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(88) **Date of publication of the revised international search report**:
30 May 2014

[Continued on next page]

(54) **Title**: WIRELESS BROADCAST/MULTICAST SERVICE CAPACITY OVER DIFFERENT LINK BUDGETS AND OVERLAY NETWORKS

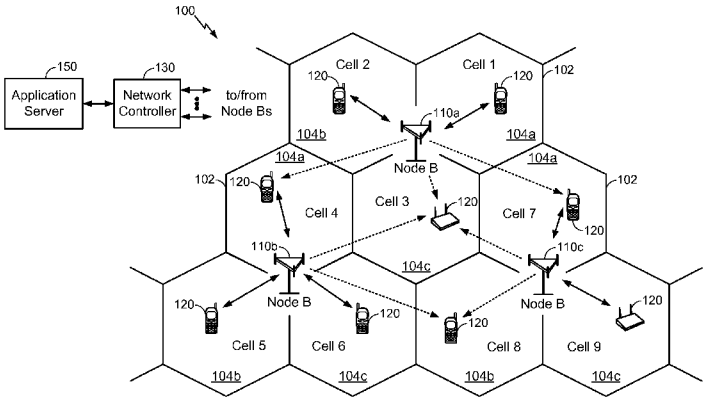

FIG. 1

(57) **Abstract**: In an embodiment, an application server determines to transmit a first data stream in a first multicasting area, a second data stream in a second multicasting area and both data streams in a third multicasting area that overlaps with the second multicasting area (e.g., at a border region between the first and second multicasting areas). The application server sends the first data stream to a multicast network management node for transmission in the first and third multicasting areas. The application server sends the first and second data streams to a multiplex stream multiplexer that multiplexes the two data streams into a single higher-rate multiplexed multicast stream with packets that include payloads data for both the first and second data streams. The multiplexed multicast stream is delivered to the third multicasting area for transmission to at least one target UE.

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(15) **Information about Correction**:
see Notice of 30 May 2014

INTERNATIONAL SEARCH REPORT

International application No
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A. CLASSIFICATION OF SUBJECT MATTER
INV. H04W4/06
ADD.

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
H04W A61M

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	US 2005/094618 A1 (COLBAN ERIK [US] ET AL) 5 May 2005 (2005-05-05) paragraph [0004] paragraph [0018] - paragraph [0036] paragraph [0096] - paragraph [0097]	1-11,39, 42,45
X	WO 2005/022811 A2 (KIESELE HERBERT [DE] ET AL) 10 March 2005 (2005-03-10)	25-38, 41,44,47
A	paragraph [0004] - paragraph [0005] paragraph [0099] - paragraph [0104]	1-24,39, 40,42, 43,45,46
A	WO 2005/046284 A2 (ERICSSON TELEFON AB L M [SE]; COLBAN ERIK [US]; BALASUBRAMANIAN SRINIV) 19 May 2005 (2005-05-19) paragraph [0004] - paragraph [0006] paragraph [0018] - paragraph [0025] paragraph [0032] - paragraph [0034]	1-11,39, 42,45

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[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier 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)

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"P" document published prior to the international filing date but later than the priority date claimed

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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"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
14 April 2014	24/04/2014

Name and mailing address of the ISA/	Authorized officer
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Form PCT/ISA/210 (second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2012/071942

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 an 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 6.4(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 fees, 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.:

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.

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2012/071942

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2011/164548 A1 (KIM DONG CHEOL [KR] ET AL) 7 July 2011 (2011-07-07) abstract paragraph [0012] - paragraph [0014] paragraph [0088] - paragraph [0090] -----	1-11,39, 42,45
X	ALCATEL-LUCENT SHANGHAI BELL ET AL: "ABBR based statistical multiplexing solution for eMBMS", 3GPP DRAFT; R3-091300_ABBR, 29 April 2009 (2009-04-29), XP050341652, San Francisco, USA the whole document -----	12-24, 40,43,46
A	ALCATEL-LUCENT SHANGHAI BELL ET AL: "eMBMS resource allocation and service multiplexing", 3GPP DRAFT; R3-091859_EMBMSRESOURCEALLOCATIONCR, no. Shenzhen, China; 20090820, 20 August 2009 (2009-08-20), XP050353226, the whole document -----	12-24, 40,43,46

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2005094618 A1	05-05-2005	NONE	
WO 2005022811 A2	10-03-2005	AR 045556 A1	02-11-2005
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		WO 2010044605 A2	22-04-2010

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-11, 39, 42, 45

Operating an application server that is distributing a plurality of multicast streams to a plurality of target user equipments (UEs) in a communications system, comprising: determining a first multicasting area for transmission of a first multicast stream having a first data rate, a second multicasting area for transmission of a second multicast stream having a second data rate that is different than the first data rate, and a third multicasting area that overlaps with the second multicasting area for transmission of both the first and second multicast streams;obtaining a first set of data packets that are associated with the first multicast stream;obtaining a second set of data packets that are associated with the second multicast stream;delivering, for transmission within the first and third multicasting areas, the first set of data packets to a multicast network management node configured to manage Internet Protocol (IP) multicast transmissions; anddelivering, to a multiplex stream multiplexer, the first and second sets of packets to be multiplexed into a single multiplexed multicast stream for transmission within the second and third multicasting areas, wherein the single multiplexed multicast stream has a third data rate that is higher than the first and/or second data rates.

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2. claims: 12-24, 40, 43, 46

Operating a network device that is configured to multiplex a set of streams into a single output stream for delivery to a plurality of target devices, comprising: receiving a first data packet associated with a first multicast stream for transmission in a given multicasting area and having a first data rate;receiving a second data packet associated with a second multicast stream for transmission in the given multicasting area and having a second data rate that is different from the first data rate;multiplexing the first and second data packets into a multiplexed data packet for a multiplexed multicast stream having a third data rate that is higher than the first and/or second data rates, wherein the multiplexed data packet includes (i) a first payload portion from the first data packet based on the first data rate, and (ii) a second payload portion from the second data packet based on the second data rate; anddelivering, for transmission within the given multicasting area, the multiplexed data packet to a multicast network management node configured to manage IP multicast transmissions within the given multicasting area.

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3. claims: 25-38, 41, 44, 47

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Operating a target user equipment (UE) that is configured to monitor one or more multicast streams, comprising:receiving, on a downlink multicast channel, a multiplexed data packet that includes (i) a first payload portion associated with a first multicast stream and having a first data rate, and (ii) a second payload portion associated with a second multicast stream and having a second data rate that is different from the first data rate;determining whether the first and/or the second multicast streams are relevant to the target UE; andselectively decoding and processing the first and second payload portions based on the determination.
