

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

PCT

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

To:

see form PCT/ISA/220

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

| | |
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| Applicant's or agent's file reference see form PCT/ISA/220 | FOR FURTHER ACTION See paragraph 2 below |
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| International application No. PCT/US2019/064451 | International filing date (day/month/year) 04.12.2019 | Priority date (day/month/year) 05.12.2018 |
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International Patent Classification (IPC) or both national classification and IPC
INV. H04L5/00 H04W72/04

Applicant
QUALCOMM INCORPORATED

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.

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| Name and mailing address of the ISA:  European Patent Office P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Fax: +31 70 340 - 3016 | Date of completion of this opinion see form PCT/ISA/210 | Authorized Officer Colzi, Enrico Telephone No. +31 70 340-0 |
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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>2-16, 18-28</u> |
| | No: Claims | <u>1, 17, 29, 30</u> |
| Inventive step (IS) | Yes: Claims | |
| | No: Claims | <u>1-30</u> |
| Industrial applicability (IA) | Yes: Claims | <u>1-30</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

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

1 INTRODUCTION

- 1.1 The application does not meet the requirements of Article 6 PCT, because at least claims 1, 13 are not clear, as indicated in Item V, Sect. 1 and in Sect. VIII, Sect. 1.
- 1.2 The application does not meet the criteria of Article 33(1) PCT, because the subject-matter of independent claims 1, 17, 29, 30 is not new in the sense of Article 33(2) PCT, in view of the document D1, as indicated in Item V, Sect. 2.1.
- 1.3 Independently from the objection on lack of novelty indicated above, the application does not meet the criteria of Article 33(1) PCT, because the subject-matter of independent claims 1, 17, 29, 30 does not involve an inventive step, in view of the document D2 taken alone, as indicated in Item V, Sect. 3.1.
- 1.4 The application does not meet the criteria of Article 33(1) PCT, because the subject-matter of dependent claims 2-16, 18-28 does not involve an inventive step in the sense of Article 33(3) PCT, in view of the documents D1 (or D2) taken alone, as indicated in Item V, Sect. 3.2.

2 CITATIONS

Reference is made to the following documents:

- D1 WO 2018/175820 A1 (XIONG GANG [US]; HE HONG [US] ET AL.) 27 September 2018
- D2 QUALCOMM INCORPORATED: "Maintenance for SRS", 3GPP DRAFT; R1-1802830, 3RD GENERATION PARTNERSHIP PROJECT (3GPP), MOBILE COMPETENCE CENTRE; 650, ROUTE DES LUCIOLES; F-06921 SOPHIA-ANTIPOLIS CEDEX; FRANCE, vol. RAN WG1, no. Athens, Greece; 17 February 2018
- D3 INTEL CORPORATION: "Scheduling and UCI feedback for carrier aggregation", 3GPP DRAFT; R1-1710578, 3RD GENERATION PARTNERSHIP PROJECT (3GPP), MOBILE COMPETENCE CENTRE; 650, ROUTE DES LUCIOLES; F-06921 SOPHIA-ANTIPOLIS CEDEX; FRANCE, vol. RAN WG1, no. Qingdao, P.R. China; 26 June 2017
- D4 US 2018/263064 A1 (ISLAM MUHAMMAD NAZMUL [US] ET AL) 13 September 2018

Re Item V

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

1 INTERPRETATION OF CLAIMS WITH REGARD TO NOVELTY AND INVENTIVE STEP (Art. 6 PCT)

The application does not meet the requirements of Article 6 PCT, because at least claims 1, 13 are not clear. This lack of clarity may lead to problems vis-à-vis the interpretation of the above claims.

Detailed argumentation on the clarity issues mentioned above can be found under Item VIII, sect. 1 of the present Written Opinion.

2 NOVELTY (Art. 33(2) PCT)

2.1 *Independent claims*

The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of independent claims 1, 17, 29, 30 is not new in the sense of Article 33(2) PCT.

2.1.1 Claim 1: Document D1 discloses (the references in parentheses applying to this document) all the features of independent claim 1, namely:

A method for wireless communication at a user equipment (UE), comprising:

establishing a connection with a base station via at least a first component carrier (CC) and a second CC, wherein the first CC has a different numerology than the second CC (par. [0084]: "[...] a first transmission in a first CC of control information including an indication of timing information for a second transmission in a second CC, where the indication is based on a subcarrier spacing of one of the first CC and the second CC. According to one embodiment, the first CC and the second CC have different subcarrier spacings");

identifying a minimum gap between a resource associated with a downlink control channel transmission on the first CC and a resource associated with a reference signal transmission on the second CC (Eq. (1) and par. [0104]: "Where Δ_f^{CC1} and Δ_f^{CC2} may be the subcarrier spacings for CC#1 and

CC#2 for the transmission of PDCCH and PDSCH or PUSCH, respectively, and N_{delay} may be the scheduling timing delay with respect to slot boundary for CC#2. In Equation 1, the left side of the equation denotes a floor value, and the right side a ceiling value. A NR evolved NodeB (gNB) according to some embodiments may determine the scheduling timing delay based on the subcarrier spacings for first and second CCs and may configure the delay suitably for the UE operation." and par. [0118]: "[...] in cases when PDCCH at low band is used to schedule the data transmission at high band, a beam pair link index may be indicated in the DCI. More particularly, for the scheduling of DL data transmission at high band, the use of a beam pair link index may be realized by the indication of a spatial Quasi co-located (QCL) assumption between DL reference signal (RS) antenna port(s) and Demodulation RS (DM-RS) antenna port(s) of the DL data channel." ;

receiving the downlink control channel transmission via the first CC (par. [0084]: "[...] a first transmission in a first CC of control information");

receiving, responsive to the downlink control channel transmission, the reference signal transmission on the second CC based at least in part on the minimum gap (cf. par.s [0104] and [0118] cited above); and

measuring one or more channel characteristics of the reference signal transmission (par. [0047]: "[...] channel quality information fed back from any of the UEs").

- 2.1.2 Claim 17, 29, 30: The argumentation in Item V, Sect. 2.1.1 above applies mutatis mutandis also to independent claims 17, 29, 30.

3 INVENTIVE STEP (Art. 33(3) PCT)

3.1 *Independent claims*

Independently from the objection on lack of novelty presented above, the present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of independent claims 1, 17, 29, 30 does not involve an inventive step in the sense of Article 33(3) PCT.

- 3.1.1 Claim 1: Document D2 discloses the following features of claim 1 (the references hereafter applying to this document):

A method for wireless communication at a user equipment (UE), comprising:

establishing a connection with a base station via at least a first component carrier (CC) and a second CC, wherein the first CC has a different numerology than the second CC (Sect. 2.1.1: "different CCs have different numerology.");

identifying a minimum gap between a resource associated with a downlink control channel transmission on the first CC and a resource associated with a reference signal transmission on the second CC (Sect. 2.1.1: "[...] the minimum timing gap between A-SRS transmission and associated triggering [...]", and "For n-th ($n \geq 1$) aperiodic SRS transmission on a cell c, upon detection of a positive SRS request on a grant, the UE shall commence this SRS transmission on the configured symbol and slot provided:

- it is no earlier than the summation of the time duration needed for PUSCH preparation time according to Table 6.4-1 and 6.4-2 for the numerology used in the cell c, and the UL or DL RF retuning time [...] as defined by higher layer parameters rf-RetuningTimeUL and rf-RetuningTimeDL") ;

receiving the downlink control channel transmission via the first CC (cf. passages above);

~~receiving~~, responsive to the downlink control channel transmission, the reference signal transmission on the second CC based at least in part on the minimum gap (cf. passages above); and

~~measuring one or more channel characteristics of the reference signal transmission.~~

The subject-matter of claim 1 therefore differs from these known features in that it defines the UE receiving the reference signal, which is then a downlink reference signal, and measuring its channel characteristics.

The objective problem to be solved by the present invention may therefore be regarded as to define the reception of a downlink reference signal and measuring its channel characteristics.

However, the features of receiving a downlink reference signal and measuring its channel characteristics are very well known in the art.

It would be obvious to the person skilled in the art, namely when the same result is to be achieved, to apply these features with corresponding effect to the teaching of document D2, in order to solve the problem posed.

3.1.2 Claim 17, 29, 30: The argumentation in Item V, Sect. 3.1 applies mutatis mutandis also to independent claim 17, 29, 30.

3.2 *Dependent claims*

Dependent claims 2-16, 18-28 do not contain any features, which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of inventive step (Article 33 (3) PCT).

3.2.1.1 Claims 2-16, 18-28: The additional features of claims 2-16, 18-28 are normal design options for the person skilled in the art.

Re Item VII

Certain defects in the international application

- 1 Independent claims 1, 17, 29, 30: the claims are not in the two-part form in accordance with Rule 6.3(b) PCT, which in the present case would be appropriate, with those features known in combination from the prior art D1 (cf. Item V, Sect. 2.1) being placed in the preamble (Rule 6.3(b)(i) PCT) and the remaining features being included in the characterising part (Rule 6.3(b) (ii) PCT).
- 2 The features of claim 1 are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).
- 3 Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in D1-D4 is not mentioned in the description, nor are these documents identified therein.
- 4 Claim 1: The use of parentheses in a claim is reserved for placing reference signs relating to technical features included in the drawings of the PCT Application (see Rule 6.2 (b) PCT and Guidelines 5.11). The parentheses should be replaced, for example, by commas.

This objection is valid also for other claims where the same issues are present.

Re Item VIII

Certain observations on the international application

- 1 CLARITY (Art. 6 PCT)

The application does not meet the requirements of Article 6 PCT, because at least claims 1, 13 are not clear. This lack of clarity may lead to problems vis-à-vis the interpretation of the above claims.
- 1.1 Claim 1: The expression “identifying a minimum gap” is vague and unclear and leaves the reader in doubt as to the meaning of the technical features to which it refers, thereby rendering the definition of the subject-matter of said claim unclear (Article 6 PCT). As a matter of fact, it is not clear whether it is made reference to a) a gap in time; b) a gap in frequency; c) a gap in time and/or frequency.
- 1.2 Claim 13: The expression “the second CC has a shorter resource duration than the first CC” is vague and unclear and leave the reader in doubt as to the meaning of the technical features to which they refer, thereby

rendering the definition of the subject-matter of said claim unclear (Article 6 PCT); as a matter of fact, it is not clear what is meant by resource duration, as it could be interpreted as any of the following: a) time interval; frequency interval; time and/or frequency interval.

- 1.3 The objections above are valid also for other claims where the same issues are present.