UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO.	: 9,647,918 B2
APPLICATION NO.	: 15/227814
DATED	: May 9, 2017
INVENTOR(S)	: Raleigh et al.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Page 2 Column 1, Line 48 Under item (63), Related U.S. Application Data:
"No. 12/380,788" should be changed to "No. 12/380,778"

Signed and Sealed this
Twelfth Day of February, 2019

Andrei Iancu
Director of the United States Patent and Trademark Office

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	Raleigh et al.	Patent No.: 9,647,918
Serial No.:	15/227,814	Issue Date: May 9, 2017
Filing Date:	August 3, 2016	Conf. No.: 2668
Title:	Mobile Device and Method Attributing Media Services Network Usage to Requesting Application	

Commissioner for Patents
Office of Patent Publication
ATTN: Certificate of Correction Branch
P.O. Box 1450
Alexandria, VA 22313-1450

MISCELLANEOUS COMMUNICATION REGARDING CERTIFICATE OF CORRECTION

Applicant/Patentee (hereinafter, "Applicant") respectfully requests that the Office issue a Certificate of Correction for U.S. Patent No. 9,647,918 to correct a typographical error in the "Related U.S. Application Data (63)" section of the patent. The error being corrected is the Office's error.

In the published patent, section (63) recites an incorrect application number at page 2 col. 1, line 48 (the last citation in the section):

No. 12/380,788

The non-provisional application listed as: No. 12/380,788 should be: No. 12/380,778, as listed in the August 3, 2016 Application Data sheet page 9.

CONCLUSION

Applicant respectfully requests issuance of the Certificate of Correction to correct the error in the priority claim. The Office is authorized to charge any fee deficiency or credit any overpayment to Deposit Account 50-5876.

Respectfully submitted,

Date: January 11, 2019 By: /James E. Harris/

James E. Harris
Reg. No. 40,013
Patent Counsel
Headwater Research LLC
1011 Pruitt Place
Tyler, TX 75703
(903) 201-6212

CERTIFICATE OF ELECTRONIC TRANSMISSION

I hereby certify that this paper (along with any paper referred to as being attached or enclosed) is being filed electronically via EFS-Web addressed to the Commissioner for Patents on:

Date: January 11, 2019 By: /Jennifer Smith/
Jennifer Smith

PTO/SB/44 (09-07)
Approved for use through 08/31/2013. OMB 0651-0033
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.
(Also Form PTO-1050)

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 9,647,918

APPLICATION NO.: 15/227,814

ISSUE DATE : May 9, 2017

INVENTOR(S) : Raleigh et al.

It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Page 2 col. 1, line 48:

"No. 12/380,788" should be changed to "No. 12/380,778"

MAILING ADDRESS OF SENDER (Please do not use customer number below):

Headwater Research LLC
1011 Pruitt Place
Tyler, TX 75703

This collection of information is required by 37 CFR 1.322, 1.323, and 1.324. 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 1.0 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: Attention Certificate of Corrections Branch, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

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

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

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

Electronic Acknowledgement Receipt	
EFS ID:	34836587
Application Number:	15227814
International Application Number:	
Confirmation Number:	2668
Title of Invention:	Mobile Device and Method Attributing Media Services Network Usage to Requesting Application
First Named Inventor/Applicant Name:	Gregory G. Raleigh
Customer Number:	106963
Filer:	James E. Harris/Jennifer Smith
Filer Authorized By:	James E. Harris
Attorney Docket Number:	RALEP046C2C1C1
Receipt Date:	11-JAN-2019
Filing Date:	03-AUG-2016
Time Stamp:	17:27:25
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Request for Certificate of Correction	P046C2C1C1_ReqforCoC_RTF.pdf	202577 5a0016009de30f12bd2a5ba0c1aac20cf4884e02	no	4
Warnings:					

Information:	
Total Files Size (in bytes):	202577

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

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.
National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.
New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/227,814	05/09/2017	9647918	RALEP046C2C1C1	2668

106963 7590 04/19/2017

Headwater Research LLC
1011 Pruitt Place
Tyler, TX 75703

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):

Gregory G. Raleigh, Woodside, CA;
Headwater Partners I LLC, Tyler, TX;
Jeffrey Green, Sunnyvale, CA;
James Lavine, Corte Madera, CA;
Vien-Phuong Nguyen, Newark, CA;

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.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	15227814
	Filing Date	2016-08-03
	First Named Inventor	Raleigh
	Art Unit	
	Examiner Name	not yet assigned
	Attorney Docket Number	RALEP046C2C1C1

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.M/

	284	8930238		2015-01-06	Coffman et al.	
	285	8880047		2014-11-04	Konicek et al.	
	286	8739035		2014-05-27	Trethewey, Jim	
Change(s) applied to document. /D.D./ 4/10/2017	287	8571598		10-2013 ~~2013-07-16~~	Valavi, John J.	
	288	8489110		2013-07-16	Frank et al.	
	289	8406736		2013-03-26	Das et al.	
	290	8259692		2012-09-04	Bajko, Gabor	
	291	8233433		2012-07-31	Kalhan, Amit	
	292	8155666		2012-04-10	Alizadeh-Shabdiz, Farshid	
	293	8103285		2012-01-24	Kalhan, Amit	
	294	7936736		2011-05-03	Proctor Jr., James Arthur et al.	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	15227814
	Filing Date	2016-08-03
	First Named Inventor	Raleigh
	Art Unit	
	Examiner Name	not yet assigned
	Attorney Docket Number	RALEP046C2C1C1

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.M/

	218	8353001		2013-01-08	Herrod, Allan	
Change(s) applied to document, /D.D./ 4/7/2017	219	8195093		06-2012 ~~2013-08-05~~	Garrett, Darrin et al.	
	220	8036600		2011-10-11	Garrett, Darrin et al.	
	221	8301513		2012-10-30	Peng, Shih-Ta et al.	
	222	8230061		2012-07-24	Hassan, Amer A. et al.	
	223	8204794		2012-06-19	Peng, Shih-Ta et al.	
	224	8350700		2013-01-08	Fast, Raymond D. et al.	
	225	8204190		2012-06-19	Bang, Jung-Hee et al.	
	226	7865182		2011-01-04	Macaluso, Anthony G.	
	227	7962622		2011-06-14	Friend, John et al.	
	228	7583964		2009-09-01	Wong, Gregory A.	

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.
15/227,814	08/03/2016	Gregory G. Raleigh	RALEP046C2C1C1	2668

106963 7590 03/23/2017

Headwater Research LLC
1011 Pruitt Place
Tyler, TX 75703

EXAMINER	
MOUTAOUAKIL, MOUNIR	

ART UNIT	PAPER NUMBER
2476	

NOTIFICATION DATE	DELIVERY MODE
03/23/2017	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):

patent@headwaterllc.com

Supplemental Notice of Allowability	Application No. 15/227,814	Applicant(s) RALEIGH ET AL.	
	Examiner MOUNIR MOUTAOUAKIL	Art Unit 2476	AIA (First Inventor to File) Status No

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

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

1. ☒ This communication is responsive to *amendment filed on 02-08-2017*.
   ☐ 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 *2 and 4-21(renumbered as 1-19)*. 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 _____
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 _____.

/MOUNIR MOUTAOUAKIL/
Primary Examiner, Art Unit 2476

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15227814	RALEIGH ET AL.
	Examiner	**Art Unit**
	MOUNIR MOUTAOUAKIL	2476

CPC						
Symbol					**Type**	**Version**
H04L		43	/	0876	F	2013-01-01
H04L		47	/	14	I	2013-01-01
H04L		47	/	2441	I	2013-01-01
H04W		28	/	0268	I	2013-01-01
H04L		41	/	0896	I	2013-01-01
G06F		9	/	54	I	2013-01-01
H04L		41	/	5041	I	2013-01-01
			/			
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			/			
			/			

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

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	19	
/MOUNIR MOUTAOUAKIL/ Primary Examiner.Art Unit 2476	03/19/2017	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15227814	RALEIGH ET AL.
	Examiner	Art Unit
	MOUNIR MOUTAOUAKIL	2476

US ORIGINAL CLASSIFICATION		INTERNATIONAL CLASSIFICATION										
CLASS	SUBCLASS	CLAIMED					NON-CLAIMED					
		H	0	4	L	12 / 26 (2006.01.01)						
CROSS REFERENCE(S)												
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)											

NONE (Assistant Examiner)	(Date)	Total Claims Allowed: 19	
/MOUNIR MOUTAOUAKIL/ Primary Examiner.Art Unit 2476 (Primary Examiner)	03/19/2017 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 1

U.S. Patent and Trademark Office

Part of Paper No. 20170319

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15227814	RALEIGH ET AL.
	Examiner	**Art Unit**
	MOUNIR MOUTAOUAKIL	2476

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

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original

NONE (Assistant Examiner)	(Date)	**Total Claims Allowed:** 19	
/MOUNIR MOUTAOUAKIL/ Primary Examiner.Art Unit 2476 (Primary Examiner)	03/19/2017 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 1

U.S. Patent and Trademark Office Part of Paper No. 20170319

PART B - FEE(S) TRANSMITTAL

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

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

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

158963 7590 03/09/2017
Headwater Research LLC
1011 Pratt Place
Tyler, TX 75703

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

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

Ann Taylor (Depositor's name)
/Ann Taylor/ (Signature)
March 9, 2017 (Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/227,814	08/03/2016	Gregory G. Raleigh	RALEP046C2C1C1	2568

TITLE OF INVENTION: Mobile Device and Method Attributing Media Services Network Usage to Requesting Application

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$480	$0	$0	$480	06/07/2017

EXAMINER	ART UNIT	CLASS-SUBCLASS
MOUTAOUAKIL, MOUNIR	2476	370-252000

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

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

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

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

(A) NAME OF ASSIGNEE: Headwater Research LLC
(B) RESIDENCE: (CITY and STATE OR COUNTRY): Tyler, TX

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

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

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**
- ☐ A check is enclosed.
- ☐ Payment by credit card. Form PTO-2038 is attached.
- ☑ The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number 505876 (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)
- ☐ Applicant certifying micro entity status. See 37 CFR 1.29
- ☐ 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: /James E. Harris/ Date: March 9, 2017
Typed or printed name: James E. Harris Registration No. 40013

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

Electronic Patent Application Fee Transmittal

Application Number:	15227814
Filing Date:	03-Aug-2016
Title of Invention:	Mobile Device and Method Attributing Media Services Network Usage to Requesting Application
First Named Inventor/Applicant Name:	Gregory G. Raleigh
Filer:	James E. Harris/Ann Taylor
Attorney Docket Number:	RALEP046C2C1C1

Filed as Small Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
UTILITY APPL ISSUE FEE	2501	1	480	480

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

Electronic Acknowledgement Receipt	
EFS ID:	28587608
Application Number:	15227814
International Application Number:	
Confirmation Number:	2668
Title of Invention:	Mobile Device and Method Attributing Media Services Network Usage to Requesting Application
First Named Inventor/Applicant Name:	Gregory G. Raleigh
Customer Number:	106963
Filer:	James E. Harris/Ann Taylor
Filer Authorized By:	James E. Harris
Attorney Docket Number:	RALEP046C2C1C1
Receipt Date:	09-MAR-2017
Filing Date:	03-AUG-2016
Time Stamp:	17:33:26
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	$480
RAM confirmation Number	031017INTEFSW00004436505876
Deposit Account	
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	P046C2C1C1_IssueFee.pdf	2584405 cd01969a3386ebc5cafc4689f77fb6b2f1ab16b2	no	1
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	30875 f7bdf6e22a601d429a7373d29069e50aca7fc35a	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	2615280		

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

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

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

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

UNITED STATES PATENT AND TRADEMARK OFFICE

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

NOTICE OF ALLOWANCE AND FEE(S) DUE

106963 7590 03/07/2017

Headwater Research LLC
1011 Pruitt Place
Tyler, TX 75703

EXAMINER
MOUTAOUAKIL, MOUNIR

ART UNIT	PAPER NUMBER
2476	

DATE MAILED: 03/07/2017

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/227,814	08/03/2016	Gregory G. Raleigh	RALEP046C2C1C1	2668

TITLE OF INVENTION: Mobile Device and Method Attributing Media Services Network Usage to Requesting Application

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$480	$0	$0	$480	06/07/2017

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

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

HOW TO REPLY TO THIS NOTICE:

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

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

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

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

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

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

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

PART B - FEE(S) TRANSMITTAL

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

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

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

106963 7590 03/07/2017
Headwater Research LLC
1011 Pruitt Place
Tyler, TX 75703

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

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

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/227,814	08/03/2016	Gregory G. Raleigh	RALEP046C2C1C1	2668

TITLE OF INVENTION: Mobile Device and Method Attributing Media Services Network Usage to Requesting Application

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$480	$0	$0	$480	06/07/2017

EXAMINER	ART UNIT	CLASS-SUBCLASS
MOUTAOUAKIL, MOUNIR	2476	370-252000

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

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

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

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

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

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

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

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

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

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

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

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

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/227,814	08/03/2016	Gregory G. Raleigh	RALEP046C2C1C1	2668

106963 7590 03/07/2017

Headwater Research LLC
1011 Pruitt Place
Tyler, TX 75703

EXAMINER	
MOUTAOUAKIL, MOUNIR	
ART UNIT	PAPER NUMBER
2476	

DATE MAILED: 03/07/2017

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

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

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

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

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

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

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

Privacy Act Statement

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

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

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

Notice of Allowability	Application No. 15/227,814	Applicant(s) RALEIGH ET AL.	
	Examiner MOUNIR MOUTAOUAKIL	Art Unit 2476	AIA (First Inventor to File) Status No

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

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

1. ☒ This communication is responsive to *amendment filed on 02-08-2017*.
   ☐ 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 *1,2 and 4-21(renumbered as 1-20)*. 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 _____
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 _____.

/MOUNIR MOUTAOUAKIL/
Primary Examiner, Art Unit 2476

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	15227814
Filing Date	2016-08-03
First Named Inventor	Raleigh
Art Unit	
Examiner Name	not yet assigned
Attorney Docket Number	RALEP046C2C1C1

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.M/

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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
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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	20070259656		2007-11-08	Jeong, Jong Woo	
	2	20080263348		2008-10-23	Zaltsman, Etai et al.	
	3	20080313315		2008-12-18	Karaoguz, Jeyhan et al.	
	4	20090282127		2009-11-12	LeBlanc, Michael et al.	
	5	20100167696		2010-07-01	Smith, Christopher David et al.	

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.M/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	15227814
	Filing Date	2016-08-03
	First Named Inventor	Raleigh
	Art Unit	
	Examiner Name	not yet assigned
	Attorney Docket Number	RALEP046C2C1C1

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.M/

	6	20030188006		2003-10-02	Bard, Steven R.	
	7	20060160536		2006-07-20	Chou, Joey	
	8	20060168128		2006-07-27	Sistla, Amber et al.	
	9	20040203833		2004-10-14	Rathunde, Dale F. et al.	
	10	20050186948		2005-08-25	Gallagher, Michael D. et al.	
	11	20070147317		2007-06-28	Smith, Brian K. et al.	
	12	20080270212		2008-10-30	Blight, Jeffrey et al.	
	13	20080056273		2008-03-06	Pelletier, Ghyslain et al.	
	14	20110110309		2011-05-12	Bennett, James D.	
	15	20100030890		2010-02-04	Dutta, Satadip et al.	
	16	20110238545		2011-09-29	Fanaian, Nabil Ruh et al.	

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.M/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	15227814
	Filing Date	2016-08-03
	First Named Inventor	Raleigh
	Art Unit	
	Examiner Name	not yet assigned
	Attorney Docket Number	RALEP046C2C1C1

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.M/

	17	20080025230		2008-01-31	Patel, Alpesh et al.	
	18	20040170191		2004-09-02	Guo, Zihua et al.	
	19	20020188732		2002-12-12	Buckman, Charles R. et al.	
	20	20080034419		2008-02-07	Mullick, Amarnath et al.	
	21	20080010379		2008-01-10	Zhao, Hang	
	22	20080139210		2008-06-12	Gisby, Doug et al.	
	23	20040243992		2004-12-02	Gustafson, James P. et al.	
	24	20070226775		2007-09-27	Andreasen, Flemming Stig et al.	
	25	20100235329		2010-09-16	Koren, David et al	
	26	20090254857		2009-10-08	Romine, Christopher et al.	
	27	20120101952		2012-04-26	Raleigh, Gregory G. et al.	

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.M/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	15227814
	Filing Date	2016-08-03
	First Named Inventor	Raleigh
	Art Unit	
	Examiner Name	not yet assigned
	Attorney Docket Number	RALEP046C2C1C1

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.M/

	28	20080166993		2008-07-10	Gautier et al.	
	29	20040137890		2004-07-15	Kalke, Catherine	
	30	20070143824		2007-06-21	Shahbazi, Majid	
	31	20070266422		2007-11-15	Germano et al.	
	32	20090044185		2009-02-12	Krivopaltsev, Eugene	
	33	20040039792		2004-02-26	Nakanishi, Tomoaki	
	34	20050075115		2005-04-07	Corneille et al.	
	35	20050239447		2005-10-27	Holzman et al.	
	36	20070213054		2007-09-13	Han, Seung-Wook	
	37	20080032715		2008-02-07	Jia et al.	
	38	20090163173		2009-06-25	Williams, Timothy D.	

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.M/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
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	Filing Date	2016-08-03
	First Named Inventor	Raleigh
	Art Unit	
	Examiner Name	not yet assigned
	Attorney Docket Number	RALEP046C2C1C1

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.M/

	39	20100075666		2010-03-25	Garner, Neil Robert	
	40	20080293395		2008-11-27	Matthews, Ajit et al.	
	41	20050245241		2005-11-03	Durand, Terry et al.	
	42	20080125079		2008-05-29	O'Neil, Douglas et al.	
	43	20050135264		2005-06-23	Popoff, Jeff et al.	
	44	20070165630		2007-07-19	Rasanen, Jorma	
	45	20100287599		2010-11-11	HE, Xianhui	
	46	20070060200		2007-03-15	Boris et al.	
	47	20060030306		2006-02-09	Kuhn, Brian Gerald	
	48	20060035631		2006-02-16	White et al.	
	49	20060206709		2006-09-14	Labrou et al.	

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	15227814
	Filing Date	2016-08-03
	First Named Inventor	Raleigh
	Art Unit	
	Examiner Name	not yet assigned
	Attorney Docket Number	RALEP046C2C1C1

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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	Dixon et al., "Triple Play Digital Services: Comcast and Verizon (Digital Phone, Television, and Internet), August 2007	
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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).

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See attached certification statement.

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

☒ None

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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	/James E. Harris/	Date (YYYY-MM-DD)	2016-08-12
Name/Print	James E. Harris	Registration Number	40013

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	15227814	RALEIGH ET AL.
	Examiner	Art Unit
	MOUNIR MOUTAOUAKIL	2476

CPC- SEARCHED		
Symbol	Date	Examiner

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner

SEARCH NOTES		
Search Notes	Date	Examiner
Inventorship Search	10/20/2016	MM
IDS	10/20/2016	MM
East	10/20/2016	MM
NPL	10/20/2016	MM
EPO	10/20/2016	MM
WIPO	10/20/2016	MM
Double patenting search	10/20/2016	MM
family search	10/20/2016	MM

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner
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H04L		43	/	0876	F	2013-01-01
H04L		47	/	14	I	2013-01-01
H04L		47	/	2441	I	2013-01-01
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NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	20	
/MOUNIR MOUTAOUAKIL/ Primary Examiner.Art Unit 2476	02/26/2017	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

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US ORIGINAL CLASSIFICATION		INTERNATIONAL CLASSIFICATION										
CLASS	SUBCLASS	CLAIMED					NON-CLAIMED					
		H	0	4	L	12 / 26 (2006.01.01)						
CROSS REFERENCE(S)												
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)											

NONE (Assistant Examiner)	(Date)	Total Claims Allowed: 20	
/MOUNIR MOUTAOUAKIL/ Primary Examiner.Art Unit 2476 (Primary Examiner)	02/26/2017 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 1

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Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original

NONE (Assistant Examiner)	(Date)	**Total Claims Allowed:** 20	
/MOUNIR MOUTAOUAKIL/ Primary Examiner.Art Unit 2476 (Primary Examiner)	02/26/2017 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 1

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EAST Search History

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Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	17149	(application adj programming adj interface).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/02/26 21:45
L2	1497	(application adj programming adj interface with first with second).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/02/26 21:46
L3	23	(application adj programming adj interface with first with second with stack).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/02/26 21:47

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L4	7227	(application adj programming adj interface).clm.	USPAT	OR	ON	2017/02/26 21:47
L5	793	(application adj programming adj interface with first with second).clm.	USPAT	OR	ON	2017/02/26 21:47
L6	14	(application adj programming adj interface with first with second with stack).clm.	USPAT	OR	ON	2017/02/26 21:47

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Examiner Name	Moutaouakil, Mounir
Attorney Docket Number	RALEP046C2C1C1

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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	6115823	A	2000-09-05	Velasco et al.	
	2	7203721	B1	2007-04-10	Ben-Efraim et al.	
	3	7219123	B1	2007-05-15	Fiechter et al.	
	4	7505795	B1	2009-03-17	Lim et al.	
	5	9326173	B2	2016-04-26	Luft, Achim	

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	1	20090065571	A1	2009-03-12	Jain, Deepak	

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	15227814
	Filing Date	2016-08-03
	First Named Inventor	Gregory G. Raleigh
	Art Unit	2476
	Examiner Name	Moutaouakil, Mounir
	Attorney Docket Number	RALEP046C2C1C1

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Examiner Signature	/MOUNIR MOUTAOUAKIL/	Date Considered	02/26/2017

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OR

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

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.

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Signature	/James E. Harris/	Date (YYYY-MM-DD)	2017-02-08
Name/Print	James E. Harris	Registration Number	40013

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(Not for submission under 37 CFR 1.99)

Application Number	15227814
Filing Date	2016-08-03
First Named Inventor	Gregory G. Raleigh
Art Unit	2476
Examiner Name	Moutaouakil, Mounir
Attorney Docket Number	RALEP046C2C1C1

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	1	5617539	A	1997-04-01	Ludwig et al.	
	2	6401113	B2	2002-06-04	Lazaridis et al.	
	3	6601040	B1	2003-07-29	Kolls, H. Brock	
	4	6636721	B2	2003-10-21	Threadgill et al.	
	5	6879825	B1	2005-04-12	Daly, Brian Kevin	
	6	6959393	B2	2005-10-25	Hollis et al.	
	7	7151764	B1	2006-12-19	Heinonen et al.	
	8	7177919	B1	2007-02-13	Truong et al.	

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	9	7191248	B2	2007-03-13	Chattopadhyay et al.	
	10	7369856	B2	2008-05-06	Ovadia, Shlomo	
	11	7409569	B2	2008-08-05	Illowsky et al.	
	12	7428750	B1	2008-09-23	Dunn et al.	
	13	7486658	B2	2009-02-03	Kumar, Rajneesh	
	14	7562213	B1	2009-07-14	Timms, Natalie	
	15	7599714	B2	2009-10-06	Kuzminskiy, Alexandr	
	16	7602746	B2	2009-10-13	Calhoun et al.	
	17	7610047	B2	2009-10-27	Hicks III et al.	
	18	7643411	B2	2010-01-05	Andreasen et al.	
	19	7660419	B1	2010-02-09	Ho, Jin-Meng	

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	20	7719966	B2	2010-05-18	Luft et al.	
	21	7979069	B2	2011-07-12	Hupp et al.	
	22	8036387	B2	2011-10-11	Kudelski et al.	
	23	8044792	B2	2011-10-25	Orr et al.	
	24	8125897	B2	2012-02-28	Ray et al.	
	25	8132256	B2	2012-03-06	Bari, Farooq	
	26	8140690	B2	2012-03-20	Ly et al.	
	27	8145194	B2	2012-03-27	Yoshikawa et al.	
	28	8194581	B1	2012-06-05	Schroeder et al.	
	29	8307095	B2	2012-11-06	Clark et al.	
	30	8380247	B2	2013-02-19	Engstrom	

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	31	8412798	B1	2013-04-02	Wang, Frank C.	
	32	8418168	B2	2013-04-09	Tyhurst et al.	
	33	8494559	B1	2013-07-23	Malmi	
	34	8521775	B1	2013-08-27	Poh et al.	
	35	8531954	B2	2013-09-10	McNaughton et al.	
	36	8543814	B2	2013-09-24	Laitinen et al.	
	37	8639215	B2	2014-01-28	McGregor et al.	
	38	8700729	B2	2014-04-15	Dua, Robin	
	39	8719397	B2	2014-05-06	Levi et al.	
	40	8787249	B2	2014-07-22	Giaretta et al.	
	41	8819253	B2	2014-08-26	Simeloff et al.	

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	42	8838686	B2	2014-09-16	Getchius, Jeffery M.	
	43	8838752	B2	2014-09-16	Lor et al.	
	44	8855620	B2	2014-10-07	Sievers et al.	
	45	8862751	B2	2014-10-14	Faccin et al.	
	46	8943551	B2	2015-01-27	Ganapathy et al.	
	47	9361451	B2	2016-06-07	Oberheide et al.	
	48	9369959	B2	2016-06-14	Ruutu et al.	
	49	9413546	B2	2016-08-09	Meier et al.	

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	1	20020138599	A1	2002-09-26	Dilman et al.	

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	2	20030184793	A1	2003-10-02	Pineau, Richard A.	
	3	20040054779	A1	2004-03-18	Takeshima et al.	
	4	20040267872	A1	2004-12-30	Serdy et al.	
	5	20050091505	A1	2005-04-28	Riley et al.	
	6	20050163320	A1	2005-07-28	Brown et al.	
	7	20060114821	A1	2006-06-01	Willey et al.	
	8	20060182137	A1	2006-08-17	Zhou et al.	
	9	20070130283	A1	2007-06-07	Klein et al.	
	10	20070201502	A1	2007-08-30	Abramson, Nathan	
	11	20080168275	A1	2008-07-10	DeAtley et al.	
	12	20080178300	A1	2008-07-24	Brown et al.	

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	13	20080320497	A1	2008-12-25	Tarkoma et al.	
	14	20090047989	A1	2009-02-19	Harmon et al.	
	15	20090049156	A1	2009-02-19	Aronsson et al.	
	16	20090320110	A1	2009-12-24	NICOLSON et al.	
	17	20100190469	A1	2010-07-29	Vanderveen et al.	

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	1	1289326	EP	A1	2003-03-05	Motorola, Inc.		
	2	1545114	EP	A1	2005-06-22	Alcatel		
	3	1887732	EP	A1	2008-02-13	Huawei Technologies Co., Ltd.		
	4	2007065	EP	A1	2008-12-24	Huawei Technologies Co., Ltd.		

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	5	2006041989	JP		2006-02-09	Fujitsu Ltd.		
	6	2002067616	WO	A1	2002-08-29	Sonera Oyj		
	7	2003017063	WO	A2	2003-02-27	Apogee Networks		
	8	2003017065	WO	A2	2003-02-27	Apogee Networks		
	9	2007120310	WO		2007-10-25	Qualcomm Inc.		
	10	2011002450	WO	A1	2011-01-06	Alcatel-Lucent USA Inc.		

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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
15/227,814	08/03/2016	2476	1140	RALEP046C2C1C1	15	2

CONFIRMATION NO. 2668

106963
Headwater Research LLC
1011 Pruitt Place
Tyler, TX 75703

CORRECTED FILING RECEIPT



Date Mailed: 03/06/2017

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

Inventor(s)

Gregory G. Raleigh, Woodside, CA;
Jeffrey Green, Sunnyvale, CA;
James Lavine, Corte Madera, CA;
Vien-Phuong Nguyen, Newark, CA;

Applicant(s)

Headwater Partners I LLC, Tyler, TX;

Power of Attorney: The patent practitioners associated with Customer Number 106963

Domestic Priority data as claimed by applicant

This application is a CON of 14/339,110 07/23/2014
which is a CON of 14/338,807 07/23/2014 PAT 9094311
which is a CON of 14/098,527 12/05/2013 PAT 9270559
which is a CON of 13/374,959 01/24/2012 PAT 8606911
which is a CIP of 12/695,019 01/27/2010 PAT 8275830
and is a CIP of 12/695,020 01/27/2010 PAT 8406748
and is a CIP of 12/694,445 01/27/2010 PAT 8391834
and is a CIP of 12/694,451 01/27/2010 PAT 8548428
and is a CIP of 12/694,455 01/27/2010 PAT 8402111
and is a CIP of 12/695,980 01/28/2010 PAT 8340634
and is a CIP of 13/229,580 09/09/2011 PAT 8626115
and is a CIP of 13/237,827 09/20/2011 PAT 8832777
and is a CIP of 13/239,321 09/21/2011 PAT 8898293
and is a CIP of 13/248,028 09/28/2011 PAT 8924469
and is a CIP of 13/247,998 09/28/2011 PAT 8725123
and is a CIP of 13/248,025 09/28/2011 PAT 8924543

and is a CIP of 13/253,013 10/04/2011 PAT 8745191
and is a CIP of 13/309,556 12/01/2011 PAT 8893009
and is a CIP of 13/309,463 12/01/2011 PAT 8793758
and is a CIP of 13/134,028 05/25/2011 PAT 8589541
and claims benefit of 61/435,564 01/24/2011
and claims benefit of 61/472,606 04/06/2011
and claims benefit of 61/550,906 10/24/2011
and claims benefit of 61/589,830 01/23/2012
and said 12/695,019 01/27/2010
claims benefit of 61/264,126 11/24/2009
and claims benefit of 61/270,353 07/06/2009
and said 12/695,020 01/27/2010
claims benefit of 61/275,208 08/25/2009
and claims benefit of 61/237,753 08/28/2009
and said 12/694,455 01/27/2010
claims benefit of 61/264,120 11/24/2009
and said 13/134,028 05/25/2011
claims benefit of 61/348,022 05/25/2010
and claims benefit of 61/381,159 09/09/2010
and claims benefit of 61/381,162 09/09/2010
and claims benefit of 61/384,456 09/20/2010
and claims benefit of 61/389,547 10/04/2010
and claims benefit of 61/385,020 09/21/2010
and claims benefit of 61/387,243 09/28/2010
and claims benefit of 61/387,247 09/28/2010
and claims benefit of 61/407,358 10/27/2010
and claims benefit of 61/418,507 12/01/2010
and claims benefit of 61/418,509 12/01/2010
and claims benefit of 61/420,727 12/07/2010
and claims benefit of 61/422,565 12/13/2010
and claims benefit of 61/422,572 12/13/2010
and claims benefit of 61/422,574 12/13/2010
and is a CIP of 13/134,005 05/25/2011 PAT 8635335
and is a CIP of 12/695,021 01/27/2010 PAT 8346225
which claims benefit of 61/252,151 10/15/2009
and claims benefit of 61/252,153 10/15/2009
and is a CIP of 12/380,780 03/02/2009 PAT 8839388
and said 13/134,005 05/25/2011
is a CIP of 12/380,780 03/02/2009 PAT 8839388
and is a CIP of 12/380,778 03/02/2009 PAT 8321526
and said 12/380,780 03/02/2009
claims benefit of 61/206,354 01/28/2009
and claims benefit of 61/206,944 02/04/2009
and claims benefit of 61/207,393 02/10/2009
and claims benefit of 61/207,739 02/13/2009
and said 12/380,778 03/02/2009
claims benefit of 61/206,354 01/28/2009
and claims benefit of 61/206,944 02/04/2009
and claims benefit of 61/207,393 02/10/2009
and claims benefit of 61/207,739 02/13/2009

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: Yes

Permission to Access Search Results: Yes

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: 08/16/2016

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 15/227,814**

Projected Publication Date: Not Applicable

Non-Publication Request: No

Early Publication Request: No

**** SMALL ENTITY ****

Title

Mobile Device and Method Attributing Media Services Network Usage to Requesting##Application

Preliminary Class

370

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.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	Raleigh et al.	Examiner:	Moutaouakil, Mounir
Serial No.:	15/227,814	Art Unit:	2476
Filed:	August 3, 2016	Conf. No.:	2668
Title:	Mobile Device and Method Attributing Media Services Network Usage to Requesting Application		

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

REQUEST FOR A CORRECTED FILING RECEIPT

Applicant respectfully requests a corrected filing receipt for the above-captioned application. Submitted with this request are:

(1) The application data sheet (ADS) filed on August 3, 2016;

(2) A copy of the Filing Receipt mailed August 18, 2016 with the requested changes noted thereon.

Applicant respectfully notes that this request is not a request to add or correct a benefit claim. Applicant is simply seeking a filing receipt that reflects the ADS that was filed on August 3, 2016.

CONCLUSION

The Commissioner is authorized to charge any fee deficiency or credit any overpayment to Deposit Account 50-5876.

Respectfully submitted,

Date: March 1, 2017 By: /James E. Harris/

James E. Harris
Reg. No. 40,013
Headwater Research LLC
1011 Pruitt Place
Tyler, TX 75703
(903) 201-6212

CERTIFICATE OF ELECTRONIC TRANSMISSION

I hereby certify that this paper (along with any paper referred to as being attached or enclosed) is being filed electronically via EFS-Web addressed to the Commissioner for Patents on:

Date: March 1, 2017 By: /Ann Taylor/
Ann Taylor

PTO/AIA/14 (11-15)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	RALEP046C2C1C1
	Application Number	
Title of Invention	Flow Tagging for Service Policy Implementation	

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

Secrecy Order 37 CFR 5.2:

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

Inventor Information:

Inventor 1 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Gregory	G.	Raleigh	

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

City	Woodside	State/Province	CA	Country of Residence	US

Mailing Address of Inventor:

Address 1	1011 Pruitt Place		
Address 2			
City	Tyler	State/Province	TX
Postal Code	75703	Country	US

Inventor 2 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Jeffrey		Green	

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

City	Sunnyvale	State/Province	CA	Country of Residence	US

Mailing Address of Inventor:

Address 1	1011 Pruitt Place		
Address 2			
City	Tyler	State/Province	TX
Postal Code	75703	Country	US

Inventor 3 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	James		Lavine	

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

PTO/AIA/14 (11-15)
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	RALEP046C2C1C1
	Application Number	
Title of Invention	Flow Tagging for Service Policy Implementation	

City	Corte Madera	State/Province	CA	Country of Residence	US

Mailing Address of Inventor:

Address 1	1011 Pruitt Place		
Address 2			
City	Tyler	State/Province	TX
Postal Code	75703	Country	US

Inventor 4 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Vien-Phuong		Nguyen	

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

City	Newark	State/Province	CA	Country of Residence	US

Mailing Address of Inventor:

Address 1	1011 Pruitt Place		
Address 2			
City	Tyler	State/Province	TX
Postal Code	75703	Country	US

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

Correspondence Information:

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

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

Customer Number	106963		
Email Address	patent@headwaterllc.com	Add Email	Remove Email

Application Information:

Title of the Invention	Flow Tagging for Service Policy Implementation		
Attorney Docket Number	RALEP046C2C1C1	Small Entity Status Claimed	☒
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	40	Suggested Figure for Publication (if any)	

PTO/AIA/14 (11-15)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	RALEP046C2C1C1
	Application Number	
Title of Invention	Flow Tagging for Service Policy Implementation	

Filing By Reference:

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

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

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

Publication Information:

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

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

Representative Information:

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

Please Select One:	● Customer Number	US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	106963		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.
When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
thisapplication	Continuation of	14339110	2014-07-23

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	RALEP046C2C1C1
	Application Number	
Title of Invention	Flow Tagging for Service Policy Implementation	

Prior Application Status	Patented				Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
14339110	Continuation of	14338807	2014-07-23	9094311	2015-07-28
Prior Application Status	Patented				Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
14338807	Continuation of	14098527	2013-12-05	9270559	2016-02-23
Prior Application Status	Patented				Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
14098527	Continuation of	13374959	2012-01-24	8606911	2013-12-10
Prior Application Status	Patented				Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
13374959	Continuation in part of	12695019	2010-01-27	8275830	2012-09-25
Prior Application Status	Patented				Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
13374959	Continuation in part of	12695020	2010-01-27	8406748	2013-03-26
Prior Application Status	Patented				Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
13374959	Continuation in part of	12694445	2010-01-27	8391834	2013-03-05
Prior Application Status	Patented				Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
13374959	Continuation in part of	12694451	2010-01-27	8548428	2013-10-01
Prior Application Status	Patented				Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
13374959	Continuation in part of	12694455	2010-01-27	8402111	2013-03-19
Prior Application Status	Patented				Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
13374959	Continuation in part of	12695980	2010-01-28	8340634	2012-12-25
Prior Application Status	Patented				Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
13374959	Continuation in part of	13229580	2011-09-09	8626115	2014-01-07

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	RALEP046C2C1C1
	Application Number	
Title of Invention	Flow Tagging for Service Policy Implementation	

Prior Application Status	Patented				Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
13374959	Continuation in part of	13237827	2011-09-20	8832777	2014-09-09
Prior Application Status	Patented				Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
13374959	Continuation in part of	13239321	2011-09-21	8898293	2014-11-25
Prior Application Status	Patented				Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
13374959	Continuation in part of	13248028	2011-09-28	8924469	2014-12-30
Prior Application Status	Patented				Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
13374959	Continuation in part of	13247998	2011-09-28	8725123	2014-05-13
Prior Application Status	Patented				Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
13374959	Continuation in part of	13248025	2011-09-28	8924543	2014-12-30
Prior Application Status	Patented				Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
13374959	Continuation in part of	13253013	2011-10-04	8745191	2014-06-03
Prior Application Status	Patented				Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
13374959	Continuation in part of	13309556	2011-12-01	8893009	2014-11-18
Prior Application Status	Patented				Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
13374959	Continuation in part of	13309463	2011-12-01	8793758	2014-07-29
Prior Application Status	Patented				Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
13374959	Continuation in part of	13134028	2011-05-25	8589541	2013-11-19
Prior Application Status	Expired				Remove

Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
13374959	Claims benefit of provisional	61435564	2011-01-24

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	RALEP046C2C1C1
	Application Number	
Title of Invention	Flow Tagging for Service Policy Implementation	

Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
13374959	Claims benefit of provisional	61472606	2011-04-06
Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
13374959	Claims benefit of provisional	61550906	2011-10-24
Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
13374959	Claims benefit of provisional	61589830	2012-01-23
Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
12695019	Claims benefit of provisional	61264126	2009-11-24
Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
12695019	Claims benefit of provisional	61270353	2009-07-06
Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
12695020	Claims benefit of provisional	61275208	2009-08-25
Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
12695020	Claims benefit of provisional	61237753	2009-08-28
Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
12694455	Claims benefit of provisional	61264120	2009-11-24
Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
13134028	Claims benefit of provisional	61348022	2010-05-25

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	RALEP046C2C1C1
	Application Number	
Title of Invention	Flow Tagging for Service Policy Implementation	

Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
13134028	Claims benefit of provisional	61381159	2010-09-09
Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
13134028	Claims benefit of provisional	61381162	2010-09-09
Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
13134028	Claims benefit of provisional	61384456	2010-09-20
Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
13134028	Claims benefit of provisional	61389547	2010-10-04
Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
13134028	Claims benefit of provisional	61385020	2010-09-21
Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
13134028	Claims benefit of provisional	61387243	2010-09-28
Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
13134028	Claims benefit of provisional	61387247	2010-09-28
Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
13134028	Claims benefit of provisional	61407358	2010-10-27
Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
13134028	Claims benefit of provisional	61418507	2010-12-01

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	RALEP046C2C1C1
	Application Number	
Title of Invention	Flow Tagging for Service Policy Implementation	

Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
13134028	Claims benefit of provisional	61418509	2010-12-01
Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
13134028	Claims benefit of provisional	61420727	2010-12-07
Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
13134028	Claims benefit of provisional	61422565	2010-12-13
Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
13134028	Claims benefit of provisional	61422572	2010-12-13
Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
13134028	Claims benefit of provisional	61422574	2010-12-13
Prior Application Status	Patented		Remove

Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
13134028	Continuation in part of	13134005	2011-05-25	8635335	2014-01-21

Prior Application Status	Patented		Remove

Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
13134028	Continuation in part of	12695021	2010-01-27	8346225	2013-01-01

Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
12695021	Claims benefit of provisional	61252151	2009-10-15
Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
12695021	Claims benefit of provisional	61252153	2009-10-15

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	RALEP046C2C1C1
	Application Number	
Title of Invention	Flow Tagging for Service Policy Implementation	

Prior Application Status	Patented				Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
12695021	Continuation in part of	12380780	2009-03-02	8839388	2014-09-16
Prior Application Status	Patented				Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
13134005	Continuation in part of	12380780	2009-03-02	8839388	2014-09-16
Prior Application Status	Patented				Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
13134005	Continuation in part of	12380778	2009-03-02	8321526	2012-11-27
Prior Application Status	Expired				Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
12380780	Claims benefit of provisional	61206354	2009-01-28		
Prior Application Status	Expired				Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
12380780	Claims benefit of provisional	61206944	2009-02-04		
Prior Application Status	Expired				Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
12380780	Claims benefit of provisional	61207393	2009-02-10		
Prior Application Status	Expired				Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
12380780	Claims benefit of provisional	61207739	2009-02-13		
Prior Application Status	Expired				Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
12380778	Claims benefit of provisional	61206354	2009-01-28		
Prior Application Status	Expired				Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
12380778	Claims benefit of provisional	61206944	2009-02-04		

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	RALEP046C2C1C1
	Application Number	
Title of Invention	Flow Tagging for Service Policy Implementation	

Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
12380778	Claims benefit of provisional	61207393	2009-02-10
Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
12380778	Claims benefit of provisional	61207739	2009-02-13
Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button.			Add

Foreign Priority Information:

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

			Remove
Application Number	Country[i]	Filing Date (YYYY-MM-DD)	Access Code[i] (if applicable)
Additional Foreign Priority Data may be generated within this form by selecting the **Add** button.			Add

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

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

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	RALEP046C2C1C1
	Application Number	
Title of Invention	Flow Tagging for Service Policy Implementation	

Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

NOTE: This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

A. Priority Document Exchange (PDX) - Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

B. Search Results from U.S. Application to EPO - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)

☐ A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

☐ B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

NOTE: Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

PTO/AIA/14 (11-15)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	RALEP046C2C1C1
	Application Number	
Title of Invention	Flow Tagging for Service Policy Implementation	

Applicant Information:

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

Applicant 1 Remove

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

Clear

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

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

Name of the Deceased or Legally Incapacitated Inventor:

If the Applicant is an Organization check here. ☒

Organization Name	Headwater Partners I LLC		
Mailing Address Information For Applicant:			
Address 1	1011 Pruitt Place		
Address 2			
City	Tyler	**State/Province**	TX
Country	US	Postal Code	75703
Phone Number	903-201-6212	Fax Number	
Email Address	patent@headwaterllc.com		

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

Assignee Information including Non-Applicant Assignee Information:

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

PTO/AIA/14 (11-15)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	RALEP046C2C1C1
	Application Number	
Title of Invention	Flow Tagging for Service Policy Implementation	

Assignee 1

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

Remove

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

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

Mailing Address Information For Assignee including Non-Applicant Assignee:

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

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

Signature:

Remove

NOTE: This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). **However, if this Application Data Sheet is submitted with the INITIAL filing of the application and either box A or B is not checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).**

This Application Data Sheet **must** be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, **all** joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of **all** joint inventor-applicants.

See 37 CFR 1.4(d) for the manner of making signatures and certifications.

Signature	/James E. Harris/			Date (YYYY-MM-DD)	2016-08-03
First Name	James E.	Last Name	Harris	Registration Number	40013

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

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	RALEP046C2C1C1
	Application Number	
Title of Invention	Flow Tagging for Service Policy Implementation	

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

UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
15/227,814	08/03/2016	2414	930	RALEP046C2C1C1	15	2

CONFIRMATION NO. 2668

106963
Headwater Partners I LLC
1011 Pruitt Place
Tyler, TX 75703

FILING RECEIPT



Date Mailed: 08/18/2016

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

Inventor(s)

Gregory G. Raleigh, Woodside, CA;
Jeffrey Green, Sunnyvale, CA;
James Lavine, Corte Madera, CA;
Vien-Phuong Nguyen, Newark, CA;

Applicant(s)

Headwater Partners I LLC, Tyler, TX;

Power of Attorney: The patent practitioners associated with Customer Number 106963

Domestic Priority data as claimed by applicant

This application is a CON of 14/339,110 07/23/2014
which is a CON of 14/338,807 07/23/2014 PAT 9094311
which is a CON of 14/098,527 12/05/2013 PAT 9270559
which is a CON of 13/374,959 01/24/2012 PAT 8606911
which is a CIP of 12/695,019 01/27/2010 PAT 8275830
and is a CIP of 12/695,020 01/27/2010 PAT 8406748
and is a CIP of 12/694,445 01/27/2010 PAT 8391834
and is a CIP of 12/694,451 01/27/2010 PAT 8548428
and is a CIP of 12/694,455 01/27/2010 PAT 8402111
and is a CIP of 12/695,980 01/28/2010 PAT 8340634
and is a CIP of 13/229,580 09/09/2011 PAT 8626115
and is a CIP of 13/237,827 09/20/2011 PAT 8832777
and is a CIP of 13/239,321 09/21/2011 PAT 8898293
and is a CIP of 13/248,028 09/28/2011 PAT 8924469
and is a CIP of 13/247,998 09/28/2011 PAT 8725123
and is a CIP of 13/248,025 09/28/2011 PAT 8924543

and is a CIP of 13/253,013 10/04/2011 PAT 8745191
and is a CIP of 13/309,556 12/01/2011 PAT 8893009
and is a CIP of 13/309,463 12/01/2011 PAT 8793758
and is a CIP of 13/134,028 05/25/2011 PAT 8589541
and claims benefit of 61/435,564 01/24/2011
and claims benefit of 61/472,606 04/06/2011
and claims benefit of 61/550,906 10/24/2011
and claims benefit of 61/589,830 01/23/2012
and said 12/695,019 01/27/2010
claims benefit of 61/264,126 11/24/2009
and claims benefit of 61/270,353 07/06/2009
and said 12/695,020 01/27/2010
claims benefit of 61/275,208 08/25/2009
and claims benefit of 61/237,753 08/28/2009
and said 12/694,455 01/27/2010
claims benefit of 61/264,120 11/24/2009
and said 13/248,028 09/28/2011 and said 13/134,028 05/25/2011
claims benefit of 61/348,022 05/25/2010
and said 13/134,028 05/25/2011
claims benefit of 61/381,159 09/09/2010
and claims benefit of 61/381,162 09/09/2010
and claims benefit of 61/384,456 09/20/2010
and claims benefit of 61/389,547 10/04/2010
and claims benefit of 61/385,020 09/21/2010
and claims benefit of 61/387,243 09/28/2010
and claims benefit of 61/387,247 09/28/2010
and claims benefit of 61/407,358 10/27/2010
and claims benefit of 61/418,507 12/01/2010
and claims benefit of 61/418,509 12/01/2010
and claims benefit of 61/420,727 12/07/2010
and claims benefit of 61/422,565 12/13/2010
and claims benefit of 61/422,572 12/13/2010
and claims benefit of 61/422,574 12/13/2010
and is a CIP of 13/134,005 05/25/2011 PAT 8635335
and is a CIP of 12/695,021 01/27/2010 PAT 8346225
which claims benefit of 61/252,151 10/15/2009
and claims benefit of 61/252,153 10/15/2009
and is a CIP of 12/380,780 03/02/2009 PAT 8839388
and said 13/134,005 05/25/2011
is a CIP of 12/380,780 03/02/2009 PAT 8839388
and said 13/134,005
is a CIP of 12/380,778 03/02/2009 PAT 8321526
and said 12/380,780
claims benefit of 61/206,354 01/28/2009
and claims benefit of 61/206,944 02/04/2009
and claims benefit of 61/207,393 02/10/2009
and claims benefit of 61/207,739 02/13/2009
and said 12/380,778 03/02/2009
claims benefit of 61/206,354 01/28/2009
and claims benefit of 61/206,944 02/04/2009
and claims benefit of 61/207,393 02/10/2009

and claims benefit of 61/207,739 02/13/2009

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: Yes

Permission to Access Search Results: Yes

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: 08/16/2016

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 15/227,814**

Projected Publication Date: 11/24/2016

Non-Publication Request: No

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

Mobile Device and Method Attributing Media Services Network Usage to Requesting Application

Preliminary Class

370

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).

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Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

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

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Electronic Acknowledgement Receipt

EFS ID:	28505222
Application Number:	15227814
International Application Number:	
Confirmation Number:	2668
Title of Invention:	Mobile Device and Method Attributing Media Services Network Usage to Requesting Application
First Named Inventor/Applicant Name:	Gregory G. Raleigh
Customer Number:	106963
Filer:	James E. Harris/Ann Taylor
Filer Authorized By:	James E. Harris
Attorney Docket Number:	RALEP046C2C1C1
Receipt Date:	01-MAR-2017
Filing Date:	03-AUG-2016
Time Stamp:	16:25:47
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Request for Corrected Filing Receipt	P046C2C1C1_Request.pdf	772498 4ffd6712b6b06b77932c092a7bb4b37bcb73b931	no	20

Warnings:

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

Application Number	15227814
Filing Date	2016-08-03
First Named Inventor	Gregory G. Raleigh
Art Unit	2476
Examiner Name	Moutaouakil, Mounir
Attorney Docket Number	RALEP046C2C1C1

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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	6115823	A	2000-09-05	Velasco et al.	
	2	7203721	B1	2007-04-10	Ben-Efraim et al.	
	3	7219123	B1	2007-05-15	Fiechter et al.	
	4	7505795	B1	2009-03-17	Lim et al.	
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	1	20090065571	A1	2009-03-12	Jain, Deepak	

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	15227814
	Filing Date	2016-08-03
	First Named Inventor	Gregory G. Raleigh
	Art Unit	2476
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	Attorney Docket Number	RALEP046C2C1C1

Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
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[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	15227814
	Filing Date	2016-08-03
	First Named Inventor	Gregory G. Raleigh
	Art Unit	2476
	Examiner Name	Moutaouakil, Mounir
	Attorney Docket Number	RALEP046C2C1C1

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	/James E. Harris/	Date (YYYY-MM-DD)	2017-02-08
Name/Print	James E. Harris	Registration Number	40013

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Electronic Patent Application Fee Transmittal	
Application Number:	15227814
Filing Date:	03-Aug-2016
Title of Invention:	Mobile Device and Method Attributing Media Services Network Usage to Requesting Application
First Named Inventor/Applicant Name:	Gregory G. Raleigh
Filer:	James E. Harris/Ann Taylor
Attorney Docket Number:	RALEP046C2C1C1
Filed as Small Entity	
Filing Fees for Utility under 35 USC 111(a)	

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

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
SUBMISSION- INFORMATION DISCLOSURE STMT	2806	1	90	90
		Total in USD ($)		**90**

Electronic Acknowledgement Receipt	
EFS ID:	28303791
Application Number:	15227814
International Application Number:	
Confirmation Number:	2668
Title of Invention:	Mobile Device and Method Attributing Media Services Network Usage to Requesting Application
First Named Inventor/Applicant Name:	Gregory G. Raleigh
Customer Number:	106963
Filer:	James E. Harris/Ann Taylor
Filer Authorized By:	James E. Harris
Attorney Docket Number:	RALEP046C2C1C1
Receipt Date:	08-FEB-2017
Filing Date:	03-AUG-2016
Time Stamp:	16:54:44
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	$90
RAM confirmation Number	020917INTEFSW00003641505876
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The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:	

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1	Information Disclosure Statement (IDS) Form (SB08)	P046C2C1C1_IDS.pdf	1053873 fbcf7ff87f19aa5444ed56e9ea6d1fcf70009047	no	4
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	31049 13d2c10ef355f3fa5814ddef60173ce8074f05b3	no	2
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	Raleigh et al.	Examiner:	Moutaouakil, Mounir
Serial No.:	15/227,814	Art Unit:	2476
Filed:	August 3, 2016	Conf. No.:	2668
Title:	Mobile Device and Method Attributing Media Services Network Usage to Requesting Application		

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

AMENDMENT AND RESPONSE

In response to the Office Action dated October 26, 2016, the no-fee deadline for response being January 26, 2017, please amend the above-identified application as follows:

Amendments to the Claims begin on page 2.

Remarks begin on page 9.

AMENDMENTS TO THE CLAIMS

Without prejudice and without surrender of any subject matter, please amend the claims as follows:

1. (Canceled).

2. (Currently Amended) A wireless end-user device, comprising:

a wireless modem configurable to connect to a wireless network;

a network stack configurable to receive and transmit data via the wireless modem and the wireless network;

a first network stack Application Programming Interface (API), containing at least one first call ~~to allow~~ accessible to each of a plurality of device applications, the first network stack API callable by each of the plurality of device applications to open and use data packet flows via the network stack, the wireless modem, and the at least one wireless network;

a second API containing at least one second call ~~to allow~~ accessible to each of the plurality of device applications, the second API callable by each of the plurality of device applications to make a data transfer request for a media object associated with a network resource identifier supplied by the calling device application;

a media service manager prompted by the second call, to manage network data transfers for the media object by interfacing with the network stack to retrieve the media object associated with the network resource identifier via the wireless modem and the wireless network; and

[[a]] one or more service classification and measurement agents to associate wireless network data usage for the media object network data transfers with the device application that requests the data transfer for the media object, to associate wireless network data usage for respective data packet flows opened and used via the first network stack API with the device application opening such respective data packet flow, and to reconcile wireless network data usage for each of the plurality of device applications to track an aggregate wireless network data usage attributable to each of the plurality of device applications via both the first network stack API and the second API.

3. (Canceled).

4. (Currently Amended) The wireless end-user device of claim 2, wherein to associate wireless network data usage for the media object network data transfers with the device application that makes the data transfer request for the media object comprises to identify at least one of an application name, an application identifier, or a process identifier for the application that makes the data transfer request.

5. (Previously Presented) The wireless end-user device of claim 4, wherein the data transfer request comprises a network resource identifier that identifies a source of the data to be transferred, a proxy to the source of the data to be transferred, or the media object to be transferred, in particular, wherein the network resource identifier comprises one or more of an Internet Protocol address, a Uniform Resource Locator, a remote file name/address, a stream name, and an object name.

6. (Currently Amended) The wireless end-user device of claim 5, wherein to associate wireless network data usage for the media object network data transfers with the device application that makes the data transfer request for the media object further comprises to store an entry comprising the at least one of the application name, the application identifier, or the process identifier for each of the device applications that makes a data transfer request, each stored entry further comprising information about the corresponding network resource identifier for the data transfer request.

7. (Currently Amended) The wireless end-user device of claim 6, wherein the one or more service classification and measurement agents includes a requesting application storing function within the media services manager.

8. (Previously Presented) The wireless end-user device of claim 7, wherein the media service manager is a first media service manager and the requesting application storing function is a first requesting application storing function, the device further comprising a second media service manager of a different type than the first media service manager, the service classification agent including a second requesting application storing function within the second media service manager.

9. (Currently Amended) The wireless end-user device of claim 8, further comprising ~~a usage and classification reconciliation agent and~~ a usage and classification database, the one or more service classification and measurement agents ~~usage and classification reconciliation agent~~ to receive application association information stored by the first and second requesting application

storing functions, and to maintain the usage and classification database based in part on the received application association information.

10. (Currently Amended) The wireless end-user device of claim 5, wherein to manage network data transfers for the media object by interfacing with the at least one network stack comprises to map the data transfer request and network resource identifier to one or more data flow connections communicated through the device network[[ing]] stack.

11. (Previously Presented) The wireless end-user device of claim 2, further comprising a media player and a user interface, wherein the media object comprises media data that is, as a result of the media service manager management of network data transfers for the media object, received by the device and played by the media player through the user interface.

12. (Currently Amended) The wireless end-user device of claim 11, the media service manager ~~function~~ to receive, from the application launching the data transfer request, a network resource indicator that identifies the media object,

return to the application a media object handle descriptor,

call a proxy service to perform one or more network data transfers comprising the media object,

accept, from the application, commands associated with the media object handle descriptor, and

control playback of the media data by the media player based on the commands.

13. (Currently Amended) The wireless end-user device of claim 2, wherein the one or more service classification and measurement agents comprise[[s]]:

a requesting application storage agent to, for each device application that makes a data transfer request using the second API, store application identification information and network resource identification information;

a network data flow storage agent to, for each network data flow associated with the media service manager, identify network data flow identification information; and

an association agent to match the network data flow identification information for a network data flow with application identification information for the network data transfer associated with the network data flow.

14. (Previously Presented) The wireless end-user device of claim 2, further comprising:

a local database to store data usage, including data usage for network data transfers managed by the media service manager on behalf of a device application, the stored data usage classified by device application;

a user interface; and

a user interface display agent to display the data usage classified by application to a user.

15. (Currently Amended) The wireless end-user device of claim 2, the one or more service classification and measurement agents to further associate one or more traffic flows, comprising the media object network data transfers, with the device application that makes the data transfer request, the device further comprising an enforcement agent to, based on the association between the one or more traffic flows and the device application, enforce an application-based usage control on network data usage by one or more of the device applications.

16. (Currently Amended) A method of operating a wireless end-user device when connected via a wireless modem to a wireless network, the method comprising:

operating a first network stack Application Programming Interface (API), containing at least one first call ~~that allows~~ accessible to each of a plurality of device applications, the first network stack API callable by each of the plurality of device applications to open and use data flows via a network stack coupled to the wireless modem;

operating a second API containing at least one second call ~~that allows~~ accessible to each of the plurality of device applications, the second API callable by each of the plurality of device applications to make a data transfer request for a media object associated with a network resource identifier supplied by the calling device application;

operating a media service manager prompted by the second call, the media service manager managing network data transfers for the media object by interfacing with the network stack to retrieve the media object associated with the network resource identifier via the wireless modem and the wireless network; and

associating wireless network data usage for the media object network data transfers with the device application that requests the data transfer for the media object, associating wireless network data usage for respective data packet flows opened and used via the first network stack API with the device application opening such respective data packet flow, and reconciling wireless network data usage for each of the plurality of device applications to track an aggregate wireless network data

usage attributable to each of the plurality of device applications via both the first network stack API and the second API.

17. (New) A wireless end-user device, comprising:

a wireless modem configurable to connect to a wireless network;

a network stack configurable to receive and transmit data via the wireless modem and the wireless network;

a first network stack Application Programming Interface (API), containing at least one first call to allow device applications to open and use data flows via the network stack, the wireless modem, and the at least one wireless network;

a second API containing at least one second call to allow device applications to make a data transfer request for a media object associated with a network resource identifier supplied by the device application, wherein the data transfer request comprises a network resource identifier that identifies a source of the data to be transferred, a proxy to the source of the data to be transferred, or the media object to be transferred, in particular, wherein the network resource identifier comprises one or more of an Internet Protocol address, a Uniform Resource Locator, a remote file name/address, a stream name, and an object name;

a media service manager prompted by the second call, to manage network data transfers for the media object by interfacing with the network stack to retrieve the media object associated with the network resource identifier via the wireless modem and the wireless network; and

a service classification agent to associate wireless network data usage for the media object network data transfers with the device application that requests the data transfer for the media object, wherein to associate data usage for the media object network data transfers with the device application that makes the data transfer request for the media object comprises to identify and store at least one of an application name, an application identifier, or a process identifier for the application that makes the data transfer request, each stored entry further comprising information about the corresponding network resource identifier for the data transfer request.

18. (New) The wireless end-user device of claim 17, wherein the service classification agent includes a requesting application storing function within the media services manager.

19. (New) The wireless end-user device of claim 18, wherein the media service manager is a first media service manager and the requesting application storing function is a first requesting application storing function, the device further comprising a second media service manager of a different type than the first media service manager, the service classification agent including a second requesting application storing function within the second media service manager.

20. (New) The wireless end-user device of claim 19, further comprising a usage and classification reconciliation agent and a usage and classification database, the usage and classification reconciliation agent to receive application association information stored by the first and second requesting application storing functions, and to maintain the usage and classification database based in part on the received application association information.

21. (New) A wireless end-user device, comprising:

a wireless modem configurable to connect to a wireless network;

a network stack configurable to receive and transmit data via the wireless modem and the wireless network;

a first network stack Application Programming Interface (API), containing at least one first call to allow device applications to open and use data flows via the network stack, the wireless modem, and the at least one wireless network;

a second API containing at least one second call to allow device applications to make a data transfer request for a media object associated with a network resource identifier supplied by the device application, wherein the data transfer request comprises a network resource identifier that identifies a source of the data to be transferred, a proxy to the source of the data to be transferred, or the media object to be transferred, in particular, wherein the network resource identifier comprises one or more of an Internet Protocol address, a Uniform Resource Locator, a remote file name/address, a stream name, and an object name;

a media service manager prompted by the second call, to manage network data transfers for the media object by interfacing with the network stack to retrieve the media object associated with the network resource identifier via the wireless modem and the wireless network, wherein to manage network data transfers for the media object by interfacing with the at least one network stack comprises to map the data transfer request and network resource identifier to one or more data flow connections communicated through the device networking stack; and

a service classification agent to associate wireless network data usage for the media object network data transfers with the device application that requests the data

transfer for the media object, wherein to associate data usage for the media object network data transfers with the device application that makes the data transfer request for the media object comprises to identify at least one of an application name, an application identifier, or a process identifier for the application that makes the data transfer request.

REMARKS

Claims 2-16 were pending, with claims 2-5, 11, and 13-16 rejected by the Office Action dated October 26, 2016, and claims 6-10 and 12 objected to. Claim 1 was previously canceled. Applicant has amended claims 2, 4, 6, 7, 9, 10, 12, 13, 15, and 16 herein, canceled claim 3, and added new claims 17-21 to place prior claims 6 and 10 in independent form and duplicate the prior claim 6 dependent claims as new claims 18-20, depending from new claim 17. In view of the claim amendments and the following remarks, Applicant respectfully requests reconsideration.

Claim Amendment Overview

Applicant has amended prior independent claims 2 and 16 to clarify that plural device applications can call both APIs (see Figure 32), and to add further operational concepts of the service classification and measurement agent(s), previously found in claim 3 and the description of, e.g., Figure 35, detailing a solution for classifying and measuring application network data usage when the applications have multiple ways to access network data flows, including at least one way in which the application is itself not an endpoint for flows it requests.

Applicant has carefully reviewed and amended the prior dependent claims to maintain antecedent basis with amended claim 2.

Prior claims 6 and 10 were objected to as each dependent on rejected base claims 2, 4, and 5, but allowable if rewritten in independent form. New claims 17 and 21 represent, respectively, claims 6 and 10 rewritten in independent form. New claims 18-20 depend from claim 17, and mirror prior claims 7-9.

No new matter has been added. The application continues to have no more than 4 independent claims and no more than 30 total claims, and remains eligible for expedited prosecution.

Claim Rejections – 35 U.S.C. § 102

In section 3, the Office Action rejected claims 2-4, 11, and 13-16 under 35 U.S.C. § 102(e) as being unpatentable over U.S. 8,402,165 to Deu-Ngoc (hereinafter, "Deu-Ngoc"). Applicant respectfully traverses the rejection on the grounds that Deu-Ngoc fails to disclose all elements of any rejected claim.

Deu-Ngoc addresses a problem for mobile devices having applications that require different packet data sessions to different APNs (in order to reach different network "communication services"). When operated in a network that limits the number of simultaneous connections to different APNs, the operation of one application may preclude the network connectivity of another application that needs a different APN. Deu-Ngoc proposes a solution to this problem, where different priorities are established for different applications/APNs. A lower-priority application may temporarily displace the APN of a higher-priority application, but after a set period of network inactivity, the APN of the higher-priority application is reestablished.

Deu-Ngoc fails to disclose that the mobile device has both a first network stack API available to applications, that allows the applications to open and use data packet flows via a network stack, and a second API available to the applications, and that allows the applications to make a data transfer request for a media object, with the network data transfers for that media object being managed not by the application, but by a media service manager that interfaces with the network stack. (Note that Applicant has amended claims 2 and 16 to further clarify that both APIs are available to a common group of applications). Deu-Ngoc is silent as to any API constructs present on the device—it is just assumed in the reference that applications can access the network when Deu-Ngoc's priority system allows them to reach an APN that is useful. The Office Action identifies as the first API "a voice telephony application;" Applicant cannot identify in the reference any teachings that a "voice telephony application" is a network stack API accessible to a plurality of device applications and callable by those applications to open and use data packet flows via the stack and modem. The Office Action's identification of a second API is not understood to disclose an API at all, and Applicant cannot identify in the reference any teachings of a second API callable by the plurality of device applications to make a data transfer request for a media object (to be handled by a media service manager).

Deu-Ngoc also fails to disclose a media service manager prompted by the second call, to manage network data transfers for the media object. The Office Action identifies the "Controller 106" of Deu-Ngoc, but this is merely the processor of the mobile device. Unless that processor is disclosed as providing the media service manager elements of the claim (something that Applicant has been unable to locate in the reference), it fails to provide anticipatory support for the claim element. Again, the reference provides no details as to APIs or underlying mechanisms for opening and using flows via a network stack.

The Office Action further states that "it is inherent that each application, in smart phone, is associated with its own ID which is used to exchanged data, for example: Skype, gmail, google voice, Hotmail, Viber, Vonage…)." Applicant disagrees with this statement, as inherency requires that something necessarily happen. Clearly, one case is already present which violates this statement, as Applicant's second API and media service manager allow a data exchange wherein the requesting application is not involved with the network data transfers and thus "its own ID" is not used inherently to exchange data. Deu-Ngoc completely fails to discuss an intermediary to interface with a network stack on behalf of an application and handle a data flow.

Deu-Ngoc associates different APNs with different applications, but there is no mention of associating wireless network data usage for media object network data transfers with requesting device applications. Deu-Ngoc comprehends that multiple APNs can be active simultaneously (see, e.g., col. 13, ll. 35-41), but never suggests that data usage is tracked or associated as claimed. Further, even if Deu-Ngoc would have disclosed a media service manager, according to the teachings of Deu-Ngoc that media service manager would have one APN, with no mention of classifying network data transfers over a single APN based on which application called the media service manager.

Although not required to distinguish claims 2 and 16 from Deu-Ngoc, Applicant has elected to include several other concepts, each of which further distinguish from Deu-Ngoc. First, a concept previously found in claim 3, the association of data usage for each data packet flow opened and used via the first network stack API with the device application opening that data packet flow, is now in claims 2 and 16. As addressed in the preceding paragraph, Deu-Ngoc

is silent as to data usage. Second, Applicant has added the concept of reconciling data usage for each of the applications to track wireless network data usage attributable to each application via both APIs. Deu-Ngoc is silent as to aggregating data usage per application, much less data usage via multiple APIs as claimed.

Accordingly, Deu-Ngoc fails to disclose all elements of claim 2 or 16. Applicant requests that the rejection be withdrawn as to claims 2-4, 11, and 13-16. Further, the dependent claims contain further patentable concepts not found in Deu-Ngoc. For instance, claim 4 describes identifying each media object network data transfer with an application name, an application identifier, or a process identifier for the application making the request. In contrast, Deu-Ngoc merely associates an APN with the application using the APN (and not whatever application may have requested a media object network data transfer being associated with that data transfer). As to claim 13, Deu-Ngoc fails to describe the second API, nor the different tracking elements of claim 13 that allow network data flows with applications that did not participate in those flows. Applicant cannot locate in Deu-Ngoc any disclosure of a data usage database or display agent to display data usage classified by application, as recited in claim 14. Claim 15 recites an enforcement agent that enforces a network data usage control on an application, for traffic flows conducted by the media service manager and associated with that application. Deu-Ngoc contains no such agent—to Applicant's understanding, Deu-Ngoc merely controls available APNs based on a priority, with no network data usage control.

Claim Rejections – 35 U.S.C. § 103

In section 14, the Office Action rejected claim 5 under 35 U.S.C. § 103(a) as being unpatentable over Deu-Ngoc in view of U.S. 2014/0241342 to Constantinof (hereinafter, "Constantinof"). Applicant respectfully traverses the rejection on the grounds that the combination of Deu-Ngoc and Constantinof fails to disclose all elements of claim 5, and therefore fails to support a *prima facie* case of obviousness for claim 5.

Constantinof discloses a SIP proxy reachable by a URL. A user agent contacts the SIP proxy to set up a call with a remote user agent identified in a SIP request. Applicant fails to see how this pertains to a data transfer request for some entity other than the first user agent, which presumably manages its own session. Further, Constantinof does not appear to cure any of the

deficiencies noted above regarding Deu-Ngoc and parent claims 2 and 4. Accordingly, Applicant respectfully requests that this rejection be withdrawn.

CONCLUSION

Applicant respectfully requests entry of these amendments as provided herein. The application is believed to be in condition for allowance, and a Notice of Allowance is hereby respectfully requested. If the Examiner has any questions or needs any additional information, the Examiner is invited to contact the undersigned.

The Commissioner is authorized to charge any fee deficiency or credit any overpayment to Deposit Account 50-5876.

Respectfully submitted,

Date: January 25, 2017

By: /James E. Harris/

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Date: Jan. 26, 2017 By: /Ann Taylor/
Ann Taylor

Electronic Patent Application Fee Transmittal

Application Number:	15227814
Filing Date:	03-Aug-2016
Title of Invention:	Mobile Device and Method Attributing Media Services Network Usage to Requesting Application
First Named Inventor/Applicant Name:	Gregory G. Raleigh
Filer:	James E. Harris/Ann Taylor
Attorney Docket Number:	RALEP046C2C1C1

Filed as Small Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
INDEPENDENT CLAIMS IN EXCESS OF 3	2201	1	210	210
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
SUBMISSION- INFORMATION DISCLOSURE STMT	2806	1	90	90
		Total in USD ($)		**300**

Electronic Acknowledgement Receipt	
EFS ID:	28178568
Application Number:	15227814
International Application Number:	
Confirmation Number:	2668
Title of Invention:	Mobile Device and Method Attributing Media Services Network Usage to Requesting Application
First Named Inventor/Applicant Name:	Gregory G. Raleigh
Customer Number:	106963
Filer:	James E. Harris/Ann Taylor
Filer Authorized By:	James E. Harris
Attorney Docket Number:	RALEP046C2C1C1
Receipt Date:	26-JAN-2017
Filing Date:	03-AUG-2016
Time Stamp:	15:17:58
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	$300
RAM confirmation Number	012717INTEFSW00001760505876
Deposit Account	505876
Authorized User	Ann Taylor
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37 CFR 1.19 (Document supply fees)

37 CFR 1.20 (Post Issuance fees)

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	Information Disclosure Statement (IDS) Form (SB08)	P046C2C1C1_IDS.pdf	1056006 156a3475d9cacf93984e79604242a9ffd609269b	no	11
Warnings:					
Information:					
2	Foreign Reference	2084.pdf	1397656 9e6a8957ad2e807f979431120ddbd1741e2acde7	no	57
Warnings:					
Information:					
3	Foreign Reference	2085.pdf	441333 e8defb411cdca2f87d3c0c97eae168e0c2960826	no	19
Warnings:					
Information:					
4	Foreign Reference	2086.pdf	232424 fbefdfe44bda45a08d0dfa2e2b40b5d0f577f976	no	29
Warnings:					
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5	Foreign Reference	2087.pdf	922375 5370f148f48d4def4ad535f2c2b1762f0ca57119	no	47
Warnings:					
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6	Foreign Reference	2088.pdf	255944 b4b8ef7ddc1f98c4716aaed35917fdb84c9be0fa	no	18
Warnings:					
Information:					

7	Foreign Reference	2089.pdf	172902 9025822de8f174376f282787af6b3524407be5db	no	13
Warnings:					
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8	Foreign Reference	2090.pdf	643809 f84e3fb9347dd0d758241de1f737fa384a62bebe	no	38
Warnings:					
Information:					
9	Foreign Reference	2091.pdf	4030163 9f5a695d3972f432ff9791f8b2ac99ef7cbca74d	no	16
Warnings:					
Information:					
10	Foreign Reference	2092.pdf	2382529 5c57dc228f491cd9301830aad5e4493f4c99b261	no	12
Warnings:					
Information:					
11		P046C2C1C_OAR.pdf	133470 dc9d58df6fdafeb100ad1609e043f283c91cca6c	yes	14

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Amendment/Req. Reconsideration-After Non-Final Reject	1	1
	Claims	2	8
	Applicant Arguments/Remarks Made in an Amendment	9	14

Warnings:					
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12	Fee Worksheet (SB06)	fee-info.pdf	32643 3a78091e5d5c47100d097becb3bd315849c03521	no	2
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT
(Not for submission under 37 CFR 1.99)

Application Number	15227814
Filing Date	2016-08-03
First Named Inventor	Gregory G. Raleigh
Art Unit	2476
Examiner Name	Moutaouakil, Mounir
Attorney Docket Number	RALEP046C2C1C1

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	5617539	A	1997-04-01	Ludwig et al.	
	2	6401113	B2	2002-06-04	Lazaridis et al.	
	3	6601040	B1	2003-07-29	Kolls, H. Brock	
	4	6636721	B2	2003-10-21	Threadgill et al.	
	5	6879825	B1	2005-04-12	Daly, Brian Kevin	
	6	6959393	B2	2005-10-25	Hollis et al.	
	7	7151764	B1	2006-12-19	Heinonen et al.	
	8	7177919	B1	2007-02-13	Truong et al.	

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	Attorney Docket Number	RALEP046C2C1C1

	9	7191248	B2	2007-03-13	Chattopadhyay et al.	
	10	7369856	B2	2008-05-06	Ovadia, Shlomo	
	11	7409569	B2	2008-08-05	Illowsky et al.	
	12	7428750	B1	2008-09-23	Dunn et al.	
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	15	7599714	B2	2009-10-06	Kuzminskiy, Alexandr	
	16	7602746	B2	2009-10-13	Calhoun et al.	
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	18	7643411	B2	2010-01-05	Andreasen et al.	
	19	7660419	B1	2010-02-09	Ho, Jin-Meng	

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	20	7719966	B2	2010-05-18	Luft et al.	
	21	7979069	B2	2011-07-12	Hupp et al.	
	22	8036387	B2	2011-10-11	Kudelski et al.	
	23	8044792	B2	2011-10-25	Orr et al.	
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	25	8132256	B2	2012-03-06	Bari, Farooq	
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	27	8145194	B2	2012-03-27	Yoshikawa et al.	
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	29	8307095	B2	2012-11-06	Clark et al.	
	30	8380247	B2	2013-02-19	Engstrom	

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	Attorney Docket Number	RALEP046C2C1C1

	31	8412798	B1	2013-04-02	Wang, Frank C.	
	32	8418168	B2	2013-04-09	Tyhurst et al.	
	33	8494559	B1	2013-07-23	Malmi	
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	Attorney Docket Number	RALEP046C2C1C1

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	43	8838752	B2	2014-09-16	Lor 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	20020138599	A1	2002-09-26	Dilman et al.	

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	Attorney Docket Number	RALEP046C2C1C1

	2	20030184793	A1	2003-10-02	Pineau, Richard A.	
	3	20040054779	A1	2004-03-18	Takeshima et al.	
	4	20040267872	A1	2004-12-30	Serdy et al.	
	5	20050091505	A1	2005-04-28	Riley et al.	
	6	20050163320	A1	2005-07-28	Brown et al.	
	7	20060114821	A1	2006-06-01	Willey et al.	
	8	20060182137	A1	2006-08-17	Zhou et al.	
	9	20070130283	A1	2007-06-07	Klein et al.	
	10	20070201502	A1	2007-08-30	Abramson, Nathan	
	11	20080168275	A1	2008-07-10	DeAtley et al.	
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	Examiner Name	Moutaouakil, Mounir
	Attorney Docket Number	RALEP046C2C1C1

	13	20080320497	A1	2008-12-25	Tarkoma et al.	
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	17	20100190469	A1	2010-07-29	Vanderveen et al.	

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Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2]	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1	1289326	EP	A1	2003-03-05	Motorola, Inc.		
	2	1545114	EP	A1	2005-06-22	Alcatel		
	3	1887732	EP	A1	2008-02-13	Huawei Technologies Co., Ltd.		
	4	2007065	EP	A1	2008-12-24	Huawei Technologies Co., Ltd.		

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	Art Unit	2476
	Examiner Name	Moutaouakil, Mounir
	Attorney Docket Number	RALEP046C2C1C1

	5	2006041989	JP		2006-02-09	Fujitsu Ltd.		
	6	2002067616	WO	A1	2002-08-29	Sonera Oyj		
	7	2003017063	WO	A2	2003-02-27	Apogee Networks		
	8	2003017065	WO	A2	2003-02-27	Apogee Networks		
	9	2007120310	WO		2007-10-25	Qualcomm Inc.		
	10	2011002450	WO	A1	2011-01-06	Alcatel-Lucent USA Inc.		

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	Attorney Docket Number	RALEP046C2C1C1

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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	/James E. Harris/	Date (YYYY-MM-DD)	2017-01-26
Name/Print	James E. Harris	Registration Number	40013

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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.

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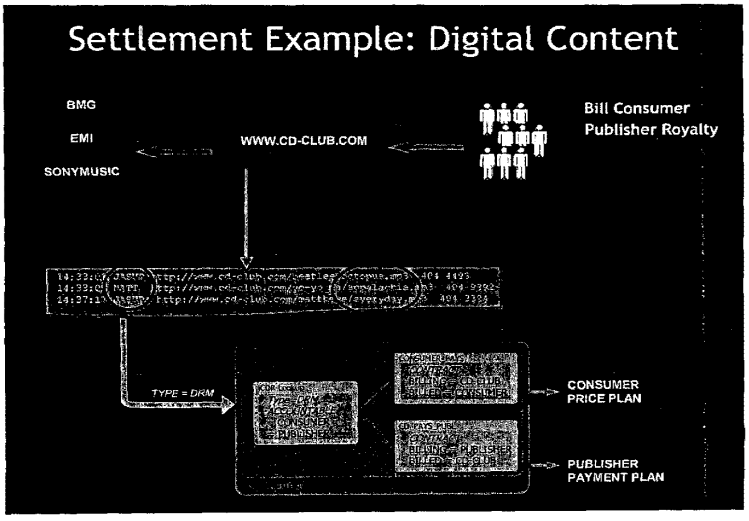
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(54) Title: SETTLEMENT OF TRANSACTIONS SUBJECT TO MULTIPLE PRICING PLANS



(57) Abstract: The invention includes a method, system, and computer-readable medium having computer-executable instructions for rating a transaction. The inventive method includes processing a transaction, where the transaction is processed when a service is provided from a service provider to a service consumer, accessing via a computer network multiple pricing plans related to the transaction, and rating the transaction in accordance with the multiple pricing plans. The method further may include receiving output states from at least one pricing plan. The rating may be accomplished within one pricing plan, or within a group of pricing plans.

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

SETTLEMENT OF TRANSACTIONS SUBJECT TO MULTIPLE PRICING PLANS

Cross Reference to Related Applications

This application claims priority under 35 U.S.C. § 119 (e) from provisional application no. 60/313,968 filed August 21, 2001. The provisional application 60/313,968 is incorporated by reference herein, in its entirety, for all purposes.

Technical Field

The invention relates generally to the processing of data, and more particularly to efficiently and generically aggregating data available on a communication network and billing/paying multiple parties for access to the content of the aggregated data.

Background of the Invention

Recently, the collection and processing of data transmitted over communication networks, like the Internet, has moved to the forefront of business objectives. In fact, with the advent of the Internet, new revenue generating business models have been created to account for the consumption of content received from a data network (*i.e.*, content-based billing). For example, content distributors, application service providers (ASPs), Internet service providers (ISPs), and wireless Internet providers have realized new opportunities based on the value of the content that they deliver. As a result of this content-billing initiative, it has become increasingly important to resolve intelligently and flexibly the corresponding transactions according to the business needs of the customer.

Often, even in traditional commerce streams, there are many different participants between the maker and the consumer of the good. Some of these so-called "middlemen" simply may facilitate access to the good, while others may add useful characteristics to the good. This is especially true in a distributed network environment, like the Internet, that impose additional burdens on capturing the

transaction process because of the unlimited number of data sources and the correspondingly unlimited number of data types. As a result, adequately describing the transacting of the goods and services in such an environment, or even across any of the traditional environments requires a technique that is capable of understanding and processing the participants and the various types of data.

To date, resolving the characteristics of a transaction has been accomplished over data-specific environments using certain application-specific (*i.e.*, "non-generic") methods. For example, a typical telephone bill captures the characteristics of a voice-based telecommunications transaction. In particular, the participants may be identified as the party initiating the call (*i.e.*, the "calling party" telephone number), the party receiving the call (*i.e.*, the "called party" telephone number), and one or more parties connecting the communication (*i.e.*, the "local" or "long distance carrier"). This simple example adequately captures all of the necessary aspects of the telephone call to properly account for the transaction by requiring payment from certain parties (*e.g.*, the calling and/or the called party) to certain other parties (*e.g.*, the local and/or long distance carrier). While these "hard-coded" transaction resolution techniques are sufficient to accommodate only specific environments involving well-defined participants, they are correspondingly too rigid to efficiently satisfy the ever-changing face of a communication network like the Internet. Also, these "hard-coded" techniques are too specific to operate across the many and varied transaction environments that exist throughout the business world.

Therefore, there exists a need to provide a flexible technique that can capture and resolve transactions of any type and involving any participants without requiring modification of the technique for each type. Such a technique would serve to accommodate multi-faceted network environments like the Internet, as well as to provide a single solution that would apply to any business environment.

Summary of the Invention

The invention includes a method, system, and computer-readable medium having computer-executable instructions for rating a transaction. The inventive

method includes processing a transaction, where the transaction is processed when a service is provided from a service provider to a service consumer, accessing via a computer network multiple pricing plans related to the transaction, and rating the transaction in accordance with the multiple pricing plans. The method further may include receiving output states from at least one pricing plan. The rating may be accomplished within one pricing plan, or within a group of pricing plans. Also, accessing the multiple pricing plans may be accomplished via interconnected building blocks located within each of the pricing plans. The method also may include a revenue fold that summarizes the output of multiple pricing plans, including child and parent accounts. Selection of the appropriate child accounts may be a function of end dates that are within a parent account's time period. The method further may pool revenue/usage data as a function of billing cycles, and update the pooled revenue/usage data by summing the values of data from selected account plan periods. Values of the pooled revenue/usage data may be obtained via a building block. The inventive method also may determine a commission, wherein the commission is a credit given to an account.

Brief Description of the Drawings

Other features of the invention are further apparent from the following detailed description of the embodiments of the invention taken in conjunction with the accompanying drawings, of which:

Figure 1 is a block diagram of a system for analyzing content transmitted over a communication network, according to the invention;

Figure 2 is a block diagram further describing the components of the system described in Figure 1;

Figures 3A and 3B provide a flow diagram further detailing the operation the system described in Figure 1;

Figure 4 provides a block diagram of the system described in Figure 1, providing greater detail of a configuration and operation of a transaction layer;

Figures 5A and 5B provide a flow diagram of a method for identifying the characteristics of a transaction, according to the invention;

Figure 6 is a block diagram further detailing the operation and configuration of the transaction layer, according to the invention;

Figure 7 is a flow diagram that details the operation and configuration of the transaction layer of transaction layer, according to the invention;

Figure 8 illustrates a sample settlement scenario for settling the fees associated with the download of certain content;

Figure 9 illustrates a general system description of settlement technologies useful in accordance with the invention to accommodate multiple aggregation of usage, multiple ownership of content, and multiple settlement options;

Figure 10 illustrates a settlement example for digital music downloaded by a consumer from an on-line music club that implements a pricing plan to the consumer and a publisher payment plan using the settlement techniques of the invention;

Figure 11 illustrates a transaction pricing usage based settlement model for use in settling low volume, high value transactions;

Figure 12 illustrates a billing cycle pricing, usage based settlement model for use in settling high volume, low value transactions;

Figure 13 illustrates a revenue sharing settlement using folds in accordance with a first embodiment of the invention;

Figure 14 illustrates a revenue sharing settlement using revenue/usage pools in accordance with a second embodiment of the invention;

Figure 15 illustrates a revenue pool contribution example for the embodiment of Figure 14;

Figure 16 illustrates a revenue pool accessor example for the embodiment of Figure 14;

Figure 17 illustrates a revenue sharing settlement using commissions in accordance with a third embodiment of the invention;

Figure 18 provides an example of computing revenue fold;

Figure 19 illustrates how accounts and pools with different billing cycles contribute to and access from pool instances; and

Figure 20 provides an example of how an account with billing period ending will get one commission from account.

Detailed Description of the Invention

System Overview

Figure 1 is a block diagram of a system 100 for analyzing content transmitted over a communication network. Although the following description will be discussed in the context of collecting, processing and billing for data transmitted over the Internet, it should be appreciated that the invention is no so limited. In fact, the invention may be applied to any type of network, including a private local area network, for example. Also, the invention may be used for purposes other than billing for the usage of content. For example, the invention may be used to analyze the type of data transmitted over a particular network, or to determine the routing patterns of data on a network. Furthermore, the invention may be used to facilitate the intelligent collection and aggregation of data relevant to a particular industry. In addition, the invention may be used to track specific Internet protocol (IP) network resources and to detect fraud, for example.

In addition, it should be appreciated that the term "content" may be defined as data that is transmitted over the network. In the context of the Internet, content may include .mp3 files, hypertext markup language (html) pages, videoconferencing data, and streaming audio, for example. The terms "content provider" and "customer" will be used throughout the description as well. Content provider may refer to the primary creator or provider of the content, while customer is the primary recipient of the content. Both the producer and customer may be a human or a computer-based system.

As shown in Figure 1, an instrumentation layer 101 provides raw data to a content collection layer 102. Instrumentation layer 101 may consist of various data sources, for example, network routers. The network routers may provide information

regarding the various types of routed data, including for example, data format, originating Internet protocol (IP) address, and destination IP address. One example of such information is Cisco System's NetFlow™.

Content collection layer 102 collects information about the delivery of the content, as well as the substance of the content itself. Content collection layer 102 also may sort, filter, aggregate, and store the content according to the particular needs of the end user. In effect, content collection layer is responsible for extracting meaningful information about IP traffic, and so it is provided with an understanding of the data sources in instrumentation layer 101. Content collection layer 102 also may transform the data from the plurality of sources in instrumentation layer 101 into standard formats for use in a transaction layer 103.

Content collection layer 102 is in communication with transaction layer 103. Generally, content collection layer 102 reports to transaction layer 103 that a relevant communication event has occurred and should be considered by the remainder of system 100. A communication event may be defined as any transfer of data between systems. Transaction layer 103 captures the predetermined agreements among all of the parties involved in system 100 regarding the value of the transferred content, as well as the value added by each of the individual parties in transferring such content. Therefore, transaction layer 103 is charged with understanding the nature of the parties, as well as the understanding the actions that one or more parties perform and the influence of such action on the respective parties.

Transaction layer 103 is in communication with a settlement layer 104. Settlement layer 104 captures the operations that are necessary to understand the significance of the transaction defined by transaction layer 103. For example, settlement layer 104 may rate a particular transaction by assigning a monetary value to the transaction. Settlement layer 104 also may divide the burdens and benefits of the monetary value among the relevant parties. In this way, settlement layer 104 ensures that certain parties receive a particular portion of the payment made by the other parties. Settlement layer 104 also may be responsible for delivering this burden and benefit information to the appropriate parties with the appropriate identifiers (*e.g.*,

account numbers). As will be explained in more detail below, the present invention is directed to operations of the settlement layer 104.

Figure 2 is a block diagram further describing the components of system 100. As shown in Figure 2, instrumentation layer 101 includes data sources 201-203 that each provide raw data 204-206, respectively, to collection layer 102. As discussed, data sources 201-203 may include various internetworking devices like routers, bridges, and network switches. Data sources 201-203 provide raw data to an input data adapter 207. Accordingly, input data adapter 207 understands the operation of and the data provided by data sources 201-203. Although one input data adapter is shown in Figure 2, it should be appreciated that more than one input data adaptermay be used in system 100. For example, each data source may have a dedicated input data adapter.

Input data adapter 207 understands the incoming data and extracts the data into the appropriate fields. This field-delimited data, called flow objects 208, are sets of attributes. The attributes may be any characteristics that are provided by, or can be derived from, raw data 204-206 provided by data sources 201-203, respectively. For example, flow objects 208 may include a set of attributes describing the source and destination, including source IP address, destination IP address, source interface, and destination interface. Because input data adapter 207 is charged with understanding raw data 204-206 from data sources 201-203, as well as the required flow objects 208 of system 100, it is capable of transforming the raw data to the flow objects, where the flow objects may all be of a standard format.

Input data adapter 207 provides flow objects 208 to a content data language 209. Content data language 209 may transform the attributes in flow objects 208 into other attributes that are desired by a particular customer. For example, content data language 209 may derive a network identifier attribute that is not readily available from a data source, from a source address attribute and a destination address attribute that are provided by flow object 208 attributes from input data adapter 207. This derivation may be based on a customer's desire to determine which network conveyed the transaction between the source and the destination. Therefore, following this

example, content data language 209 will know to extract the source address attribute and the destination address attribute from flow objects 208.

Content data language 209 may perform other functions as well. For example, content data language 209 may perform a generic lookup function 219 that is built into content data language 209. Generally, generic lookup 219 describes a technique for mapping any number of attributes to any number of other derived attributes. For example, generic lookup 219 may be used to map a unique resource locator (URL) attribute to a particular content-type attribute.

Content data language 209 also is in communication with a correlator 211. Generally, correlator 211 connects the many daily network content events from various network devices, like routers for example. Often, the connected data may come from distinctly different data sources at distinctly unrelated times. Correlator 211 allows this data to be intelligently connected to each other, regardless of how different the sources or of how disparate the time received. For example, a Netflow™ enabled router and a Radius™ enabled network access switch may each provide certain data that is relevant to one particular transaction. However, because portions of the data come from different devices, the data may arrive at system 100 at different times, and in different formats. Also, because each provides data that is necessary to complete one transaction, the data from each cannot be considered separately. Correlator 211 allows this data to be intelligently grouped regardless of the format of the data or of the time the data pieces are received.

Furthermore, correlator 209 may rearrange the order of the received flow objects 208 to suit the needs of the remainder of system 100. By performing such correlation without having to first store all of the data on a disk (*e.g.*, a database), significantly faster processing is achieved. Correlator 209 may perform this correlation in real-time, for example.

Although system 100 has been described using content data language 209 and correlator 211, it should be appreciated that flow objects 208 may proceed directly to a filter 212, if no correlation is required and if no attribute derivation is required, for example. Filter 212 analyzes flow objects 208 to ensure that the provided attributes

are desired by system 100. If flow objects 208 are not needed (*i.e.*, a mismatch), filter 212 may prevent flow objects 208 from passing to an aggregator 213. Also, although filter 212 has been shown as a separate device in system 100, it should be appreciated that the functionality of filter 212 may be incorporated into aggregator 213.

Filter 212 passes the matching flow objects to aggregator 213. Aggregator 213 may provide additional filtering and classification of the multitude of daily network content transactions, based on user criteria. Aggregator 213 may perform such filtering and classification in real-time. Aggregator 213 provides the filtered and classified information to an output data adapter 214. Output data adapter 214 may convert the data from aggregator 213 into one or more content detail records for storage in CDR database 215. Therefore, CDR database 215 stores a complete description of a content event.

Transaction layer 103 includes CDR database 215, an ownership resolution component 216, and a transaction resolution component 221. CDR database 215 passes the CDR onto ownership resolution component 216. A proper accounting of a communication event, for any purpose including billing, requires both identifying the participants and defining the relationships among those participants. These tasks are accomplished by ownership resolution component 216 and transaction resolution component 221.

Ownership resolution component 216 serves to define the participants of the communication event. In particular, because raw data 204-206 may not provide sufficient "ownership" data relating to the parties involved in the content transaction, such "ownership" data must be provided by system 100 to properly account for the entire transaction. Ownership resolution component 216 operates to provide such ownership-based data to system 100.

Ownership resolution component 216 is in communication with transaction resolution component 221. Transaction resolution component 221 serves to capture the predetermined relationships and/or agreements among the parties defined by ownership resolution component 216 regarding the value of the transferred content, as well as the value added by each of the individual parties in transferring such content.

Such predetermined relationships may be previously agreed upon by the participants, or may be created and agreed upon with the implementation of system 100. Therefore, transaction component 103 understands the nature of the parties, the actions that one or more parties perform, and the influence of such action on the respective parties.

Transaction component 216 provides the transaction information to a rating component 217. Rating component 217 provides a weight or significance (*e.g.*, a price) to the transaction, so as to provide a tangible value to the transaction. Rating component 217 may make this determination based on various metrics including the type of the content, the quantity of content consumed, the place and time delivered, or the quality of the content, for example. Therefore, rating component 217 allows system 100 to provide some contextual value, indicting the significance or relevance that certain content or information has to the individual customer.

Rating component 217 provides the rated transaction to a presentment component 218. Presentment component 218 may provide the capability for a customer 220 to view their real-time billing information, for example, over the network. Presentment component 218 also may attach relevant identifiers to the bill (*e.g.*, account numbers, etc.).

Figures 3A and 3B provide a flow diagram further detailing the operation 300 of system 100. As shown in Figure 3A, in step 301, raw data 204-206 is received from data sources 201-203. In step 302, input data adapter 207 converts raw data 204-206 to flow objects 208, where flow objects 208 are sets of attributes, determined from raw data 204-206. In step 303, it is determined whether there is a need to derive new attributes from the existing attributes found in flow objects 208. If there is such a need, in step 304, CDL 209 is used to derive new attributes from existing attributes. Also, as discussed above, attributes may be correlated by correlator 211.

In step 305, flow objects 208 are filtered by filter 212. In step 306, the matching flow objects (*i.e.*, those passed by filter 212) are further filtered and classified by aggregator 213. In step 307, output data adapter 214 converts the data aggregated by aggregator 213 to a format compatible with transaction layer 103.

As shown in Figure 3B, in step 308, output adapter 214 may format the aggregated data into one or more content data records for storage in CDR database 215. In step 309, ownership resolution component 216 identifies the parties involved in the transaction. In step 310, transaction resolution component 221 captures the predetermined agreements among the parties, as well as the value added by each of the individual parties. In step 311, the CDR is rated based on predetermined metrics (*e.g.*, time of transmission, quality of content). In step 312, a bill is presented to the customer.

Content Transaction Layer

A transaction, including a business transaction for example, may be any activity between two or more participants that affects certain parties. The affected parties may be considered the participants to the transaction, although parties and participants may be mutually exclusive entities. It should be appreciated that the terms "parties" and "owners" may be used interchangeably throughout. Also, a transaction may include one or more events, where an event may be some action (*e.g.*, the transfer of a service or good) that the participants conduct with each other. Such events may be the exchange of data over a communication network, for example. Also, it should be appreciated that the same event or action may take place in any direction (*e.g.*, from party A to party B or from party B to party A). The "subject" of the action is the party who performs the activity, while the "object" of the action is the party who is affected or influenced in any way by the action.

Transaction layer 103 is responsible for capturing the characteristics of the transaction, including the parties, participants, subject, object, event/action type, direction of the action, for example. The scope of the characteristics captured by transaction layer 103 will vary with the nature of instrumentation layer 101, the capability of content collection layer 102, and the requirements of settlement layer 104. Generally, transaction layer 103 captures the predetermined agreements among all of the parties involved in system 100 regarding the value of the transferred content, as well as the value added by each of the individual parties in transferring such content. Therefore, transaction layer 103 is charged with understanding the nature of

the parties, as well as the understanding the actions that one or more parties perform and the influence of such action on the respective parties.

Transaction layer 103 includes CDR database 215, an ownership resolution component 216, and a transaction resolution component 221. CDR database 215 is a data store that holds each CDR for further processing by ownership resolution component 216 and transaction resolution component 221. In the context of a billable electronic business transaction, a proper accounting of a communication event, for any purpose including billing, requires both identifying the participants and defining the relationships among those participants. As discussed, ownership resolution component 216 serves to define the participants of the communication event, while transaction resolution component 221 serves to capture the predetermined relationships and/or agreements among the parties defined by ownership resolution component 216.

Transaction layer 103 is generic in that it operates without requiring an understanding of instrumentation layer 101 and content collection layer 102. Instead, transaction layer 103 takes the relevant characteristics of the transaction provided by instrumentation layer 101 and content collection layer 102, and selects and generates those characteristics required by settlement layer 104.

Although the operation of transaction layer 103 will be described in the context of an electronic event over a communication network for the purposes of billing for the event, it should be appreciated that the invention is not so limited, but is so described the purpose of clarity. For example, it should be appreciated that the invention may include functions other than billing, including security, network capacity planning, and content monitoring, for example. Also, the generic techniques described may be applied beyond the context of an electronic event over a communication network.

Figure 4 provides a block diagram of system 100 providing greater detail of the configuration and operation of transaction layer 103. As shown in Figure 4, content collection layer 102 provides a usage record 401 to transaction layer 103. A series of fields 403-408 comprise usage record 401. Although fields 403-408 will be

identified by certain labels for the purpose of clarity, it should be appreciated that fields 403-408 may identify any of the many possible characteristics of the transaction.

In the example provided by Figure 4, fields 407 and 408 identify the parties or participants to the transaction. In particular, field 407 identifies "User A" and field 408 identifies "User B." User A may be the subject party and User B may be the object party. For example, in the context of a telecommunication event, User A may be the "calling" party and User B may be the "called" party. Field 405 and field 406 identify a measurable quantity of the event. In particular, following the example of the telecommunications event, field 405 identifies a duration (in minutes) of the event and field 406 identifies the quantity of data exchanged during the event (in megabytes). Field 403 and field 404 may identify a "start time" and an "end time," respectively, of the communication event.

Although fields 403-408 provide just one example, in any case, it should be appreciated that user record 401 will include certain characteristics provided by instrumentation layer 101 and/or derived by content collection layer 102. These characteristics typically are provided to transaction layer 103 because they have some particular significance to identifying the characteristics necessary to allow settlement layer 104 to provide some accounting of the transaction. Therefore, usage record 401 may not necessarily include all of the characteristics provide by instrumentation layer 101 and/or derived by content collection layer 102, because certain characteristics may not relevant to the settlement of the transaction (*e.g.*, network type). Yet, usage record 401 will include those available characteristics that pertain to permitting settlement layer 104 to properly account for the transaction.

Once usage record 401 passes through transaction layer 103, a modified usage record 402 may be provided to settlement layer 104. Modified usage record 402 may be modified by transaction layer 103 to include additional details of the transaction event required by settlement layer 104 and/or required by the customer's system to which the usage record applies (*e.g.*, a usage billing system). As shown for modified usage record 402, an account A field 409 and an account B field 410 may be added to

further identify the transaction. In one example, account A field 409 may include an alphanumeric designator that identifies the account number that has been assigned by the customer's billing system for User A. In the context of the telecommunications system, account A field 409 may hold User A's ten-digit home telephone number, for example.

In any case, the components of transaction layer 103 operate to identify these additional fields, based on the requirements of the customer's system and of settlement layer 104. In particular, ownership resolution component 216 operates to ensure that the necessary participants or parties to the transaction are identified, while transaction resolution component 221 operates to ensure that the relationships among the parties or participants are identified.

Identification of the relevant entities and their relationships may be accomplished using "lookups" in data stores located within ownership resolution component 216 and transaction resolution component 221, for example. For example, a data table may have a "User" data field and an associated "Account" data field. When User A is received by ownership resolution component 216, it will conduct a lookup in the data table and identify Account A as the appropriate account associated with User A. Also, transaction resolution component 221 may have a data table that permits a lookup of the relationship between User A and User B, identified in usage record 401. For example, upon receiving field 407 designating User A and field 408 designating User B, transaction resolution component 221 may conduct a lookup of an algorithm that identifies the appropriate burdens and benefits (*e.g.*, debit and credit of money) assigned to each of the users with respect to each other.

It also should be appreciated that transaction layer 103 may not provide additional characteristics to usage record 401, as described but may select the relevant characteristics (*i.e.*, those characteristics needed by settlement layer 104) from the characteristics made available by instrumentation layer 101 and/or derived by content collection layer 102. In fact, usage record 401 may include all of the necessary characteristics to properly account for the transaction. In this case, ownership resolution component 216 and transaction resolution component 221 select the

relevant characteristics from the available characteristics. As will be explained in more detail below, the information added to the usage record 402 may also constitute pricing plans and the settlement layer may be configured to handle more sophisticated settlement strategies involving multiple parties and multiple pricing plans over a multiplicity of noncontiguous time periods.

Figures 5A and 5B provide a flow diagram of a method 500 for identifying the characteristics of a transaction using system 100. As shown in Figure 5A, in step 501, raw data 204-206 is received into system 100. Raw data 204-206 includes certain characteristics provided by data sources 201-203, respectively, in instrumentation layer 101. In step 502, content collection layer 102 processes (*e.g.*, aggregates, correlates and filters) raw data 204-206. In step 503, content collection layer 102 provides the processed data to CDR database 215 in transaction layer 103. CDR database 215 stores the data for further processing by transaction layer 103.

In step 505, it is determined whether the contents of the data provided to transaction layer 103 already include the needed ownership data. If the data includes the needed ownership data, the relevant data is selected by ownership resolution component 216 and provided to transaction resolution component 221, in step 507. If, on the other hand, the data provided to transaction layer 103 does not already include the needed ownership data, the required data is identified (*e.g.*, using database lookups) by ownership resolution component 216, in step 506. Once ownership resolution component 216 identifies the required ownership data, the relevant data is selected by ownership resolution component 216 and provided to transaction resolution component 221, in step 507.

As shown in Figure 5B, in step 508 it is determined whether the contents of the data provided to transaction layer 103 already include the needed relationship data (*i.e.*, data defining the burdens and benefits encountered by the parties/participants to the transaction). If the data includes the needed relationship data, the relevant data is selected by transaction resolution component 221 and provided to settlement layer 104, in step 510. If, on the other hand, the data provided to transaction layer 103 does not already include the needed relationship data, the required data is identified (*e.g.*,

using database lookups) by transaction resolution component 221, in step 509. Once ownership resolution component 216 identifies the required ownership data, the relevant data is selected by ownership resolution component 216 and provided to transaction resolution component 221, in step 510.

Ownership and Transaction Resolution

Figure 6 is a block diagram further detailing the operation and configuration of transaction layer 103. It should be appreciated that elements described for transaction layer 103 are not exclusive, but provide just one example of a configuration for transaction layer 103. In particular, the functionality of the previously described ownership resolution component 216 and transaction resolution component 221 will be described in greater detail in the various components described with reference to Figure 6. In practice, however, it should be appreciated that transaction layer 103 may comprise of any number of components that ensure that the necessary parties to a transaction are identified generically.

As shown in Figure 6, transaction layer 103 includes a configuration repository 601, a configuration database 610, a configuration manager 603, and a fail over detector 604. In addition, transaction layer 103 includes a transaction layer engine 608 in communication with configuration repository 601, configuration manager 603, and fail over detector 604.

Transaction layer engine 608 includes a rules processor 605, a CDR reader 606, and a transaction writer 607. Transaction layer engine 608 processes raw data 204-206 in usage record 401 and creates a modified usage record 402, based upon the requirements of settlement layer 104. It should be appreciated that there may be more than one transaction layer engine 608 for each transaction layer 103. However, a single transaction layer engine 608 is shown for the purpose of clarity and brevity.

CDR reader 106 understands the nature of the transaction and operates to read a particular usage record 401 stored in CDR database 215. CDR reader 106 then submits usage record 401 to rules processor 605. Rules processor 605 applies rules (*e.g.*, written in XML) to usage record 401 so as to determine ownership and the relationships among the ownership, for each individual usage record 401. Rules

processor 605 may then generate one or more modified usage records 402, based on the application of the rules to usage record 401. Once rules processor 605 generates the modified usage record 402, transaction writer 607 operates to write a transaction (based on the modified usage record 402) to CDR database 215. Modified usage record 402 is then used by settlement layer 104 to further process the transaction (*e.g.*, rate the transactions monetarily).

Fail over detector 604 operates to provide fault tolerance and initiate a fail over engine (not shown) for a failed transaction layer engine, in accordance with one or more mathematical algorithms, the discussion of which is beyond the scope of the invention. Configuration manager 603 provides an external interface to transaction layer 103 using a business editor 609. Business editor 609 may be manipulated by a user or customer using a graphics user interface (GUI). In particular, the GUI of business editor 609 receives commands from a user and translates them into actions to be performed on usage record 401, for example, by rules processor 605. Configuration repository 601 operates to provide an abstraction to configuration database 610. Configuration database 610 may be a relational database or a set of extensible markup language (XML) computer-readable files, for example.

Figure 7 is a flow diagram that details the operation of transaction layer 103, as shown in Figure 6. As discussed, it should be appreciated that multiple transaction engines may be used to implement a process. Where the invention is instituted using computer-readable instruction, transaction layer engine 608 may be implemented as a computer-executable instruction or thread. Therefore, multiple transaction layer engines may be implemented by having multiple computer-readable instructions.

In step 701, transaction layer engine 608 reads usage record 401 using CDR reader 606. In step 702, rules processor 605 applies one or more rules to usage record 401 read by CDR reader 606, so as to determine one or more "accountables." Accountables are labels that are used to facilitate identifying the parties or owners to a transaction. Accountables may be defined and/or modified by an external user (*e.g.*, a customer) using the graphical user interface provided by business editor 609. Also, it should be appreciated that accountables may be defined for a new usage types for

which no rules in rules processor 605 are provided. The identification of accountables is the function of ownership resolution component 216, as described with reference to Figure 4.

In step 703, "contracts" are identified that define the relationships or agreements between one or more accountables. In the context of a billing system, a contract identifies which parties pays (*i.e.*, the billed party) and which party receives payment (*i.e.*, the billing party). A particular contract may be identified and executed when one or more "conditions" are satisfied. The identification of contracts is conducted by transaction resolution component 221, as described with reference to Figures 2 and 4. A condition is an expression of a logical assertion that can be evaluated as true or false. In transaction layer 103, for example, a condition may be true if a certain data element is present and false if the data element is not present. The following is an example of a condition in XML:

```
<condition name="condition1" function="IsPresent" outcome="true"
type="Accountable" id="ColoProvider"/>
```

In step 704, once the contracts are determined, they are executed. In step 705, usage record 401 is changed to modified usage record 402 based upon the execution of the contract and the identification of the accountables. In step 706, modified usage record 402 may be written to a data table using transaction writer 607, so that settlement layer 104 can rate it, in step 707. Therefore, a transaction may be represented as modified usage record 402, where modified usage record may include the elements of usage record 401 in addition to the accountable and contract elements (*e.g.*, fields 409-410 as discussed with reference to Figure 4).

Although the discussion provided an example of a single contract and two accountables for a single usage record, it should be appreciated that many contracts and many accountables (*i.e.*, and therefore many "transactions") may be derived from a single usage record, because there may be multiple transactions implicated from a single usage record 401. For example, usage record 401 may involve three parties

each having a contract with the other respective parties. In this example, therefore, there may be three separate contracts for a single usage record 401, and three individual accountables for each party or owner. Moreover, as will be explained below, the contracts may operate according to pricing plans that vary over time and from party to party.

In addition to requiring a certain accountable, it may be necessary to determine a value of the accountable. For example, transaction layer 103 may determine not only that the "called party" accountable be a part of the transaction, but also that a value for the called party (*e.g.*, "856-555-1212" or "John Doe") be identified. Also, it may be necessary to transform one accountable into another accountable to satisfy the requirement of settlement layer 104. For example, settlement layer 104 may require the called party accountable (either determined by transaction layer 103 or provided in usage record 401) be transformed into a network identifier accountable.

In either case, the value or transformation of accountables or contracts may be determined using certain predetermined functions or "primitives." A primitive defines a transformation or a valuation of an accountable or contract. As discussed, transformations may allow a value of an accountable to be determined using another accountable, for example. Primitives define and direct such transformations. The input to a primitive can be one of fields 403-408 from usage record 401 or a previously determined accountable, for example.

Primitives may be described and distinguished based on their prescribed functionality. For example, one type of primitive may be a database lookup. A database lookup is a primitive that operates to transform one accountable or contract to another accountable or contract. Also, a database lookup primitive may function to assign a value to an accountable or contract, as a result of conducting a lookup of the accountable or contract in a database. It should be appreciated that the database lookup primitive also allows flexibility in that any database that has Java Database Connectivity (JDBC) drivers (*e.g.*, Oracle, Microsoft SQL Server, Sybase, Database 2) can be used to perform complex lookups. In this way, therefore, previous

accountable or contact transformations can be linked to find new accountables or contracts, respectively.

Other types of primitives may include direct value assignment, and a function primitive that looks up data in an external database. Other primitives may include a function primitive that it allows a third party based library (*e.g.,* Java-based) to be used. Another primitive may be a "regular expression" based primitive that allows parsing of complex text-based fields with a full feature (*e.g.,* PERL5 compliant) pattern specification. Common used techniques would include parsing URLs, filenames and paths, calling/called telephone numbers, email address, for example. In addition, a CDR database 215 lookup primitive allows holding on to an ownership entity if no further processing is required. This primitive is used where usage record 401 provides the information needed by settlement layer 104 without any need for more data correlation and/or manipulation by transaction layer 103.

A default primitive may be a hard-coded primitive that is used where the value is known and/or is not dependent on usage record 401. For example, such a primitive may be used where a party is always present in a consumption event, regardless of the other relevant parties. A network address primitive allows determination of a network entity given an arbitrary string. An area code primitive may be used to determine an area code of a telephone number given the complete telephone number. This primitive may be relevant for a Voice-over-IP application. These examples primitives are not exclusive, but are meant to provide a few examples of the manipulation and correlation that may be achieved by the primitives on the accountables and contracts.

The following is an example of an accountable primitive in XML:

```
<accountable>
<name> ColoProvider </name>
<role> ServiceProvider </role>
<usageType> RMONHost </usageType>
<valid from="past" to="present" />
<primitive type="default">
<value> Exodus </value>
</primitive>
</accountable>
```

Each accountable that is involved in a contract will have an assigned "role." It follows, therefore, that an accountable that is not involved in a contract may not need to have an assigned role. The role associates the particular accountable for integration with settlement layer 104.

Similar to the accountable, a contract is implemented using a set of primitives. The following is an example of a contract primitive in XML. In the example, a Web hosting scenario is present where a content provider (*e.g.*, CNN) places content on one or more Web servers and pays a Web Hoster for doing so based on some predefined pricing plan.

In order to define the accountables, certain elements of usage record 401 may be assumed as follows: Web Hit Time, Web Server Name/IP address, Client IP address, bytes, Mime type, and URL. In this example, if a rule in the business world requires the "Content Provider" of the Web Server (*e.g.*, CNN) to pay to the Web Hoster, there are two accountables: Web Hoster and Content Provider. The XML definition of a contract that captures this business rule may be as follows:

```
01  <contract>
02  <name> ContentProvider-Pays-WebHoster </name>
03  <usageType> WebHosting </usageType>
04  <valid from="past" to="present" />
05  <condition function="IsPresent" type="Accountable"
    name="condition1"  id=" ContentProvider " />
06  <condition function="IsPresent" type="Accountable"
    name="condition2" id="WebHoster" />
07  <billedFunction>
08  <status> enabled </status>
09  <primitive type="internal-account-lookup">
10  <database name="GlobalDB"/>
11  <argument order="1" type="Accountable"
    name="ContentProvider"/>
12  </primitive>
13  </billedFunction>
14  <billingFunction>
15  <status> disabled </status>
16  <primitive type="internal-account-lookup">
17  <database name="GlobalDB"/>
```

```
18    <argument order="1" type="Accountable"
name="WebHoster"/>
19    </primitive>
20    </billingFunction>
21    </contract>
```

In this example, a contract has a name defined in line 02 as "ContentProvider-Pays-WebHoster." The contract also defines an element or usage type called "WebHosting" in line 03. The contract also has two sets of conditions in lines 05 and 06, called "IsPresent," which consider whether "ContentProvider" and "WebHoster" elements are present, respectively. Therefore, this particular contract will be selected and executed by transaction layer 103 if these elements are present.

Also, in this contract example, there are two primitives that are specified. There is a first primitive for finding the account number of the billed entity "ContentProvider," which begins on line 07 and ends on line 13, and there is a primitive for determining the account of the billing entity "WebHoster" beginning on line 14 and ending on line 20. Therefore, the example contract contemplates the "who pays to whom" logic, and results in the execution of a contract that creates a modified usage record 402, which captures the transaction. Notably, in lines 09 and 16, both primitives are defined as database lookups.

As noted above, to settle a transaction, the system must determine who should compensate whom and by how much. Many processes contribute to such "settlement." Accordingly, the settlement layer 104 is not necessarily a particular logical component but may be spread throughout the system. In operation, a typical "settlement" might occur as described below with respect to Figure 8.

Figure 8 illustrates a sample content event as received by transaction layer 103 pursuant to the processes described above. In this example, "content.com" is identified as the billed party for a caching service, and IP address "128.33.2.41" is identified as the billed party for consuming content type "audio video interleave" (.avi). This IP address may be mapped to a customer account that may vary over time. The system also may identify the log provider (*e.g.*, web host service) and may identify the content property owner (*e.g.*, "Disney") as the party to receive a royalty,

or some other form of compensation, for the download. This ownership may create rules based on the unique resource locator (URL) substring and other event information. Also, links may be provided from the event to the multiple accounts related to that event. The use of pricing plans and pools, as described below, allow business rules to be captured regarding compensation for events, for example, in ways that greatly increase system flexibility. In this example, a fee may be charged to "content.com," while revenue may be paid back to the log provider.

Settlement of Transactions Subject to Multiple Pricing Plans

In many transactions, the accounts include one or more pricing plans that are customized to particular customers. As shown in Figure 9, the settlement technologies used to settle such transactions may allow for multiple ownership of content, multiple aggregation of usage, and provide a variety of revenue sharing models. Several of such models will be described below including folds with parent account plans, revenue pooling, and commission relationships between plans.

Figure 10 illustrates a settlement example for the case of digital content, such as digital music content downloadable off of the Internet. In this example, an on-line music club (*e.g.,* BMG, EMI, Sony) has a contractual relationship with the consumers as well as the music publishers (*e.g.,* "www.cd-club.com") and, at settlement, allocates payment according to the price plan(s) with the consumer and the payment plan(s) with the publishers. These payment plans recognize that each song may have a different price and that the revenue paid to the publisher, author, etc. may vary over time depending upon the frequency of download, for example. The price to the consumer also may vary with use. Figures 11 and 12 illustrate settlement models that take into account transaction pricing and billing cycle pricing for such usage based settlements. As those skilled in the art will appreciate, the per transaction usage based model may be best utilized for low volume, high value transactions, while the billing cycle pricing usage based model may be better for high volume, low value transactions.

The present invention allows for the networking of a multiplicity of pricing plans during rating process 217 in settlement layer 104. Thus, the system described

below is implemented primarily in ratings 217 described above with respect to Figure 2.

Pricing Plan Overview

In accordance with the invention, pricing plans may be created by interconnecting rating building blocks with customizable properties. Each rating building block may be specialized in one well-defined function that falls roughly into five classes: usage selection and filtering, usage computation, accumulation, rate computation, and bill presentation. By interconnecting these rating building blocks, together with the ability to add new rating building blocks to the system, very flexible and extensible pricing plans can be created. The computation may be desirably constrained within one pricing plan.

A new class of rating building blocks also may be defined to extend the usefulness of pricing plans. This new class of rating building blocks allows a plan to access the states of another pricing plan or a group of pricing plans. These states can be usages and/or charges associated with line items and/or intermediate computations. With this new capability, computation is not constrained within one pricing plan but within a network of pricing plans working together. This new computation offers, but is not limited to, many settlement features.

A revenue fold summarizes revenue, which is the output of a pricing plan, from child accounts and presents the folded revenue to their corresponding parent accounts as input to their pricing plans. This process may start from the lowest level and continue on up to the root level. The value of revenue fold may be available to a parent account in a pricing plan through a building block (*e.g.*, "RevenueToDate"). As illustrated in Figure 13, the revenue fold settlement model of the invention may provide for pricing plans at each level in the hierarchy and allow for the use of resellers.

Revenue/usage pools are similar to global variables except that they include the concept of billing cycles. Different periods of a pool imply different instances and therefore different values. A pool value may be updated during invoice processing by summing the values of invoice line items associated with the pool from appropriate

account plan periods. An account plan period is considered appropriate if the end date is within the period of the particular pool instance. Note that it is possible to have zero or more than one account plan periods from the same account to be included in the same pool instance. The computation of a pool value may not be cumulative between updates. When a pool value needs to be updated, the computation may start over with the previous value of a pool having no consequence. For example, the value of a pool may be accessible from a pricing plan through a building block (*e.g.*, "PoolAccessor") with the pool name as its property. The output of the "PoolAccessor" is the sum of the pool instances having the same pool name and billing period end dates within the start and end dates of the account plan period. As shown in Figure 14, this settlement feature is useful in revenue sharing scenarios where total revenue and resources are pooled together and total revenue is shared among the contributing accounts based on contributed resources. The pools may be hierarchy independent and defined by the pricing plans. A revenue pool contribution example is given in Figure 15, and a revenue pool accessor example is given in Figure 16.

A commission is a credit given to an account. The credit amount is computed based on the revenue, or states of another account. The two accounts involved in the transaction are commission source account and commission destination account. As shown in Figure 17, the commission source account (commission generator plan) generates the commission contribution iCDR using a building block (*e.g.*, "CommissionGenerator") with "AccountNumber" and "CommissionDescription" as its properties. The amount, not necessarily revenue, going into the CommissionGenerator (commission plan) is the commission amount. When used in conjunction with existing rating building blocks, commission features such as the following can be supported: commission going to multiple accounts, commission based on total revenue or a subset of the revenue (*e.g.*, only monthly and usage charges, but not setup charges), commission for the first "n" billing period only (or different rate after first "n" periods), and step rate.

The commission destination account may receive the commission data through a building block (*e.g.*, "CommissionAccumulator"). Additional commission features such as the following can be supported on the destination account: a recurring base commission, promotional commission rate, and step commission rate. The commission settlement model also may be hierarchy independent and permit variable settlement arrangements.

When computation involves a network of pricing plans, the correct output of a particular pricing plan may be dependent on the processing of another pricing plan. The output of the other pricing plan may in turn dependent on yet another pricing plan. A cyclic dependence can even exist. In order to have the correct computation for the network of pricing plans as a whole, the system detects and continues processing until all pricing plans reach their final values. Accordingly, the settlement processing software in accordance with the invention has a built-in mechanism to repeat processing of the pricing plans until their values are final. The algorithm will stop after a configurable loop count to prevent infinite processing in case there is a cyclic dependence.

Billing Cycle Considerations

Because more than one account may be involved in settlement, it is possible that they have different billing periods. The following section details how each settlement feature is processed for the settlement models of the invention when accounts with different billing periods are involved.

Revenue fold summarizes revenue from child accounts and presents the folded revenue to their parent accounts. This process starts from the lowest level and continues up to the root level. In actual settlement processing, revenue fold is a post order traversal of a tree whose nodes are account plan periods, where a post order tree traversal traverses each sub tree of the root in post order followed by the root. The child account plan periods are selected if the end dates are within the parent's account plan period. It is possible to have zero or more than one account plan period from the same account included in one revenue fold. The root account's account plan period is defined by the invoice processing start and end dates.

An iCDR is generated for each revenue fold. The iCDR is rated by the pricing plan for the account plan period receiving the revenue fold. Therefore, pricing plans for non-leaf accounts take revenue fold into consideration. The value of revenue fold is available in a pricing plan through a building block (*e.g.*, "RevenueToDate").

Figure 18 provides an example of computing revenue fold. To compute the revenue fold for account 1001, the revenue from all child accounts of 1001 with account plan period end dates between 3/1 and 4/1 are summed. In this example, the revenue for account 2001 for the billing period 2/7 to 3/7, account 2002 for the billing period 2/15 to 3/15, account 2003 for the billing period 2/22 to 3/22 are summed. Before the summing of the revenue of these accounts can occur, their own revenues are determined. In order to determine the revenue of these child accounts, their child accounts with account plan period end dates between their account plan period start and end dates are selected and summed. The following example shows that to determine the revenue for account 2003 for the billing period 2/22 to 3/22, revenue for account 3001 for the billing period 2/1 to 3/1 and account 3002 for the billing period 2/15 to 3/15 are summed. This process repeats until the leaf level account is reached.

The value of a pool is accessible from a pricing plan through a rating building block (*e.g.*, "PoolAccessor"). The output of "PoolAccessor" is the sum of the pool instances having billing period end dates within the start and end dates of the account plan period. It is possible to have zero or more than one instance selected given a particular account plan period depending on the billing period of the pool and the account. Therefore, given the same plan, "PoolAccessor" output may vary according to the account plan period. This technique ensures that each invoice line item associated with a pool will be included a pool instance and that each pool instance will be accessed once by an account which accesses the pool.

Figure 19 illustrates how accounts and pools with different billing cycles contribute to and access from pool instances. For example, line items associated with pool A for account 1001 with billing period from 4/1 to 6/1 and account 1002 with billing periods from 3/22 to 4/22 and 4/22 to 5/22 will contribute to the pool A's

instance with period from 4/1 to 6/1. The output of the PoolAccessor will be zero for account 2001 during the period 4/1 to 5/1. For billing period from 5/1 to 6/1, account 2001 will get the value of pool A's instance with period from 4/1 to 6/1. Account 2002 with billing period from 4/1 to 6/1 will also get pool A's 4/1 to 6/1 instance. The account plan period from 4/1 to 8/1 for account 2003 will get the sum of the two pool A's instances, 4/1 to 6/1 and 6/1 to 8/1.

During invoice processing, one or more iCDRs will be generated for each commission producing account plan periods. The generated record will have the destination account number, amount, and a timestamp. The timestamp is the end date of the account plan period that generated the record. The record will then be rated by the destination account in the appropriate account plan period.

Figure 20 provides an example of how an account 2001 with billing period ending 6/1 will get one commission from account 1001 for the period 4/1 to 6/1 and two commissions from account 1002 for the periods 3/22 to 4/22 and 4/22 to 5/22.

An invoice output may be dependent on the processing of settlement features. In turn, processing of settlement features may be dependent on correct invoice output. For example, if the pricing plan associated with an invoice accesses one or more pools, revenue/usage pool processing should be completed successfully before a correct invoice can be produced. To process a revenue/usage pool correctly, account plan periods associated with a pool have to produce a correct invoice that in turn may be dependent on revenue fold. There may not be a single, correct pre-defined order of processing for these settlement features. In some cases, the same settlement features may have to be processed more than once (*e.g.*, revenue fold, generate commission and then revenue fold again).

The settlement processing has a built-in mechanism to repeat processing of the settlement features in a fixed sequence until the values are final. To prevent the algorithm from looping forever, there is a configurable maximum loop count. If the result is not final after the maximum loop count, a warning will be given, and the user may remove the circular dependency (if one exists) and/or increases the maximum loop count.

The invention described above is directed to a system and method for handling the networking of pricing plans in the settlement of transactions. The invention often was described in the context of the Internet, but is not so limited to the Internet, regardless of any specific description in the drawing or examples set forth herein. For example, the invention may be applied to wireless networks, as well as non-traditional networks like Voice-over-IP-based networks and/or private networks. It will be understood that the invention is not limited to the use of any of the particular components or devices herein. Indeed, this invention can be used in any application that requires aggregating data. Further, the system disclosed in the invention can be used with the method of the invention or a variety of other applications.

While the invention has been particularly shown and described with reference to the embodiments thereof, it will be understood by those skilled in the art that the invention is not limited to the embodiments specifically disclosed herein. Those skilled in the art will appreciate that various changes and adaptations of the invention may be made in the form and details of these embodiments without departing from the true spirit and scope of the invention as defined by the following claims.

What is claimed is:

1. A method of rating a transaction, comprising:

processing a transaction, wherein the transaction is processed when a service is provided from a service provider to a service consumer;

accessing via a computer network multiple pricing plans related to the transaction; and

rating the transaction in accordance with the multiple pricing plans.

2. The method of claim 1, wherein at least one of the pricing plans includes at least one of the following: revenue folds, revenue/usage pools, and commissions.

3. The method of claim 1, further comprising receiving output states from at least one pricing plan.

4. The method of claim 1, wherein the rating is accomplished within one pricing plan.

5. The method of claim 1, wherein the rating is accomplished within a group of pricing plans.

6. The method of claim 1, wherein the accessing is accomplished via interconnected building blocks located within each of the pricing plans.

7. The method of claim 1, wherein the building blocks perform at least one of the following functions: data usage selection and filtering, data usage computation, data accumulation, rate computation, and presentation of required payment.

8. The method of claim 6, wherein the building blocks have customizable properties.

9. The method of claim 6, wherein the building blocks allow a first pricing plan to access states of another pricing plan.

10. The method of claim 9, wherein the states are usages and charges associated with one or more pricing plans.

11. The method of claim 6, wherein the building blocks allow a first pricing plan to access the states of a group of pricing plans.

12. The method of claim 11, wherein the states are usages and charges associated with one or more pricing plans.

13. The method of claim 1, further comprising a revenue fold, wherein the revenue fold summarizes the output of multiple pricing plans.

14. The method of claim 13, wherein the revenue fold summarizes child accounts and inputs the summary information to pricing plans of corresponding parent accounts.

15. The method of claim 13, wherein the value of the revenue fold is available to the pricing plan via a building block.

16. The method of claim 13, wherein the revenue fold is available to child and parent accounts.

17. The method of claim 13, further comprising selecting child accounts with end dates that are within a parent account's time period.

18. The method of claim 1, further comprising pooling revenue/usage data as a function of billing cycles.

19. The method of claim 18, further comprising updating the pooled revenue/usage data by summing the values of data from selected account plan periods.

20. The method of claim 18, further comprising selecting the account plan period as a function of the end date of the account plan with respect to the pooled revenue/usage data.

21. The method of claim 18, further comprising accessing a value of the pooled revenue/usage data via a building block.

22. The method of claim 1, further comprising determining the value of a pricing plan as a function of another pricing plan.

23. The method of claim 22, further comprising providing a configurable loop count.

24. A computer-readable medium having computer-executable instructions, comprising:

processing a transaction, wherein the transaction is processed when a service is provided from a service provider to a service consumer;

accessing via a computer network multiple pricing plans related to the transaction; and

rating the transaction in accordance with the multiple pricing plans.

25. The computer-readable medium of claim 24, having computer-executable instructions further comprising receiving output states from at least one pricing plan.

26. The computer-readable medium of claim 24, having computer-executable instructions further comprising a revenue fold, wherein the revenue fold summarizes the output of multiple pricing plans.

27. The computer-readable medium of claim 24, having computer-executable instructions further comprising selecting child accounts with end dates that are within a parent account's time period.

28. The computer-readable medium of claim 24, having computer-executable instructions further comprising pooling revenue/usage data as a function of billing cycles.

29. The computer-readable medium of claim 24, having computer-executable instructions further comprising determining a commission, wherein the commission is a credit given to an account.

30. The computer-readable medium of claim 24, having computer-executable instructions further comprising determining the value of a pricing plan as a function of another pricing plan.

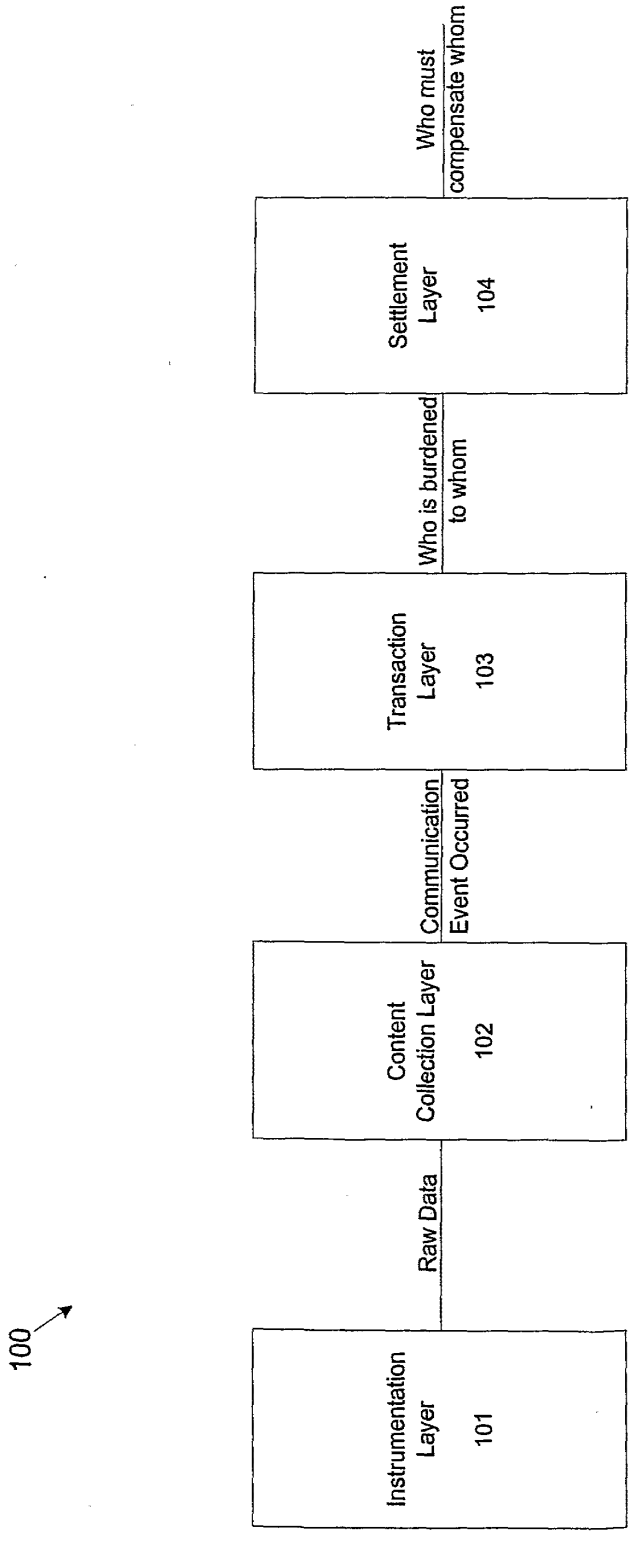

100
Instrumentation Layer 101
Raw Data
Content Collection Layer 102
Communication Event Occurred
Transaction Layer 103
Who is burdened to whom
Settlement Layer 104
Who must compensate whom

Figure 1

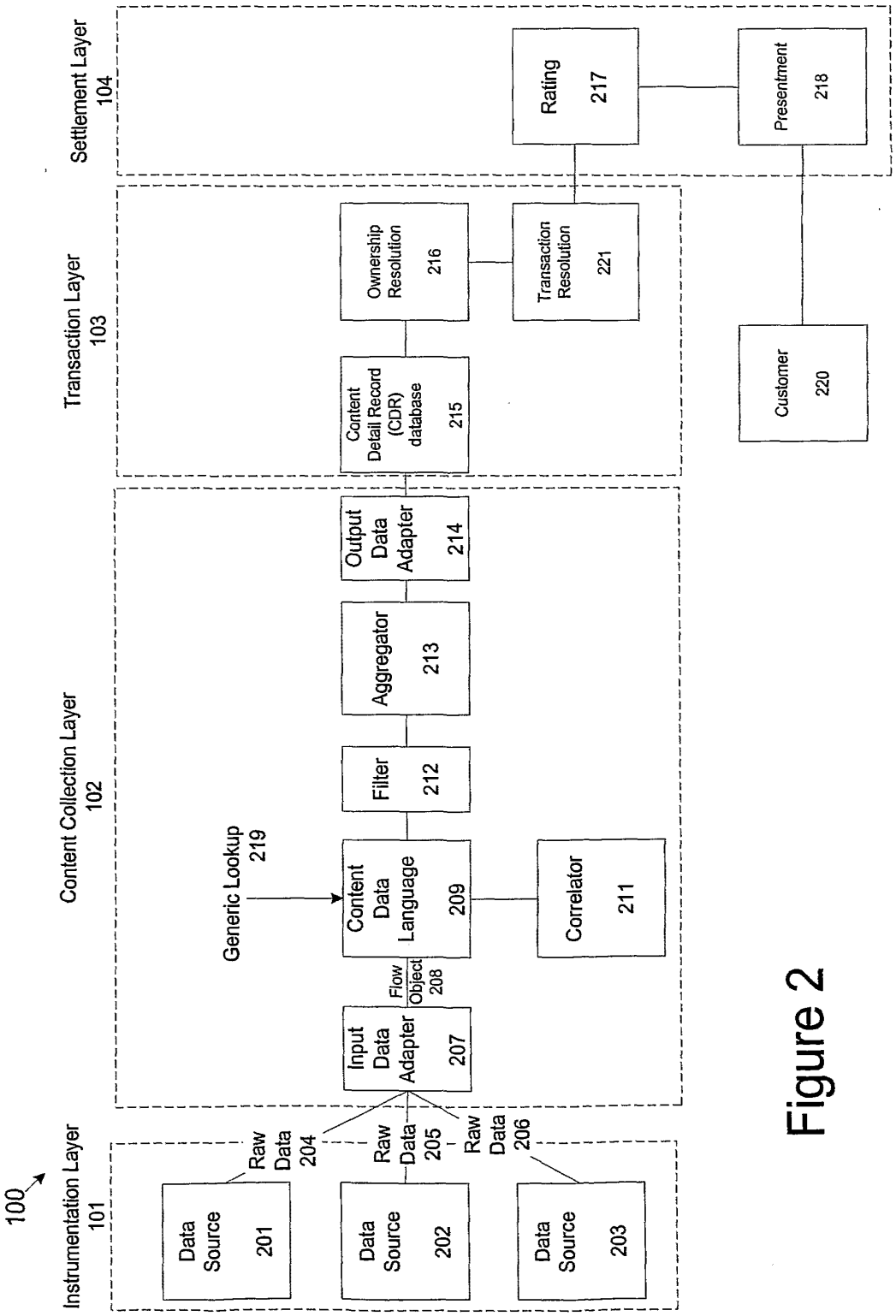

100
Instrumentation Layer 101
Data Source 201
Data Source 202
Data Source 203
Raw Data 204
Raw Data 205
Raw Data 206
Content Collection Layer 102
Input Data Adapter 207
Flow Object 208
Content Data Language 209
Generic Lookup 219
Filter 212
Aggregator 213
Output Data Adapter 214
Correlator 211
Transaction Layer 103
Content Detail Record (CDR) database 215
Ownership Resolution 216
Transaction Resolution 221
Settlement Layer 104
Rating 217
Presentment 218
Customer 220

Figure 2

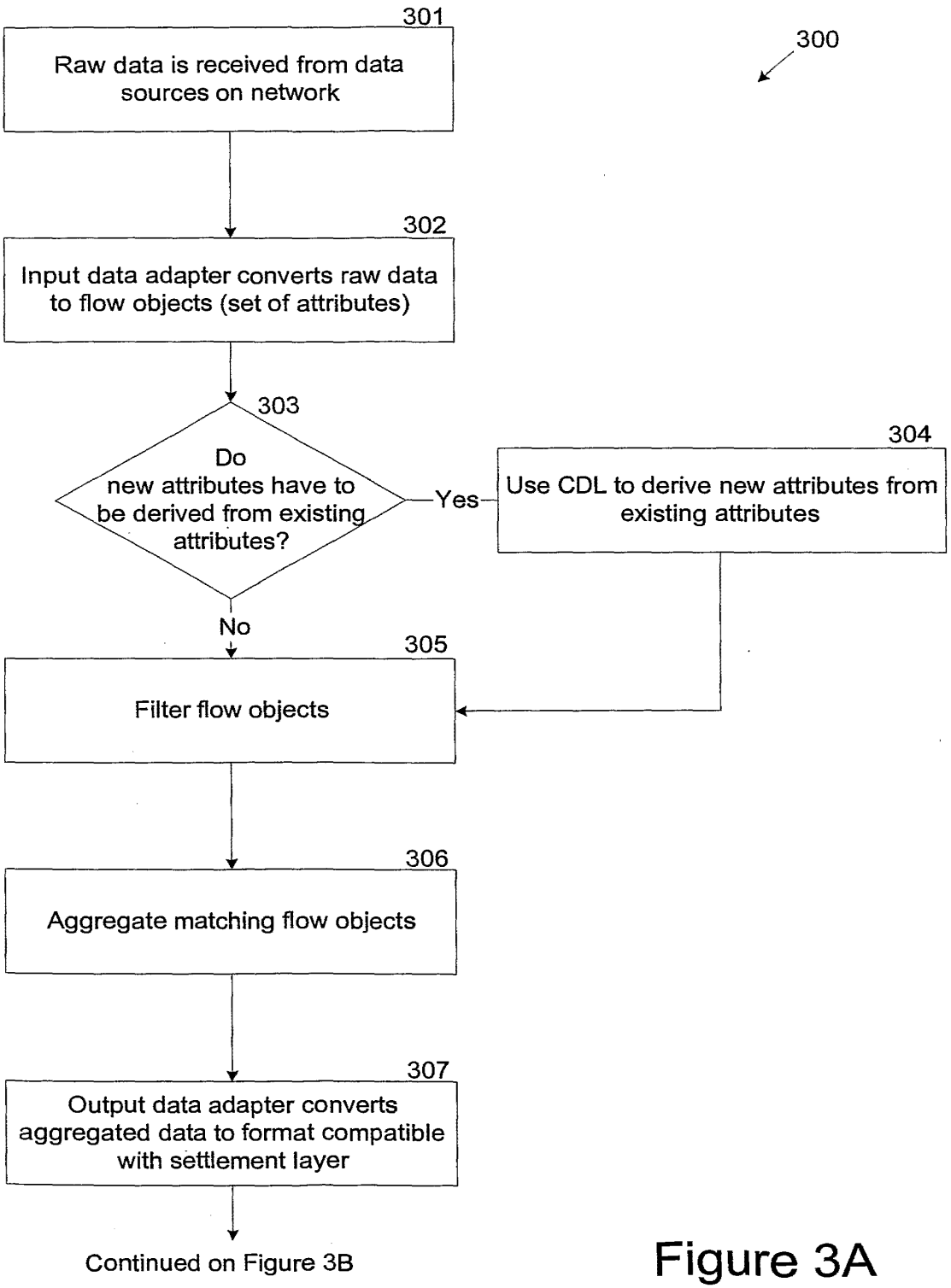

301
Raw data is received from data sources on network
300
302
Input data adapter converts raw data to flow objects (set of attributes)
303
Do new attributes have to be derived from existing attributes?
Yes
304
Use CDL to derive new attributes from existing attributes
No
305
Filter flow objects
306
Aggregate matching flow objects
307
Output data adapter converts aggregated data to format compatible with settlement layer
Continued on Figure 3B

Figure 3A

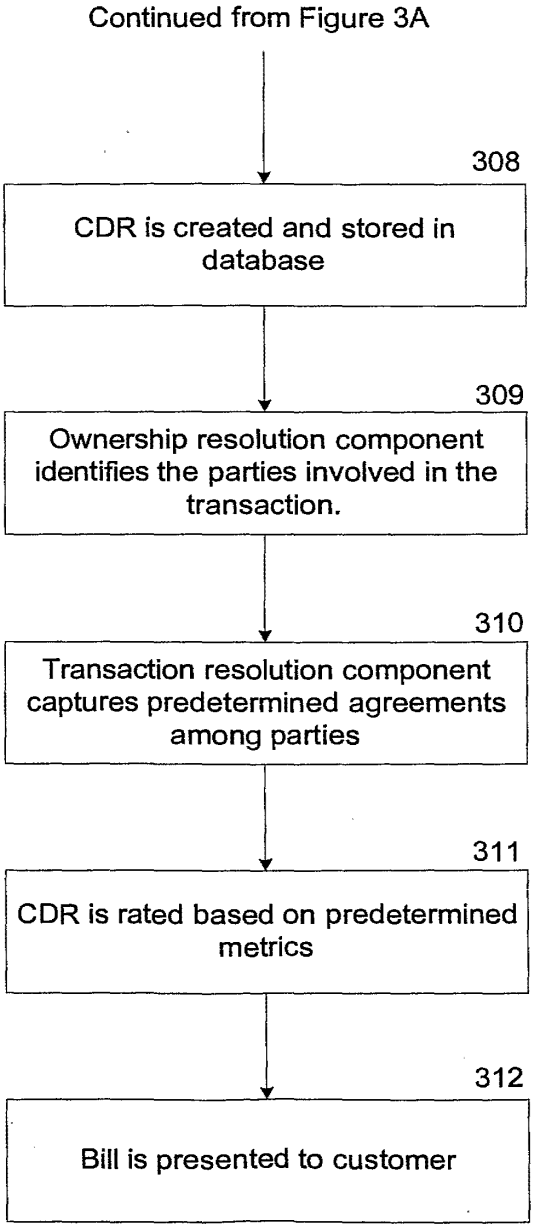

Continued from Figure 3A
308
CDR is created and stored in database
309
Ownership resolution component identifies the parties involved in the transaction.
310
Transaction resolution component captures predetermined agreements among parties
311
CDR is rated based on predetermined metrics
312
Bill is presented to customer

Figure 3B

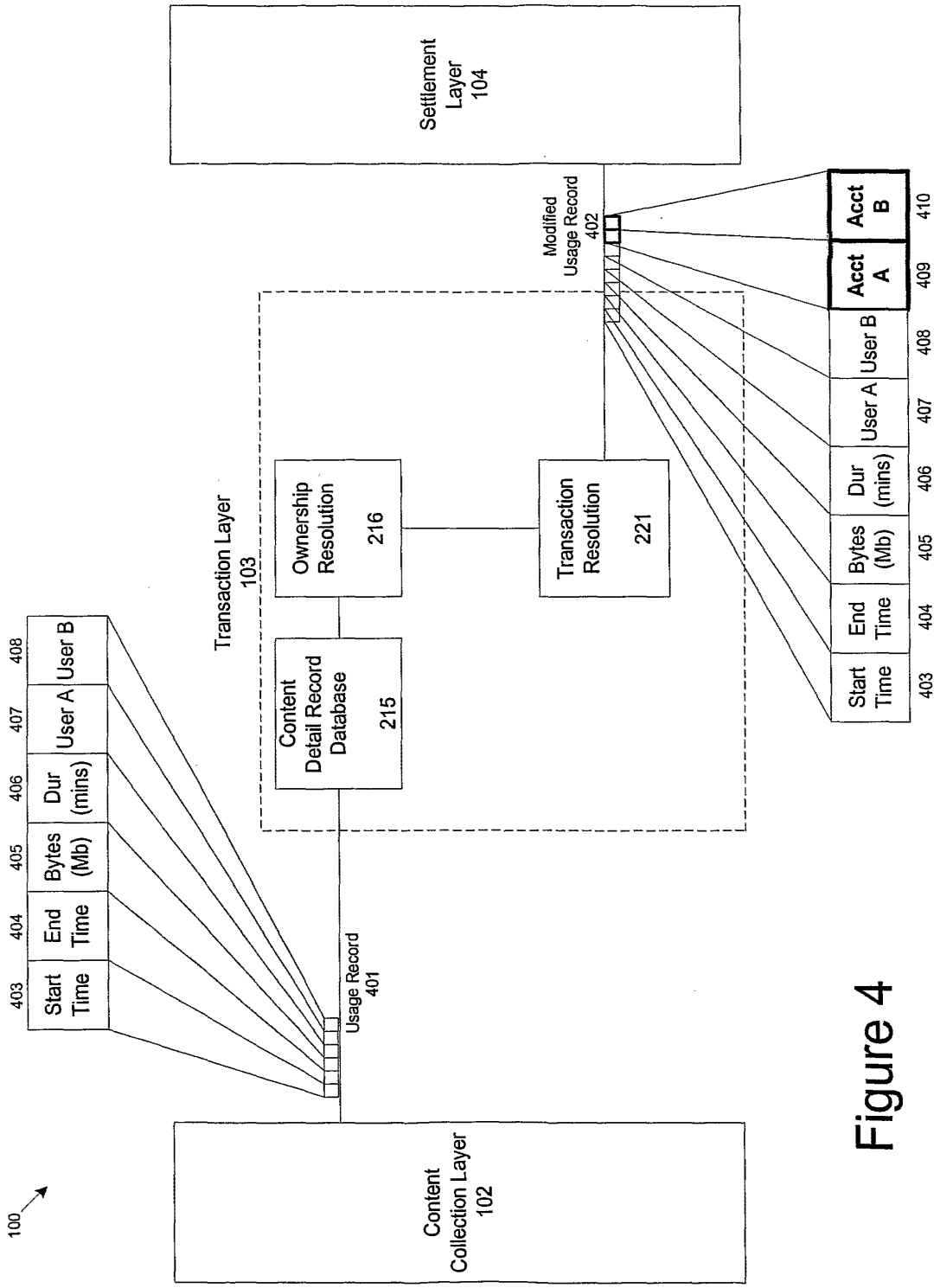

100
Content Collection Layer 102
Usage Record 401
Start Time 403
End Time 404
Bytes (Mb) 405
Dur (mins) 406
User A 407
User B 408
Transaction Layer 103
Content Detail Record Database 215
Ownership Resolution 216
Transaction Resolution 221
Modified Usage Record 402
Settlement Layer 104
Start Time 403
End Time 404
Bytes (Mb) 405
Dur (mins) 406
User A 407
User B 408
Acct A 409
Acct B 410

Figure 4

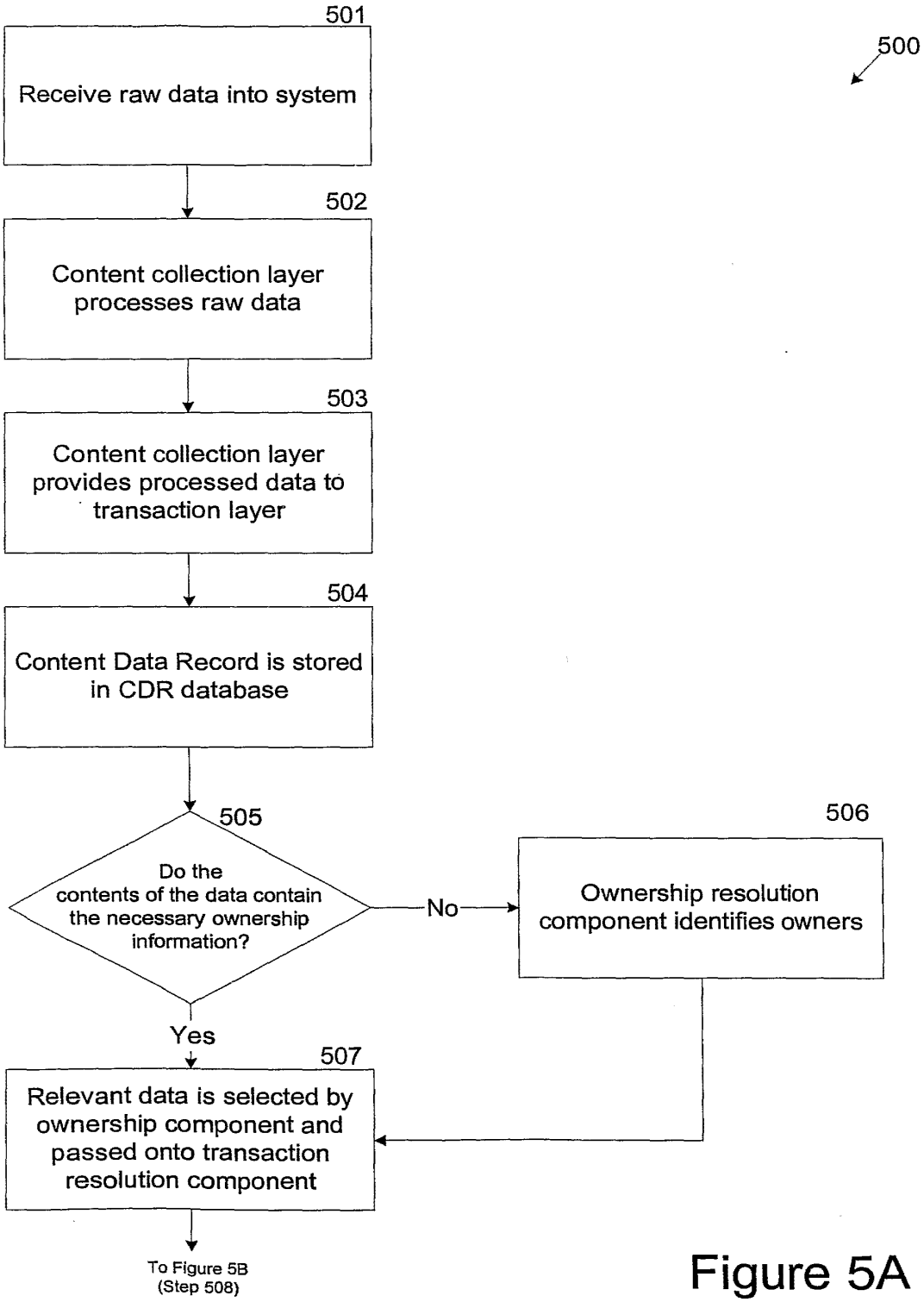

500
501
Receive raw data into system
502
Content collection layer processes raw data
503
Content collection layer provides processed data to transaction layer
504
Content Data Record is stored in CDR database
505
Do the contents of the data contain the necessary ownership information?
No
506
Ownership resolution component identifies owners
Yes
507
Relevant data is selected by ownership component and passed onto transaction resolution component
To Figure 5B (Step 508)

Figure 5A

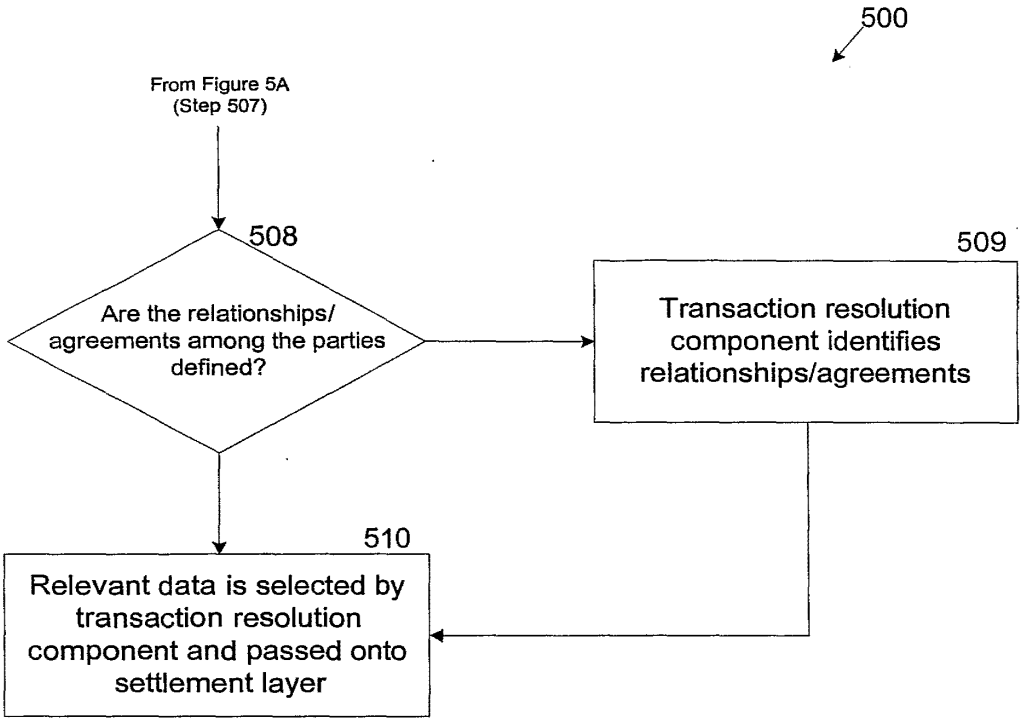

500
From Figure 5A
(Step 507)
508
Are the relationships/ agreements among the parties defined?
509
Transaction resolution component identifies relationships/agreements
510
Relevant data is selected by transaction resolution component and passed onto settlement layer

Figure 5B

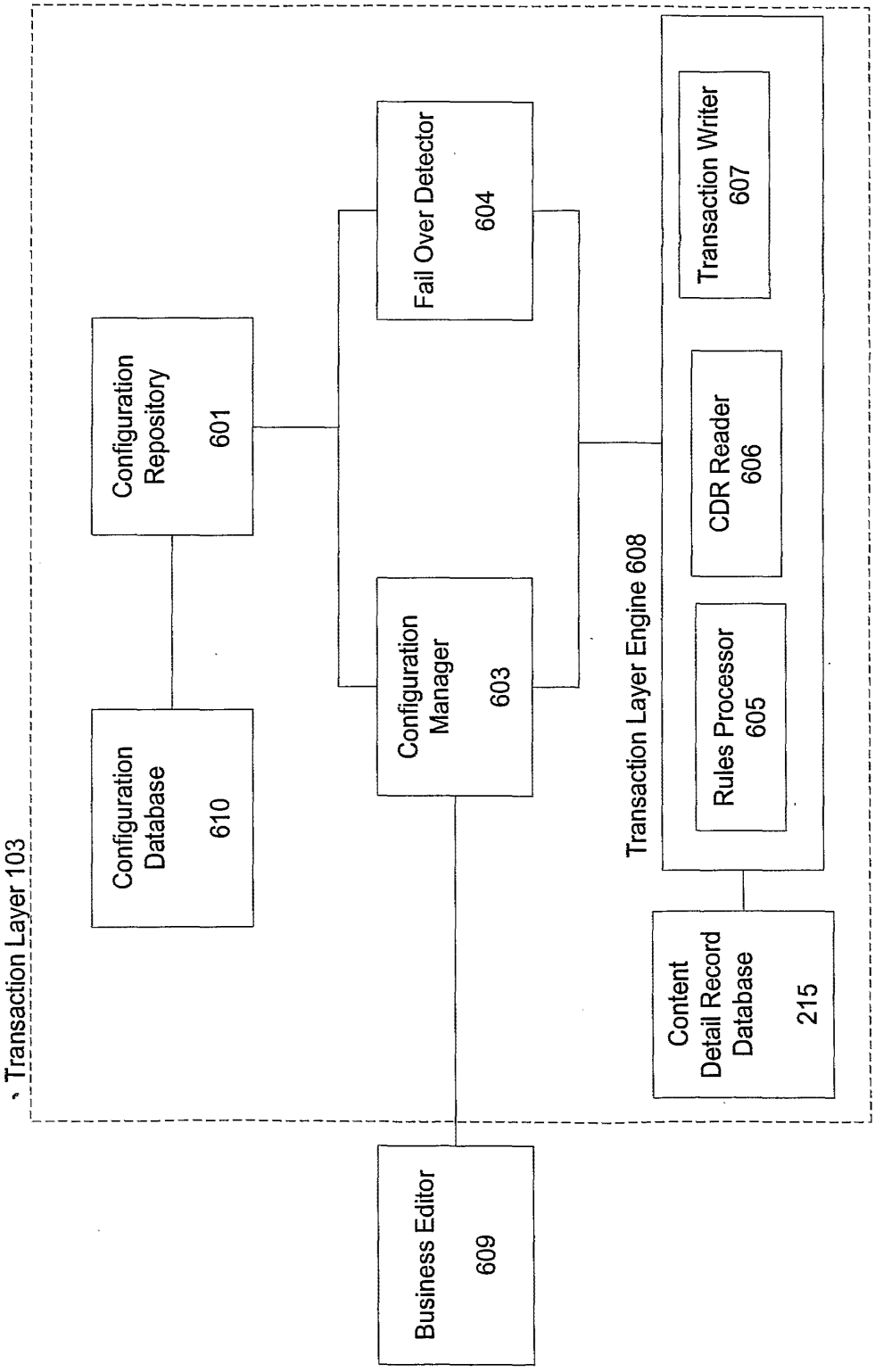

Transaction Layer 103
Configuration Repository 601
Configuration Database 610
Fail Over Detector 604
Configuration Manager 603
Business Editor 609
Transaction Layer Engine 608
Transaction Writer 607
CDR Reader 606
Rules Processor 605
Content Detail Record Database 215

Figure 6

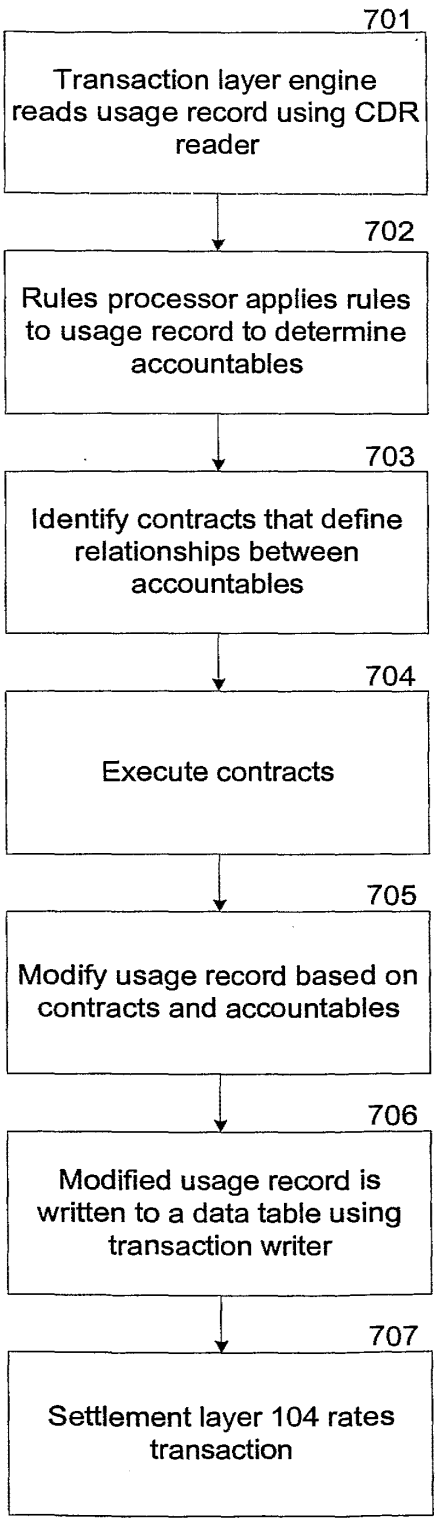

701
Transaction layer engine reads usage record using CDR reader
702
Rules processor applies rules to usage record to determine accountables
703
Identify contracts that define relationships between accountables
704
Execute contracts
705
Modify usage record based on contracts and accountables
706
Modified usage record is written to a data table using transaction writer
707
Settlement layer 104 rates transaction
700

Figure 7

Settlement Scenario

A Content Event might look like

```
14:33:01 128.33.2.41 http://www.content.com disney/lionking.avi 404 4493
```

DATACTR_83.log

- Identify "Content.com" as billed party for caching service
- Identify "128.33.2.41" as billed party for consuming content type .avi
  - Map IP to customer account, vary over time
- Identify log provider (a Web Host service)
- Identify Content Property Owner "Disney" as party to receive Royalty

Ownership creates rules based on URL substring and other event information

- Links from the event to the *multiple* accounts related to that event

Pricing Plans & Pools capture business rules regarding compensation for events

- Fee charged to content.com
- Revenue is paid back to log provider

Figure 8

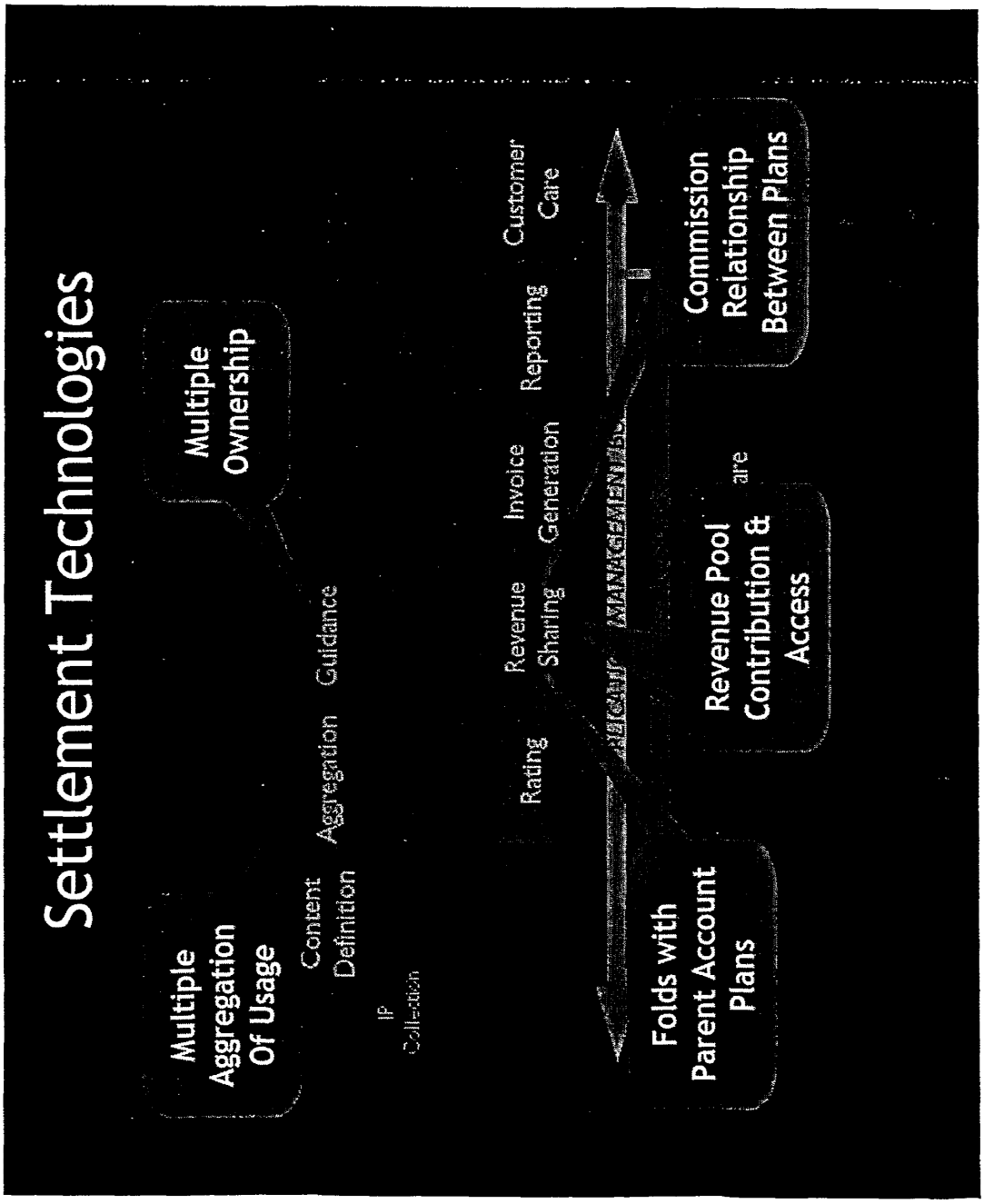

Settlement Technologies
Multiple Aggregation Of Usage
Content Definition
Aggregation
Guidance
IP Collection
Multiple Ownership
Rating
Revenue Sharing
Invoice Generation
Reporting
Customer Care
Folds with Parent Account Plans
Revenue Pool Contribution & Access
are
Commission Relationship Between Plans

Figure 9

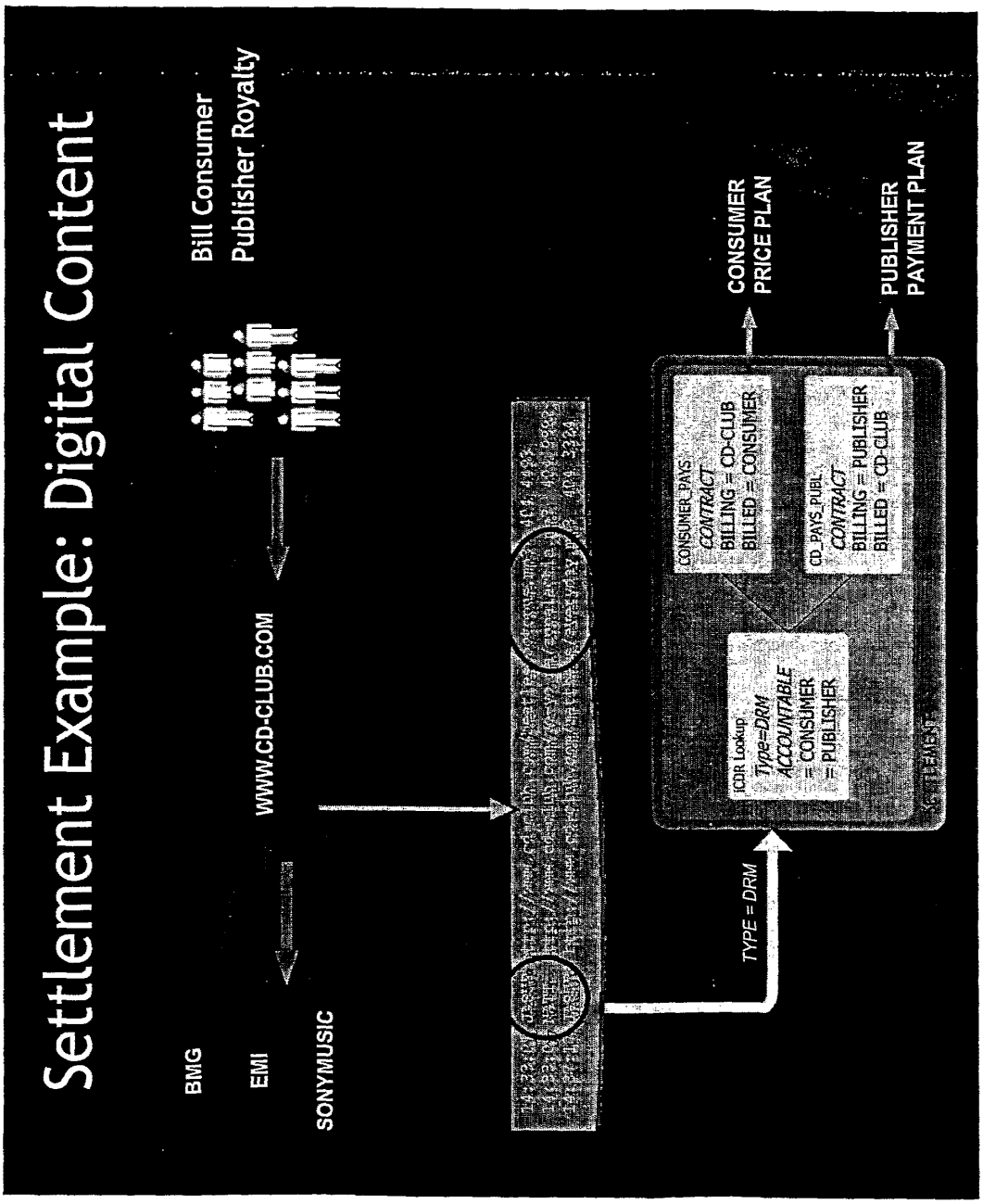

Settlement Example: Digital Content
Bill Consumer
Publisher Royalty
BMG
EMI
SONYMUSIC
WWW.CD-CLUB.COM
CONSUMER
PRICE PLAN
PUBLISHER
PAYMENT PLAN
CONSUMER_PAYS
CONTRACT
BILLING = CD-CLUB
BILLED = CONSUMER
CD_PAYS_PUBL
CONTRACT
BILLING = PUBLISHER
BILLED = CD-CLUB
CDR Lookup
Type=DRM
ACCOUNTABLE
= CONSUMER
= PUBLISHER
TYPE = DRM

Figure 10

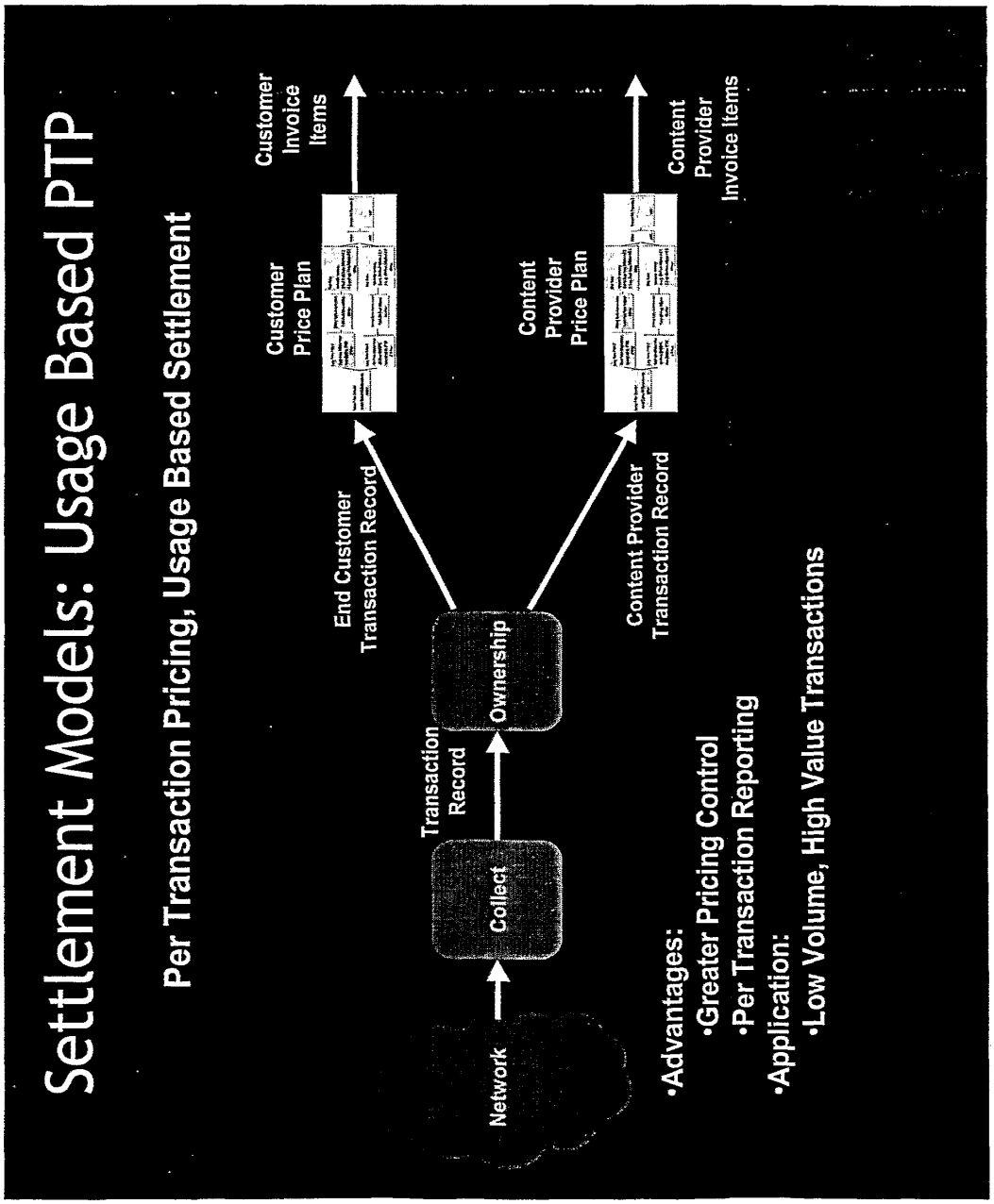

Settlement Models: Usage Based PTP
Per Transaction Pricing, Usage Based Settlement
Customer Invoice Items
Customer Price Plan
End Customer Transaction Record
Content Provider Price Plan
Content Provider Invoice Items
Content Provider Transaction Record
Transaction Record
Ownership
Collect
Network
•Advantages:
•Greater Pricing Control
•Per Transaction Reporting
•Application:
•Low Volume, High Value Transactions

Figure 11

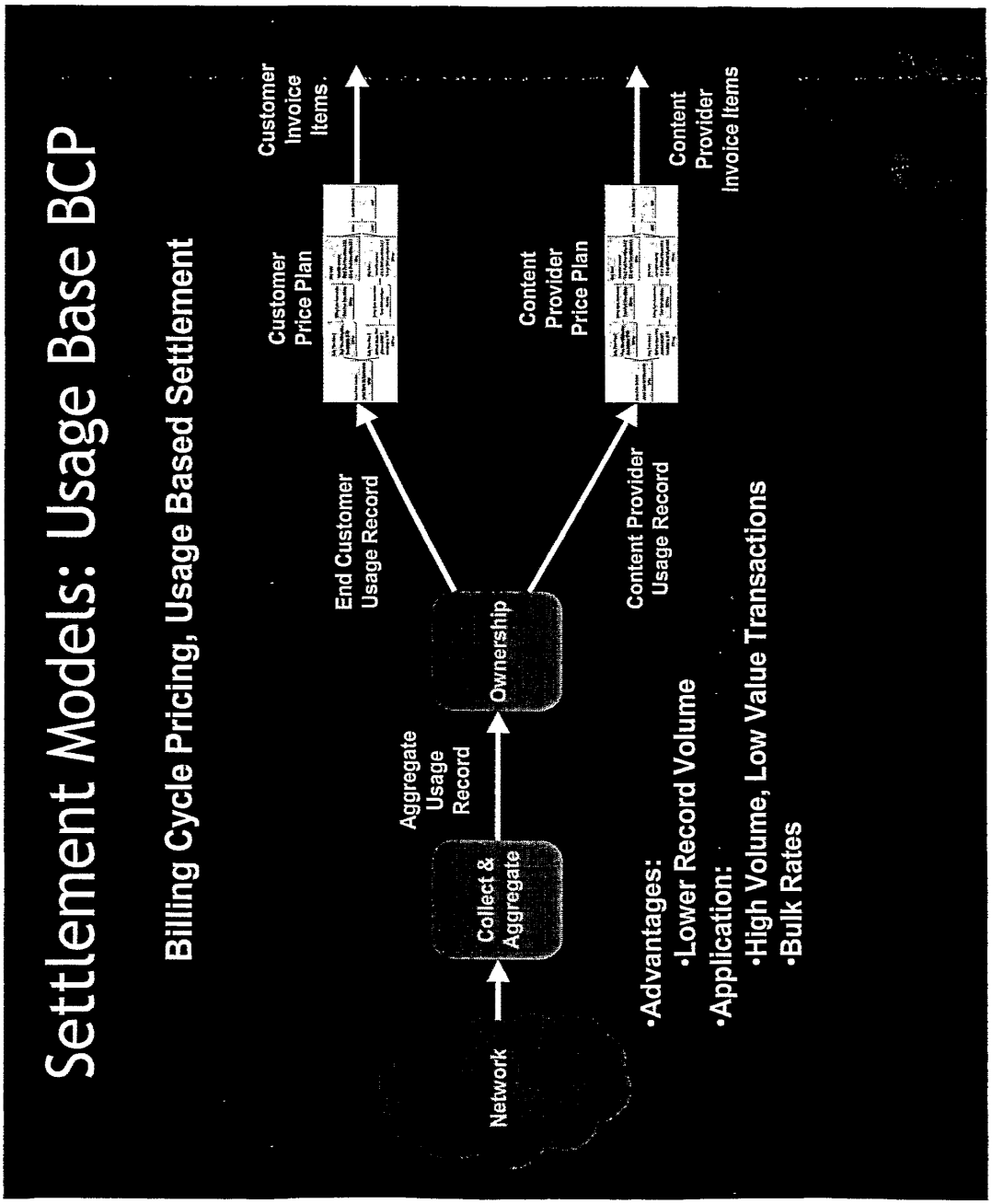

Settlement Models: Usage Base BCP
Billing Cycle Pricing, Usage Based Settlement
Customer Invoice Items.
Customer Price Plan
End Customer Usage Record
Content Provider Price Plan
Content Provider Usage Record
Content Provider Invoice Items
Aggregate Usage Record
Ownership
Collect & Aggregate
Network
•Advantages:
•Lower Record Volume
•Application:
•High Volume, Low Value Transactions
•Bulk Rates

Figure 12

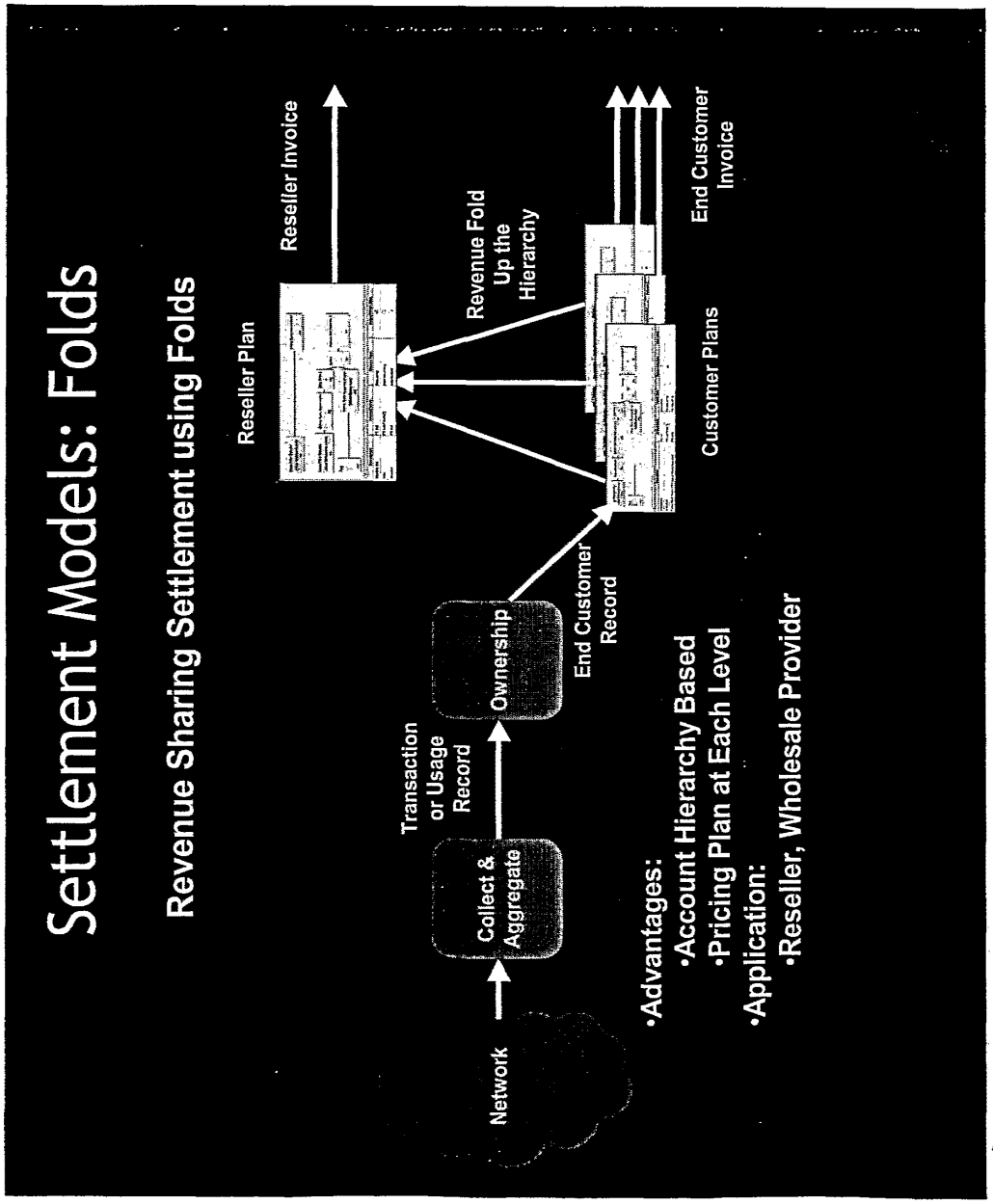

Settlement Models: Folds
Revenue Sharing Settlement using Folds
Reseller Plan
Reseller Invoice
Revenue Fold Up the Hierarchy
End Customer Invoice
Customer Plans
Transaction or Usage Record
Collect & Aggregate
Ownership
End Customer Record
Network
•Advantages:
•Account Hierarchy Based
•Pricing Plan at Each Level
•Application:
•Reseller, Wholesale Provider

Figure 13

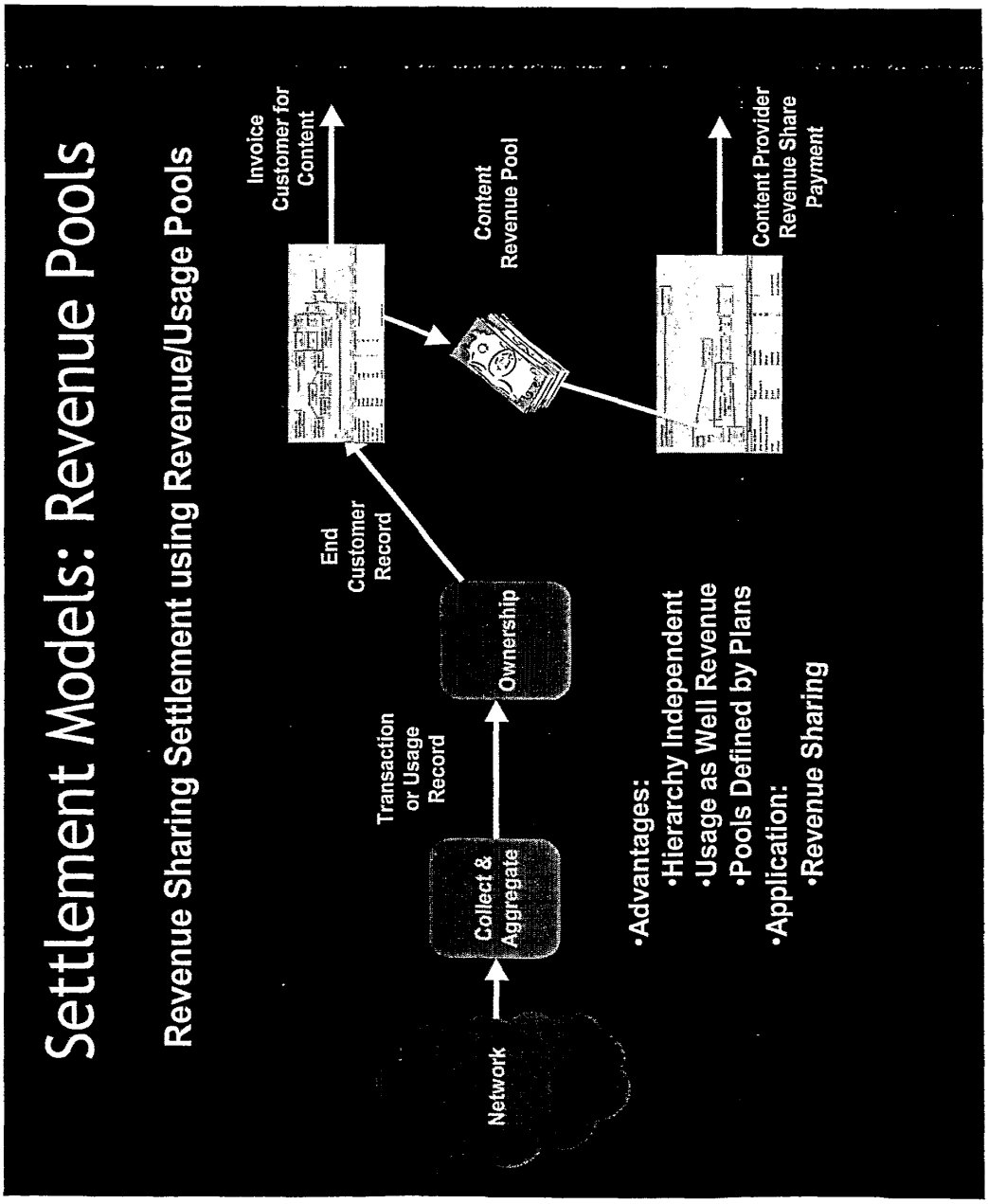

Settlement Models: Revenue Pools
Revenue Sharing Settlement using Revenue/Usage Pools
Network
Collect & Aggregate
Transaction or Usage Record
Ownership
End Customer Record
Invoice Customer for Content
Content Revenue Pool
Content Provider Revenue Share Payment
•Advantages:
•Hierarchy Independent
•Usage as Well Revenue
•Pools Defined by Plans
•Application:
•Revenue Sharing

Figure 14

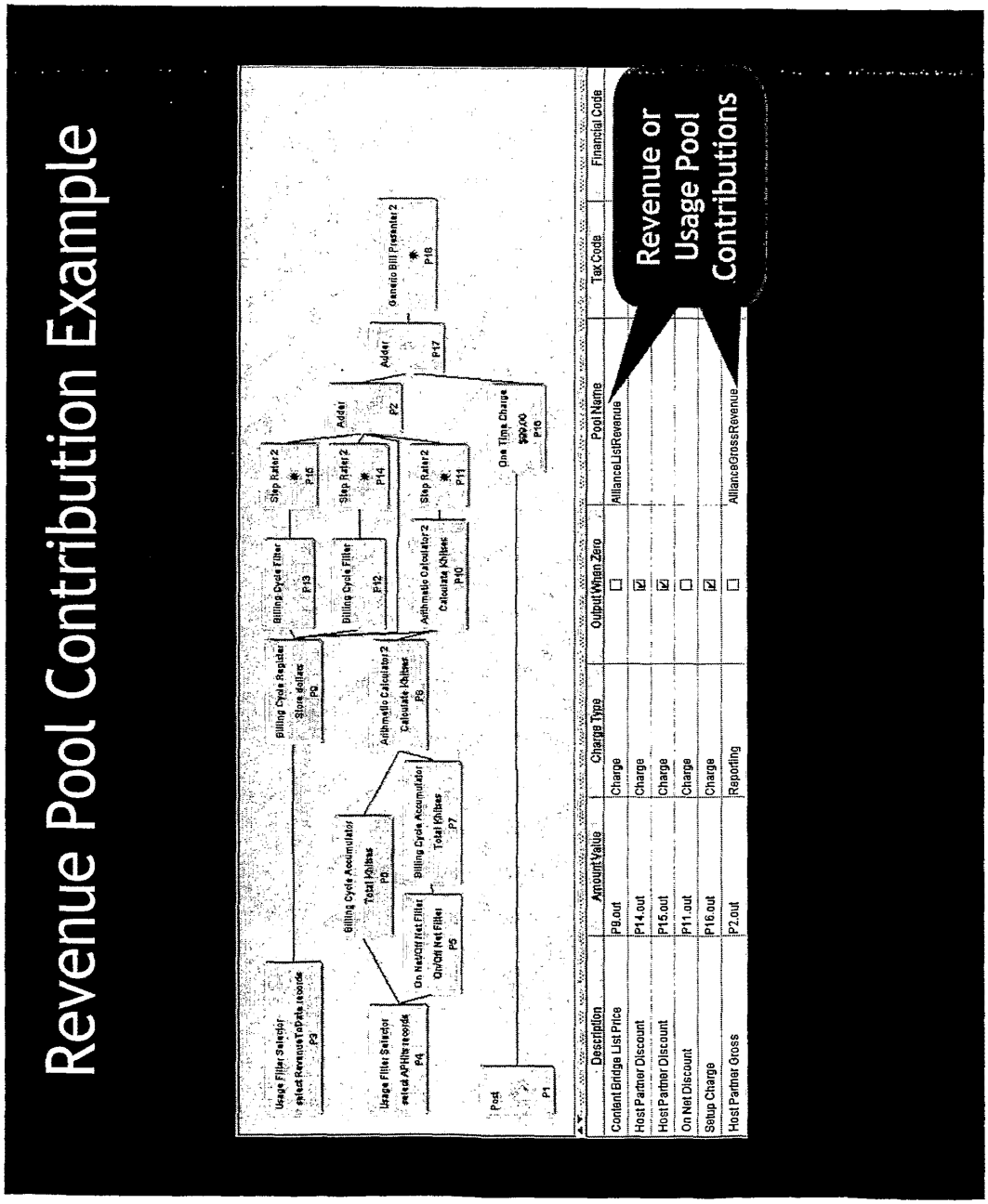

Revenue Pool Contribution Example
Revenue or Usage Pool Contributions
Description
Amount Value
Charge Type
Output When Zero
Pool Name
Tax Code
Financial Code
Content Bridge List Price
P8.out
Charge
AllianceListRevenue
Host Partner Discount
P14.out
Charge
Host Partner Discount
P15.out
Charge
On Net Discount
P11.out
Charge
Setup Charge
P16.out
Charge
Host Partner Gross
P2.out
Reporting
AllianceGrossRevenue

Figure 15

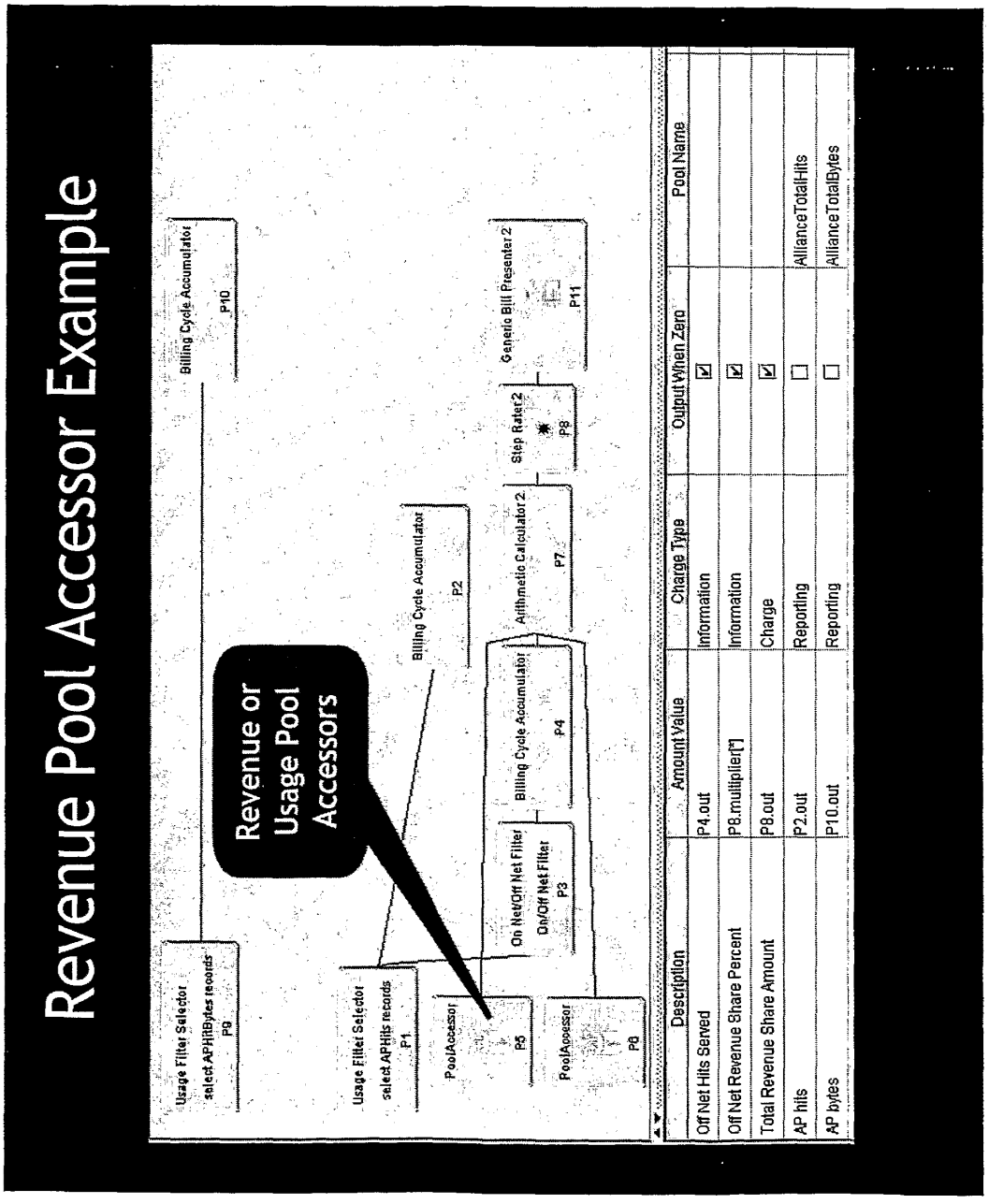

Revenue Pool Accessor Example
Revenue or Usage Pool Accessors
Usage Filter Selector select APHitBytes records P9
Billing Cycle Accumulator P10
Usage Filter Selector select APHits records P1
PoolAccessor P5
PoolAccessor P6
On Net/Off Net Filter P3
Billing Cycle Accumulator P4
Billing Cycle Accumulator P2
Arithmetic Calculator 2 P7
Step Rate*2 P8
Generic Bill Presenter 2 P11
Description | Amount Value | Charge Type | Output When Zero | Pool Name
Off Net Hits Served | P4.out | Information | ☑
Off Net Revenue Share Percent | P8.multiplier[*] | Information | ☑
Total Revenue Share Amount | P8.out | Charge | ☑
AP hits | P2.out | Reporting | ☐ | AllianceTotalHits
AP bytes | P10.out | Reporting | ☐ | AllianceTotalBytes

Figure 16

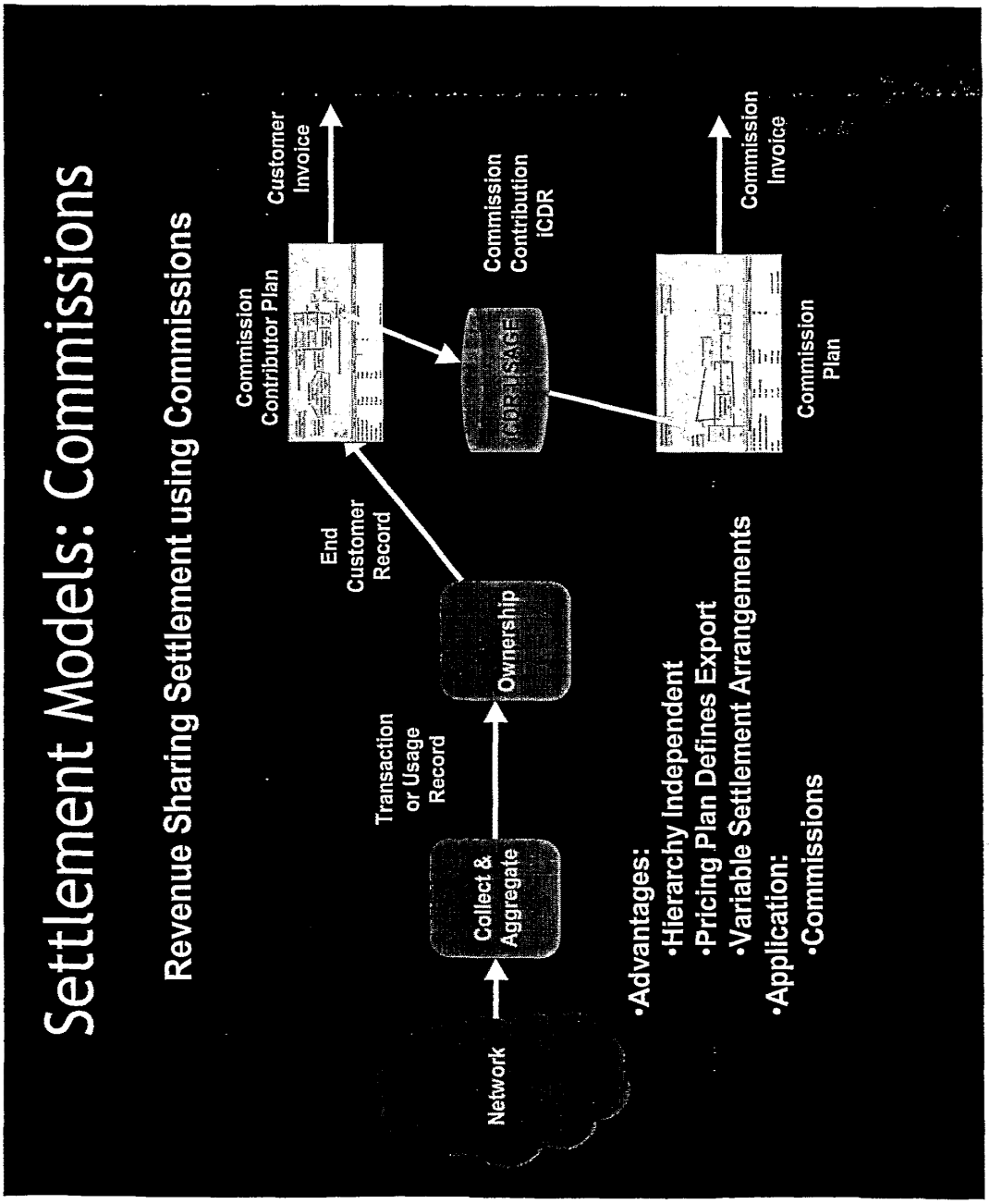

Settlement Models: Commissions
Revenue Sharing Settlement using Commissions
Network
Collect & Aggregate
Transaction or Usage Record
Ownership
End Customer Record
Commission Contributor Plan
Customer Invoice
Commission Contribution iCDR
Commission Plan
Commission Invoice
•Advantages:
•Hierarchy Independent
•Pricing Plan Defines Export
•Variable Settlement Arrangements
•Application:
•Commissions

Figure 17

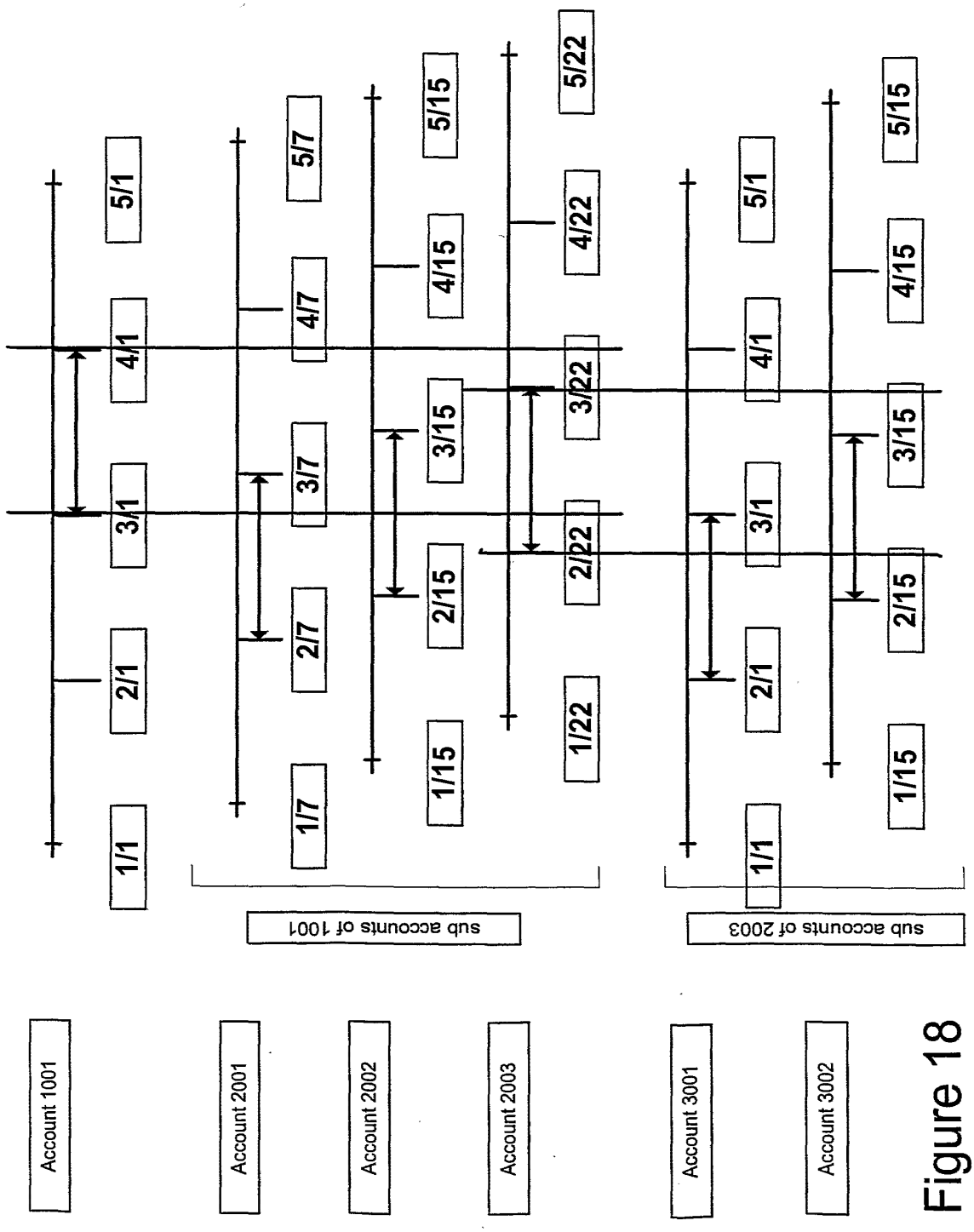

Account 1001
Account 2001
Account 2002
Account 2003
Account 3001
Account 3002
sub accounts of 1001
sub accounts of 2003
1/1
2/1
3/1
4/1
5/1
1/7
2/7
3/7
4/7
5/7
1/15
2/15
3/15
4/15
5/15
1/22
2/22
3/22
4/22
5/22

Figure 18

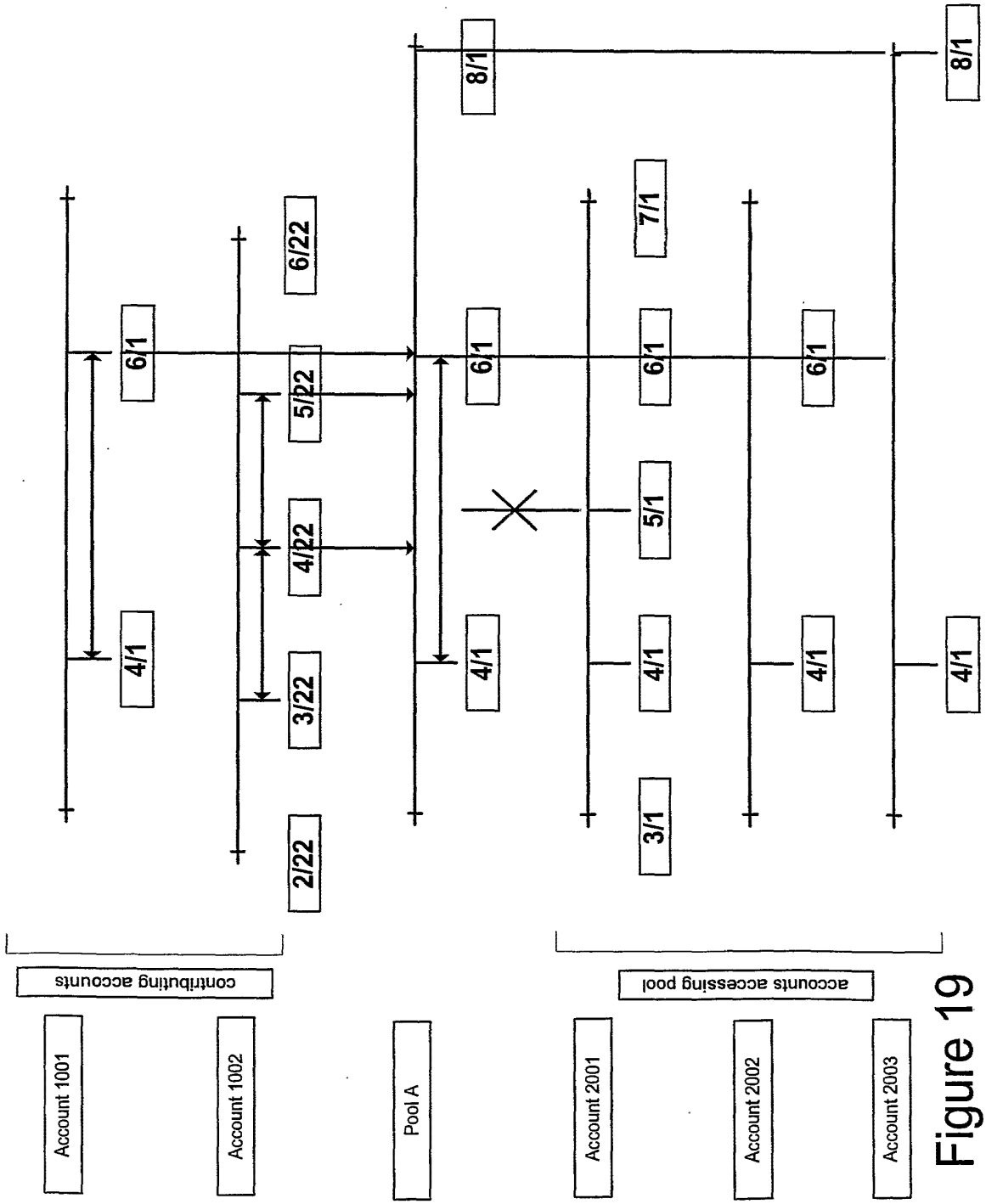

Account 1001
Account 1002
Pool A
Account 2001
Account 2002
Account 2003
contributing accounts
accounts accessing pool
8/1
6/22
7/1
6/1
5/22
5/1
4/22
4/1
3/22
3/1
2/22

Figure 19

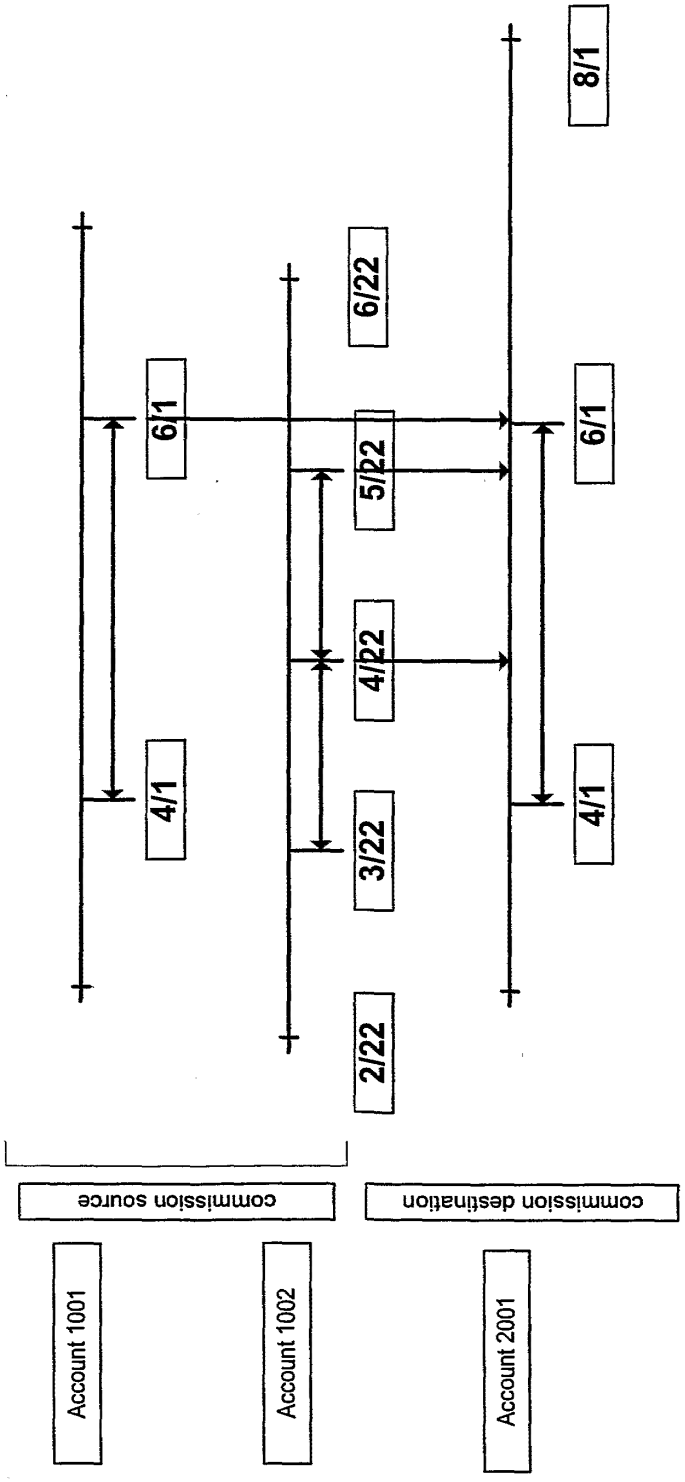

8/1
6/22
6/1
6/1
5/22
4/22
4/1
4/1
3/22
2/22
commission source
commission destination
Account 1001
Account 1002
Account 2001

Figure 20

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Declarations under Rule 4.17:

— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii)) for the following designations AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZM, ZW, ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)*

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Published:

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

(54) Title: SYSTEM, METHOD AND NETWORK NODE FOR PROVIDING SERVICE-SPECIFIC BILLING IN A TELECOMMUNICATIONS SYSTEM

P	ID	N	S1	V	S2	SV	BV
Elvis	PT	price_today	:	number	&	0	500
Elvis	EC	extra_cutback	=	number	&	0	250
Iiris	SP	single_payment	-	number	*	250	250

(57) Abstract: In a multi-provider environment, where a network operator provides bearer services and a service provider provides the actual service, customizing billing for services requires accurate contracts concerning the content and structure of billing data transmitted by the service provider. In order to eliminate this problem, a billing content is determined for a service in such a manner that the content is available to the network operator and it determines parameters (N) provided in service billing data and indicates how to find the parameters from the billing data (ID, S1, S2). For determining billing data, definition rules are defined in advance to indicate at least the type of data that should be specified for each parameter.

WO 02/067616 A1

System, method and network node for providing service-specific billing in a telecommunications system

FIELD OF THE INVENTION

The invention relates to billing for a service transmitted in a telecommunications system, and particularly to providing service-specific billing.

BACKGROUND OF THE INVENTION

Services provided in telecommunications systems are more and more often produced in a multi-provider environment, where a network operator provides bearer services and one or more service providers provide the actual services. A service provider does not maintain a network but purchases the required bearer services from the network operator. Thus, the total price of a service is a combination of the price of the connection and the price of the actual service or content. Even in a multi-provider environment the best way to charge a client is that the network operator attends to authentication and billing of the user of the service according to the user's phone number also on behalf of the service provider. An actual bill is based on billing data transmitted by the service provider in a service response, and collected and processed by a billing data collecting system of the network operator.

A problem with such billing is that the operator and the service provider must have accurate contracts concerning the content and structure of the billing data in order that a service could be billed for in the way the service provider wants. In case of a large number of service providers, the network operator does not necessarily have time or is not able to agree in detail on the contents of the billing data with each service provider, which means that either the introduction of a service into the market will be delayed, or the service provider must arrange billing in some other manner or use an existing billing method, which may not be the best for the service in question.

BRIEF DESCRIPTION OF THE INVENTION

An objective of the invention is to develop a method and equipment implementing the method so as to solve the aforementioned problems. The objective of the invention is achieved by a method, system and network nodes, which are characterized by what is disclosed in the independent claims. The preferred embodiments of the invention are disclosed in the dependent claims.

The invention is based on detecting this problem and on solving it by providing a system of a network operator, preferably a system for process-

ing billing data, with a mechanism for informing the network operator of the form in which the billing data should be disclosed. The mechanism is preferably created by determining rules for defining billing parameters and by determining, by means of these rules, a billing content of a service, which is available to the network operator when forming a call detail record, and by storing the billing content in the system so as to be available to a process producing tickets. A billing content determines the service-specific parameters used in a call detail record, i.e. a ticket, and indicates how to locate the parameters in the billing data. The processing system can constitute a part of the system for collecting billing data.

An advantage of the invention is the ability to transmit and process billing data, which has different contents for different services since the billing parameters can be freely selected. Another advantage of the invention is that no specific service contract is needed between the network operator and the service provider, since the invention enables determining the structure of the billing data in such a manner that the network operator's system identifies the billing parameters and their values. Therefore the operator can provide user authentication and billing services globally to service providers. This even enables billing for free browsing, where a user is able to use all the services and not only the services of the operator or partners thereof.

BRIEF DESCRIPTION OF THE FIGURES

The invention will be described below in more detail by means of the preferred embodiments and with reference to the accompanying drawings, in which

Figure 1 shows a simplified network architecture,

Figure 2 shows an example of determining a billing content according to a first preferred embodiment of the invention,

Figure 3 shows formation of a ticket according to the first preferred embodiment of the invention, and

Figure 4 shows an example of a ticket according to the first preferred embodiment of the invention.

DETAILED DESCRIPTION OF THE INVENTION

The present invention can be applied in connection with any telecommunications system where the data required for billing a subscriber is transmitted together with service data. Such systems include for example third-

generation mobile systems, such as the Universal Mobile Telecommunications System (UMTS), and mobile systems similar to the pan-European GSM (Global System for Mobile Communications), such as the GSM 1800 and the PCS (Personal Communication System), and systems based on the aforementioned systems, such as GSM 2+ systems. GSM 2+ services include the general packet radio service (GPRS) and customized applications for mobile network enhanced logic (CAMEL). The invention can also be applied in fixed systems. The invention will be described below by using as an example the GSM providing a WAP (Wireless Application Protocol) service, without restricting the invention thereto, however. The WAP is a protocol specification that enables apparatuses utilizing wireless data transmission, such as mobile phones, to use Internet services.

Figure 1 shows a simplified network architecture of a first preferred embodiment of the invention, and it illustrates only some elements of a system architecture J. Network nodes shown in Figure 1 are logical units, the implementation of which can differ from that of the figure. It is obvious to a person skilled in the art that the system can also comprise other functions and structures, which do not have to be described in more detail herein. The description of the system is by no means restrictive but only suggestive.

The system shown in Figure 1 consists of a system of a network operator VJ and a system of a service provider PJ. In the example of Figure 1, a mobile station MS user has set up a connection to a server S providing a WAP service via the network operator's network PLMN via a WAP gateway W_GW in a previously known manner. In the first preferred embodiment of the invention, the WAP gateway W_GW picks the billing data from a service response transmitted by the server and stores it in a log file, which is retrieved by a charging gateway CG connected to the network operator's network PLMN and which is processed into call detail records, i.e. tickets. An example of a ticket is shown in Figure 4. The tickets are then transmitted to a billing centre BC, which attends to billing of a user. The picking of billing data refers to picking of data used to form a ticket, such as a part of the service response containing the data required in billing. In a service response, billing data can be located for example in an HTTP (Hyper Text Transport Protocol) header. In another embodiment of the invention, the WAP gateway W_GW does not store the billing-related data that was picked into a log file but transmits the data to the charging gateway CG for example via a real-time interface. The details of

the billing, e.g. how billing data is transmitted, collected and retrieved and where it is stored, are not significant for the invention. For example, arranging billing for the WAP service is described in more detail in Finnish Patent Application 20000589 (Arranging billing in a telecommunications system), which is incorporated herein by reference.

The charging gateway CG comprises an interface I, via which service-specific billing contents LS can be determined in the charging gateway. Examples of such billing contents are shown in Figure 2. The interface I thus provides configuring means for determining the content and structure of the billing data and the ticket and for storing them by means of the definition rules for billing parameters. Billing contents are preferably stored in a memory M of the charging gateway. The network operator has usually determined the definition rules and the service provider determines the actual billing content of the service, i.e. it determines the required parameters and provides parameter specifications. The actual billing content is input/processed into the memory M of the charging gateway via the interface I by the operator or the service provider, depending on their mutual agreement. The interface I can also be arranged to check, in connection with the input or processing of the billing content, that the parameter specifications comply with the definition rules. The definition rules are preferably the same for all the service providers, but the network operator can also customize the rules separately for each service provider. Inputting billing contents does not preferably require a service contract between the service provider and the network operator, but the service provider may be able to input billing contents for example via the Internet after having accepted certain rules and passed a log-in process. The charging gateway CG also comprises processing means, i.e. a process P, which converts the billing data into a ticket by means of the billing content specified for the service. The operation of the process P will be described in more detail in connection with Figure 3.

Depending on the embodiment, the interface I can be located in a different network node than the stored billing contents LS. Neither has to be located in the charging gateway. A network node where the billing contents LS are stored comprises means for receiving requests on billing contents and means for processing and transmitting responses.

In addition to prior art means, a system implementing the functionality of the present invention and the network nodes of the system comprise

means for creating and storing service-specific billing contents. The system and the network nodes can also comprise means for processing a billing content. The means are preferably implemented by using the present network nodes, especially the processors and memory thereof. All the modifications required to implement the invention can be carried out in the form of added or updated software routines, application-specific integrated circuits (ASIC) and/or programmable circuits.

Figure 2 shows a manner according to the first preferred embodiment of the invention of determining service-specific billing contents stored in a database table where each service-specific parameter to be taken into account in billing is provided with required data, i.e. the parameters are determined according to the definition rules. It is assumed in the first preferred embodiment of the invention that a billing ticket consists of standard data and service-specific data. Parameters for the standard data are determined generally in the first preferred embodiment, i.e. they are shared by all services. Such standard data includes for example user identifier, service name, service status data, and time. Standard data or some part of it can be transmitted with service-specific billing data, but for example in case of WAP services they are usually obtained in some other manner. Service-specific data is determined in the billing content of a service. The parameters that should be or may be specified in the billing content naturally depend on the operator, the billing system used by the operator, and the form in which billing data is transmitted. These matters are described in the definition rules. The essential fact in the billing content of an individual service is that it can be connected to a specific service and that at least one billing parameter is determined in such a manner that the billing parameter and the value thereof can be somehow separated from the billing data. However, in the first preferred embodiment of the invention it is not necessary to determine a billing content for all the services if standard data is sufficient to bill for a service.

In the example shown in Figure 2, it is assumed for the sake of clarity that the service name identifies the service sufficiently, i.e. the service cannot be confused with any other service, and different service providers do not have services with similar names. In embodiments where a mere service name does not identify a service sufficiently accurately, a service to be billed for can be identified for example based on the names of both the service provider and the service.

In the first preferred embodiment of the invention, the definition rules do not restrict in any way the ability of service providers to determine the parameters to be taken into account in billing, and the only requirement is that each parameter of a service billing content is provided with not only a name N but also the following data:

- The service P to which the parameter is related. A parameter defined by means of a service can be connected to the service billing content,
- A parameter identifier ID used in billing data to help locate the parameter and the value thereof,
- A separator S1 between an identifier and the value thereof in the billing data,
- Value type V,
- The allowed range of variation of the value indicated by means of the lowest value SV and the highest value GV, and
- A separator S2 between the identifiers.

On the basis of this data, a single ticket may contain 1 to n items of service-specific billing data, which are mutually independent. The billing data can even consist of data not used by the network operator in its own billing. For example based on the specifications shown in Figure 2, a ticket formed of a service called 'Elvis' contains the billing value of two parameters in the service-specific data, and a ticket formed of a service called 'Iiris' contains the billing value of one parameter. The same parameter can also be used in different services and with different ranges of variation. Eliminating parameters from or adding new parameters into a service is easy and simple in the first preferred embodiment of the invention. It is also easy and simple to alter parameter specifications, for example to update the allowed range of variation.

In a preferred embodiment of the invention, the operator can restrict parameter specifications for example by limiting the maximum number of parameters used in one service or by restricting the allowed value types to numbers only. The operator can also determine its own set of billing parameters, which it offers to service providers. The service providers then select from the set of billing parameters the parameters they want to use in billing for each service.

In a preferred embodiment of the invention, parameters and their values to be used in standard data are also specified in the billing content of

each service. In this way standard data can also be configured specifically for each service/service provider.

In another preferred embodiment of the invention, a common billing content is also determined and used for services with no specified billing content of their own. A common billing content can also be determined specifically for each service provider and/or service type. If a service-type-specific billing content is used, the service type is indicated in a service response either directly or indirectly in order that the correct billing content can be selected when forming a ticket. The same applies to service-provider-specific billing contents as well. The service type can be concluded for example based on the service when the system maintains data that links each service to a service type.

In a preferred embodiment of the invention, also a broader description of a parameter, such as the manner of use or the meaning in billing, can be stored in the billing content.

In another preferred embodiment of the invention, several different identifiers with different value ranges can be stored for one parameter in a billing content. In this embodiment, only one such identifier is shown in the billing data.

If the highest allowed value of the identifiers is equal to the lowest allowed value, in a preferred embodiment of the invention the billing data does not have to contain a value for the parameter, but it is possible to use the value determined in the billing content when forming a ticket.

In the other embodiments of the invention, the predetermined definition rules can differ from what is shown in Figure 2. It is sufficient that the definition rules ensure that the parameters in the billing content are known and that they will be found from the billing data.

Figure 3 shows a flowchart of how a ticket (or a part thereof, if one ticket combines the billing data of several service responses) is formed according to the first preferred embodiment of the invention from the billing data in the service response. It is assumed in the example of Figure 3 that the service provider has transmitted billing data or that the billing data field is not empty. An empty billing data field is preferably not processed at all. The example of Figure 3 does not determine at which stage the tickets should be transmitted to the billing centre. In the first preferred embodiment of the invention, service-specific billing data is transmitted in HTTP headers of a service response. Transmitting billing data as a part of an HTTP header has an advantage that

the data is not transmitted from the gateway, such as the WAP gateway, to the subscriber of the service. Furthermore, an HTTP header is an efficient channel of data transmission between a service provider and an operator.

Since it is not significant for the invention how the billing data is found for example from a log file, the starting point of Figure 3 is that in step 301 the processing of billing data is initiated. For example in the first preferred embodiment of the invention, the WAP gateway picks the billing data from the HTTP header of the service response for the WAP service on the basis of a carriage return. An example of billing data will be described below. The payer is identified first in step 302. The payer can be for example the end user or the service provider, such as a service provider providing a commercial WAP/SMS push service. A payer is identified according to the system used. In the present WAP services, a user is identified based on a phone number received during the set-up of the connection. In the future third-generation mobile systems and in general Internet-based services, the end user can be identified for example from the service log-in data transmitted by the service provider. It is also possible to identify both the payer and the user. After the payer has been identified, the service to which the billing data is related is identified in step 303. The service can be identified either directly by means of an identifier indicating the service name in the HTTP header, or by means of an analysis of a URL (Uniform Resource Locator) address. After the service has been identified, the standard data is retrieved from the billing data and stored (or the part of the standard data not received via some other route/earlier) in a ticket in step 304, and the service billing content is retrieved in step 305. The service billing content is retrieved in the first preferred embodiment of the invention by checking the database table shown in Figure 2 and by picking all the parameters with their specifications that relate to the service to be billed for. In step 306, it is checked whether a billing content was obtained. In other words, it is checked whether a billing content has been specified for the service. If a billing content was obtained (i.e. has been specified), the processing of the first parameter is initiated in step 307 and a corresponding identifier is retrieved from the HTTP header in step 308. If such an identifier was found (step 309), the value given for the identifier is retrieved in step 310. It is thereafter checked in step 311 whether the value is allowed, i.e. whether it is within predetermined limits and of a specified type. If the value was allowed, the parameter name and value are stored in the ticket in step 312, and it is checked in step 313 whether the

parameter was the last parameter of the billing content. If the parameter was not the last one, the next parameter is subjected to processing in step 314, whereafter the process proceeds from step 308 by searching the HTTP header for the corresponding identifier.

If the parameter was the last one (step 313), the processing of the billing data is terminated in step 315.

If the parameter value was not allowed (step 311), a failure report is generated to the system in step 316, and the ticket field in question is left empty. After the failure report has been generated, the process proceeds to step 313 to check whether the processed parameter was the last one in the billing content.

If a parameter identifier was not located (step 309), the process proceeds to the last step 313 to check whether the processed parameter was the last parameter in the billing content. In other words, it is assumed in the first preferred embodiment of the invention that this time the service provider did not want to use this parameter for billing. Such a parameter can be for example an additional discount parameter.

If a billing content was not obtained (step 306), it has not been determined for the service, wherefore the processing of the billing data is terminated in step 315.

In a preferred embodiment of the invention, at least some of the parameter specifications of the standard data are contained in the service billing content. In this embodiment, the billing content must be retrieved (step 306) before step 304, i.e. the retrieval and storage of the standard data.

In a preferred embodiment of the invention, all the parameters, including the parameters of the standard data transmitted in the billing data, such as a service identifier, are determined at least specifically for each service provider. In this embodiment, the processing of the billing data is initiated by first identifying the service provider, whereafter the database table is checked in order to retrieve the service-provider-specific parameters, such as a service identifier and possibly at least some of the standard data. After the service has been identified, the parameters specified for the service are retrieved. This provides the billing content, and the parameter values thereof are retrieved in the manner described above.

The steps of Figure 3 are not in an absolute order of time. Some of the aforementioned steps can take place simultaneously or in another order,

such as steps 304 and 305. Some steps can be skipped, or steps not shown in Figure 3 can be implemented between the steps. Some steps can also be replaced with a corresponding step. For example in an embodiment where the log file only comprises notes containing billing data and where a service-type-specific billing content is used for each service, step 306 can be skipped and step 303 can be replaced with a step of identifying the service type.

Figure 4 shows an xml (eXtendable Mark up Language) ticket CDR according to the first preferred embodiment of the invention, where the WAP service 'Elvis' has been subscribed to from mobile phone number 040555555. The billing content of the service has been specified as shown in Figure 2 and the billing data is indicated as follows in the HTTP header of the service response:

X-up-billing-Info:SN=elvis&PT:67&EC=15

In the first preferred embodiment, the ticket comprises standard data 1 and a part 2 that changes according to the service. The service-specific part 2 is determined according to the billing content defined for the service. In the first preferred embodiment of the invention, the standard data 1 includes a calling party identifier 11, billing data 12 in the HTTP header, a service name 13, and a service price class 14, which is used to distribute different services of the same service provider to different price classes. The standard data is followed by the changing part 2 of the ticket, which is not found in tickets related to a service for which a billing content has not been specified. By means of the definitions shown in Figure 2, the process forming a ticket is able to retrieve from the billing data an identifier and a value corresponding to each parameter specified for the service 'Elvis'.

Even though the above description relates to the use of the billing content for altering a ticket, it can also be applied to other functions related to billing, such as selecting what to store in a log file.

It is obvious to a person skilled in the art that as the technology develops, the basic idea of the invention can be implemented in several manners. The embodiments of the invention described above or the individual characteristics thereof can be combined to provide new embodiments. Thus, the invention and the embodiments thereof are not restricted to the above examples, but they may vary within the scope of the claims.

CLAIMS

1. A method of providing service-specific billing in a telecommunications system, where a system of a network operator transmits services of at least one service provider to a subscriber, and forms call detail records to be used in billing and containing at least one billing parameter and the value thereof, **characterized** in that the method comprises at least the following steps of:

determining rules for defining billing parameters,

determining, by means of the definition rules, a billing content for at least one service, the content containing at least one service-specific billing parameter and indicating how the parameter is found from billing data transmitted during the use of the service, and

storing the billing content in the telecommunications system such that it is available to the system of the network operator.

2. A method according to claim 1, **characterized** in that the method also comprises a step of forming, from the billing data, a call detail record, which contains at least a service-specific part comprising service-specific billing parameters and their values defined in the billing content.

3. A method according to claim 1 or 2, **characterized** in that the method also comprises the steps of

determining at least one set of billing parameters, and

selecting the billing parameters to be used in the billing content from the set of billing parameters.

4. A method according to claim 1, 2 or 3, **characterized** by determining a billing content for one service.

5. A method according to claim 1, 2 or 3, **characterized** by determining a billing content for a service type, and indicating the service type in the billing data.

6. A telecommunications system (J) comprising

a system of a service provider (PJ) for transmitting at least one service to a subscriber and for providing billing data related to the service, and

a system of a network operator (VJ) for transmitting the service from the service provider's system to the subscriber of the service, and for providing a call detail record to be used in billing of the subscriber by means of the billing data, and

a memory (M) for storing different specifications,

characterized in that

the system of the network operator (VJ) comprises an interface (I) for storing a billing content (LS) in the memory (M) for the service, the billing content determining at least one service-specific billing parameter of the billing data according to the predetermined definition rules, such that the billing parameter is found from the billing data transmitted during the use of the service.

7. A system according to claim 6, **characterized** in that the system of the network operator (VJ) is arranged to utilize the specifications of the billing content in forming a call detail record from the billing data related to the service.

8. A system according to claim 6, **characterized** in that the system of the network operator (VJ) is arranged to form a call detail record (CDR) for the service from standard data (1) containing the same parameters for all the services, and from service-specific data (2) according to the billing content defined for the service.

9. A system according to claim 6, 7 or 8, **characterized** in that the interface (I) is also arranged to alter the specifications of the billing content.

10. A system according to claim 6, 7, 8 or 9, **characterized** in that the interface (I) is also arranged to check, in connection with said storage, whether the parameter specifications comply with the definition rules.

11. A system according to claim 6, 7, 8, 9 or 10, **characterized** in that the system (J) is based on a GPRS system.

12. A system according to claim 6, 7, 8, 9 or 10, **characterized** in that the system (J) is based on a UMTS.

13. A network node (CG) in a telecommunications system where a system of a network operator transmits services of at least one service provider to a subscriber and provides call detail records used in billing, and where the service provider transmits billing data in connection with a service,

characterized in that

the network node comprises configuring means (I) for specifying parameters contained in the service billing data according to predetermined definition rules, such that the system of the network operator can use the specifications in forming a call detail record related to the service.

14. A network node according to claim 13, **characterized** in

that the configuring means (I) are arranged to alter the parameter specifications.

15. A network node according to claim 13 or 14, **characterized** in that the network node also comprises processing means (P) for forming a call detail record from the billing data related to the service, such that at least a part of the call detail record is formed according to the parameter specifications for the service.

16. A network node (CG) in a telecommunications system, where a system of a network operator transmits services of at least one service provider to a subscriber, and where the service provider transmits billing data in connection with a service, the network node comprising processing means (P) for forming a call detail record from the billing data related to the service,

characterized in that

the processing means (P) are arranged to determine a billing content specified for the service according to predetermined definition rules in the system of the network operator, the billing content containing at least service-specific billing parameters and indicating how the parameters can be found from the billing data, the processing means being also arranged to form a call detail record in such a manner that at least a part of the call detail record complies with the billing content.

17. A network node (CG) according to any one of claims 13 to 16, **characterized** in that the means (I, P) are implemented by software routines.

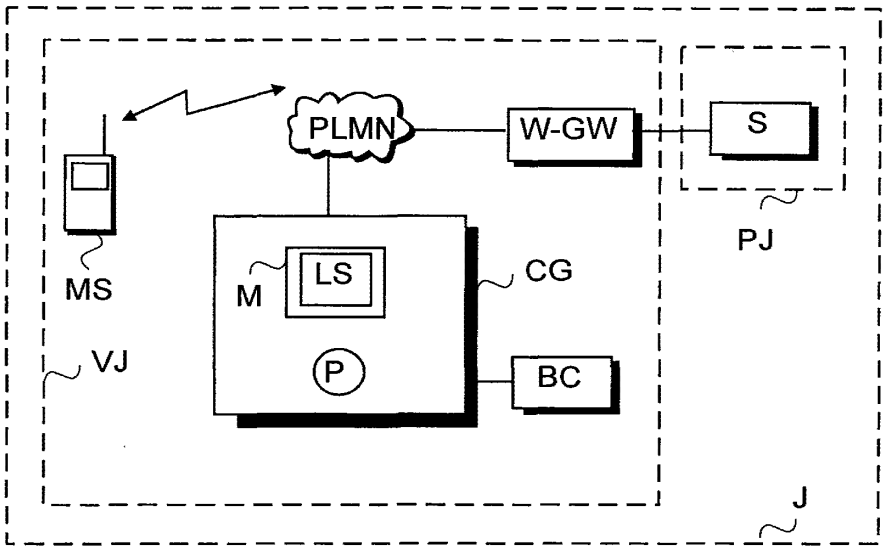


FIG.1

P	ID	N	S1	V	S2	SV	BV
Elvis	PT	price_today	:	number	&	0	500
Elvis	EC	extra_cutback	=	number	&	0	250
Iiris	SP	single_payment	-	number	*	250	250

FIG.2

CDR

<user_msisdn>040555555</user_msisdn>

11 <header>SN=elvis&RC=99&PT:67&EC=15</header>

12 <service_name>ELVIS</service_name>

13 <rate_category>99</rate_category>

1

<psd>
<price_today>67</price_today>
<extra_cutback>15</extra_cutback>
</psd>

2

FIG.4

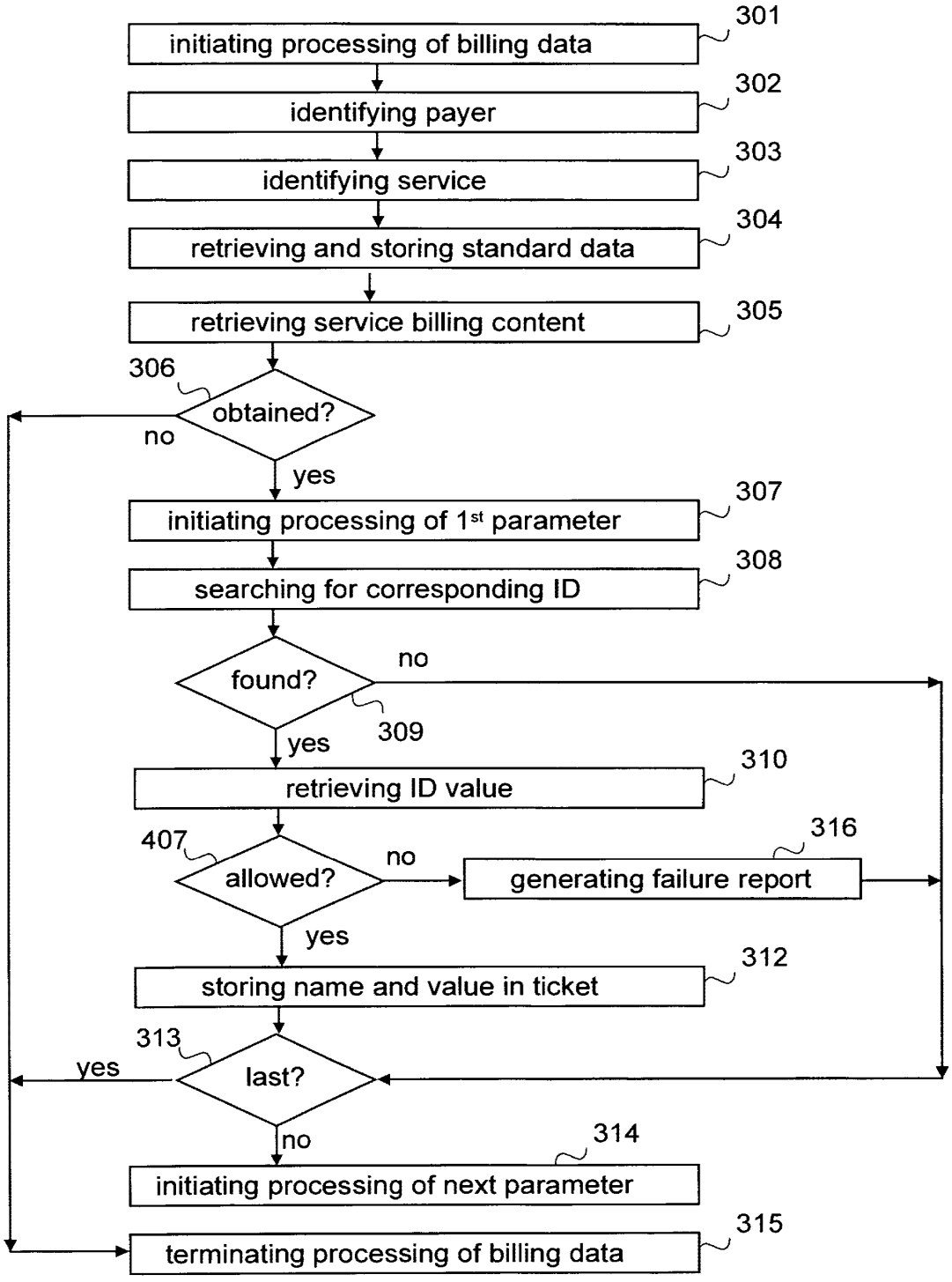

initiating processing of billing data
301
identifying payer
302
identifying service
303
retrieving and storing standard data
304
retrieving service billing content
305
306
obtained?
no
yes
initiating processing of 1st parameter
307
searching for corresponding ID
308
found?
no
309
yes
retrieving ID value
310
407
allowed?
no
316
generating failure report
yes
storing name and value in ticket
312
313
yes
last?
no
314
initiating processing of next parameter
315
terminating processing of billing data

FIG.3

INTERNATIONAL SEARCH REPORT

International application No.
PCT/FI 02/00128

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: H04Q 7/38, H04M 15/00
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5982864 A (JAGADISH ET AL), 9 November 1999 (09.11.99), column 3, line 48 - column 4, line 18, figure 1b, column 7, line 28 - line 32, column 5, line 19 - line 22	1-9,11-17
A	abstract	10
	--	
A	US 6047051 A (GINZBOORG ET AL), 2 April 2000 (02.04.00), abstract	1-17
	--	
P,A	WO 0191003 A2 (ZTANGO, INC), 29 November 2001 (29.11.01), claim 3, abstract	1-17
	--	

[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
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"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"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
23 May 2002	06 -06- 2002
Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86	Authorized officer Malin Söderman /js Telephone No. +46 8 782 25 00

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INTERNATIONAL SEARCH REPORT

International application No.
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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P,A	WO 0133456 A2 (AP ENGINES, INC), 10 May 2001 (10.05.01), page 2, line 15 - line 21, abstract ---	1-17
A	WO 0065812 A1 (TELIA AB), 2 November 2000 (02.11.00), page 19, line 6 - line 15 --- --------	1-17

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INTERNATIONAL SEARCH REPORT
Information on patent family members

01/05/02

International application No.
PCT/FI 02/00128

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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US 6047051 A	02/04/00	AU 730689 B	15/03/01
		AU 4871297 A	03/06/98
		BR 9713014 A	25/01/00
		EP 1012760 A	28/06/00
		FI 964524 A	12/05/98
		NZ 335701 A	27/10/00
		WO 9821676 A	22/05/98
WO 0191003 A2	29/11/01	AU 6333001 A	03/12/01
		US 2002029197 A	07/03/02
WO 0133456 A2	10/05/01	AU 1346901 A	14/05/01
WO 0065812 A1	02/11/00	AU 1191900 A	01/05/00
		EP 1117340 A	25/07/01
		EP 1180297 A	20/02/02
		NO 20015022 A	18/12/01
		SE 9901509 A	28/10/00

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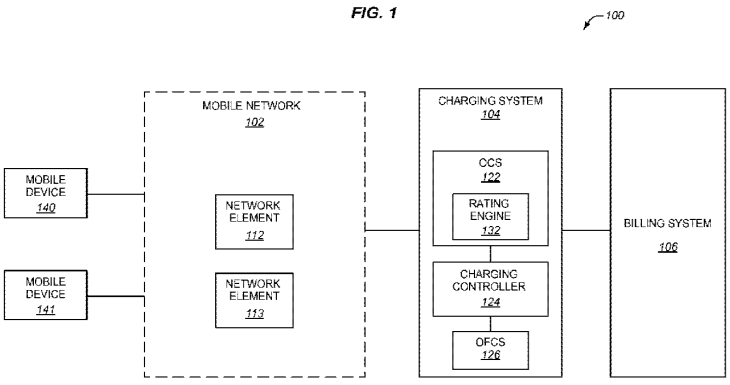
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— *with international search report (Art. 21(3))*

(54) **Title**: FRONT-END CHARGING SYSTEM THAT GENERATES CHARGING DATA PER ENTITY HAVING A REVENUE SHARE

FIG. 1



(57) **Abstract**: Charging systems and methods are disclosed for determining the share of call revenue for multiple entities. One embodiment comprises a charging controller that is coupled to a mobile network and an online charging system. The charging controller receives charging data for a call in the mobile network, and processes the charging data and charging rules to identify entities that have a share in revenue for the call. The charging controller generates a charging request message indicating the entities having a revenue share in the call, and transmits the charging request message to the online charging system to cause the online charging system to determine the revenue share for each of the entities.

WO 2011/002450 A1

FRONT-END CHARGING SYSTEM THAT GENERATES CHARGING DATA PER ENTITY HAVING A REVENUE SHARE

Background

1. Field of the Invention

The invention is related to the field of communication networks and, in particular, to charging and billing in communication networks.

2. Statement of the Problem

When a phone call is placed over a communication network, there may be multiple entities that share in the revenue received for the call. For instance, the network operator that actually operates and maintains the network over which the call is placed shares in the revenue. If the call extends to a foreign communication network, such as for an international call, then the network operator of the foreign communication network shares in the revenue for the call. If a call extends to a roaming mobile user, then the network operator of the mobile network in which the user is roaming shares in the revenue. The process of determining which entities share in the revenue of a call is sometimes referred to as mediation.

In traditional communication networks, charging functions for calls are performed by network components, such as switches. Switches collect charging data for the calls, and generate Charging Detail Records (CDR) that include the charging data. Switches all over the entire network forward the CDRs to a billing system in service provider's IT system (often referred to as a back-end or back-office billing system). The back-office billing system stores information that may be used for the mediation process. For example, the billing system stores agreements that a network operator may have with a foreign network operator for international calls, stores agreements that a network operator may have with mobile networks for roaming scenarios, etc. The billing system also performs settlement processes to invoice customers for the telephone services, and to provide vouchers or credits to other entities.

In more recent charging architectures, postpaid charging is implemented through an Offline Charging System (OFCS) and an associated billing system. Similarly, prepaid charging is implemented through an Online Charging System (OCS) and an associated billing system. To provide offline and online charging, the OCS and the billing systems

each maintain their own rating engine. Also, the billing systems each maintain profiles for the subscribers, profiles for the wholesale customers, and profiles for other network operators having contractual agreements. The overlap of the rating engines and the profiles wastes significant resource in the network. Operational inefficiencies and technical overhead for maintaining two separate charging systems may lead to the drawback in marketing and business activities for a network operator. Presently, the network operators are subject to great pressures to reduce the operational costs.

Summary

Embodiments described herein are able to manage the flow of revenue to the appropriate entities for a call using a converged charging system. The converged charging system centralizes prepaid charging, postpaid charging, interconnect charging, wholesale charging, content charging, roaming charging, etc. Thus, revenues for a call may be divided among multiple entities based on the applicable charging types. This will significantly reduce the work in the back office, and create near real-time billing. The converged charging system also enables the rating or billing-related activity to share a common rating engine and a common account balance management function, which reduces the cost for system deployment, operation, and maintenance.

One embodiment comprises a charging controller that is coupled to a mobile network and an online charging system. The charging controller is operable to receive charging data for a call in the mobile network, and to process the charging data for the call and charging rules to identify entities that have a share in revenue for the call. The charging controller is further operable to generate a charging request message indicating the entities having a revenue share in the call, and to transmit the charging request message to the online charging system to cause the online charging system to determine the revenue share for each of the entities.

In another embodiment, the online charging system is operable to receive the charging request message from the charging controller, and to identify a profile for each of the entities having a revenue share. The online charging system is further operable to determine a revenue share amount for each of the entities based on their profile and a rating, to generate charging records indicating the revenue share amount for each of the entities, and to transmit the charging records to the charging controller.

In yet another embodiment, the charging controller is further operable to receive the charging records, to correlate the charging records to generate a consolidated charging record that indicates the revenue share amount for each of the entities, and to transmit the consolidated charging record to a billing system.

Other exemplary embodiments may be described below.

Description of the Drawings

Some embodiments of the present invention are now described, by way of example only, and with reference to the accompanying drawings. The same reference number represents the same element or the same type of element on all drawings.

FIG. 1 illustrates a communication network in an exemplary embodiment.

FIG. 2 is a flow chart illustrating a method of charging for a call by generating charging data for each entity having a revenue share in an exemplary embodiment.

FIG. 3 is a flow chart illustrating a method of determining the revenue share for multiple entities in an exemplary embodiment.

FIG. 4 is a flow chart illustrating a method of correlating charging records in an exemplary embodiment.

FIG. 5 illustrates another communication network in an exemplary embodiment.

FIG. 6 illustrates how the revenue for a call is divided among entities in an exemplary embodiment.

FIG. 7 is a message diagram illustrating how revenue for a call is divided in an exemplary embodiment.

Description of Embodiments

The figures and the following description illustrate specific exemplary embodiments of the invention. It will thus be appreciated that those skilled in the art will be able to devise various arrangements that, although not explicitly described or shown herein, embody the principles of the invention and are included within the scope of the invention. Furthermore, any examples described herein are intended to aid in understanding the principles of the invention, and are to be construed as being without limitation to such specifically recited examples and conditions. As a result, the invention is not limited to the specific embodiments or examples described below, but by the claims and their equivalents.

FIG. 1 illustrates a communication network 100 in an exemplary embodiment. Communication network 100 includes a mobile network 102, a charging system 104, and a billing system 106. Mobile network 102 may comprise a circuit-based network, such as a CDMA network or a GSM network, may comprise a packet-based network, such as an IP Multimedia Subsystem (IMS) network, or a mix of the two. Mobile network 102 is able to provide service to mobile devices 140-141 to place voice calls, to initiate data sessions, to send or receive text messages or multimedia messages, etc. Mobile network 102 includes a plurality of network elements 112-113 that are operable to serve a session/call or provide a service for a session/call within mobile network 102. For example, network element 112 may comprise a Serving-Call Session Control Function (S-CSCF) while network element 113 may comprise an application server (AS) in an IMS network. Alternatively, network element 112 may comprise a Mobile Switching Center (MSC) while network element 113 may comprise an SGSN of a UMTS network.

Charging system 104 comprises any system, server, or function operable to provide online and/or offline charging for sessions/calls in mobile network 102. For the online/offline charging, charging system 104 is able to generate consolidated charging records for sessions/calls within mobile network 102, and send the CDRs to billing system 106. Charging system 104 includes an online charging system (OCS) 122, a charging controller 124, and an offline charging system (OFCS) 126. OCS 122 includes a common rating engine 132 that may be shared by OCS 122 and OFCS 126, and may include other functions that are not shown. OFCS 126 may also include a variety of functions that are not shown for the sake of brevity, such as a Charging Data Function (CDF)/Charging Gateway Function (CGF) as defined by the 3GPP in Release 6, or a Charging Collector Function (CCF) as defined by the 3GPP in Release 5.

Billing system 106 comprises any system, server, or function operable to receive a consolidated charging record for a session/call, and to invoice one or more customers for the session/call based on the consolidated CDR or issue a voucher or credit.

For a call, there may be a variety of different types of charging involved. Some common types of charging are as follows. One type of charging is referred to as retail charging. Retail charging occurs between a mobile network operator (MNO) or a mobile virtual network operator (MVNO) and an end user. Thus, retail charging defines how end users pay for services provided by the MNO (or MVNO).

Another type of charging is referred to as wholesale (or MVNO) charging. Wholesale charging occurs between an MVNO and an MNO. A wholesale customer purchases mobile products and services from an MNO for resale. Wholesale charging defines how the MVNO pays for services provided by the MNO.

Another type of charging is referred to as content charging. Content charging occurs between a content provider and an MNO (or MVNO). The content provider supplies some content/service to end users via the MNO/MVNO network. Thus, content charging defines how the MNO/MVNO pays for the content supplied by the content provider.

Another type of charging is referred to as interconnect charging. Interconnect charging occurs between an MNO and another network operator. When a call is originated in the MNO's network but is terminated in network of the other operator (or vice-versa), interconnect charging defines how the MNO pays for services provided by the other network operator.

Another type of charging is referred to as roaming charging. Roaming charging occurs between an MNO and other MNO that is serving a roaming user. When an end user of one MNO (visiting MNO) is roaming in the network of another MNO (visited MNO), roaming charging defines how the visiting MNO pays for services provided by the visited MNO.

There may be other types of charging that apply to the description provided below. One common thread for each of these charging types is that multiple entities will share in the revenue of a call. Thus, the revenue has to be divided at some point and allocated appropriately to each of the entities. In a traditional charging architecture, a charging system generates CDRs that include charging data for a call. A back-office billing system then processes the charging data from the CDRs to divide the revenue for the call to entities that have a share. Thus, the revenue is divided in back-office systems instead of in the actual charging system. In the embodiments described below, a new charging controller 124 is implemented in the charging architecture to divide the revenue. Thus, revenue sharing entities for a call are identified in charging system 104 instead of in back office systems.

Assume for this embodiment that mobile device 140 is involved in a call over mobile network 102. One or both of network elements 112-113 may provide a service for the call, and generate charging data for providing the service. Those skilled in the art will appreciate that other mobile networks (not shown) and other fixed networks (not shown)

may also be involved in the call. Network elements 112-113 then transmit the charging data to charging system 104. For example, if prepaid charging applies for the call, then network elements 112-113 may transmit a Diameter Ro Credit Control Request (CCR) to charging system 104. If postpaid charging applies for the call, then network elements 112-113 may transmit a Diameter Rf Accounting Request (ACR) to charging system 104. Charging controller 124 manages charging for the call as is illustrated in FIG. 2.

FIG. 2 is a flow chart illustrating a method 200 of charging for a call by generating charging data for each entity having a revenue share in an exemplary embodiment. The steps of method 200 will be described with reference to communication network 100 in FIG. 1, but those skilled in the art will appreciate that method 200 may be performed in other networks and systems. The steps of the flow charts described herein are not all inclusive and may include other steps not shown. The steps may also be performed in an alternative order.

In step 202, charging controller 124 receives charging data for the call in mobile network 102. The charging data may be received in a charging request message from mobile network 102, such as a Diameter Ro CCR or a Diameter Rf ACR. Alternatively, the charging data may be received in a CDR from OCS 122 or OFCS 126. In step 204, charging controller 124 processes the charging data for the call and charging rules to identify entities that have a share in revenue for the call. Charging controller 124 stores charging rules that define conditions for different types of charging. For example, the charging rules may include retail rules defining conditions for retail charging. The charging rules may include wholesale rules defining conditions for wholesale charging. The charging rules may include interconnect rules defining conditions for interconnect charging. The charging rules may include content rules defining conditions for content charging. The charging rules may include roaming rules defining conditions for roaming charging.

As an example, charging controller 124 may process the calling party number and wholesale rules to determine that wholesale charging applies, and to determine the identity of the wholesale entity. Charging controller 124 may also process the called party number and interconnect rules to determine that interconnect charging applies, and to determine an identity of the network operator entity providing the interconnect service. Based on the charging data, charging controller 124 is able to generate a list of entities that have a share in the revenue for the call.

In step 206, charging controller 124 generates a charging request message indicating the entities having a revenue share in the call. For example, charging controller 124 may generate a Diameter Ro CCR, and insert the identities of the revenue sharing entities in the CCR. In step 208, charging controller 124 transmits the charging request message to OCS 122. Charging controller 124 may transmit a separate charging request message for each of the identified revenue sharing entities, or may transmit a single charging request message for all of the identified revenue sharing entities. Based on the data included in the charging request message, OCS 122 is able to determine the revenue share for each of the entities, which is further illustrated in FIG. 3.

FIG. 3 is a flow chart illustrating a method 300 of determining the revenue share for multiple entities in an exemplary embodiment. The steps of method 300 will be described with reference to communication network 100 in FIG. 1, but those skilled in the art will appreciate that method 300 may be performed in other networks and systems. In step 302, OCS 122 receives the charging request message from charging controller 124. In step 304, OCS 122 identifies a profile for each of the entities having a revenue share as indicated in the charging request message. OCS 122 may maintain a database of profiles for each entity. For example, OCS 122 may maintain a profile for mobile device 140 that indicates a service plan subscription of its end user. OCS 122 may maintain a profile of other MNO's having a roaming agreement with the operator of mobile network 102. OCS 122 may maintain a profile of fixed networks having an interconnect agreement with the operator of mobile network 102. OCS 122 may also maintain a profile of content providers having an agreement to supply content to end users of mobile network 102. Alternatively, the profiles may be maintained on an external database that is accessible to OCS 122.

In step 306, OCS 122 determines a revenue share amount for each of the entities based on their profile and a rating provided by rating engine 132. For example, assume that overall charging for a call is $30. Based on the profiles and the ratings, OCS 122 may determine that entity 1 shares $10 of the revenue, entity 2 shares $10 of the revenue, and entity 3 shares $10 of the revenue. In step 308, OCS 122 generates charging records, such as a CDR, indicating the revenue share amount for each of the entities. For example, OCS 122 may generate an individual charging record for each of the entities indicating the amount the entity is owed or the amount payable to the entity. OCS 122 then transmits the charging records to charging controller 124 in step 310.

The charging records generated by OCS 122 include a new set of data for each revenue sharing entity. The new set of data includes an entity ID, which may be an end user subscriber ID, an MNO ID, an MVNO ID, a content provider ID, another network operator ID, etc. The new set of data also includes a charging type, such as retail charging, wholesale charging, content charging, interconnect charging, roaming charging, etc. The new set of data also includes a revenue share amount. The revenue share amount indicates the monetary amount of service usage owed by each entity or payable to each entity. The revenue share amount may be an accumulated amount per payment billing cycle, or a special call charge amount. For retailing charging, the revenue share amount represents the service units the end user pays to the MVNO/MNO. For wholesale charging, the revenue share amount represents the service units the MVNO pays to the MNO for network/service usage. For content charging, the revenue share amount represents the service units the MNO pays for the content supplied by the content provider. For interconnect charging, the revenue share amount represents the service units the MNO pays for the other network operator that interconnects the call. For roaming charging, the revenue share amount represents the service units the visiting MNO pays to the visited MNO for a local user to roam in a foreign network.

FIG. 4 is a flow chart illustrating a method 400 of correlating charging records in an exemplary embodiment. The steps of method 400 will be described with reference to communication network 100 in FIG. 1, but those skilled in the art will appreciate that method 400 may be performed in other networks and systems. In step 402, charging controller 124 receives the charging records for the entities having a revenue share. In step 404, charging controller 124 correlates the charging records to generate a consolidated charging record that indicates the revenue share amount for each of the entities. The consolidated charging record also includes the new set of data for each revenue sharing entity, such as entity ID, charging type, and revenue share amount. In step 406, charging controller 124 transmits the consolidated CDR to billing system 106.

Billing system 106 may then perform a settlement process based on the data included in the consolidated charging record to generate billing invoices and generate vouchers or credits for each revenue sharing entity. Because charging controller 124 has already divided the revenue for the call in the consolidated charging record, billing system 106 does not need to perform this process. Billing system 106 only needs to issue the

vouchers to the proper entities for the revenue share amounts indicated in the consolidated charging record.

Examples

FIG. 5 illustrates another communication network 500 in an exemplary embodiment. Communication network 500 includes a mobile network 502, a charging system 504, and a billing system 506. Mobile network 502 is able to provide service to mobile device 540 to place voice calls, to initiate data sessions, to send or receive text messages or multimedia messages, etc. Charging system 504 includes an online charging system (OCS) 522, a charging controller 524, and an offline charging system (OFCS) 526.

OCS 522 handles online charging (or prepaid) for calls in mobile network 502. OCS 522 includes an online charging function (OCF) 530, an account balance management function (ABMF) 531, a rating engine 532, a profile database 533, and a tariff database 534. OCS 522 is enhanced to perform multiple-event charging based on one request event (i.e., a CCR). OCS 522 will use the different subscription IDs of the request to access each account profile separately, so OCS 522 will rate the call charge for each entity. After charging is finished, OCS 522 will generate a CDR indicating each entity's call cost, such as for retail charging, wholesale charging, content charging, interconnect charging, roaming charging, etc.

OCF 530 comprises any system, server, or function operable to manage online charging in OCS 522 by accessing ABMF 531 and rating engine 532, exchanging charging messages with network elements in mobile network 502, and performing other functions. ABMF 531 comprises any system, server, or function operable to maintain accounts for users, and more particularly to maintain an amount of service units in the accounts of the users. Rating engine 532 comprises any system, server, or function operable to determine the cost of service usage according to a tariff defined by the network operator. Rating engine 532 will perform tariff plan determination by accessing the tariff index of each entity, such as a unit determination, a price determination, a tariff determination, a counter, etc.

Rating engine 532 will not only hold the retail tariff plan for end user's service usage, but also holds the tariff plan for MNO's partnership, such as the price plan with MVNO, content provider, or other operators based on the service level agreement. OCF

530 will use the price plan index in each retail/partner's account profile to access the tariff to determine each entity's call charge.

Profile database 533 comprises any database or data structure operable to store profiles for retail customers, wholesale customers, content providers, interconnect operators, roaming operators, etc. Profile database 533 may alternatively store addresses for the profiles in order to remotely access the profiles. Tariff database 534 comprises any database or data structure operable to store a tariff plan or tariff plan index. Rating engine 532 is able to perform a tariff plan determination by accessing the tariff plan data of an entity, such as a unit determination, a price determination, a tariff determination, a counter, etc. OCF 530 will use the price plan index in each retail/partner's account profile to access the rating tariff index to determine each entity's call charge.

OFCS 526 handles offline charging (or postpaid) for calls in mobile network 502. OFCS 526 may include a Charging Data Function (CDF), a Charging Gateway Function (CGF), or other charging elements which are not specifically shown in FIG. 5.

Charging controller 524 comprises any system, server, or function operable to control overall charging for calls in mobile network 502. Charging controller 524 processes charging rules to determine which entities share in revenue for calls in mobile network 502. Charging controller 524 then generates a separate Diameter Ro CCR for each of the revenue sharing entities, and transmits CCRs to OCS 522 to determine the cost or the amount payable to the entity.

Assume for example that an end user of mobile device 540 subscribes to a service offered by OnStar Corporation, which is an in-vehicle service providing in-vehicle security, hands free calling, turn-by-turn navigation, remote diagnostics, etc. OnStar may be considered an MVNO in this example. OnStar leases its mobile services from mobile network 502, which is operated by Verizon Wireless (or some other mobile service provider). Verizon Wireless may thus be considered the MNO for the end user in this example. Assume further that the end user of mobile device 540 places a call (through the OnStar service) to another end user. The called end user subscribes to a service offered by another service provider, such as Vodafone in England. Vodafone may thus be considered the MNO for the called end user in this example.

Assume further that the overall charge for the call from the calling end user to the called end user is $30, and that the calling end user is responsible for payment for the call. FIG. 6 illustrates how the revenue for the call is divided among the entities in an exemplary

embodiment. According to the retail agreement between the calling end user 602 and OnStar (MNVO 604), calling end user 602 pays $30 to MVNO 604 for the call. This is an example of retail charging. MVNO 402 (OnStar) leases its mobile services from Verizon Wireless (MNO 606). According to the wholesale agreement between MVNO 604 and MNO 606, MVNO 604 pays $20 to MNO 606 for the mobile services. This is an example of wholesale charging. To connect the call to called end user 610, MNO 606 needs to connect to a foreign network operated by Vodafone (MNO 608). According to the interconnect agreement between MNO 606 and MNO 608, MNO 606 pays $10 to MNO 608 for the interconnect fees. This is an example of interconnect charging. Thus, the revenue for the call is divided between MVNO 604 (OnStar), MNO 606 (Verizon Wireless), and MNO 608 (Vodafone). In the embodiments provided herein, the dividing of the revenue is performed in the charging system instead of in back office systems. FIG. 7 further illustrates how this is done.

FIG. 7 is a message diagram illustrating how revenue for a call is divided in an exemplary embodiment. Mobile network 502 transmits a Diameter Ro CCR to OCS 522. The CCR includes charging data for the call in mobile network 502, such as a calling party number, a called party number, time stamps, etc. Although a Diameter Ro CCR is received in this example, other charging messages may be received in other examples, such as INAP messages. OCS 522 processes a subscription ID (subscription ID = MSISDN of the end user of mobile device 540) to access to the account profile for the end user. OCS 522 then calculates the overall charge for the call, which is $30 that is owed from the end user to OnStar. OCS 522 also generates a rated CDR (CDR1) indicating the call charge of $30, and sends the rated CDR to a mediation device (such as CDF or CGF) in OFCS 526. OFCS 526 then sends the rated CDR to charging controller (CC) 524. Those skilled in the art will appreciate that OCS 522 may send the rated CDR to charging controller (CC) 524 directly.

In response to receiving the rated CDR having charging data for the call, charging controller 524 processes charging rules to identify which entities are entitled to share in the revenue for the call. The following illustrates some exemplary rules for the different types of charging that may apply to the call.

Retail Rules:

Rule 1: CDR is not rated AND calling party number belongs to local operator AND call direction = originated call THEN:

Retail chargeable entity = calling party;

Trigger a Diameter Ro CCR [subscription ID = MSISDN of calling party, subscription type = retail charging,…] to OCS to determine the call cost for the calling party.

Rule 2: CDR is not rated AND called party number belongs to local operator AND call direction = terminate call AND subscriber location in home zone THEN:

Terminated local call is free to hear/accept;

Set the CDR as free call.

Rule 3: CDR is not rated AND called party number belongs to local operator AND call direction = terminate call AND subscriber location in roaming zone THEN:

Retail chargeable entity = called party

Trigger a Diameter Ro request [Subscription ID = MSISDN of called party, Subscription Type = retail charging,…] to OCS to determine the call cost for the called party.

Wholesale Rules:

Rule 1: Calling party number belongs to local operator AND call direction = originated call AND the prefix number of the calling party number is an MVNO call number THEN:

Map out the MVNO ID based on prefix number of the calling party number;

Wholesale chargeable entity = MVNO;

Trigger a Diameter Ro CCR [Subscription ID = MVNO ID, Subscription Type = wholesale charging,…] to OCS to determine the call cost for the MVNO.

Rule 2: Called party number belongs to local operator AND call direction = terminated call AND the prefix number of the called party number is an MVNO call number AND subscriber location in roaming zone THEN:

Map out the MVNO ID based on prefix number of the called party number;

Wholesale chargeable entity = MVNO;

Trigger a Diameter Ro CCR [Subscription ID = MVNO ID, Subscription Type =wholesale charging,…] to OCS to determine the call cost for the MVNO.

Interconnect Rules:

Rule 1: Calling party number belongs to the local operator AND called party number doesn't belong to local operator AND call direction = originated call THEN:

Map out the Interconnect Partner ID based on prefix number of the called party number;

Interconnect Partner entity = Interconnect Operator ID;

Trigger a Diameter Ro CCR [Subscription ID = Interconnect Operator ID, Subscription Type = interconnect charging,…] to OCS to determine the call cost for the interconnect partner.

Roaming Rules:

Rule 1: Calling party number doesn't belong to the local operator AND calling party's visited PLMN belongs to local operator THEN:

Map out the Inbound Partner ID based on prefix number of the calling party number;

Inbound Partner entity = Inbound Partner ID;

Trigger a Diameter Ro CCR [Subscription ID = Inbound Partner ID, subscription type = inbound roaming charging,…] to OCS to determine the call cost for inbound roaming partner.

Content Rules:

Rule 1: Calling party number belongs to the local operator AND (Service ID = *xxx* OR Merchant ID = *yyy* OR Content Provider = *zzz*) THEN:

Map out the Content Provider ID based on Service ID, Content ID, or Merchant ID;

Trigger a Diameter Ro CCR [Subscription ID = Content Provider ID, subscription type = content revenue sharing charging,…] to OCS to determine the call cost for the content provider.

In this example, charging controller 524 processes the wholesale rules and the prefix number of mobile device 540 that is included in the CDR. Based on the wholesale rules, charging controller 524 determines that this is an MVNO number of Verizon Wireless. Thus, charging controller 524 maps out the MVNO ID based on IMSI prefix, wherein the

MVNO ID is the identifier for OnStar. Charging controller 524 then transmits a Diameter Ro CCR (with subscription ID = MVNO ID) to OCS 522.

OCS 522 uses the MVNO ID in the CCR to access the OnStar account profile in profile database 533. OCS 522 then determines the call charge for the MVNO, which is the amount OnStar pays to Verizon Wireless ($20). OCS 522 then generates the rated CDR (CDR2) that includes the wholesale charge amount of $20, and transmits the rated CDR to OFCS 526.

Charging controller 524 also processes the interconnect rules and the prefix number of called party number in the CDR. Based on the interconnect rules, charging controller 524 determines that the call is an interconnect call. Charging controller 524 maps out the MNO ID based on called party number prefix, wherein in MNO ID is the identifier for Vodafone. Charging controller 524 then transmits a Diameter Ro CCR (with subscription ID = MNO ID) to OCS 522.

OCS 522 uses the MNO ID in the CCR to access the Vodafone account profile in profile database 533. OCS 522 then determines the call charge for the MNO, which is the amount Verizon Wireless pays to Vodafone ($10). OCS 522 then generates the rated CDR (CDR3) that includes the interconnect charge amount of $10, and transmits the rated CDR to OFCS 526.

OFCS 526 correlates the three rated CDRs to generate a consolidated CDR that indicates the revenue share amount for each of the entities. In this example, the consolidated CDR indicates the retail charge of $30, the wholesale charge of $20, and the interconnect charge of $10. The consolidated CDR includes the new set of data for each revenue sharing entity, such as entity ID, charging type, and revenue share amount. OFCS 526 then transmits the consolidated CDR to billing system 506. Although OFCS 526 is shown as correlating the CDRs in this embodiment, charging controller 524 may correlate the CDRs in other embodiments.

Billing system 506 may then perform a settlement process based on the data included in the consolidated CDR to generate billing invoices and generate vouchers or credits for each revenue sharing entity. In the above example, Verizon Wireless will receive a $20 voucher from OnStar, and Vodafone will receive a $10 voucher from Verizon Wireless for this call. Because charging controller 524 has already divided the revenue for the call in the consolidated CDR, billing system 506 does not need to perform this process.

Billing system 506 only needs to issue the vouchers to the proper entities for the revenue share amounts indicated in the consolidated CDR.

Any of the various elements shown in the figures or described herein may be implemented as hardware, software, firmware, or some combination of these. For example, an element may be implemented as dedicated hardware. Dedicated hardware elements may be referred to as "processors", "controllers", or some similar terminology. When provided by a processor, the functions may be provided by a single dedicated processor, by a single shared processor, or by a plurality of individual processors, some of which may be shared. Moreover, explicit use of the term "processor" or "controller" should not be construed to refer exclusively to hardware capable of executing software, and may implicitly include, without limitation, digital signal processor (DSP) hardware, a network processor, application specific integrated circuit (ASIC) or other circuitry, field programmable gate array (FPGA), read only memory (ROM) for storing software, random access memory (RAM), non volatile storage, logic, or some other physical hardware component or module.

Also, an element may be implemented as instructions executable by a processor or a computer to perform the functions of the element. Some examples of instructions are software, program code, and firmware. The instructions are operational when executed by the processor to direct the processor to perform the functions of the element. The instructions may be stored on storage devices that are readable by the processor. Some examples of the storage devices are digital or solid-state memories, magnetic storage media such as a magnetic disks and magnetic tapes, hard drives, or optically readable digital data storage media.

Although specific embodiments were described herein, the scope of the invention is not limited to those specific embodiments. The scope of the invention is defined by the following claims and any equivalents thereof.

CLAIMS:

We claim:

1. A charging system comprising:

a charging controller coupled to a mobile network and an online charging system, the charging controller operable to receive charging data for a call in the mobile network, to process the charging data for the call and charging rules to identify entities that have a share in revenue for the call, to generate a charging request message indicating the entities having a revenue share in the call, and to transmit the charging request message to the online charging system to cause the online charging system to determine the revenue share for each of the entities.

2. The charging system of claim 1 further comprising:

the online charging system operable to receive the charging request message from the charging controller, to identify a profile for each of the entities having a revenue share, to determine a revenue share amount for each of the entities based on their profile and a rating, to generate charging records indicating the revenue share amount for each of the entities, and to transmit the charging records to the charging controller.

3. The charging system of claim 2 wherein the charging records each include an entity ID, a charging type, and the revenue share amount.

4. The charging system of claim 3 wherein the revenue share amount indicates a monetary amount owed to another entity.

5. The charging system of claim 2 wherein:

the charging controller is further operable to receive the charging records, to correlate the charging records to generate a consolidated charging record that indicates the revenue share amount for each of the entities, and to transmit the consolidated charging record to a billing system.

6. The charging system of claim 1 wherein the charging rules include retail rules defining conditions for retail charging.

7. The charging system of claim 1 wherein the charging rules include wholesale rules defining conditions for wholesale charging.

8. The charging system of claim 1 wherein the charging rules include interconnect rules defining conditions for interconnect charging.

9. The charging system of claim 1 wherein the charging rules include content rules defining conditions for content charging.

10. The charging system of claim 1 wherein the charging rules include roaming rules defining conditions for roaming charging.

11. A method of determining the share of call revenue for a call, the method comprising:

receiving charging data for a call placed over a mobile network in a charging controller that is coupled to the mobile network and to an online charging system;

processing the charging data for the call and charging rules to identify entities that have a share in revenue for the call;

generating a charging request message indicating the entities having a revenue share in the call; and

transmitting the charging request message to the online charging system to cause the online charging system to determine the revenue share for each of the entities.

12. The method of claim 11 further comprising:

receiving the charging request message in the online charging system from the charging controller;

identifying a profile for each of the entities having a revenue share;

determining a revenue share amount for each of the entities based on their profile and a rating;

generating charging records indicating the revenue share amount for each of the entities; and

transmitting the charging records from the online charging system to the charging controller.

13. The method of claim 12 wherein the charging records each include an entity ID, a charging type, and a revenue share amount.

14. The method of claim 13 wherein the revenue share amount indicates a monetary amount owed to another entity.

15. The method of claim 12 further comprising:

receiving the charging records in the charging controller from the online charging system;

correlating the charging records to generate a consolidated charging record that indicates the revenue share amount for each of the entities; and

transmitting the consolidated charging record from the charging controller to a billing system.

16. The method of claim 11 wherein the charging rules include retail rules defining conditions for retail charging.

17. The method of claim 11 wherein the charging rules include wholesale rules defining conditions for wholesale charging.

18. The method of claim 11 wherein the charging rules include interconnect rules defining conditions for interconnect charging.

19. The method of claim 11 wherein the charging rules include content rules defining conditions for content charging.

20. The method of claim 11 wherein the charging rules include roaming rules defining conditions for roaming charging.

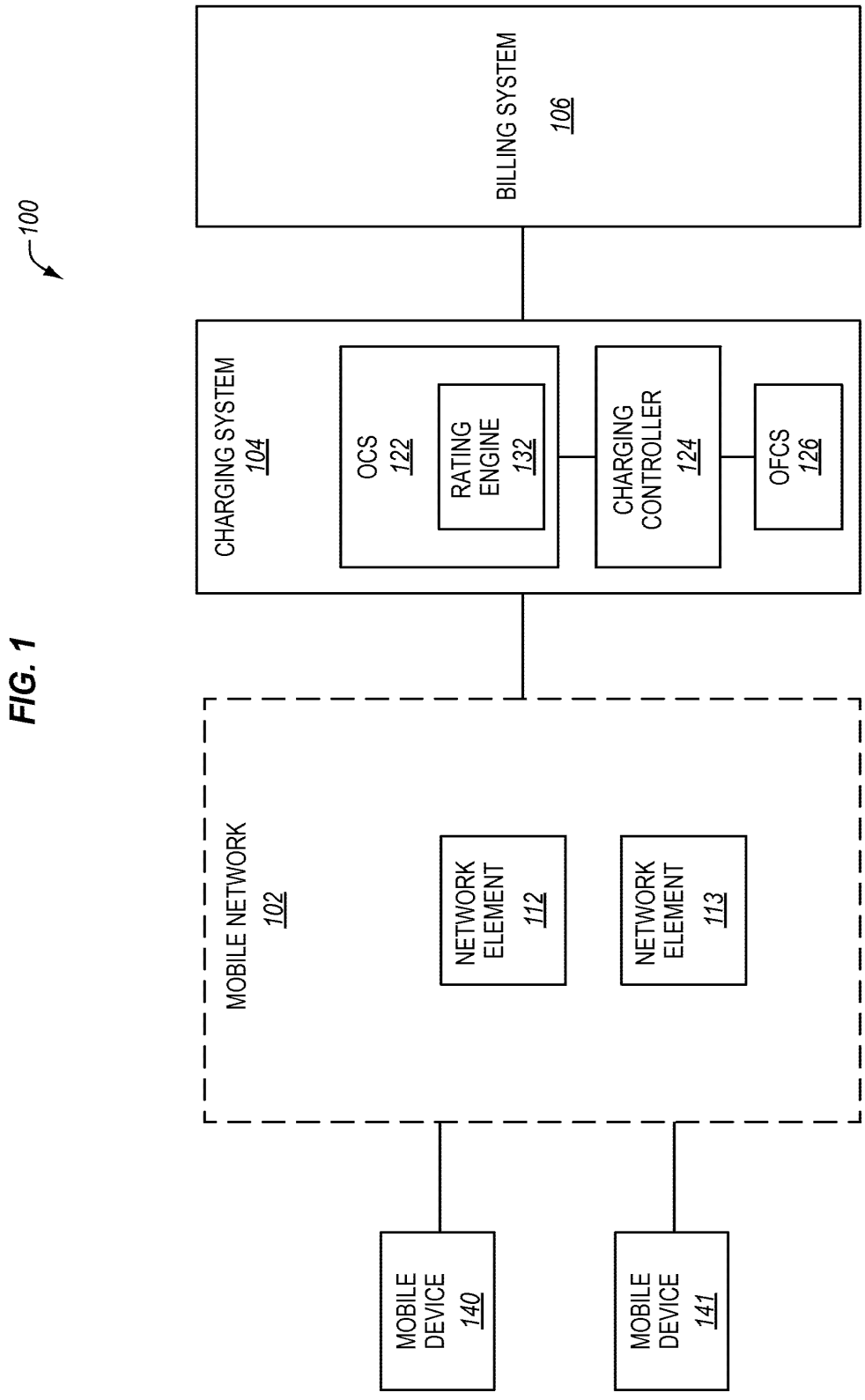

100
BILLING SYSTEM
106
CHARGING SYSTEM
104
OCS
122
RATING ENGINE
132
CHARGING CONTROLLER
124
OFCS
126
MOBILE NETWORK
102
NETWORK ELEMENT
112
NETWORK ELEMENT
113
MOBILE DEVICE
140
MOBILE DEVICE
141

FIG. 1

FIG. 2

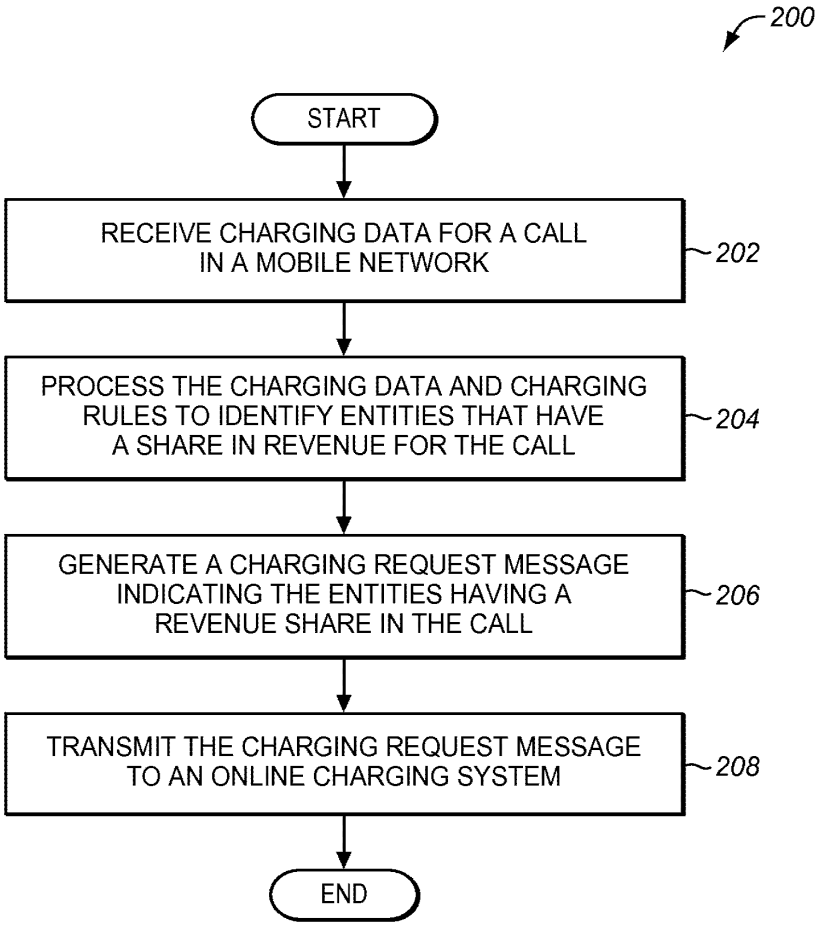

200
START
RECEIVE CHARGING DATA FOR A CALL IN A MOBILE NETWORK
202
PROCESS THE CHARGING DATA AND CHARGING RULES TO IDENTIFY ENTITIES THAT HAVE A SHARE IN REVENUE FOR THE CALL
204
GENERATE A CHARGING REQUEST MESSAGE INDICATING THE ENTITIES HAVING A REVENUE SHARE IN THE CALL
206
TRANSMIT THE CHARGING REQUEST MESSAGE TO AN ONLINE CHARGING SYSTEM
208
END

FIG. 3

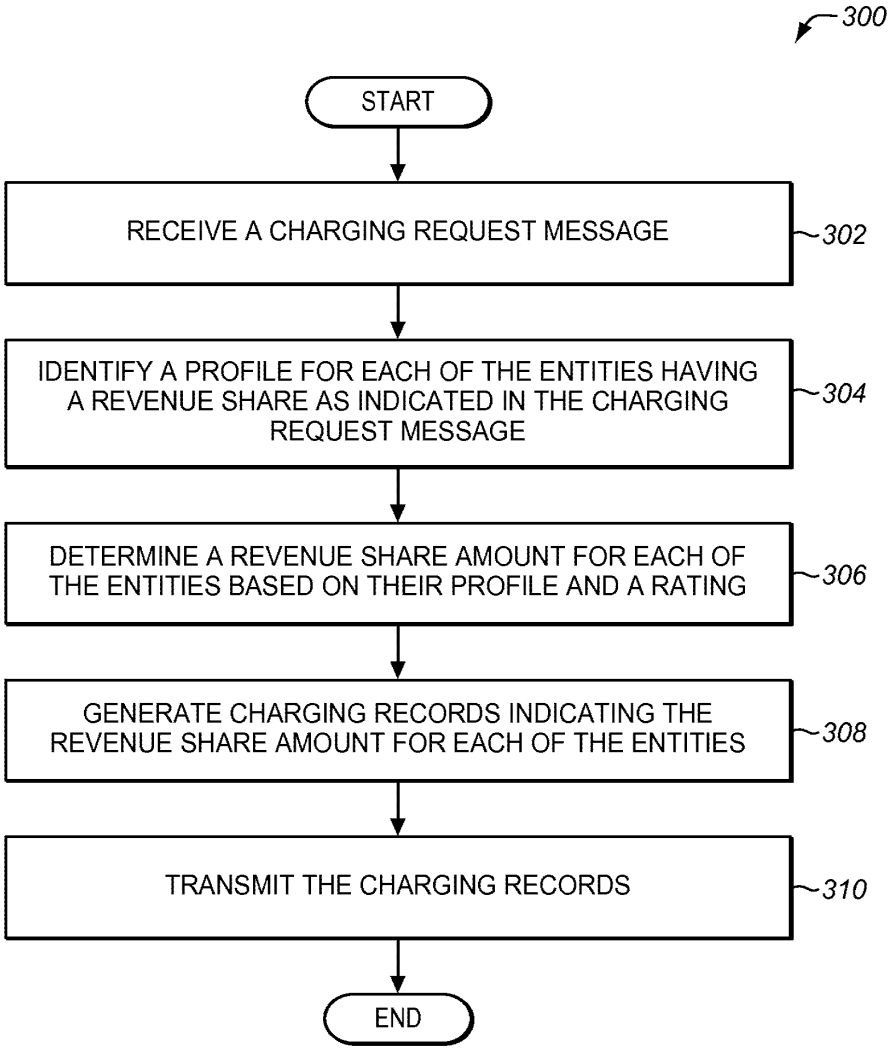

300
START
RECEIVE A CHARGING REQUEST MESSAGE
302
IDENTIFY A PROFILE FOR EACH OF THE ENTITIES HAVING A REVENUE SHARE AS INDICATED IN THE CHARGING REQUEST MESSAGE
304
DETERMINE A REVENUE SHARE AMOUNT FOR EACH OF THE ENTITIES BASED ON THEIR PROFILE AND A RATING
306
GENERATE CHARGING RECORDS INDICATING THE REVENUE SHARE AMOUNT FOR EACH OF THE ENTITIES
308
TRANSMIT THE CHARGING RECORDS
310
END

FIG. 4

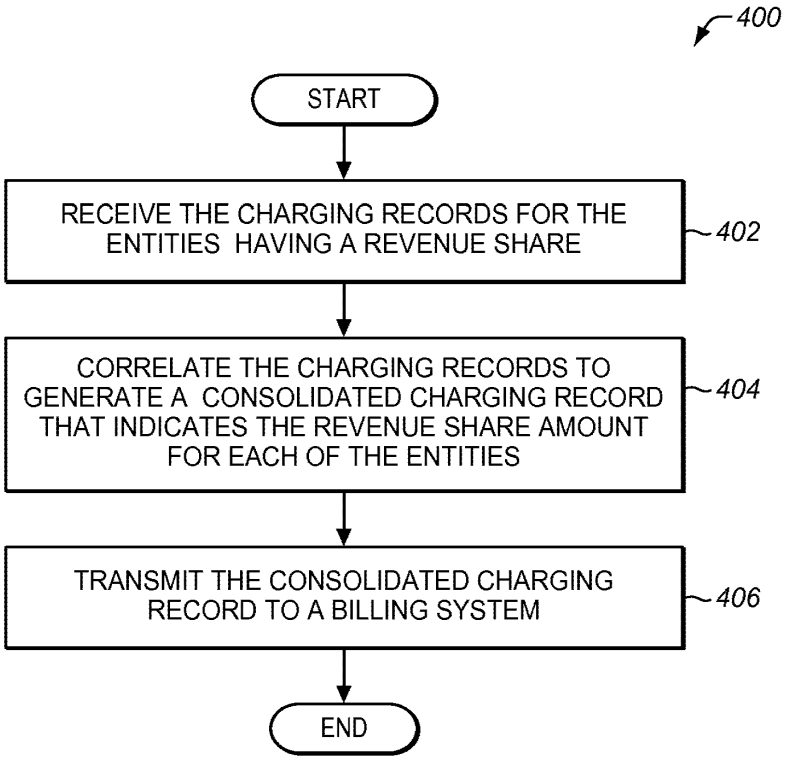
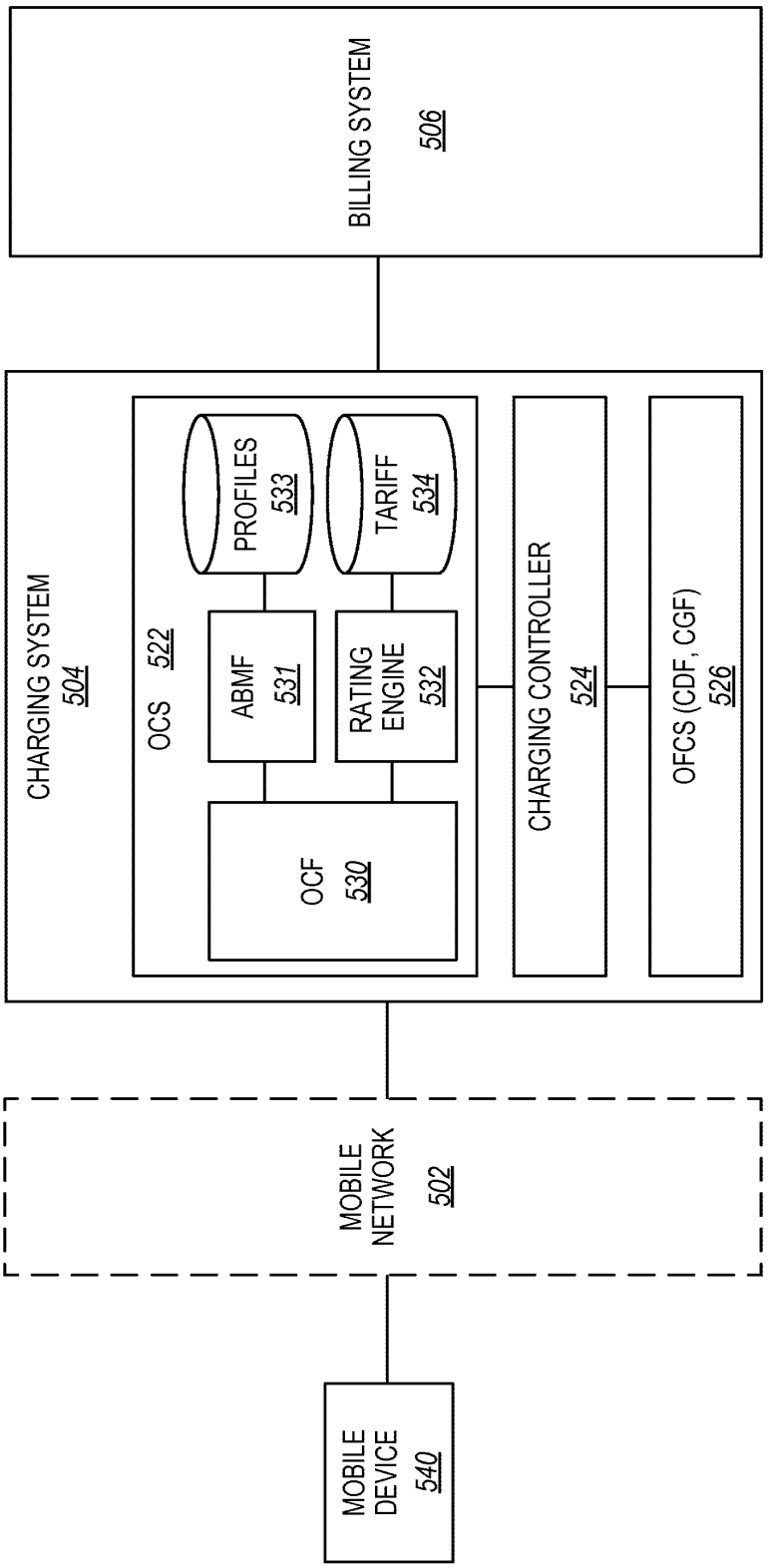

400
START
RECEIVE THE CHARGING RECORDS FOR THE ENTITIES HAVING A REVENUE SHARE
402
CORRELATE THE CHARGING RECORDS TO GENERATE A CONSOLIDATED CHARGING RECORD THAT INDICATES THE REVENUE SHARE AMOUNT FOR EACH OF THE ENTITIES
404
TRANSMIT THE CONSOLIDATED CHARGING RECORD TO A BILLING SYSTEM
406
END

FIG. 5


500
BILLING SYSTEM
506
CHARGING SYSTEM
504
OCS
522
PROFILES
533
TARIFF
534
ABMF
531
RATING ENGINE
532
OCF
530
CHARGING CONTROLLER
524
OFCS (CDF, CGF)
526
MOBILE NETWORK
502
MOBILE DEVICE
540

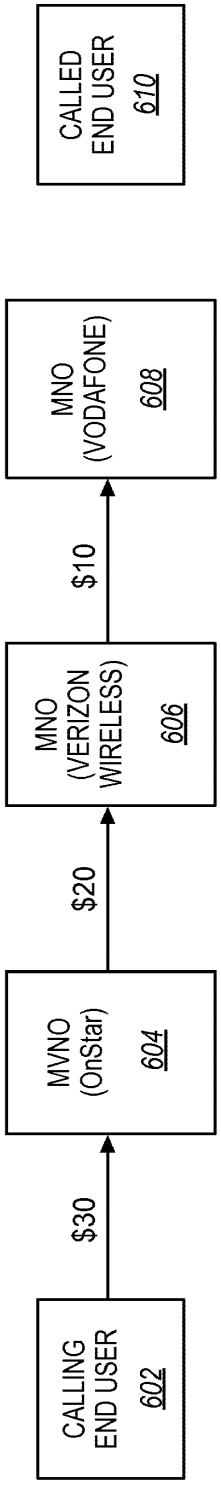

CALLING END USER 602
$30
MVNO (OnStar) 604
$20
MNO (VERIZON WIRELESS) 606
$10
MNO (VODAFONE) 608
CALLED END USER 610

FIG. 6

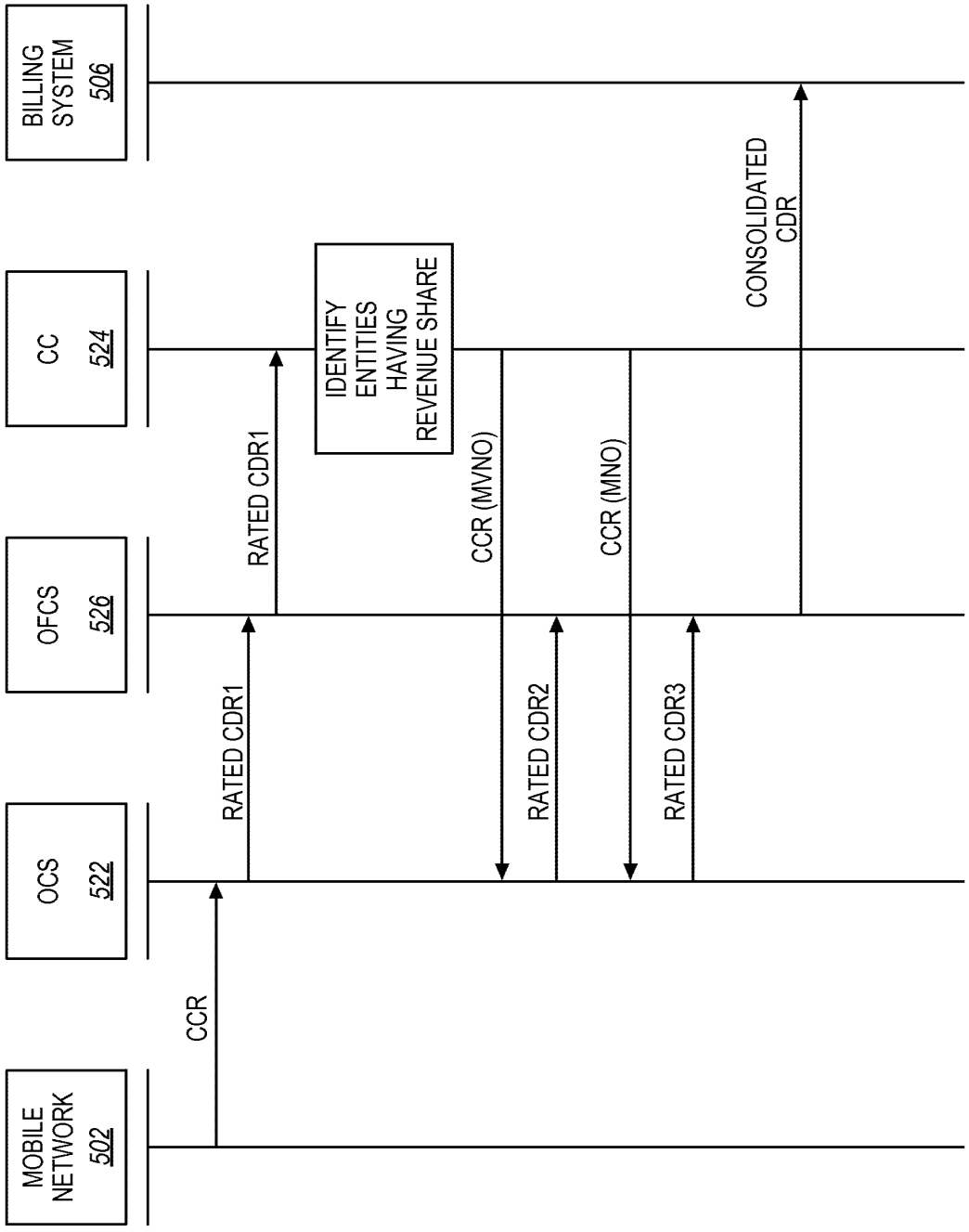

MOBILE NETWORK 502
OCS 522
OFCS 526
CC 524
BILLING SYSTEM 506
CCR
RATED CDR1
RATED CDR1
IDENTIFY ENTITIES HAVING REVENUE SHARE
CCR (MVNO)
RATED CDR2
CCR (MNO)
RATED CDR3
CONSOLIDATED CDR

FIG. 7

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2009/049255

A. CLASSIFICATION OF SUBJECT MATTER
INV. H04M15/00 H04W4/24
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)
H04M H04W

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	XIANG YANG LI ET AL: "Converged network common charging controller function" BELL LABS TECHNICAL JOURNAL, WILEY, CA, US, vol. 13, no. 2, 21 June 2008 (2008-06-21), pages 161-183, XP001514359 ISSN: 1089-7089 page 167 - page 179 figures 4-15 ----- -/--	1-20

[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
30 March 2010	09/04/2010

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	Patlaka, Efi

1

Form PCT/ISA/210 (second sheet) (April 2005)

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	Maria Koutsopoulou: "A platform for charging, billing and accounting in future mobile networks" 24 January 2005 (2005-01-24), XP002574421 Retrieved from the Internet: URL:http://cgi.di.uoa.gr/~mkoutsop/data/Koutsopoulou_NGNM2004_almost_final.pdf> [retrieved on 2010-03-23] paragraph [0003] - paragraph [0005]	1-20
A	EP 1 545 114 A1 (CIT ALCATEL [FR] ALCATEL LUCENT [FR]) 22 June 2005 (2005-06-22) claims 1-10 paragraph [0028]	1-20
A	ANONYMOUS: "Telecommunications and Internet Converged Services and Protocols for Advanced Networking (TISPAN); NGN Management; Charging specification for Release 1; Draft ETSI DTS 02032" ETSI STANDARDS, LIS, SOPHIA ANTIPOLIS CEDEX, FRANCE, vol. TISPAN, no. Version 1, 1 October 2005 (2005-10-01), XP014031462 ISSN: 0000-0001 the whole document	1-20
A	US 2004/224662 A1 (O'NEIL DOUGLAS R [US] ET AL) 11 November 2004 (2004-11-11) claim 8 claims 12, 13 claims 19, 20	1-20
A	WO 03/017065 A2 (APOGEE NETWORKS [US]; DESHMUKH ABHI [US]; HERNANDEZ MILTON [US]; GUHA) 27 February 2003 (2003-02-27) the whole document	1-20
A	EP 1 320 214 A1 (MARKPORT LTD [IE]) 18 June 2003 (2003-06-18) paragraph [0044] paragraph [0047] paragraph [0051]	1-20

1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/US2009/049255

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 1545114 A1	22-06-2005	AT 372643 T	15-09-2007
		CN 1630239 A	22-06-2005
		US 2005135577 A1	23-06-2005
US 2004224662 A1	11-11-2004	US 2009286507 A1	19-11-2009
		US 2007042750 A1	22-02-2007
WO 03017065 A2	27-02-2003	AU 2002332604 A1	03-03-2003
EP 1320214 A1	18-06-2003	NONE	

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(75) Inventors/Applicants *(for US only)*: **DESHMUKH, Abhi** [IN/US]; 253A, Kinderkamack Road, River Edge, NJ 07661 (US). **HERNANDEZ, Milton** [DM/US]; Apt. D, 1 Cononial Court, River Edge, NJ 07661 (US). **GUHA, Jayanta** [—/US]; 860 Main Street, Apt. 5B, Hackensack, NJ 07601 (US).

(74) Agents: **DUNNAM, Michael, P.** et al.; Woodcock Washburn LLP, One Liberty Place, 46th Floor, Philadelphia, PA 19103 (US).

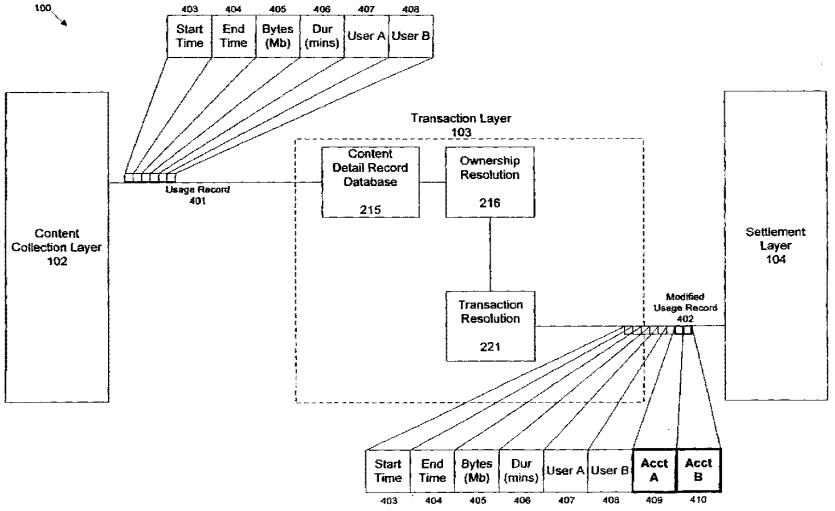
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[Continued on next page]

(54) Title: CONTENT OWNERSHIP RESOLUTION



(57) Abstract: The invention describes a method, system, and computer-readable medium having computer-executable instructions for determining parties to a transaction. The inventive method includes receiving data related to an event, where the data includes one or more data elements. The inventive method also includes selecting the data elements that identify the parties to the transaction, determining whether additional data elements are required to identify the parties to the transaction, and identifying the additional data elements. The event may be an exchange of data between the parties over a communication network, and the data related to the event may be stored in a usage record. The additional data element may identify an owner or party to the transaction, called an accountable. The party may have direct or indirect association in the transaction and may not be obvious from the record of the transaction itself.

WO 03/017065 A2

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

CONTENT OWNERSHIP RESOLUTION

Technical Field

The invention relates generally to the processing of data, and more particularly to efficiently and generically aggregating data available on a communication network.

Background of the Invention

Recently, the collection and processing of data transmitted over communication networks, like the Internet, has moved to the forefront of business objectives. In fact, with the advent of the Internet, new revenue generating business models have been created to account for the consumption of content received from a data network (*i.e.*, content-based billing). For example, content distributors, application service providers (ASPs), Internet service providers (ISPs), and wireless Internet providers have realized new opportunities based on the value of the content and services that they deliver. As a result of this content-and-services-billing initiative, it has become increasingly important to resolve intelligently and flexibly the corresponding transactions according to the business needs of the customer.

Often, even in traditional commerce streams, there a many different participants between the maker and the consumer of the goods. Some of these so-called "middlemen" simply may facilitate access to the good, while others may add useful characteristics to the good. This is especially true in a distributed network environment, like the Internet,

that impose additional burdens on capturing the transaction process because of the unlimited number of data sources and the correspondingly unlimited number of data types. As a result, adequately describing the transacting of the goods and services in such an environment, or even across any of the traditional environments requires a technique that is capable of understanding and processing the participants and the various types of data.

To date, resolving the characteristics of a transaction has been accomplished over data-specific environments using certain application-specific (*i.e.,* "non-generic" or custom) methods. For example, a typical telephone bill captures the characteristics of a voice-based telecommunications transaction. In particular, the participants may be identified as the party initiating the call (*i.e.,* the "calling party" telephone number), the party receiving the call (*i.e.,* the "called party" telephone number), and one or more parties connecting the communication (*i.e.,* the "local" or "long distance carrier"). This simple example adequately captures all of the necessary aspects of the telephone call to properly account for the transaction by requiring payment from certain parties (*e.g.,* the calling and/or the called party) to certain other parties (*e.g.,* the local and/or long distance carrier). While these "hard-coded" transaction resolution techniques are sufficient to accommodate only specific environments involving well-defined participants (e.g., the telecommunications network), they are correspondingly too rigid to efficiently satisfy the ever-changing face of a communication network like the Internet. Also, these "hard-

coded" techniques are too specific to operate across the many and varied transaction environments and domains that exist throughout the business world.

Therefore, there exists a need to provide a flexible technique that can capture and resolve transactions of any type in any business domain involving any number and kind of participants without requiring modification of the technique for each type. Such a technique would serve to accommodate multi-faceted networked environments like the Internet, as well as to provide a single solution that would apply to any business environment.

Summary of the Invention

The invention describes a method, system, and computer-readable medium having computer-executable instructions for determining parties to a transaction. The inventive method includes receiving data related to an event, where the data includes one or more data elements. The inventive method also includes selecting the data elements that identify the parties to the transaction, determining whether additional data elements are required to identify all or some of the parties to the transaction, and identifying the additional data elements. The event may be an exchange of data between the parties over a communication network, and the data related to the event may be stored in a usage record. The additional data element may identify an owner or party to the transaction, called an accountable. Determining whether additional elements are required may be a function of the received data, and/or a function of the requirements of a customer

settlement system. The customer settlement system may be a data security system, a network capacity planning system, a content monitoring system, and/or a billing application, for example. The identifying of additional data elements or accountables may be initiated by a building block known as a primitive that includes multiple specific methods, including a database lookup, a direct value assignment, a regular expression parsing or match, a CDR database lookup, hard-coded, network address, area code, substring manipulation or a custom code execution. All or some of the inventive method steps may be conducted on a computer-readable medium using computer-executable instructions.

The inventive system for determining parties to a transaction includes an instrumentation layer, a content collection layer in communication with the instrumentation layer, and a transaction layer in communication with the content collection layer. The instrumentation layer provides raw data, while the content collection layer generically processes the raw data, and the transaction layer identifies one or more parties to the transaction. Also, the content collection layer may provide the raw data to the transaction layer in a usage record, and the transaction layer may modify the usage record as a function of identifying the parties to the transaction. The inventive system may further include a settlement layer in communication with the transaction layer, wherein the settlement layer rates the modified usage record. The transaction layer may include a database for storing the data processed by the content collection layer.

Brief Description of the Drawings

Other features of the invention are further apparent from the following detailed description of the embodiments of the invention taken in conjunction with the accompanying drawings, of which:

Figure 1 is a block diagram of a system for analyzing content transmitted over a communication network, according to the invention;

Figure 2 is a block diagram further describing the components of the system described in Figure 1;

Figures 3A and 3B provide a flow diagram further detailing the operation the system described in Figure 1;

Figure 4 provides a block diagram of the system described in Figure 1, providing greater detail of a configuration and operation of a transaction layer;

Figures 5A and 5B provide a flow diagram of a method for identifying the characteristics of a transaction, according to the invention;

Figure 6 is a block diagram further detailing the operation and configuration of the transaction layer, according to the invention; and

Figure 7 is a flow diagram that details the operation and configuration of the transaction layer of transaction layer, according to the invention.

Detailed Description of the Invention

System Overview

Figure 1 is a block diagram of a system 100 for analyzing content transmitted over a communication network. Although the following description will be discussed in the context of collecting, processing and billing for data transmitted over the Internet, it should be appreciated that the invention is no so limited. In fact, the invention may be applied to any type of network, including a private local area network, for example. Also, the invention may be used for purposes other than billing for the usage of content. For example, the invention may be used to analyze the type of data transmitted over a particular network, or to determine the routing patterns of data on a network. Furthermore, the invention may be used to facilitate the intelligent collection and aggregation of data relevant to a particular industry. In addition, the invention may be used to track specific Internet protocol (IP) network resources and to detect fraud, for example. It should also be appreciated that the invention may contemplate non-network and non-computer related business domains like commodity trading (*e.g.,* grains, crude oil) where multiple parties are involved. Therefore, although the invention is often described in the context of the Internet, it should be appreciated that the invention may equally applied to traditional business environments.

In addition, it should be appreciated that the term "content" may be defined as data that is transmitted over the network. In the context of the Internet, content may include .mp3 files, hypertext markup language (html) pages, videoconferencing data, and streaming audio, for example. The terms "content provider" and "customer" will be used throughout the description as well. Content provider may refer to the primary creator or

provider of the content, while customer is the primary recipient of the content. Both the producer and customer may be a human or a computer-based system.

As shown in Figure 1, an instrumentation layer 101 provides raw data to a content collection layer 102. Instrumentation layer 101 may consist of various data sources, for example, network routers. The network routers may provide information regarding the various types of routed data, including for example, data format, originating Internet protocol (IP) address, and destination IP address. One example of such information is Cisco System's NetFlow™.

Content collection layer 102 collects information about the delivery of the content, as well as the substance of the content itself. Content collection layer 102 also may sort, filter, aggregate, correlate and store the content according to the particular needs of the end user. In effect, content collection layer is responsible for extracting meaningful information about IP traffic, and so it is provided with an understanding of the data sources in instrumentation layer 101. Content collection layer 102 also may transform the data from the plurality of sources in instrumentation layer 101 into standard formats for use in a transaction layer 103.

Content collection layer 102 is in communication with transaction layer 103. Generally, content collection layer 102 reports to transaction layer 103 that a relevant communication event has occurred and should be considered by the remainder of system 100. A communication event may be defined as any transfer of data between systems. Transaction layer 103 captures the predetermined agreements among all of the parties

involved in system 100 regarding the value of the transferred content, as well as the value added by each of the individual parties in transferring such content. Therefore, transaction layer 103 is charged with understanding the nature of the parties, as well as the understanding the actions that one or more parties perform and the influence of such action on the respective parties.

Transaction layer 103 is in communication with a settlement layer 104. Settlement layer 104 captures the operations that are necessary to understand the significance of the transaction defined by transaction layer 103. For example, settlement layer 104 may rate a particular transaction by assigning a monetary value to the transaction. Settlement layer 104 also may divide the burdens and benefits of the monetary value among the relevant parties. In this way, settlement layer 104 ensures that certain parties receive a particular portion of the payment made by the other parties. Settlement layer 104 also may be responsible for delivering this burden and benefit information to the appropriate parties with the appropriate identifiers (*e.g.,* account numbers).

Figure 2 is a block diagram further describing the components of system 100. As shown in Figure 2, instrumentation layer 101 includes data sources 201-203 that each provide raw data 204-206, respectively, to collection layer 102. As discussed, data sources 201-203 may include various internetworking devices like routers, bridges, and network switches. Data sources 201-203 provide raw data to an input data adapter 207. Accordingly, input data adapter 207 understands the operation of and the data provided

by data sources 201-203. Although one input data adapter is shown in Figure 2, it should be appreciated that more than one input data adapter may be used in system 100. For example, each data source may have a dedicated input data adapter.

Input data adapter 207 understands the incoming data and extracts the data into the appropriate fields. This field-delimited data, called flow objects 208, are sets of attributes. The attributes may be any characteristics that are provided by, or can be derived from, raw data 204-206 provided by data sources 201-203, respectively. For example, flow objects 208 may include a set of attributes describing the source and destination, including source IP address, destination IP address, source interface, and destination interface. Because input data adapter 207 is charged with understanding raw data 204-206 from data sources 201-203, as well as the required flow objects 208 of system 100, it is capable of transforming the raw data to the flow objects, where the flow objects may all be of a standard format.

Input data adapter 207 provides flow objects 208 to a content data language 209. Content data language 209 may transform the attributes in flow objects 208 into other attributes that are desired by a particular customer. For example, content data language 209 may derive a network identifier attribute that is not readily available from a data source, from a source address attribute and a destination address attribute that are provided by flow object 208 attributes from input data adapter 207. This derivation may be based on a customer's desire to determine which network conveyed the transaction between the source and the destination. Therefore, following this example, content data

language 209 will know to extract the source address attribute and the destination address attribute from flow objects 208.

Content data language 209 may perform other functions as well. For example, content data language 209 may perform a generic lookup function 219 that is built into content data language 209. Generally, generic lookup 219 describes a technique for mapping any number of attributes to any number of other derived attributes. For example, generic lookup 219 may be used to map a unique resource locator (URL) attribute to a particular content-type attribute.

Content data language 209 also is in communication with a correlator 211. Generally, correlator 211 connects the many daily network content events from various network devices, like routers for example. Often, the connected data may come from distinctly different data sources at distinctly unrelated times. Correlator 211 allows this data to be intelligently connected to each other, regardless of how different the sources or of how disparate the time received. For example, a Netflow™ enabled router and a Radius™ enabled network access switch may each provide certain data that is relevant to one particular transaction. However, because portions of the data come from different devices, the data may arrive at system 100 at different times, and in different formats. Also, because each provides data that is necessary to complete one transaction, the data from each cannot be considered separately. Correlator 211 allows this data to be intelligently grouped regardless of the format of the data or of the time the data pieces are received.

Furthermore, correlator 209 may rearrange the order of the received flow objects 208 to suit the needs of the remainder of system 100. By performing such correlation without having to first store all of the data on a disk (*e.g.*, a database), significantly faster processing is achieved. Correlator 209 may perform this correlation in real-time, for example.

Although system 100 has been described using content data language 209 and correlator 211, it should be appreciated that flow objects 208 may proceed directly to a filter 212, if no correlation is required and if no attribute derivation is required, for example. Filter 212 analyzes flow objects 208 to ensure that the provided attributes are desired by system 100. If flow objects 208 are not needed (*i.e.*, a mismatch), filter 212 may prevent flow objects 208 from passing to an aggregator 213. Also, although filter 212 has been shown as a separate device in system 100, it should be appreciated that the functionality of filter 212 may be incorporated into aggregator 213.

Filter 212 passes the matching flow objects to aggregator 213. Aggregator 213 may provide additional filtering and classification of the multitude of daily network content transactions, based on user criteria. Aggregator 213 may perform such filtering and classification in real-time. Aggregator 213 will be discussed in greater detail with reference to Figures 4-7. Aggregator 213 provides the filtered and classified information to an output data adapter 214. Output data adapter 214 may convert the data from aggregator 213 into one or more content detail records for storage in CDR database 215. Therefore, CDR database 215 stores a complete description of a content event.

Transaction layer 103 includes CDR database 215, an ownership resolution component 216, and a transaction resolution component 221. CDR database 215 passes the CDR onto ownership resolution component 216. A proper accounting of a communication event, for any purpose including billing, requires both identifying the participants and defining the relationships among those participants. These tasks are accomplished by ownership resolution component 216 and transaction resolution component 221.

Ownership resolution component 216 serves to define the direct and indirect participants of the communication event. In particular, because raw data 204-206 may not provide sufficient "ownership" data relating to the parties involved in the content transaction, such "ownership" data must be provided by system 100 to properly account for the entire transaction. Ownership resolution component 216 operates to provide such ownership-based data to system 100.

Ownership resolution component 216 is in communication with transaction resolution component 221. Transaction resolution component 221 serves to capture the predetermined relationships and/or agreements among the parties defined by ownership resolution component 216 regarding the value of the transferred content, as well as the value added by each of the individual parties in transferring such content. Such predetermined relationships may be previously agreed upon by the participants, or may be created and agreed upon with the implementation of system 100. Therefore, transaction component 103 understands the nature of the parties, the actions that one or

more parties perform, and the influence of such action on the respective parties. Ownership resolution component 216 and transaction resolution component 221 will be discussed in greater detail.

Transaction component 216 provides the transaction information to a rating component 217. Rating component 217 provides a weight or significance (*e.g.*, a price) to the transaction, so as to provide a tangible value to the transaction. Rating component 217 may make this determination based on various metrics including the type of the content, the quantity of content consumed, the place and time delivered, or the quality of the content for example. Therefore, rating component 217 allows system 100 to provide some contextual value, indicting the significance or relevance that certain content or information has to the individual customer.

Rating component 217 provides the rated transaction to a presentment component 218. Presentment component 218 may provide the capability for a customer 220 to view their real-time billing information, for example, over the network. Presentment component 218 also may attach relevant identifiers to the bill (*e.g.*, account numbers, etc.).

Figures 3A and 3B provide a flow diagram further detailing the operation 300 of system 100. As shown in Figure 3A, in step 301, raw data 204-206 is received from data sources 201-203. In step 302, input data adapter 207 converts raw data 204-206 to flow objects 208, where flow objects 208 are sets of attributes, determined from raw data 204-206. In step 303, it is determined whether there is a need to derive new attributes from

the existing attributes found in flow objects 208. If there is such a need, in step 304, CDL 209 is used to derive new attributes from existing attributes. Also, as discussed above, attributes may be correlated by correlator 211.

In step 305, flow objects 208 are filtered by filter 212. In step 306, the matching flow objects (*i.e.*, those passed by filter 212) are further filtered and classified by aggregator 213 (as discussed more fully with reference to Figures 4-7). In step 307, output data adapter 214 converts the data aggregated by aggregator 213 to a format compatible with transaction layer 103.

As shown in Figure 3B, in step 308, output adapter 214 may format the aggregated data into one or more content data records for storage in CDR database 215. In step 309, ownership resolution component 216 identifies the parties involved in the transaction. In step 310, transaction resolution component 221 captures the predetermined agreements among the parties, as well as the value added by each of the individual parties. In step 311, the CDR is rated based on predetermined metrics (*e.g.*, time of transmission, quality of content). In step 312, a bill is presented to the customer.

Content Transaction Layer

A transaction, including a business transaction for example, may be any activity between two or more participants that affects certain parties. The affected parties may be considered the participants to the transaction, although parties and participants may be mutually exclusive entities. It should be appreciated that the terms "parties" and "owners" may be used interchangeably throughout. Also, a transaction may include one or more events, where an event may be some action (*e.g.*, the transfer of a service or good) that the participants conduct with each other. Such events may be the exchange of data over a communication network, for example. Also, it should be appreciated that the same event or action may take place in any direction (*e.g.*, from party A to party B or from party B to party A). The "subject" of the action is the party who performs the activity, while the "object" of the action is the party who is affected or influenced in any way by the action.

Transaction layer 103 is responsible for capturing the characteristics of the transaction, including the parties, participants, subject, object, event/action type, direction of the action, for example. The scope of the characteristics captured by transaction layer 103 will vary with the nature of instrumentation layer 101, the capability of content collection layer 102, and the requirements of settlement layer 104. Generally, transaction layer 103 captures the predetermined agreements among all of the parties involved in system 100 regarding the value of the transferred content, as well as the value added by each of the individual parties in transferring such content. Therefore, transaction layer

103 is charged with understanding the nature of the parties, as well as the understanding the actions that one or more parties perform and the influence of such action on the respective parties.

Transaction layer 103 includes CDR database 215, an ownership resolution component 216, and a transaction resolution component 221. CDR database 215 is a data store that holds each CDR for further processing by ownership resolution component 216 and transaction resolution component 221. In the context of a billable electronic business transaction, a proper accounting of a communication event, for any purpose including billing, requires both identifying the participants and defining the relationships among those participants. As discussed, ownership resolution component 216 serves to define the participants of the communication event, while transaction resolution component 221 serves to capture the predetermined relationships and/or agreements among the parties defined by ownership resolution component 216.

Transaction layer 103 is generic in that it operates without requiring an understanding of instrumentation layer 101 and content collection layer 102. Instead, transaction layer 103 takes the relevant characteristics of the transaction provided by instrumentation layer 101 and content collection layer 102, and selects and generates those characteristics required by settlement layer 104.

Although the operation of transaction layer 103 will be described in the context of an electronic event over a communication network for the purposes of billing for the event, it should be appreciated that the invention is not so limited, but is so described the

purpose of clarity. For example, it should be appreciated that the invention may include functions other than billing, including security, network capacity planning, and content monitoring, for example. Also, the generic techniques described may be applied beyond the context of an electronic event over a communication network.

Figure 4 provides a block diagram of system 100 providing greater detail of the configuration and operation of transaction layer 103. As shown in Figure 4, content collection layer 102 provides a usage record 401 to transaction layer 103. A series of fields 403-408 comprise usage record 401. Although fields 403-408 will be identified by certain labels for the purpose of clarity, it should be appreciated that fields 403-408 may identify any of the many possible characteristics of the transaction.

In the example provided by Figure 4, fields 403 and 404 identify the parties or participants to the transaction. In particular, field 403 identifies "User A" and field 404 identifies "User B." User A may be the subject party and User B may be the object party. For example, in the context of a telecommunication event, User A may be the "calling" party and User B may be the "called" party. Field 405 and field 406 identify a measurable quantity of the event. In particular, following the example of the telecommunications event, field 405 identifies a duration (in minutes) of the event and field 406 identifies the quantity of data exchanged during the event (in megabytes). Field 407 and field 408 may identify a "start time" and an "end time," respectively, of the communication event.

Although fields 403-408 provide just one example, in any case, it should be appreciated that user record 401 will include certain characteristics provided by instrumentation layer 101 and/or derived by content collection layer 102. These characteristics typically are provided to transaction layer 103 because they have some particular significance to identifying the characteristics necessary to allow settlement layer 104 to provide some accounting of the transaction. Therefore, usage record 401 may not necessarily include all of the characteristics provide by instrumentation layer 101 and/or derived by content collection layer 102, because certain characteristics may not relevant to the settlement of the transaction (*e.g.*, network type). Yet, usage record 401 will include those available characteristics that pertain to permitting settlement layer 104 to properly account for the transaction.

Once usage record 401 passes through transaction layer 103, a modified usage record 402 may be provided to settlement layer 104. Modified usage record 402 may be modified by transaction layer 103 to include additional details of the transaction event required by settlement layer 104 and/or required by the customer's system to which the usage record applies (*e.g.*, a usage billing system). As shown for modified usage record 402, an account A field 409 and an account B field 410 may be added to further identify the transaction. In one example, account A field 409 may include an alphanumeric designator that identifies the account number that has been assigned by the customer's billing system for User A. In the context of the telecommunications system, account A field 409 may hold User A's ten-digit home telephone number, for example.

In any case, the components of transaction layer 103 operate to identify these additional fields, based on the requirements of the customer's system and of settlement layer 104. In particular, ownership resolution component 216 operates to ensure that the necessary participants or parties to the transaction are identified, while transaction resolution component 221 operates to ensure that the relationships among the parties or participants are identified.

Identification of the relevant entities and their relationships may be accomplished using "lookups" in data stores located within ownership resolution component 216 or user-defined actions specified on external systems and applications and transaction resolution component 221, for example. For example, a data table may have a "User" data field and an associated "Account" data field. When User A is received by ownership resolution component 216, it will conduct a lookup in the data table and identify Account A as the appropriate account associated with User A. Also, transaction resolution component 221 may have a data table that permits a lookup of the relationship between User A and User B, identified in usage record 401. For example, upon receiving field 407 designating User A and field 408 designating User B, transaction resolution component 221 may conduct a lookup of an algorithm that identifies the appropriate burdens and benefits (*e.g.*, debit and credit of money) assigned to each of the users with respect to each other.

It also should be appreciated that transaction layer 103 may not provide additional characteristics to usage record 401, as described but may select the relevant

characteristics (*i.e.*, those characteristics needed by settlement layer 104) from the characteristics made available by instrumentation layer 101 and/or derived by content collection layer 102. In fact, usage record 401 may include all of the necessary characteristics to properly account for the transaction. In this case, ownership resolution component 216 and transaction resolution component 221 select the relevant characteristics from the available characteristics.

Figures 5A and 5B provide a flow diagram of a method 500 for identifying the characteristics of a transaction using system 100. As shown in Figure 5A, in step 501, raw data 204-206 is received into system 100. Raw data 204-206 includes certain characteristics provided by data sources 201-203, respectively, in instrumentation layer 101. In step 502, content collection layer 102 processes (*e.g.*, aggregates, correlates and filters) raw data 204-206. In step 503, content collection layer 102 provides the processed data to CDR database 215 in transaction layer 103. CDR database 215 stores the data for further processing by transaction layer 103.

In step 505, it is determined whether the contents of the data provided to transaction layer 103 already include the needed ownership data. If the data includes the needed ownership data, the relevant data is selected by ownership resolution component 216 and provided to transaction resolution component 221, in step 507. If, on the other hand, the data provided to transaction layer 103 does not already include the needed ownership data, the required data is identified (*e.g.*, using database lookups, accountable primitives) by ownership resolution component 216, in step 506. Once ownership

resolution component 216 identifies the required ownership data, the relevant data is selected by ownership resolution component 216 and provided to transaction resolution component 221, in step 507.

As shown in Figure 5B, in step 508 it is determined whether the contents of the data provided to transaction layer 103 already include the needed relationship data (*i.e.*, data defining the burdens and benefits encountered by the parties/participants to the transaction). If the data includes the needed relationship data, the relevant data is selected by transaction resolution component 221 and provided to settlement layer 104, in step 510. If, on the other hand, the data provided to transaction layer 103 does not already include the needed relationship data, the required data is identified (*e.g.*, using database lookups) by transaction resolution component 221, in step 509. Once ownership resolution component 216 identifies the required ownership data, the relevant data is selected by ownership resolution component 216 and provided to transaction resolution component 221, in step 510.

Ownership and Transaction Resolution

Figure 6 is a block diagram further detailing the operation and configuration of transaction layer 103. It should be appreciated that elements described for transaction layer 103 are not exclusive, but provide just one example of a configuration for transaction layer 103. In particular, the functionality of the previously described ownership resolution component 216 and transaction resolution component 221 will be

descried in greater detail in the various components described with reference to Figure 6. In practice, however, it should be appreciated that transaction layer 103 may comprise of any number of components that ensure that the necessary parties to a transaction are identified generically.

As shown in Figure 6, transaction layer 103 includes a configuration repository 601, a configuration database 610, a configuration manager 603, and a fail over detector 604. In addition, transaction layer 103 includes a transaction layer engine 608 in communication with configuration repository 601, configuration manager 603, and fail over detector 604.

Transaction layer engine 608 includes a rules processor 605, a CDR reader 606, and a transaction writer 607. Transaction layer engine 608 processes raw data 204-206 in usage record 401 and creates a modified usage record 402, based upon the requirements of settlement layer 104. It should be appreciated that there may be more than one transaction layer engine 608 for each transaction layer 103. However, a single transaction layer engine 608 is shown for the purpose of clarity and brevity.

CDR reader 106 understands the nature of the transaction and operates to read a particular usage record 401 stored in CDR database 215. CDR reader 106 then submits usage record 401 to rules processor 605. Rules processor 605 applies rules (*e.g.*, written in XML) to usage record 401 so as to determine ownership and the relationships among the ownership, for each individual usage record 401. Rules processor 605 may then generate one or more modified usage records 402, based on the application of the rules to

usage record 401. Once rules processor 605 generates the modified usage record 402, transaction writer 607 operates to write a transaction (based on the modified usage record 402) to CDR database 215. Modified usage record 402 is then used by settlement layer 104 to further process the transaction (*e.g.*, rate the transactions monetarily).

Fail over detector 604 operates to provide fault tolerance and initiate a fail over engine (not shown) for a failed transaction layer engine, in accordance with one or more mathematical algorithms, the discussion of which is beyond the scope of the invention. Configuration manager 603 provides an external interface to transaction layer 103 using a business editor 609. Business editor 609 may be manipulated by a user or customer using a graphics user interface (GUI). In particular, the GUI of business editor 609 receives commands from a user and translates them into actions to be performed on usage record 401, for example, by rules processor 605. Configuration repository 601 operates to provide an abstraction to configuration database 610. Configuration database 610 may be a relational database or a set of extensible markup language (XML) computer-readable files, for example.

Figure 7 is a flow diagram that details the operation of transaction layer 103, as shown in Figure 6. As discussed, it should be appreciated that multiple transaction engines may be used to implement a process. Where the invention is instituted using computer-readable instruction, transaction layer engine 608 may be implemented as a computer-executable instruction or thread. Therefore, multiple transaction layer engines may be implemented by having multiple computer-readable instructions.

In step 701, transaction layer engine 608 reads usage record 401 using CDR reader 606. In step 702, rules processor 605 applies one or more rules to usage record 401 read by CDR reader 606, so as to determine one or more "accountables." Accountables are labels that are used to facilitate identifying the parties or owners to a transaction. Accountables may be defined and/or modified by an external user (*e.g.*, a customer) using the graphical user interface provided by business editor 609. Also, it should be appreciated that accountables may be defined for a new usage types for which no rules in rules processor 605 are provided. The identification of accountables is the function of ownership resolution component 216, as described with reference to Figure 4.

In step 703, "contracts" are identified that define the relationships or agreements between one or more accountables. In the context of a billing system, a contract identifies which party pays (*i.e.*, the billed party) and which party receives payment (*i.e.*, the billing party). A particular contract may be identified and executed when one based on "conditions" are satisfied, however, such conditions may not be required. The identification of contracts is conducted by transaction resolution component 221, as described with reference to Figures 2 and 4. A condition is an expression of a logical assertion that can be evaluated as true or false. In transaction layer 103, for example, a condition may be true if a certain data element is present and false if the data element is not present. The following is an example of a condition in XML:

<condition name="condition1" function="IsPresent" outcome="true" type="Accountable" id="ColoProvider"/>

In step 704, once the contracts are determined, they are executed. In step 705, usage record 401 is changed to modified usage record 402 based upon the execution of the contract and the identification of the accountables. In step 706, modified usage record 402 may be written to a data table using transaction writer 607, so that settlement layer 104 can rate it, in step 707. Therefore, a transaction may be represented as modified usage record 402, where modified usage record may include the elements of usage record 401 in addition to the accountable and contract elements (*e.g.,* fields 409-410 as discussed with reference to Figure 4).

Although the discussion provided an example of a single contract and two accountables for a single usage record, it should be appreciated that many contracts and many accountables (*i.e.,* and therefore many "transactions") may be derived from a single usage record, because there may be multiple transactions implicated from a single usage record 401. For example, usage record 401 may involve three parties each having a contract with the other respective parties. In this example, therefore, there may be three separate contracts for a single usage record 401, and three individual accountables for each party or owner.

In addition to requiring a certain accountable, it may be necessary to determine a value of the accountable. For example, transaction layer 103 may determine not only that the "called party" accountable be a part of the transaction, but also that a value for the

called party (*e.g.*, "856-555-1212" or "John Doe") be identified. Also, it may be necessary to transform one accountable into another accountable to satisfy the requirement of settlement layer 104. For example, settlement layer 104 may require the called party accountable (either determined by transaction layer 103 or provided in usage record 401) be transformed into a network identifier accountable.

In either case, the value or transformation of accountables or contracts may be determined using certain predetermined functions or "primitives." A primitive allows the user to specify how to find the value of a particular accountable or how to find billing and/or billed account numbers associated with a particular contract. As discussed, transformations may allow a value of an accountable to be determined using another accountable (*i.e.*, called "linked accountables"), for example. Primitives define and direct such transformations. The input to a primitive can be one of fields 403-408 from usage record 401 or a previously determined accountable, for example.

Primitives may be described and distinguished based on their prescribed functionality. For example, one type of primitive may be an external database lookup. A database lookup is a primitive that operates to transform one accountable or contract to another accountable or contract. Also, a database lookup primitive may function to assign a value to an accountable or contract, as a result of conducting a lookup of the accountable or contract in a database. It should be appreciated that the database lookup primitive also allows flexibility in that any database that has Java Database Connectivity (JDBC) drivers (*e.g.*, Oracle, Microsoft SQL Server, Sybase, Database 2) can be used to

perform complex lookups. For native databases that do not have JDBC connectivity, however, it should be appreciated that native methods for native databases may be accommodated through the primitives. In this way, therefore, previous accountable or contact transformations can be linked to find new accountables or contracts, respectively.

Other types of primitives may include direct value assignment, and a function primitive. A function primitive provides flexibility and extensibility by allowing a third party based library (*e.g.*, Java-based or native libraries) to be used. The arguments of a function primitive may be text strings. Also, the arguments of a function primitive may be expressed in terms of fields in CDR database 215 (*i.e.*, string-based fields in usage record 401), and other previously determined accountables. Therefore, function primitives permit the integration of proprietary and domain-specific algorithms to be implemented to perform ownership related processing.

Another primitive may be a "regular expression" based primitive that allows parsing of complex text-based fields with a full feature (*e.g.*, PERL5 compliant) pattern specification. Common used techniques would include parsing URLs, filenames and paths, calling/called telephone numbers, email address, for example. In addition, a CDR database 215 lookup primitive allows holding on to an ownership entity if no further processing is required. This primitive is used where usage record 401 provides the information needed by settlement layer 104 without any need for more data correlation and/or manipulation by transaction layer 103.

A default primitive may be a hard-coded primitive that is used where the value is known and/or is not dependent on usage record 401. For example, such a primitive may be used where a party is always present in a consumption event, regardless of the other relevant parties. A network address primitive allows determination of a network entity given an arbitrary string. An area code primitive may be used to determine an area code of a telephone number given the complete telephone number. This primitive may be relevant for a Voice-over-IP application. These examples primitives are not exclusive, but are meant to provide a few examples of the manipulation and correlation that may be achieved by the primitives on the accountables and contracts.

The following is an example of an accountable primitive in XML:

```
<accountable>
<name> ColoProvider </name>
<role> ServiceProvider </role>
<usageType> RMONHost </usageType>
<valid from="past" to="present" />
<primitive type="default">
<value> Exodus </value>
</primitive>
</accountable>
```

Each accountable that is involved in a contract will have an assigned "role." It follows, therefore, that an accountable that is not involved in a contract may not need to have an assigned role. The role associates the particular accountable for integration with settlement layer 104. This means that the concept of a role is used for the TL/AMI integration.

Similar to the accountable, a contract is implemented using a set of primitives. The following is an example of a contract primitive in XML, and is provided to further describe the invention. In the example, a Web hosting scenario is present where a content provider (*e.g.*, CNN) places content on one or more Web servers and pays a Web Hoster for doing so based on some predefined pricing plan.

In order to define the accountables, certain elements of usage record 401 may be assumed as follows: Web Hit Time, Web Server Name/IP address, Client IP address, bytes, Mime type, and URL. In this example, if a rule in the business world requires the "Content Provider" of the Web Server (*e.g.*, CNN) to pay to the Web Hoster, there are two accountables: Web Hoster and Content Provider. The XML definition of a contract that captures this business rule may be as follows:

```
01  <contract>
02  <name> ContentProvider-Pays-WebHoster </name>
03  <usageType> WebHosting </usageType>
04  <valid from="past" to="present" />
05  <condition function="IsPresent" type="Accountable"
    name="condition1"  id=" ContentProvider " />
06  <condition function="IsPresent" type="Accountable"
    name="condition2" id="WebHoster" />

07  <billedFunction>
08  <status> enabled </status>
09  <primitive type="internal-account-lookup">
10  <database name="GlobalDB"/>
11  <argument order="1" type="Accountable"
    name="ContentProvider"/>
12  </primitive>
13  </billedFunction>
```

```
14    <billingFunction>
15    <status> disabled </status>
16    <primitive type="internal-account-lookup">
17    <database name="GlobalDB"/>
18    <argument order="1" type="Accountable" name="WebHoster"/>
19    </primitive>
20    </billingFunction>
21    </contract>
```

In this example, a contract has a name defined in line 02 as "ContentProvider-Pays-WebHoster." The contract also defines an element or usage type called "WebHosting" in line 03. The contract also has two sets of conditions in lines 05 and 06, called "IsPresent," which consider whether "ContentProvider" and "WebHoster" elements are present, respectively. Therefore, this particular contract will be selected and executed by transaction layer 103 if these elements are present.

Also, in this contract example, there are two primitives that are specified. There is a first primitive for finding the account number of the billed entity "ContentProvider," which begins on line 07 and ends on line 13, and there is a primitive for determining the account of the billing entity "WebHoster" beginning on line 14 and ending on line 20. Therefore, the example contract contemplates the "who pays to whom" logic, and results in the execution of a contract that creates a modified usage record 402, which captures the transaction. Notably, in lines 09 and 16, both primitives are defined as database lookups.

The invention is directed to a system and method for of determining of direct and/or indirect parties involved in a transaction. The invention often was described in the context of the Internet, but is not so limited to the Internet, regardless of any specific description in the drawing or examples set forth herein. For example, the invention may be applied to wireless networks, as well as non-traditional networks like Voice-over-IP-based networks, private networks, and/or non-technology related business environments, like commodity trading for example. It will be understood that the invention is not limited to the use of any of the particular components or devices herein. Indeed, this invention can be used in any application that requires the determining of direct or indirect parties involved in a transaction. Further, the system disclosed in the invention can be used with the method of the invention or a variety of other applications.

While the invention has been particularly shown and described with reference to the embodiments thereof, it will be understood by those skilled in the art that the invention is not limited to the embodiments specifically disclosed herein. Those skilled in the art will appreciate that various changes and adaptations of the invention may be made in the form and details of these embodiments without departing from the true spirit and scope of the invention as defined by the following claims.

What is Claimed is:

1. A method of determining parties to a transaction, comprising:

receiving data related to an event, wherein said data comprises one or more data elements;

selecting said data elements that identify the parties to the transaction;

determining whether additional data elements are required to identify the parties to the transaction; and

identifying the additional data elements.

2. The method of claim 1, wherein said event is an exchange of data between the parties over a communication network.

3. The method of claim 1, wherein said data related to said event is stored in a usage record.

4. The method of claim 1, wherein the parties include at least one of the following: a subject party and an object party.

5. The method of claim 1, wherein said determining is a function of the received data.

6. The method of claim 1, wherein said determining is a function of the requirements of a customer settlement system.

7. The method of claim 6, wherein said customer settlement system includes at least one of the following: a data security system, a network capacity planning system, and a content monitoring system.

8. The method of claim 1, wherein said data element is an accountable.

9. The method of claim 1, wherein said identifying of additional data elements is initiated by a primitive.

10. The method of claim 9, wherein said primitive includes at least one of the following: a database lookup, direct value assignment, regular expression, CDR database lookup, hard-coded, network address, substring manipulation, area code, and a user-specified action.

11. A system for determining parties to a transaction, comprising:

an instrumentation layer, wherein the instrumentation layer provides raw data;

a content collection layer in communication with the instrumentation layer, wherein the content collection layer generically processes the raw data; and

a transaction layer in communication with the content collection layer, wherein the transaction layer identifies one or more parties to the transaction.

12. The system of claim 11, wherein said content collection layer provides said raw data to said transaction layer in a usage record.

13. The system of claim 12, wherein said transaction layer modifies said usage record as a function of identifying the parties to the transaction.

14. The system of claim 11, further comprising a settlement layer in communication with said transaction layer, wherein the settlement layer rates the modified usage record.

15. The system of claim 12, wherein said transaction layer comprises a data base for storing said data processed by said content collection layer.

16. A computer-readable medium having computer-executable instructions for:

receiving data related to an event, wherein said data comprises one or more data elements;

selecting said data elements that identify the parties to the transaction;

determining whether additional data elements are required to identify the parties to the transaction; and

identifying the additional data elements.

17. The computer-readable medium of claim 16, wherein said computer-executable instructions are extensible.

18. The computer-readable medium of claim 16, wherein said event is an exchange of data between the parties over a communication network.

19. The computer-readable medium of claim 16, wherein said data related to said event is stored in a usage record.

20. The computer-readable medium of claim 16, wherein the parties include at least one of the following: a subject party and an object party.

21. The computer-readable medium of claim 16, wherein said determining is a function of the received data.

22. The computer-readable medium of claim 16, wherein said determining is a function of the requirements of a customer settlement system.

23. The computer-readable medium of claim 22, wherein said customer settlement system includes at least one of the following: a data security system, a network capacity planning system, and a content monitoring system.

24. The computer-readable medium of claim 16, wherein said data element is an accountable.

25. The computer-readable medium of claim 16, wherein said identifying of additional data elements is initiated by a primitive.

26. The computer-readable medium of claim 25, wherein said primitive includes at least one of the following: a database lookup, direct value assignment, regular expression, CDR database lookup, hard-coded, network address, substring manipulation, area code, and user-specified action.

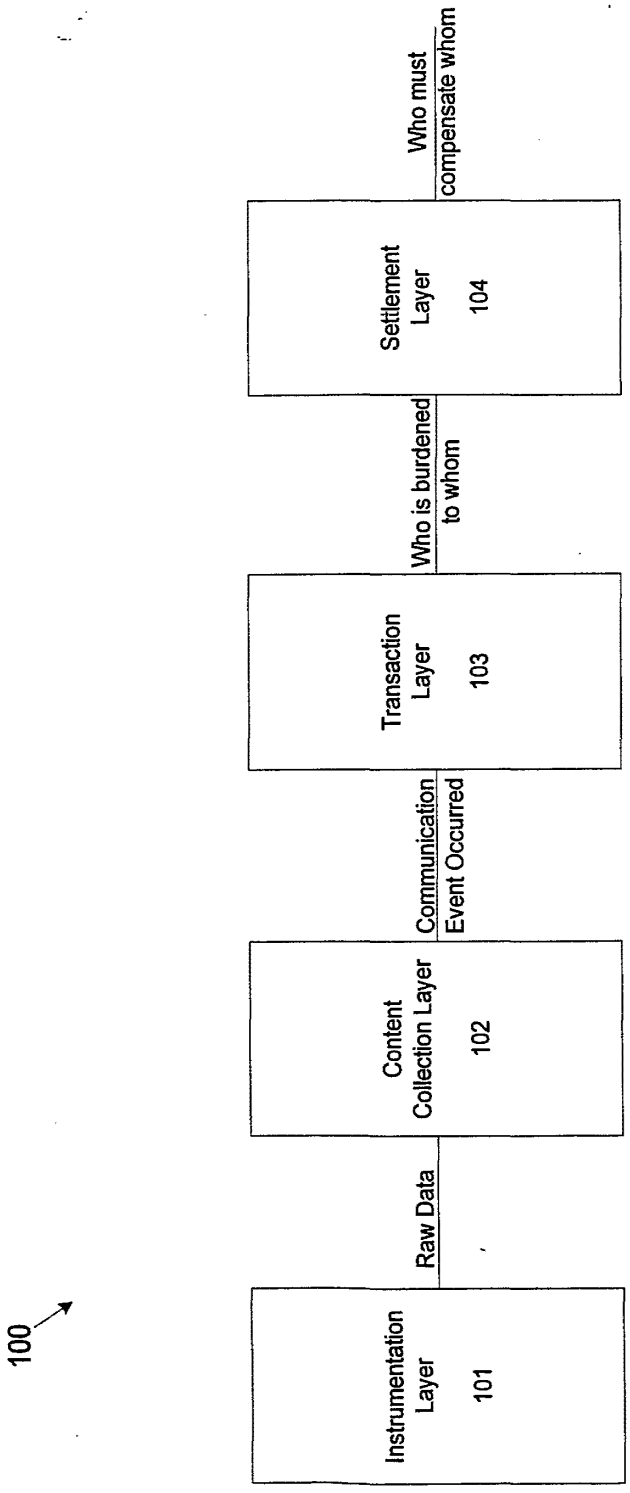

100
Instrumentation Layer 101
Raw Data
Content Collection Layer 102
Communication Event Occurred
Transaction Layer 103
Who is burdened to whom
Settlement Layer 104
Who must compensate whom

Figure 1

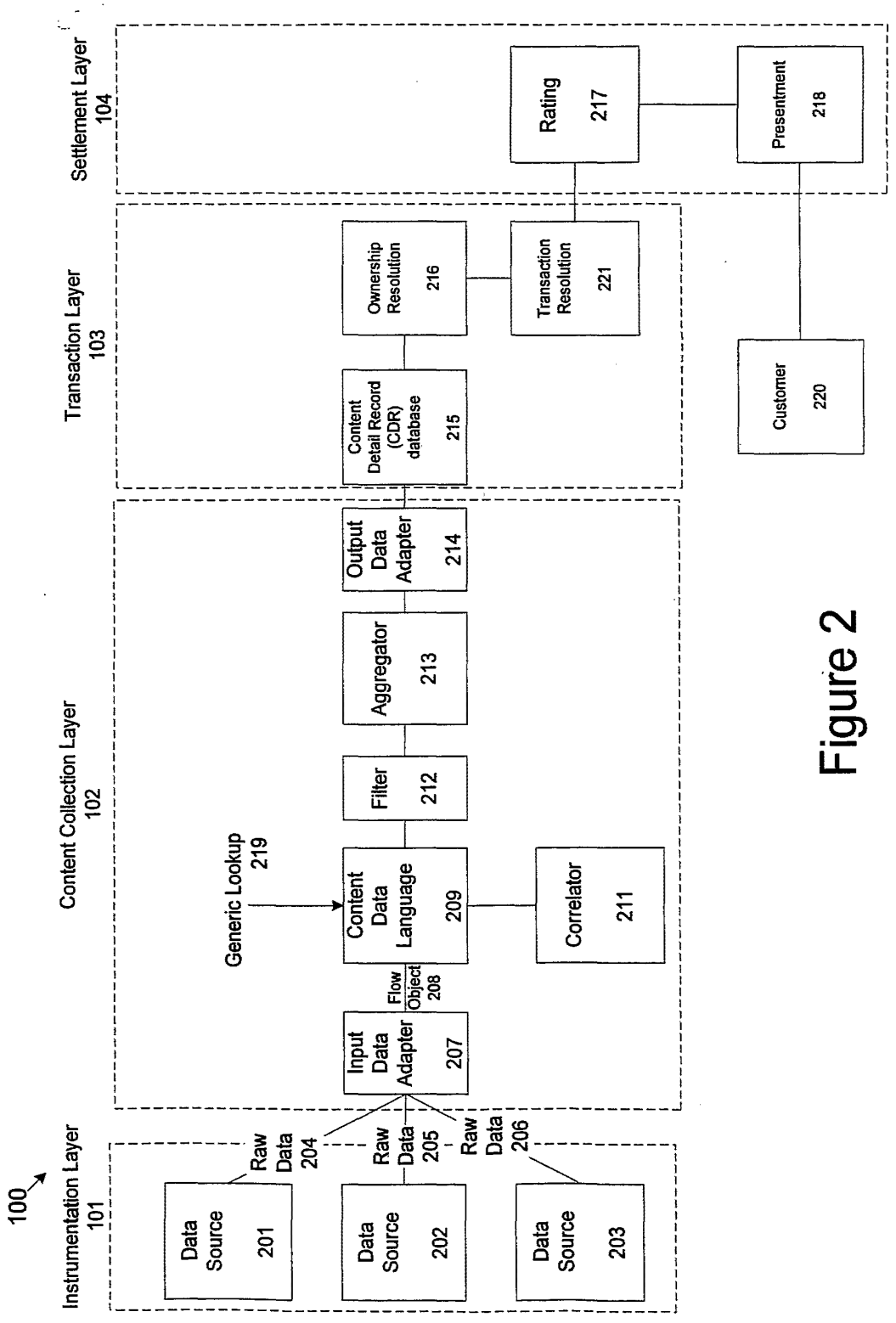

100
Instrumentation Layer 101
Data Source 201
Data Source 202
Data Source 203
Raw Data 204
Raw Data 205
Raw Data 206
Content Collection Layer 102
Input Data Adapter 207
Flow Object 208
Content Data Language 209
Generic Lookup 219
Correlator 211
Filter 212
Aggregator 213
Output Data Adapter 214
Transaction Layer 103
Content Detail Record (CDR) database 215
Ownership Resolution 216
Transaction Resolution 221
Settlement Layer 104
Rating 217
Presentment 218
Customer 220

Figure 2

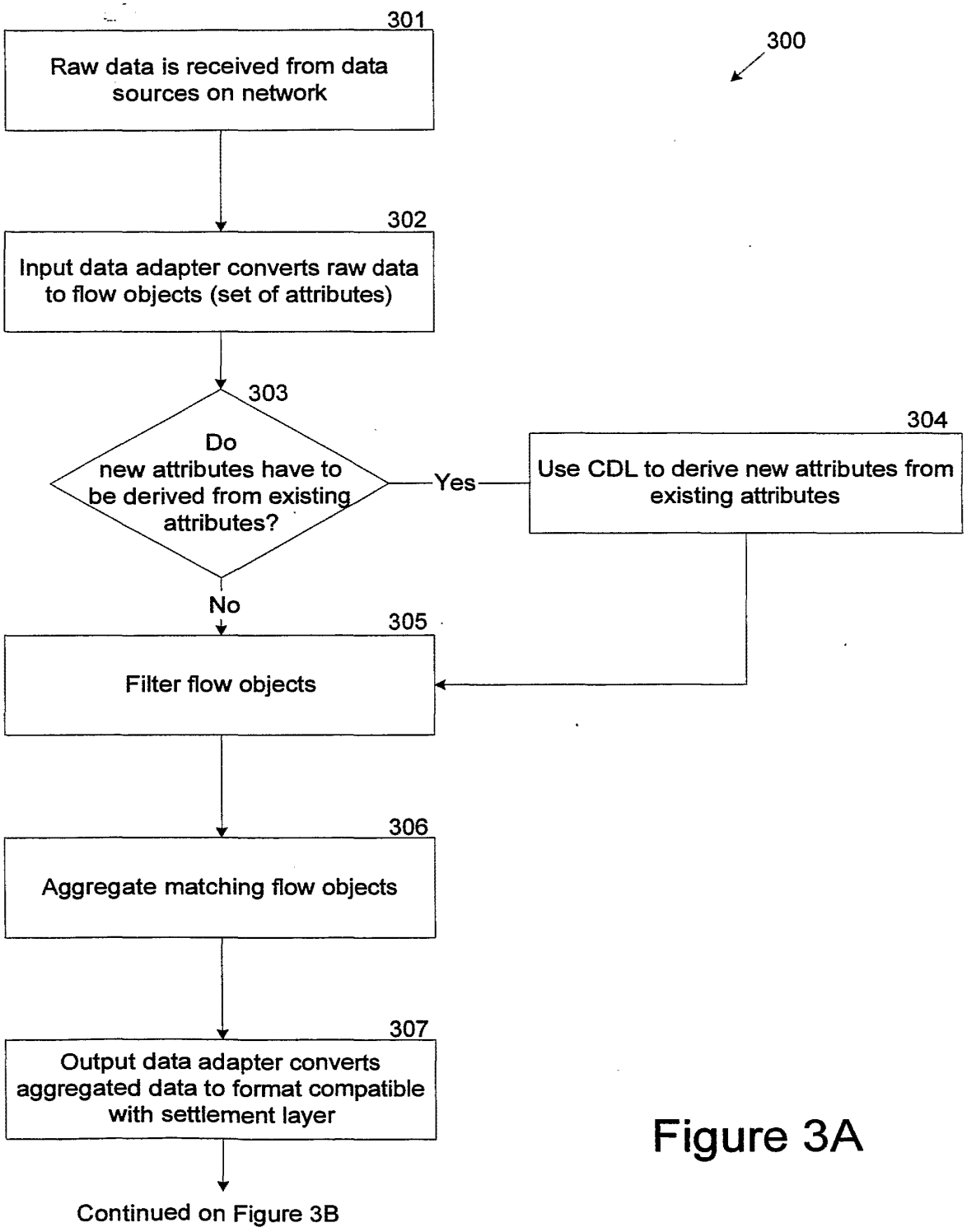

300
301
Raw data is received from data sources on network
302
Input data adapter converts raw data to flow objects (set of attributes)
303
Do new attributes have to be derived from existing attributes?
Yes
304
Use CDL to derive new attributes from existing attributes
No
305
Filter flow objects
306
Aggregate matching flow objects
307
Output data adapter converts aggregated data to format compatible with settlement layer
Continued on Figure 3B

Figure 3A

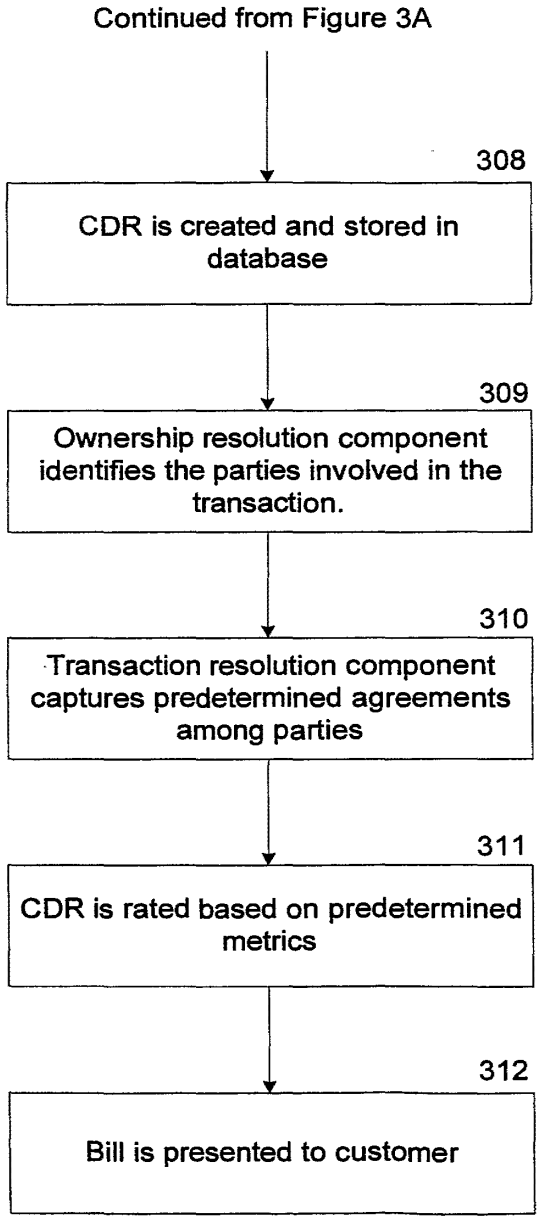

Continued from Figure 3A
308
CDR is created and stored in database
309
Ownership resolution component identifies the parties involved in the transaction.
310
Transaction resolution component captures predetermined agreements among parties
311
CDR is rated based on predetermined metrics
312
Bill is presented to customer

Figure 3B

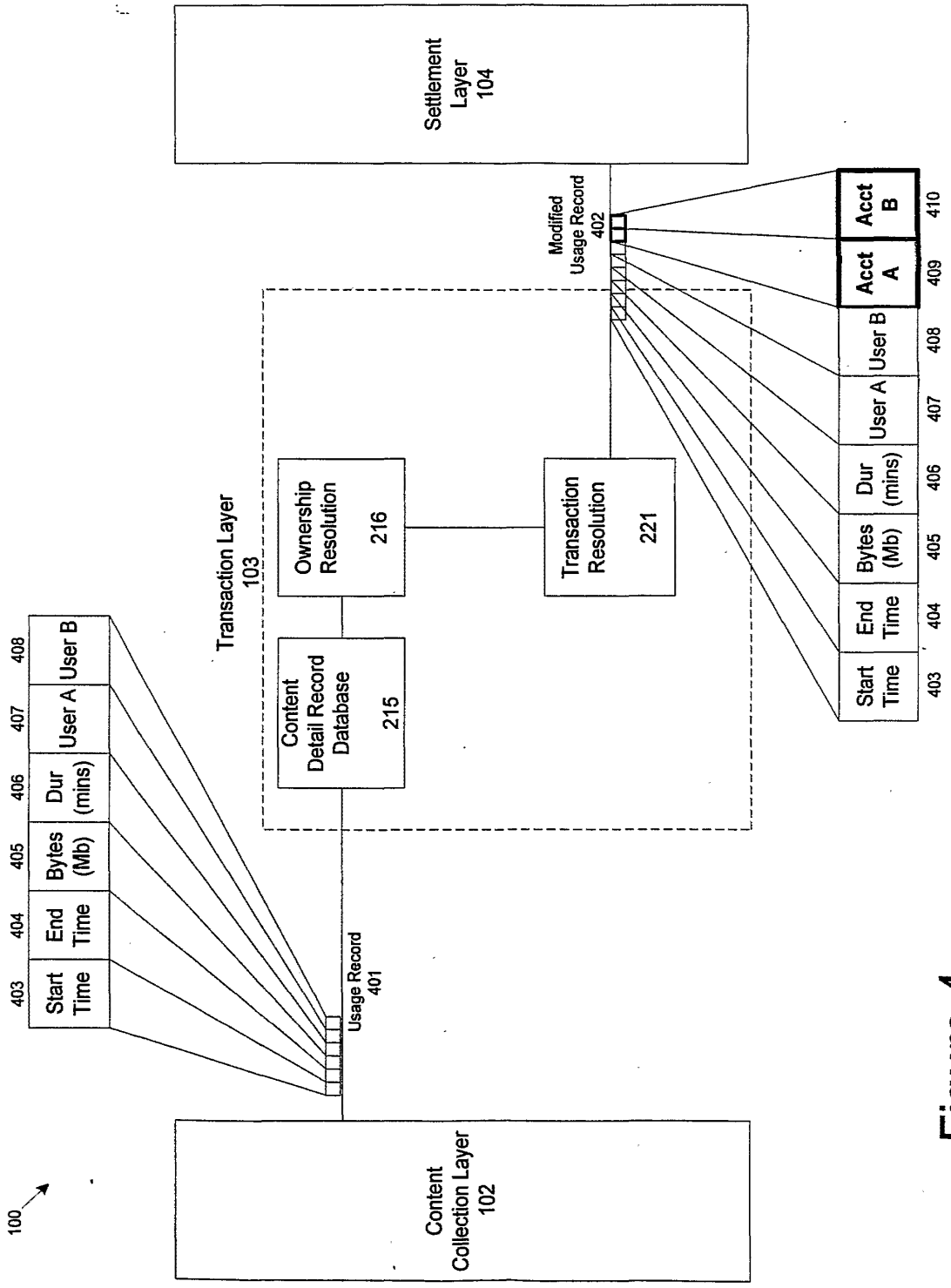

100
Content Collection Layer 102
Settlement Layer 104
Transaction Layer 103
Content Detail Record Database 215
Ownership Resolution 216
Transaction Resolution 221
Usage Record 401
Modified Usage Record 402
403 Start Time
404 End Time
405 Bytes (Mb)
406 Dur (mins)
407 User A
408 User B
409 Acct A
410 Acct B

Figure 4

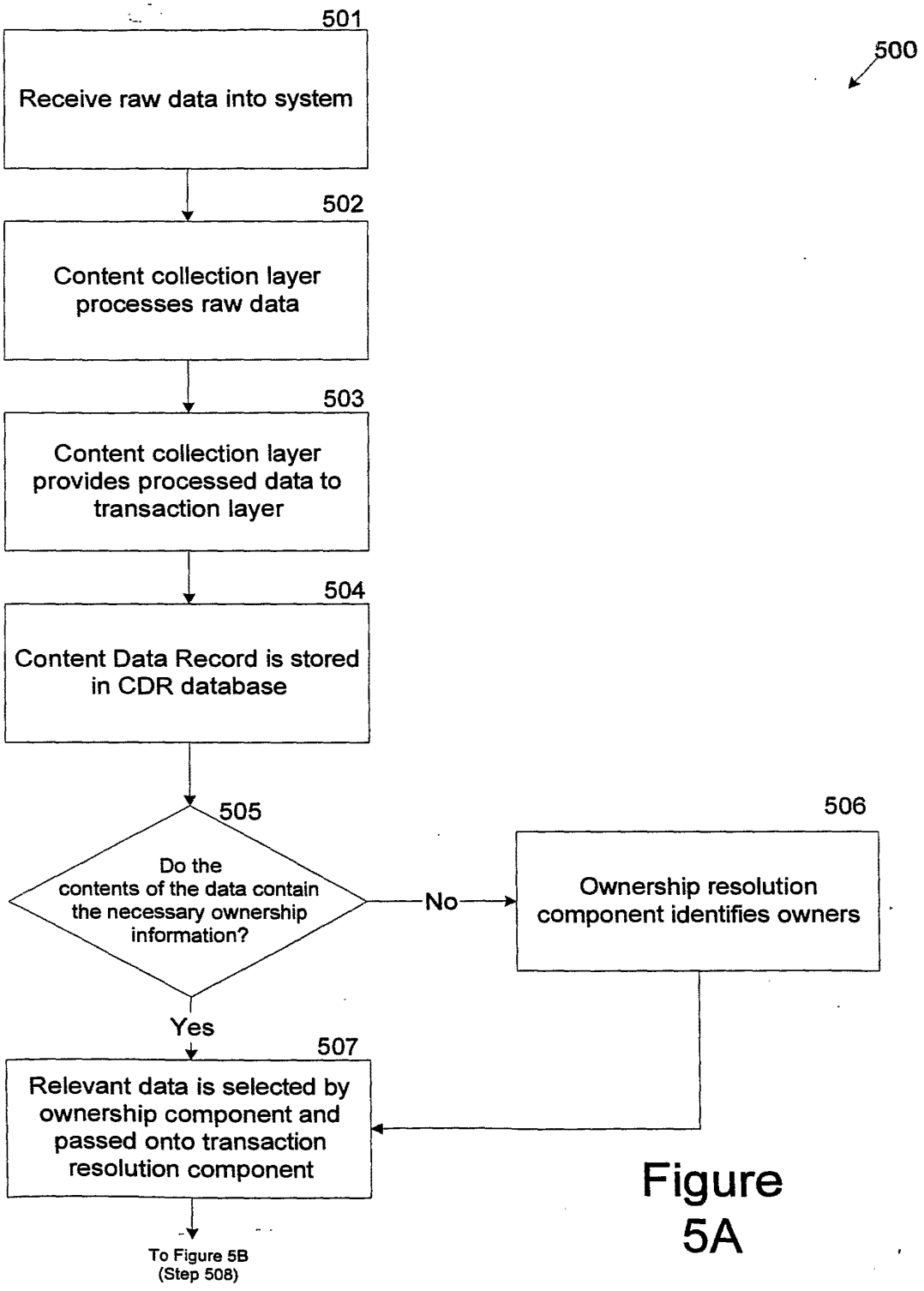

500
501
Receive raw data into system
502
Content collection layer processes raw data
503
Content collection layer provides processed data to transaction layer
504
Content Data Record is stored in CDR database
505
Do the contents of the data contain the necessary ownership information?
No
506
Ownership resolution component identifies owners
Yes
507
Relevant data is selected by ownership component and passed onto transaction resolution component
To Figure 5B (Step 508)

Figure 5A

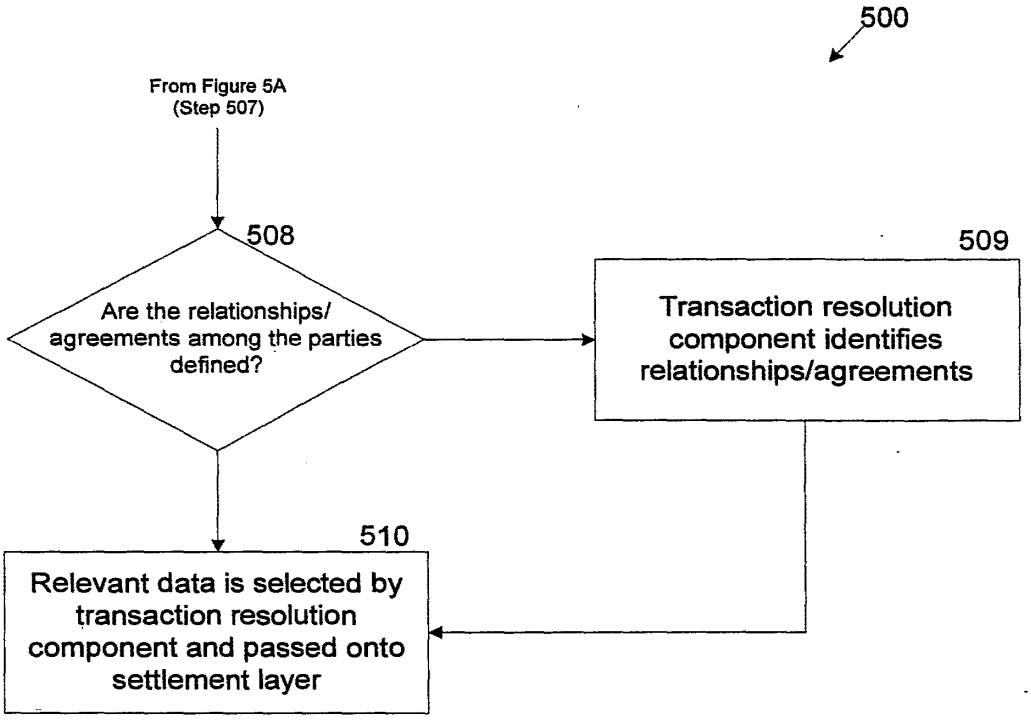

500
From Figure 5A
(Step 507)
508
Are the relationships/ agreements among the parties defined?
509
Transaction resolution component identifies relationships/agreements
510
Relevant data is selected by transaction resolution component and passed onto settlement layer

Figure 5B

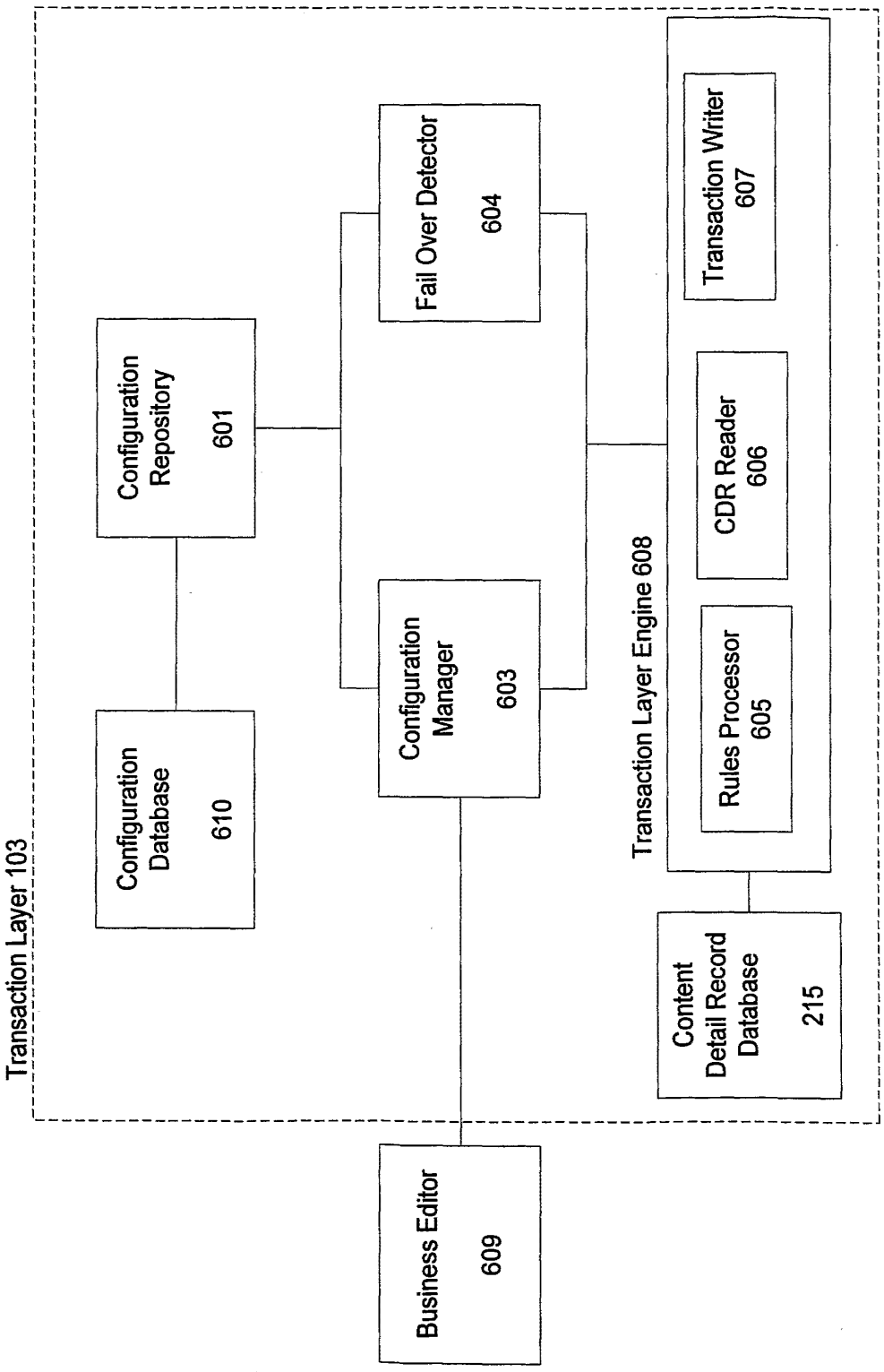

Transaction Layer 103
Configuration Repository 601
Configuration Database 610
Fail Over Detector 604
Configuration Manager 603
Business Editor 609
Transaction Layer Engine 608
Transaction Writer 607
CDR Reader 606
Rules Processor 605
Content Detail Record Database 215

Figure 6

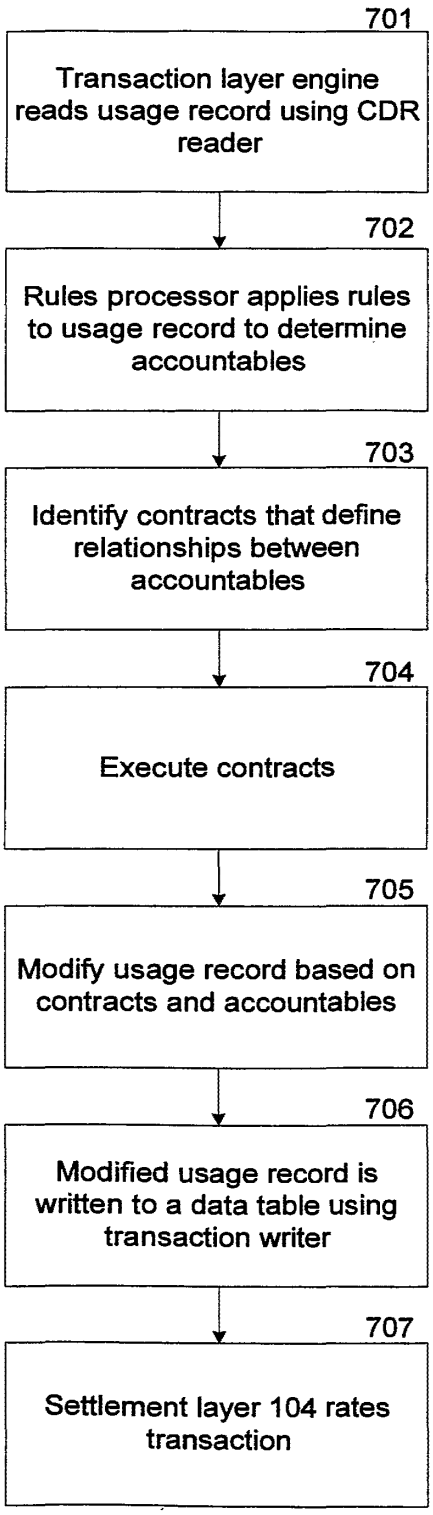

701
Transaction layer engine reads usage record using CDR reader
702
Rules processor applies rules to usage record to determine accountables
703
Identify contracts that define relationships between accountables
704
Execute contracts
705
Modify usage record based on contracts and accountables
706
Modified usage record is written to a data table using transaction writer
707
Settlement layer 104 rates transaction
700

Figure 7

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(54) A method and apparatus for division of revenue of communication among different proprietors

(57) A method and apparatus for division of revenue of communication among different proprietors is provided in this invention, where the division of revenue among the different proprietors is performed by a gateway office, wherein the gateway office will set a source parameter and a destination parameter respectively from the source and the destination when a call goes through the gateway office; Judge the two parameters to get a revenue zone index; Judge the value of the revenue zone index, and modulate the revenue zone index to get a revenue class index; The gateway office generates contents related to the revenue class index; A central memory receives all these contents, adds an increment of each counter of the revenue class memory related to the revenue class index to a corresponding counter and carries out multiple safety mechanisms; Output the information in the revenue class memory to a storage medium for storing, then output it to a billing center for revenue sorting. The billing mode present in this invention is based on group pairs, so it is more adaptive for the gateway office to divide revenue.

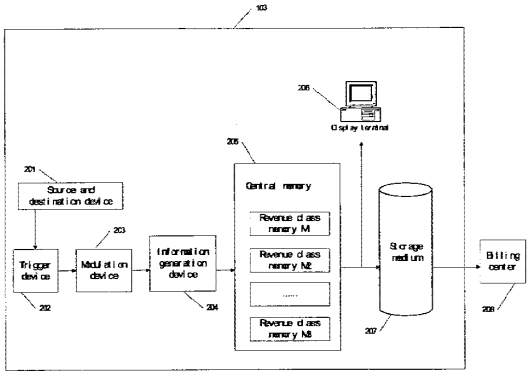


Fig. 2

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Description

TECHNICAL FIELD

[0001] The present invention relates to a method and apparatus for division of revenue of telecommunication among different proprietors.

RELATED ART

[0002] As to the relay jumping table billing, in the SPC exchange, it takes relay groups (income and outgoing) as revenue billing units, and accumulates all metering impulses of the relay group as the billing content. Although this technology is simple, it is not able to provide enough flexibility in resource sorting and billing content selecting.

[0003] As to the detail billing, in the SPC exchange, it generates a detail record for each call. All these records (telephone billing list) will be sent out from the SPC exchange after a specific period. A specific sorting department sorts all received telephone billing list, which will be treated as the billing content after sorting and summation. It can satisfy all kinds of user's customized demands, but there is a large number of temporary data transferring between the SPC exchange and the sorting department, and the investments on the equipments will be expanded greatly in order to satisfy demands.

SUMMARY OF THE INVENTION

[0004] In order to solve said problems of existing technology, this invention provides all kinds of methods for the division of revenue at the SPC exchange level of the gateway office, to satisfy various potential billing demands among the proprietors. Moreover, it is needless for proprietors to add investments immediately to meet with the additional demands for detail billing because of this demand.

[0005] The present invention provides a method for division of revenue of communication among different proprietors, wherein the division of revenue among the different proprietors is performed by a gateway office, the method comprising that:

a) When a call goes through the gateway office, the gateway office gets a source of a calling user and a destination of a called user respectively from different proprietors, and extracts a source parameter and a destination parameter from the source and the destination;

b) The gateway office judges values of the source parameter and the destination parameter as said in step a), and if there is one of values of the parameters corresponding to a parameter value for stopping a function on the division of revenue, the division of revenue function is stopped, otherwise, a corresponding revenue zone index is obtained according to said source parameter and destination parameter and step c) is executed;

c) The gateway office judges a value of the revenue zone index as said in step b), if it corresponds to the parameter value for stopping the division of revenue function, the revenue division function is stopped, otherwise, said revenue area index is modulated according to said call, a corresponding revenue class index R_j, j=1, 2...n is obtained, and step d) is executed;

d) The gateway office generates contents related to the revenue class index R_j as said in step c), and sends the contents to a central memory of the gateway office after said calling is finished;

e) The central memory of the gateway office receives the contents related to said revenue class index R_j as said in step d), and based on these contents, adds an increment of each counter in revenue class memory M_j (j=1,2... n) related to the revenue class index R_j to the corresponding counter and performs multiple safety mechanisms;

f) The central memory sends information in the revenue class memory M_j obtained in step e) to a storage medium. The storage medium stores the information with a predefined formatted scheme and sends the information to a billing center for sorting the revenue

wherein in said step c), said revenue zone index is modulated by a modulation parameter or several modulation parameters, and the obtained revenue class index varies with different modulation parameters which include type of call, bear capacity, high level carrying(HLC), analog or ISDN user.

wherein in said step d), said contents related to the revenue class index R_j as said in step c) include static and dynamic information on the call as said in step a);

[0006] In said step e), the revenue class memory M_j (j=1, 2...n) is set according to user's needs during initialization in the gateway office;

[0007] In said step f), the central memory sends the information in the revenue class memory M_j as said in step e) to a display terminal.

wherein in said step e), the multiple safety mechanisms include:

[0008] The central memory introducing a windowing mechanism during a receiving procedure;

[0009] The accumulation of each counter having a hot backup;

[0010] Each counter backups its information to a pair of hard disks with specific intervals.

wherein in said step f), the predefined formatted scheme is either a general scheme or a scheme customized according to user's needs.

[0011] The present invention provides an apparatus for division of revenue of communication among different proprietors, wherein the division of revenue among the different proprietors is performed by a gateway office, the apparatus comprising a source and destination device located in the gateway office, and further a trigger device, a modulation device, an information generation device□a central memory and a storage medium which are all located in the gateway office, wherein:

[0012] When a call goes through the gateway office, the source and destination device located in the gateway office respectively extracts a source parameter and a destination parameter according to a source of calling user and a destination of called user;

[0013] The trigger device judges values of the source parameter and the destination parameter, and if there is one of the values of the parameters corresponding to a parameter value for stopping a function on the division of revenue , the revenue division is stopped, otherwise, a corresponding revenue zone index is obtained according to said source parameter and destination parameter, and then judges a value of said revenue zone index, if it corresponds to the parameter value for stopping the revenue division function, t the revenue division function is stopped, otherwise, said revenue zone index is sent to the modulation device;

[0014] The modulation device, according to said call, modulates said revenue area index from the trigger device, and obtains the corresponding revenue class index R_j, j=1, 2...n;

[0015] The information generation device, according to said revenue class index R_j, j=1, 2...n, generates contents related to said revenue class index R_j, and sends them to the central memory after said call is finished;

[0016] The central memory receives the contents related to said revenue class index R_j, and based on these contents, adds an increment of each counter in revenue class memory M_j (j=1,2...n) related to the revenue class index R_j to the corresponding counter, and performs multiple safety mechanisms, and then sends information in said revenue class memory M_j to the storage medium;

[0017] The storage medium stores the information in said revenue class memory M_j with a predefined formatted scheme and sends the information to a billing center for sorting the revenue.

wherein said revenue zone index is modulated in the modulation device by a modulation parameter or several modulation parameters, and the obtained revenue class index varies with different modulation parameters which include type of call, bear capacity, high level carrying(HLC), analog or ISDN user.

[0018] Wherein said contents related to the revenue class index R_j include static and dynamic information on the said call;

[0019] Said revenue class memory M_j (j=1, 2...n) is set according to user's needs during initialization in the gateway office;

[0020] Said apparatus also includes a display terminal, which is used to display the information in said revenue class memory M_j.

wherein said multiple safety mechanisms include:

[0021] The central memory introducing a windowing mechanism during a receiving procedure;

[0022] The accumulation of each counter having a hot backup;

[0023] Each counter backups its information to a pair of hard disks with specific intervals.

wherein the predefined formatted scheme is either a general scheme or a customized scheme according to user's needs.

[0024] The division of revenue of this invention is a kind of billing method based on group pairs, making it more adaptive for gateway offices to divide revenue. Moreover, the division of revenue method present in this invention is not only based on relays, but it can also be realized by other billing units, comparing to the present technology whose billing unit is simply based on relays. The revenue class in this invention is abstract, and can be a mixture of several different entity types. Besides, the present invention also adopts a new normalized input and output format for the division of revenue.

DESCRIPTION OF THE DRAWINGS

[0025]

Fig .1 is a flowchart illustrating different proprietors realizing division of revenue by the gateway office in accordance with a preferred embodiment of the invention;

Fig .2 is a map of the gateway office realizing division of revenue in accordance with a preferred embodiment of the invention;

Fig .3 is a flowchart illustrating the safety mechanisms of the central memory in accordance with a preferred embodiment of the invention.

DETAILED DESCRIPTION OF THE INVENTION

[0026] This invention will be further explained with reference to the drawings and an embodiment.

[0027] This invention provides a method and a apparatus for division of revenue of communication among different proprietors, wherein the division of revenue among the different proprietors is performed by a gateway office.

[0028] Here, the gateway office is an interface exchanging office carrying out transmission of telephone services among different proprietors. For instance, a user of the Shanghai Mobile makes a call to another fixed phone user of the Shanghai Telecom, which will reach the fixed phone user via a gateway office between the two companies. Since the Shanghai Telecom proprietor has supplied its resource, it will count this kind of resource at the gateway office, and then come to a settlement with the Shanghai Mobile for the revenue. Therefore, the main function of the gateway office is to separately count resources occupied and divide revenue among different proprietors. At the same time, it also provides other gateway services such as the call identification authority and black/white list. The Division of Revenue (DOR) is used to count communication resource among different proprietors.

[0029] As shown in Fig.1, the user 101 is a user of the proprietor A 102 and the user 105 is a user of the proprietor B 104. When a call from the calling user 101 to the called user 104 go in and out from the gateway office 103, the gateway office 103 will get a source from the proprietor A, such as Beijing, and get a destination from the proprietor B, such as Shanghai.

[0030] Fig.2 is a map of the gateway office implementing division of revenue in accordance with an embodiment of the invention, including a source and destination device 201, a billing center 208, which are existing technology, and a trigger device 202, a modulation device 203, an information generation device 204, a central memory 205, a display terminal 206 and a storage medium 207, which are added in this invention. As shown in Fig.2, the source and destination device 201 of the gateway office 103 gets a source parameter and a destination parameter respectively from the source and the destination, which is a numeric value (0-255). For example, if the source is Beijing, the value of the source parameter is "1", and if the destination is Shanghai, the value of the destination parameter is "2".

[0031] At this time the route is already elected to pass, namely when the called user starts ringing, the trigger device 202 of the gateway office 103 judges the value of source and destination parameters. If there is a parameter's value corresponding to the value for stopping the division of revenue function, for example, in this embodiment, if there is a parameter whose value is 0, the division of revenue function is stopped. Those users who do not need this function shield it to consume the least resources. Otherwise, the trigger device 202 obtains a revenue zone parameter according to the source parameter and the destination parameter, as show in table 1.

Destination / Source	Beijing	Shanghai	...	...
Beijing	X1 (north china revenue zone index(1))	X2 (north china-east china revenue zone index (2))	...	...
Shanghai	X3 (east china - north china revenue index (3))	X4 (east - china revenue zone index (4))	...	...
...	...	...	...	...
...	...	...	...	Xn

Table.1

[0032] x_1, x_2, x_3, x_4 ... x_n in the table 1 are revenue zone indices. In this embodiment, the source is Beijing (1) and the destination is Shanghai (2). The trigger device 202 judges the source parameter value and the destination parameter value, if neither of them is zero, the corresponding revenue zone index x_2 is obtained, namely North China - East China revenue zone index, whose revenue zone index value is "2". As shown in table 1, in this invention, the revenue zone indices with different values can simply correspond to the different revenue class indices, which means obtaining many different revenue class indices. In existing technology, if the source and the destination are respectively output relay group and input relay group, it realizes the relay jump table function, and the largest number of the relay group soft table is 10 or 14. In this invention, we can dynamically assign many revenue class indices to one input relay group + several destinations, or to one output relay group + several sources, which actually means a relay group can have the nearly infinite number of the soft tables. This already breaks through the number limitation of the relay group soft table,

which is 10 or 14 in the existing technology, therefore, this invention actually functions better than the current relay jump table technology.

[0033] The trigger device 202 judges the revenue zone index value, if the value is 0, the function of division of revenue is stopped. This is helpful to users' flexible choice, and save system resource to the greatest extent. Otherwise, the modulation device 203 will modulate the revenue zone index. For instance, in this embodiment, the value of the revenue zone index x_2 is "2", not "0", so x_2 is modulated. Refer to table 2 for detailed modulation process.

[0034] As shown in table 2, for instance, proprietors are interested in the voice service of this call, namely require to count and charge the voice service, then said revenue zone index is modulated with one of the modulation parameters and the corresponding revenue class index R_j, j=1, 2...n is obtained. In this embodiment, the revenue zone index x_2 is modulated with the type of call (voice) modulation parameter and the corresponding revenue class index R1 is obtained, which corresponds to the voice service of the DDD call, namely the DDD call list. Furthermore, if there are other calls corresponding to the ISDN call, the revenue zone index x_2 will be modulated with the type of call (voice) modulation parameter, and the corresponding revenue class index R2 will be obtained, which means R2 corresponds to the voice service of the ISDN, namely the ISDN call list.

Revenue zone index	Type of call	Revenue class index	Billing list
X2 (north china- east china revenue zone index(2))	Type of call (voice)	R1 (east china - north china revenue class index (1)) (DDD call)	DDD billing list
		R2 (east china - north china revenue class index (2)) (ISDN call)	ISDN billing list
		R3 (east china - north china revenue class index (3)) (IN call)	IN billing list
		...	...

		R4 (east china - north china revenue class index (n)) (other types of call)	Other types of billing lists

Table.2

[0035] This invention provides an extremely flexible modulation method, wherein said modulating characteristics in this invention means modulating said revenue zone index using one or several modulation parameters, and the different corresponding revenue class indices by different combinations of these modulation parameters are obtained. The purpose of the modulation is to further conclude and arrange all revenue by different modulation parameters, and make revenue sortable according to the proprietor's demand, namely to perform revenue class indexing. At the end, various billing data will be obtained through different revenue class indices. The modulation parameters can be type of call (voice), bear capacity, high level carrying(HLC), analog or ISDN user and so on.

[0036] Said modulation in this invention is carried out during the calling process. In the existing technology, the relationship between each revenue zone index and revenue class index is usually one-to-one correspondence, which could satisfy the demand of most users. In this case, the modulation step can be ignored.

[0037] After the called user 105 gives reply, and before the call is released, the information generation device 204 of the gateway office 103 generates contents related to said revenue class index, such as R1, which include static and dynamic information on the call. The static information contains the modulating characteristics as shown in table 2, the calling number, the called number, the route and so on, the dynamic information contains the call holding time, the answering time and so on. These static information and dynamic information related to the call will be sent to the central memory 205 of the gateway office 103 after the call is finished.

[0038] After the call is released, namely the call is finished, the central memory 205 of the gateway office 103 receives these contents related to said revenue class index R_j, and based on these contents, adds the increment values of every counter of the revenue class memory M_j (j=1, 2...n), which is related to said revenue class index R_j, to the corresponding counter. For example, in this call there are several counters in the revenue class memory M1 corresponding to the revenue class index R1 of the central memory 205, such as a total-number-of-calls counter□total-length-of-calls counter, etc, which respectively accumulate the total number of calls and the total length of calls, based on this call. This revenue class memory M_j (j=1, 2...n) is set according to users' needs during the gateway office initializing procedure.

[0039] Because of the importance of the resource, multiple safety mechanisms are performed in the present invention, which including: The central memory 205 introduces a windowing mechanism during the receiving procedure. The accumulation of each counter has a hot backup, as shown in Fig.3, the central memory 205 is comprised of primary central storage region 301, hot backup central storage region 302, primary hard disk 305 and standby hard disk 307, the primary central storage region 301 and the hot backup central storage region 302 stores at the same time, as arrow 303 shows, one-region working task can be performed under certain circumstances. However, synchronous working starts as soon as the two-region working task takes over.Each counter backups its information to a pair of hard disks with specific intervals, namely to the primary hard disk 305 and the standby hard disk 306, the backuping task is executed by the primary central storage region 301, as arrow 304 shows. Since these safety mechanisms are existing technology, just a simply introduction is provided.

[0040] The central memory 205 sends the information of said revenue class memory M_j to the storage medium 207, which stores the information with reference to a predefined formatted scheme and sends the information to the billing center 208 for revenue sorting the same way as other bill documents. The central memory 205 also can send the information of said revenue class memory M_j to the display terminal 206. For example, display contents of each counter of the revenue class memory M_j through display terminal 206, then the network resource occupation situation of each

proprietor can be observed directly and instantly, which realizes flexible online operation. The revenue sorting here means arranging the billing data (such as the detailed billing phone list, the double counting jump table file, all said revenue class indices) generated in the gateway office in a document, sending the entire document to the billing center 208, where the document will be operated according to the predefined procedure and reorganized into a list of each revenue class and the corresponding total number of calls, total length of calls.

[0041] The predefined format can be a general style, as shown in table 3, the first part is a file header, such as information indicating the revenue dividing category, information on the file generation time, information labeling the local gateway office, etc. The following is a revenue class index sequence, the last part is a file trailer, such as an end-of-file indicator; The format can also be a customized style according to the user's need, as shown in table 4, the first part is a file header, such as information indicating the revenue dividing category, information on the file generation time, information labeling the local gateway office, etc, the following is a each revenue class index arranged in an order of the relay group and the bear type, the last part is a file trailer, such as an end-of-file indicator.

Table.3

<table>
<tr><td colspan="2">File header (such as: such as information indicating the revenue dividing category, information on the file generation time, information labeling the local gateway office, etc)</td></tr>
<tr><td rowspan="4">Arranging each revenue class index in order</td><td>Revenue class index sequence number 1</td></tr>
<tr><td>Total number of calls</td></tr>
<tr><td>Total length of calls</td></tr>
<tr><td>Total number of pulses</td></tr>
<tr><td>...</td><td>...</td></tr>
<tr><td colspan="2">File trailer (such as end-of-file indicator)</td></tr>
</table>

Table.4

<table>
<tr><td colspan="2">File header (such as: such as information indicating the revenue dividing category, information on the file generation time, information labeling the local gateway office, etc)</td></tr>
<tr><td rowspan="4">Arranging each revenue class index in an order of the relay group and the bear type</td><td>Revenue class index sequence number (1, 2, 3)</td></tr>
<tr><td>Corresponding relay group name</td></tr>
<tr><td>Corresponding bear type</td></tr>
<tr><td>Total number of calls</td></tr>
<tr><td rowspan="2"></td><td>Total length of calls</td></tr>
<tr><td>Total number of pulses</td></tr>
<tr><td>...</td><td>...</td></tr>
<tr><td colspan="2">File trailer (such as end-of-file indicator)</td></tr>
</table>

[0042] Therefore, the output format adopted in this invention greatly meets the users' demand, and makes it very convenient for the users to introduce this new function. Moreover, the output format can be customized to meet the needs of various high-end users. The output format provides more options, such as bureau name, file generation time, relay group name and other specific information, making it more supportive to on-line transmission.

[0043] More detailed steps corresponding to the embodiment of this invention are as follows:

a) When a call goes through the gateway office, the gateway office gets a source of a calling user and a destination of a called user respectively from different proprietors, and extracts a source parameter and a destination parameter from the source and the destination;

b) The gateway office judges values of the source parameter and the destination parameter as said in step a), and if there is one of values of the parameters corresponding to a parameter value for stopping a function on the division of revenue, the division of revenue function is stopped, otherwise, a corresponding revenue zone index is obtained according to said source parameter and destination parameter and step c) is executed;

c) The gateway office judges a value of the revenue zone index as said in step b), if it corresponds to the parameter value for stopping the division of revenue function, the revenue division function is stopped, otherwise, said revenue

area index is modulated according to said call, a corresponding revenue class index R_j, j=1, 2...n is obtained, and step d) is executed;

d) The gateway office generates contents related to the revenue class index R_j as said in step c), and sends the contents to a central memory of the gateway office after said calling is finished;

e) The central memory of the gateway office receives the contents related to said revenue class index R_j as said in step d), and based on these contents, adds an increment of each counter in revenue class memory M_j (j=1,2... n) related to the revenue class index R_j to the corresponding counter and performs multiple safety mechanisms;

f) The central memory sends information in the revenue class memory M_j obtained in step e) to a storage medium. The storage medium stores the information with a predefined formatted scheme and sends the information to a billing center for sorting the revenue

[0044] As to a medium-sized gateway office (10 hours when busy, 100CAPS bill list), the data volume ratio of detail billing in existing technology to the division of revenue in the present invention is over 100:1.

[0045] The present invention also greatly reduces the massive dump of the exchanger, the mass data processing of the sorting center and the mass data storage and transmission, saving various resources.

[0046] The division of revenue of this invention is a kind of billing method based on group pairs, making it more adaptive for gateway offices to divide telecommunication revenue. Moreover, the division of revenue method present in this invention is not only based on relays, but it can also be realized by other billing units, comparing to the exiting technology whose billing unit is simply based on relays.

[0047] It should be understood that the said embodiment has been presented by way of example only, and not limitation. Thus, all modifications that fall within the scope of this invention are intended to be included therein.

Claims

1. A method for division of revenue of communication among different proprietors, wherein the division of revenue among the different proprietors is performed by a gateway office, the method comprising that:

   a) When a call goes through the gateway office, the gateway office gets a source of a calling user and a destination of a called user respectively from different proprietors, and extracts a source parameter and a destination parameter from the source and the destination;

   b) The gateway office judges values of the source parameter and the destination parameter as said in step a), and if there is one of values of the parameters corresponding to a parameter value for stopping a function on the division of revenue, the division of revenue function is stopped, otherwise, a corresponding revenue zone index is obtained according to said source parameter and destination parameter and step c) is executed;

   c) The gateway office judges a value of the revenue zone index as said in step b), if it corresponds to the parameter value for stopping the division of revenue function, the revenue division function is stopped, otherwise, said revenue area index is modulated according to said call, a corresponding revenue class index R_j, j=1, 2...n is obtained, and step d) is executed;

   d) The gateway office generates contents related to the revenue class index R_j as said in step c), and sends the contents to a central memory of the gateway office after said calling is finished;

   e) The central memory of the gateway office receives the contents related to said revenue class index R_j as said in step d), and based on these contents, adds an increment of each counter in revenue class memory M_j (j=1,2...n) related to the revenue class index R_j to the corresponding counter and performs multiple safety mechanisms;

   f) The central memory sends information in the revenue class memory M_j obtained in step e) to a storage medium. The storage medium stores the information with a predefined formatted scheme and sends the information to a billing center for sorting the revenue.

2. The method according to claim 1, wherein in said step c), said revenue zone index is modulated by a modulation parameter or several modulation parameters, and the obtained revenue class index varies with different modulation parameters which include type of call, bear capacity, high level carrying(HLC), analog or ISDN user.

3. The method according to claim 1, wherein in said step d), said contents related to the revenue class index R_j as said in step c) include static and dynamic information on the call as said in step a);

   In said step e), the revenue class memory M_j (j=1, 2...n) is set according to user's needs during initialization in the gateway office;

   In said step f), the central memory sends the information in the revenue class memory M_j as said in step e)

to a display terminal.

4. The method according to claim 1, wherein in said step e) the multiple safety mechanisms include:

The central memory introducing a windowing mechanism during a receiving procedure;
The accumulation of each counter having a hot backup;
Each counter backups its information to a pair of hard disks with specific intervals.

5. The method according to claim 1, wherein in said step f), the predefined formatted scheme is either a general scheme or a scheme customized according to user's needs.

6. An apparatus for division of revenue of communication among different proprietors, wherein the division of revenue among the different proprietors is performed by a gateway office, the apparatus comprising a source and destination device located in the gateway office, and further a trigger device, a modulation device, an information generation device, a central memory and a storage medium which are all located in the gateway office, wherein:

When a call goes through the gateway office, the source and destination device located in the gateway office respectively extracts a source parameter and a destination parameter according to a source of calling user and a destination of called user;
The trigger device judges values of the source parameter and the destination parameter, and if there is one of the values of the parameters corresponding to a parameter value for stopping a function on the division of revenue ,the revenue division is stopped, otherwise, a corresponding revenue zone index is obtained according to said source parameter and destination parameter, and then judges a value of said revenue zone index, if it corresponds to the parameter value for stopping the revenue division function, the revenue division function is stopped, otherwise, said revenue zone index is sent to the modulation device;
The modulation device, according to said call, modulates said revenue area index from the trigger device, and obtains the corresponding revenue class index R_j, j=1, 2...n;
The information generation device, according to said revenue class index R_j, j=1, 2...n, generates contents related to said revenue class index R_j, and sends them to the central memory after said call is finished;
The central memory receives the contents related to said revenue class index R_j, and based on these contents, adds an increment of each counter in revenue class memory M_j (j=1,2...n) related to the revenue class index R_j to the corresponding counter, and performs multiple safety mechanisms, and then sends information in said revenue class memory M_j to the storage medium;
The storage medium stores the information in said revenue class memory M_j with a predefined formatted scheme and sends the information to a billing center for sorting the revenue.

7. The apparatus according to claim 6, wherein said revenue zone index is modulated in the modulation device by a modulation parameter or several modulation parameters, and the obtained revenue class index varies with different modulation parameters which include type of call, bear capacity, high level carrying(HLC), analog or ISDN user.

8. The apparatus according to claim 6, wherein:

Said contents related to the revenue class index R_j include static and dynamic information on the said call;
Said revenue class memory M_j (j=1, 2...n) is set according to user's needs during initialization in the gateway office;
Said apparatus also includes a display terminal, which is used to display the information in said revenue class memory M_j.

9. The apparatus according to claim 6, wherein said multiple safety mechanisms include:

The central memory introducing a windowing mechanism during a receiving procedure;
The accumulation of each counter having a hot backup;
Each counter backups its information to a pair of hard disks with specific intervals.

10. The apparatus according to claim 6, wherein the predefined formatted scheme is either a general scheme or a customized scheme according to user's needs.

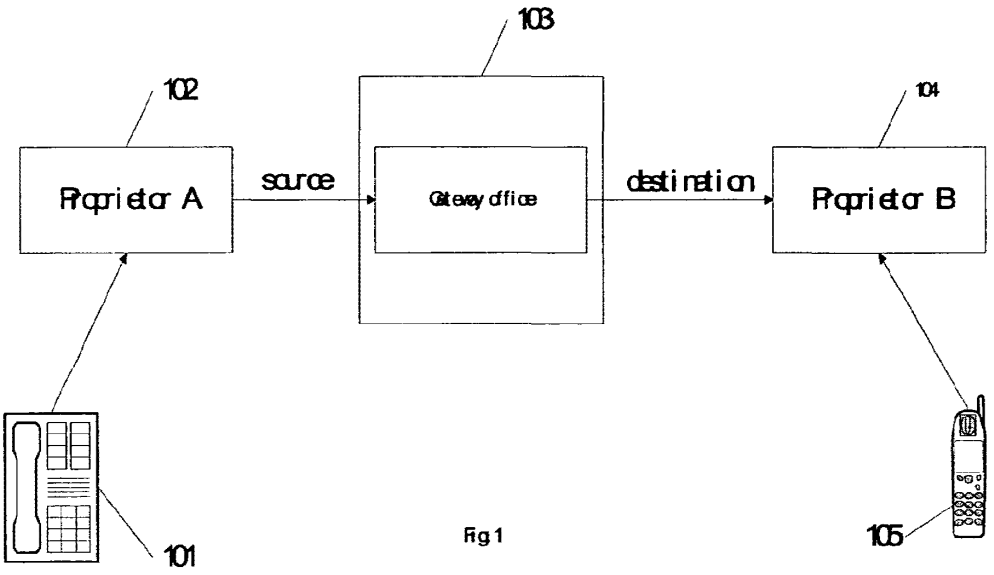

103
102
104
Proprietor A
source
Gateway office
destination
Proprietor B
101
105

Fig 1

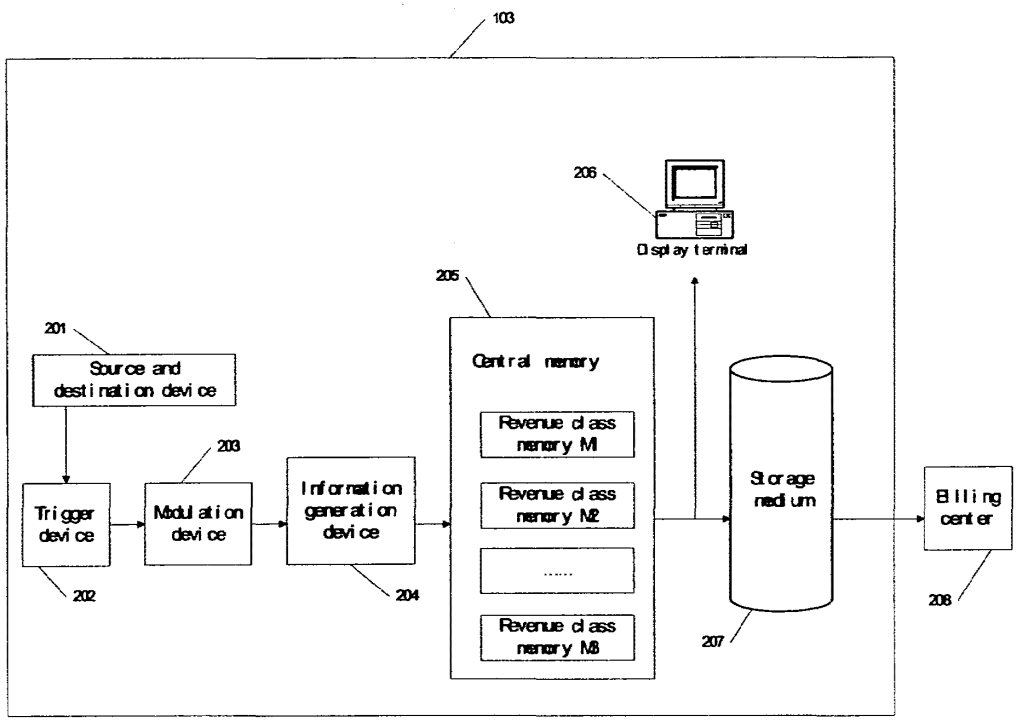

103
206
Display terminal
205
201
Source and destination device
Central memory
Revenue class memory M1
203
Trigger device
Modulation device
Information generation device
Revenue class memory M2
.....
Revenue class memory M3
Storage medium
Billing center
202
204
207
208

Fig. 2

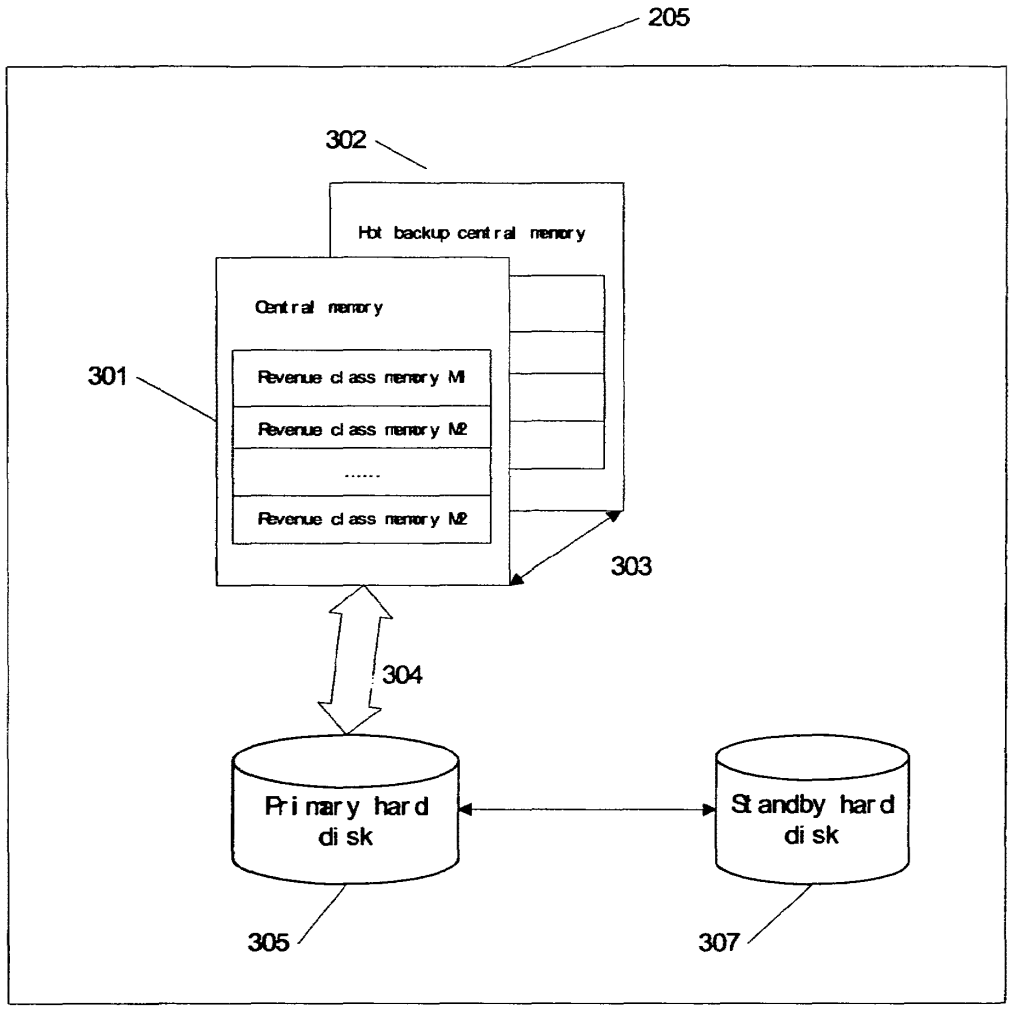

205
302
Hot backup central memory
Central memory
301
Revenue class memory M1
Revenue class memory M2
.....
Revenue class memory M2
303
304
Primary hard disk
Standby hard disk
305
307

Fig. 3

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 04 02 7514

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	19 April 2005	Patlaka, E.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 04 02 7514

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	19 April 2005	Patlaka, E.

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(54) **A METHOD AND SYSTEM FOR CONTENT CHARGING**

(57) A method for content charging includes: the portal server transmits the service activation request to the policy server based on the request for user using the service; the policy server determines the service policy corresponding to the service request after responding to the service activation request and distributes the service policy activation message to the content control gateway; the content control gateway performs the service policy and reports the user service usage message to the policy server; the policy server performs the charging according to the user service usage message. The solution provided by the present invention can realize the exact and low-cost charging for the content service and meet the requirement of QoS dynamic adjustment of the content service.

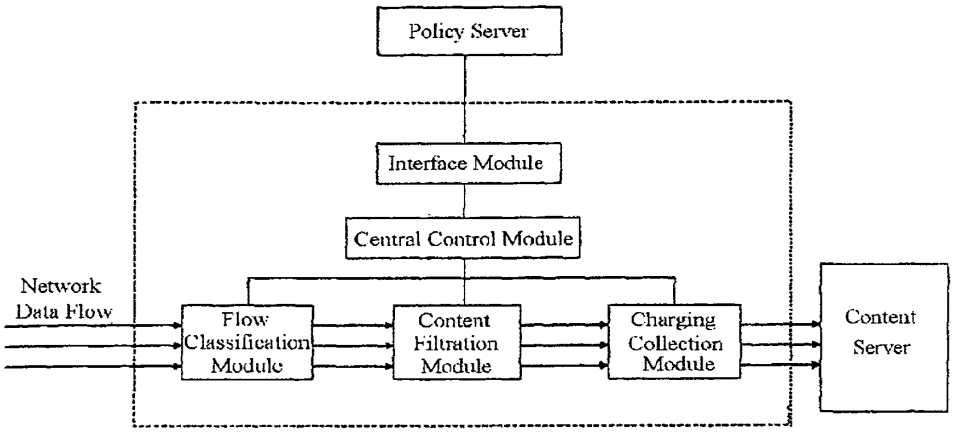


Fig.3

EP 1 887 732 A1

Printed by Jouve, 75001 PARIS (FR)

Description

Field of the Invention

[0001] The present invention relates to the technical field of network communications, in particular, to a method and a system for content charging.

Background of the Invention

[0002] With the rapid development of the Internet, content services become more and more abundant. Correspondingly, Internet Content Providers (ICPs) for getting profit by providing contents come on the scene. By cooperating with the ICP, service providers may increase the income of the access service by expanding the scale of network userson one hand, and earn the profit sharing of content income of the ICP on the other hand. At the same time, the ICP may obtain a low-cost channel for selling its content service rapidly.

[0003] The content platform of the service provider is developed on such background. The general mode of the content platform is as follows: The service provider provides a technical platform, and the ICP issues its content service via this platform. The service provider performs advertising, authentication, charging for the use of the content service via the platform. The user uses the content service provided by each ICP via the platform. The content platform records various fees caused by the user, and all of the fees will be recorded on a content account provided to the user by the service provider. With this content platform, the user does not need to settle accounts with each ICP; instead, the user only needs to settle accounts with the service provider.

[0004] The existing content charging solution for this content platform is usually implemented as follows:

[0005] A user connects to the network, logs in a portal website Portal Server, and connects to a Content Server of an ICP via a content channel. If the user is interested in a content provided by the ICP, then he/she clicks the button "OK", and the ICP Content Server will send an authentication request to the content platform of the service provider. If the authentication is passed, the right to use the content is assigned to the user and a charging start message is sent to the content platform.

[0006] To ensure the accuracy of the charging, the Content Server of the ICP sends an intermediate charging message to the content platform at a certain time interval during the usage of the content. When the user logs out the Content Server, the Content Server of the ICP sends a charging completion message to the content platform.

[0007] The content platform processes the charging message in real time, and performs rating and accounting on the content consumption of the user according to the information in the charging message such as service number, time length traffic flow, etc., together with the charging policy of the service.

[0008] In the prior art, strict requirements are laid on the interconnection technology between the content platform and the ICP. The ICP has to carry out customized development according to the content platform authentication and charging interface provided by the service provider, and joint debugging and testing should be performed after the development. Services may only be formally issued after the testing is passed. Thus, the cost is very high.

[0009] Some small-scale ICPs are weak in technical strength and they are not able to carry out customized development according to the charging interface. Some other ICPs purchase their service contents, such as multiplayer-fighting games, from other software company, so they have no source code for interface development, and are not able to implement content charging for such services.

[0010] Quality of Service (QoS) is required for some content services. For example, Video On Demand (VOD) service requires a broad bandwidth. However, in the mode aforementioned, the bandwidth may not be dynamically adjusted according to the service, and it is disadvantageous for operation and management.

[0011] In the actual operation of the ICP, it is difficult for the service provider to control the correctness of the service number, traffic flow and time length in the charging message, thus accurate charging may not be performed.

Summary of the Invention

[0012] The present invention provides a method and a system for implementing content charging at low cost, so that the service charging may be more accurate and reasonable, and the bandwidth may be adjusted dynamically according to the service.

[0013] The present invention provides a method for content charging, including:

[0014] sending, by a Portal Server, a service activation request to a Policy Server, based on a service request from a user;

[0015] responding to the service activation request, determining a service policy corresponding to the service request, and delivering a service policy activation message to a content control gateway, by the Policy Server;

[0016] executing the service policy and reporting user service consumption information to the Policy Server by the content control gateway; and permitting the user to use the service, and charging according to the user service consumption information reported by the content control gateway, by the Policy Server.

[0017] The method further includes:

[0018] sending, by the Portal Server, a service deactivation request to the Policy Server, when a request for stopping the service from the user is received; and

[0019] responding to the service deactivation request, delivering a service policy cancellation message, performing rating and accounting according to the consump-

tion information, by the Policy Server.

[0020] The content control gateway reports the user service consumption information to the Policy Server periodically during the service;

[0021] The Policy Server performs rating according to the user service consumption information, and settles accounts on the service consumption of the user according to each rating information after the user stops using the service.

[0022] After responding to the service activation request, the Policy Server queries a preset correlation table between the service and the service policy according to the service activation request, determines the service policy corresponding to the service, and extracts the parameters needed for executing the service policy, then fills the parameters in the service policy activation message and delivers the service policy activation message to the content control gateway.

[0023] Wherein, the service policy message includes the information of the source IP address, destination IP address, destination port, destination service resource and traffic flow information of the network packet.

[0024] The content control gateway grants the right to the source IP address of the user network packet to access the destination IP address, destination port and destination service resource, and controls the network flow according to the traffic flow information in the policy message.

[0025] The content control gateway distinguishes between the content data flows according to the Content Server or the service port of the content, controls the content data flow and collects the consumption information.

[0026] In another aspect of the invention, there is provided a system for content charging, which includes a Portal Server and a Content Server, wherein

[0027] the system further includes a Policy Server and a content control gateway, the Policy Server is connected with the Portal Server and the content control gateway and is adapted to deliver a service policy activation message and a service policy cancellation message, perform rating and charging according to user service consumption information reported by the content control gateway;

[0028] the content control gateway is connected with the Content Server and is adapted to control access to the Content Server of the user according to the access right, count the service consumption information and report the user service consumption information to the Policy Server for charging.

[0029] The Policy Server includes a central control module, a charging engine module, a portal interface module and a device interface module.

[0030] The central control module is connected with the charging engine module, portal interface module and device interface module, and is adapted to respond to a service activation request sent by the portal interface module, convert the service activation request into a service policy message corresponding to the service, deliver a service policy activation message via the device interface module, receive user service consumption information reported by the device interface module, and invoke the charging engine module for rating.

[0031] The portal interface module is adapted to receive a service request from the user, send a service activation request or a service deactivation request to the central control module, and return the execution result of the service request.

[0032] The device interface module is adapted to forward the policy information delivered by the central control module, and report policy execution information and service consumption information to the central control module.

[0033] The charging engine module is adapted to receive an invoking instruction from the central control module and perform rating and charging according to the user service consumption information.

[0034] The content control gateway includes a central control module, a flow classification module, a content filtration module, a charging collection module and an interface module.

[0035] The central control module is adapted to receive a policy sent by the Policy Server, and interact with the flow classification module, content filtration module and charging collection module for interpreting and executing the policy.

[0036] The flow classification module is adapted to check, classify, control a source IP address, a destination IP address and destination port information of a network packet on the IP layer, and permit a network flow that conforms to the policy to pass.

[0037] The content filtration module is adapted to check, classify, control resources to be accessed by the network packet on the application layer, and permit the network flow that conforms to the policy to pass.

[0038] The charging collection module is adapted to collect the time length and the traffic flow information of the network flow, and report the original charging data to the central control module.

[0039] The interface module is adapted to provide an interface between the central control module and the Policy Server.

[0040] In still another aspect of the invention, there is provided a Policy Server for implementing content charging, which includes a central control module, a charging engine module, a portal interface module and a device interface module.

[0041] The central control module is connected with the charging engine module, portal interface module and device interface module, and is adapted to receive a service activation request sent by the portal interface module, convert the service activation request into a service policy message corresponding to the service, deliver the service policy activation message via the device interface, receive user service consumption information reported by the device interface module, and invoke the charging engine module for rating.

[0042] The portal interface module is adapted to receive a service request from the user, send a service activation request or a service deactivation request to the central control module, and return the execution result of the service request.

[0043] The device interface module is adapted to forward the policy information delivered by the central control module, and report policy execution information and service consumption information to the central control module.

[0044] The charging engine module is adapted to receive an invoking instruction from the central control module and perform rating and charging according to the user service consumption information.

[0045] The server further includes a database interface and a memory database, Through the database interface, an external database and the memory database may be accessed. The memory database is adapted to store policy data, charging data, configuration data and user session data, and receive an instruction from the central control module for updating the data.

[0046] The invention further provides a content control gateway for implementing the charging method according to claim 1, which includes a central control module, a flow classification module, a content filtration module, a charging collection module and an interface module.

[0047] The central control module is adapted to receive a policy sent by the Policy Server, and interact with the flow classification module, content filtration module and charging collection module for interpreting and executing the policy.

[0048] The flow classification module is adapted to check, classify and control a source IP address, a destination IP address and destination port information of a network packet on the IP layer, and only permit a network flow that conforms to the policy to pass.

[0049] The content filtration module is adapted to check, classify and control resources to be accessed by the network packet on the application layer, and only permit the network flow that conforms to the policy to pass.

[0050] The charging collection module is adapted to collect the time length and the traffic flow information of the network flow, and report the original charging data to the central control module.

[0051] The interface module is adapted to provide an interface between the central control module and the Policy Server.

[0052] In summary, in the method and system for content charging according to the embodiments of the invention, by determining the service policy corresponding to the service information and executing the service policy, the user is controlled to use the service, the content data flows are distinguished according to the Content Server or the service port of the content, and the content data flow is controlled and the consumption information is collected. So that charging may be performed according to the user service consumption information reported. As a result, the interconnection difficulty and interconnection cost between the ICP Content Server and the content platform of the service provider may be lowered greatly, and a non-coding interconnection operation solution may be provided. Thus, the service provider may rapidly dispose a content service, the ICP may be effectively prevented from falsifying data, and accurate charging data may be provided. At the same time, the corresponding network QoS may be ensured according to the requirements of a certain content service, thus an overall QoS may be provided, and the market competitive power may be improved.

Brief Description of the Drawings

[0053] Figure 1 is a schematic diagram showing an exemplary system structure according to an embodiment of the invention;

[0054] Figure 2 is a schematic diagram showing the structure of the Policy Server according to an embodiment of the invention;

[0055] Figure 3 is a schematic diagram showing the structure of the content control gateway according to an embodiment of the invention; and

[0056] Figure 4 is a flow chart of the method according to an embodiment of the invention.

Detailed Description of the Embodiments

[0057] To make the principle, characteristics and advantages of the invention clearer, the invention will now be described in detail hereinafter in conjunction with the embodiments and the drawings of the invention.

[0058] As shown in Figure 1, the system for content charging according to an embodiment of the invention includes a Portal Server, a Policy Server, a Content Control Gateway (CCG) and a Content Server. Wherein, the Policy Server is connected with the Portal Server and the content control gateway, for delivering or canceling a service policy message, and performing rating and charging according to the service usage information reported by the CCG, such as traffic flow and time length. The CCG is connected with the Content Server, for controlling the access to the Content Server of the user, counting the service consumption information, and periodically reporting the related data to the Policy Server for charging. The Portal Server provides a portal for user access, and provides the user with functions such as login, service channel, service selection, self-help service. The Content Server is a server through which the ICP provides contents. There may be a plurality of Content Servers connected with a CCG, and various contents may also be issued on a Content Server. The servers on which the contents exist may be different, and the service ports of the contents, i.e. Transmission Control Protocol/User Data Protocol (TCP/UDP) ports may be different. The CCG distinguishes between the content data flows according to the server on which the contents exist or the service port of the content, and controls the content

data flows and collects data respectively for executing the policy.

[0059] The service policy message may be regarded as an indication message for the service data flow rules, which comprises parameters such as the source IP address, destination IP address, destination port, service resource information and traffic flow information of a network packet. For example, when a Content Server provides a game service, if a user wants to access the game server, the content of the corresponding service policy message may include the following information: the source IP address (which may be the IP address of the user), the IP address of the game server, the port of the game server (which may refer to the TCP/UDP port), the upstream bandwidth, the downstream bandwidth, the Universal Resource Locator (URL), etc. Thus, if the Policy Server delivers the policy and notifies the CCG, the CCG grants the user the right to access the game server after applying the policy. If the Policy Server instructs the CCG to remove the policy, the current user will lose the right to access the game server.

[0060] If the user wants to access a streaming server, the content of the corresponding service policy message may include the following information: the source IP address, the IP address of the streaming server, the port of the streaming server, the upstream bandwidth, the downstream bandwidth and the URL. The Policy Server delivers a policy and notifies the CCG, and the CCG grants the user the right to access the streaming server after applying the policy and reserves a designated bandwidth for the video/audio stream. If the Policy Server instructs the CCG to remove the policy, then the current user will lose the right to access the streaming server.

[0061] Similarly, if the user wants to access a download server, the content of the corresponding service policy message may include the following information: the source IP address, the IP address of the download server, the port of the download server, the upstream bandwidth, the downstream bandwidth, and the path of the download file. The Policy Server delivers a policy and notifies the CCG, and the CCG grants the user the right to access the download server after applying the policy and reserves a designated download bandwidth. If the Policy Server instructs the CCG to delete the policy, then the current user will lose the right to access the download server.

[0062] Each service and its corresponding service policy are stored in the form of a correlation table between the service and the service policy.

[0063] The internal structure of the Policy Server is as shown in Figure 2, which may include a central control module, a charging engine, a portal interface module, a device interface module, a database interface module and a local memory database (Built-in-Memory).

[0064] The central control module is the core module of the Policy Server, and is mainly responsible for scheduling and controlling other modules in the system. The central control module receives a service activation request sent from the portal interface module, converts it into a service policy message corresponding to the service, and sends the service policy message to the CCG via the device interface. If the policy is executed successfully, the CCG will periodically report the user service consumption information (mainly including time length and traffic flow information), and the central control module invokes the charging engine module for performing rating after receiving the original charging information from the device interface module.

[0065] The portal interface is responsible for interconnecting with the Portal Server, sending the service activation request or the service deactivation request to the central control module, and returning the service request execution result to the Portal Server.

[0066] The device interface module is responsible for interconnecting with the CCG, forwarding the policy information delivered by the central control module to the CCG, and reporting the policy execution information and service usage information to the central control module.

[0067] The charging engine is the charging component of the Policy Server. The central control module invokes the charging engine for performing rating and accounting according to the user service consumption record.

[0068] The database interface enables other subsystems to access the database and the memory database.

[0069] The memory database is an optional component, which may be regarded as a buffer for the external database. The memory database is mainly adapted to store policy data, charging data, configuration data and user session data. By using the memory database, the performance of the system may be improved greatly. The central control module periodically sends an instruction to the memory database for reading the policy data, charging data, configuration data from the external database and refreshing the local memory data.

[0070] The CCG is adapted to control the access to the Content Server of the user, count the service consumption information, and periodically report related data to the Policy Server for performing charging. As shown in Figure 3, the internal structure of the CCG includes a central control module, a flow classification module, a content filtration module, a charging collection module and an interface module.

[0071] The central control module is responsible for receiving the policy sent from the Policy Server and interpreting and executing the policy. During the execution of the policy, the central control module needs to interact with and control the flow classification module, the content filtration module and the charging collection module.

[0072] The flow classification module checks, classifies and controls the information such as the source IP, the destination IP, the destination port of the network packet, on the IP layer. The network flow that conforms to the policy may pass.

[0073] The content filtration module checks, classifies and controls the resources to be accessed by the network packet, such as the URL address applied by the HTTP,

the file path applied by the FTP (File Transfer Protocol) and the RTICP (Real-Time Streaming Protocol) path applied by the stream media, on the application layer. The network flow that conforms to the policy may pass.

[0074] The charging collection module collects the time length and the traffic flow information of the network flow, and reports the original charging data to the central control module. The central control module reports the original charging data to the Policy Server.

[0075] In the method according to an embodiment of the invention, Portal Server receives a service request from a user, and sends a service activation request to Policy Server. The Policy Server determines the corresponding service policy message according to the service after receiving the service activation request, and delivers the service policy message to CCG. The CCG executes the policy message, permits the user to use the service, and periodically reports the user service consumption information to the Policy Server. The Policy Server performs rating and charging according to the consumption information.

[0076] Specifically, as shown in Figure 4, the method includes following steps.

[0077] (1) A user sends a login request to the Portal Server, and the Portal Server authenticates the identity of the user.

[0078] (2) If the authentication is passed, the Portal Server receives the service selection data input by the user.

[0079] (3) The Portal Server sends a service activation request, which carries information such as the user IP, destination IP, service resources, to the Policy Server.

[0080] (4) The Policy Server determines the corresponding service policy message according to the service after receiving the service activation request, and delivers the service policy message to the CCG. Each service and its corresponding service policy are stored in the form of a correlation table between the service and the service policy. This table may be stored on the Policy Server or on a third party device. The Policy Server determines the policy corresponding to the service by querying the correlation table according to the activation request, extracts the parameters needed by the policy according to the activation request and the service policy, fills the parameters in the policy message and delivers the policy message. For example, for a game service, the content of the corresponding service policy message may include the following information: the source IP address (which may be the IP address of the user), the IP address of the game server, the port of the game server (which may refer to the TCP/UDP port), the upstream bandwidth, the downstream bandwidth and the URL.

[0081] (5) The CCG receives the service policy message, executes the service policy according to the instruction of the message, releases the access right from the user IP (which may be a source IP) to the destination IP, destination port or destination URL, and controls the network flow according to the bandwidth parameters in the policy. The CCG sends the policy execution result to the Policy Server after executing the policy.

[0082] (6) The Policy server informs the Portal Server of the service activation result.

[0083] (7) The Portal Server displays the service activation result to the user.

[0084] (8) If the service is activated, the user starts an application client end and performs content consumption, after knowing from the Portal Server that the service is available.

[0085] (9) The CCG periodically reports the service consumption information to the Policy Server during the content service used by the user.

[0086] (10) The Policy Server processes the service consumption information reported by the CCG in real time, and performs rating for the user content consumption.

[0087] (11) The Portal Server receives a request for stopping the service from the user when the user wants to logout the Content Server.

[0088] (12) The Portal Server sends a service deactivation request to the Policy Server.

[0089] (13) The Policy Server delivers a policy cancellation request to the CCG.

[0090] (14) The CCG cancels the policy and returns the policy cancellation result to the Policy server.

[0091] (15) The Policy server informs the Portal Server of the service cancellation result.

[0092] (16) The Portal Server displays the service cancellation result to the user.

[0093] (17) The CCG reports the last service consumption information of the user to the Policy Server.

[0094] (18) The Policy Server processes the service consumption information, performs rating, and settles accounts on the current content consumption according to each rating information.

[0095] In another embodiment of the invention, the content control gateway does not need to periodically report the user service consumption information to the Policy Server. Instead, the content control gateway reports the total service consumption information of the user to the Policy Server at a time after receiving the policy cancellation request delivered by the Policy Server. The Policy Server performs rating and accounting according to the consumption information.

[0096] The invention provides a novel content charging solution, by means of which the interconnection difficulty and the interconnection cost between the ICP Content Server and the content platform of the service provider may be lowered greatly, and the ICP may be effectively prevented from falsifying data, and accurate charging data may be provided. In the meanwhile, the corresponding network QoS may be ensured according to the requirements of a certain content service.

Claims

1. A method for content charging, comprising:

   sending, by a Portal Server, a service activation request to a Policy Server based on a service request from a user;
   responding to the service activation request, determining a service policy corresponding to the service request, and delivering a service policy activation message to a content control gateway, by the Policy Server;
   executing the service policy and reporting user service consumption information to the Policy Server by the content control gateway; and
   permitting the user to use the service, and charging according to the user service consumption information reported by the content control gateway, by the Policy Server.

2. The method according to claim 1, wherein the method further comprises:

   sending, by the Portal Server, a service deactivation request to the Policy Server, when a request for stopping the service from the user is received; and
   responding to the service deactivation request, delivering a service policy cancellation message, performing rating and accounting according to the consumption information, by the Policy Server.

3. The method according to claim 1 or 2, wherein the method further comprises:

   reporting, by the content control gateway, the user service consumption information to the Policy Server periodically during the use of the service;
   rating according to the user service consumption information, and accounting on the service consumption of the user according to each rating information after the user stops using the service, by the Policy Server.

4. The method according to claim 1, wherein the method further comprises:

   after responding to the service activation request, querying a preset correlation table between the service and the service policy according to the service activation request, determining the service policy corresponding to the service, extracting the parameters needed for executing the service policy, filling the parameters in the service policy activation message and delivering the service policy activation message to the content control gateway by the Policy Server.

5. The method according to claim 1, 2 or 4, wherein: the service policy activation message comprises the information of the source IP address, destination IP address, destination port, destination service resource and traffic flow information of the network packet.

6. The method according to claim 5, wherein the method further comprises:

   granting the source IP address of the user network packet a right to access the destination IP address, destination port and destination service resource, and controlling the network flow according to the traffic flow information in the service policy message, by the content control gateway.

7. The method according to claim 1, wherein the method further comprises:

   obtaining the content data flows according to the Content Server or the service port of the content, controlling the content data flow and collecting the consumption information, by the content control gateway.

8. A system for content charging, comprising a Portal Server and a Content Server, wherein the system further comprises a Policy Server and a content control gateway, the Policy Server is connected with the Portal Server and the content control gateway and is adapted to deliver a service policy activation message and a service policy cancellation message, perform rating and charging according to user service consumption information reported by the content control gateway;
   the content control gateway is connected with the Content Server and is adapted to control access to the Content Server of the user according to the access right, count the service consumption information and report the user service consumption information to the Policy Server for charging.

9. The system according to claim 8, wherein the Policy Server comprises a central control module, a charging engine module, a portal interface module and a device interface module, wherein:

   the central control module is connected with the charging engine module, portal interface module and device interface module, and is adapted to respond to a service activation request sent by the portal interface module, convert the service activation request into a service policy message corresponding to the service, deliver a

service policy activation message via the device interface module, receive user service consumption information reported by the device interface module, and invoke the charging engine module for rating;
the portal interface module is adapted to receive a service request from the user, send a service activation request or a service deactivation request to the central control module, and return the execution result of the service request;
the device interface module is adapted to forward the policy information delivered by the central control module, and report policy execution information and service consumption information to the central control module;
the charging engine module is adapted to receive an invoking instruction from the central control module and perform rating and charging according to the user service consumption information.

10. The system according to claim 8, wherein the content control gateway comprises a central control module, a flow classification module, a content filtration module, a charging collection module and an interface module, wherein:

the central control module is adapted to receive a policy sent by the Policy Server, and interact with the flow classification module, content filtration module and charging collection module for interpreting and executing the policy;
the flow classification module is adapted to check, classify, control a source IP address, a destination IP address and destination port information of a network packet on the IP layer, and permit a network flow that conforms to the policy to pass;
the content filtration module is adapted to check, classify, control resources to be accessed by the network packet on the application layer, and permit the network flow that conforms to the policy to pass;
the charging collection module is adapted to collect the time length and the traffic flow information of the network flow, and report the original charging data to the central control module;
the interface module is adapted to provide an interface between the central control module and the Policy Server.

11. A Policy Server, for realizing the charging method according to claim 1, wherein the Policy Server comprises a central control module, a charging engine module, a portal interface module and a device interface module, wherein:

the central control module is connected with the charging engine module, portal interface module and device interface module, and is adapted to receive a service activation request sent by the portal interface module, convert the service activation request into a service policy message corresponding to the service, deliver the service policy activation message via the device interface, receive user service consumption information reported by the device interface module, and invoke the charging engine module for rating;
the portal interface module is adapted to receive a service request from the user, send a service activation request or a service deactivation request to the central control module, and return the execution result of the service request;
the device interface module is adapted to forward the policy information delivered by the central control module, and report policy execution information and service consumption information to the central control module;
the charging engine module is adapted to receive an invoking instruction from the central control module and perform rating and charging according to the user service consumption information.

12. The server according to claim 11, wherein the server further comprises a database interface and a memory database, through the database interface, an external database and the memory database is accessed; the memory database is adapted to store policy data, charging data, configuration data and user session data, and receive an instruction from the central control module for updating the data.

13. A content control gateway, for implementing the charging method according to claim 1, comprising a central control module, a flow classification module, a content filtration module, a charging collection module and an interface module, wherein:

the central control module is adapted to receive a policy sent by the Policy Server, and interact with the flow classification module, content filtration module and charging collection module for interpreting and executing the policy;
the flow classification module is adapted to check, classify and control a source IP address, a destination IP address and destination port information of a network packet on the IP layer, and only permit a network flow that conforms to the policy to pass;
the content filtration module is adapted to check, classify and control resources to be accessed by the network packet on the application layer, and only permit the network flow that conforms to the policy to pass;

the charging collection module is adapted to collect the time length and the traffic flow information of the network flow, and report the original charging data to the central control module;
the interface module is adapted to provide an interface between the central control module and the Policy Server.

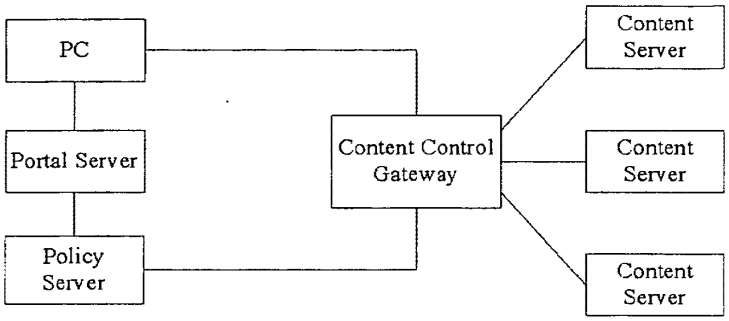

PC
Portal Server
Policy Server
Content Control Gateway
Content Server
Content Server
Content Server

Fig.1

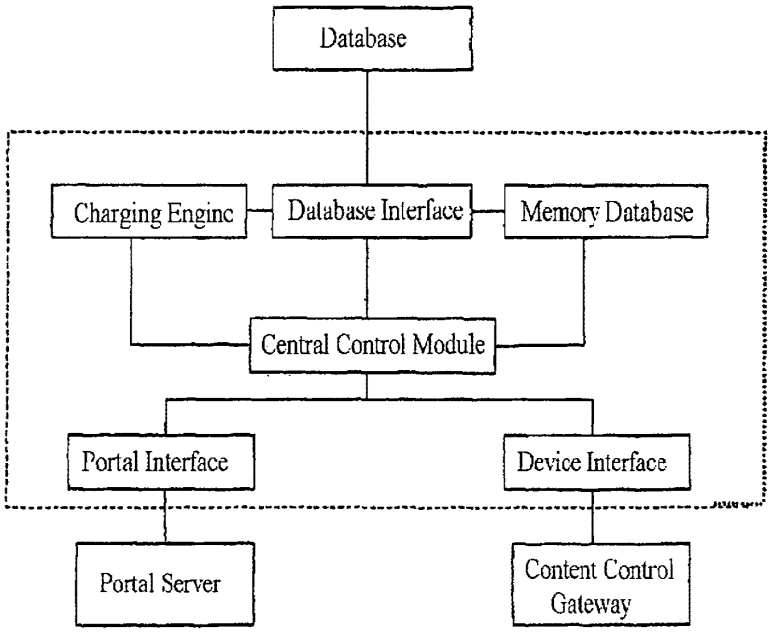

Database
Charging Engine
Database Interface
Memory Database
Central Control Module
Portal Interface
Device Interface
Portal Server
Content Control Gateway

Fig.2

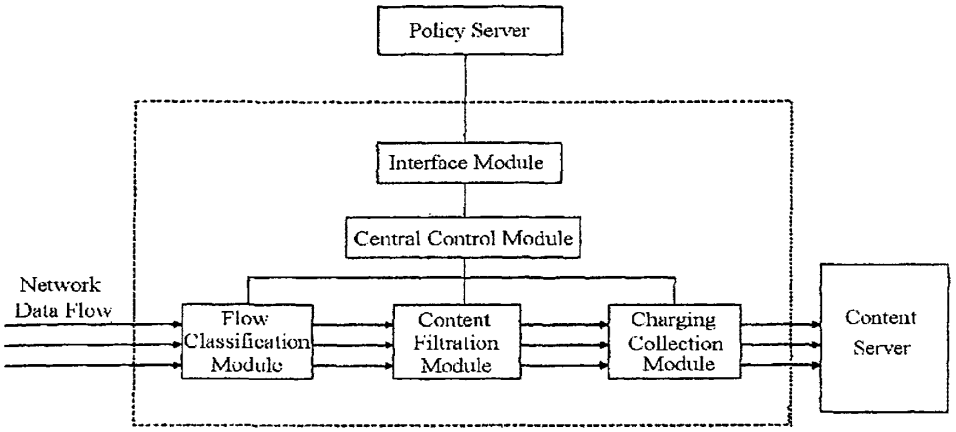

Policy Server
Interface Module
Central Control Module
Network Data Flow
Flow Classification Module
Content Filtration Module
Charging Collection Module
Content Server

Fig.3

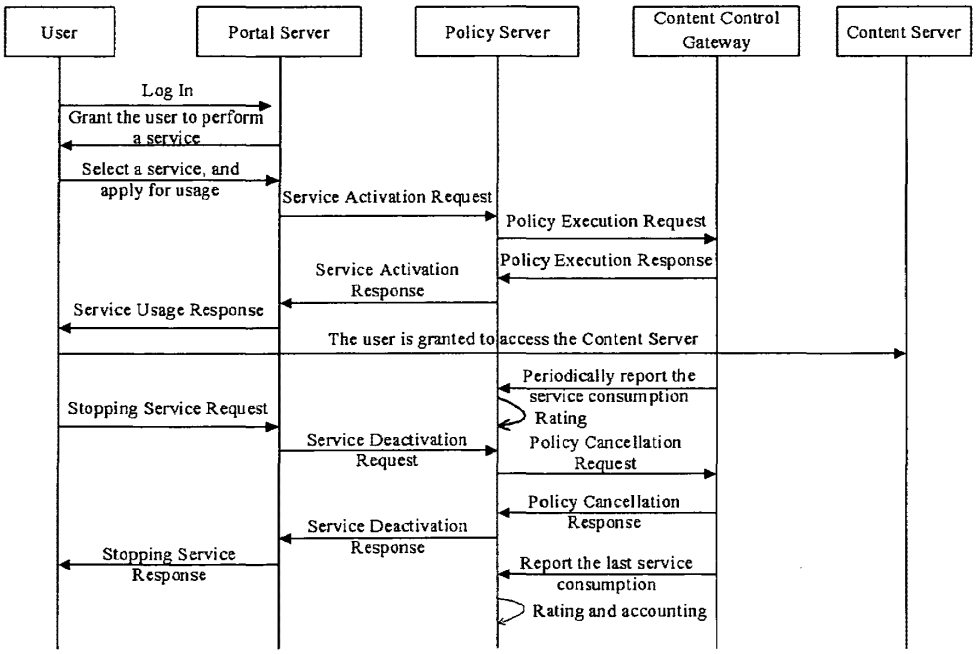

User
Portal Server
Policy Server
Content Control Gateway
Content Server
Log In
Grant the user to perform a service
Select a service, and apply for usage
Service Activation Request
Policy Execution Request
Policy Execution Response
Service Activation Response
Service Usage Response
The user is granted to access the Content Server
Periodically report the service consumption
Rating
Stopping Service Request
Service Deactivation Request
Policy Cancellation Request
Policy Cancellation Response
Service Deactivation Response
Stopping Service Response
Report the last service consumption
Rating and accounting

Fig.4

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2006/001156

A. CLASSIFICATION OF SUBJECT MATTER

H04L 12/14 (2006.01) i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

H04L (2006.01), G07F (2006.01)

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)

CNPAT, CNKI, WPI, EPODOC, PAJ: bill+, charg+, account, content, policy, strategy, request, gateway, server

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO, A1, 0159990 (FUTURE TECH INC) 16.AUG. 2001 (16.08.2001), the whole document.	1-13
A	EP, A1, 1400934 (OPENWAVE SYSTEMS INC) 24.MAR. 2004 (24.03.2004), the whole document.	1-13
A	CN, A, 1556634 (ZHONGXING COMMUNICATION CO LTD SHENZHEN) 22.DEC. 2004 (22.12.2004), the whole document.	1-13

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"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

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
29. AUG. 2006 (29. 08. 2006)	21 · SEP 2006 (21 · 09 · 2006)
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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2006/001156

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
WO0159990A1	16.08.2001	JP2003523031T	29.07.2003
		KR2000024368 A	06.05.2000
		AU200136124 A	20.08.2001
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(54) **CHARGING ASSOCIATING METHOD, SYSTEM, CHARGING CENTER, AND DEVICE FOR APPLICATION SERVICE**

(57) A method for charging correlation for an application or service is provided. The method may include: receiving a service identifier assigned for an application or service; and correlating Charging Data Records CDRs generated for the application or service based on the service identifier. A system for charging correlation, a billing center and an apparatus for charging correlation are also provided. These method and apparatus may provide a simple charging correlation process for an application or service.

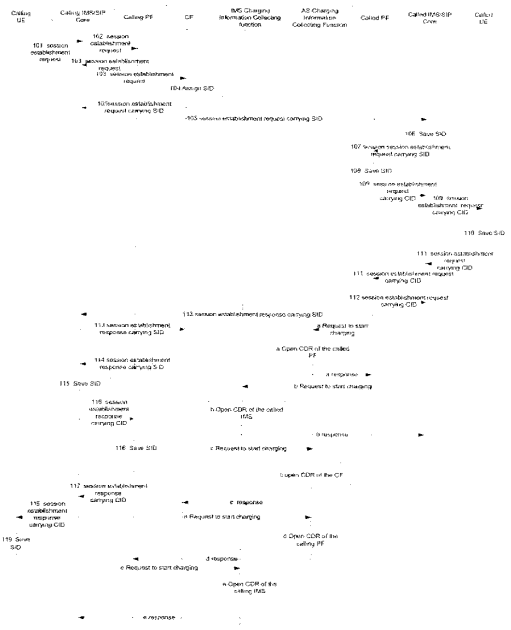


Fig. 1

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Description

Field of the Invention

[0001] The present invention relates to applications and services, and particularly, to a method and system for charging correlation of applications and services, a billing center and an apparatus for generating charging data record.

Background of the Invention

[0002] At present, communication systems have provided applications and services for individual user and/or group users, and communication media employed in these applications and services may include text, audio, video, and varieties combinations of multimedia. A general application or service is mainly oriented to individuals, and there usually is only one or two User Equipments (UEs) communicating with an Application Server or with each other. However, in an application or service in which group users take part, users of one or more groups usually communicate with other users at the same time. In other words, this kind of communication is not a two-party communication including one calling user and one called user, but a communication including a plurality of calling users and a plurality of called users. Such an application or service in which group users take part is also called a multi-party service.

[0003] In a session-based service, a Charging Identifier (CID) is allocated each time when an Application Server (AS) establishes a session with a UE, and all CIDs allocated are saved in the AS and a service bearer network. A billing center retrieves Charging Data Records (CDRs) corresponding to the CIDs from the service bearer network and the AS via a charging function collecting entity, and combines CDRs that correspond to the same CID in order to perform a charging. For applications and services employing an IP Multi-media Subsystem (IMS) as a service bearer network, the CIDs allocated are also called IMS Charging Identifiers (ICIDs). However, the applicant finds out that the CID-based charging method described above has some disadvantages in practical applications and services.

[0004] For example, in a service communication, when a UE establishes a session with an AS for a first time, the UE is given a CID. For some reasons, the UE may exit the service communication temporarily before the service communication is end. Later, the UE re-enters the service communication. In such a case the UE is given a new CID for a session established after re-entering the service communication. From a perspective of a user using the UE, the two sessions, established for the first entering and established for the re-entering, respectively, are two related sessions, and need to be combined for a charging. However, from a perspective of the billing center, the two sessions correspond to different CIDs, thus the two sessions are considered as unrelated sessions. If the two sessions need to be correlated, the billing center needs to analyze CDRs of the two sessions and perform complicated calculation based on user information recorded in the CDRs, yet it is still difficult to guarantee an accurate correlation of the two sessions. Such problem becomes more apparent in multi-party services.

[0005] In a multi-party service, UEs used by users of various parties of this service access a center control server via respective access servers. The center control server provides centralized session handling, which includes session signaling controls, media transmission authorization to communication parties, media data duplication and distribution, etc. One multi-party service has one center control server and at least one access server. The center control server performs controlling function (CF) and the access server performs participating function (PF). Logically, a CF corresponds to a multi-party service. In a multi-party service, the CF establishes one session for each UE, and the sessions of each UE correspond to a PF. Therefore, the center control server is looked as a CF while the access server is looked as at least one PF corresponding to at least one UE connected to the access server.

[0006] Therefore, multi-party services have a common feature that, a multi-party service has at least one session and each session corresponds to a UE of one user and corresponds to its CID. Due to such feature of multi-party services, the billing center needs to correlate a great number of CIDs when performing charging, which leads to poor charging accuracy and difficult implementation. Moreover, for a multi-party service, there is also a need to charge a user by correlating a plurality of sessions of the user in one multi-party service. However, according to the charging technique in the prior art, the billing center needs to generate CDRs based on ICIDs first and make further calculations based on group information in the CDRs, which is still complicated and tends to be inaccurate.

[0007] As discussed above, CID-based charging method in the prior art cannot correlate different sessions of a user in one service communication, but only can correlate actions of the user in one session. Such charging method may easily result in a repeated charging for one action and may omit an action which needs to be charged, thereby threatening security and reliability of charging operations and reducing user satisfaction.

[0008] Furthermore, as new demands emerge, it is becoming more and more difficult to use a single AS to handle a plurality of applications or services. In order to provide more flexible and richer services, operators or service providers are developing multi-services which includes a plurality of sub-services. For a perspective of a multi-service, the above application or service provided by the AS can be called single-service. In a multi-service, each sub-service has a sub-service server e.g. an AS, and an entire multi-service also has a service control function adapted to perform a centralized control of all the sub-service servers. For example, the service control

function controls initiation procedures of the respective sub-services and controls assignment of session identifiers of the respective sub-services, etc. A current typical multi-service has a structure that one of the sub-services is considered as the primary service, and all other sub-services of the multi-service are considered as supplementary services. The sub-service server serves the primary service can be called a primary service server and the sub-service servers serve the supplementary services can be called supplementary service servers. The implementation of the supplementary services depends on the implementation of the primary service in certain degree and provides supplementary functions for the implementation of the primary service. For example, a Presence Server may be configured in a PoC service network and be used to display group status to users during a PoC service session. For another example, a Location Service Server (LCS Server) may also be used in a PoC service network to provide location information of participating users.

[0009] As the development of multi-services, operators or service providers may develop correlating charging policies for multi-services. However, as discussed above, the conventional charging method is based on CIDs corresponding to separate sessions. Therefore the billing center needs to correlate CDRs of a plurality of services in a multi-service charging to perform a charging. Because a CID corresponds to only one session of a sub-service of a user, the billing center needs to analyze each CDR and performs comprehensive calculation by using complicated processes, thereby resulting in low charging accuracy and low feasibility.

[0010] Therefore, the conventional CID-based charging method is only applicable to correlate a plurality of actions of a user in one session, but is not applicable to correlate a plurality of sessions of a user in a single-service and says nothing of correlating a plurality of sessions of a user in a plurality of sub-services of a multi-service.

Summary of the Invention

[0011] Embodiments of a method and a system for charging correlation, a billing center and an apparatus for generating charging data record for implementing a charging correlation for an application or service are provided, which enables a charging correlation process to be easily performed and to greatly improve charging accuracy.

[0012] A method for charging correlation for an application or service may include:

assigning a service identifier by a service control function to an application or service;
sending the service identifier to a charging system; and
correlating, by the charging system, at least one Charging Data Record CDR generated for the application or service based on the service identifier.

[0013] A system for charging correlation for an application or service may include:

a service control function, adapted to assign a service identifier for an application or service; and
a charging system, adapted to correlate Data Records CDRs generated for the application or service based on the service identifier.

[0014] A billing center may include:

a first module, adapted to receive a service identifier assigned to an application or service and CDRs generated for the application or service; and
a second module, adapted to correlate the CDRs based on the service identifier from the first module.

[0015] An apparatus for generating charging data record may include:

a first module, adapted to receive a service identifier assigned to an application or service; and
a second module, adapted to generate Charging Data Records CDRs carrying the service identifier from the first module for the application or service.

[0016] The method for charging correlation, the system for charging correlation, the billing center and the apparatus for generating charging data record for implementing a charging correlation for an application or service provided in accordance with embodiments of the present invention are able to correlate a plurality of CDRs generated during an application or service, thereby implementing a correlated charging of a plurality of users participating in the application or service in a simple way. A plurality of CDRs generated for one user in the application or service may be correlated and the user can be accurately charged. Furthermore, correlated charging for multi-services can also be implemented. The technical solution provided in embodiments of the present invention is easy to be implemented and does not need to make many modifications to the existing networks, and therefore is highly feasible.

Brief description of the drawings

[0017]

Figure 1 is a flowchart of a charging correlation process in a session establishment in accordance with an embodiment of the present invention.
Figure 2 is a flowchart of a charging correlation process in a session establishment in accordance with an embodiment of the present invention.
Figure 3 is a flowchart of a charging correlation process in a session modification in accordance with an embodiment of the present invention.
Figure 4 is a flowchart of a charging correlation proc-

ess when a new user is added in accordance with an embodiment of the present invention.

Figure 5 is a flowchart of a charging correlation process of an on-demand session in accordance with an embodiment of the present invention.

Figure 6 is a flowchart of a charging correlation process of a pre-established session in accordance with an embodiment of the present invention.

Figure 7 is a flowchart of a charging correlation process when a user who established an on-demand session re-enters the session in accordance with an embodiment of the present invention.

Figure 8 is a flowchart of a charging correlation process when a user who established a pre-established session re-enters the session in accordance with an embodiment of the present invention.

Figure 9 is a flowchart of a charging correlation process for a multi-service in accordance with an embodiment of the present invention.

Figure 10 is a flowchart of a charging correlation process for a multi-service in accordance with an embodiment of the present invention.

Figure 11 is a structure diagram of a system for implementing a charging correlation of an application or service in accordance with an embodiment of the present invention.

Detailed Description of the Embodiments

[0018] This invention will hereinafter be described in detail with reference to accompanying drawings and embodiments.

[0019] A charging method for an application or service according to an embodiment of the present invention may include: assigning a service identifier to an application or service session, sending the service identifier to a charging system, and correlating, by the charging system, the CDRs generated in this service based on the service identifier. The charging method is described in detail in the following embodiments.

[0020] The charging system may include a charging information collecting function used to receive CDRs from ASs and bearer control layer entities, a charging gateway, and a billing center used to correlate the CDRs and perform other operations for charging. The charging information collecting function functions as an interface of the charging system, receives CDRs from network nodes e.g., ASs or bearer control layer entities connected to the charging information collecting function, and sends the CDRs to the billing center via the charging gateway. ASs and the bearer control layer entities have respective charging information collecting functions. A charging information collecting function corresponding to ASs is usually called an AS-charging information collecting function and a charging information collecting function corresponding to bearer control layer entities is usually called a bearer control layer-charging information collecting function. For bearer control layer in an IMS network, the bearer control layer-charging information collecting function is also called an IMS charging information collecting function. Embodiments of the present invention mainly concerns about transmission of service identifiers among ASs, bearer control layer entities and charging information collecting functions, therefore the figures and illustrations of the embodiments of the present invention omit the processes that the charging information collecting functions send CDRs and service identifiers to the billing center. In the figures and illustrations of the embodiments of the present invention, the AS-charging information collecting function entities and IMS charging information collecting function entities are referred to as AS-charging information collecting functions and IMS charging information collecting functions.

[0021] A first charging correlation scheme given in an embodiment of the present invention implements charging with a plurality of CDRs generated for one user in a single-service. In this embodiment, a service control function, e.g. an AS of a single-service session, assigns a uniform service identifier for the single-service, generates CDRs of participating users and sends the service identifier and the CDRs to a charging system. The charging system correlates the CDRs of a user in this single-service session.

[0022] In practical applications, a user may establish one or a plurality of sessions in one service and a CDR corresponds to one session of the user. Different ways may be adapted to correlate CDRs based on the service identifier. The CDRs to be correlated may be CDRs corresponding to a plurality of sessions established for one user in one service, or may be CDRs corresponding to a plurality of sessions established for a part of users or all users in one service. The specific way of correlating CDRs is chosen in accordance with an applied correlation policy and will not be described further herein.

[0023] The AS sends the service identifier and the CDRs to a charging information collecting function of a charging system. The charging information collecting function sends the CDRs collected and the service identifier to a billing center which performs charging correlation operations. When this charging correlation scheme is applied to application service layer, the charging information collecting function includes an AS-charging information collecting function corresponding to the service control function entity. The charging correlation scheme may also be applied to bearer control layer, and in such a case the charging information collecting function includes a bearer control layer-charging information collecting function corresponding to a bearer control layer entity that the service control function entity corresponds to, wherein the bearer control layer entity that the service control function corresponds to is used to bear the service control function. At this time, the bearer control layer entity corresponding to the service control function records the service identifier and generates CDRs for the current application or service, and sends the service identifier and the CDRs to the bearer control layer-charging infor-

mation collecting function of the bearer control layer entity. The AS-charging information collecting function and the bearer control layer-charging information collecting function respectively send the CDRs and service identifiers to the billing center. The billing center correlates the CDRs received from the AS-charging information collecting function and correlates the CDRs received from the bearer control layer-charging information collecting function, respectively. Or the billing center may correlates the CDRs received from the AS-charging information collecting function with the CDRs received from the bearer control layer-charging information collecting function. This charging correlation scheme in an embodiment of the present invention may be applied to both the application service layer and the bearer control layer in the embodiments shown in Figures 1 to 8. When the charging correlation scheme is applied only to the application service layer, the charging correlation process involves UE, AS, AS-charging information collecting function and billing center, without involving the bearer control layer entity and the bearer control layer-charging information collecting function. The charging correlation process in which the charging correlation scheme is applied only to the application service layer will not be described in detail herein, yet such process is still covered by the protection scope of the present invention.

[0024] The embodiments of the present invention are mainly oriented to session-based applications or services such as multi-party services. In conventional session-based services, session IDs (SIDs) corresponding to different service sessions are already employed. The existing SIDs may be used as service identifiers to correlate a plurality of CDRs. Also new identifiers may be defined as the service identifiers. Usually information exchanged among entities on the application service layer is sent via corresponding bearer control layer entities. For example, servers that perform PF of the multi-party service, a server performing CF, and UEs are used to exchange information via corresponding bearer control layer entities such as an IMS/SIP Core network (IMS/SIP Core). At the same time, network functions in the IMS/SIP Core may also generate CDRs for the current application or service in order to implement a charging process on the bearer control layer. In such process the AS of each application or service corresponds to a bearer control layer entity that is adapted to bear the AS.

[0025] At present, the mainstream multi-party services include Push-to-Talk over Cellular network (PoC) service, Conference service, etc. In a PoC service session, a server performing CF is a PoC server that performs CF, also called Controlling PoC Server; and the server performing PF is the PoC server that performs PF, also called Participating PoC Server. In a Conference service session, the server that performs CF is the Conference server that performs CF, also called a Controlling Conference Server; and the server performing PF is the Conference server that performs PF, also called a Participating Conference Server. The server performing PF and the server performing CF are logical functions of multi-party service servers, and the server performing PF and the server performing CF may be physically located in different ASs or in one AS. The server performing CF is referred to as the CF and the server performing PF is referred to as PF herein for the sake of simplicity. The embodiments of the present invention are described in detail herein taken a SIP based multi-party service as an example.

[0026] Figure 1 shows a flowchart of a charging correlation process in a session establishment in accordance with an embodiment of the present invention. The entities involved in this embodiment include a calling UE and a calling PF of the calling UE, a calling IMS/SIP Core corresponding to the calling PF and the calling UE, a CF of a present multi-party service, a called UE and a called PF of the called UE, a called IMS/SIP Core corresponding to the called PF and the called UE. The entities involved in this embodiment also include an AS-charging information collecting function corresponding to the calling PF, CF, and the called PF, and an IMS charging information collecting function corresponding to the calling IMS/SIP Core and the called IMS/SIP Core. The calling UE, the calling PF and the CF correspond to a same bearer control layer entity i.e., the calling IMS/SIP Core, the called UE and the called PF correspond to a same bearer control layer entity i.e., the called IMS/SIP Core. The service control function of the current application or service performs CF of the multi-party service.

[0027] When the calling/called PF and CF are provided by servers in a network of one service provider, the calling/called PF and the CF may correspond to a same AS-charging information collecting function. In this embodiment, suppose that the calling/called PF and the CF correspond to a same AS-charging information collecting function. However, when the calling/called PF and the CF are provided by servers in different networks of different service providers, the calling/called PF and the CF may correspond to different AS-charging information collecting functions respectively, and accordingly, the calling/called PF and the CF send service identifiers and the CDRs to different AS-charging information collecting functions respectively. Similarly, when IMS/SIP Cores of the calling UE and the called UE are provided in a same network of a same operator, the calling/called IMS/SIP Cores may correspond to one IMS charging information collecting function. When the IMS/SIP Cores of the calling UE and the called UE are in different networks provided by different operators, the calling/called IMS/SIP Cores may correspond to different IMS charging information collecting functions and send service identifiers and the CDRs to different IMS charging information collecting functions respectively. In this embodiment, suppose that the calling/called IMS/SIP Cores correspond to one IMS charging information collecting function.

[0028] As shown in Figure 1, the process includes as follows.

[0029] 101-102: The calling UE sends a session es-

tablishment request to the calling PF via a corresponding calling IMS/SIP Core. The session establishment request may be carried in an SIP INVITE message in this embodiment; however, the present invention is not limited to this.

[0030] The application service layer entities such as the UE, PF, CF, etc., and the corresponding bearer control layer entities such as the IMS/SIP Core, etc., may be in a same network or in different networks. The present invention is not limited to this.

[0031] 103: The calling PF sends the session establishment request to the CF via the calling IMS/SIP Core.

[0032] 104: The CF assigns a service identifier (SID) for the current multi-party service session and the followings shall be performed once for each of the called UEs.

[0033] 105: The CF sends the session establishment request to the called IMS/SIP Core corresponding to the called PF via the calling IMS/SIP Core of the CF. The session establishment request carries the SID assigned in 104.

[0034] 106-107: The called IMS/SIP Core saves the received SID and sends the session establishment request carrying the SID to the called PF.

[0035] 108-109: The called PF saves the received SID and sends the session establishment request carrying the SID to the called UE via the called IMS/SIP Core.

[0036] 110-111: The called UE saves the received SID and returns a session establishment response carrying the SID to the called PF via the called IMS/SIP Core. The session establishment response is carried in an SIP 2000K message in this embodiment, however, the present invention does not limit to this.

[0037] 112-113: The called PF sends the session establishment response carrying the SID to the CF via the called IMS/SIP Core and the calling IMS/SIP Core.

[0038] 114: The CF returns the session establishment response carrying the SID to the calling IMS/SIP Core.

[0039] 115-116: The calling IMS/SIP Core saves the received SID and returns the session establishment response carrying the SID to the calling PF, the calling PF also saves the received SID.

[0040] 117-119: The calling PF returns the session establishment response carrying the SID to the calling UE via the calling IMS/SIP Core, and the calling UE saves the received SID. By now, a session establishment process is completed.

[0041] In this embodiment, after receiving the SID, the service layer entities and bearer control layer entities related to the charging correlation process may insert the SID into or with the CDRs generated for the current application or service and send the CDRs to the corresponding charging information collecting functions. Specifically, the application service layer entities and bearer control layer entities generate CDRs after receiving a session establishment response indicating a successful session set-up or after sending the session establishment request, and the SID is included in the CDRs and the CDRs are sent to the charging information collecting functions. This embodiment describes a process in which the session is successfully established; hence it is supposed that the session establishment response always indicates a successful session set-up. In Figure 1, the application service layer entities related to the charging correlation process include a calling PF, a called PF and a CF; the bearer control layer entities related to the charging correlation process include a calling IMS/SIP Core and a called IMS/SIP Core. The procedure of sending the SID and the CDRs by the application service layer entities and bearer control layer entities related to the charging correlation process includes the followings.

[0042] The called PF may perform step ***a*** after sending the session establishment request in 109 or after receiving the session establishment response in 111. Step ***a*** is independent of other following steps and this embodiment of the present invention does not limit the sequence order of performing ***a*** and the steps following 111. Step ***a*** may include followings. The called PF requests the AS-charging information collecting function to start charging and sends the CDR of the called UE carrying the SID to the AS-charging information collecting function. The AS-charging information collecting function opens the CDR and starts to record actions performed by the called UE with the called PF during a current multi-party service.

[0043] The called IMS/SIP Core may save the SID when sending the session establishment request or when sending session establishment response that carries the SID. The called IMS/SIP Core may further perform step ***b*** after receiving the session establishment response in 112. Step ***b*** is independent of other following steps and this embodiment of the present invention does not limit the sequence order of performing step ***b*** and the steps following 112. Step ***b*** may include followings. The called IMS/SIP Core requests the IMS charging information collecting function to start charging, and sends the CDR of the called UE carrying the SID to the IMS charging information collecting function. The IMS charging information collecting function opens the CDR and starts to record actions performed by the called UE with the called IMS/SIP Core during the current multi-party service.

[0044] The CF may perform step c after receiving the session establishment response in 113. Step c is independent of other following steps and this embodiment of the present invention does not limit the sequence order of performing step ***c*** and the steps following 113. Step c may include followings. The CF requests the AS-charging information collecting function to start charging and sends CDRs of the calling and called UEs carrying the SID to the AS-charging information collecting function. The AS-charging information collecting function opens the CDRs and starts to record actions performed by the calling and called UE with the CF during the current multi-party service.

[0045] The calling PF may perform step ***d*** after receiving the session establishment response in 116. Step ***d*** is independent of other following steps and this embodiment of the present invention does not limit the sequence

order of performing step ***d*** and the steps following 116. Step ***d*** may include followings. The calling PF requests the AS-charging information collecting function to start charging and sends the CDR of the calling UE carrying the SID to the AS-charging information collecting function. The AS-charging information collecting function opens the CDR and starts to record actions performed by the calling UE with the calling PF during the current multi-party service.

[0046] The calling IMS/SIP Core may save the SID after sending the session establishment response that carries the SID. The calling IMS/SIP Core may further perform step ***e*** after receiving the session establishment response in 117. Step ***e*** is independent of other following steps and this embodiment of the present invention does not limit the sequence order of performing step ***e*** and the steps following 117. Step ***e*** may include followings. The calling IMS/SIP Core requests the IMS charging information collecting function to start charging and sends the CDR of the calling UE that carries the SID to the IMS charging information collecting function. the IMS charging information collecting function opens the CDR and starts to record actions performed by the calling UE with the calling IMS/SIP Core during the current multi-party service.

[0047] When the calling UE and the called UE establish a session and start a multi-party service communication, the AS-charging information collecting function or the IMS charging information collecting function starts to record the actions of the calling and called UEs that are performed on the entities during the multi-party service in real-time.

[0048] In the embodiment shown in Figure 1, the calling and the called PFs send the received SID to the calling and the called UEs, respectively. As such, when it needs to modify the session, or to add a new user into a session, or to make a user re-enter into a session, or to make a user exit the session, it is possible for the UEs to send the SID to a server performing PF or a server performing CF, in order to generate partial CDRs corresponding to the SID, or to generate a new CDR corresponding to the SID, or to update the CDR corresponding to the SID, or to close the CDR corresponding to the SID, respectively. However, sending the SID to the calling and the called UEs is not essential. Only when the above factors are taking into consideration, it is necessary to send the SID to the calling and the called UEs. In Figure 1, the calling and called UEs do not negotiate media parameters before establishing a session i.e., the calling and the called UEs establish an on-demand session. When the calling and called UEs negotiate media parameters before establishing a session i.e., the calling and the called UEs establish a pre-established session, the charging correlation process will be different from the process shown in Figure 1, as shown in Figure 2.

[0049] Figure 2 shows a flowchart of a charging correlation process in a session establishment in accordance with an embodiment of the present invention. In this embodiment, media parameters have been negotiated between the calling UEs and the calling PF that servers the calling UEs before establishing a session, and media parameters have been negotiated also between the called UEs and the called PF that servers the called UEs. The entities involved in the process are the same as the entities in Figure 1. A brief description of the pre-established session is given as follows. Before establishing a session, the UE negotiates session parameters with the server performing PF for the UE. The UE initiates a session establishment process by a session modify request such as a parameter message (REFER message). Therefore in the session establishment process, session parameters negotiation may be omitted and the UE does not need to upload session parameters. The UE just needs to indicate the server performing PF which service is to be joined by the UE. As such, SIP signaling that is exchanged with the UE has fewer bits, and air interface resources may be saved. The server performing PF then initiates a normal session establishment process with the server performing CF according to the indication from the UE, and informs the UE of a successful set-up by sending a media data control protocol message to the UE after the session between the PF and the CF is established. The media data control protocol may be the Talk Burst Control Protocol (TBCP) or the Media Burst Control Protocol (MBCP).

[0050] Figure 2 mainly includes followings.

[0051] 201-202: The calling UE sends a session modify request to the calling PF via the calling IMS/SIP Core corresponding to the calling UE. The calling PF returns a session modify response to the calling UE. The session modify request may be carried in an SIP parameter message (SIP REFER message) and the session modify response may be carried in an SIP accepted message (SIP ACCEPTED message), however, the present invention is not limited to this.

[0052] 203: The calling PF sends a session establishment request to the CF via the calling IMS/SIP Core corresponding to the calling PF.

[0053] 204: The CF assigns a service identifier SID for a current multi-party service and the followings is performed once for each of the called UEs.

[0054] 205: The CF sends the session establishment request to the called IMS/SIP Core via the calling IMS/SIP Core. The session establishment request carries the SID assigned in 204.

[0055] 206-207: The called IMS/SIP Core saves the received SID and sends the session establishment request that carries the SID to the called PF.

[0056] 208-210: The called PF saves the received SID and returns a session establishment response carrying the SID to the CF via the called IMS/SIP Core and the calling IMS/SIP Core.

[0057] While returning the session establishment response to the CF, the called PF also performs 210'. 210' may include followings. The called PF sends to the called IMS/SIP Core a media data control protocol message

carrying the SID, such as a TBCP Connect message used to notify the called UE to join the current service. The called UE saves the SID and returns an acknowledgment e.g. a TBCP Talk Burst Acknowledge message to the called PF via the called IMS/SIP Core. The called PF sends a confirmation e.g. a TBCP Talk Burst Confirm message to the called UE and then media data streams may be transmitted to the called UE.

[0058] In this embodiment, suppose that the called UE has negotiated parameters with the called PF and an auto-answer mode Has been set. That is, the called PF may send the media data control protocol message to the called UE, and return a session establishment response to the CF, without requesting the called UE in advance. The media data control protocol message, such as a TBCP Connect message or a Talk Burst Confirm message that is sent to the called UE, carries the SID. In another example, the called UE may also be configured to a manual response mode. That is, the called PF first sends a session establishment request e.g. an INVITE message to the called UE and then sends the media data control protocol message to the called UE. The called PF sends a session establishment response to the CF after the called user agrees to join the current service. In such a case, the media data control protocol message such as a TBCP Connect message or Talk Burst Confirm message, or the session establishment request such as an INVITE message that is sent to the called UE, may carry the SID.

[0059] 211-214: The CF returns a session establishment response carrying the SID to the calling IMS/SIP Core. The calling IMS/SIP Core saves the received SID and returns a session establishment response carrying the SID to the calling PF. The calling PF also saves the received SID.

[0060] 215-217: The calling PF sends a media data control protocol message, such as a TBCP Connect message, to the calling UE via the calling IMS/SIP Core to inform the calling UE that it is ready for a service session setup. The calling UE returns an acknowledgment, such as a TBCP Talk Burst Acknowledge message, to the calling PF via the calling IMS/SIP Core. The calling PF sends a confirmation such as a TBCP Talk Burst Confirm message to the called UE and is ready to receive media data streams from the calling UE. After that, the calling PF sends a session setup notification such as a NOTIFY message carrying the SID to the calling UE via the calling IMS/SIP Core. The calling UE saves the received SID and a whole session establishment process is completed.

[0061] In this process, the calling PF sends the SID to the calling UE by carrying the SID in a session setup notification or in a media data control protocol message such as a TBCP Connect message or a Talk Burst Confirm message.

[0062] The procedure of sending the SID and the CDRs received from the application service layer entities and bearer control layer entities that are related to the charging correlation process may include the followings.

[0063] The called IMS/SIP Core may save the SID after sending the session establishment request that carries the SID, the media data control protocol message that carries the SID, or the session establishment response that carries the SID. The called IMS/SIP Core may perform Step ***a*** after receiving the session establishment response, e.g., the response to the session establishment request or the response to the media data control protocol message, from the called UE. Step ***a*** is independent of other following steps and this embodiment of the present invention does not limit the sequence order of performing step ***a*** and other steps. Step ***a*** may include followings. The called IMS/SIP Core requests the IMS charging information collecting function to start charging, and sends the CDR of the called UE to the IMS charging information collecting function, wherein the CDR of the called UE carries the SID. The IMS charging information collecting function opens the CDR and starts to record actions performed by the called UE with the called IMS/SIP Core during the current multi-party service.

[0064] The called PF may perform step ***b*** after sending the session establishment request or media data control protocol message to the called UE, or after receiving the session establishment response e.g., a response to the session establishment request or a response to the media data control protocol message from the called UE. Step ***b*** is independent of other following steps and this embodiment of the present invention does not limit the sequence order of performing step ***b*** and other steps. Step ***b*** may include followings. The called PF requests the AS-charging information collecting function to start charging and sends the CDR of the called UE that carries the SID to the AS-charging information collecting function. The AS-charging information collecting function opens the CDR and starts to record actions performed by the called UE with the called PF during the current multi-party service.

[0065] The CF may perform step c after receiving the session establishment response in 210. Step c is independent of other following steps and this embodiment of the present invention does not limit the sequence order of performing step c and the steps following 210. Step c may include followings. The CF requests the AS-charging information collecting function to start charging and sends CDRs of the calling and called UEs that carry the SID to the AS-charging information collecting function. The AS-charging information collecting function opens the CDRs and starts to record actions performed by the calling and called UE with the CF during the current multi-party service.

[0066] The calling PF may perform step ***d*** after receiving the session establishment response in 213. Step ***d*** is independent of other following steps and this embodiment of the present invention does not limit the sequence order of performing step ***d*** and the steps following 213. Step ***d*** may include followings. The calling PF requests the AS-charging information collecting function to start

charging and sends the CDR of the calling UE that carries the SID to the AS-charging information collecting function. The AS-charging information collecting function opens the CDR and starts to record actions performed by the calling UE with the calling PF during the current multi-party service.

[0067] The calling IMS/SIP Core may save the SID after sending the session establishment response carrying the SID. The calling IMS/SIP Core may further perform step e after receiving the session establishment response in 211. Step e is independent of other following steps and this embodiment of the present invention does not limit the sequence order of performing step e and the steps following 211. Step e may include followings. The calling IMS/SIP Core requests the IMS charging information collecting function to start charging and sends the CDR of the calling UE that carries the SID to the IMS charging information collecting function. the IMS charging information collecting function opens the CDR and starts to record actions performed by the calling UE with the calling IMS/SIP Core during the current multi-party service.

[0068] During a multi-party service, a UE may modify the session, for example, the UE may modify the session media parameters, which may result that the AS-charging information collecting function or IMS charging information collecting function may generate a partial CDR. The partial CDR and original CDRs belong to the same multi-party service and need to be correlated in the charging correlation process. Therefore, in a session modification process, the UE needs to send the SID saved during the session establishment process to entities such as the server performing PF and the server performing CF which are related to the charging correlation process, so that the entities can generate partial CDRs corresponding to the SID. In this way the partial CDR may be correlated with other CDRs generated for the multi-party service.

[0069] Figure 3 shows a flowchart of a charging correlation process in a session modification process in accordance with an embodiment of the present invention. The entities involved in this embodiment may include: a calling UE and a calling PF of the calling UE, a calling IMS/SIP Core corresponding to the calling PF and the calling UE, a CF of a current multi-party service, a called UE and a called PF of the called UE, and a called IMS/SIP Core corresponding to the called PF and the called UE. This embodiment also involves: a AS-charging information collecting function corresponding to the calling PF, the called PF and the CF, and an IMS charging information collecting function corresponding to the calling IMS/SIP Core and the called IMS/SIP Core. Figure 3 includes the following processes.

[0070] 301: The calling UE sends a session modify request that carries the SID to the calling PF via the calling IMS/SIP Core. The session modify request is carried in an SIP UPDATE message or in an SIP Re-INVITE message in this embodiment, however, the present invention is not limited to this.

[0071] 302: The calling PF sends the session modify request that carries the SID to the calling IMS/SIP Core.

[0072] 303: The calling IMS/SIP Core sends the session modify request that carries the SID to the CF, and the followings is performed once for each of the called UEs.

[0073] 304-305: The CF sends the session modify request that carries the SID to the called IMS/SIP Core via the calling IMS/SIP Core.

[0074] 306: The called IMS/SIP Core sends the session modify request that carries the SID to the called PF.

[0075] 307-308: The called PF sends the session modify request that carries the SID to the called UE via the called IMS/SIP Core.

[0076] 309-310: The called UE returns a session modify response that carries the SID to the called PF via the called IMS/SIP Core. The session modify response may be carried in an SIP 2000K message in this embodiment, however, the present invention is not limited to this.

[0077] 311-313: The called PF sends the session modify response that carries the SID to the CF via the called IMS/SIP Core and the calling IMS/SIP Core.

[0078] 314-315: The CF returns the session modify response that carries the SID to the calling IMS/SIP Core, the calling IMS/SIP Core returns the session modify response that carries the SID to the calling PF.

[0079] 316-317: The calling PF returns the session modify response that carries the SID to the calling UE via the calling IMS/SIP Core and the session modify process is completed.

[0080] In the above process, the procedure of sending the SID and the CDRs by the application service layer entities and bearer control layer entities that are related to the charging correlation process includes the followings.

[0081] The called PF may perform step ***a*** after sending the session modify request to the called UE or after receiving the session modify response from the called UE. Step ***a*** is independent from steps following 307 and the present invention does not limit the sequence order of performing step ***a*** and the steps following 307. Step ***a*** may include followings. The called PF requests the AS-charging information collecting function to start an intermediate charging and sends a partial CDR of the called UE, that is generated by the called PF and carries the SID, to the AS-charging information collecting function. The AS-charging information collecting function updates CDR of the called PF, saves the partial CDR, and starts to record actions that may affect an accounting and are performed by the called UE on the called PF after the session is modified in the current multi-party service.

[0082] The called IMS/SIP Core may save the SID after sending the session modify request or the session modify request response carrying the SID. The called IMS/SIP Core may further perform step ***b*** after receiving the session modify response from the called UE. Step ***b*** is independent from steps following 309 and the present inven-

tion does not limit the sequence order of performing step ***b*** and the steps following 309. Step ***b*** may include followings. The called IMS/SIP Core requests the IMS charging information collecting function to start an intermediate charging and sends a partial CDR of the called UE, that is generated by the called IMS/SIP Core and carries the SID, to the IMS charging information collecting function. The IMS charging information collecting function updates CDR of the called IMS/SIP Core, saves the partial CDR and starts to record actions that may affect an accounting and are performed by the called UE on the called IMS/SIP Core after the session is modified in the current multi-party service.

[0083] The CF may perform step c after receiving the session modify response in 313. Step c is independent from steps following 313 and the present invention does not limit the sequence order of performing step ***c*** and the steps following 313. Step ***c*** may include followings. The CF requests the AS-charging information collecting function to start an intermediate charging and sends the partial CDRs of the calling UEs and the called UEs, that is generated by the CF and carries the SID, to the AS-charging information collecting function. The AS-charging information collecting function updates CDR of the CF, saves the partial CDRs of the calling and the called UEs and starts to record actions that may affect an accounting and are performed by the calling and called UE on the CF after the session is modified in the current multi-party service.

[0084] The calling PF may perform step ***d*** after receiving the session modify response in 315. Step ***d*** is independent from steps following 315 and the present invention does not limit the sequence order of performing step ***d*** and the steps following 315. Step ***d*** may include followings. The calling PF requests the AS-charging information collecting function to start an intermediate charging and sends the partial CDR of the calling UE, which is generated by the calling PF and carries the SID, to the AS-charging information collecting function. The AS-charging information collecting function updates CDR of the calling PF, saves the partial CDR of the calling UE and starts to record actions that may affect an accounting and are performed by the calling UE on the calling PF after the session is modified in the current multi-party service.

[0085] The calling IMS/SIP Core may save the SID while sending the session modify response carrying the SID. The calling IMS/SIP Core may further perform step ***e*** after receiving the session modify response in 314. Step e is independent from steps following 314 and the present invention does not limit the sequence order of performing step e and the steps following 314. Step e may include followings, the calling IMS/SIP Core requests the IMS charging information collecting function to start an intermediate charging and sends the partial CDR of the calling user, which is generated by the calling IMS/SIP Core and carries the SID, to the IMS charging information collecting function. The IMS charging information collecting function updates CDR of the calling IMS/SIP Core, saves the partial CDR of the calling user and starts to record actions that may affect an accounting and are performed by the calling UE on the calling IMS/SIP Core after the session is modified in the current multi-party service.

[0086] In the embodiments shown in Figures 1 to 3, the calling PF, the CF and the called PF are separated entities. In practical applications, any one or any combination of the calling PF, the CF and the called PF may be provided by one entity, in which case the basic processes are the same as the embodiments shown in Figures 1 to 3, and will not be described in detail herein but are still covered by the protection scope of the present invention.

[0087] In Figures 1 and 2, the calling PF and the CF correspond to a same IMS/SIP Core and the called PF corresponds to another IMS/SIP Core. In practical applications, the calling PF, the CF and the called PF may correspond to different IMS/SIP Cores. When the calling UE and a called UE are in one network provided by an operator, the calling PF and the called PF of the called UE may correspond to the same IMS/SIP Core. When the calling UE and a called UE are in different networks provided by different operators, the calling PF and the called PF correspond to different IMS/SIP Cores. When the calling PF and the CF are in one network provided by the same operator, the calling PF and the CF correspond to the same IMS/SIP Core. When the called PF and the CF are in different networks provided by different operators, the called PF and the CF correspond to different IMS/SIP Cores. However, no matter the calling PF, the CF and the called PF correspond to the same IMS/SIP Core or to different IMS/SIP Cores, the processes in embodiments of the present invention are essentially the same. In one word, the application service layer entities such as the calling PF, the CF and the called PF send/receive session establishment/modify requests or session establishment/modify responses via corresponding IMS/SIP Cores, and the detailed processes thereof will not be described herein, but are still covered by the protection scope of the present invention.

[0088] During an existing multi-party service, when adding a new user, the control function entity (e.g., the CF) of the multi-party service generates a new CDR for a session of the new user. A service identifier will be adapted to correlate the CDRs of the new user when adding the new user.

[0089] Figure 4 shows a flowchart of a charging correlation process when adding a new user to an existing multi-party service in accordance with an embodiment of the present invention. A process of adding a new user includes: requesting by a UE to add another user (a third party user) into a current multi-party service. The third party user is shown as an added UE in Figure 4. The entities involved in this embodiment include: a UE and a PF of the UE, an IMS/SIP Core corresponding to the UE, an added UE, a CF of the current multi-party service, an

AS-charging information collecting function and an IMS charging information collecting function. In this embodiment, suppose that the UE and the new user added to the current service (the added UE) are served by the same PF, and the UE, the added UE, the PF and the CF correspond to the same IMS/SIP Core.

[0090] As shown in Figure 4, the process includes followings.

[0091] 401-402: The UE sends an adding request that carries an SID to the PF via the IMS/SIP Core. The adding request may be carried in an SIP REFER message in this embodiment, however, the present invention is not limited to this.

[0092] 403-404: The PF sends the adding request that carries the SID to the CF via the IMS/SIP Core.

[0093] 405-406: The CF sends the adding request that carries the SID to the PF of the added UE via the IMS/SIP Core, and the PF sends the adding request that carries the SID to the added UE. The added UE returns an adding response that carries the SID to the PF via the IMS/SIP Core after receiving the adding request. The PF returns the adding response that carries the SID to the CF via the IMS/SIP Core. As such, the new UE is added to the current service.

[0094] The adding request may be carried in an SIP INVITE message and the adding response may be carried in an SIP 2000K message, however, the present invention is not limited to this.

[0095] 407: The CF returns the adding response that carries the SID to the PF of the UE via the IMS/SIP Core. The PF informs the UE that the new user has been added to the current service by returning the adding response that carries the SID to the UE via the IMS/SIP Core. The adding response may be carried in an SIP ACCEPTED message in this embodiment; however, the present invention is not limited to this.

[0096] In Figure 4, the application service layer entities related to the charging correlation process include the PF and the CF. The CF may perform step ***a*** after receiving the adding response in 406. Step ***a*** is independent of other following steps and the present invention does not limit the sequence order of performing step ***a*** and the follow-up steps. The PF may perform step ***b*** after receiving the adding response in 406 and step ***b*** is independent of other following steps and the present invention does not limit the sequence order of performing step ***b*** and the follow-up steps.

[0097] Step ***a*** may include followings. The CF requests the AS-charging information collecting function to start charging and sends the CDR of the new user (the added UE) that is generated by the CF and carries the SID to the AS-charging information collecting function. The AS-charging information collecting function opens the CDR of the new user from the CF and starts to record actions performed by the new user on the CF during the current multi-party service.

[0098] Step ***b*** may include followings. The PF requests the AS-charging information collecting function to start charging and sends the CDR of the new user that is generated by the PF and carries the SID to the AS-charging information collecting function. The AS-charging information collecting function opens the CDR of the new user from the PF and starts to record actions performed by the new user on the PF during the current multi-party service.

[0099] The bearer control layer entity related to the charging correlation process in Figure 4 is the IMS/SIP Core. The IMS/SIP Core may perform step c after receiving the adding response in 406, and step c is independent of other following steps and the present invention does not limit the sequence order of performing step c and the follow-up steps. Step ***c*** may include followings. The IMS/SIP Core requests the IMS charging information collecting function to start charging and sends the CDR of the new user that is generated by the IMS/SIP Core and carries the SID to the IMS charging information collecting function. The IMS charging information collecting function opens the CDR of the new user from the IMS/SIP Core and starts to record actions performed by the new user on the IMS/SIP Core during the current multi-party service.

[0100] In embodiments shown in Figures 3 and 4, the UE may establish an on-demand session or have a pre-established session, the processes in Figures 3 and 4 may be applied to both cases.

[0101] If a UE exits a session, the AS-charging information collecting function and the IMS charging information collecting function need to close the CDRs of the multi-party service of the UE. In such a case, the SID of the current multi-party service needs to be sent to the AS-charging information collecting function and the IMS charging information collecting function so that the CDRs corresponding to the same SID among all CDRs of the UE may be closed based on the same SID.

[0102] Figure 5 shows a flowchart of a charging correlation process when a UE that has established a pre-established session exits a session in accordance with an embodiment of the present invention. The entities involved in this embodiment include: a UE and a PF of the UE, an IMS/SIP Core corresponding to the UE, a CF of a current multi-party service, an AS-charging information collecting function and an IMS charging information collecting function. In this embodiment, the UE, the PF and the CF correspond to the same IMS/SIP Core.

[0103] As shown in Figure 5, the process includes followings.

[0104] 501-502: The UE sends a release session request that carries an SID to the PF via the IMS/SIP Core. The release session request is carried in an SIP BYE message in this embodiment, however, the present invention is not limited to this.

[0105] 503: The PF sends the release session request that carries the SID to the CF via the IMS/SIP Core.

[0106] 504: The CF returns a release session response that carries the SID to the PF via the IMS/SIP Core. The release session response may be carried in

an SIP 200OK message in this embodiment, however, the present invention is not limited to this.

[0107] 505-506: The PF sends the release session response that carries the SID to the UE via the IMS/SIP Core.

[0108] In Figure 5, the application service layer entities related to the charging correlation process include the PF and the CF. The CF may perform step ***a*** after receiving the release session response in 503. Step ***a*** is independent of following steps and the present invention does not limit the sequence order of performing step ***a*** and the steps following 503. The PF may perform step ***b*** after receiving the release session response in 504 and step ***b*** is independent of following steps and the present invention does not limit the sequence order of performing step ***b*** and the steps following 504.

[0109] Step ***a*** may include followings. The CF requests the AS-charging information collecting function to stop charging and sends the SID to the AS-charging information collecting function. The AS-charging information collecting function closes CDR of the UE from the CF and stops recording charging data of the UE.

[0110] Step ***b*** may include followings. The PF requests the AS-charging information collecting function to stop charging and sends the SID to the AS-charging information collecting function. The AS-charging information collecting function closes CDR of the UE from the PF and stops recording the charging data of the UE.

[0111] The bearer control layer entity related to the charging correlation process in Figure 5 is the IMS/SIP Core. The IMS/SIP Core may perform step ***c*** after receiving the release session response in 505, and step ***c*** is independent of following steps and the present invention does not limit the sequence order of performing step c and the steps following 505.

[0112] Step ***c*** may include followings. The IMS/SIP Core requests the IMS charging information collecting function to stop charging and sends the SID to the IMS charging information collecting function. The IMS charging information collecting function closes CDR of the UE from the PF.

[0113] The release session process shown in Figure 5 is suitable to be used for a user who establishes an on-demand session. For a user who establishes a pre-established session, a different release session process shall be used. Figure 6 shows a flowchart of a charging correlation process for a user who establishes a pre-established session in accordance with an embodiment of the present invention. The entities involved in this embodiment include: a UE and a PF of the UE, an IMS/SIP Core corresponding to the UE, a CF of a current multi-party service, an AS-charging information collecting function and an IMS charging information collecting function. In this embodiment, the UE, the PF and the CF correspond to the same IMS/SIP Core.

[0114] A whole session establishment process for a user who establishes a pre-established session includes two parts: firstly, the UE and the PF negotiate session parameters before establishing a session; then, the PF establishes a session with the CF for the UE when the UE is ready for establishing the session. Therefore this kind of session establishment process shall be ended in two steps: firstly, the session that is pre-established between the UE and the PF is modified; then, the session between the PF and the CF is released. As shown in Figure 6, the process includes followings.

[0115] 601-602: The UE sends a session modify and release request that carries an SID to the PF via the IMS/SIP Core in order to release the session. The session modify and release request may be carried in an SIP REFER BYE message in this embodiment, however, the present invention is not limited to this.

[0116] 603: The PF returns a session modify response to the UE via the IMS/SIP Core. The session modify response may be carried in an SIP ACCEPTED message in this embodiment, however, the present invention is not limited to this.

[0117] 604: The PF sends a release session request carrying the SID to the CF via the IMS/SIP Core. The release session request may be carried in a BYE message, however, the present invention is not limited to this.

[0118] 605: The CF returns a release session response to the PF via the IMS/SIP Core. The release session response may be carried in an SIP 2000K message in this embodiment, however, the present invention is not limited to this.

[0119] 606-607: The PF sends a release session notification to the UE via the IMS/SIP Core to notify the UE of a successful release of the session between the UE and the CF. The UE returns a release session response to the PF. The release session response may be carried in a NOTIFY message, and the release session response may be carried in an OK message, however, the present invention is not limited to this.

[0120] In Figure 6, the application service layer entities related to the charging correlation process include the PF and the CF. The CF may perform step ***a*** after receiving the release session request in 604 and after successful releasing the session. Step ***a*** is independent of following steps and the present invention does not limit the sequence order of performing step ***a*** and the steps following 604. The PF may perform step ***a*** after receiving the release session response in 607.

[0121] Step ***a*** may include followings. The CF requests the AS-charging information collecting function to stop charging and sends the SID to the AS-charging information collecting function. The AS-charging information collecting function closes CDR of the UE from the CF and stops recording the charging data of the UE.

[0122] Step ***b*** may include followings. The PF requests the AS-charging information collecting function to stop charging and sends the SID to the AS-charging information collecting function. The AS-charging information collecting function closes CDR of the UE from the PF and stops recording the charging data of the UE.

[0123] The bearer control layer entity related to the

charging correlation process in Figure 6 is the IMS/SIP Core. The IMS/SIP Core may perform step ***c*** after receiving the release session response in 605, and step ***c*** is independent of following steps and the present invention does not limit the sequence order of performing step c and the steps following 605.

[0124] Step ***c*** may include followings. The IMS/SIP Core requests the IMS charging information collecting function to stop charging and sends the SID to the IMS charging information collecting function. The IMS charging information collecting function closes CDR of the UE from the PF.

[0125] Besides the situations described above, new CDRs may be generated by the entities related to the charging correlation process in two other situation. The charging correlation processes in accordance with the embodiments of the present invention are suitable in such two situations. In the first situation, a user who establishes an on-demand session exits a current multi-party service session temporarily while the current multi-party service proceeds, then the user re-enters the multi-party service. In the other of the two situations, a user who establishes a pre-established session exits a current multi-party service session temporarily while the current multi-party service proceeds, then the user re-enters the multi-party service. The charging correlation processes in the two situations are described with reference to Figures 7 and 8.

[0126] Figure 7 shows a flowchart of a charging correlation process in a case that a user who establishes an on-demand session re-enters a session after the user exits the session in accordance with an embodiment of the present invention. The entities involved in this embodiment include: a UE and a PF of the UE, an IMS/SIP Core corresponding to the UE, a CF of a current multi-party service, an AS-charging information collecting function and an IMS charging information collecting function. In this embodiment, the UE, the PF and the CF correspond to a same IMS/SIP Core. As shown in Figure 7, the process includes followings.

[0127] 701-702: The UE sends a session joining request carrying an SID to the PF via the IMS/SIP Core. The session joining request may be carried in an SIP REFER message or an SIP INVITE message in this embodiment, however, the present invention is not limited to this.

[0128] 703: The PF sends the session joining request carrying the SID to the CF via the IMS/SIP Core.

[0129] 704: The CF returns a session joining response carrying the SID to the PF via the IMS/SIP Core. The session joining response may be carried in an SIP 2000K message or an SIP ACCEPTED message in this embodiment, however, the present invention is not limited to this.

[0130] 705-706: The PF sends the session joining response carrying the SID to the UE via the IMS/SIP Core.

[0131] In Figure 7, the application service layer entities related to the charging correlation process include the PF and the CF. The CF may perform step ***a*** after receiving the session joining response in 703. Step ***a*** is independent of following steps and the present invention does not limit the sequence order of performing step ***a*** and the steps following 703. The PF may perform step ***b*** after receiving the session joining response in 704 and step ***b*** is independent of following steps and the present invention does not limit the sequence order of performing step ***b*** and the steps following 704.

[0132] Step ***a*** may include followings, the CF requests the AS-charging information collecting function to start charging and sends the CDR of the user who requests to re-enter the session (the UE), which is generated by the CF and carries the SID, to the AS-charging information collecting function. The AS-charging information collecting function opens the CDR of the UE received from the CF and starts to record actions that affect an accounting and are performed by the UE on the CF during the current multi-party service. It need to be noted that when the user re-enters the session, the opened CDR of the UE is a new CDR instead of the CDR of the UE generated before the UE dropped out of the session. However, the two CDRs have the same SID and can be correlated based on the SID.

[0133] Step ***b*** may include followings. The PF requests the AS-charging information collecting function to start charging and sends the CDR of the UE, which is generated by the PF and carries the SID, to the AS-charging information collecting function. The AS-charging information collecting function opens the CDR of the UE received from the PF and starts to record actions that affect the accounting and are performed by the UE on the PF during the current multi-party service.

[0134] The bearer control layer entity related to the charging correlation process in Figure 7 is the IMS/SIP Core. The IMS/SIP Core may perform step c after receiving the session joining response in 705, and step c is independent of following steps and the present invention does not limit the sequence order of performing step ***c*** and the steps following 705.

[0135] Step ***c*** may include followings. The IMS/SIP Core requests the IMS charging information collecting function to start charging and sends the CDR of the UE, which is generated by the IMS/SIP Core and carries the SID, to the IMS charging information collecting function. The IMS charging information collecting function opens the CDR of the UE from the IMS/SIP Core and starts to record actions that affect the accounting and are performed by the UE on the IMS/SIP Core during the current multi-party service.

[0136] Figure 8 shows a flowchart of a charging correlation process in a case where a user who establishes a pre-established session re-enters a session after the user exits the session in accordance with an embodiment of the present invention. The entities involved in this embodiment include: a UE and a PF of the UE, an IMS/SIP Core corresponding to the UE, a CF of the current multi-party service, an AS-charging information collecting function and an IMS charging information collecting func-

tion. In this embodiment, the UE, the PF and the CF correspond to the same IMS/SIP Core. As shown in Figure 8, the process includes followings.

[0137] 801-802: The UE and the PF negotiate session parameters before establishing a session. Then the UE sends a session modify request carrying an SID to the PF via the IMS/SIP Core. The session modify request may be carried in an SIP REFER message in this embodiment, however, the present invention is not limited to this.

[0138] 803: The PF returns a session modify response carrying the SID to the UE via the IMS/SIP Core. The session modify response may be carried in an SIP ACCEPTED message in this embodiment. However, the present invention is not limited to this.

[0139] 804: The PF sends a session joining request carrying the SID to the CF via the IMS/SIP Core to establish a session between the UE and the CF. The session joining request may be carried in an SIP INVITE message. However, the present invention is not limited to this.

[0140] 805-806: The CF returns a session joining response carrying the SID to the PF via the IMS/SIP Core. The session joining response may be carried in an SIP 200OK or an OK message. However, the present invention is not limited to this.

[0141] 807-809: The PF sends to the UE a session joining notification (e.g., a NOTIFY message) carrying a result of the session setup via the IMS/SIP Core. The UE returns a session joining response (e.g., an OK response) to the PF via the IMS/SIP Core. As such, the session re-entering process is completed.

[0142] In Figure 8, the service layer entities related to the charging correlation process include the PF and the CF. The CF may perform step ***a*** after receiving the session joining request in 804 and after successful adding the UE into the session. Step ***a*** is independent of other following steps and the present invention does not limit the sequence order of performing step ***a*** and the steps following 804. The PF may perform step b after receiving the session joining response in 809 and similarly, the bearer control layer entity related to the charging correlation process, i.e., the IMS/SIP Core, may perform step c after receiving the response in 809.

[0143] Step ***a*** may include followings, the CF requests the AS-charging information collecting function to start charging and sends the CDR of the user (the UE) who requests to re-enter the session, which is generated by the CF and carries the SID, to the AS-charging information collecting function. The AS-charging information collecting function opens the CDR of the UE from the CF and starts to record actions that affect an accounting and are performed by the UE on the CF during the current multi-party service. It need to be noted that when the user re-enters the session, the opened CDR of the UE is a new CDR instead of the CDR of the UE that is generated before the UE dropped out of the session. However, the two CDRs have the same SID and can be correlated based on the SID.

[0144] Step ***b*** may include followings. The PF requests the AS-charging information collecting function to start charging and sends the CDR of the UE, which is generated by the PF and carries the SID, to the AS-charging information collecting function. The AS-charging information collecting function opens the CDR of the UE received from the PF and starts to record actions that affect the accounting and are performed by the UE on the PF during the current multi-party service.

[0145] The bearer control layer entity related to the charging correlation process in Figure 8 is the IMS/SIP Core. The IMS/SIP Core may perform step c after receiving the session joining response in 805, and step c is independent of following steps and the present invention does not limit the sequence order of performing step c and the steps following 805.

[0146] Step c may include followings. The IMS/SIP Core requests the IMS charging information collecting function to start charging and sends the CDR of the UE, which is generated by the IMS/SIP Core and carries the SID, to the IMS charging information collecting function. The IMS charging information collecting function opens the CDR of the UE from the IMS/SIP Core and starts to record actions that affect the accounting and are performed by the UE on the IMS/SIP Core during the current multi-party service.

[0147] In embodiments shown in Figures 4 to 8, the PF and the CF are performed by two separated entities. In practical applications, the PF and the CF may be performed by one entity. In such a case, the essential processes of the embodiments in which the PF and the CF are performed by one entity are similar to the processes shown in Figures 4 to 8 and will not be described in detail herein, but are still covered by the protection scope of the invention.

[0148] Moreover, the PF and the CF correspond to the same bearer control layer entity e.g., the IMS/SIP Core in Figures 4 to 8. In practical applications, the PF and the CF may correspond to different bearer control layer entities. When the PF and the CF are in the same network of an operator, the PF and the CF correspond to the same IMS/SIP Core. When the PF and the CF are in different networks of different operators, the PF and the CF correspond to different IMS/SIP Cores. No matter the PF and the CF correspond to the same IMS/SIP Core or to different IMS/SIP Cores, the method in accordance with embodiments of the present invention is applicable. No matter the PF and the CF correspond to the same bearer control layer entity or to different bearer control layer entities, the method in accordance with embodiments of the present invention is applicable. In one word, the application service layer entities such as the PF and the CF send/receive messages comprising session modify requests/responses, session joining requests/responses, release session requests/responses, session modify requests/responses and session modify and release requests via corresponding IMS/SIP Cores. Detailed proc-

esses will not be described herein, but are still covered by the protection scope of the present invention.

[0149] In the flowcharts of the above embodiments, the responses returned by the called UE to the CF carry the SID. However, since the CF has learnt the SID of the current service, the responses from the called UE to the CF may not carry the SID.

[0150] In the above embodiments, the SID is sent to the AS-charging information collecting function and IMS charging information collecting function, thus the application service layer of the AS and the bearer control layer of the IMS can perform a function in accordance with the charging correlation scheme provided by embodiments of the present invention. In practical applications, it may be unnecessary for the application service layer or the bearer control layer to implement the charging correlation process, and in such a case the SID and CRDs needs not to be sent to the AS-charging information collecting function or the IMS charging information collecting function.

[0151] The embodiments of the present invention adopt SIDs as service identifiers, and a description of the SID used in a PoC service is given herein. In a PoC service, SID is assigned by a service control function to a calling/called PoC client. The SID is used to identify a PoC group session in an SIP communication, but is not used in charging data generation processes. A PoC Session Identity (PoC SID) is constructed in a format of a SIP Uniform Resource Identifier (URI) and is sent during a PoC session establishment process to a PoC client in a Contact header field and/or a TBCP CONNECT message. The PoC SID may be assigned and available for a long period, or be assigned temporarily. A long term PoC SID is adapted to a pre-arranged PoC group session. A temporary PoC SID is assigned by a server performing CF in the network to a PoC client when the PoC client establishes a PoC session for a PoC service for a first time, and is remained valid as long as the PoC service is in progress. When the PoC client establishes a session for another PoC service, the new PoC service is assigned a different PoC SID. However, if the PoC client exits a session of a PoC service temporarily and re-enters the same PoC service later, the PoC SID to used in the session will remain the same. It can be seen that the PoC SID may be used to identify a PoC service, therefore the PoC SID can also be used to charge correlation information of the service. Such PoC SID cannot be modified easily in transmission and the PoC client cannot modify the PoC SID after receiving the PoC SID, hence it is safe and reliable to use the PoC SID in a charging correlation process.

[0152] Embodiments of the present invention also propose a second charging correlation scheme to implement a charging correlation for a plurality of CDRs generated for one user in a multi-service that comprises a plurality of sub-services. The charging correlation scheme provides two ways to implement this charging correlation.

[0153] According to a first method, a service control function assigns a multi-service identifier for a current multi-service and assigns a sub-service identifier to each of the sub-services included in the current multi-service. The multi-service identifier and the sub-service identifiers are sent to a charging system. The charging system correlates CDRs of a sub-service based on the sub-service identifier of the sub-service, and correlates CDRs of the plurality of sub-services based on the multi-service identifier.

[0154] According to a second method, a service control function just assigns a multi-service identifier for a current multi-service. The multi-service identifier is sent to a charging system which correlates the CDRs of a plurality of sub-services of the current multi-service based on the multi-service identifier.

[0155] In a multi-service, a user may establish one or a plurality of sessions in each of the sub-services and a CDR is generated for each of the sessions of the user. Different methods may be used to correlate the CDRs based on the multi-service identifier. The CDRs to be correlated based on the multi-service identifier may be: CDRs corresponding to a plurality of sub-services (or a plurality of sessions of a plurality of sub-services) establish for one user in the current multi-service, or CDRs corresponding to a plurality of sub-services (or a plurality of sessions of a plurality of sub-services) established for a part of users or all users in the current multi-service. The method of correlating CDRs may be chosen based on special correlation policy applied. The contents and forms of correlation policies are not the technical problem to be solved by the present invention and will not be described further herein.

[0156] In a multi-service, a sub-service corresponds to a sub-service server. A service control function controls the sub-service servers to initiate, modify and terminate sub-services in order to initiate, modify and terminate the multi-service. According to the first method described above, for a sub-service, after the service control function assigns the multi-service identifier and the sub-service identifiers corresponding to the sub-services, the service control function sends the multi-service identifier and a sub-service identifier corresponding to a sub-service to a sub-service server corresponding to the sub-service. The sub-service server generates CDRs for the sub-service and sends the CDRs, the received multi-service identifier and the sub-service identifier to an AS-charging information collecting function of the sub-service server. The AS-charging information collecting function sends the received multi-service identifier, the sub-service identifier and the CDRs to a billing center. The billing center correlates the CDRs generated by one sub-service server based on the sub-service identifier, and further correlates CDRs generated by the sub-service servers based on the multi-service identifier. According to the second method described above, after assigning the multi-service identifier, the service control function sends the multi-service identifier to each sub-service server corresponding to each sub-service. A sub-service

server generates CDRs for each corresponding sub-service and sends the received multi-service identifier and the CDRs generated to the AS-charging information collecting function of the sub-service server. The AS-charging information collecting function sends the received multi-service identifier and the CDRs to the billing center. The billing center correlates the CDRs from different sub-service servers based on the multi-service identifier.

[0157] When the charging correlation scheme is applied to the application service layer, the charging information collecting function includes the AS-charging information collecting functions corresponding to the sub-service servers. The scheme can further be applied to the bearer control layer, and in such a case the charging information collecting function includes bearer control layer-charging information collecting functions of the bearer control layer entities corresponding to the sub-service servers. The bearer control layer entities corresponding to the sub-service servers are used to implement the service control functions. The bearer control layer entities corresponding to the sub-service servers are further used to record the multi-service identifier or a combination of the multi-service identifier and a sub-service identifier, and generate CDRs for corresponding sub-services. The bearer control layer entities send the multi-service identifier or the combination of the multi-service identifier and a sub-service identifier, and the CDRs to the bearer control layer-charging information collecting function of the bearer control layer entities. The AS-charging information collecting function and the bearer control layer-charging information collecting function send the received CDRs, and the multi-service identifier or the combination of the multi-service identifier and a sub-service identifier to the billing center. In Figures 9 and 10, the application service layer is taken as an example. When the present invention is applied only to the bearer control layer, charging correlation process involves UEs, service control functions, bearer control layer entities corresponding to sub-service servers, bearer control layer-charging information collecting functions and a billing center, without involving sub-service servers and AS-charging information collecting functions. Embodiments that the bearer control layer is employed are not described in detailed herein, but are still covered by the protection scope of the present invention. When the multi-service identifier or the combination of the multi-service identifier and the sub-service identifier is sent to an AS-charging information collecting function or to bearer control layer-charging information collecting function, the multi-service identifier or the combination of the multi-service identifier and the sub-service identifiers may be carried in CDRs.

[0158] Moreover, a multi-service usually includes a primary service and one or more supplementary services. That is, a multi-service includes a sub-service as the primary service and at least one sub-service as the supplementary service. The sub-service server and sub-service identifier corresponding to the primary service are called primary server and primary service identifier respectively, and the sub-service server and sub-service identifier corresponding to a supplementary service are called supplementary server and supplementary service identifier respectively. The service control function may be performed by a separated entity or be performed by the primary server. The multi-service identifier assigned to the multi-service may be identical with or different from the sub-service identifiers. When the multi-service includes a primary service and at least one supplementary service, the multi-service identifier may be identical with the primary service identifier.

[0159] The embodiments of the present invention are mainly applied to session-based applications or services such as multi-party services, the session IDs (SIDs) corresponding to different service sessions are already applied to conventional session-based services. The existing SIDs may be used as service identifiers to correlate a plurality of CDRs. Also new identifiers may be defined as the service identifiers. Usually information exchanged among entities on the application service layer is sent via corresponding bearer control layer entities. For example, servers performing PF of the multi-party service, the server performing CF, and the UEs may exchange information via corresponding bearer control layer entities such as an IMS/SIP Core network (IMS/SIP Core). At the same time, the network functions in the IMS/SIP Core may also generate CDRs for the current application or service in order to implement the charging correlation process on the bearer control layer. Each sub-service server of a sub-service corresponds to a bearer control layer entity, and the bearer control layer entity is adapted to bear the sub-service server.

[0160] At present, mainstream multi-services include: combinations of a plurality of multi-party services, a combination of a multi-party service and a Location Service or a combination of a multi-party service and a Presence Service. The second charging correlation scheme of the present invention is described hereinafter with reference to a multi-service comprising two multi-party services, e.g. a PoC service and a Conference service. A server performing CF and a server performing PF in the multi-party service are used to provide the services, yet the second charging correlation scheme focuses on the charging correlation of the sub-services, not internal flows of the sub-services. Therefore, for the sake of simplicity, the service processes between the server performing CF and the server performing PF in the multi-party service are omitted, and the server performing CF and the server performing PF are considered as sub-service servers of the multi-party service. A sub-service server corresponding to the PoC service is called a PoC server, and a sub-service server corresponding to the Conference service is called a Conference server. In embodiments of the present invention, the service control function is implemented by a PoC server.

[0161] Figure 9 shows a flowchart of a charging cor-

relation process for a multi-service in accordance with an embodiment of the present invention. In this embodiment, the service control function assigns a multi-service identifier. In this embodiment, the SID adapted to an individual PoC service in a conventional PoC service is used as the multi-service identifier. The entities involved in the embodiment include: PoC Client 1, PoC Client 2, a PoC server, a Conference server and a charging information collecting function. In this embodiment, PoC Client 1 initiates a multi-service and adds PoC Client 2 into the multi-service. As shown in Figure 9, the process includes followings.

[0162] 901: PoC Client 1 sends a session establishment request to the PoC server to initiate a PoC service. The session establishment request carries information of PoC Client 2, and is used to instruct to establish a multi-service comprising a Conference service and to add PoC Client 2 into the multi-service. The PoC server implements PoC service logic. A service control function in the PoC server assigns a multi-service identifier to the current multi-service. The multi-service identifier is the SID assigned to the PoC service. The session establishment request may be carried in an SIP INVITE message. However, the present invention is not limited to this.

[0163] 902: The service control function in the PoC server sends the session establishment request (e.g., an INVITE message) carrying the SID to the Conference server to initiate a Conference service. The Conference server returns a session establishment response (e.g., a 200OK message). The session establishment request carries the information of PoC Client 2 to indicate that PoC Client 2 need to be added into the Conference service.

[0164] After 902, both the PoC service and the Conference service are originated and the PoC server and the Conference server will perform steps ***b*** and ***a*** respectively to generate CDRs of the PoC service and CDRs of the Conference service on the AS-charging information collecting function.

[0165] Step ***a*** may include the followings. The Conference server generates CDRs for the present Conference service, requests the AS-charging information collecting function to start charging, and sends to the AS-charging information collecting function the CDRs that are generated by the Conference server and carries the SID. The AS-charging information collecting function opens the CDR received from the Conference server, starts to record actions which affect the accountings and, are performed on the Conference server by users of the Conference service, and returns a response to the Conference server.

[0166] Step ***b*** may include the followings. The PoC server generates a CDR for the current PoC service, requests the AS-charging information collecting function to start charging, and sends to the AS-charging information collecting function the CDR that is generated by the PoC server and carries the SID. The AS-charging information collecting function opens the CDR received from the PoC server, starts to record actions which affect the accountings and are performed on the PoC server by users of the PoC service, and returns a response to the PoC server.

[0167] 903: The PoC server sends a session joining request carrying the SID to PoC Client 2 in order to add PoC Client 2 into the current PoC service session. PoC Client 2 returns a session joining response to the PoC server in order to indicate that PoC Client 2 has successfully joined the current PoC service session.

[0168] After the PoC server has successfully added PoC Client 2 into the current PoC service, the information of PoC Client 2 needs to be recorded in the CDRs of the current PoC service session on the AS-charging information collecting function, therefore step c needs to be performed. Step c may include the followings. The PoC server requests the AS-charging information collecting function to update the charging, and sends the CDR carrying the SID of PoC Client 2 to the AS-charging information collecting function. The AS-charging information collecting function updates the CDR of PoC Client 2 that carries the SID and is received from the PoC server, records the information of PoC Client 2 in the CDR, starts to record actions that affect the accounting and are performed by PoC Client 2 on the PoC server during the current multi-service, and returns a response to the PoC server.

[0169] 904: The PoC server sends an acknowledgement (ACK) to the Conference server after PoC Client 2 has successfully joined the current PoC service session, in order to indicate that it is ready for the Conference server to add PoC Client 2 into the service session. The Conference server performs operations similar to the operations in 903 to add PoC Client 2 into the current Conference service session.

[0170] The information of PoC Client 2 needs to be recorded in the CDRs of the current Conference service session on the AS-charging information collecting function, therefore step ***d*** needs to be performed. Step ***d*** may include the followings. The Conference server requests the AS-charging information collecting function to update the charging, sends the CDRs that carries the SID of PoC Client 2 to the AS-charging information collecting function. The AS-charging information collecting function updates the CDRs of PoC Client 2 that carries the SID and is received from the Conference server, records the information of PoC Client 2 in the CDRs, starts to record actions that are performed by PoC Client 2 on the Conference server and affect the accounting during the current multi-service, and returns a response to the Conference server.

[0171] 905-906: The PoC server sends a session joining request (e.g., an INVITE message) carrying the SID to the Conference server, and the Conference server returns a session joining response (e.g., a 200OK message). The session joining request carries information of PoC Client 1 to indicate that PoC Client 1 need to be added into the Conference service. At the same time, the

PoC server adds PoC Client 1 into the current PoC service session and returns a session joining response (e.g., a 2000K message) to PoC Client 1.

[0172] After the PoC server has successfully added PoC Client 1 into the current PoC service session, the information of PoC Client 1 needs to be recorded in the CDRs of the current PoC service session on the AS-charging information collecting function, therefore step e needs to be performed. Step e may include the followings. The PoC server requests the AS-charging information collecting function to update the charging, and sends the CDRs carrying the SID of PoC Client 1 to the AS-charging information collecting function. The AS-charging information collecting function updates the CDRs of PoC Client 1 that carries the SID and is received from the PoC server, records the information of PoC Client 1 in the CDR, starts to record actions that are performed by PoC Client 1 on the PoC server and affect the accounting during the current multi-service, and returns a response to the PoC server.

[0173] 907: The PoC server sends an acknowledgement (ACK) to the Conference server after PoC Client 1 has successfully joined the current PoC service session, in order to indicate that it is ready for the Conference server to add PoC Client 1 into the service session. The Conference server performs operations similar to the operations in 903 to add PoC Client 1 into the current Conference service session.

[0174] The information of PoC Client 1 needs to be recorded in the CDRs of the current Conference service session on the AS-charging information collecting function, therefore step ***f*** needs to be performed. Step ***f*** may include the followings. The Conference server requests the AS-charging information collecting function to update the charging, and sends the CDRs carrying the SID of PoC Client I to the AS-charging information collecting function. The AS-charging information collecting function updates the CDRs of PoC Client 1 that carries the SID and is received from the Conference server, records the information of PoC Client 1 in the CDR, starts to record actions that are performed by PoC Client 1 on the Conference server and affect the accounting during the current multi-service, and returns a response to the Conference server.

[0175] After the processes described above, the CDRs of the sub-services, which are saved in the AS-charging information collecting function, carry the multi-service identifier, therefore, the CDRs of the sub-services can be correlated based on the multi-service identifier.

[0176] Figure 10 shows a flowchart of a charging correlation process for a multi-service in accordance with an embodiment of the present invention. In this embodiment, the service control function assigns a multi-service identifier for the multi-service and assigns a sub-service identifier to each sub-service. In this embodiment, the sub-service identifier of the PoC service adopts the SID assigned for an individual PoC service in the conventional PoC service, called SID1. The sub-service identifier of the Conference service adopts the SID assigned for an individual Conference service in the conventional Conference service, called SID2. The entities involved in this embodiment include: PoC Client 1, PoC Client 2, a PoC server, a Conference server and a charging information collecting function. In this embodiment, PoC Client 1 initiates a multi-service and adds PoC Client 2 into the multi-service. As shown in Figure 10, the process includes followings.

[0177] 1001: PoC Client 1 sends a session establishment request to the PoC server to initiate a PoC service. The session establishment request carries information of PoC Client 2 and is used to instruct to establish a multi-service comprising a Conference service and to add PoC Client 2 into the multi-service. The PoC server implements PoC service logic. A service control function in the PoC server assigns a multi-service identifier for the current multi-service, assigns one or more sub-service identifiers to the PoC service and assigns one or more sub-service identifiers to the Conference service.

[0178] The sub-service identifier of the PoC service adopts the SID assigned to the PoC service, called SID1; the sub-service identifier of the Conference service adopts the SID assigned to the Conference service, called SID2; and the multi-service identifier adopts the SID assigned to the multi-service, called SID0. The session establishment request may be carried in an SIP INVITE message in this embodiment. However, the present invention is not limited to this.

[0179] 1002: The service control function in the PoC server sends the session establishment request (e.g., an INVITE message) carrying the SID0 and SID2 to the Conference server to initiate a Conference service. The Conference server returns a session establishment response (e.g., a 2000K message). The session establishment request carries information of PoC Client 2 to indicate that PoC Client 2 need to be added into the Conference service.

[0180] After 1002, both the PoC service and the Conference service are originated, and the PoC server and the Conference server will perform steps ***b*** and ***a*** respectively to generate CDRs of the PoC service session and CDRs of the Conference service session on the AS-charging information collecting function.

[0181] Step ***a*** may include the followings. The Conference server generates CDRs for the current Conference service, requests the AS-charging information collecting function to start charging, and sends to the AS-charging information collecting function the CDRs that is generated by the Conference server and carries the SID0 and SID2. The AS-charging information collecting function opens the CDRs received from the Conference server, starts to record actions of the Conference service which are performed on the Conference server by users and affect the accounting, and returns a response from the AS-charging information collecting function to the Conference server.

[0182] Step ***b*** may include the followings. The PoC

server generates CDRs for the current PoC service, requests the AS-charging information collecting function to start charging, and sends to the AS-charging information collecting function the CDRs that is generated by the PoC server and carries the SID0 and SID1. The AS-charging information collecting function opens the CDRs from the PoC server, starts to record actions of the PoC service which are performed on the PoC server by users and affect the accounting, and returns a response to the PoC server.

[0183] 1003: The PoC server sends a session joining request carrying the SID0 and SID1 to PoC Client 2 in order to add PoC Client 2 into the current PoC service session. PoC Client 2 returns a session joining response to the PoC server in order to indicate that PoC Client 2 has successfully joined the current PoC service session.

[0184] After the PoC server has successfully added PoC Client 2 into the current PoC service, the information of PoC Client 2 needs to be recorded in the CDRs of the current PoC service session on the AS-charging information collecting function, therefore step ***c*** needs to be performed. Step ***c*** may include the followings. The PoC server requests the AS-charging information collecting function to update the charging, and sends the CDRs carrying the SID0 and SID1 of PoC Client 2 to the AS-charging information collecting function. The AS-charging information collecting function updates the CDRs of PoC Client 2 that carry the SID0 and SID1 and are received from the PoC server, records the information of PoC Client 2 in the CDRs, starts to record actions that are performed by PoC Client 2 on the PoC server and affect the accounting during the current multi-service, and returns a response to the PoC server.

[0185] 1004: The PoC server sends an acknowledgement (ACK) to the Conference server after PoC Client 2 has successfully joined the current PoC service session, in order to indicate that it is ready for the Conference server to add PoC Client 2 into the service session. The Conference server performs operations similar to the operations in 1003 in order to add PoC Client 2 into the current Conference service.

[0186] The information of PoC Client 2 needs to be recorded in the CDRs of the current Conference service on the AS-charging information collecting function, therefore step ***d*** needs to be performed. Step ***d*** may include the followings. The Conference server requests the AS-charging information collecting function to update the charging, and sends to the AS-charging information collecting function the CDRs carrying the SID0 and SID2 of PoC Client 2. The AS-charging information collecting function updates the CDRs of PoC Client 2 that carry the SID0 and SID2 are received from the Conference server, records the information of PoC Client 2 in the CDRs, starts to record actions that are performed by PoC Client 2 on the Conference server and affect the accounting during the current multi-service, and returns a response to the Conference server.

[0187] 1005-1006: The PoC server sends a session joining request (e.g., an INVITE message) carrying the SID0 and SID2 to the Conference server, and the Conference server returns a session joining response (e.g., a 2000K message). The session joining request carries information of PoC Client 1 to indicate that PoC Client 1 can be added into the Conference service session. At the same time, the PoC server adds PoC Client 1 into the current PoC service session and returns a session joining response (e.g., a 2000K message) to PoC Client 1.

[0188] After the PoC server has successfully added PoC Client 1 into the current PoC service session, the information of PoC Client 1 needs to be recorded in the CDRs of the current PoC service on the AS-charging information collecting function, therefore step ***e*** needs to be performed. Step e may include the followings. The PoC server requests the AS-charging information collecting function to update the charging, and sends to the AS-charging information collecting function the CDRs carrying the SID0 and SID1 of PoC Client 1. The AS-charging information collecting function updates the CDRs of PoC Client 1 that carry the SID0 and SID1 are received from the PoC server, records the information of PoC Client 1 in the CDRs, starts to record actions that are performed by PoC Client 1 on the PoC server and affect the accounting during the current multi-service, and returns a response to the PoC server.

[0189] 1007: The PoC server sends an acknowledgement (ACK) to the Conference server after PoC Client 1 has successfully joined the current PoC service session, in order to indicate that it is ready for the Conference server to add PoC Client 1 into the service session. The Conference server performs operations similar to the operations in 1003 to add PoC Client 1 into the current Conference service session.

[0190] The information of PoC Client 1 needs to be recorded in the CDRs of the current Conference service on the AS-charging information collecting function, therefore step ***f*** needs to be performed. Step ***f*** may include the followings. The Conference server requests the AS-charging information collecting function to update the charging, and sends to the AS-charging information collecting function the CDRs carrying the SID0 and SID2 of PoC Client 1. The AS-charging information collecting function updates the CDRs of PoC Client 1 that carry the SID0 and SID2 are received from the Conference server, records the information of PoC Client 1 in the CDRs, starts to record actions that are performed by PoC Client 1 on the Conference server and affect the accounting during the current multi-service, and returns a response to the Conference server.

[0191] After the processes described above, CDRs of the sub-services in the AS-charging information collecting function have the multi-service identifier and the sub-service identifiers corresponding to the sub-services. Therefore the CDRs of a sub-service may be correlated based on the sub-service identifier of the sub-service, and the CDRs of different sub-services, which have al-

ready been correlated based on the sub-service identifiers, are then correlated based on the multi-service identifier.

[0192] Figures 9 and 10 illustrate the second charging correlation scheme of the present invention which is applied to the application service layer. When the charging correlation scheme is applied to the bearer control layer, the entities involved include: a bearer control layer entity corresponding to the sub-service servers, a bearer control layer-charging information collecting function, and UEs. The bearer control layer entities corresponding to the sub-service servers may record the multi-service identifier and/or sub-service identifiers when the multi-service identifier and/or sub-service identifiers are received by the sub-service servers, generate CDRs, and send the received multi-service identifier and/or sub-service identifiers and the CDRs to the corresponding bearer control layer-charging information collecting functions. The processes in which the charging correlation scheme is applied to the bearer control layer is similar to that in Figures 9 and 10 and will not be described in detail herein, but is covered by the protection scope of the present invention.

[0193] Moreover, the charging correlation process may be variable based on different multi-services to be charged for, yet the charging correlation process will always be in accordance with the two methods of implementing the second charging correlation scheme provided in the above embodiments of the present invention. Since different multi-services may include various sub-services, the charging flow may vary in different ways. For example, the service control function may send the multi-service identifier and the sub-service identifiers to the primary server and the supplementary servers in different ways: 1) the service control function may send a primary service identifier when initiating a primary service session, or when setting up the primary service session, or when setting up all supplementary service sessions, or when setting up the current multi-service session; 2) the service control function may send the multi-service identifier when initiating the primary service session, or when setting up the primary service session, or when setting up all supplementary service sessions, or when setting up the current multi-service session; 3) the service control function may send a supplementary service identifier when initiating corresponding supplementary service session, or when setting up corresponding supplementary service session, or when setting up the current multi-service session; 4) the service control function may send the multi-service identifier when initiating each of the supplementary service sessions, or when setting up each of the supplementary service sessions, or when setting up the current multi-service session. Various charging correlation processes for various multi-services will not be listed herein. However, any charging correlation process for multi-service that is in accordance with the principles of the current invention falls in the scope of the present invention.

[0194] In embodiments of the present invention, a sub-service included in a multi-service can be any application or service. A multi-service may include sub-services such as PoC service, Conference service, Location service, Presence service and any combination of the above applications and services.

[0195] A system for charging correlation for an application or service is further proposed. Figure 11 is a structure diagram of a system for implementing a charging correlation of an application or service in accordance with an embodiment of the present invention. In an embodiment of the present invention, the system includes a service identifier generating unit, a CDR generating unit and a CDR correlating unit.

[0196] The service identifier generating unit is adapted to assign a service identifier to a current application or service and send the service identifier to the CDR generating unit. The CDR generating unit is adapted to receive the service identifier from the service identifier generating unit, generate a plurality of CDRs for the current application or service and send the received service identifier and the CDRs generated to the CDR correlating unit. The CDR correlating unit is adapted to receive the CDRs and the service identifier from the CDR generating unit and correlate the CDRs of the current application or service based on the service identifier.

[0197] The service identifier generating unit may be a separated entity or be integrated into the service control function of the application or service. When the system is applied to a single-service, the service control function is an AS of the current application or service, e.g., a server performing CF for a multi-party service such as PoC service and Conference service. When the system is applied to a multi-service, the service control function is a service control function of the current multi-service. The service control function may be integrated into an AS of a sub-service (i.e., a sub-service server) of the multi-service or be integrated into a server performing CF for the multi-party service such as the PoC service and the Conference service. The CDR correlating unit may also be a separated entity or be integrated into a charging system.

[0198] Moreover, the CDR generating unit may further add the received service identifier into the CDRs generated so that the CDRs and the service identifier may be sent.

[0199] In the system provided by embodiments of the present invention, the units may function according to the processes described in the preceding embodiments, and detailed functions of the units are not described anymore.

[0200] A system for charging correlation is also proposed by embodiments of the present invention. The system for charging correlation includes a service control function entity and a charging system. The service control function entity is adapted to assign a service identifier to a current application or service and the charging system is adapted to correlate at least one set of CDRs generated for the application or service based on the service iden-

tifier that is assigned by the service control function entity. The charging system may further include a charging information collecting function entity and a billing center. The charging information collecting function entity is adapted to receive the service identifier from the service control function entity and collect at least one set of CDRs, and the billing center is adapted to correlate at least one set of CDRs based on the service identifier.

[0201] The service control function entity may be an AS adapted to generate at least one set of CDRs for the application or service. The system may further include a bearer control layer entity adapted to record the service identifier assigned by the service control function entity, and generate at least one set of CDRs. In such a case the charging information collecting function entity further includes an AS-charging information collecting function entity and a bearer control layer-charging information collecting function entity. The AS-charging information collecting function is adapted to receive the service identifier from the service control function entity (i.e., the AS) and the at least one set of CDRs generated by the service control function entity, and the bearer control layer-charging information collecting function entity is adapted to receive the service identifier from a bearer control entity and the at least one set of CDRs generated by the bearer control layer entity. Therefore the billing center can correlate the at least one set of CDRs received from the bearer control layer-charging information collecting function entity based on the service identifier, or correlate the at least one set of CDRs received from the AS-charging information collecting function entity based on the service identifier, or correlate the at least one set of CDRs from the bearer control layer-charging information collecting function entity and the at least one set of CDRs from the AS-charging information collecting function entity based on the service identifier.

[0202] When the application or service is a multi-party service, the service control function entity is a server performing CF. At least one server performing PF may further be included. The bearer control layer entity may include a bearer control layer entity corresponding to the server performing CF, and at least one bearer control layer entity corresponding to the server performing PF. The bearer control layer entity corresponding to the server performing CF is adapted to bear the server performing CF, and a bearer control layer entity corresponding to a server performing PF is adapted to bear the server performing PF. The AS-charging information collecting function entity may further include an AS-charging information collecting function entity of the server performing CF and at least one AS-charging information collecting function entity of the server performing PF. The bearer control layer-charging information collecting function entity may further include a bearing control layer charging information collecting function entity of the bearer control layer entity corresponding to the server performing CF, and at least one bearer control layer-charging information collecting function entity of a bearer control layer entity corresponding to a server performing PF.

[0203] When the application or service is a multi-service comprising a plurality of sub-services, the system may further include sub-service servers of a plurality of sub-services. The bearer control layer entity may further include at least one bearer control layer entity corresponding to a plurality of sub-service servers. The bearer control layer entity corresponding to the sub-service servers is adapted to bear the sub-service servers. The AS-charging information collecting function entity may further include AS-charging information collecting function entities of sub-service servers, and the bearer control layer-charging information collecting function entity may further include bearer control layer-charging information collecting function entities of bearer control layer entities of sub-service servers.

[0204] The functions of the components of the system in various cases have been given in the preceding description and will not be explained further herein, but are still covered by the protection scope of the present invention.

[0205] A billing center is also proposed in embodiments of the present invention. The billing center may include a first module adapted to receive a service identifier of the current application or service, and receive at least one set of CDRs generated for the application or service, and a second module adapted to correlate at least one set of CDRs based on the service identifier received by the first module and generate a bill. The CDRs received by the first module may be CDRs generated by an AS and CDRs generated by a bearer control layer entity. The second module may correlate the CDRs generated by the AS based on the service identifier, or correlate the CDRs generated by the bearer control layer entity based on the service identifier, or correlate the CDRs generated by the AS and the CDRs generated by the bearer control layer entity together based on the service identifier.

[0206] An apparatus for generating charging data record is also proposed in embodiments of the present invention. The an apparatus for generating charging data record may include a first module and a second module. The first module is adapted to receive a service identifier assigned to the current application or service, and the second module is adapted to generate for the application or service at least one set of CDRs carrying the service identifier that is received by the first module and adapted to export the at least one set of CDRs. The an apparatus for generating charging data record may be an AS or a bearer control layer entity in embodiments of the present invention.

[0207] In one word, in embodiments of the present invention, a plurality of CDRs generated for a user in a service session may be correlated for charging, and the CDRs of a plurality of sub-services in a multi-service of the user can also be correlated for charging. Furthermore, the embodiments of the present invention is easy to implement and can improve accuracy of correlated

charging. Therefore the methods and apparatus proposed in the embodiments of the present invention are beneficial in supplementing and improving the conventional application or service charging correlation process (especially the charging correlation process of a multi-party service).

[0208] The previous description of the disclosed embodiments is provided to enable those skilled in the art to make or use the present invention. Various modifications to these embodiments will be readily apparent to those skilled in the art and generic principles defined herein may be applied to other embodiments without departing from the scope of the invention. Thus, the present invention is not intended to be limited to the embodiments shown herein but is to be accorded the widest scope consistent with the principles and novel features disclosed herein.

Claims

1. A method for charging correlation for an application or service, comprising:

   assigning a service identifier by a service control function to an application or service;
   sending the service identifier to a charging system; and
   correlating, by the charging system, at least one Charging Data Record CDR generated for the application or service based on the service identifier.

2. The method according to Claim 1, wherein the charging system comprises a charging information collecting function entity and a billing center; and the method further comprises:

   sending the service identifier to the billing center via the charging information collecting function entity; and
   correlating, by the billing center, the at least one CDR generated by the service control function entity based on the service identifier.

3. The method according to Claim 2, wherein the application or service is a single-service, the service control function entity comprises an Application Server AS and the charging information collecting function entity comprises an AS charging information collecting function entity corresponding to the AS; and the method further comprises:

   assigning a service identifier by the AS to the single-service;
   sending the service identifier to the billing center via the AS charging information collecting function entity; and
   correlating, by the billing center, the at least one CDR generated by the AS based on the service identifier.

4. The method according to Claim 3, wherein the charging information collecting function entity further comprises: a bearer control layer charging information collecting function entity corresponding to a bearer control layer entity that corresponds to the AS, and the method further comprises:

   assigning the service identifier by the AS to the single-service;
   sending the service identifier to the billing center via the AS charging information collecting function entity;
   recording the service identifier by the bearer control layer entity that corresponds to the AS;
   sending the service identifier to the billing center via the bearer control layer charging information collecting function entity; and
   correlating, by the billing center, the at least one CDR generated by the AS based on the service identifier and correlating the at least one CDR generated by the bearer control layer entity based on the service identifier; or correlating the at least one CDR generated by the AS together with the at least one CDR generated by the bearer control layer entity based on the service identifier.

5. The method according to Claim 4, wherein the application or service is a multi-party service, the AS further comprises a server performing Control Function CF and at least one server performing Participating Function PF, and the service control function entity is the server performing CF; the AS charging information collecting function entity further comprises: at least one AS charging information collecting function entity covered by the server performing CF and at least one AS charging information collecting function entity covered by at least one server performing PF; the bearer control layer charging information collecting function entity further comprises at least one bearer control layer charging information collecting function entity covering the bearer control layer entities corresponding to the server performing CF and at least one server performing PF respectively, the bearer control layer entity corresponding to the server performing CF is used for bearing the server performing CF and the bearer control layer entity corresponding to a server performing PF is used for bearing the server performing PF;
   the server performing CF assigns the service identifier to the multi-party service and sends the service identifier to the at least one server performing PF, the server performing CF and the at least one server performing PF send the service identifier to the billing

center respectively via the AS charging information collecting function entity which corresponds to the server performing CF and the AS charging information collecting function entity which corresponds to the server performing PF;
the bearer control layer entities corresponding respectively to the server performing CF and the at least one server performing the PF record the service identifier, and send the server identifier to the billing center via the at least one bearer control layer charging information collecting function entity;
correlating, by the billing center, the CDRs generated by the server performing CF and generated by the at least server performing PF based on the service identifier, and correlating the CDRs generated by the bear control layer entities; or, correlating, by the billing center, the CDRs generated by the bear control layer entities, the CDRs generated by the server performing CF and generated by the at least server performing PF based on the service identifier.

6. The method according to any one of Claims 1 to 5, wherein sending the service identifier to the charging system comprises:

sending the at least CDR that carries the service identifier to the charging system.

7. The method according to any one of Claims 1 to 5, wherein in the application or service, one user is established at least one session, and one CDR corresponds to one session of one user; and
the at least CDR correlated for the application or service based on the service identifier comprises: CDRs corresponding to a plurality of sessions of one user in the application or service, or CDRs corresponding to a plurality of sessions of a part of or all users in the application or service.

8. The method according to Claim 2, wherein the application or service is a multi-service comprising a plurality of sub-services; the charging information collecting function entity comprises: at least one AS charging information collecting function entity which respectively corresponds to multiple sub-service server providing multiple sub-services; the service identifier assigned by the service control function entity for the application or service comprises: multi-service identifier of the multi-service and multiple sub-service identifiers of the multiple sub-services;
respectively receiving, by the multiple sub-service servers, the multi-service identifier and the respective sub-service identifier from the service control function entity, and sending the multi-service identifier and the respective sub-service identifier to the billing center via respective AS charging information collecting function entity; and
correlating, the billing center, the CDRs each sub-service server using the respective sub-service identifier, and correlating, the CDRs generated by all sub-service servers using the multi-service identifier.

9. The method according to Claim 8, wherein the charging information collecting function entity comprises:
multiple bear control layer charging information collecting function entities of bear control layer entities that respectively correspond to the multiple sub-service servers; and the bear control layer entities that respectively correspond to the multiple sub-service servers are adapted to respectively bear the bear control layers;
recording, by the bear control layer entities that respectively correspond to the multiple sub-service servers, the corresponding sub-service identifier and the multi-service identifier, and sending the corresponding sub-service identifier and the multi-service identifier to the billing center via respective bear control layer charging information collecting function entities;
correlating, by the billing center, the CDRs generated by each bear control layer entity based on the corresponding sub-service identifier, and correlating CDRs generated by all the bear control layer entities based on the multi-service identifier.

10. The method according to Claim 8 or 9, wherein sending the multi-service identifier and the sub-service identifier comprises:

sending the CDRs that carry the multi-service identifier and the sub-service identifier.

11. The method according to Claim 8 or 9, wherein the multi-service identifier is identical to one of the sub-service identifiers, or is not identical to any one of the sub-service identifiers.

12. The method according to Claim 2, wherein the application or service is a multi-service comprising a plurality of sub-services; the service identifier assigned by the service control function entity for the application or service comprises: multi-service identifier of the multi-service; the charging information collecting function comprises: at least one AS charging information collecting function entity that respectively correspond to the multiple sub-service servers;
receiving, by the multiple sub-service servers, the multi-service identifier from the service charging information collecting function entity, and respectively sending the multi-service identifier to the billing center via respective AS charging information collecting function entity; correlating, by the billing center, the CDRs generated by the multiple sub-service servers based on the multi-service identifier.

13. The method according to Claim 12, wherein the

charging information collecting function entity comprises: multiple bear control layer charging information collecting function entities of bear control layer entities that respectively correspond to the multiple sub-service servers; and the bear control layer entities that respectively correspond to the multiple sub-service servers are adapted to respectively bear the bear control layers;
the method further comprises:

recording, by the bear control layer entities that respectively correspond to the multiple sub-service servers, the multi-service identifier, and sending the multi-service identifier to the billing center via respective bear control layer charging information collecting function entities; correlating, by the billing center, the CDRs generated by the bear control layer entities based on the the multi-service identifier.

14. The method according to Claim 12 or 13, wherein sending the multi-service identifier comprises: sending the CDRs that carry the multi-service identifier.

15. A system for charging correlation for an application or service, comprising:

a service control function, adapted to assign a service identifier for an application or service; and
a charging system, adapted to correlate at least one Charging Data Records CDR generated for the application or service based on the service identifier.

16. The system according to Claim 15, wherein the charging system comprises:

a charging information collecting function entity, adapted to receive the service identifier assigned by the service control function entity and collect the at least one CDR; and
a billing center, adapted to correlate the at least one CDR based on the service identifier received from the charging information collecting function entity.

17. The system according to Claim 16, wherein the service control function comprises an Application Server AS adapted to generate at least one CDR for the application or service; and the system further comprises a bearer control layer entity, adapted to record the service identifier and generate at least one CDR for the application or service.
wherein the charging information collecting function entity comprises:

an AS-charging information collecting function entity, adapted to receive the service identifier and the at least one CDR from the service control function entity;
a bearer control layer-charging information collecting function entity, adapted to receive the service identifier and the at least one CDR from the bearer control layer entity;

wherein
the billing center is further adapted to correlate the at least one CDR from the bearer control layer-charging information collecting function entity based on the service identifier, and correlate the at least one CDR from the AS-charging information collecting function entity based on the service identifier respectively, or adapted to correlate the at least one CDR from the bearer control layer-charging information collecting function entity with the at least one CDR from the AS-charging information collecting function entity based on the service identifier.

18. The system according to Claim 17, wherein the application or service is a multi-party service and the service control function entity is a server performing Controlling Function CF,
the system further comprises at least one server performing Participating Function PF,
wherein the bearer control layer entity comprises a bearer control layer entity corresponding to the server performing CF and at least one bearer control layer entity corresponding to the at least one server performing PF; the bearer control layer entity corresponding to the server performing CF is adapted to bear the server performing CF and the bearer control layer entity corresponding to the server performing PF is adapted to bear the server performing PF;
the AS-charging information collecting function entity comprises an AS-charging information collecting function entity corresponding to the server performing CF and at least one AS-charging information collecting function corresponding to the at least one server performing PF;
the bearer control layer-charging information collecting function comprises a bearer control layer-charging information collecting function entity of the bearer control layer entity corresponding to the server performing CF and at least a bearer control layer-charging information collecting function of the bearer control layer entity corresponding to the at least one server performing PF;
the server performing CF is adapted to assign the service identifier, send the service identifier to the at least one server performing PF, generate at least one set of CDR and send the service identifier and the CDRs to the AS-charging information collecting function entity of the server performing CF;
each server performing PF is adapted to record the service identifier, generate at least one set of CDR

and send the at least one set of CDR and the service identifier to the AS-charging information collecting function entity of the server performing PF;
the bearer control layer entity corresponding to the server performing CF is adapted to record the service identifier, generate the CDRs and send the CDRs and the service identifier to the bearer control layer-charging information collecting function entity of the bearer control layer entity;
each bearer control layer entity corresponding to a server performing PF is adapted to record the service identifier, generate the CDRs and send the CDRs and the service identifier to the bearer control layer-charging information collecting function entity of the bearer control layer entity;
the AS-charging information collecting function entity is adapted to send the service identifier and the CDRs to the billing center; and
the bearer control layer-charging information collecting function entity is adapted to send the service identifier and the CDRs to the billing center.

19. The system according to Claim 17, wherein the application or service is a multi-service comprising a plurality of sub-services, and
the system further comprises a plurality of sub-service servers providing the plurality of sub-services respectively; wherein
the bearer control layer entity comprises at least one bearer control layer entity corresponding to the sub-service servers and is adapted to bear the sub-service servers;
the AS-charging information collecting function entity comprises AS-charging information collecting function entities of respective sub-service servers;
the bearer control layer-charging information collecting function entity comprises bearer control layer-charging information collecting function entities of the bearer control layer entities corresponding to respective sub-service servers;
the service control function entity is further adapted to assign sub-service identifiers for the sub-services and send the service identifier and the sub-service identifiers to the sub-service servers;
each sub-service server is adapted to record the service identifier and the sub-service identifiers from the service control function entity, generate at least one set of CDRs for the sub-service provided by the sub-service server and send the service identifier, the sub-service identifier and the at least one set of CDRs to the AS-charging information collecting function entity of the sub-service server;
the bearer control layer entity corresponding to the sub-service server is adapted to record the service identifier and the sub-service identifier from the sub-service server, generate at least one set of CDRs for the sub-service provided by the sub-service server and send the service identifier, the sub-service identifier and the at least one set of CDRs to the bearer control layer-charging information collecting function entity of the bearer control layer entity;
the AS-charging information collecting function entity is adapted to send the service identifier, sub-service identifiers and the CDRs to the billing center;
the bearer control layer-charging information collecting function entity is adapted to send the service identifier, sub-service identifiers and the CDRs to the billing center; and
the billing center is further adapted to correlate CDRs of each sub-service according to the sub-service identifier corresponding to the sub-service, and correlate CDRs of the plurality of sub-services according to the service identifier.

20. The system according to Claim 17, wherein the application or service is a multi-service comprising a plurality of sub-services, and
the system further comprises a plurality of sub-service servers providing the sub-services; wherein
the bearer control layer entity comprises at least one bearer control layer entity corresponding to the sub-service servers and is adapted to bear the sub-service servers;
the AS-charging information collecting function entity comprises AS-charging information collecting function entities corresponding to the sub-service servers; the bearer control layer-charging information collecting function entity comprises bearer control layer-charging information collecting function entities corresponding to the bearer control layer entities corresponding to the sub-service servers;
the service control function entity is adapted to send the service identifier to the sub-service servers;
the sub-service server is adapted to record the service identifier from the service control function entity, generate at least one set of CDRs for the sub-service provided by the sub-service server and send the at least one set of CDRs and the service identifier to the AS-charging information collecting function entity of the sub-service server;
the bearer control layer entity corresponding to a sub-service server is adapted to record the service identifier from the sub-service server, generate at least one set of CDRs for the sub-service provided by the sub-service server and send the service identifier and the at least one set of CDRs to the bearer control layer-charging information collecting function entity of the bearer control layer entity;
an AS-charging information collecting function entity is adapted to send the service identifier and the CDRs to the billing center;
a bearer control layer-charging information collecting function entity is adapted to send the service identifier and the CDRs to the billing center; and
the billing center is adapted to correlate the CDRs of the sub-services based on the service identifier.

21. A billing center, comprising:

a first module, adapted to receive a service identifier assigned for an application or service and Charging Data Records CDRs generated for the application or service; and
a second module, adapted to correlate the CDRs based on the service identifier from the first module.

22. The billing center according to Claim 21, wherein the CDRs received by the first module comprise CDRs generated by an Application Server AS and CDRs generated by a bearer control layer entity; and
the second module is adapted to correlate the CDRs generated by the AS based on the service identifier and correlate the CDRs generated by the bearer control layer entity based on the service identifier respectively, or adapted to correlate the CDRs generated by the AS and the CDRs generated by the bearer control layer entity based on the service identifier.

23. The billing center according to any of Claim 21 or 22, wherein the application or service comprises at least one session and each set of the CDRs identified by ICID corresponds to one session; and
the second module is adapted to correlate a plurality of CDRs corresponding to a plurality of sessions of one user in the application or service based on the service identifier, or adapted to correlate a plurality of CDRs corresponding to a plurality of sessions of a part of or all users in the application or service based on the service identifier.

24. A apparatus for generating a charging data record, comprising:

a first module, adapted to receive a service identifier assigned for an application or service; and
a second module, adapted to generate Charging Data Records, CDRs, carrying the service identifier from the first module for the application or service.

25. The apparatus according to Claim 24, wherein the apparatus is an AS or a bearer control layer entity.

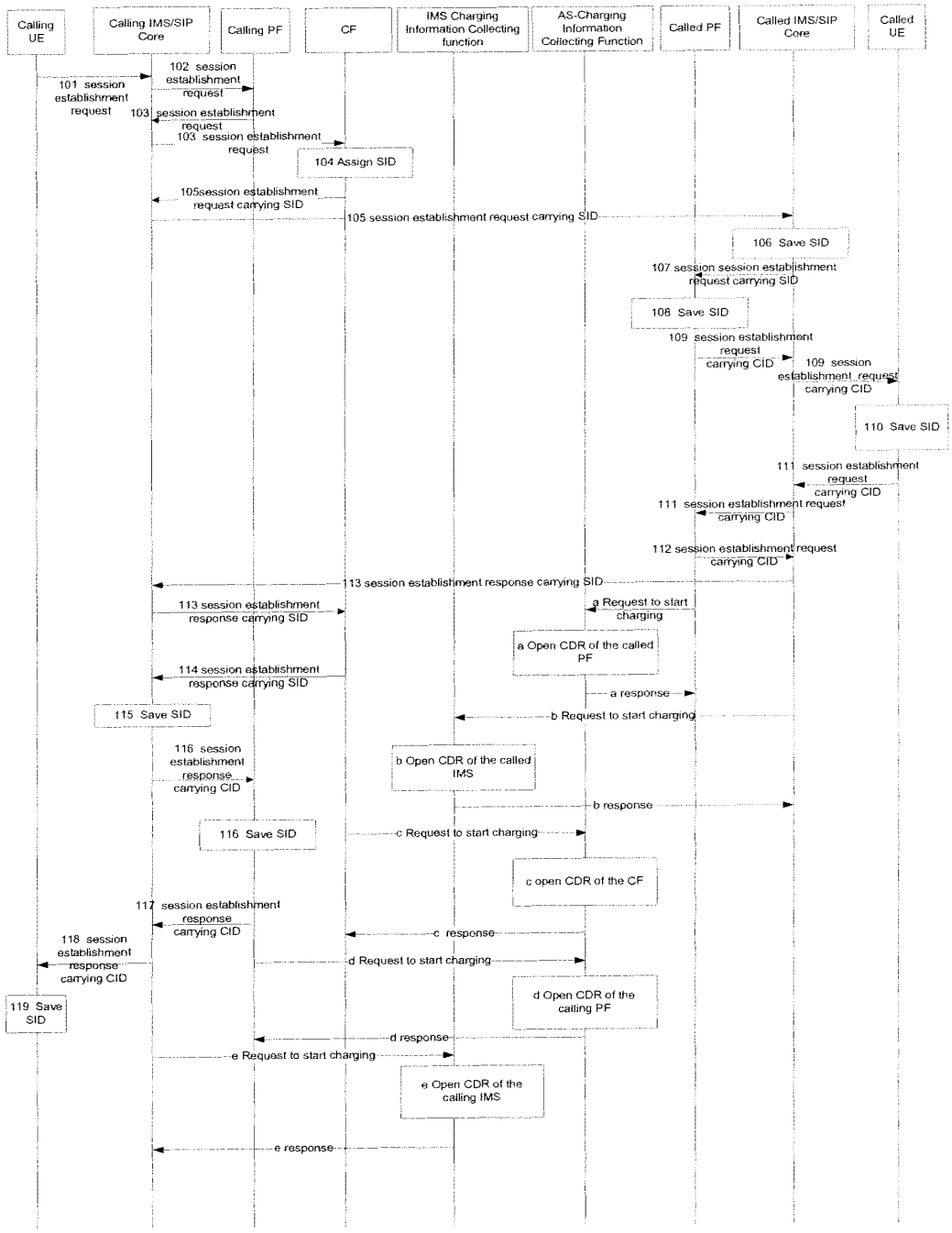

Calling UE
Calling IMS/SIP Core
Calling PF
CF
IMS Charging Information Collecting function
AS-Charging Information Collecting Function
Called PF
Called IMS/SIP Core
Called UE
101 session establishment request
102 session establishment request
103 session establishment request
103 session establishment request
104 Assign SID
105session establishment request carrying SID
105 session establishment request carrying SID
106 Save SID
107 session session establishment request carrying SID
108 Save SID
109 session establishment request carrying CID
109 session establishment request carrying CID
110 Save SID
111 session establishment request carrying CID
111 session establishment request carrying CID
112 session establishment request carrying CID
113 session establishment response carrying SID
113 session establishment response carrying SID
a Request to start charging
a Open CDR of the called PF
114 session establishment response carrying SID
a response
115 Save SID
b Request to start charging
116 session establishment response carrying CID
b Open CDR of the called IMS
b response
116 Save SID
c Request to start charging
c open CDR of the CF
117 session establishment response carrying CID
c response
118 session establishment response carrying CID
d Request to start charging
d Open CDR of the calling PF
119 Save SID
d response
e Request to start charging
e Open CDR of the calling IMS
e response

Fig. 1

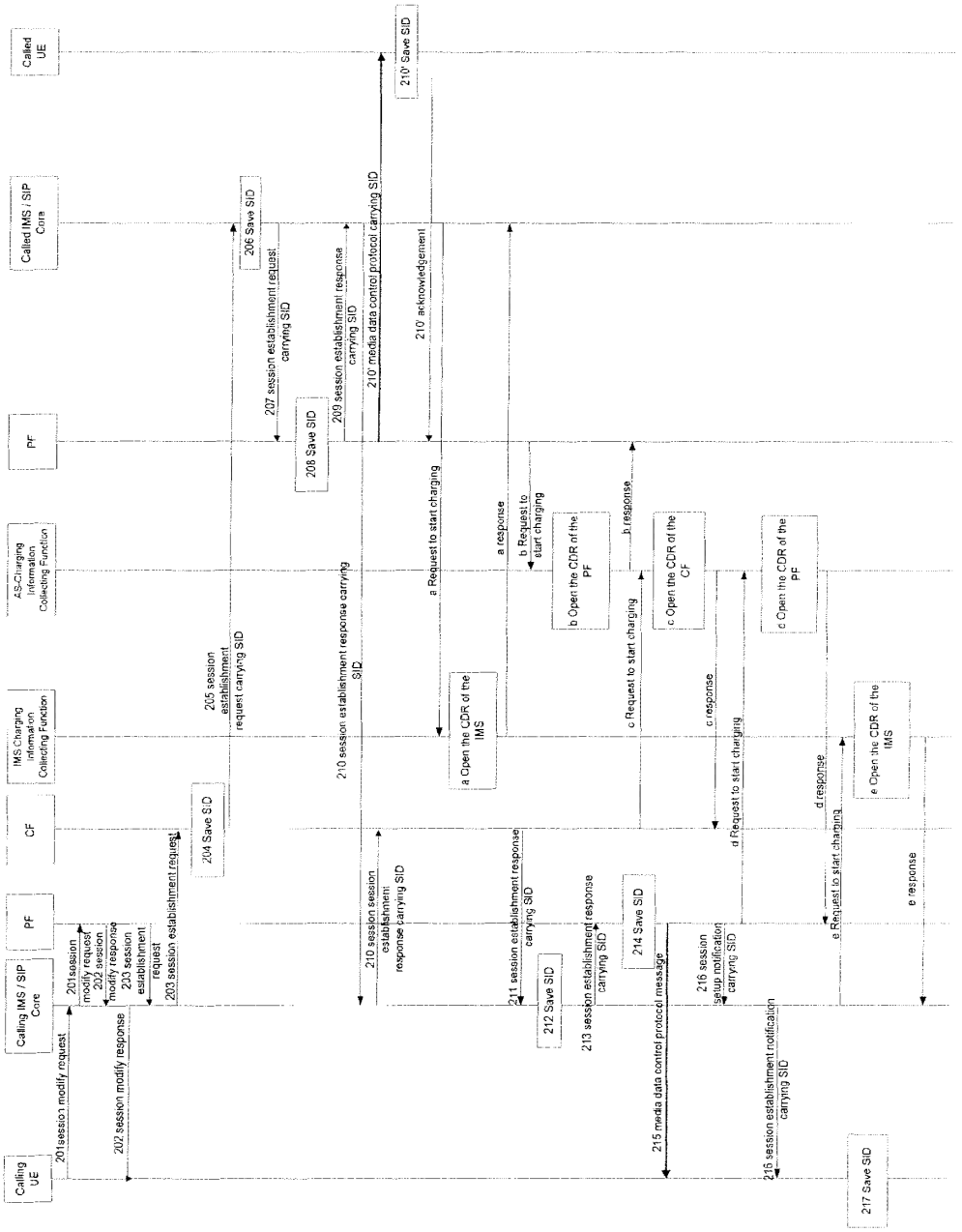

Calling UE
Calling IMS / SIP Core
PF
CF
IMS Charging Information Collecting Function
AS-Charging Information Collecting Function
PF
Called IMS / SIP Core
Called UE
201 session modify request
202 session modify response
201 session modify request
202 session modify response
203 session establishment request
203 session establishment request
204 Save SID
205 session establishment request carrying SID
206 Save SID
207 session establishment request carrying SID
208 Save SID
209 session establishment response carrying SID
210' media data control protocol carrying SID
210' acknowledgement
210' Save SID
210 session session establishment response carrying SID
a Open the CDR of the IMS
a Request to start charging
a response
b Request to start charging
b Open the CDR of the PF
b response
c Request to start charging
c Open the CDR of the CF
c response
211 session establishment response carrying SID
212 Save SID
213 session establishment response carrying SID
214 Save SID
215 media data control protocol message
d Request to start charging
c Open the CDR of the PF
d response
216 session setup notification carrying SID
e Request to start charging
e Open the CDR of the IMS
e response
216 session establishment notification carrying SID
217 Save SID

Fig. 2

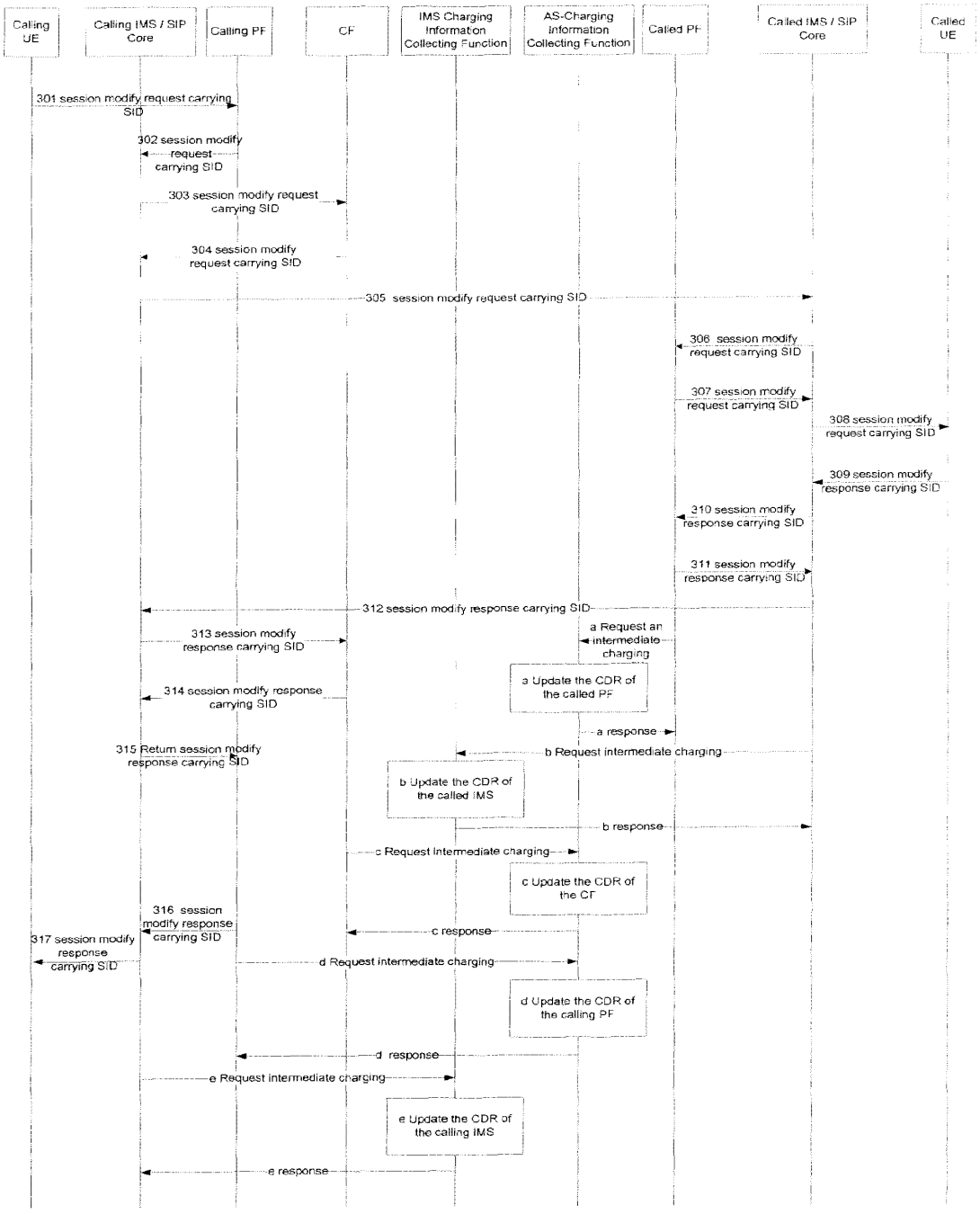

Calling UE
Calling IMS / SIP Core
Calling PF
CF
IMS Charging Information Collecting Function
AS-Charging Information Collecting Function
Called PF
Called IMS / SIP Core
Called UE
301 session modify request carrying SID
302 session modify request carrying SID
303 session modify request carrying SID
304 session modify request carrying SID
305 session modify request carrying SID
306 session modify request carrying SID
307 session modify request carrying SID
308 session modify request carrying SID
309 session modify response carrying SID
310 session modify response carrying SID
311 session modify response carrying SID
312 session modify response carrying SID
313 session modify response carrying SID
a Request an intermediate charging
a Update the CDR of the called PF
314 session modify response carrying SID
a response
315 Return session modify response carrying SID
b Request intermediate charging
b Update the CDR of the called IMS
b response
c Request Intermediate charging
c Update the CDR of the CF
316 session modify response carrying SID
c response
317 session modify response carrying SID
d Request intermediate charging
d Update the CDR of the calling PF
d response
e Request intermediate charging
e Update the CDR of the calling IMS
e response

Fig. 3

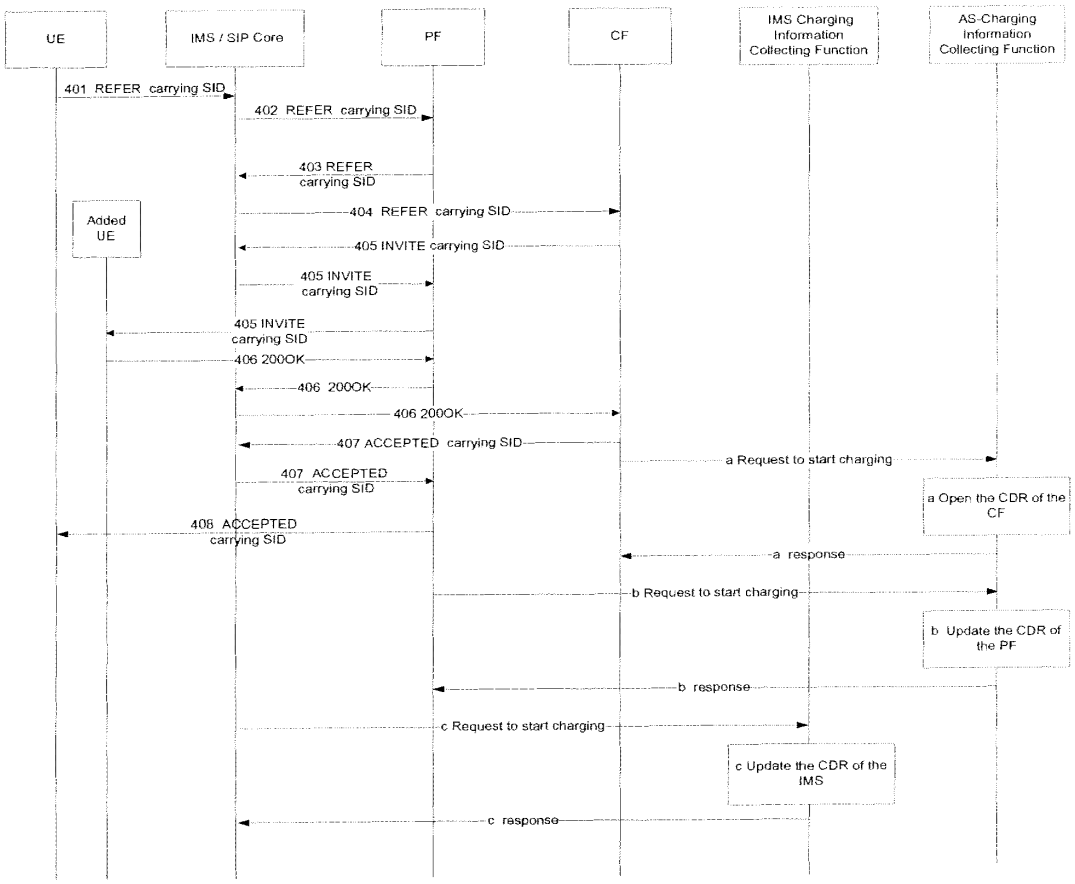

UE
IMS / SIP Core
PF
CF
IMS Charging Information Collecting Function
AS-Charging Information Collecting Function
401 REFER carrying SID
402 REFER carrying SID
403 REFER carrying SID
404 REFER carrying SID
Added UE
405 INVITE carrying SID
405 INVITE carrying SID
405 INVITE carrying SID
406 200OK
406 200OK
406 200OK
407 ACCEPTED carrying SID
a Request to start charging
407 ACCEPTED carrying SID
a Open the CDR of the CF
408 ACCEPTED carrying SID
a response
b Request to start charging
b Update the CDR of the PF
b response
c Request to start charging
c Update the CDR of the IMS
c response

Fig. 4

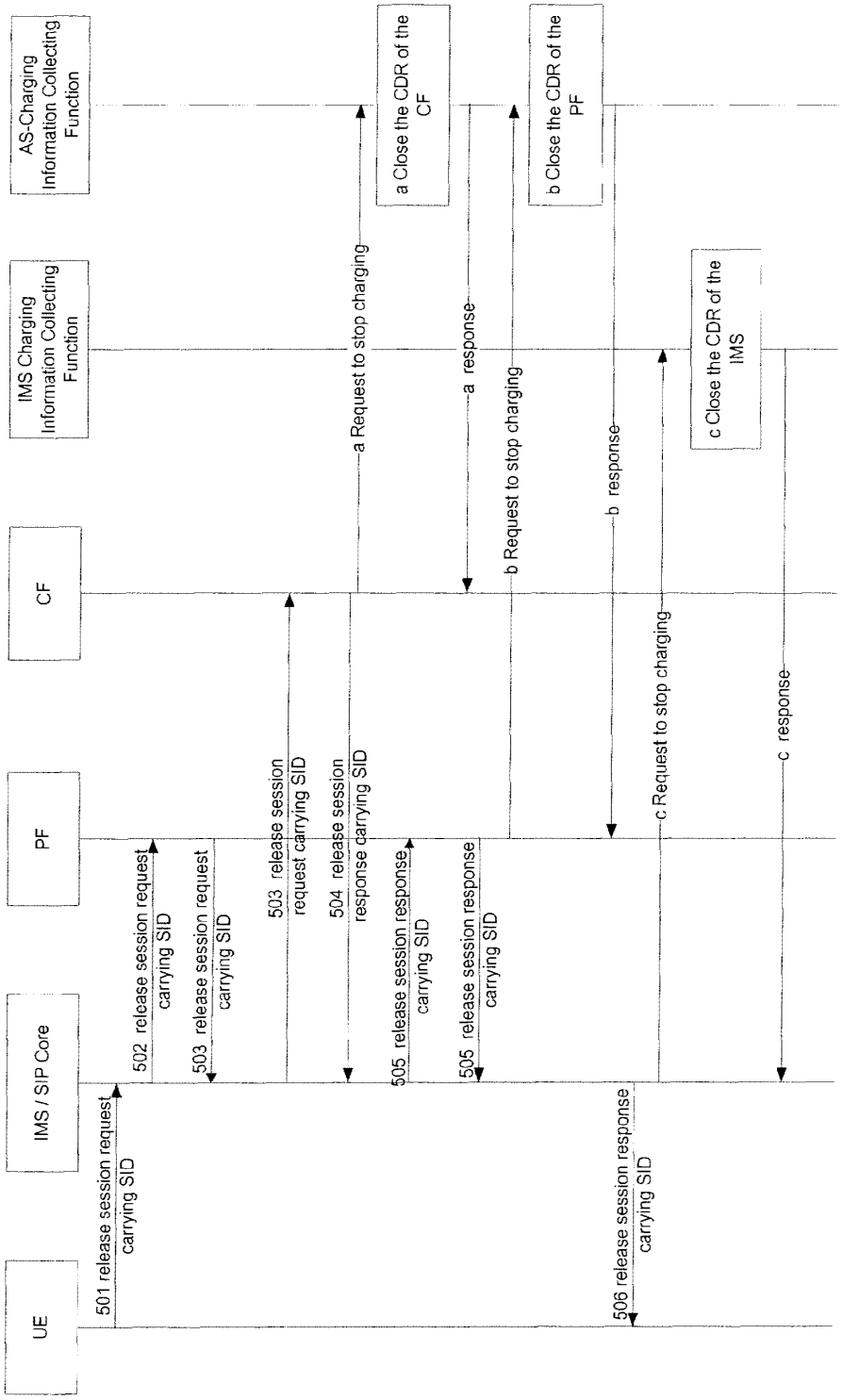

UE
IMS / SIP Core
PF
CF
IMS Charging Information Collecting Function
AS-Charging Information Collecting Function
501 release session request carrying SID
502 release session request carrying SID
503 release session request carrying SID
503 release session request carrying SID
504 release session response carrying SID
505 release session response carrying SID
505 release session response carrying SID
506 release session response carrying SID
a Request to stop charging
a response
a Close the CDR of the CF
b Request to stop charging
b response
b Close the CDR of the PF
c Request to stop charging
c response
c Close the CDR of the IMS

Fig. 5

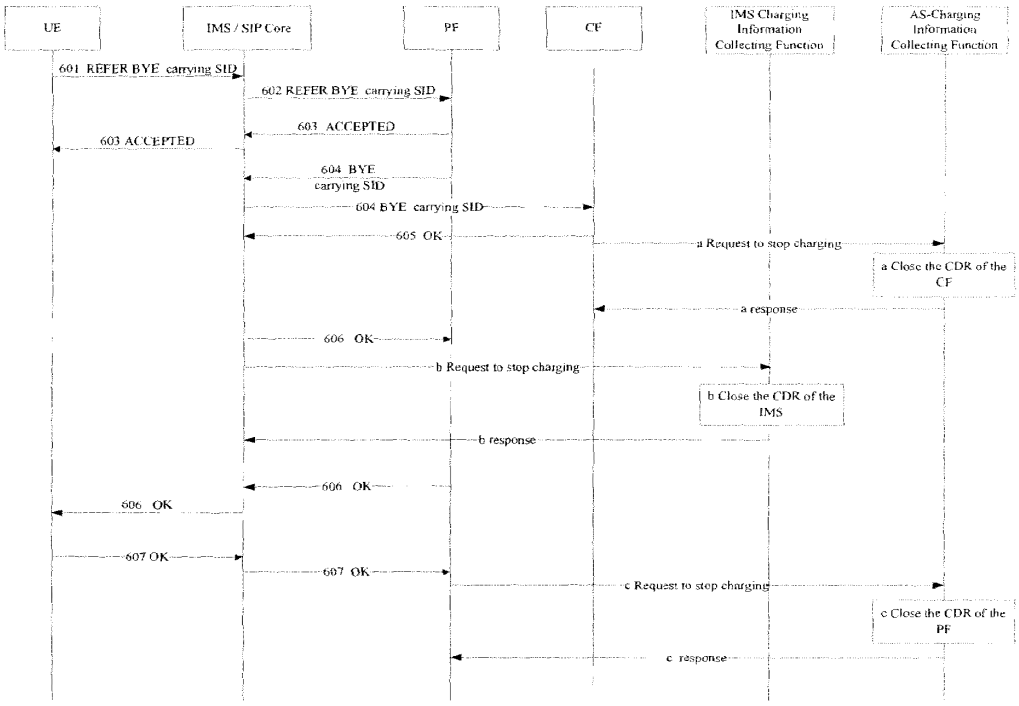

UE
IMS / SIP Core
PF
CF
IMS Charging Information Collecting Function
AS-Charging Information Collecting Function
601 REFER BYE carrying SID
602 REFER BYE carrying SID
603 ACCEPTED
603 ACCEPTED
604 BYE carrying SID
604 BYE carrying SID
605 OK
a Request to stop charging
a Close the CDR of the CF
a response
606 OK
b Request to stop charging
b Close the CDR of the IMS
b response
606 OK
606 OK
607 OK
607 OK
c Request to stop charging
c Close the CDR of the PF
c response

Fig. 6

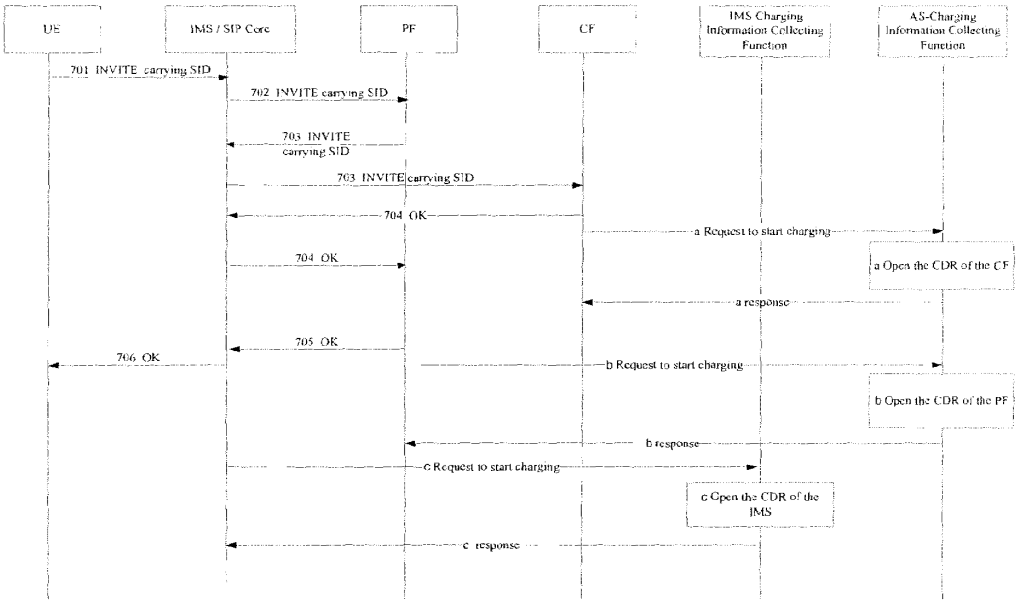

UE
IMS / SIP Core
PF
CF
IMS Charging Information Collecting Function
AS-Charging Information Collecting Function
701 INVITE carrying SID
702 INVITE carrying SID
703 INVITE carrying SID
703 INVITE carrying SID
704 OK
a Request to start charging
704 OK
a Open the CDR of the CF
a response
705 OK
706 OK
b Request to start charging
b Open the CDR of the PF
b response
c Request to start charging
c Open the CDR of the IMS
c response

Fig. 7

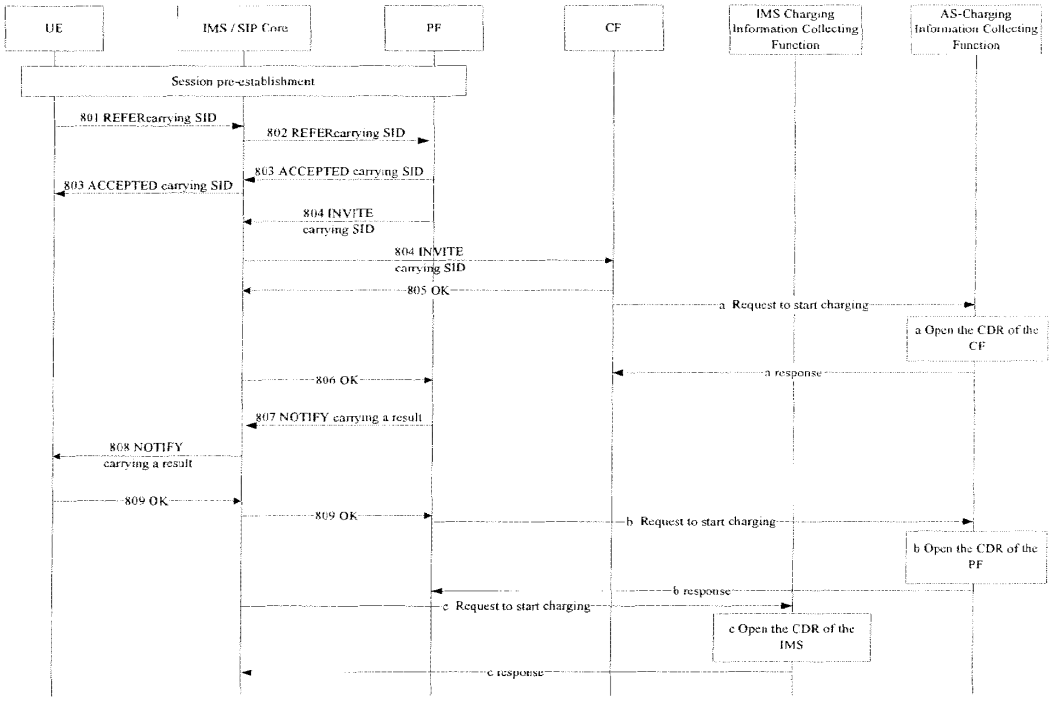

UE
IMS / SIP Core
PF
CF
IMS Charging Information Collecting Function
AS-Charging Information Collecting Function
Session pre-establishment
801 REFERcarrying SID
802 REFERcarrying SID
803 ACCEPTED carrying SID
803 ACCEPTED carrying SID
804 INVITE carrying SID
804 INVITE carrying SID
805 OK
a Request to start charging
a Open the CDR of the CF
a response
806 OK
807 NOTIFY carrying a result
808 NOTIFY carrying a result
809 OK
809 OK
b Request to start charging
b Open the CDR of the PF
b response
c Request to start charging
c Open the CDR of the IMS
c response

Fig. 8

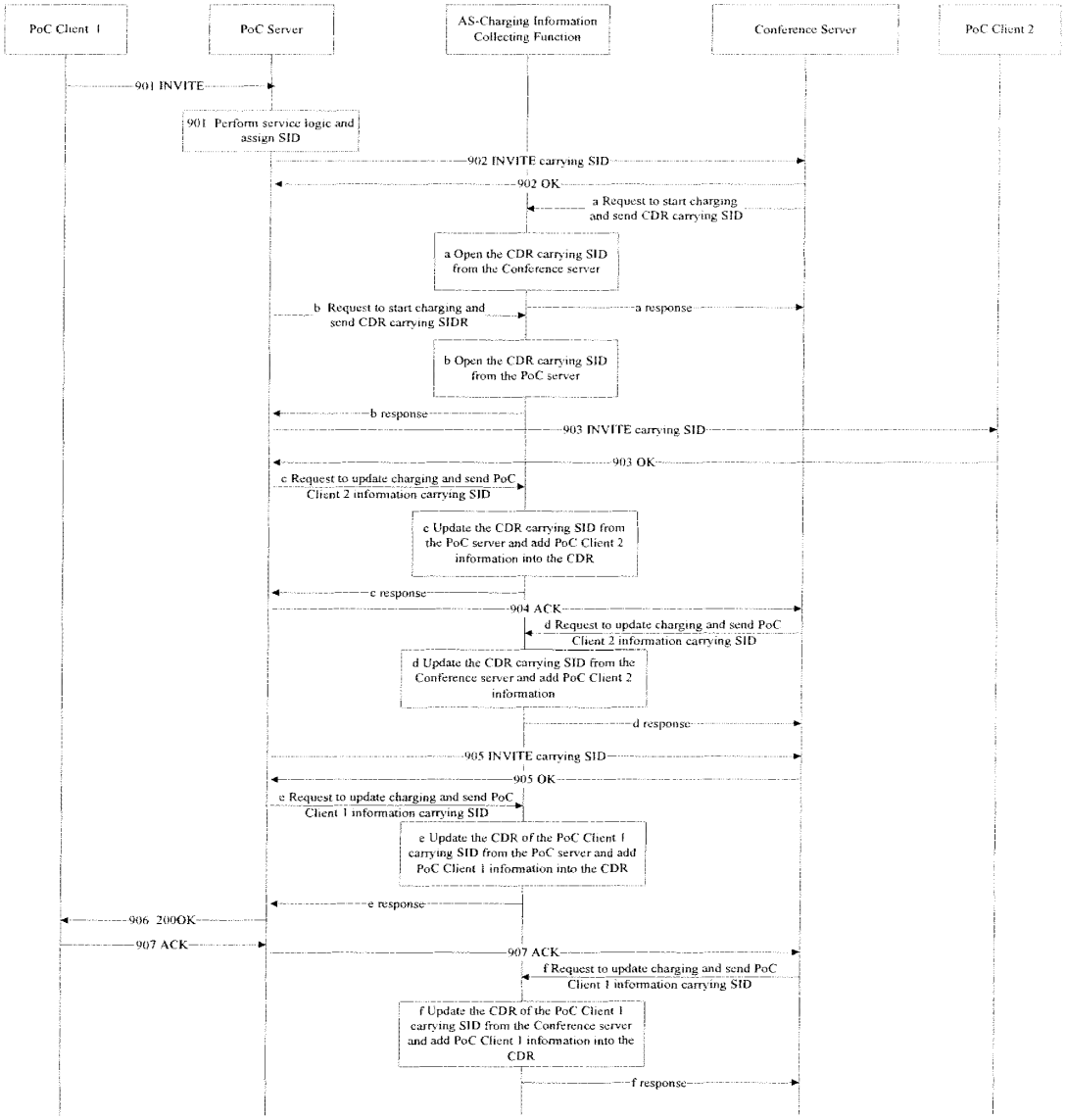

PoC Client 1
PoC Server
AS-Charging Information Collecting Function
Conference Server
PoC Client 2
901 INVITE
901 Perform service logic and assign SID
902 INVITE carrying SID
902 OK
a Request to start charging and send CDR carrying SID
a Open the CDR carrying SID from the Conference server
b Request to start charging and send CDR carrying SIDR
a response
b Open the CDR carrying SID from the PoC server
b response
903 INVITE carrying SID
903 OK
c Request to update charging and send PoC Client 2 information carrying SID
c Update the CDR carrying SID from the PoC server and add PoC Client 2 information into the CDR
c response
904 ACK
d Request to update charging and send PoC Client 2 information carrying SID
d Update the CDR carrying SID from the Conference server and add PoC Client 2 information
d response
905 INVITE carrying SID
905 OK
e Request to update charging and send PoC Client 1 information carrying SID
e Update the CDR of the PoC Client 1 carrying SID from the PoC server and add PoC Client 1 information into the CDR
e response
906 200OK
907 ACK
907 ACK
f Request to update charging and send PoC Client 1 information carrying SID
f Update the CDR of the PoC Client 1 carrying SID from the Conference server and add PoC Client 1 information into the CDR
f response

Fig. 9

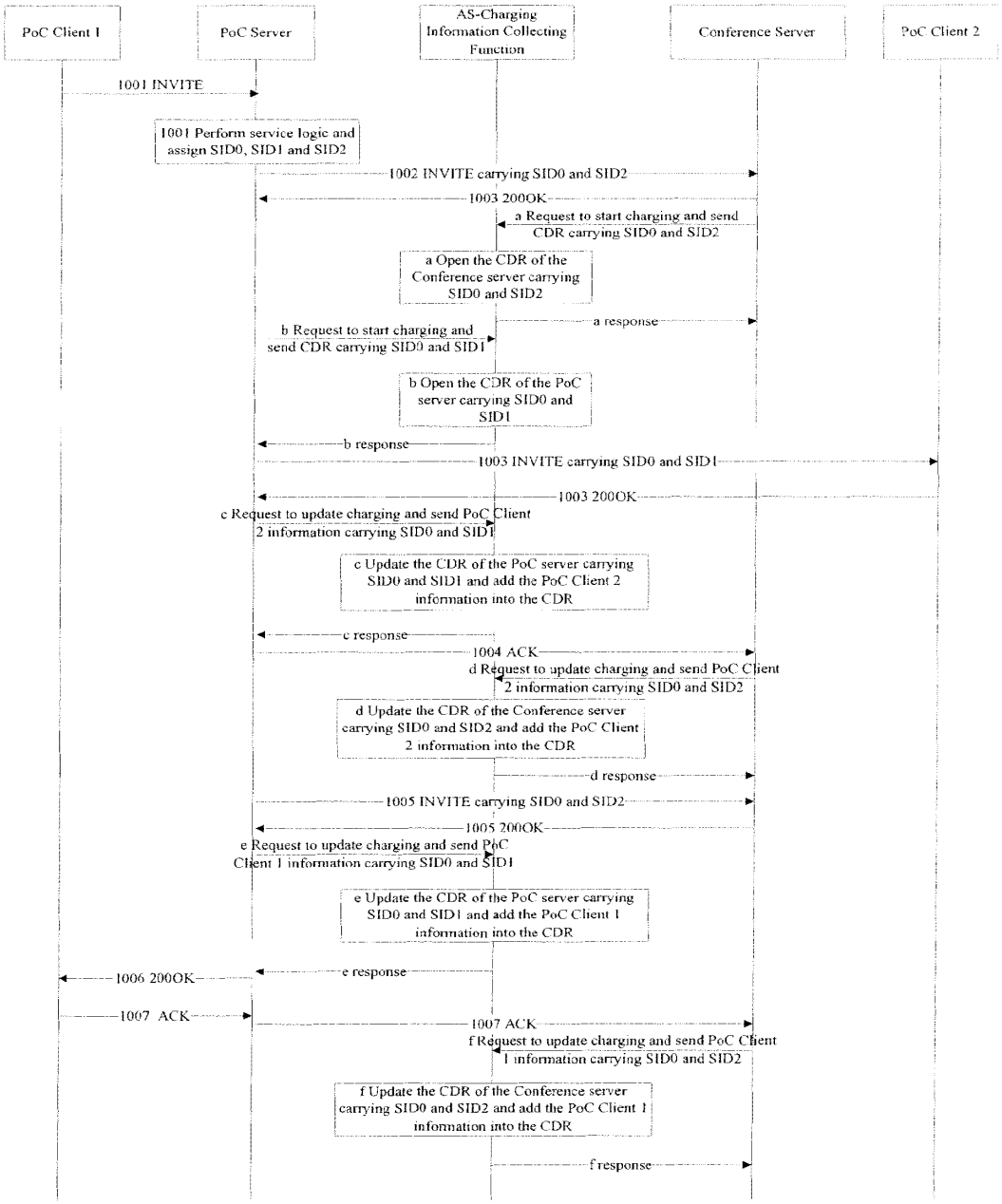

PoC Client 1
PoC Server
AS-Charging Information Collecting Function
Conference Server
PoC Client 2
1001 INVITE
1001 Perform service logic and assign SID0, SID1 and SID2
1002 INVITE carrying SID0 and SID2
1003 200OK
a Request to start charging and send CDR carrying SID0 and SID2
a Open the CDR of the Conference server carrying SID0 and SID2
a response
b Request to start charging and send CDR carrying SID0 and SID1
b Open the CDR of the PoC server carrying SID0 and SID1
b response
1003 INVITE carrying SID0 and SID1
1003 200OK
c Request to update charging and send PoC Client 2 information carrying SID0 and SID1
c Update the CDR of the PoC server carrying SID0 and SID1 and add the PoC Client 2 information into the CDR
c response
1004 ACK
d Request to update charging and send PoC Client 2 information carrying SID0 and SID2
d Update the CDR of the Conference server carrying SID0 and SID2 and add the PoC Client 2 information into the CDR
d response
1005 INVITE carrying SID0 and SID2
1005 200OK
e Request to update charging and send PoC Client 1 information carrying SID0 and SID1
e Update the CDR of the PoC server carrying SID0 and SID1 and add the PoC Client 1 information into the CDR
e response
1006 200OK
1007 ACK
1007 ACK
f Request to update charging and send PoC Client 1 information carrying SID0 and SID2
f Update the CDR of the Conference server carrying SID0 and SID2 and add the PoC Client 1 information into the CDR
f response

Fig. 10

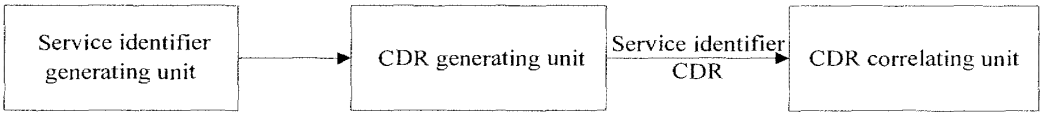

Service identifier generating unit
CDR generating unit
Service identifier
CDR
CDR correlating unit

Fig. 11

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2007/001048

A. CLASSIFICATION OF SUBJECT MATTER

H04L 12/14(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC H04L 12/-; H04M 15/-; G06Q10/-

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)

CNPAT WPI EPODOC PAJ: service, charg+, money, bill, fee, cost, associat+, relat+, corresponding, flag, ID, identification, indicator, mark, identifier, identity, distribut+, assign, communicat+

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN1267414A (NOKIA NETWORKS OY [FI]) 20 September 2000(20.09.2000) see claims 1,7and figure 3A	1-2, 15-16, 21, 24-25
A		3-14, 17-20, 22-23
A	CN1643888A (ERICSSON TELEFON AB L M [SE]) 20 July 2005(20.07.2005) see whole document	1-25
A	US2004255025A1 (RICAGNI GIUSEPPE [IT]) 16 December 2004(16.12.2004) see whole document	1-25

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim (S) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&"document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
26 June 2007 (26.06.2007)	**12 Jul. 2007 (12.07.2007)**
Name and mailing address of the ISA/CN The State Intellectual Property Office, the P.R.China 6 Xitucheng Rd., Jimen Bridge, Haidian District, Beijing, China 100088 Facsimile No. 86-10-62019451	Authorized officer ZHAO, Weihua Telephone No. (86-10)62085024

Form PCT/ISA /210 (second sheet) (April 2007)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2007/001048

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
CN1267414A	20.09.2000	FI981031A	15.01.1999
		WO9907108A2	11.02.1999
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		ES2252682T	16.05.2006
US2004255025A1	16.12.2004	None	

Form PCT/ISA /210 (patent family annex) (April 2007)

EUROPEAN PATENT OFFICE

Patent Abstracts of Japan

PUBLICATION NUMBER : 2006041989
PUBLICATION DATE : 09-02-06

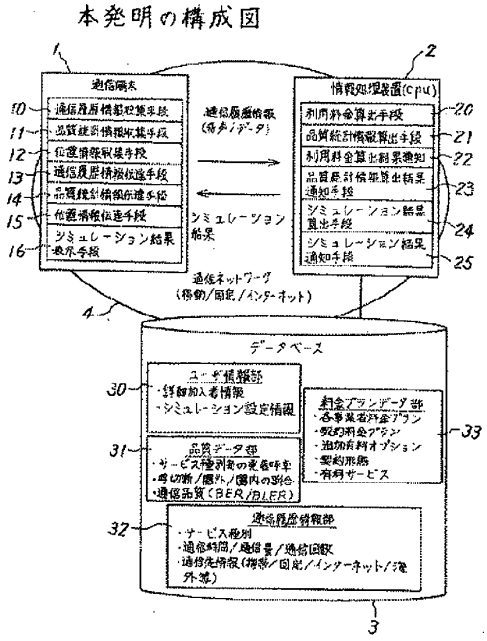
APPLICATION DATE : 28-07-04
APPLICATION NUMBER : 2004219784

APPLICANT : FUJITSU LTD;

INVENTOR : KATAOKA KOSUKE;

INT.CL. : H04M 15/16 (2006.01)

TITLE : CHARGING PLAN NOTIFICATION SYSTEM



ABSTRACT : PROBLEM TO BE SOLVED: To provide a charging plan notification system for calculating the lowest optimum charging plan corresponding to a utilization state of a communication terminal user from charging plans provided by all carriers.

SOLUTION: The charging plan notification system is provided with: a communication terminal for transmitting communication history information concerned with communication; a database 3 for storing the communication history information, all contract information between communication terminal users and communication carriers and all charging plans for communication service provided by all the carriers; and an information processor 2 for calculating utilization charges. The information processor 2 respectively calculates accurate utilization charges in the charging plans provided from respective carriers on the basis of the communication history information of each communication terminal user, the contract information and all the charging plans and notifies the communication terminal user of the calculated results.

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(51)Int.Cl.	F I	テーマコード（参考）
H04M 15/16 (2006.01)	H04M 15/16	5K025

審査請求 未請求　請求項の数 5　OL　（全 15 頁）

(21)出願番号　特願2004-219784 (P2004-219784)
(22)出願日　平成16年7月28日 (2004.7.28)

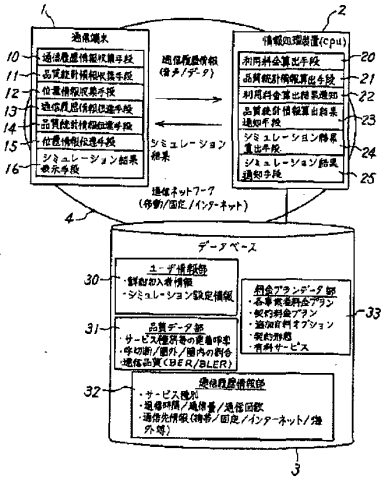
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最終頁に続く

(54)【発明の名称】料金プラン通知装置

(57)【要約】
【課題】全通信事業者の料金プランの中から通信端末ユーザの利用状態に応じた最も安い最適の料金プランを算出する料金プラン通知装置を提供すること。
【解決手段】このため本発明では、通信に関する通信履歴情報を送信する通信端末１と、通信履歴情報と、通信端末ユーザの通信事業者との全ての契約情報と、全通信事業者が提供する通信サービスの全料金プランとを蓄積しておくデータベース３と、利用料金を算出する情報処理装置２を具備する料金プラン通知装置であって、通信端末ユーザの通信履歴情報と、契約情報と、全料金プランとの情報を利用し、情報処理装置２により各通信事業者が提供している料金プランにおいて、各々正確な利用料金を算出し、通信端末ユーザに通知する。
【選択図】図１

本発明の構成図



BNSDOCID: <JP_____2006041989A__I_>

【特許請求の範囲】
【請求項1】
通信に関する通信履歴情報を送信する通信端末と、
通信履歴情報と、通信端末ユーザの通信事業者との全ての契約情報と、全通信事業者が提供する通信サービスの全料金プランとを蓄積しておくデータベースと、
利用料金を算出する情報処理装置を具備する料金プラン通知装置であって、
通信端末ユーザの通信履歴情報と、契約情報と、全料金プランとの情報を利用し、情報処理装置により各通信事業者が提供している料金プランにおいて、各々正確な利用料金を算出し、通信端末ユーザに通知する料金プラン通知装置。
【請求項2】
前記通信端末は、全通信における発着呼率、通信途中での切断、待受け時における圏内・圏外の割合・データ伝送速度等、全ての品質情報を通信履歴情報、通信端末が取得できる位置情報とをデータベースに送信する伝達手段を持ち、
上記データベースは品質情報を蓄積する蓄積手段を持ち、
上記情報処理装置は、品質情報を基に各通信事業者、エリア、時間帯毎等の統計的な通信サービスの品質情報を算出する算出手段を持ち、通信サービスの品質情報を全料金プランの正確な利用料金と共に通信端末ユーザに通知できる通知手段を具備したことを特徴とする請求項１記載の料金プラン通知装置。
【請求項3】
上記情報処理装置は、予めデータベースに登録されている、通信端末ユーザが通信事業者と契約している料金プラン、追加有料オプション、契約時期、契約形態、有料サービス、全通信事業者が提供している全料金プラン、及び有料オプション、割引情報等の情報を利用して正確な利用料金を算出することを特徴とする請求項１記載の料金プラン通知装置。
【請求項4】
上記情報処理装置は、サービス種別、通信時間、量、回数、通信先、位置情報等の詳細な通信履歴情報を利用して、正確な利用料金を算出することを特徴とする請求項１記載の料金プラン通知装置。
【請求項5】
通信端末ユーザが利用を想定した任意の利用条件をデータベースに設定し、ユーザの要求に応じて情報処理装置は、それらの情報と、データベースに登録してある通信端末ユーザの詳細加入者情報及び料金プランに関連する情報を利用して、各料金プランにおいてシミュレーションし、正確に料金算出し、結果を通信端末ユーザに通知することを特徴とする請求項１記載の料金プラン通知装置。

【発明の詳細な説明】
【技術分野】
【0001】
本発明は、通信端末の利用料金を算出し、通信端末ユーザに通知するサービスを行う料金プランを考慮した料金シミュレーションを実施し、最適な料金プランをユーザおよび事業者に通知する料金プラン通知システムに関する。
【背景技術】
【0002】
従来、携帯電話の如き通信端末では、基本使用料と一定金額の無料通話分の設定や、平日昼間や夜間、土日祝日等通話時間帯毎の通話料割引倍率、パケット料金の割引など様々な割引プランが設定されている。
【0003】
通信事業者は、これらの組み合せによりバリエーションを持たせた料金プランを準備している。
【0004】
ユーザは、あらかじめ１つの料金プランを選択し、そのプランに設定された割引率と実

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際の月々の利用料金により算出された金額を契約した通信事業者からの請求により支払う。

【0005】

ユーザが自己の通信に対して最適な料金プランによる通信サービスを受けることができるように、ユーザに対して通話終了毎に、契約された契約料金プランと準備された全ての料金プランとを比較して、得られる最適な料金プランをリアルタイムで通知することが提案されている。

【特許文献1】特開２００１－３６６７３号公報

【発明の開示】

【発明が解決しようとする課題】

【0006】

上記従来技術では、ユーザが現在契約している通信事業者が提供しているサービスの中における最適な料金プランの提供であり、他社の通信事業者の提供しているものを含めた料金プランにおける最適なものの提供ではない。

【0007】

したがってユーザが、現在契約している料金システムが自己にとって最適なプランであるかどうかを判断するために、ユーザ自身が月々の利用状態を分析し、検討し、現在の契約通信事業者のみならず他の契約通信事業者の料金プランと比較することが必要である。

【0008】

しかるに各社の料金プランは多様・複雑化しており、ユーザ自らが分析・検討するのは困難である。したがって、各社の料金プランの中からユーザの通信端末の利用状態に応じた、最適の料金プランを提供するサービスが求められている。

【課題を解決するための手段】

【0009】

上記課題を解決するため、本発明では、下記（１）～（５）の料金プラン通知装置を提供する。

【0010】

（１）通信に関する通信履歴情報を送信する通信端末と、通信履歴情報と、通信端末ユーザの通信事業者との全ての契約情報と、全通信事業者が提供する通信サービスの全料金プランとを蓄積しておくデータベースと、利用料金を算出する情報処理装置を具備する料金プラン通知装置であって、通信端末ユーザの通信履歴情報と、契約情報と、全料金プランとの情報を利用し、情報処理装置により各通信事業者が提供している料金プランにおいて、各々正確な利用料金を算出し、通信端末ユーザに通知することを特徴とする料金プラン通知装置。

【0011】

（２）上記（１）の料金プラン通知装置において、前記通信端末は、全通信における発着呼率、通信途中での切断、待受け時における圏内・圏外の割合・データ伝送速度等、全ての品質情報を通信履歴情報、通信端末が取得できる位置情報とをデータベースに送信する伝達手段を持ち、上記データベースは品質情報を蓄積する蓄積手段を持ち、上記情報処理装置は、品質情報を基に各通信事業者、エリア、時間帯毎等の統計的な通信サービスの品質情報を算出する算出手段を持ち、通信サービスの品質情報を全料金プランの正確な利用料金と共に通信端末ユーザに通知できる通知手段を具備したことを特徴とする。

【0012】

（３）上記（１）の料金プラン通知装置において、上記情報処理装置は、予めデータベースに登録されている、通信端末ユーザが通信事業者と契約している料金プラン、追加有料オプション、契約時期、契約形態、有料サービス、全通信事業者が提供している全料金プラン、及び有料オプション、割引情報等の情報を利用して正確な利用料金を算出することを特徴とする。

【0013】

（４）上記（１）の料金プラン通知装置において、上記情報処理装置は、サービス種別

、通信時間、量、回数、通信先、位置情報等の詳細な通信履歴情報を利用して、正確な利用料金を算出することを特徴とする。

【0014】

（５）上記（１）の料金プラン通知装置において、通信端末ユーザが利用を想定した任意の利用条件をデータベースに設定し、ユーザの要求に応じて情報処理装置は、それらの情報と、データベースに登録してある通信端末ユーザの詳細加入者情報及び料金プランに関連する情報を利用して、各料金プランにおいてシミュレーションし、正確に料金算出し、結果を通信端末ユーザに通知することを特徴とする。

【発明の効果】

【0015】

本発明により下記の効果を奏する。

【0016】

（１）通信端末が通信端末ユーザの詳細な通信履歴情報をサービス提供業者の料金プラン通知装置のデータベースに登録し、情報処理装置において、前記データベースに登録された詳細な通信履歴情報と料金プラン情報を使用して、ユーザが契約していない他の通信事業者のプランも含めて全料金プランについて正確な通信料金を算出し、通信端末ユーザに通知するので、通信端末ユーザは前記契約外の通信事業者のプランも含めた一番安い料金プランを正確に知ることができる。

【0017】

（２）通信端末に、通信履歴情報と共に通話品質に関連する情報をサービス提供業者の料金プラン通知装置のデータベースに送信し、情報処理装置に、データベースに登録されている通信品質に関連する情報を使用して各通信事業者、エリア、時間帯毎等の統計的な通信サービスの品質情報を算出し、通信端末ユーザに通知するので、通信端末ユーザは契約していない通信事業者のつながり易さ、音声品質等の通信品質を含め、全通信事業者の通信品質情報を知る事が出来るので、通信端末ユーザは、一番通信品質の良い通信事業者を選択することができる。

【0018】

（３）通信端末ユーザは、料金プランや契約形態等の詳細な加入者情報、契約情報をサービス提供者の料金プラン通知装置のデータベースに登録し、それらを利用料金算出に使用することにより、利用形態に沿った正確な一番安い利用料金プランを算出することが可能となる。

【0019】

（４）現在の通信端末は音声通話終話単位で表示される通信履歴情報とパケット数情報を確認できるが、これらは各通信事業者の標準的なプランを基にした情報であり必ずしも正確な情報ではなかったが、本発明では通信端末ユーザからの実用的な詳細情報の収集は、通話時間、パケット数だけでなく、通信量、通話回数、接続通話先、データ量、利用回数等通信履歴情報の詳細を用いてデータベースに登録し、それらを利用料金算出に使用できるので、情報処理装置での正確な利用料金算出を可能とする。

【0020】

（５）通信端末ユーザが自分の利用形態を想定した条件をデータベースに登録し、データベースに登録した詳細な加入者情報、各種料金プランを利用することで大雑把な料金シミュレーションではなく、正確なシミュレーションの実現が可能となり、また前月の履歴情報を流用する手段を持たせることで、シミュレーションに必要な情報を前月と同じ状態で算出することができ、ユーザオペレーションを低減させた正確なシミュレーションの実現が可能となる。

【発明を実施するための最良の形態】

【0021】

自己の通信履歴情報を、サービス業者に送信する通信端末と、多数の通信事業者の料金プランと前記通信履歴情報を保持するデータベースと、前記通信履歴情報にもとづき前記多数の通信事業者の料金プランを使用して通信を行ったときの料金を算出する情報処理装

置を設け、前記通信履歴情報にもとづき前記多数の通信事業者の料金プランを使用して通信を行ったときもっとも安いものを前記情報処理装置で算出して、このうちのもっとも安い料金システムを通信端末ユーザに通知する料金プラン通知装置を提供する。これにより、通信端末ユーザは、このサービス業者からの通知により、自己が契約している通信事業者以外の他の通信事業者を含めた全通信事業者の料金プランのうちより、自己に適したもっとも安い料金プランを認識することができる。

【実施例】

【0022】

本発明の実施例１を図１～図３にもとづき説明する。図１は本発明の構成図、図２は本発明の品質統計情報説明図、図３は時間毎の品質統計情報説明図である。

【0023】

図中、１は通信端末、２は情報処理装置、３はデータベース、４は通信ネットワーク、１０は通信履歴情報収集手段、１１は品質統計情報収集手段、１２は位置情報収集手段、１３は通信履歴情報伝達手段、１４は品質統計情報伝達手段、１５は位置情報伝達手段、１６はシミュレーション結果表示手段、２０は利用料金算出手段、２１は品質統計情報算出手段、２２は利用料金算出結果通知手段、２３は品質統計情報算出結果通知手段、２４はシミュレーション結果算出手段、２５はシミュレーション結果通知手段、３０はユーザ情報部、３１は品質データ部、３２は通信履歴情報部、３３は料金プランデータ部である。

【0024】

通信端末１は、ユーザが通信相手と音声やデータを送受信するものであり、例えば携帯端末である。

【0025】

情報処理装置２は、通信端末１から送信された通信履歴情報と、データベース３に保持された多くの通信事業者Ａ、Ｂ、Ｃ・・・の料金プランデータに基づいてシミュレーション演算を行い、そのうちもっとも安いものを送出するものであり、ＣＰＵで構成される。

【0026】

データベース３は通信端末１から送信された通信履歴情報や、多くの通信事業者Ａ、Ｂ、Ｃ、Ｄの料金プランデータが保持されており、外部メモリで構成されている。そしてデータベース３と情報処理装置２はサービス提供業者側の料金プラン通知装置に設置されている。

【0027】

通信ネットワーク４は、移動端末用ネットワーク、固定端末用ネットワーク、インターネットの如き、通信ネットワークである。

【0028】

通信端末１には、通信履歴情報収集手段１０、品質統計情報収集手段１１、位置情報収集手段１２、通信履歴情報伝達手段１３、品質統計情報伝達手段１４、位置情報伝達手段１５、シミュレーション結果表示手段１６等を有する。

【0029】

通信履歴情報収集手段１０は、通信端末１が通信相手に送信した送信データの種別データ量、送信時刻、送信時間、サービス種別等の履歴情報を一定期間保持するものである。

【0030】

品質統計情報収集手段１１は、通信相手から受信したデータの品質を通信相手が使用している通信事業者Ａ、Ｂ、Ｃ・・・毎に、例えば公知の５段階評価し、これを保持するものである。

【0031】

品質情報は、例えば前記受信データの５段階評価の外に、発着呼率、通信途中での切断、圏内・圏外の割合、通信品質（ビットエラーレートＢＥＲ、ブロックエラーレートＢＬＥＲ）、データ伝送レート等である。

【0032】

品質情報の例を図２、図３に示す。図２、図３は、通信事業者Ａ、Ｂ、Ｃ、Ｄの４者における品質統計情報を示すもので、図２（Ａ）は各通信事業者の平均の呼接続率、圏内の割合を示し、図２（Ｂ）は各通信事業者の平均の通信品質を示し、図２（Ｃ）は各通信事業者の平均データ伝送レートを示し、図３は各通信事業者の時間毎の呼接続率、圏内の割合を示す図である。

【0033】

なお図２（Ａ）における呼接続率（平均）Ｍ１と圏内の割合（平均）Ｍ２は下式により算出されるものである。

【0034】

Ｍ１＝（完了呼－不完了呼）／発呼

Ｍ２＝（圏内の時間－圏外の時間）／電源を入れていた時間

図２、図３のデータは、サービス業者に加入している通信事業者Ａ、Ｂ、Ｃ、Ｄを利用しているユーザの通信端末より送信されたデータにもとづく統計情報である。

【0035】

図２（Ａ）に示す如く、呼接続率は通信事業者Ａが約９０％、通信事業者Ｂが約９５％、通信事業者Ｃが約８０％、通信事業者Ｄが約９８％であることを示す。またノイズの少ない安定した状態で通信可能であることを示す圏内の割合は通信事業者Ａが約９５％、通信事業者Ｂが約７６％、通信事業者Ｃが約８５％、通信事業者Ｄが約９７％であることを示す。

【0036】

通信品質は、５段階評価で通信事業者Ａ、Ｂ、Ｄが５、通信事業者Ｃが４であることを示し、平均データ伝送レートは通信事業者Ａが約２５ｋｂｐｓ、通信事業者Ｂが約１７ｋｂｐｓ、通信事業者Ｃが約２３ｋｂｐｓ、通信事業者Ｄが約２４ｋｂｐｓであることを示す。

【0037】

品質情報には通信端末ユーザの住所が記入されているので、サービス装置側では各通信事業者についてこれらの住所を解析することにより例えば通信事業者Ｃが横浜駅周辺では通信品質があまりよくない等の品質統計情報を得ることができ、このような情報をユーザに提供することもできる。

【0038】

位置情報収集手段１２はサービス業者を利用している通信端末ユーザと通信先の通信端末ユーザの位置情報（住所）を収集し、これを保持するものである。

【0039】

通信履歴情報伝達手段１３は、通信履歴情報収集手段１０が収集した通信端末１が行った通信データを、通信ネットワーク４を経由してサービス業者側の情報処理装置２に送出するものである。

【0040】

品質統計情報伝達手段１４は、品質統計情報収集手段１１が収集したデータの品質情報をサービス業者側の情報処理装置２に通信ネットワーク４を経由して送出するものである。

【0041】

位置情報伝達手段１５は、位置情報収集手段１２で収集した、通信端末１と通信した相手端末のユーザの位置情報（住所）を通信ネットワーク４を経由してサービス業者側の情報処理装置２に送出するものである。

【0042】

シミュレーション結果表示手段１６は、情報処理装置２が算出したシミュレーション結果が通信ネットワーク４を経由して通信端末１に伝達されたとき、これを通信端末ユーザに表示する表示手段である。

【0043】

情報処理装置２は、通信端末から送信された通信履歴情報とデータベース４に蓄積され

ている全通信事業者の料金プランを使用して、全通信事業者の各料金プランについて正確な通信料金を算出し、通信端末の要求に応じて算出した通信料金を通信端末に通知したり、通信端末から受信した通信品質情報をデータベースに送信したり、データベースに登録してある通信品質情報を使用し、地域、時間帯通信事業者毎に品質統計情報を算出し通信端末の要求に応じて品質統計情報を通信端末に通知するものである。

【0044】

このため、情報処理装置２には、利用料金算出手段２０、品質統計情報算出手段２１、利用料金算出結果通知手段２２、品質統計情報算出結果通知手段２３、シミュレーション結果算出手段２４、シミュレーション結果通知手段２５等を有する。

【0045】

利用料金算出手段２０は、通信端末１から伝達された音声、データ等の通信履歴情報や、データベース部３に保持された各通信事業者の料金プランを使用して通信端末１のユーザに対する利用料金を算出するものである。

【0046】

品質統計情報算出手段２１は、通信端末１から受信されデータベース３に登録した通信品質情報を使用し、地域、時間帯、通信事業者毎における発着呼率、通信品質情報等を算出し、通信端末１の要求に応じて品質統計情報を通信端末１に通知するものである。

【0047】

利用料金算出結果通知手段２２は、利用料金算出手段２０で算出された全通信事業者の料金プランにもとづく通信料金のうち、もっとも安い料金を通信端末１に通知するものである。

【0048】

シミュレーション結果算出手段２４は、通信端末１のユーザが指定した任意の利用条件にもとづき、各通信事業者の料金プランを使用してもっとも安い利用料金を算出するものである。

【0049】

シミュレーション結果通知手段２５は、このシミュレーション結果算出手段２４から通知されたシミュレーション結果を、シミュレーション要求を行った通信端末に対し通知するものである。

【0050】

データベース３は、通信事業者に対する通信端末の加入者の詳細な契約情報、全通信事業者が提供する各種料金プラン、追加有料オプション情報、割引情報等の全ての課金に関する情報、及び本発明のサービスを制御するための、通信料金の通知回数や通知するタイミング等の設定情報、通信端末が送信した通信履歴情報を蓄積するもので、ユーザ情報部３０、品質データ部３１、通信履歴情報部３２、料金プランデータ部３３等を有し、前記情報処理装置２とともにサービス業者の料金プラン通知装置を構成する。

【0051】

ユーザ情報部３０は、通信端末１の加入者が現在契約している通信業者との詳細な契約情報である詳細加入者情報や、この加入者が料金のシミュレーション演算を求めるシミュレーション設定情報を保持するものである。

【0052】

品質データ部３１は、通信端末より送出されるサービス種別毎の発着呼率、呼切断の割合、圏内と圏外の割合、ビットエラーレート（ＢＥＲ）、ブロックエラーレート（ＢＬＥＲ）等の通信品質を保持するものである。

【0053】

通信履歴情報部３２は、通信端末より伝達された、通信端末が実際に通信を行った結果の情報を保持するもので、サービス種別、通信時間、通信量、通信回数、通信先が携帯端末か、固定端末か、インターネットか、海外か等を示す通信先情報を保持するものである。

【0054】

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料金プランデータ部３３は、通信端末が加入しているか否かにかかわらず、全通信事業者の提供する各事業者料金プラン、契約料金プラン、追加有料オプション、契約形態、有料サービス等の課金に関する料金データを保持するものである。これらの料金データは、通信事業者がインターネットで公開したり、通信端末販売業者に郵送したりしているので、容易に入手できるものである。

【0055】

実施例１において、通信端末１は、通信履歴情報収集手段１０が収集したこの通信端末１が実際に通信した通信履歴情報を、通信履歴情報伝達手段１３が電子情報に変換し、移動通信網、固定通信網、インターネットの如き通信ネットワーク４を経由して、サービス業者の料金プラン通知装置を構成する情報処理装置２に送信する。

【0056】

情報処理装置２では、これを受信し、データベース３の通信履歴情報部３２に通信端末毎に、サービス種別、通信時間、通信量、通信回数、通信先情報等に識別して保持する。

【0057】

なお、サービス業者の料金プラン通知装置のデータベース３には、通信端末の加入者の料金プラン、オプション、契約期間等の詳細加入者情報やシミュレーション設定情報がそのユーザ情報部３０に保持され、また各通信事業者の料金プラン、契約料金プラン、追加有料オプション、契約形態、有料サービス等が料金プランデータ部３３に保持されている。

【0058】

したがって、通信端末の加入者が、例えば過去１ヶ月の通信履歴情報にもとづき、全通信事業者の料金プランにしたがって料金算出を求めたとき、情報処理装置２では、利用料金算出手段２０がデータベース３よりこの加入者の通信端末が過去１カ月に実際に通信を行った履歴情報にもとづき、料金プランデータ部３３に保持されている全通信事業者の各料金プランにより料金を算出し、これを利用料金算出結果通知手段２２に伝達する。

【0059】

利用料金算出結果通知手段２２では、この伝達された料金のうちもっとも安いものを選択してこれを通信端末１に送信する。

【0060】

通信端末１ではこれをシミュレーション結果表示手段１６が受信して表示出力し、加入者はこれにより、どの通信事業者の料金プランが自己の過去１ヶ月の通信履歴に対しもっとも安かったか認識し、現在の契約が適切か否かの判定が可能となる。勿論履歴情報は過去１ヶ月ではなく、１週間とか、適宜選択できる。

【0061】

実施例２においては、通信品質情報を算出通知するものである。通信端末１では通信毎の通信品質情報、例えば発着呼率、通信品質、通信時間、位置情報等を品質統計情報収集手段１１が算出し、これを収集する。

【0062】

品質統計情報伝達手段１４はこれらの情報を電子情報に変換し、任意のタイミングで移動通信網、固定通信網、インターネットの如き通信ネットワーク４を経由して、情報処理装置２に送信する。

【0063】

情報処理装置２は、通信端末１から受信した受信品質情報をデータベース３の品質データ部３１に送信し、通信品質情報を蓄積する。

【0064】

そして情報処理装置２は、通信端末１のユーザの要求に応じて、データベース３に登録してある通信品質情報を使用し、その品質統計情報算出手段２１が、地域毎、時間帯毎、通信事業者毎に、各時間帯毎、地域毎、事業者毎における発着呼率、呼切断、圏外・圏内の割合、ＢＥＲ、ＢＬＥＲ等の通信品質情報等を算出し、通信端末１のユーザの要求に応じて品質統計情報算出結果通知手段２３がこの品質統計情報を通信端末１に通知する。通

信端末１はこれをシミュレーション結果表示手段１６で受信してユーザに表示する。通信端末１のユーザは例えば図２、図３に示す如き、各通信事業者のサービス品質情報を取得することにより、通信サービスの品質を比較することができる。

【0065】

実施例３においては、有料オプション、契約期間等の詳細な加入者情報と、全通信事業者の提供する全料金プラン、追加オプション、割引制度情報から料金を比較算出するようにしたものである。

【0066】

データベース３のユーザ情報部３０には、情報処理装置２が通信端末ユーザの利用料金を算出する際に使用する、データベースに登録されている詳細な加入者情報が保持されている。

【0067】

この詳細な加入者情報としては、通信端末ユーザが通信事業者と契約している料金プラン情報すなわち、月額基本料金、無料通話時間、音声・データ・メール（Ｅメール、通信事業者網内向けメール、送受信料）等のサービス種別の通信料、自他国内キャリア、海外キャリア、国内・海外の固定電話、通信電話等の通信先毎の通信料、有料オプション、割引情報、契約期間、個人契約、法人契約（複数回線割引）等の契約形態等が登録されている。

【0068】

有料オプションの代表的なものとしては、通信事業者が提供する、留守番電話サービス、三者通話、海外ローミングサービス、国際通話等、その他ニュース、天気情報等の料金や条件等の詳細情報が登録される。

【0069】

割引情報の代表的なものとしては、家族割引、指定番号割引等の特定番号割引、時間帯割引、年齢・学生割引、長期契約割引、パケット割引の如きサービス種別毎の割引等の詳細情報が登録される。

【0070】

また、データベースの料金プランデータ部３３には、全通信事業者が提供している全料金プラン及び有料オプション、割引情報等の課金対象サービスの全ての詳細情報、条件が登録されており、これらの情報により情報処理装置２の利用料金算出手段２０が、例えば履歴情報に対して正確な利用料金を算出し、通信端末ユーザの契約料金と比較検討することができる。

【0071】

実施例４においては、通信履歴情報の詳細を示す。

【0072】

通信端末１がデータベース３に送信する通信履歴情報には、下記のような通信料金を算出するために必要な詳細情報が含まれている。

【0073】

音声、伝送速度・ＷＥＢアクセス・メール等のデータ、動画等のサービス種別。

【0074】

通信時間、パケット数等の量、回数。

【0075】

通信電話又は固定電話・フリーダイヤル・特定番号・ＵＲＬ・Ｅメール・国内又は海外等の通信先。

【0076】

緯経度等の位置情報。

【0077】

通信端末１は、これらの情報を電子情報に変換し、データベース３に送信する。情報処理装置２ではこれらの情報を利用料金の算出に使用する。

【0078】

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実施例５においては、ユーザの任意の設定により、各料金プランにおいて使用料金をシミュレーション可能とするものである。

【0079】

このために、通信端末にユーザが例えば後述するサービス提供者のホームページより利用方法を想定したシミュレーション条件例えば音声通話時間、メール送受信回数、Ｗｅｂアクセス頻度、データ転送頻度、シミュレーション結果通知項目等を情報処理装置２に送信し、データベース３のユーザ情報部３０にこれらシミュレーション設定情報を登録する。

【0080】

情報処理装置２では、シミュレーション結果算出手段２４がこのシミュレーション条件と、データベース３の料金プランデータ部３３に登録ずみの全通信事業者の料金プランを利用してシミュレーション結果を算出し、シミュレーション結果通知手段２５がそのうちのもっとも安いものを通信端末１に送信し、シミュレーション結果表示手段１６がこれを表示してユーザにシミュレーション結果を知らせることができる。

【0081】

シミュレーション条件としてユーザの設定によるもののみでなく、例えばデータベースに蓄積されている前月の使用明細などの以前の通信履歴情報やデータベース３のユーザ情報部３０に予め用意してある代表的なシミュレーション条件を利用して設定することもできる。

【0082】

以前の通信履歴情報を利用する場合、本発明の料金プラン通知装置を設置するサービス提供者が作成したホームページの入力フォームにこの通信履歴情報を読み込ませるようにしてもよく、定形のファイルに以前の通信履歴情報を入力して通信端末等に送信し、通信端末は以前の通信履歴情報が記載された定形のファイルを編集し、データベースに送信することによっても実現できる。

【0083】

本発明では、通信端末ユーザは任意の利用条件を指定し、各料金プランにおいて通信料金をシミュレーションすることができる。

【0084】

通信端末は、ホームページの利用など公知の手段を使用して任意の利用条件をデータベースに設定する。任意の利用条件は、データベースに蓄積されている以前の通信履歴情報を流用することも可能である。

【0085】

データベースは通信端末から送信されてくる通信履歴情報を蓄積する。

【0086】

情報処理装置は、通信端末ユーザが指定した任意の利用条件、又はデータベースに蓄積されている以前の通信履歴情報、料金プラン、契約情報、割引情報を使用し、通信料金をシミュレーションし、通信端末ユーザに通知することができる。

【0087】

このシミュレーションとは、過去何時間とか特定の日等任意の期間の利用条件を元に、１ヶ月、１年分等の利用料金を全料金プランにおいて試算できる。これにより通信端末ユーザは種々の利用形態における利用料金を知ることができる。

【0088】

本発明では、通信端末ユーザは、情報処理装置で算出した、各料金プランの正確な使用料金、シミュレーション結果、及びサービス種別、通信先、通信時間、回数、情報量等の個別通信毎の料金内訳、品質統計情報等を下記に示す手段で入手することができる。

（１）電子データ：情報処理装置は通信端末ユーザの要求に応じて前記算出情報を、データベースから収集し、データファイル（テキスト、ＨＴＭＬ形式等）に変換して、Ｅメール、データファイルを通信端末ユーザのＥメールアドレスに送信する。また情報処理装置が前記算出情報をホームページに変換し、通信端末ユーザにホームページのアドレスを送

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信し、通信端末ユーザはそのホームページのアドレスにアクセスして閲覧することにより前記情報を見ることができる。また情報処理装置が前記算出情報をデータファイルに変換して通信端末ユーザに送信し、通信端末ユーザはそのデータファイルを閲覧することにより前記算出情報を見ることができる。

【0089】

（２）前記以外の手段：情報処理装置は通信端末ユーザの要求に応じて、前記算出情報をデータベースから収集し、音声ガイダンスに変換することで通信端末ユーザに聞かせることができる。またその他に、明細書を作成して郵送したり、オペレータによる対応等により通信端末ユーザは前記算出情報を入手することができる。

【0090】

本発明では、通信端末ユーザは、情報処理装置が行う全ての処理、情報を伝送するタイミングを任意に設定することができる。これにより、通信料が安い時間帯での送信や、日、週、月、年単位等のある期間の通信履歴情報を送信するタイミング、自動又は手動、月に何回等の回数を設定することができる。これにより通信端末は、任意のタイミングで通信履歴情報をデータベースに送信することができる。

【0091】

また通信端末は、利用料金をシミュレーションさせるタイミング、シミュレーション結果を通知するタイミング等の各種タイミングをデータベースに登録することができる。

【0092】

情報処理装置は、前記タイミングで利用料金算出、シミュレーションを行い、通信端末ユーザに利用料金や、シミュレーション結果を通知する。

【0093】

本発明では、通信履歴情報や品質情報及び情報処理装置が送信するデータに優先度をつけることができ、これによりトラフィックを制御することができる。

【0094】

通信端末や情報処理装置では、公知の手段によりそれぞれが送信すべきデータの形式を変換して送信することができる。通信事業者は一般的に許容される伝送遅延を、映像＞音声＞パケットデータ（ＷＥＢアクセス、ファイル転送、Ｅメール等）の順に設定していることが多いので、通信履歴情報や品質情報、使用料金シミュレーション等の通信端末と情報処理装置で送受信する全ての情報を映像のフォーマットに変換して送れば、遅延時間は最小で送信できるが、その分トラフィックを圧迫することになる。反対にパケットデータに変換して送れば、遅延時間は多くなるが、その分トラフィックの隙間を利用して送信できるので、通信ネットワークのトラフィックに負担をあまりかけないようにできる。

【0095】

本発明では、使用料金算出、シミュレーションや品質情報を提供するのに通信費がかかるので、通信端末ユーザは、使用料金算出やシミュレーションに関連する情報を使用料金算出、シミュレーションする際に料金に含むか、含まないかをデータベースに設定することができる。もし「含まない」を選択した場合、情報処理装置は、純粋な通信にかかった使用料金を算出し、通信端末ユーザに送信する。このように通信端末ユーザは、純粋に通信にかかった料金のみを知ることができる。

【0096】

本発明では、通信端末ユーザは、情報処理装置で算出する通信先、通信時間、回数、情報量等の詳細な通信履歴毎の料金、事業者内・事業者間、比較プラン数、通知プラン数等のシミュレーション結果、料金プラン、通信履歴情報、割引情報等のシミュレーション条件の内容を、ユーザが任意に設定できる。

【0097】

これにより使用料金算出、シミュレーションにかかる通信費や情報処理装置がシミュレーションに要する時間を調整できる。

【0098】

通信端末ユーザは、使用料金算出、シミュレーション結果、シミュレーション条件の項

目のうち、任意の項目をデータベースに設定できる。これにより通信端末ユーザはどこまで正確に使用料金を算出するか設定することができる。当然、条件が多ければ通信履歴情報やシミュレーション結果等のデータ量は多くなり、その分通信費、情報処理装置が処理に要する時間は多くなる。

【0099】

情報処理装置は通信端末ユーザがデータベースに設定された条件を使用して使用料金算出、シミュレーションを行い通信端末ユーザに結果を送信する。

【0100】

本発明では、個人情報の秘密を保護するため、通信端末ユーザが送信する通信履歴情報及び情報処理装置において算出する使用料金算出、シミュレーション結果、品質情報等全てを暗号化して送信することができる。例えば通知端末では公知の暗号化機能を有するソフトを使用することができ、また情報処理装置は自身で暗号化機能を持つ。

【0101】

暗号化・復号化手段には一般に使用されている公開鍵暗号方式、秘密暗号方式等の暗号化手段や、ＩＤ、パスワード、電子署名等の認証機能手段が考えられる。

【0102】

暗号化手段を使用する場合は、通信端末のアプリケーションソフトと情報処理装置で同じ暗号化・復号化手段を持つ。また認証機能を使用する場合は、通信端末ユーザはデータベースにＩＤ、パスワード、電子署名等を登録しておき、情報処理装置はそれらの認証情報が一致していることが確認できたら通信端末ユーザからの情報を受信する。

【0103】

また通信端末ユーザは、情報処理装置から送信される認証情報と、予め情報処理装置から入手しておいた認証情報が一致していることが確認できたら、情報処理装置からの情報を受信する。

【0104】

本発明では、通信端末ユーザが設定する任意の使用料金設定を超えた、又は下回っている時に、通信端末ユーザにその旨を通知する機能を持つ。

【0105】

通信端末ユーザは、任意の使用料金と、その設定した使用料金を超えた、又は下回っている時に通知するようデータベースに設定する。情報処理装置はそれらの設定を認識し、通信端末ユーザから送信されてくる通信履歴情報から使用料金を算出し、データベースに設定されている使用料金を超えた、又は下回っている時に、通信端末ユーザに設定金額をいくら上回った、または下回っているかを通知する。

【0106】

本発明では、通信端末ユーザが契約している料金プランにおいて、無料通信料金が設定されている場合、通信端末ユーザに無料通信料金の残高、残り時間、残りパケットを通知する機能を持つ。

【0107】

通信端末ユーザは、データベースに無料通信料金の残高、残り時間、残りパケット数を通知させる時間、ベアラ毎の残高、残り時間、残りパケット数の割合等の内容を設定する。

【0108】

情報処理装置はそれらの設定を認識し、通信端末ユーザから送信されてくる通信履歴情報から使用料金を算出し、通信端末ユーザに、残高、残り時間、残りパケット数を通知する。

【0109】

通信端末ユーザは本発明が提供する、使用料金算出、シミュレーション、品質情報のうち、任意のサービスを選択することができる。

【0110】

通信端末ユーザは、シミュレーション内容、無料通信料金の算出、比較プラン数等デー

タベースに希望するサービスの種類、シミュレーション回数、品質情報等を受け取る回数、タイミングを設定する。

【0111】

情報処理装置はそれらの設定を認識し、通信端末ユーザから送信してくる通信履歴情報から使用料金、品質情報を算出し、通信端末ユーザの設定した日時に通信端末ユーザが要求した情報を送信する。

【0112】

本発明では、通信端末ユーザの加入者情報は公知のアプリケーションソフトやサービス提供者が作成するホームページを利用することでデータベースに登録、修正することができる。

【0113】

通信端末ユーザは、アプリケーションソフトを使用する場合は、アプリケーションソフトが提供するフォーマットに設定項目を入力し、データベースに送信する。ホームページを使用する場合は、通信端末ユーザが本サービス提供者が提供する加入者情報のホームページにアクセスし、必要事項を記入することで、データベースに通信端末ユーザの加入者情報を登録することができる。修正も同様の手段で可能である。

【0114】

本発明を使用すれば、通信端末ユーザは料金とサービス品質の両面から最適な料金プラン、通信事業者を選択することができる。また通信事業者は各ユーザの使用状況を詳細に把握することができ、適切な料金プランを検討する際に有効なデータや、サービスエリア拡充時に参考になる情報を得ることができる。

【図面の簡単な説明】

【0115】

【図1】本発明の一実施例構成図である。

【図2】本発明の品質統計情報説明図である。

【図3】本発明の時間毎の品質統計情報説明図である。

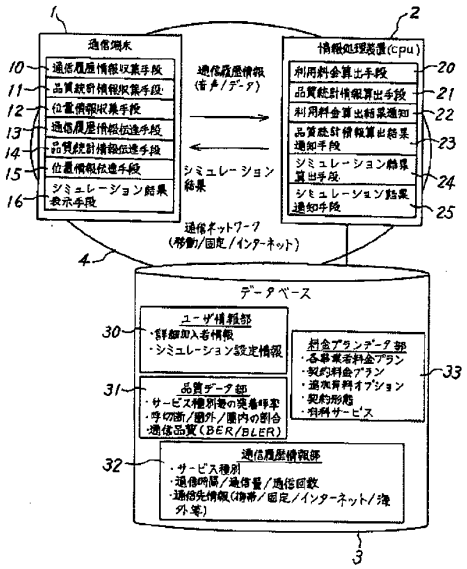
【符号の説明】

【0116】

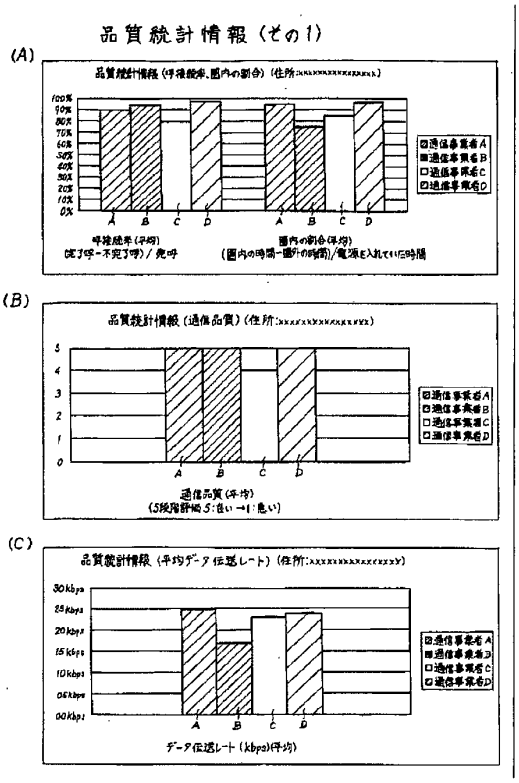
1　通信端末
2　情報処理装置
3　データベース
4　通信ネットワーク

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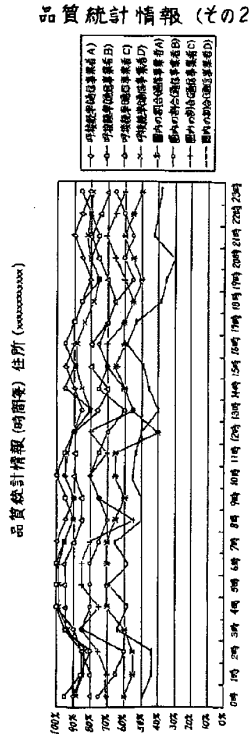
【図1】



【図2】



【図3】



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(54) Method of verifying downloaded software and corresponding device

(57) The present invention relates to ensuring security for software downloads to a device, in which a smart card is used for storage of secure keys and for calculations using the secure keys. The result of the calculations using the smart card are passed to the device for comparison with calculations performed by the device on the downloaded software, to verify the downloaded software. Thus the security of the keys and calculations involving the secure keys are kept secure. Preferably root security keys stored in the smart card can be updated using communication system messaging protocols.

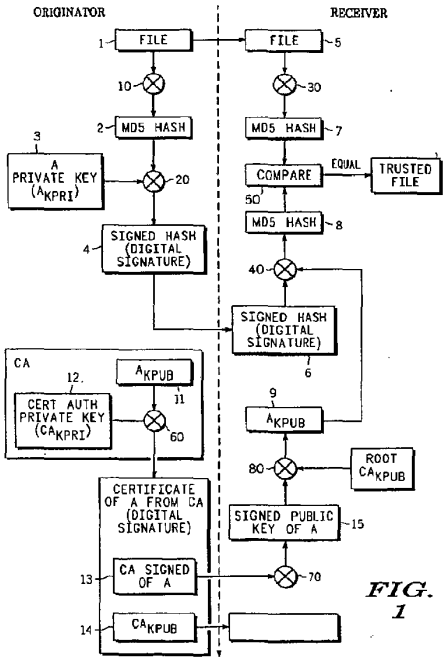


FIG. 1

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Description

[0001] The present invention relates to a method of verifying software downloaded from an originator to a device, and to a corresponding device. In particular, the invention relates to download verification in standardised execution environments such as the Mobile Execution Environment (MExE) and Java.

[0002] Increasingly it is becoming desirable for software to be downloaded to a portable device over the air. This allows the device to be upgraded with newly released software or enables new applications to be added to the device as these become available.

[0003] It is desirable that the device checks the authenticity of the downloaded software to determine whether, for example, the downloaded software has indeed been received from a trusted sender. In addition, it is desirable that the downloaded software should be restricted to a given domain, to avoid permission violation for the rest of the device.

[0004] This security can be ensured by keys, which are stored securely in the device such that they cannot be read or tampered with by applications except the security-checking environment. In addition it is desirable to update the keys periodically, and this must be done using a secure method.

[0005] Previously, it has been suggested to implement the security algorithms in software/hardware and then to protect them by hardware control on the processor of the terminal with memory management unit. However, this results in increased cost. In addition, the development of separate security hardware is undesirable.

[0006] The Mobile Execution Environment (MExE), which enables software download, is currently under standardisation. Three class marks are defined in the MexE environment. Class mark 1 relates to devices utilizing the Wireless Application Protocol (WAP); class mark 2 relates to devices, such as personal digital assistants (pda) or laptops using standard edition JAVA™ (J2SE); and class mark 3 relates to small devices, such as mobile telephones, using micro-edition JAVA™ (J2ME).

[0007] J2ME is being proposed as an environment for class mark 3 devices in MExE because of its small size, which makes it suitable for environments, such as the mobile communication environment for example, in which the available memory or processing power is limited and the size of files must be limited.

[0008] However, the security model for J2ME requires server-based pre-verification, in which a server inserts basic run-time security information in the software prior to download. The receiving device can then use the run-time security information to check the security of the download and verify the sender.

[0009] It is desirable to increase the security provided for software download, particularly in a MExE class mark 3 environment, so that server-based verification is avoided and software can be downloaded from a greater variety of sources.

[0010] According to a first aspect of the present invention, there is provided a method of verifying software downloaded from an originator to a device adapted to receive, in use, a smart card having at least one secure key stored therein, comprising: receiving software and security information relating to the received software; obtaining in the smart card a first calculation result from the security information using at least one secure key; obtaining in the device a second calculation result from calculations performed on the received software; and comparing in the device first and second calculation results to verify the received software.

[0011] According to a second aspect of the invention, there is provided a device comprising: communication means for receiving software and security information relating to the received software; smart card interface means for passing the security information to a smart card coupled to the smart card interface means and for receiving from the smart card a first calculation result obtained from the security information by the smart card using at least one security key; means for obtaining a second calculation result from calculations performed on the received software; means for comparing first and second calculation results to verify the received software.

[0012] For a better understanding of the present invention, and to show how it may be brought into effect reference will now be made, by way of example to the accompanying drawings in which:

Figure 1 illustrates a known file transfer verification procedure;
Figure 2 shows a communication device;
Figure 3 illustrates a download verification procedure in accordance with the invention;
Figure 4 illustrates message creation for transfer of the root key in accordance with the invention;
Figure 5 illustrates update of the root key in accordance with the invention

[0013] The present invention is described with reference to the use of RSA cryptography. The RSA cryptography algorithm and principle are well known and therefore will not be explained in detail in this document. As will be apparent to a skilled person, other cryptography techniques may also be used in accordance with the invention.

[0014] Figure 1 illustrates a known file transfer verification procedure, for verifying the authenticity of a file transferred from an originator to a receiver. The principle behind this procedure is that in addition to the transfer of the file 1 a second piece of information which is related to both the file 1 and the originator is also transferred between the originator and the receiver, which information enables the receiver to confirm that the file comes from the originator. In addition, the receiver possesses or is passed a third piece of information, which enables

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the receiver to confirm that the originator can be trusted and that it is therefore safe to execute the downloaded file.

[0015] In the illustrated procedure the originator generates the second piece of information by performing an MD5 hash operation 10 on the file 1 to be transferred to create an MD5 hash result 2. The MD5 hash operation is well known and will not be explained further. The MD5 hash result 2 is uniquely dependent on the file 1 and can be used to verify file 1.

[0016] Next the originator performs an RSA algorithm operation 20 on the MD5 hash result 2 using the private key of the originator (A_{KPRI}) 3 to generate a signed hash (or digital signature) 4. The signed hash 4 thus depends upon the file and is signed as having been originated by A and can therefore act as the second piece of information mentioned above. The file 1 and the signed hash 4 are transferred to the receiver resulting in a received file 5 and a received signed hash 6.

[0017] In order to verify the received file, the receiver independently generates two versions of the MD5 hash result. The first MD5 hash result 7 is generated from the received file 5 using a MD5 hash operation 30, and the second MD5 hash result 8 is obtained from the received signed hash 6 by performing an RSA operation 40 on the received signed hash 6 using the public key of the originator A (A_{Kpub}) 9 held by the receiver. The first MD5 hash result 7 and the second MD5 hash result 8 are compared in a comparison operation 50 and if they are found to be equal, the received file 5 is authenticated and can be executed.

[0018] In order for the above authentication scheme to work, the receiver must have authenticated access to the public key of the originator A (A_{Kpub}). This is achieved in the illustrated procedure through the use of a certification authority. The certification authority is trusted by the receiver, such that received information signed by the certification authority is trusted by the receiver.

[0019] Therefore, as shown the certification authority performs an RSA algorithm operation 60 on the public key of the originator (A_{KPub}) 11 using the private key of the certification authority (CA_{KPRI}) 12 resulting in a signed key 13 of the originator A. The signed key 13 and the certification authority public key (CA_{Kpub}) 14 are transferred to the receiver. As shown, if necessary the signed key 13 undergoes a certificate chain analysis operation 70 to obtain the received signed public key 15 of the originator A.

[0020] A certificate chain analysis operation is required if the certificate authority CA is not known by the receiver. In this case, the certificate authority is requested to provide its public key signed by a further certificate authority using the private key of the further certificate authority. If the further certificate authority is trusted by the receiver, the receiver will be able to use the public key of the further signature authority to verify that the public key of the signed authority has been signed by the private key of the further signature authority. The receiver can then trust the certificate authority and can use the received certificate authority public key. If the further certificate authority is not trusted by the receiver, use must be made of an additional certificate authority.

[0021] The receiver has stored therein a root certification authority public key. The root certification authority is the most trusted by the receiver, and ultimately the stored public key of the root certification authority can be used to verify all other certification authorities in a certificate chain situation.

[0022] The receiver then performs an RSA operation 80 on the resulting signed public key of the originator (A_{KPub}) (15) using the root certification authority public key (Root CA_{KPub}) to obtain the public key of the originator (A_{KPub}) 9. The public key of the originator (A_{KPub}) 9 is then used in the RSA operation 40 as described above.

[0023] The present invention is described below with reference to a communication device, such as a mobile telephone. However, it will be clear to a skilled person that the present invention is also applicable to other devices. An exemplary communication device 200 is now described with reference to Figure 2.

[0024] The communication device 200 shown in Figure 2 comprises a communication interface 210 coupled to an antenna 220 and to a processor 230. The processor 230 and the communication interface 210 are also coupled to volatile memory 240 and to a non-volatile memory 250. A smart card 260 is coupled to a smart card interface 270, which is also coupled to the processor 230. The smart card is equipped with its own processor 280 and memory 290.

[0025] The communication interface 210 comprises the necessary components to convert radio frequency signals for the communication device 200 received by the antenna 220 to digital signals to be stored in volatile memory 240 and/or non-volatile memory 250 and/or to be processed by processor 230, and to convert digital signals from the memories 240 and 250 and/or the processor 230 to radio frequency signals to be transmitted by the antenna 220. Thus communication interface 210 comprises radio frequency transmitter and receiver means and signal processor means, for example.

[0026] The volatile memory 240 and non-volatile memory 250 are used for storing program and other data for operation of the communication device 200.

[0027] The smart card is preferably a subscriber smart card (SIM) holding subscriber information used by the communication device 200, for example a Subscriber Identity Module card as currently used in the Global System for Mobile Communications (GSM system) and in use or proposed for other communication systems. However, it is possible that the smart card 260 may be another type of smart card received in the communication device instead of, or preferably in addition to a SIM card, for example an electronic commerce smart card.

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[0028] As indicated above, the smart card is equipped with its own processor 280 and memory 290, and is capable of storing information therein and is also capable of carrying out operations or calculations on data received from the processor 230 via smart card interface 270 and of providing data or the results of such calculation to the processor 230 via smart card interface 270.

[0029] The smart card is preferably removably receivable in the communication device, for example by means of the provision of a slot in the housing of the communication device 200.

[0030] It will be appreciated by a skilled person that other components or arrangements of components within the communication device 200 are possible within the scope of the invention.

[0031] The secure download procedure in accordance with the invention will now be described with reference to Figure 3. In Figure 3 operations or data corresponding to operations or data in Figure 1 have been given similar reference numerals.

[0032] Figure 3 illustrates the download of an executable J2ME file in a MExE environment from an originator A to a device such as the communication device 200 described above with reference to Figure 2. As shown in Figure 3, box 3260 represents operations carried out and data stored in the smart card 260 of the communication device 200 shown in Figure 2, and the remaining operation and data storage is carried out in the rest of the communication device 200 shown in Figure 2.

[0033] As illustrated in Figure 2, the smart card 260 has no direct communications capability. Instead, the relevant data received by the communication device is passed by the processor 230 to the smart card 260 for storage therein and operation thereon.

[0034] In the procedure illustrated in Figure 3, the originator A performs an MD5 hash operation 310 on a file 31 to be transferred to create an MD5 hash result 32. As explained above, the MD5 hash result 32 is uniquely dependent on the file 31 and can be used to verify file 31.

[0035] Next the originator A performs an RSA algorithm operation 320 on the MD5 hash result 32 using the private key of the originator (A_{KPRI}) 33 to generate a signed hash 34. The signed hash 34 thus depends upon the file and is signed as having been originated by A and can therefore act as the second piece of information mentioned above. The file 31 and the signed hash 34 are then sent to the communication device 200 resulting in a received file 35 and a received signed hash 36. File 35 is received using antenna 220 and communication interface 210 and is stored by the processor 230 in the volatile memory 240. In contrast, the signed hash 34 is received using antenna 220 and communication interface 210 and is sent by the processor 230 to the smart card 260 via smart card interface 270 and is stored in the smart card memory 290.

[0036] As described above, in order to verify the received file, two versions of the MD5 hash result must be independently generated and compared. The first MD5 hash result 37 is generated by the communication device processor 230 from the received file 35 using a MD5 hash operation 330.

[0037] The second MD5 hash result 38 is obtained by the smart card from the received signed hash 36. The smart card processor 280 performs an RSA operation 340 on the received signed hash 36 stored in the smart card memory 390 using the public key of the originator A (A_{Kpub}) 39 stored in the smart card memory 290, as will be explained later.

[0038] The second MD5 hash result 38 is passed by the smart card processor 280 to the communication device processor 230 and the communication device processor 230 compares the first MD5 hash result 37 and the second MD5 hash result 38, calculated in the smart card 260, in a comparison operation 350. If the first MD5 hash result 37 and the second MD5 hash result 38 are found to be equal, the received file 35 is authenticated and can be executed.

[0039] In this arrangement, the smart card 260 must have authenticated access to the public key of the originator A (A_{Kpub}). This is achieved in the illustrated procedure according to Figure 3 through the use of the root certification authority public key stored in the smart card memory 290. The root certification authority is trusted by the communications device, such that received information signed by the certification authority is trusted.

[0040] In this context, there may be more than one root certification authority. For example in the context of a mobile telephone the manufacturer and/or the operator can act as a root authority. In addition, it is possible to specify one or more trusted third parties as root certification authorities. The public key for each of the root certification authorities (eg the operator public root key (OPRK); the manufacturer public root key (MPRK); and third party public root key (TPRK)) is stored in the smart card of the communication device 200, for example during provisioning of a mobile telephone SIM card.

[0041] In order that the smart card 260 has authenticated access to the public key of the originator A (A_{Kpub}), as shown the root certification authority performs an RSA algorithm operation 360 on the public key of the originator (A_{KPub}) 311 using the private key of the certification authority ($RootCA_{KPRI}$) 312 resulting in a certificate from A 321 signed by the root certification authority. This certificate 321 is sent to the communications device 200, is received using antenna 220 and communication interface 210 and is sent by the processor 230 to the smart card 260 via smart card interface 270 and is stored in the smart card memory 290 as certificate 322.

[0042] The Root certification authority public key ($RootCA_{KPub}$) 332 is already stored in the smart card memory 290, as indicated above. The smart card processor can perform an RSA operation 380 on the received certificate 322 using the Root Certification Authority public key ($RootCA_{KPub}$) 332 to obtain the public

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key of the originator A (A_{Kpub}) 39. The smart card processor can then use the obtained public key of the originator A (A_{Kpub}) 39 and the received signed hash 36 in RSA operation 340 to obtain the smart card MD5 hash value 38, as outlined above.

[0043] Also shown in Figure 3 is the transfer of the Root Certification Authority public key ($RootCA_{KPub}$) 331 to the communications device for storage in the smart card memory as Root Certification Authority public key ($RootCA_{KPub}$) 332. It is desirable to update the root certification authority keys periodically in a secure manner otherwise the security of the system will be compromised.

[0044] A preferred mechanism for the secure transfer of a Root public key (for example OPRK, MPRK, TPRK) using communication system messaging technology will now be explained with reference to Figures 4 and 5.

[0045] Figure 4 illustrates message creation for transfer of a root key, for example the operator public root key (OPRK), to the smart card 360 in accordance with the invention. In this exemplary arrangement, the update is achieved using a SMS message as provided in the GSM/UMTS systems, although other messaging techniques could be used.

[0046] An RSA operation is performed on the new OPRK 41 with the operator's private root key 42 corresponding to the old OPRK stored in the smart card 360. As mentioned earlier, the old OPRK may have been stored in the smart card 360 during provisioning, or during a previous update of the root key. The resulting signed new operator public root key 44 is included in an SMS message 45 to be sent to the communication device. The SMS message 45 has an SMS header portion 451 and SMS download command 452 in addition to the signed new operator public root key 44. The SMS message in encrypted by the communication system prior to being sent to the communication device.

[0047] Figure 5 illustrates update of the root key in the communication device in accordance with an embodiment of the invention. In this exemplary embodiment of the invention, the SMS message 45 sent by the network 500 to the communication device 200 is passed to the smart card 260. Once the encrypted SMS message 45 is received in the smart card 260, the smart card 260 undertakes an SMS message analysis and memory update procedure 51.

[0048] In the SMS message analysis and memory update procedure 51 the SMS message is initially decrypted and the SMS message is analysed. The download command 452 instructs the smart card 260 that a new OPRK is being sent to the smart card 260. The smart card 260 performs an RSA operation on the received signed new OPRK using the old OPRK already stored in the smart card 260 to verify the identity of the sender. The OPRK stored in the smart card can then be updated using the new value. Preferably a confirmation message 52 is sent from the smart card 260 to the network using the communication interface 210 of the communication device 200.

[0049] Although the update of the operator public root key (OPRK) has been described above, it would be possible to update any root key stored in the smart card in the same way.

[0050] In accordance with an alternative embodiment of the invention, the manufacturer root public key may be stored partially in the smart card memory and partially in the communications device memory. This arrangement is more secure since the communication device then contributes to ensuring the security of download in the manufacturer domain using the manufacturer root public key. This helps to prevent an insecure smart card from changing the manufacturer public root key via download authorization.

[0051] Thus the present invention proposes a solution to ensuring security for software downloads to a device, in which a smart card is used for storage of secure keys and for calculations using the secure keys. The result of the calculations using the smart card are passed to the device for comparison with calculations performed by the device on the downloaded software, to verify the downloaded software.

[0052] Since the secure keys are stored on the smart card and calculations involving the secure keys are performed by the smart card, the security of the secure keys can be ensured. In addition, the result of the calculation performed on the received file by the device is not passed to the smart card.

[0053] As will be apparent to a skilled person, the invention could be implemented in a different form from that shown herein, and so the invention is intended to encompass all arrangements and variations within the scope of the appended claims.

Claims

1. A method of verifying software downloaded from an originator to a device adapted to receive, in use, a smart card having at least one secure key stored therein, comprising:

   receiving software and security information relating to the received software;
   obtaining in the smart card a first calculation result from the security information using at least one secure key;
   obtaining in the device a second calculation result from calculations performed on the received software; and
   comparing in the device first and second calculation results to verify the received software.

2. The method as claimed in claim 1, further comprising the steps of;

   receiving additional signed originator key infor-

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mation;

obtaining, in the smart card, originator key information from the received signed originator key information using a root security key stored therein; and

obtaining in the smart card the first calculation result from the security information using the originator key information.

3. The method as claimed in claim 2 wherein the root security key stored in the smart card is updated by

receiving a root security key update message containing a new root security key;

verifying the new root security key using the existing root security key stored in the smart card;

storing the new root security key in the smart card.

4. The method as claimed in claim 2 or 3, wherein part of the root security key is stored in the smart card and part of the root security key is stored in the device.

5. The method as claimed in any preceding claim, wherein the smart card is a Subscriber Identity Module (SIM) card

6. A device comprising

communication means for receiving software and security information relating to the received software;

smart card interface means for passing the security information to a smart card coupled to the smart card interface means and for receiving from the smart card a first calculation result obtained from the security information by the smart card using at least one security key;

means for obtaining a second calculation result from calculations performed on the received software;

means for comparing first and second calculation results to verify the received software.

7. The device as claimed in claim 6 wherein

the communications means also receives additional signed originator key information; and

the smart card interface also passes the additional signed originator key information to the smart card, which obtains originator key information from the received signed originator key information using a root security key stored therein; and obtains the first calculation result from the security information using the originator key information.

8. The device as claimed in claim 7 wherein

the communications means also receives a root security key update message containing a new root security key; and

the smart card interface passes the root security key update message to the smart card, which verifies the new root security key using the existing root security key stored in the smart card; and stores the new root security key in the smart card.

9. The device as claimed in claim 7 or 8, wherein the device comprises storage means and part of the root security key is stored in the smart card and part of the root security key is stored in the storage means.

10. The device as claimed in one of claims 6-9, wherein the smart card is a Subscriber Identity Module (SIM) card.

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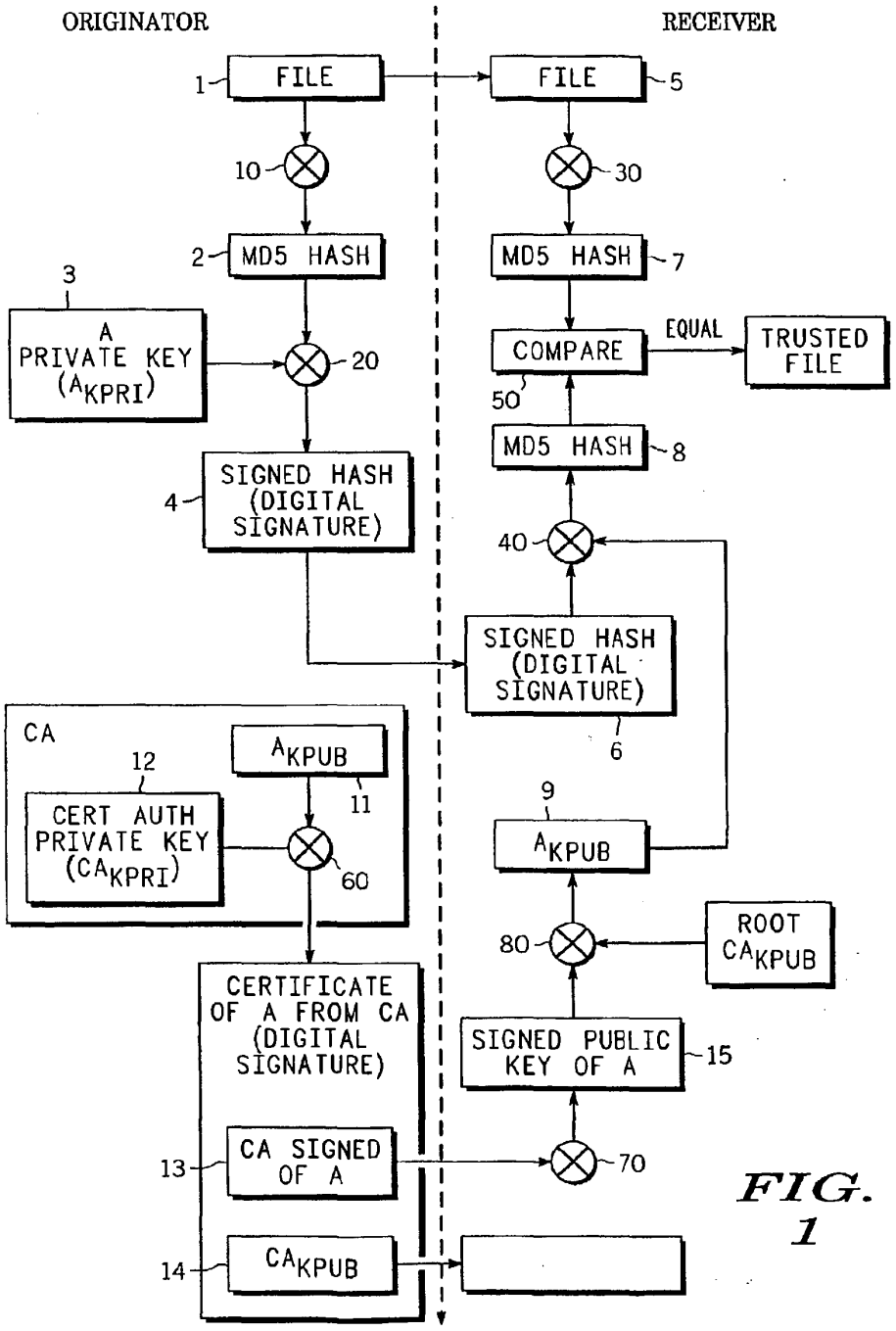


FIG. 1

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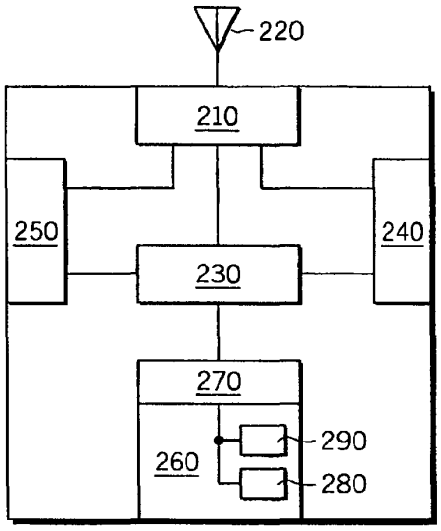


FIG. 2

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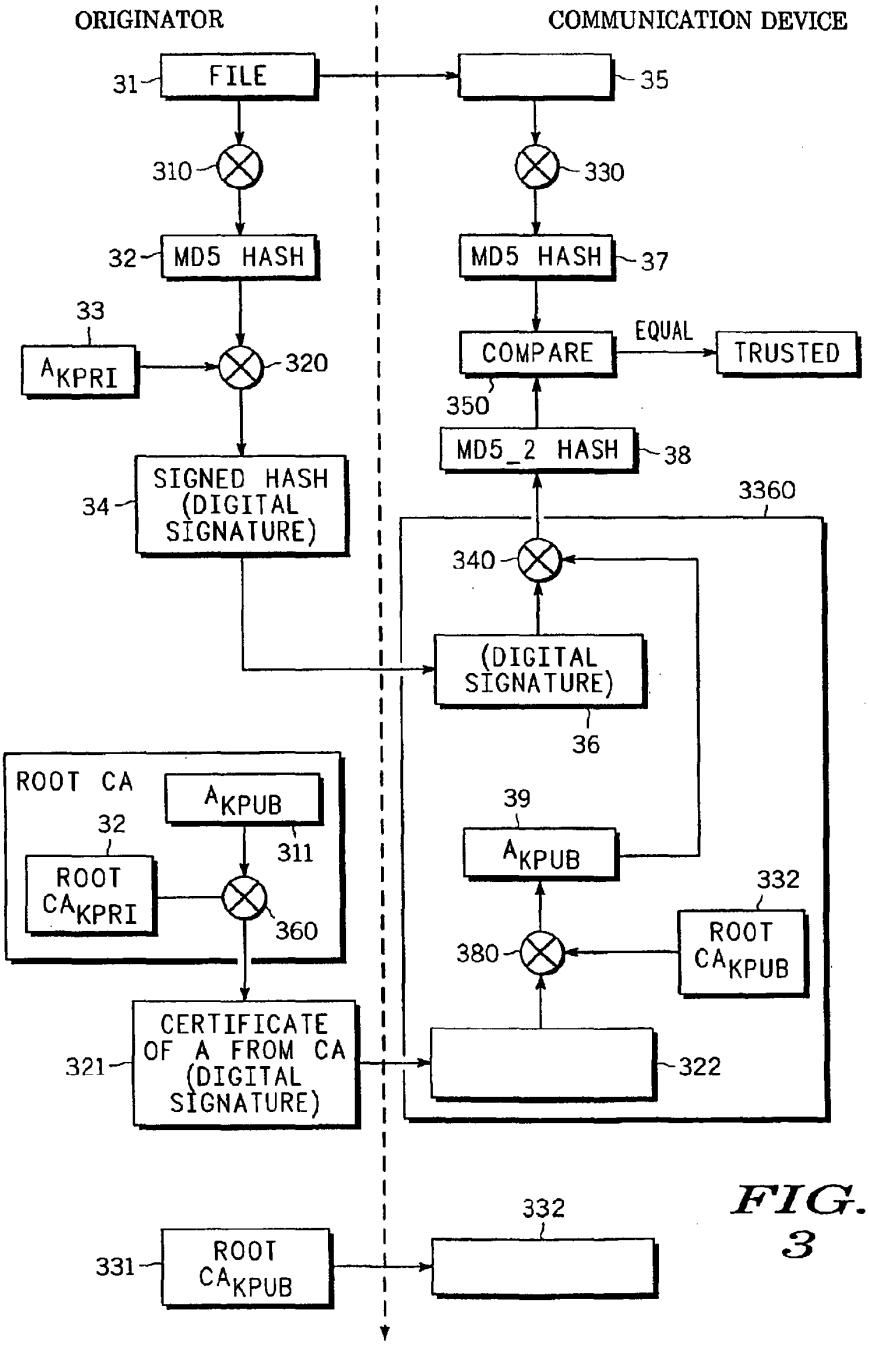


FIG. 3

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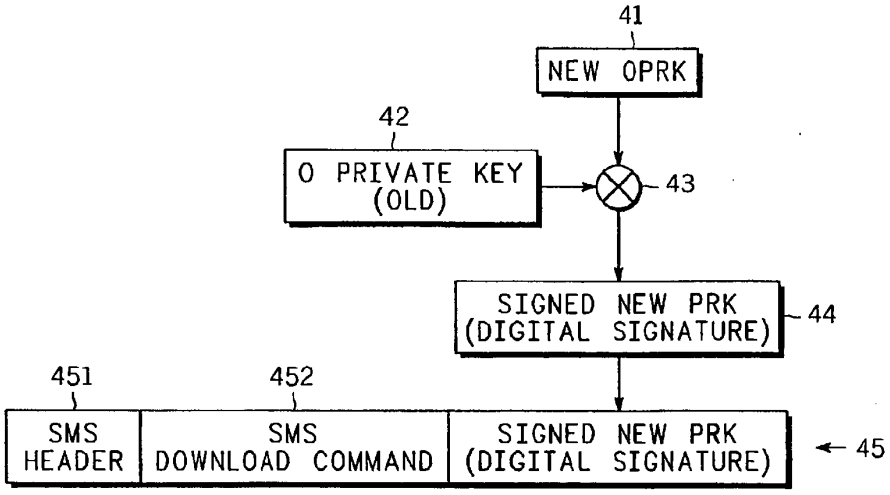
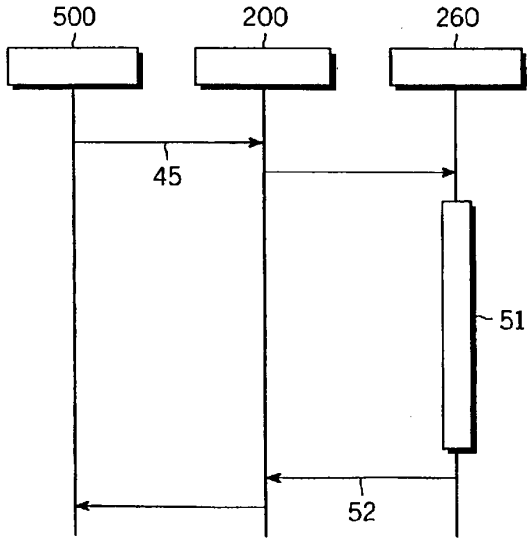


FIG. 4

FIG. 5



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European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 01 40 2259

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H04Q

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	22 February 2002	Coppieters, S

CATEGORY OF CITED DOCUMENTS

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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 15/227,814	Filing Date 08/03/2016	☐ 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 $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $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

AMENDMENT	01/26/2017	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 19	Minus	** 20	= 0	X $40 =	0
	Independent (37 CFR 1.16(h))	* 4	Minus	***3	= 1	X $210 =	210
	☐ Application Size Fee (37 CFR 1.16(s))						
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
						TOTAL ADD'L FEE	**210**

AMENDMENT		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =	
	☐ 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.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

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15/227,814	08/03/2016	Gregory G. Raleigh	RALEP046C2C1C1

CONFIRMATION NO. 2668

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Headwater Partners I LLC
1011 Pruitt Place
Tyler, TX 75703

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15/227,814	08/03/2016	Gregory G. Raleigh	RALEP046C2C1C1	2668

106963 7590 10/26/2016

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Tyler, TX 75703

EXAMINER	
MOUTAOUAKIL, MOUNIR	

ART UNIT	PAPER NUMBER
2476	

NOTIFICATION DATE	DELIVERY MODE
10/26/2016	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):

patent@headwaterllc.com

Office Action Summary	Application No. 15/227,814	Applicant(s) RALEIGH ET AL.	
	Examiner MOUNIR MOUTAOUAKIL	Art Unit 2476	AIA (First Inventor to File) 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 *08-03-2016*.

☐ 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) *2-16* 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) *2-5,11 and 13-16* is/are rejected.

8)☒ Claim(s) *6-10 and 12* 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 _____.

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

4) ☐ Other: _____.

DETAILED ACTION

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

Claim Rejections - 35 USC § 102

2. 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 –
>
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

3. Claim(s) 2-4, 11 and 13-16 is/are rejected under pre-AIA 35 U.S.C. 102(e) as being anticipated by Deu-Ngoc et al (US 8,402,165). Hereinafter referred to as Deu.

4. Regarding claims 2 and 16. Deu discloses a wireless end-user device (`Methods and apparatus for prioritizing assignment of a packet data session for a plurality of applications of a mobile communication device`), comprising: a wireless modem configurable to connect to a wireless network (see figure 1 and `The present disclosure relates generally to mobile communication devices operative in wireless communication networks`); a network stack configurable to receive and transmit data via the wireless modem and the wireless network (see figure 1 and `The present disclosure relates generally to mobile communication devices operative in wireless communication networks`); a first network stack Application Programming Interface (API), containing at least one first call to allow device applications to open and use data flows via the network stack, the wireless modem, and the at least one wireless network (see at least figure 1 and `The mobile device may have a`

voice telephony application); a second API containing at least one second call to allow device applications to make a data transfer request for a media object associated with a network resource identifier supplied by the device application (see at least figure 1, title, abstract and Mobile station 102 may consist of a single unit, such as a data communication device, a cellular telephone, a multiple-function communication device with data and voice communication capabilities, a personal digital assistant (PDA) enabled for wireless communication, or a computer incorporating an internal modem); a media service manager (see figure 1, element 106) prompted by the second call, to manage network data transfers for the media object by interfacing with the network stack to retrieve the media object associated with the network resource identifier via the wireless modem and the wireless network (see at least abstract, title, figure 1 and claim 1: Moreover, it is inherent that each application, in smart phone, is associated with its own ID which is used to exchanged data, for example: Skype, gmail, google voice, hotmail, Viber, Vonage...); and a service classification agent to associate wireless network data usage for the media object network data transfers with the device application that requests the data transfer for the media object (see at least title and abstract).

5. Regarding claim 3. Deu discloses a wireless end-user device the service classification agent to also associate wireless network data usage for a data flow opened via the first API with the device application opening that data flow (see at least abstract and claim 1).

6. Regarding claim 4. Deu discloses a wireless end-user device of claim 2, wherein to associate data usage for the media object network data transfers with the device application that makes the data transfer request for the media object comprises to identify at least one of an application name, an application identifier, or a process identifier for the application that makes

the data transfer request (see at least abstract, title, figure 1 and claim 1: Moreover, it is inherent that each application, in smart phone, is associated with its own ID which is used to exchanged data. For example: Skype, gmail, google voice, hotmail, Viber, Vonage...).

7. Regarding claim 11. Deu discloses a wireless end-user device further comprising a media player and a user interface, wherein the media object comprises media data that is, as a result of the media service manager management of network data transfers for the media object, received by the device and played by the media player through the user interface.

8. Regarding claim 13. Deu discloses a wireless end-user device wherein the service classification agent comprises: a requesting application storage agent to, for each device application that makes a data transfer request using the second API, store application dentification information and network resource identification information; a network data flow storage agent to, for each network data flow associated with the media service manager, identify network data flow identification information; and an association agent to match the network data flow identification information for a network data flow with application identification information for the network data transfer associated with the network data flow (see at least figures 1 and 2).

9. Regarding claim 14. Deu discloses a wireless end-user device further comprising: a local database to store data usage, including data usage for network data transfers managed by the media service manager on behalf of a device application, the stored data usage classified by device application; a user interface; and a user interface display agent to display the data usage classified by application to a user (see at least figures 1 and 2).

10. Regarding claim 15. Due discloses a wireless end-user device the service classification agent to further associate one or more traffic flows, comprising the media object network data transfers, with the device application that makes the data transfer request, the device further comprising an enforcement agent to, based on the association between the one or more traffic flows and the device application, enforce an application-based usage control on network data usage by one or more of the device applications (see abstract and claim 1).

Claim Rejections - 35 USC § 103

11. This application currently names joint inventors. In considering patentability of the claims under pre-AIA 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of pre-AIA 35 U.S.C. 103(c) and potential pre-AIA 35 U.S.C. 102(e), (f) or (g) prior art under pre-AIA 35 U.S.C. 103(a).

12. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under pre-AIA 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.

2. Ascertaining the differences between the prior art and the claims at issue.

3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

13. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

14. Claim 5 is/are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Deu in view of Constantinof (US 2014/0241342). Regarding claim 5, Deu discloses all the limitations of the claimed invention with the exception the data transfer request comprises a network resource identifier that identifies a source of the data to be transferred, a proxy to the source of the data to be transferred, or the media object to be transferred, in particular, wherein the network resource identifier comprises one or more of an Internet Protocol address, a Uniform Resource Locator, a remote file name/address, a stream name, and an object name. However, Constantinof, from the same field of endeavor, teaches a communication method wherein the data transfer request comprises a network resource identifier that identifies a source of the data to be transferred, a proxy to the source of the data to be transferred, or the media object to be transferred, in particular, wherein the network resource identifier comprises one or more of an Internet Protocol address, a Uniform Resource Locator, a remote file name/address, a stream name, and an object name (see at least paragraph [0020]). Thus, it would have been obvious to a person of ordinary skill in the art at the time of the invention to employ the teaching of Constantinof into the communication method of Deu for the purpose of communicating with other devices in the network.

Allowable Subject Matter

15. Claims 6-10 and 12 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

16. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. See PTO_892.

Examiner has cited particular columns and line numbers in the references applied to the claims above for the convenience of the applicant. Although the specified citations are representative of the teachings of the art and are applied to specific limitations within the individual claim, other passages and figures may apply as well. It is respectfully requested from the applicant in preparing responses, to fully consider the references in entirety as potentially teaching all or part of the claimed invention, as well as the context of the passage as taught by the prior art or disclosed by the Examiner.

In the case of amending the claimed invention, Applicant is respectfully requested to indicate the portion(s) of the specification which dictate(s) the structure relied on for proper interpretation and also to verify and ascertain the metes and bounds of the claimed invention.

When responding to this office action, applicants are advised to clearly point out the patentable novelty which they think the claims present in view of the state of the art disclosed by the references cited or the objections made. Applicants must also show how the amendments avoid such references or objections. See 37C.F.R 1.111(c). In addition, applicants are advised to provide the examiner with the line numbers and pages numbers in the application and/or references cited to assist examiner in locating the appropriate paragraphs.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MOUNIR MOUTAOUAKIL whose telephone number is (571)270-1416. The examiner can normally be reached on Monday-Thursday (1pm-4:30pm) eastern time.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ayaz R. Sheikh can be reached on 571-272-3795. 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.

/MOUNIR MOUTAOUAKIL/
Primary Examiner, Art Unit 2476

Notice of References Cited	Application/Control No. 15/227,814	Applicant(s)/Patent Under Reexamination RALEIGH ET AL.	
	Examiner MOUNIR MOUTAOUAKIL	Art Unit 2476	Page 1 of 1

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	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
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*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

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

Application Number	15227814
Filing Date	2016-08-03
First Named Inventor	Raleigh
Art Unit	
Examiner Name	not yet assigned
Attorney Docket Number	RALEP046C2C1C1

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.M/

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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
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
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	First Named Inventor	Raleigh
	Art Unit	
	Examiner Name	not yet assigned
	Attorney Docket Number	RALEP046C2C1C1

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	Filing Date	2016-08-03
	First Named Inventor	Raleigh
	Art Unit	
	Examiner Name	not yet assigned
	Attorney Docket Number	RALEP046C2C1C1

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.M/

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	34	2005008995	WO		2005-01-27	Starhub Ltd.		
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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.	T5
	1	3rd Generation Partnership Project, "Technical Specification Group Services and System Aspects; General Packet Radio Service (GPRS) Enhancements for Evolved Universal Terrestrial Radio Access Network (E-UTRAN) Access," Release 8, Document No. 3GPP TS 23.401, V8.4.0, December 2008	
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	3	ALONISTIOTI et al., "Intelligent Architectures Enabling Flexible Service Provision and Adaptability," 2002	
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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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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).

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See attached certification statement.

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

☒ None

SIGNATURE

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

Signature	/James E. Harris/	Date (YYYY-MM-DD)	2016-08-12
Name/Print	James E. Harris	Registration Number	40013

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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EAST Search History

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S1	141661	application adj programming adj interface	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/10/17 23:19
S2	2757	application adj programming adj interface with first with second	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/10/17 23:20
S3	1405	(application adj programming adj interface with first with second).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/10/17 23:21
S4	0	(application adj programming adj interface with first with second with media adj service adj manager).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/10/17 23:21
S5	35	(application adj programming adj interface with first with second with manager).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/10/17 23:21
S6	0	(application adj programming adj interface with first with second with manager).clm. and headwater.as.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/10/17 23:25
S7	2	(application adj programming adj interface with first with second).clm. and headwater.as.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/10/17 23:25
S10	19	dara.in. with monajemi.in.	US-PGPUB;	OR	ON	2016/10/18

			USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			00:01
S11	5124	(classif$7 prioritiz$4) with (different multiple plurality many number) near2 (application API)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/10/18 13:06
S12	5124	(classif$7 prioritiz$4) with (different multiple plurality many number) near2 (application API application adj programming adj interface)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/10/18 13:06
S13	83	(classif$7 prioritiz$4) with (different multiple plurality many number or (first with second)) near2 (API application adj programming adj interface)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/10/18 13:07
S14	867504	(("709") or ("455") or ("370")).CLAS.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/10/18 13:07
S15	1030	S14 and S12	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/10/18 13:07
S16	646	S14 and S12 and (@ad<="20090128" @rlad<="20090128")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/10/18 13:09
S17	7	(classif$7 prioritiz$4) with (different multiple plurality many number or (first with second)) near2 (API application adj programming adj interface) with call$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/10/18 13:09
S18	0	S14 and S17	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT;	OR	ON	2016/10/18 13:09

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S20	0	S16 and data with manamg$5	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/10/18 13:14
S21	343	S16 and data with manag$5	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/10/18 13:14
S22	26	("20020087716" | "20040022209" | "20040040025" | "20040095903" | "20040205233" | "20050043032" | "20050064891" | "20050101300" | "20050128963" | "20050243760" | "20050254453" | "20070136372" | "20070195801" | "20080089303" | "20080132268" | "20080132269" | "5881060" | "5959662" | "6104929" | "6711141" | "6742023" | "7054323" | "7272215" | "7359972" | "7433961" | "7764784").PN.	US-PGPUB; USPAT; USOCR	OR	ON	2016/10/18 19:05
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S26	11	sip with soap with proxy and url	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT;	OR	ON	2016/10/19 13:16

			IBM_TDB			
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S29	304	sip with proxy with url	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/10/20 13:40
S30	274	S29 and (@ad<="20090128" @rlad<="20090128")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/10/20 13:40

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S8	25	(application adj programming adj interface with first with second with manager).clm.	USPAT	OR	ON	2016/10/17 23:21
S9	0	(application adj programming adj interface with first with second with manager).clm. and headwater.as.	USPAT	OR	ON	2016/10/17 23:25

10/20/2016 9:42:01 PM
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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	7260382		2007-08-21	Lamb et al.	
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	11	8949597		2015-02-03	Reeves et al.	
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	First Named Inventor	Raleigh
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	Examiner Name	not yet assigned
	Attorney Docket Number	RALEP046C2C1C1

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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).

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See attached certification statement.

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

☒ None

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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	/James E. Harris/	Date (YYYY-MM-DD)	2016-08-12
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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).

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See attached certification statement.

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

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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	/James E. Harris/	Date (YYYY-MM-DD)	2016-08-12
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	22	8411587		2013-04-02	Curtis, William et al.	
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	26	8233895		2012-07-31	Tysowski, Piotr Konrad	
	27	7685254		2010-03-23	Pandya, Ashish A.	
	28	7181017		2007-02-20	Nagel, Robert H. et al.	
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	33	8135657		2012-03-13	Kapoor, Harsh et al.	
	34	8271992		2012-09-18	Chatley, Scott P. et al.	
	35	8315999		2012-11-20	Chatley, Scott P. et al.	
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	37	8468337		2013-06-18	Gaur, Santosh P. et al.	
	38	8477778		2013-07-02	Lehmann Jr., L. Curtis et al.	
	39	8352630		2013-01-08	Hart, Justin Scott	
	40	6640097		2003-10-28	Corrigan, Louis et al.	
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	44	8000276		2011-08-16	Scherzer, Shimon et al.	
	45	8358638		2013-01-22	Scherzer, Tamir et al.	
	46	8356336		2013-01-15	Johnston, Keith et al.	
	47	8307067		2012-11-06	Ryan, Nicholas M.	
	48	7286848		2007-10-23	Vireday, Richard P. et al.	
	49	7313237		2007-12-25	Bahl, Paramvir et al.	
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	54	8369274		2013-02-05	Sawai, Ryo	
	55	7881697		2011-02-01	Baker, Matthew Donald et al.	
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	65	7102620		2006-09-05	Harries, Andrew Stanely Guy et al.	
	66	7139569		2006-11-21	Kato, Akira	
	67	7529204		2009-05-05	Bourlas, Yair et al.	
	68	7720960		2010-05-18	Pruss, Richard Manfred et al.	
	69	7969950		2011-06-28	Iyer, Pradeep J. et al.	
	70	8032409		2011-10-04	Mikurak, Michael G.	
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	72	8116781		2012-02-14	Chen, Xixian et al.	
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	78	7039403		2006-05-02	Wong, Gregory A.	
	79	7583964		2009-09-01	Wong, Gregory A.	
	80	7593730		2009-09-22	Khandelwal, Deepak et al.	
	81	7948953		2011-05-24	Melkote, Keerti G. et al.	
	82	8200509		2012-06-12	Kenedy, Andrew Alexander et al.	
	83	8270972		2012-09-18	Otting, Marcia J. et al.	
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	87	7756757		2010-07-13	Oakes III, Charles Lee	
	88	7930446		2011-04-19	Kesselman, Alex et al.	
	89	8078163		2011-12-13	Lemond, Eric et al.	
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	100	7535880		2009-05-19	Hinman, Brian L. et al.	
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	104	6654814		2003-11-25	Britton, Kathryn H. et al.	
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	115	7310424		2007-12-18	Gehring, Stephan Walter et al.	
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	121	8495360		2013-07-23	Falk, Rainer et al.	
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	180	8320244		2012-11-27	Muqattash, Alaa et al.	
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	188	8516552		2013-08-20	Raleigh, Gregory G.	
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	191	8095124		2012-01-10	Balia, Hinal K.	
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	204	8046449		2011-10-25	Yoshiuchi, Hideya	
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	209	7853255		2010-12-14	Karaoguz, Jeyhan et al	
	210	7720464		2010-05-18	Batta, Puneet	
	211	8300575		2012-10-30	Willars, Per	
	212	8666395		2014-03-04	Silver, Andrew	
	213	8315593		2012-11-20	Gallant, John K. et al.	
	214	8180881		2012-05-15	Seo, Kyoung-Il et al.	
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	221	8175574		2012-05-08	Panda, Biswaranjan et al.	
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	235	5325532		1994-06-28	Crosswy, Wm. Caldwell et al.	
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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.	T5
	1	VerizonWireless.com news, "Verizon Wireless Adds to Portfolio of Cosumer-Friendly Tools With Introduction of Usage Controls, Usage Controls and Chaperone 2.0 Offer Parents Full Family Security Solution," August 18, 2008	
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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).

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See attached certification statement.

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

☒ None

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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	/James E. Harris/	Date (YYYY-MM-DD)	2016-08-12
Name/Print	James E. Harris	Registration Number	40013

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=	Allowed	÷	Restricted	I	Interference	O	Objected

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

CLAIM		DATE								
Final	Original	10/20/2016								
	1	✓								
	2	✓								
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	4	✓								
	5	✓								
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	9	=								
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	67	7529204		2009-05-05	Bourlas, Yair et al.	
	68	7720960		2010-05-18	Pruss, Richard Manfred et al.	
	69	7969950		2011-06-28	Iyer, Pradeep J. et al.	
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	71	8045973		2011-10-25	Chambers, Michael D.	
	72	8116781		2012-02-14	Chen, Xixian et al.	
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	79	7583964		2009-09-01	Wong, Gregory A.	
	80	7593730		2009-09-22	Khandelwal, Deepak et al.	
	81	7948953		2011-05-24	Melkote, Keerti G. et al.	
	82	8200509		2012-06-12	Kenedy, Andrew Alexander et al.	
	83	8270972		2012-09-18	Otting, Marcia J. et al.	
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	88	7930446		2011-04-19	Kesselman, Alex et al.	
	89	8078163		2011-12-13	Lemond, Eric et al.	
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	92	8166040		2012-04-24	Brindisi, Richard G. et al.	
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	100	7535880		2009-05-19	Hinman, Brian L. et al.	
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	115	7310424		2007-12-18	Gehring, Stephan Walter et al.	
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	149	8166554		2012-04-24	John, Pramod	
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	169	6873988		2005-03-29	Hermann, Conrad K. et al.	
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	191	8095124		2012-01-10	Balia, Hinal K.	
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	200	8572117		2013-10-29	Rappaport, Theodore S.	
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	202	8660853		2014-02-25	Robb, Terence A. et al.	
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	204	8046449		2011-10-25	Yoshiuchi, Hideya	
	205	8635164		2014-01-21	Rosenhaft, Matthew et al.	
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	209	7853255		2010-12-14	Karaoguz, Jeyhan et al	
	210	7720464		2010-05-18	Batta, Puneet	
	211	8300575		2012-10-30	Willars, Per	
	212	8666395		2014-03-04	Silver, Andrew	
	213	8315593		2012-11-20	Gallant, John K. et al.	
	214	8180881		2012-05-15	Seo, Kyoung-Il et al.	
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	220	6185576		2001-02-06	McIntosh, Lowrie	
	221	8175574		2012-05-08	Panda, Biswaranjan et al.	
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	235	5325532		1994-06-28	Crosswy, Wm. Caldwell et al.	
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	243	7409447		2008-08-05	Assadzadeh, Alireza	
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	291	8233433		2012-07-31	Kalhan, Amit	
	292	8155666		2012-04-10	Alizadeh-Shabdiz, Farshid	
	293	8103285		2012-01-24	Kalhan, Amit	
	294	7936736		2011-05-03	Proctor Jr., James Arthur et al.	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	15227814
	Filing Date	2016-08-03
	First Named Inventor	Raleigh
	Art Unit	
	Examiner Name	not yet assigned
	Attorney Docket Number	RALEP046C2C1C1

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.M/

	295	7925778		2011-04-12	Wijnands et al.	
	296	7760137		2010-07-20	Martucci et al.	
	297	7684370		2010-03-23	Kezys, Vytautas Robertas	
	298	7084775		2006-08-01	Smith, Michael R.	
	299	6578076		2003-06-10	Putzolu, David Matthew	
	300	7133695		2006-11-07	Beyda, William J.	

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
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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]

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	15227814
	Filing Date	2016-08-03
	First Named Inventor	Raleigh
	Art Unit	
	Examiner Name	not yet assigned
	Attorney Docket Number	RALEP046C2C1C1

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.M/

	1	1538730A	CN		2004-10-20	Zhongxing Communication Co., Ltd.		
	2	101115248A	CN		2008-01-30	Lenovo Beijing Ltd.		
	3	101341764A	CN		2009-01-07	Telefonaktiebolaget LM Ericsson		
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	5	1802839A	CN		2006-07-12	Motorola Inc.		
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	11	2007133844	WO		2007-11-22	Camiant, Inc.		

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
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	Examiner Name	not yet assigned
	Attorney Docket Number	RALEP046C2C1C1

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.M/

	12	2011149532 A1	WO		2011-12-01	Raleigh, Gregory G. et al.		
	13	101183958A	CN		2008-05-21	Huawei Tech. Co. Ltd.		
	14	1801829A	CN		2006-07-12	Kunda Computer Technology (Kunshan) Co., Ltd.		
	15	1867024A	CN		2006-11-22	Huawei Technologies Co., Ltd.		
	16	101815275A	CN		2010-08-25	Yang, Liu		

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

NON-PATENT LITERATURE DOCUMENTS Remove

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T5
	1	VerizonWireless.com news, "Verizon Wireless Adds to Portfolio of Cosumer-Friendly Tools With Introduction of Usage Controls, Usage Controls and Chaperone 2.0 Offer Parents Full Family Security Solution," August 18, 2008	
	2	"The Construction of Intelligent Residential District in Use of Cable Television Network," Shandong Science, Vol. 13, No. 2, June 2000	
	3	"Communication Concepts for Mobile Agent Systems," by Joachim Baumann et al.; Inst. Of Parallel and Distributed High-Performance Systems, Univ. of Stuttgart, Germany, pp. 123-135, 1997	
	4	"Prevent iCloud Documents & Data from using your data plan," October 26, 2011; CNET webarchive, by Jason Ciprian	

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	Examiner Name	not yet assigned
	Attorney Docket Number	RALEP046C2C1C1

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.M/

	5	"3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Policy and charging control architecture (Release 11)," 3GPP Standard; 3GPP TS 23.203 v11.6.0; Sophia Antipolis, France; pp. 1-177; June 2012
	6	"End to End QoS Solution for Real-time Multimedia Application;" Computer Engineering and Applications, 2007, 43 (4): 155-159, by Tan Zu-guo, Wang Wen-juan; Information and Science School, Zhanjian Normal College, Zhan jiang, Guangdong 524048, China
	7	"ASA/PIX: Allow Split Tunneling for VPN Clients on the ASA Configuration Example," Document ID 70917, January 10, 2008

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

EXAMINER SIGNATURE

Examiner Signature	/MOUNIR MOUTAOUAKIL/	Date Considered	10/20/2016

*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	15227814
	Filing Date	2016-08-03
	First Named Inventor	Raleigh
	Art Unit	
	Examiner Name	not yet assigned
	Attorney Docket Number	RALEP046C2C1C1

CERTIFICATION STATEMENT

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

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

OR

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

See attached certification statement.

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

☒ None

SIGNATURE

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

Signature	/James E. Harris/	Date (YYYY-MM-DD)	2016-08-12
Name/Print	James E. Harris	Registration Number	40013

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.

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.

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BIB DATA SHEET

CONFIRMATION NO. 2668

SERIAL NUMBER	FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
15/227,814	08/03/2016 RULE	370	2476	RALEP046C2C1C1

APPLICANTS

Headwater Partners I LLC, Tyler, TX;

INVENTORS

Gregory G. Raleigh, Woodside, CA;
Jeffrey Green, Sunnyvale, CA;
James Lavine, Corte Madera, CA;
Vien-Phuong Nguyen, Newark, CA;

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

This application is a CON of 14/339,110 07/23/2014
which is a CON of 14/338,807 07/23/2014 PAT 9094311
which is a CON of 14/098,527 12/05/2013 PAT 9270559
which is a CON of 13/374,959 01/24/2012 PAT 8606911
which is a CIP of 12/695,019 01/27/2010 PAT 8275830
and is a CIP of 12/695,020 01/27/2010 PAT 8406748
and is a CIP of 12/694,445 01/27/2010 PAT 8391834
and is a CIP of 12/694,451 01/27/2010 PAT 8548428
and is a CIP of 12/694,455 01/27/2010 PAT 8402111
and is a CIP of 12/695,980 01/28/2010 PAT 8340634
and is a CIP of 13/229,580 09/09/2011 PAT 8626115
and is a CIP of 13/237,827 09/20/2011 PAT 8832777
and is a CIP of 13/239,321 09/21/2011 PAT 8898293
and is a CIP of 13/248,028 09/28/2011 PAT 8924469
and is a CIP of 13/247,998 09/28/2011 PAT 8725123
and is a CIP of 13/248,025 09/28/2011 PAT 8924543
and is a CIP of 13/253,013 10/04/2011 PAT 8745191
and is a CIP of 13/309,556 12/01/2011 PAT 8893009
and is a CIP of 13/309,463 12/01/2011 PAT 8793758
and is a CIP of 13/134,028 05/25/2011 PAT 8589541
and claims benefit of 61/435,564 01/24/2011
and claims benefit of 61/472,606 04/06/2011
and claims benefit of 61/550,906 10/24/2011
and claims benefit of 61/589,830 01/23/2012
and said 12/695,019 01/27/2010
claims benefit of 61/264,126 11/24/2009
and claims benefit of 61/270,353 07/06/2009
and said 12/695,020 01/27/2010
claims benefit of 61/275,208 08/25/2009
and claims benefit of 61/237,753 08/28/2009
and said 12/694,455 01/27/2010
claims benefit of 61/264,120 11/24/2009
and said 13/248,028 09/28/2011
claims benefit of 61/348,022 05/25/2010
and said 13/134,028 05/25/2011
claims benefit of 61/381,159 09/09/2010

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15227814	RALEIGH ET AL.
	Examiner	Art Unit
	MOUNIR MOUTAOUAKIL	2476

CPC- SEARCHED		
Symbol	Date	Examiner

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner

SEARCH NOTES		
Search Notes	Date	Examiner
Inventorship Search	10/20/2016	MM
IDS	10/20/2016	MM
East	10/20/2016	MM
NPL	10/20/2016	MM
EPO	10/20/2016	MM
WIPO	10/20/2016	MM
Double patenting search	10/20/2016	MM
family search	10/20/2016	MM

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/227,814	08/03/2016	Gregory G. Raleigh	RALEP046C2C1C1	2668

106963 7590 09/08/2016

Headwater Partners I LLC
1011 Pruitt Place
Tyler, TX 75703

EXAMINER	
ART UNIT	PAPER NUMBER
2414	

NOTIFICATION DATE	DELIVERY MODE
09/08/2016	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):

patent@headwaterllc.com

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Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
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Doc Code:
TRACK1.GRANT

Decision Granting Request for Prioritized Examination (Track I or After RCE)	Application No.: 15/227,814

1. THE REQUEST FILED 08/03/16 IS **GRANTED.**

The above-identified application has met the requirements for prioritized examination
A. ☒ for an original nonprovisional application (Track I).
B. ☐ for an application undergoing continued examination (RCE).

2. **The above-identified application will undergo prioritized examination.** The application will be accorded special status throughout its entire course of prosecution until one of the following occurs:

A. filing a **petition for extension of time** to extend the time period for filing a reply;
B. filing an **amendment to amend the application to contain more than four independent claims, more than thirty total claims**, or a multiple dependent claim;
C. filing a **request for continued examination**;
D. filing a notice of appeal;
E. filing a request for suspension of action;
F. mailing of a notice of allowance;
G. mailing of a final Office action;
H. completion of examination as defined in 37 CFR 41.102; or
I. abandonment of the application.

Telephone inquiries with regard to this decision should be directed to Terri Johnson at 571-272-2991. In his/her absence, calls may be directed to Brian Brown at 571-272-5338.

/Terri Johnson/ — Paralegal Specialist

[*Signature*] — (Title)

U.S. Patent and Trademark Office
PTO-2298 (Rev. 02-2012)

Office of Petitions: Decision Count Sheet

Mailing Month 9

Application No. 15227814

15227814

For US serial numbers: enter number only, no slashes or commas. Ex: 10123456
For PCT: enter "51+single digit of year of filing+last 5 numbers", Ex. for PCT/US05/12345, enter 51512345

Deciding Official: Johnson, Terri

Count (1) - Palm Credit 15/227,814

Decision: GRANT

FINANCE WORK NEEDED
☐ Select Check Box for YES

GRANT

Decision Type: 643 - Track One request

643

Notes:

Count (2)

Decision: n/a

FINANCE WORK NEEDED
☑ Select Check Box for YES

Decision Type: NONE

Notes:

Count (3)

Decision: n/a

FINANCE WORK NEEDED
☐ Select Check Box for YES

Decision Type: NONE

Notes:

Initials of Approving Official (if required)

If more than 3 decisions, attach 2nd count sheet & mark this box ☐

Printed on: *9/4/2016*

Office of Petitions Internal Document - Ver. 5.0

Office of Petitions: Routing Sheet



Application No. 15/227,814

This application is being forwarded to your office for further processing. A decision has been rendered on a petition filed in this application, as indicated below. For details of this decision, please see the document PET.OP.DEC filed on the same date as this document.

[X] **GRANTED**

[ ] **DISMISSED**

[ ] **DENIED**

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 15/227,814

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	70		N/A	
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	300		N/A	
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	360		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	15 minus 20 =	*	x 40 =	0.00	OR		
INDEPENDENT CLAIMS (37 CFR 1.16(h))	2 minus 3 =	*	x 210 =	0.00			
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			200			
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				0.00			
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	930		TOTAL	

APPLICATION AS AMENDED - PART II

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

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

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

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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
15/227,814	08/03/2016	2414	930	RALEP046C2C1C1	15	2

CONFIRMATION NO. 2668

106963
Headwater Partners I LLC
1011 Pruitt Place
Tyler, TX 75703

FILING RECEIPT



Date Mailed: 08/18/2016

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

Inventor(s)

Gregory G. Raleigh, Woodside, CA;
Jeffrey Green, Sunnyvale, CA;
James Lavine, Corte Madera, CA;
Vien-Phuong Nguyen, Newark, CA;

Applicant(s)

Headwater Partners I LLC, Tyler, TX;

Power of Attorney: The patent practitioners associated with Customer Number 106963

Domestic Priority data as claimed by applicant

This application is a CON of 14/339,110 07/23/2014
which is a CON of 14/338,807 07/23/2014 PAT 9094311
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and is a CIP of 12/694,445 01/27/2010 PAT 8391834
and is a CIP of 12/694,451 01/27/2010 PAT 8548428
and is a CIP of 12/694,455 01/27/2010 PAT 8402111
and is a CIP of 12/695,980 01/28/2010 PAT 8340634
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and is a CIP of 13/247,998 09/28/2011 PAT 8725123
and is a CIP of 13/248,025 09/28/2011 PAT 8924543

and is a CIP of 13/253,013 10/04/2011 PAT 8745191
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and claims benefit of 61/472,606 04/06/2011
and claims benefit of 61/550,906 10/24/2011
and claims benefit of 61/589,830 01/23/2012
and said 12/695,019 01/27/2010
claims benefit of 61/264,126 11/24/2009
and claims benefit of 61/270,353 07/06/2009
and said 12/695,020 01/27/2010
claims benefit of 61/275,208 08/25/2009
and claims benefit of 61/237,753 08/28/2009
and said 12/694,455 01/27/2010
claims benefit of 61/264,120 11/24/2009
and said 13/248,028 09/28/2011
claims benefit of 61/348,022 05/25/2010
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claims benefit of 61/381,159 09/09/2010
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and said 12/380,780
claims benefit of 61/206,354 01/28/2009
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and claims benefit of 61/207,393 02/10/2009
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claims benefit of 61/206,354 01/28/2009
and claims benefit of 61/206,944 02/04/2009
and claims benefit of 61/207,393 02/10/2009

and claims benefit of 61/207,739 02/13/2009

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: Yes

Permission to Access Search Results: Yes

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: 08/16/2016

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 15/227,814**

Projected Publication Date: 11/24/2016

Non-Publication Request: No

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

Mobile Device and Method Attributing Media Services Network Usage to Requesting Application

Preliminary Class

370

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

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(Not for submission under 37 CFR 1.99)

Application Number	15227814
Filing Date	2016-08-03
First Named Inventor	Raleigh
Art Unit	
Examiner Name	not yet assigned
Attorney Docket Number	RALEP046C2C1C1

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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).

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See attached certification statement.

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

☒ None

SIGNATURE

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

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Name/Print	James E. Harris	Registration Number	40013

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Art Unit	
Examiner Name	not yet assigned
Attorney Docket Number	RALEP046C2C1C1

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

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