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- *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))*

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27 October 2016

(54) **Title:** HARQ/CSI ACK FEEDBACK METHOD OVER UNLICENSED CARRIER

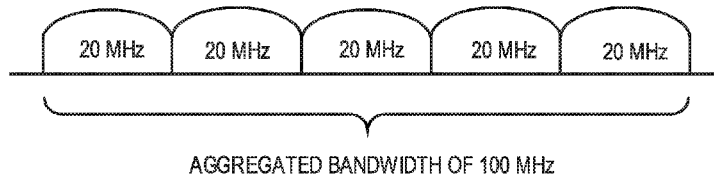
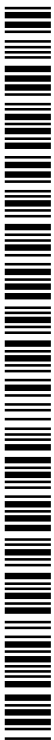


FIG. 4

(57) **Abstract:** Systems and methods relating to the use of an unlicensed Component Carrier (CC) for Hybrid Automatic Repeat Request (HARQ) and/or Channel State Information (CSI) feedback for a downlink CC or a downlink CC group are disclosed. In some embodiments, a method of operation of a wireless device in a cellular communications network comprises selecting, from a plurality of uplink CCs configured for the wireless device for HARQ and/or CSI feedback of a downlink CC or a downlink CC group, an uplink CC for HARQ and/or CSI feedback of the downlink CC or the downlink CC group based on channel availability. The method further comprises transmitting HARQ and/or CSI feedback of the downlink CC or the downlink CC group over the uplink CC selected from the plurality of uplink CCs configured for the wireless device.



INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2016/050441

A. CLASSIFICATION OF SUBJECT MATTER INV. H04L1/00 H04L1/18 ADD.		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols) H04L		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) EPO-Internal, WPI Data, INSPEC, COMPENDEX		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2014/086078 A1 (MALLADI DURGA PRASAD [US] ET AL) 27 March 2014 (2014-03-27) paragraph [0036] - paragraph [0037] paragraph [0041] - paragraph [0049] paragraph [0051] - paragraph [0058] paragraph [0072] paragraph [0078] - paragraph [0086] paragraph [0105] paragraph [0119] ----- -/--	1,16
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family annex.		
* Special categories of cited documents :		
<p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier application or patent but published on or after the international filing date</p> <p>"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)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p>		<p>"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</p> <p>"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</p> <p>"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</p> <p>"&" document member of the same patent family</p>
Date of the actual completion of the international search 19 September 2016		Date of mailing of the international search report 26/09/2016
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016		Authorized officer Papantoniou, Antonis

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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.
X	WO 2013/120253 A1 (RENESAS MOBILE CORP [JP]; CHARBIT GILLES [GB]; WEI NA [CN]; ZENG ERLIN) 22 August 2013 (2013-08-22)	1-10, 12-16
Y	page 1, line 24 - line 28 page 2, line 26 - page 3, line 13 page 8, line 17 - line 31 page 10, line 5 - line 16 page 11, line 21 - page 14, line 12 page 17, line 10 - page 18, line 16 page 19, line 1 - line 27 page 20, line 6 - line 26 page 22, line 4 - line 15	18-24,27
X	----- US 2011/128942 A1 (KIM KI HWAN [KR] ET AL) 2 June 2011 (2011-06-02) paragraph [0007] - paragraph [0012] paragraph [0072] - paragraph [0077] paragraph [0106] - paragraph [0111] paragraph [0124] - paragraph [0129] paragraph [0134] - paragraph [0141] paragraph [0158] - paragraph [0161] paragraph [0167] - paragraph [0177] paragraph [0213] - paragraph [0217] paragraph [0250] - paragraph [0257] paragraph [0270] - paragraph [0276] -----	1,16
X	EP 2 385 647 A2 (HTC CORP [TW]) 9 November 2011 (2011-11-09)	17,28
Y	paragraph [0005] - paragraph [0007] paragraph [0025] - paragraph [0030] paragraph [0035] - paragraph [0044] paragraph [0049] - paragraph [0055] -----	18-24,27
X	EP 2 639 984 A2 (LG ELECTRONICS INC [KR]) 18 September 2013 (2013-09-18) paragraph [0097] paragraph [0498] -----	17,28

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB2016/050441

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.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

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

1. claims: 1-16

Transmission of uplink HARQ / CSI feedback of downlink carriers using selected uplink carriers based on channel availability.

2. claims: 17-28

Blind decoding of UL HARQ / CSI of downlink carriers based on configured uplink carriers.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IB2016/050441

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