein determining the policy comprises selecting the policy from a set of policies and updating the parameter.

38-52. (Cancelled)

53. (Previously presented) The method of claim 1, wherein processing comprises storing at least one of the data and historical data in a memory.

54. (Previously presented) The method of claim 4, wherein updating the policy comprises updating the parameter.

55. (Cancelled)

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56. (Previously presented) The method of claim 34, wherein processing comprises storing at least one of the data and the historical data in the memory.

57. (Previously presented) The method of claim 34, wherein determining the policy comprises determining a condition for communicating the policy.

58. (New) The method of claim 1, wherein the data further comprises time-varying data.

59. (New) The method of claim 1, wherein the server performs an analysis of at least one of the data and historical data.

60. (New) The method of claim 59, wherein the analysis comprises a statistical analysis of at least one of the data and historical data.

61. (New) The method of claim 10, wherein the data further comprises time-varying data.

62. (New) The method of claim 10, wherein the server performs an analysis of at least one of the data and historical data.

63. (New) The method of claim 62, wherein the analysis comprises a statistical analysis of at least one of the data and historical data.

64. (New) The method of claim 34, wherein the data further comprises time-varying data.

65. (New) The method of claim 34, wherein the server performs an analysis of at least one of the data and historical data.

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Page #560

Document code: WFEE

United States Patent and Trademark Office
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 14/356,581	Filing Date 05/06/2014	☐ To be Mailed

ENTITY: ☑ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $80 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $420 =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).				
☐ 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	

APPLICATION AS AMENDED - PART II

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT	04/30/2019	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 26	Minus	** 20	= 6		x $100 =	600
	Independent (37 CFR 1.16(h))	* 3	Minus	*** 3	= 0		x $460 =	0
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	600

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=		x $0 =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		x $0 =	
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.	LIE
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".	/DEBORAH D SCOTT/
*** 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.**

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/356,581	05/06/2014	Wonjong Rhee	20145-054US	4319

146571 7590 04/30/2019

North Weber & Baugh LLP - ASSIA
3260 Hillview Avenue, 1st Floor
Palo Alto, CA 94304

EXAMINER	
GRIJALVA LOBOS, BORIS D	

ART UNIT	PAPER NUMBER
2446	

NOTIFICATION DATE	DELIVERY MODE
04/30/2019	ELECTRONIC

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.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

docket1@northweber.com

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Exhibit 1006
Page #563

Applicant-Initiated Interview Summary	**Application No.** 14/356,581	**Applicant(s)** Rhee, Wonjong	
	Examiner TAUQIR HUSSAIN	**Art Unit** 2446	**AIA (FITF) Status** No

All participants (applicant, applicants representative, PTO personnel):

(1) TAUQIR HUSSAIN. (3) _____.

(2) Ali Uyankik (Reg. No.: 67,080). (4) _____.

Date of Interview: 25 April 2019.

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.

Identification of prior art discussed: cited reference.

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 the claims in light of proposed amendments specifically the difference between the switch in the prior art and the server recited in the claim. Examiner suggested to further add the features as stated in the specification to capture the invention. The proposed amendment likely to overcome the cited reference. Further search and consideration will be required. No agreement was 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

/Tauqir Hussain/ Primary Examiner, Art Unit 2446	

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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 examiners 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 applicants 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 applicants 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 examiners 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 examiners initials.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: **Wonjong Rhee**	Examiner: **Grijalva Lobos, Boris D.**
Application No.: 14/356,581	Art Group: 2446
Filed: 06 May 2014	Confirmation No.: 4319
For: METHOD, APPARATUS, AND SYSTEM FOR OPTIMIZING PERFORMANCE OF A COMMUNICATION UNIT BY A REMOTE SERVER	Docket No.: 20145-054US

AGENDA FOR PHONE INTERVIEW

Examiner Tauqir:

This paper is an outline for our phone interview on Thursday April 25, 2019 at 12:00 PM (EST) to discuss the following claim amendments concerning the above-mentioned patent application.

Proposed Claim Amendments

1. (Currently amended) A method for improving performance of one or more communication units, the method comprising:

receiving, by a server, from ~~a~~ network monitoring devices that monitor ~~device~~, in real-time, data associated with an operation of two or more communication units located in different geographical areas, the data comprising a parameter;

processing, by the server, at least one of the data and historical data;

based on the processed data, determining a policy for at least one ~~each~~ of the ~~one~~ two or more communication units; and

communicating the policy, by the server, via a network, to at least one or more communication units that, in response to receiving the policy ~~implemented~~, implements one or more algorithms ~~based on~~ that use the parameter and at least a rule or a condition for the one or more communication units to improve a performance of the one or more communication units.

2. (Cancelled)

3. (Currently amended) The method of claim 1, wherein the data further ~~monitoring~~ comprises determining a received signal strength indication.

4. (Previously presented) The method of claim 1, further comprising, based on a change in the operation, updating the policy.

5. (Previously presented) The method of claim 1, wherein determining the policy comprises selecting the policy from a set of policies.

6. (Cancelled)

7. (Cancelled).

8. (Previously presented) The method of claim 1, wherein the one or more communication units comprise at least one of:

an access point (AP);
a base station;
a wireless LAN device;
a DSLAM;
a gateway;
a performance enhancement device;
a Digital Subscriber Line (DSL) Customer Premises Equipment (CPE) modem;
an in-home powerline device;
a Home Phoneline Network Alliance (HPNA) based device;
an in-home coax distribution device;
a G.hn (Global Home Networking Standard) compatible device;
an in-home metering communication device;
an in-home appliance communicatively interfaced with the LAN;
a wireless femtocell base station;
a wireless WiFi compatible base station;
a wireless mobile device repeater;

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a wireless mobile device base station;

a set-top box (STB)/set-top unit (STU) customer electronics device;

an Internet Protocol (IP) enabled television;

an IP enabled media player;

an IP enabled gaming console;

an Ethernet gateway;

a computing device connected to the LAN;

an Ethernet connected computer peripheral device;

an Ethernet connected router;

an Ethernet connected wireless bridge;

an Ethernet connected network bridge; or

an Ethernet connected network switch.

9. (Canceled)

10. (Currently amended) A non-transitory machine-readable storage medium having computer executable instructions stored thereon that when executed cause a processor of a server to perform a method for improving performance of one or more communication units, the method comprising:

receiving from ~~a~~ network monitoring devices that monitor ~~device~~, in real-time, data associated with an operation of two or more communication units located in different geographical areas, the data comprising a parameter;

processing at least one of the data and historical data;

determining by the server, a policy for each of the one or more communication units, based on the processed data; and

communicating, via a network, the policy to two or more communication units that, in response to receiving the policy ~~implemented~~, implements one or more algorithms based on at least a rule or a condition to improve a performance of the one or more communication units.

11. (Cancelled)

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12. (Previously presented) The non-transitory machine-readable storage medium of claim 10, wherein processing comprises storing at least one of the data and the historical data in a memory device.

13. (Previously presented) The non-transitory machine-readable storage medium of claim 10, wherein determining the policy comprises determining a condition for communicating the policy.

14. (Currently amended) The non-transitory machine-readable storage medium of claim 10, wherein the data further ~~monitoring~~ comprises determining a received signal strength.

15. (Previously presented) The non-transitory machine-readable storage medium of claim 10, further comprising updating the parameter based on a change in the operation to update the policy.

16. (Previously presented) The non-transitory machine-readable storage medium of claim 10, wherein determining the policy comprises selecting the policy from a set of policies.

17. – 33. (Cancelled)

34. (Currently amended) An apparatus comprising:

a memory; and

a processor, coupled to the memory, and operable to:

receive, from ~~a~~ network monitoring devices that monitor ~~device~~, in real-time, data associated with an operation of two or more communication units located in different geographical areas, the data comprising a parameter;

analyze at least one of the data and historical data;

based on the analyzed data, determine a policy for at least one ~~each~~ of the ~~one~~ two or more communication units; and

communicate the policy, via a network that is communicatively coupled to the processor, to at least one or more communication units that, in response to receiving the

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policy ~~implemented~~, implements one or more algorithms based on at least a rule or a condition to improve a performance of the one or more communication units.

35. (Cancelled)

36. (Currently amended) The apparatus of claim 34, ~~further comprising a monitoring device coupled to the processor,~~ wherein the network monitoring ~~device determines~~ devices determine a received signal strength.

37. (Previously presented) The apparatus of claim 34, wherein determining the policy comprises selecting the policy from a set of policies and updating the parameter.

38. – 52. (Cancelled)

53. (Previously presented) The method of claim 1, wherein processing comprises storing at least one of the data and historical data in a memory.

54. (Previously presented) The method of claim 4, wherein updating the policy comprises updating the parameter.

55. (Cancelled)

56. (Previously presented) The method of claim 34, wherein processing comprises storing at least one of the data and the historical data in the memory.

57. (Previously presented) The method of claim 34, wherein determining the policy comprises determining a condition for communicating the policy.

58. (New) The method of claim 1, wherein the data further comprises time-varying data.

59. (New) The method of claim 1, wherein the server performs an analysis of at least one of the data and historical data.

60. (New) The method of claim 59, wherein the analysis comprises a statistical analysis of of at least one of the data and historical data.

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61. (New) The method of claim 10, wherein the data further comprises time-varying data.

62. (New) The method of claim 10, wherein the server performs an analysis of at least one of the data and historical data.

63. (New) The method of claim 62, wherein the analysis comprises a statistical analysis of of at least one of the data and historical data.

64. (New) The method of claim 34, wherein the data further comprises time-varying data.

65. (New) The method of claim 34, wherein the server performs an analysis of at least one of the data and historical data.

Applicant's Notes

1) Support for the claim amendments may be found, e.g., in paragraphs 62 & 72 of the published patent application.
2) The switches in *Clark* are not designed for and not capable of performing any type of data analysis—whether in ***real-time*** or otherwise.
3) Applicant objects to the double patenting rejection.
4) Applicant disagrees with the 101 analysis, which asserts that steps such as ***communicating*** [a] ***policy... to at least one or more communication units*** may be interpreted as "Mental Processes" that "could be performed by a human." To the contrary, such actions, which ***improve a performance of the one or more communication units***, require networking equipment and, thus, cannot be practically applied in the mind.

Respectfully submitted,

Date: April 23, 2019

By: / Ali Uyanik /
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