

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

PCT

To:

see form PCT/ISA/220

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (PCT Rule 43bis.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.
PCT/IB2019/059503

International filing date (day/month/year)
05.11.2019

Priority date (day/month/year)
30.11.2018

International Patent Classification (IPC) or both national classification and IPC
INV. H04L5/00

Applicant
TELEFONAKTIEBOLAGET LM ERICSSON (PUBL)

1. This opinion contains indications relating to the following items:

- Box No. I Basis of the opinion
- Box No. II Priority
- Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- Box No. IV Lack of unity of invention
- Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
- Box No. VI Certain documents cited
- Box No. VII Certain defects in the international application
- Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA:



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this opinion

see form
PCT/ISA/210

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Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of:
 - the international application in the language in which it was filed.
 - a translation of the international application into , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1 (b)).
2. This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43bis.1(a))
3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing:
 - a. forming part of the international application as filed:
 - in the form of an Annex C/ST.25 text file.
 - on paper or in the form of an image file.
 - b. furnished together with the international application under PCT Rule 13ter.1(a) for the purposes of international search only in the form of an Annex C/ST.25 text file.
 - c. furnished subsequent to the international filing date for the purposes of international search only:
 - in the form of an Annex C/ST.25 text file (Rule 13ter.1(a)).
 - on paper or in the form of an image file (Rule 13ter.1(b) and Administrative Instructions, Section 713).
4. In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that forming part of the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
5. Additional comments:

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	<u>1-32</u>
	No: Claims	
Inventive step (IS)	Yes: Claims	<u>1-32</u>
	No: Claims	
Industrial applicability (IA)	Yes: Claims	<u>1-32</u>
	No: Claims	

2. Citations and explanations

see separate sheet

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to the following documents:

- D1 US 2018/227028 A1 (LEE JUNG AH [US]) 9 August 2018 (2018-08-09)
- D2 US 2018/159611 A1 (MAJMUNDAR MILAP [US] ET AL) 7 June 2018 (2018-06-07)
- D3 WO 2018/030529 A1 (FUJITSU LTD [JP]) 15 February 2018 (2018-02-15);
-& EP 3 500 061 A1 (FUJITSU LTD [JP]) 19 June 2019 (2019-06-19)
- D4 HUAWEI ET AL: "Issues in standardization of lower layer splits 5, 6, 7",
3GPP DRAFT; R3-170736_ISSUES IN STANDARDIZATION OF LOWER
LAYER SPLITS, 3RD GENERATION PARTNERSHIP PROJECT (3GPP),
MOBILE COMPETENCE CENTRE ; 650, ROUTE DES LUCIOLES ;
F-06921 SOPHIA-ANTIPOLIS CEDEX ;
,
vol. RAN WG3, no. Athens, Greece; 20170213 - 20170217 12 February
2017 (2017-02-12), XP051213314,
Retrieved from the Internet:
URL:http://www.3gpp.org/ftp/Meetings_3GPP_SYNC/RAN3/Docs/
[retrieved on 2017-02-12]
- D5 ERICSSON: "Analysis of the RAN1 Reply LS on LLS",
3GPP DRAFT; R3-174795_LLS_RAN1_LS, 3RD GENERATION
PARTNERSHIP PROJECT (3GPP), MOBILE COMPETENCE CENTRE ;
650, ROUTE DES LUCIOLES ; F-06921 SOPHIA-ANTIPOLIS CEDEX ;
FRANCE
,
vol. RAN WG3, no. Reno, Nevada, USA; 20171127 - 20171201 18
November 2017 (2017-11-18), XP051373521,
Retrieved from the Internet:
URL:<http://www.3gpp.org/ftp/tsg%5Fran/WG3%5Flu/TSGR3%5F98/Docs/>
[retrieved on 2017-11-18]

- 1 Document D1 is regarded as being the prior art closest to the subject-matter of claim 1, and discloses (the references in parentheses applying to that document):

A method of operating a radio unit, RU (**paragraph 65, "RU"**), in a network node of a wireless communication system (**paragraph 63, "eNodeB"**), comprising:

receiving (902), at the radio unit and from a lower-layer split central unit, LLS-CU (**paragraph 68, "lower layer split architecture", "centralized unit"**), a plurality of downlink signals that include reference symbols, RS, and user data downlink, UD-DL, messages to be transmitted to a user equipment, UE, over a wireless interface (**paragraph 66, "DL". It is implicit that the downlink signals include both user data messages and reference signals**);

The subject-matter of claim 1 therefore differs from this known method by:

*accumulating (904) received data corresponding to the plurality of downlink signals into a concentrated data format ; and
receiving (900) a data-associated control information, DACI, message including a section description associated with the plurality of downlink signals, the DACI message including an indication of how to perform the accumulating data operation.*

The subject-matter of claim 1 is therefore new (Article 33(2) PCT).

The problem to be solved by the present invention may be regarded as how to reduce the overhead associated with the DACI message (see description, paragraph 5)

The solution to this problem proposed in claim 1 of the present application is considered as involving an inventive step (Article 33(3) PCT) for the following reasons:

Document D1 teaches away from the solution of claim 1 by transmitting compressed multiplexed data between different units of the network node (see D1 paragraph 101). This results in an increased overhead for the signaling associated with the multiplexing of the reference symbols.

Document D2 (see paragraph 33) also discloses a lower layer split architecture. D2 also teaches away from the solution of claim 1 as in D2 the user data and the reference signals are also sent in compressed form between the radio unit and the centralized unit.

Documents D3 (see paragraph 293), D4 (see page 1) and D5 (see page 1) all disclose a lower layer split architecture but all of them are silent about the additional technical features of claim 1.

- 2 The same reasoning applies mutatis mutandis to the corresponding independent claims 10, 16, 18, 25, 31, which therefore also meet the requirements of the PCT with respect to novelty and inventive step.
- 3 Claims 2-9, 11-15, 17, 19-24, 26-30, 32 are dependent on claims 10, 16, 18, 25, 31 and as such also meet the requirements of the PCT with respect to novelty and inventive step.

Re Item VII

Certain defects in the international application

- 4 Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in document D1 is not mentioned in the description, nor is this document identified therein.