

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference NC105408WO	FOR FURTHER ACTION		See Form PCT/IPEA/416
International application No. PCT/FI2018/050245	International filing date (day/month/year) 05.04.2018	Priority date (day/month/year)	
International Patent Classification (IPC) or national classification and IPC INV. H04W48/02			
Applicant Nokia Technologies Oy			
1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36. 2. This REPORT consists of a total of <u>6</u> sheets, including this cover sheet. 3. This report is also accompanied by ANNEXES, comprising: a. ☒ (sent to the applicant and to the International Bureau) a total of <u>9</u> sheets, as follows: ☒ sheets of the description, claims and/or drawings which have been amended and/or sheets containing rectifications authorized by this Authority, unless those sheets were superseded or cancelled, and any accompanying letters (see Rules 46.5, 66.8, 70.16, 91.2, and Section 607 of the Administrative Instructions). ☐ sheets containing rectifications, where the decision was made by this Authority not to take them into account because they were not authorized by or notified to this Authority at the time when this Authority began to draw up this report, and any accompanying letters (Rules 66.4bis, 70.2(e), 70.16 and 91.2). ☐ superseded sheets and any accompanying letters, where this Authority either considers that the superseding sheets contain an amendment that goes beyond the disclosure in the international application as filed, or the superseding sheets were not accompanied by a letter indicating the basis for the amendments in the application as filed, as indicated in item 4 of Box No. I and the Supplemental Box (see Rule 70.16(b)). b. ☐ (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing, in the form of an Annex C/ST.25 text file, as indicated in the Supplemental Box Relating to Sequence Listing (see paragraph 3ter of Annex C of the Administrative Instructions).			
4. This report contains indications relating to the following items: ☒ Box No. I Basis of the report ☐ 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 Article 35(2) with regard to novelty, inventive step or 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			
Date of submission of the demand 23.01.2020		Date of completion of this report 31.07.2020	
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Fax: +49 89 2399 - 4465		Authorized officer Biye, Nicole Telephone No. +49 89 2399-2608	



INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/FI2018/050245

Box No. I Basis of the report

1. With regard to the **language**, this report is based on
- ☒ 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 (under Rules 12.3(a) and 23.1(b))
 - ☐ publication of the international application (under Rule 12.4(a))
 - ☐ international preliminary examination (under Rules 55.2(a) and/or 55.3(a) and (b))
2. With regard to the **elements*** of the international application, this report is based on (*replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report*):

Description, Pages

3-23	as published	
1, 2, 2a	filed in electronic form on	06-05-2020

Claims, Numbers

1-25	filed in electronic form on	06-05-2020
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Drawings, Sheets

1/8-8/8	as published
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- ☐ a sequence listing - see Supplemental Box Relating to Sequence Listing.

3. ☒ The amendments have resulted in the cancellation of:
- ☐ the description, pages
 - ☒ the claims, Nos. 26,27
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing (*specify*):
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since either they are considered to go beyond the disclosure as filed, or they were not accompanied by a letter indicating the basis for the amendments in the application as filed, as indicated in the Supplemental Box (Rules 70.2(c) and (c-bis)):
- ☐ the description, pages
 - ☐ the claims, Nos.
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing (*specify*):
5. ☐ This report has been established:
- ☐ taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rules 66.1(d-bis) and 70.2(e)).
 - ☐ without taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91(Rules 66.4bis and 70.2(e)).

**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
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6. ☒ With regard to top-up searches (Rules 66.1 *ter* and 70.2(f)):
- ☒ A top-up search was carried out by this Authority on 14.05.2020 (all discovered documents are listed in the Supplemental Box Relating to Top-up Search).
 - ☐ Additional relevant documents have been discovered during the top-up search.
 - ☐ No top-up search was carried out by this Authority because it would serve no useful purpose.
7. ☐ Supplementary international search report(s) from Authority(ies) has/have been received and taken into account in establishing this report (Rule 45bis.8(b) and (c)).

* If item 4 applies, some or all of those sheets may be marked "superseded".

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	<u>1-25</u>
	No: Claims	
Inventive step (IS)	Yes: Claims	<u>1-25</u>
	No: Claims	
Industrial applicability (IA)	Yes: Claims	<u>1-25</u>
	No: Claims	

2. Citations and explanations (Rule 70.7):

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

Item V

A. Concerning paragraph V:

1 Reference is made to the following documents:

D1: Huawei, "Cell selection for NR non-standalone and NR standalone UE operation", R2-168569, XP051193100,

D2: LG Electronics Inc., "Connection Establishment and Access Control for Standalone NR", R2-167022,

D3: WO 2017/065548 A1

D4: WO 2017/195463 A1

D5: US 2017/288888 A1

2 Novelty (Article 33(2) PCT) and inventive step (Article 33(3) PCT):

2.1 Regarding **claim 1**

2.1.1 Document **D1** (see paragraphs 1 to 2.3) is regarded as being the prior art closest to the subject-matter of **claim 1** and discloses (the references in parentheses relate to passages from **D1**), in the wording of **claim 1**, a method comprising:

detecting a cell at a user equipment associated with **a first public land mobile network of a plurality of public land mobile networks** (implicit from e.g. "NR cell", "NGC" and "network selection" paragraph 2.3);

receiving, at the user equipment, an **indication as to whether the cell is available for standalone access for the first public land mobile network** (implicit from "reselect to a standalone NR cell", "NGC", "NR cell type information should be broadcasted" and "UE to recognize ... Standalone NR cell" paragraph 2.3); and

determining, at the user equipment and based on the indication for the first public land mobile network, whether to request standalone access to the cell (see "UE requests to access the NR cell" after "NR cell type information should be broadcasted" and "UE to recognize ... Standalone NR cell" paragraph 2.3).

2.1.2 The subject-matter of **claim 1** differs from this known method in that, in **claim 1**

the user equipment is associated with a **first** public land mobile network, PLMN, of a **plurality of PLMNs supported by the cell**;

the receiving comprises receiving, **for each of the plurality of PLMNs supported by the cell**, an indication as to **whether the cell is available for standalone access for a corresponding one of the PLMNs**, wherein the **indication comprises a presence or absence of a tracking area code for the corresponding PLMN**.

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

2.1.3 These distinguishing features have the **technical effect** of allowing a user equipment, UE, to avoid unsuccessful standalone access attempts to a cell, shared by a plurality of PLMNs, when said cell does not support standalone access for a PLMN to which the UE is associated among said plurality of PLMNs, thereby enabling UE power saving.

2.1.4 The **problem** to be solved by the present invention starting from **D1** is therefore regarded as how to allow a UE to avoid repeated failures of initial access to a cell shared by a plurality of PLMNs.

The solution to this problem proposed in **claim 1** is not thought by any of the available prior art documents and does not appear to be obviously derivable from any of the cited prior art documents, taken alone or in combination with another document, e.g.:

document **D2** related to per-slice access control (e.g. per-PLMN access control) due to varying load conditions that could be supported in standalone NR;

document **D3** that discloses system information acquisition in a cell of a wireless communication system, in particular wherein configuration information provided to a UE/device in a cell depends on whether the cell is in standalone or non-standalone mode;

document **D4** that describes dual connectivity, standalone and non-standalone modes;

and document **D5** that is related only standalone MBSFN cells for broadcast services provision.

2.1.5 **Claim 1** appears therefore to involve an inventive step (Article 33(3) PCT).

2.2 The same considerations as made in above paragraph 2.1 regarding novelty

(Article 33 (2) PCT) and inventive step (Article 33 (2) PCT) of **claim 1** apply *mutatis mutandis* to **independent claims 9, 13, 14 and 22** since they are based on the same, inter-related or corresponding feature combination as **claim 1**.

Therefore, **claims 9, 13, 14 and 22**, that would be amended to correct the minor objections listed in paragraph B. below, appear also to meet the requirements of Article 33 (1) PCT.

- 2.3 **Claims 2 to 8, 10 to 12, 15 to 21 and 23 to 25** are respectively **dependent** on claims 1, 9, 13, 14 and 22 and, as such, appear also to meet the requirements of the PCT with respect to novelty and inventive step (Articles 33(2), (3) PCT).

Item VIII

B. Concerning paragraph VIII:

The following clarity issues (Article 6 PCT) should be considered at Entry into the Regional Phase before the EPO.

- 1 As already mentioned in the Written Opinion issued on 20-03-2020, the **independent claims** do not clearly define the apparatus/device in said claims, contrary to the description that conveys the impression that the apparatuses and device involved are only related/of a **user equipment** and a **base station**. Only claim 1, independent claim 14 and the related dependent claims were amended.

This deficiency applies to **claims 9 to 12 and 22 to 25**, wherein the "device" is/ should read "user equipment" (UE) and the transmission should be by/at a "base station"; **claim 22**, wherein "apparatus" should read "apparatus of a base station" (the transmission step should refer to **the** base station), **claim 13** should also be amended to refer to a computing device "of a base station" (PCT-EPO Guidelines, F-IV, 3.8.2) and to any of the methods of claims 1 to **12**, not claims 1 to **13**.
- 2 For consistency of the terminology and scope (Rule 10.2 PCT) **claims 9 and 22** should define that the UE is associated with a first PLMN of the plurality of PLMNs.
- 3 Also, the relation between "base station" and "cell" should be clearly defined in **claims 9 and 22**.

NOKIA

1 (2)

Intellectual Property Rights

6 May 2020

European Patent Office
International Preliminary Examination Authority
D-80298 Munich
Germany

International Patent Application No. PCT/FI2018/050245
Nokia Technologies Oy
Applicant's file ref: NC105408WO

In response to the Written Opinion (WO) of the international preliminary examination authority (IPEA) dated 20.3.2020, the applicant submits a new set of claims and comments.

Amendments

Please find a new set of claims.

It has been specified in the independent claims which entity performs the actions in each of the method/apparatus claims, as requested in point D.1 of the Communication. Consequently, dependent claims 4 and 17 were also amended from "*device*" and "*apparatus*" into "*user equipment*".

Claims 11 and 24 have been amended to address the objection in point A of the Communication. The amendment brings the addressed term "*with respect to*" back to its original form "*from*".

Claims 26 and 27 have been cancelled, without prejudice, to address the objection in point D.2 of the Communication.

To address the objections in point C of the Communication, documents D1 and D2 are now introduced in the background section and reference signs have been added to the claims in parenthesis. It is noted that already the first feature of the independent claims contains subject matter differentiating the corresponding claim from the closest prior art (D1), and thus the use of two part from is seen unnecessary.

No new matter is added and the claims are clear to a one skilled in the art.

Other

The Applicant therefore submits that the present invention is both novel and inventive over each cited prior art alone or in combination (as acknowledged in point B of the Communication), and looks forward to receiving a positive International Preliminary Examination Report (IPER).

The applicant's authorised representative would be pleased to discuss the application with the examiner of the international preliminary examination authority (IPEA), if seen appropriate.

Yours faithfully,

Nokia Technologies Oy

NOKIA

2 (2)

/Ari Aarnio/
Representative

ENC

Claims

1. A method comprising:

detecting (S710) a cell at a user equipment (510) associated with a first public land mobile network of a plurality of public land mobile networks supported by the cell;

5 receiving (S720), at the user equipment (510) for each of the plurality of public land mobile networks supported by the cell, an indication as to whether the cell is available for standalone access for a corresponding one of the public land mobile networks, wherein the indication comprises a presence or absence of a tracking area code for the corresponding public land mobile network; and

10 determining (S730), at the user equipment (510) and based on the indication for the first public land mobile network, whether to request standalone access to the cell.

2. A method as claimed in claim 1, wherein the cell is available for standalone access for some of the plurality of public land mobile networks; and the cell is unavailable for standalone access for some of the plurality of public land mobile networks.

15

3. A method as claimed in any preceding claim, comprising if the indications indicate that the cell is available for standalone access for the first public land mobile network, requesting (S740) standalone access for the cell.

20 4. A method as claimed in claim 3, wherein at least prior to requesting standalone access for the cell, the user equipment is in IDLE mode.

25 5. A method as claimed any preceding claim, comprising if the indications indicate that the cell is unavailable for standalone access for the first public land mobile network, accessing (S760) the cell when configured to operate in dual connectivity mode.

30 6. A method as claimed in any preceding claim, comprising receiving from the base station, a system information block comprising the indications as to whether the cell is available for standalone access for the plurality of public land mobile networks.

7. A method as claimed in any preceding claim, wherein for at least one of the plurality of public land mobile networks, the indication comprises a binary indicator in a field of tracking area code information.

8. A method as claimed in any preceding claim, wherein, for at least one of the plurality of public land mobile networks, the indication comprises a binary indicator in cell access related information.

5 9. A method comprising:

for each of a plurality of public land mobile networks supported by a cell, causing a transmission (S810), from a base station (620) to a device, of an indication as to whether the cell is available for standalone access for a corresponding one of the public land mobile networks, wherein the indication comprises a presence or absence of a tracking area code for the corresponding public land mobile network.

10. A method as claimed in claim 9, comprising if the indication indicates that the cell is available for standalone access for a first public land mobile network supported by the device, receiving (S830) a request for standalone access to the cell from the device.

11. A method as claimed in any of claims 9 to 10, comprising if the indication indicates that the cell is unavailable for standalone access for a first public land mobile network supported by the device, receiving a request for non-standalone access to the cell from the device.

12. A method as claimed in any of claims 9 to 11, comprising causing the transmission to the device of a system information block comprising the indications as to whether the cell is available for standalone access for the plurality of public land mobile networks.

13. A computer program comprising instructions such that when the computer program is executed on a computing device provides a method, the computing device is arranged to perform the steps of any of claims 1 to 13.

14. An apparatus for a user equipment (610), the apparatus comprising:

at least one processor and at least one memory including a computer program code, the at least one memory and the computer program code configured to, with the at least one processor, cause the apparatus at least to:

detect (S710) a cell at a user equipment (510) associated with a first public land mobile network of a plurality of public land mobile networks supported by the cell;

receive (S720), at the user equipment (510) for each of the plurality of public land mobile networks supported by the cell, an indication as to whether the cell is available for standalone access for a corresponding one of the public land mobile networks, wherein the indication comprises a presence or absence of a tracking area code for the corresponding public land mobile network; and

determine (S730), at the user equipment (510) and based on the indication for the first public land mobile network, whether to request standalone access to the cell.

15. An apparatus as claimed in claim 14, wherein the cell is available for standalone access for some of the plurality of public land mobile networks; and the cell is unavailable for standalone access for some of the plurality of public land mobile networks.

16. An apparatus as claimed in claim 14 or claim 15, configured to, if the indications indicate that the cell is available for standalone access for the first public land mobile network, request (S740) standalone access to the cell.

17. An apparatus as claimed in any of claims 14 to 16, wherein at least prior to requesting standalone access for the cell, the user equipment is in IDLE mode.

18. An apparatus as claimed in any of claims 14 to 17, configured to, if the indications indicate that the cell is unavailable for standalone access for the first public land mobile network, access (S760) the cell when configured to operate in dual connectivity mode.

19. An apparatus as claimed in any of claims 14 to 18, configured to receive from the base station, a system information block comprising the indications as to whether the cell is available for standalone access for the plurality of public land mobile networks.

20. An apparatus as claimed in any of claims 14 to 19, wherein, for at least one of the plurality of public land mobile networks, the indication comprises a binary indicator in a field of tracking area code information.

21. An apparatus as claimed in any of claims 14 to 20, wherein, for at least one of the plurality of public land mobile networks, the indication comprises a binary indicator in cell access related information.

22. An apparatus comprising:

at least one processor and at least one memory including a computer program code, the at least one memory and the computer program code configured to, with the at least one processor, cause the apparatus at least to:

for each of a plurality of public land mobile networks supported by a cell, cause a transmission (S810), from a base station (620) to a device, of an indication as to whether the cell is

available for standalone access for a corresponding one of the public land mobile networks, wherein the indication comprises a presence or absence of a tracking area code for the corresponding public land mobile network.

- 5 23. An apparatus as claimed in claim 22, configured to, if the indication indicates that the cell is available for standalone access for a first public land mobile network supported by the device, receive (S830) a request for standalone access to the cell from the device.
- 10 24. An apparatus as claimed in either of claim 22 or claim 23, configured to, if the indication indicates that the cell is unavailable for standalone access for a first public land mobile network supported by the device, receive a request for non-standalone access to the cell from the device.
- 15 25. An apparatus as claimed in any of claims 22 to 24, configured to cause the transmission to the device of a system information block comprising the indications as to whether the cell is available for standalone access for the plurality of public land mobile networks.

Improving Cell Access Procedure

Field

- 5 The present application relates to a method, apparatus, system and computer program. In particular, but not exclusively, the present application relates to determining whether to perform an access procedure in a cell in dependence upon whether or not the cell supports standalone access for a public land mobile network of a device.

10 Background

- A communication system can be seen as a facility that enables communication sessions between two or more entities such as user terminals, base stations and/or other nodes by providing carriers between the various entities involved in the communications path. A communication system can be provided, for example, by means of a communication network and one or more compatible
15 communication devices. The communication sessions may comprise, for example, communication of data for carrying communications such as voice, video, electronic mail (email), text message, multimedia and/or content data and so on. Non-limiting examples of services provided comprise two-way or multi-way calls, data communication or multimedia services and access to a data network system, such as the Internet.

- 20 In a wireless communication system, at least a part of a communication session between at least two stations occurs over a wireless link. Examples of wireless systems comprise public land mobile networks (PLMN), satellite based communication systems and different wireless local networks, for example wireless local area networks (WLAN). The wireless systems can typically be divided into cells,
25 and are therefore often referred to as cellular systems.

- A user can access the communication system by means of an appropriate communication device or terminal. A communication device of a user may be referred to as user equipment (UE) or user device. A communication device is provided with an appropriate signal receiving and transmitting apparatus
30 for enabling communications, for example enabling access to a communication network or communications directly with other users. The communication device may access a carrier provided by a station, for example a base station of a cell, and transmit and/or receive communications on the carrier.

- 35 The communication system and associated devices typically operate in accordance with a given standard or specification which sets out what the various entities associated with the system are permitted to do and how that should be achieved. Communication protocols and/or parameters which shall be used for the connection are also typically defined. One example of a communications system

is UTRAN (3G radio). Other examples of communication systems are the long-term evolution (LTE) of the Universal Mobile Telecommunications System (UMTS) radio-access technology and so-called 5G or New Radio (NR) networks. Standardization of 5G or New Radio networks is currently under discussion. LTE is being standardized by the 3rd Generation Partnership Project (3GPP). Documents

5 *"Cell selection for NR non-standalone and NR standalone UE operation"* (R2-168569) and *"Connection establishment and access control for standalone NR"* (R2-167022) discuss network access in connection of NR.

Summary

10 According to a first aspect, there is provided a method comprising: detecting at a device associated with a first public land mobile network, a cell; receiving, for each of a plurality of public land mobile networks supported by the cell, an indication as to whether or not the cell is available for standalone access for that public land mobile network; and determining, in dependence upon the indications and based on the first public land mobile network, whether to request standalone access of the cell.

15 In some embodiments, the cell is available for standalone access for some of the plurality of public land mobile networks; and the cell is unavailable for standalone access for some of the plurality of public land mobile networks.

20 In some embodiments, the method comprises, if the indications indicate that the cell is available for standalone access for the first public land mobile network, requesting standalone access for the cell.

In some embodiments, at least prior to requesting standalone access for the cell, the device is in IDLE mode.

25 In some embodiments, the method comprises, if the indications indicate that the cell is unavailable for standalone access for the first public land mobile network, accessing the cell in dual connectivity mode.

30 In embodiment, the method comprises receiving from the base station, a system information block comprising the indications as to whether or not the cell is available for standalone access for the plurality of public land mobile networks.

35 In some embodiments, wherein for at least one of the plurality of public land mobile networks, the indication comprises a presence or absence of a tracking area code.

In some embodiments, wherein for at least one of the plurality of public land mobile networks, the indication comprises a binary indicator in a field of tracking area code information.

In some embodiments, wherein, for at least one of the plurality of public land mobile networks, the indication comprises a binary indicator in cell access related information.