(51) International Patent Classification:
H04W 4/00 (2009.01) H04L 12/14 (2006.01)
(21) International Application Number:
PCT/US20 14/047951
(22) International Filing Date:
24 July 2014 (24.07.2014)
(25) Filing Language: 
English
(26) Publication Language: 
English
(30) Priority Data:
61/886,458 3 October 2013 (03. 10. 2013) US
(74) Agents: SAMUELS, Steven, B. et al; Baker & Hostetler LLP, Cira Centre, 12th Floor, 2929 Arch Street, Philadelphia, PA 19104-2891 (US).

Published:

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

(54) Title: SERVICE DOMAIN CHARGING SYSTEMS AND METHODS

(57) Abstract: Various mechanisms are disclosed for a service domain charging system that can interact with underlying networks. A service domain charging architecture is defined with several logical functions. Service-based charging types may be and applied to existing event, session, online, and offline charging mechanisms. Service domain charging messages may be exchanged over the X, Y, Z reference points. An E reference point may be used for interfacing with a service domain billing system, and a B reference point may be used between a service domain billing system and underlying network's billing system.
before the expiration of the time limit for amending the
claims and to be republished in the event of receipt of
amendments (Rule 48.2(h))

(88) Date of publication of the international search report:

19 March 2015
INTERNATIONAL SEARCH REPORT

International application No
PCT/US2014/047951

A. CLASSIFICATION OF SUBJECT MATTER

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
H04L  H04M  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 practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category* Citation of document, with indication, where appropriate, of the relevant passages Relevant to claim No.

X EP 2 512 106 AI (VODAFONE I P LICENSING LTD [GB]; VODAFONE ESPANA SAU [ES])
17 October 2012 (2012-10-17)
paras. [0003] - [0007]
paras. [0030] - [0058]
paras. [0061] - [0062]
paras. [0065]
paras. [0093] - [0095], figure 14

Date of the actual completion of the international search
5 November 2014

Date of mailing of the international search report
20/01/2015

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Authorized officer
Peeters, Dirk

* 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

"Z" document member of the same patent family
<table>
<thead>
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<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
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<tr>
<td>X</td>
<td>ERICSSON: &quot;Recording Information for Stati sti cal and Offl i ne Charging in M2M; M2M(12) 19_072r2_0ffl ine_Chargin_g i n M2 M&quot;; ETSI DRAFT; M2M(12) 19_072r2_0FFLI NE CHARG I NG i N M2M, EUROPEAN TELECOMMUNICATIONS STANDARDS INSTITUTE (ETSI ), 650, ROUTE DES LUCIOLES ; F-06921 SOPHIA-ANTI POLIS ; FRANCE, vol . M2M, 23 March 2012 (2012-03-23) ; pages 1-9 , XP014089691, the whole document</td>
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Form PCT/DA/210 (continuation of second sheet) (April 2005)

page 2 of 3
<table>
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<td>A</td>
<td>&quot;3rd Generation Partnership Project; Technical Specification on Group Services and System Aspects; System improvements for Machine-Type Communications (MTC) (Release 11) *&quot;, 3GPP STANDARD: 3GPP TR 23.888, 3RD GENERATION PARTNERSHIP PROJECT (3GPP) *, MOBILE COMPETENCE CENTRE; 650, ROUTE DES LUCIOLES; F-06921 SOPHIA-ANTIPOLIS CEDEX; FRANCE, vol. SAG2, no. V11.0.Q, 18 September 2012 (2012-09-18), pages 1-165, XP05Q649142, paragraph [0004], paragraph [06.7], paragraph [6.45.4]</td>
<td>1-4</td>
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</table>
### Box No. II  Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.: because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.: because they relate to parts of the international application that do not comply with the prescribed requirements to such extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.: because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 64(a).

### Box No. III  Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

- see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of additional fees.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☑ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.: 1-4

### Remark on Protest

- ☑ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.

- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.

- ☐ No protest accompanied the payment of additional search fees.
This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-4

   A charging system for a Machine-to-Machine, M2M, service domain comprising a service domain online charging system.

2. claims: 5-15

   In a service layer of a Machine-to-Machine, M2M, network, a method comprising receiving a policy, the policy being defined as a rule with associated attributes.

3. claims: 16-20, 25

   In a service layer of a Machine-to-Machine, M2M, network, a method comprising receiving and distributing charging policies.

4. claims: 21-24

   In a service layer that interacts with a 3GPP network, a method comprising transferring charging information between a service domain charging system in the service layer and a Machine-Type Communications Interworking Function, MTC-IWF, in the 3GPP network across a Tsp reference point, and using the transferred charging information.
<table>
<thead>
<tr>
<th>Patent document cited in search report</th>
<th>Publication date</th>
<th>Patent family member(s)</th>
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<tr>
<td></td>
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<td>US 2012284777 AI</td>
<td>08-11-2012</td>
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