

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)

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

FOR FURTHER ACTION
See paragraph 2 below

International application No.
PCT/EP2018/070913

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11.08.2017

International Patent Classification (IPC) or both national classification and IPC
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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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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. IV Lack of unity of invention

1. In response to the invitation (Form PCT/ISA/206) to pay additional fees, the applicant has, within the applicable time limit:
- paid additional fees
 - paid additional fees under protest and, where applicable, the protest fee
 - paid additional fees under protest but the applicable protest fee was not paid
 - not paid additional fees
2. This Authority found that the requirement of unity of invention is not complied with and chose not to invite the applicant to pay additional fees.
3. This Authority considers that the requirement of unity of invention in accordance with Rule 13.1, 13.2 and 13.3 is
- complied with
 - not complied with for the following reasons:
see separate sheet
4. Consequently, this report has been established in respect of the following parts of the international application:
- all parts.
 - the parts relating to claims Nos. 1-33

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>1-33</u>
	No: Claims	
Inventive step (IS)	Yes: Claims	<u>4, 5, 7-10, 14-17, 21-24, 26, 31</u>
	No: Claims	<u>1-3, 6, 11-13, 18-20, 25, 27-30, 32, 33</u>
Industrial applicability (IA)	Yes: Claims	<u>1-33</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 IV

Lack of unity of invention

This Authority considers that there are 2 inventions covered by the claims indicated as follows:

I: Claims 1-25, 27-30 and 32-33 directed to an apparatus, method, system and computer product for determining a Random Access-Radio Network Temporary Identifier RA-RNTI.

II: Claims 26, 27-28, 31 and 32-33 directed to an apparatus, method, system and computer product for managing Radio Network Temporary Identifiers RNTIs.

The reasons for which the inventions are not so linked as to form a single general inventive concept, as required by Rule 13.1 PCT, are as follows:

The first group of claims comprises the technical features of:

- a1) determine a Random Access-Radio Network Temporary Identifier, RA-RNTI, for use in a radio network system,
- b1) a first counter configured to be incremented after a pre-defined period of time and to be re-set when having reached a predefined first number, wherein the first counter counts a first count;
- c1) a second counter configured to be incremented when the first counter reaches the predefined first number and to be re-set when having reached a predefined second number, wherein the second counter counts a second count;
- d1) a third counter configured to be incremented when the second counter reaches the predefined second number and to be re-set when having reached a predefined third number, wherein the third counter counts a third count;
- e1) determine an RA-RNTI at least based on the second count and the third count.

The second group of claims comprises the technical features of:

- a2) managing Radio Network Temporary Identifiers, RNTIs, for use in a radio network system,
- b2) the RNTIs belonging to a first RNTI type comprising a number of designated Random Access-, RA-, RNTIs and

- c2) at least one second RNTI type different from the first type,
- d2) determine, based on a priori-knowledge, one or more designated RA-RNTIs available but unused in the radio network system;
- e2) allocate the one or more unused designated RA-RNTIs to the second RNTI type.

The technical feature common to groups I and II is represented by "determine RA-RNTI". This feature is a priori well known to a person skilled in the art and does not represent any contribution to the prior art (it is needed in the standard random access procedure in wireless communication). Therefore it cannot be considered as a "special technical feature".

The remaining technical features being not obvious to a person skilled in the art and a priori considered as special features according to Rule 13.1 PCT are the following:

Group I: use of three counters and use of the second and third counter values for obtaining RA-RNTI.

Group II: classify RA-RNTI as first type of RNTIs, determine RA-RNTIs not being used and assigne these to a second type of RNTIs.

Also when examining the possible correspondence by technical effect, one finds that:

- the technical effect of the first group of claims is to have a more elaborate method to compute RA_RNTI,
- the technical effect of the second group of claims is to improve the use of available RNTIs for different procedures in wireless networks.

This appears to show lack of corresponding technical effect as well.

These features are neither the same nor corresponding, because they solve different objective problems:

Group 1: the potential special technical features solve the objectively determined problem of improving the method for computing RA-RNTI.

Group 2: the special technical features solve the objectively determined problem of how to improve the use of RNTIs available in a wireless network.

Consequently, neither the objective problem underlying the subjects of the claimed inventions, nor their solutions defined by the special technical features allow for a relationship to be established between the said inventions, which involves a single general inventive concept.

In conclusion, the groups of claims are not linked by common or corresponding special technical features and define two different inventions not linked by a single general inventive concept.

Thus, these two groups of inventions do not have any special technical feature in common, nor they have any corresponding technical features as meant by Rule 13.2 PCT, as they relate to different solutions of different objectively determined problems. Hence, Rule 13.1 PCT is not satisfied and the subject-matter of the application contains more subjects which are not linked by a single inventive concept.

It is therefore considered that the international application does not comply with the requirements of unity of invention (Rules 13.1, 13.2 and 13.3 PCT).

Re Item V

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

1. Reference is made to the following documents:

- D1 HUAWEI ET AL: "Random Access Procedure Remaining Issues", 3GPP DRAFT; R2-163228 RANDOM ACCESS PROCEDURE REMAINING ISSUES, 3RD GENERATION PARTNERSHIP PROJECT (3GPP), MOBILE COMPETENCE CENTRE ; 650, ROUTE DES LUCIOLES ; F-06921 SOPHIA-ANTIPOLIS CEDEX ; FRANCE, vol. RAN WG2, no. Sophia Antipolis, France; 20160503 - 20160504 28 April 2016 (2016-04-28), XP051095152
- D2 WO 2017/121380 A1 (ZTE CORP [CN]) 20 July 2017 (2017-07-20)
- D3 CN 106 973 441 A (ZTE CORP) 21 July 2017 (2017-07-21)
- D4 WO 2016/158394 A1 (NTT DOCOMO INC [JP]) 6 October 2016 (2016-10-06); & EP 3 280 191 A1 (NTT DOCOMO INC [JP]) 7 February 2018 (2018-02-07)
- D5 US 2013/102320 A1 (SUZUKI SHOICHI [JP] ET AL) 25 April 2013 (2013-04-25)

D6 MOTOROLA: "RA-RNTI Allocation", 3GPP DRAFT; R2-081824_RA-RNTI, 3RD GENERATION PARTNERSHIP PROJECT (3GPP), MOBILE COMPETENCE CENTRE ; 650, ROUTE DES LUCIOLES ; F-06921 SOPHIA-ANTIPOLIS CEDEX ; FRANCE, vol. RAN WG2, no. Shenzhen, China; 20080325, 25 March 2008 (2008-03-25), XP050139521

First invention:

2. The present application does not meet the criteria of Article 33(3) PCT, because the **subject-matter of claims 1, 19, 27, 29, 30 and 32 does not involve an inventive step.**

2.1 D1 is regarded as being the prior art closest to the subject-matter of claim 1, and discloses:

A wireless device configured to determine a Random Access-Radio Network Temporary Identifier, RA-RNTI, for use in a radio network system (D1: Section 2.3 RA-RNTI),

and

wherein the wireless device is configured to determine an RA-RNTI at least based on the second count and the third count (D1: page 4, lines 25-27).

2.2 The subject-matter of claim 1 therefore differs from this known D1 in that the wireless device comprising:

a first counter configured to be incremented after a pre-defined period of time and to be re-set when having reached a predefined first number, wherein the first counter counts a first count;

a second counter configured to be incremented when the first counter reaches the predefined first number and to be re-set when having reached a predefined second number, wherein the second counter counts a second count; and

a third counter configured to be incremented when the second counter reaches the predefined second number and to be re-set when having reached a predefined third number, wherein the third counter counts a third count;

and is therefore new.

2.3 The problem to be solved by the present invention may therefore be regarded as how to implement the determination of RA-RNTI based on SFN and H-SFN.

2.4 The solution proposed in claim 1 of the present application cannot be considered as involving an inventive step (Article 33(3) PCT) for the following reasons:

D1 discloses a formula for obtaining RA-RNTI that makes use of SFN and H-SFN. It is well known for the skilled person in LTE and wireless communications that a system frame is composed of a given number of subframes (predefined first number) and that a hyperframe is composed of a given number of system frames (predefined second number). It is also well known that when the SFN reaches the predetermined value (predefined second number) the SFN is re-set to 0 and the H-SFN is incremented by one. Subframes, SFN and H-SFN are widely used in different aspects of wireless networks (see D4 that discloses the relation between SFN and H-SFN for DRX). If for the calculation of a RA-RNTI the values of SFN and H-SFN are needed as disclosed in D1, it would be an obvious choice for the skilled person to make use of counters/timers to count the subframes to obtain the system frames and SFN value and also to obtain the H-SFN value at a given point. Therefore the solution proposed in claim 1 cannot be considered as involving an inventive step (Article 33(3) PCT).

2.5 The same objection of missing inventive step could be substantiated based on D2 or D3 (machine translations have been attached).

2.6. The same reasoning applies, mutatis mutandis, to the subject-matter of the corresponding independent claims 19, 27, 29, 30 and 32, which therefore are also considered not inventive.

3. Dependent claims 2, 3, 6, 11-13, 18, 20, 25, 28 and 33 do not contain any features which, in combination with the features of any claim to which it/they refers/ refer, meet the requirements of the PCT in respect of novelty and/or inventive step.

Claims 2, 3, 13, 20: are implicit in the use of RA-RNTI in wireless communication.

Claims 11, 12, 28, 33: these features are merely straightforward possibilities from which the skilled person would select, in accordance with circumstances, without the exercise of inventive skill.

Claims 6: see D1: page 4, line 27.

Claims 18, 25: see D1: section 2.3.

3.1 The combination of the features of dependent claims 4, 5, 7-10, 14-17 and 21-24 is neither known from, nor rendered obvious by, the available prior art.

Second invention:

4. D5 is regarded as being the prior art closest to the subject-matter of claims 26 and 31, and discloses

An access network node for managing Radio Network Temporary Identifiers, RNTIs, for use in a radio network system (D5: [0083], [0097]), the RNTIs belonging to a first RNTI type comprising a number of designated Random Access-, RA-, RNTIs and at least one second RNTI type different from the first type (D5: [0056]).

4.1 The subject-matter of claim 26 therefore differs from this known D5 in that wherein the access network node is configured to determine, based on a priori-knowledge, one or more designated RA-RNTIs available but unused in the radio network system; and allocate the one or more unused designated RA-RNTIs to the second RNTI type

The **subject-matter of claim 26 is therefore new** (Article 33(2) PCT).

4.2 The technical effect of these differences is that unused RA-RNTI values can be reused for another type of RNTI. The problem to be solved by the present invention may be regarded as how to increase the availability of RNTIs values.

4.3 The solution to this problem proposed in claim 26 of the present application is considered as involving an inventive step (Article 33(3) PCT) for the following reasons:

The solution of determining one or more designated RA-RNTIs available but unused in the radio network system and allocating the one or more unused designated RA-RNTIs to the second RNTI type in order to increase the availability of RNTI values, is neither disclosed nor rendered obvious by any prior-art documents cited in the Search Report.

The problem is that RA-RNTI values can span a very large range of RNTI values which would leave very few RNTIs available to use as C-RNTI or another RNTI type. However, all the RA-RNTI may not be used. Thus, it would be convenient that the network node determines, based on knowledge about the PRACH configurations, which RA-RNTIs do not correspond to valid PRACH opportunities and the network node reuses RNTIs serving as RA-RNTIs which do not correspond to valid PRACHs to RNTIs to be used as, e.g., other types of RNTIs such as C-RNTIs, SPS-RNTIs, etc.

Document D5 mentions different types of RNTIs and also management of RNTIs. D6 mentions allocation of RA-RNTI. But no prior-art document considers if there are assigned but not used RA-RNTIs that could be reused as a different RNTI (C-RNTI, SPS-RNTI). No prior-art document considers the problem of having a limited number of available RNTI values.

4.4 Claim 31 is a method claim corresponding to claim 26 and as such also meets the requirements of the PCT with respect to novelty and inventive step.

Re Item VII

Certain defects in the international application

5.1 Independent claims 1, 19, 26, 27, 29, 30, 31 and 32 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-D4 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).

5.2 The claims (preamble and characterising portion) do not contain **reference signs** placed in parentheses (Rule 6.2(b) PCT).

5.3 The cited documents D1-D6, which represent the **relevant state of the art** with regard to the present application, are not acknowledged and briefly discussed in the opening part of the description, Rule 5.1 (a) (ii) PCT.

5.4 According to the requirements of Rule 11.13(I) **reference signs not appearing in the description shall not appear in the drawings**, and vice versa. This requirement is not met in view of the reference sign 460 in fig. 4A that does not appear in the description.

5.5 The Applicant's attention is drawn to some obvious typographical errors in the description and claims, namely:

- page 1, line 15: "new a radio" should read "a new radio"
- page 7, line 31: "RN-RNTI" should read "RA-RNTI"
- page 7, line 34: "RN-RNTI" should read "RA-RNTI"
- page 8, line 7: "RN-RNTI" should read "RA-RNTI"
- page 9, line 26: "RN-RNTI" should read "RA-RNTI"
- page 10, line 27: "may be generate" should read "may be generated"
- page 11, line 12: "a prior-knowledge" should read "a priori-knowledge"
- page 11, line 14: "a prior-knowledge" should read "a priori-knowledge"
- page 12, line 1: "RN-RNTI" should read "RA-RNTI"
- page 12, line 13: "there is also provided is" should read "there is also provided"
- page 30, line 7: "RN-RNTI" should read "RA-RNTI"
- Claims 6, 7, 9, 23: "RN-RNTI" should read "RA-RNTI"