

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/EP2021/054185

International filing date (day/month/year)
19.02.2021

Priority date (day/month/year)
20.02.2020

International Patent Classification (IPC) or both national classification and IPC
INV. H04W8/24 ADD. H04W92/24

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:



European Patent Office
D-80298 Munich
Tel. +49 89 2399 - 0
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Date of completion of
this opinion

see form
PCT/ISA/210

Authorized Officer

Bösch, Michael

Telephone No. +49 89 2399-0



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. II Priority

1. ☒ The validity of the priority claim has not been considered because the International Searching Authority does not have in its possession a copy of the earlier application whose priority has been claimed or, where required, a translation of that earlier application. This opinion has nevertheless been established on the assumption that the relevant date (Rules 43bis.1 and 64.1) is the claimed priority date.
2. ☐ This opinion has been established as if no priority had been claimed due to the fact that the priority claim has been found invalid (Rules 43bis.1 and 64.1). Thus for the purposes of this opinion, the international filing date indicated above is considered to be the relevant date.
3. Additional observations, if necessary:

see separate sheet

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, 5, 6, 11, 12</u>
	No: Claims	<u>1, 3, 4, 7-10, 13, 14</u>
Inventive step (IS)	Yes: Claims	
	No: Claims	<u>1-14</u>
Industrial applicability (IA)	Yes: Claims	<u>1-14</u>
	No: Claims	

2. Citations and explanations

see separate sheet

Box No. VI Certain documents cited

1. Certain published documents (Rules 43bis.1 and 70.10)

and / or

2. Non-written disclosures (Rules 43bis.1 and 70.9)

see form 210

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 Reference is made to the following documents, which are cited in the International Search Report:
- D1 US 2020/053554 A1 (KIM SUNGHOON [KR] ET AL) 13 February 2020 (2020-02-13)
- D2 NOKIA ET AL: "Support of RACS in PLMNs with distributed and-non coordinated filtering of UE radio capabilities", 3GPP DRAFT; S2-1907073 23.501 CR ON MULTIPLE IDS, 3RD GENERATION PARTNERSHIP PROJECT (3GPP), MOBILE COMPETENCE CENTRE ; 650, ROUTE DES LUCIOLES ; F-06921 SOPHIA-ANTIPOLIS CEDEX ; FRANCE, vol. SA WG2, no. Sapporo, Japan; 20190624 - 20190628 18 June 2019 (2019-06-18), XP051752048, Retrieved from the Internet: URL:<http://www.3gpp.org/ftp/tsg%5Fsa/WG2%5FArch/TSGS2%5F134%5FSapporo/Docs/S2%2D1907073%2Ezip> [retrieved on 2019-06-18]
- D3 "3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; System architecture for the 5G System (5GS); Stage 2 (Release 16)", 3GPP STANDARD; TECHNICAL SPECIFICATION; 3GPP TS 23.501, 3RD GENERATION PARTNERSHIP PROJECT (3GPP), MOBILE COMPETENCE CENTRE ; 650, ROUTE DES LUCIOLES ; F-06921 SOPHIA-ANTIPOLIS CEDEX ; FRANCE, vol. SA WG2, no. V16.3.0 22 December 2019 (2019-12-22), pages 1-417, XP051840930, Retrieved from the Internet: URL:ftp://ftp.3gpp.org/Specs/archive/23_series/23.501/23501-g30.zip 23501-g30.docx [retrieved on 2019-12-22]
- D4 "3rd Generation Partnership Project; Technical Specification Group Core Network and Terminals; 5G System; UE Radio Capability Management Services Stage 3 (Release 16)", 3GPP STANDARD; TECHNICAL SPECIFICATION; 3GPP TS 29.673, 3RD GENERATION PARTNERSHIP PROJECT (3GPP), MOBILE COMPETENCE CENTRE ; 650, ROUTE DES LUCIOLES ; F-06921 SOPHIA-ANTIPOLIS CEDEX ; FRANCE, no. V1.0.0 2 December 2019 (2019-12-02), pages 1-37, XP051840666, Retrieved from the Internet: URL:ftp://ftp.3gpp.org/Specs/archive/29_series/29.673/29673-100.zip 29673-100.docx [retrieved on 2019-12-02]

- D5 ERICSSON ET AL: "Populating New Version Id via Notification", 3GPP DRAFT; C4-203231, 3RD GENERATION PARTNERSHIP PROJECT (3GPP), MOBILE COMPETENCE CENTRE ; 650, ROUTE DES LUCIOLES ; F-06921 SOPHIA-ANTIPOLIS CEDEX ; FRANCE, vol. CT WG4, no. E-Meeting; 20200602 - 20200612 21 May 2020 (2020-05-21), XP051887319, Retrieved from the Internet: URL:https://ftp.3gpp.org/tsg_ct/WG4_protocollars_ex-CN4/TSGCT4_98e_meeting/Docs/C4-203231.zip C4-203231_populating_version_id_29674.docx [retrieved on 2020-05-21]
- D6 "3rd Generation Partnership Project; Technical Specification Group Core Network and Terminals; 5G System; UE radio capability management services; Stage 3 (Release 16)", 3GPP DRAFT; 29673-G10, 3RD GENERATION PARTNERSHIP PROJECT (3GPP), MOBILE COMPETENCE CENTRE ; 650, ROUTE DES LUCIOLES ; F-06921 SOPHIA-ANTIPOLIS CEDEX ; FRANCE, 8 July 2020 (2020-07-08), XP051907255, Retrieved from the Internet: URL:https://ftp.3gpp.org/3gppInternal/3GPP_ultimate_versions_to_be_transposed/sentToDpc/29673-g10.zip 29673-g10.docx [retrieved on 2020-07-08]
- D7 WO 2020/222842 A1 (NOKIA TECHNOLOGIES OY [FI]; NOKIA USA INC [US]) 5 November 2020 (2020-11-05)

Item VI

Certain documents cited:

2 Certain published documents (see Rule 70.10 PCT)

Publication number	Publication date	Filing date	Priority date
D5=C4-203231 (XP051887319)	21.5.21	-	-
D6=TS 29.673 V16.1.0 (XP051907255)	8.7.20	-	-
D7=WO 2020/222842 A1	5.11.20	1.5.19	-

Item II

Priority of the international application

- 3 The documents D5, D6, D7 indicated in the International Search Report as P-documents are presently not (see Rule 64.3 PCT) regarded as state of the art according to Articles 33(2) and (3) PCT, as it actually is assumed that the date of priority claimed can be allowed for the relevant parts of the present application (see Rule 64.1 b) ii) PCT).
- 4 However, D5 and D6 may become of high relevance if this assumption is not correct, and D7 may become of certain relevance when entering into the national phase (e.g. see Article 54(3) EPC).

Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability

- 5 The present application does not meet the requirements of Article 33(2) PCT, because the subject-matter of **Claims 1, 8** is not novel.
- 5.1 The respectively claimed subject-matter is not novel, because the document D1 already discloses
- a) a method of operation a core network entity in a core network of a cellular communications system (see D1, paragraphs 98, 119, figures 7, 8, the UDR which can be replaced by a UCMF defined in 3GPP), the method comprising:
 - sending, to another core network entity, a notification message that comprises a request to replace a PLMN UE radio capability ID(s) containing a first version ID with a PLMN UE radio capability ID(s) containing a second version ID, the second version ID being newer than the first version ID (see D1, paragraphs 113, 116, 125, figures 7, 8, steps 721, 723, 819, 821), and
 - b) a method of operation a core network entity in a core network of a cellular communications system (see D1, figures 7, 8, the AMF, AMF2), the method comprising:
 - receiving from another core network entity, a notification message that comprises a request to replace a PLMN UE radio capability ID(s) containing a first version ID with a PLMN UE radio capability ID(s) containing a second version ID, the second version ID being newer than the first version ID (see D1, paragraphs 113, 116, 125, figures 7, 8, steps 721, 723, 819, 821); and

- performing one or more actions responsive to receiving the notification message (see D1, paragraphs 113, 116, 125).
- 5.2 Accordingly all features of independent Claims 1, 8 are known from D1 and its claimed subject-matter is thus not novel within the meaning of Article 33(2) PCT.
- 6 The subject-matter of the corresponding network node **Claim 14** lacks novelty in the sense of Article 33(2) PCT for the same reasons.
- 7 It is furthermore pointed out that even if the above novelty objection were overcome by amendments of a minor nature, the subject-matter of independent **Claims 1, 8, 14** would still not seem to involve an inventive step (see Article 33(3) PCT) in the light of the above cited document D1 or a combination of D2 and D3, especially as these documents disclose (D1) or suggest (D1+D3, or D2+D3) the same type of solution as the present application (please see D2, sections 5.4.4.1a, 6.2.21, 5.2.18.2, see D3, sections 5.4.4.1a, 5.9.10, 6.2.21).
- 8 The dependent **Claims 2-7, 9-13** do not appear to contain any additional features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT with respect to novelty or inventive step, the reasons being that their features have already been employed for the same purpose in the prior art or consist of slight constructional changes which come within the scope of the customary practice followed by persons skilled in the art (**Claim 2**: see D2, section 5.4.4.1a, **Claims 3, 7, 9, 13**: see the preceding paragraphs, **Claims 4, 5, 10, 11**: see D1, paragraph 113, figure 7, step 717, see D3, sections 5.2.18.2, 6.2.21, see D4, sections 5.2.1, 5.2.2.4.1, 5.2.2.6.1, etc).
- 9 The claimed subject-matter is industrially applicable. Thus, the requirements of Article 33(4) PCT are fulfilled.

Item VIII

Clarity of the international application:

- 10 The application does not meet the requirements of Article 6 PCT.
- 10.1 The independent **Claims 1, 8** do not clearly define the matter for which protection is sought and lack an apparently essential feature of the invention. Thus, the requirements of Article 6 PCT in combination with Rule 6(3)(b) PCT concerning clarity are not fulfilled.

- 10.2 It is clear from paragraph 31, figure 4, steps 3, 11, of the application (see also D5, D6), that the contribution to the art of the present invention is a new operation "replace" to request the AMF/MME to use one or more PLMN Assigned UE Radio Capability IDs with a newer version, which is included in the notification and/or UcmfNotificationData.
- 10.3 Since independent **Claims 1, 8** does not contain this feature, they do not meet the requirement following from Article 6 PCT taken in combination with Rule 6(3)(b) PCT that any independent claim must contain all the technical features essential to the invention.

Item VII

Certain defects (form, content) in the international application:

- 11 When entering the national/regional phase, the following aspects should also receive attention:
- 11.1 If appropriate, the independent claims should be drafted in the proper two-part "characterised" form recommended by Rule 6.3.(b),(i),(ii) PCT, having a preamble that correctly reflects the nearest prior art, presumably that represented by the above noted D1 or D2.
- 11.2 If necessary, the description, should be brought into conformance with any claims newly filed (see Rule 5.1(a)(iii) PCT).
- 11.3 The description (e.g. paragraphs 9-13, 42) should be presented in the order specified by Rule 5.1(a) PCT (see Rule 5.1(b) PCT).
- 11.4 In order to meet the requirements of Rule 5.1(a),(ii) PCT, the documents D1-D3 should be identified in the description and the relevant background art disclosed therein should be briefly discussed.
- 11.5 The attention of the Applicant is finally drawn to the fact that the application may not be amended in such a way that it contains subject-matter which extends beyond the content of the application as filed (see Articles of the national law corresponding to Article 34.2(b) PCT like e.g. Article 123(2) EPC).

TRATADO DE COOPERACIÓN EN MATERIA DE PATENTES

De
Autoridad de Búsqueda Internacional

Para

:

Ver formulario PCT/ISA/220

PCT

OPINION ESCRITA DE LA AUTORIDAD DE
BÚSQUEDA INTERNACIONAL
(PCT Rule 43bis.1)

Fecha de envío
(día/mes/año) Ver formulario PCT/ISA/210(segunda hoja)

Referencia del archivo del solicitante o agente

Ver formulario PCT/ISA/220

PARA ACCIÓN ADICIONAL

Véase parágrafo 2

Solicitud Internacional No.

PCT/EP2021/054185

Fecha de presentación
internacional (día/mes/año)

19.02.2021

Fecha de prioridad (día/mes/año)

20.02.2020

Clasificación Internacional de Patentes (IPC) o clasificación nacional e IPC

INV. H04W8/24 ADD. H04W92/24

Solicitante

TELEFONAKTIEBOLAGET LM ERICSSON (PUBL)

1. Esta opinión contiene indicaciones relacionadas con los siguientes elementos:

- | | |
|--|---|
| ☒ Casilla No. I | Bases de la opinión |
| ☒ Casilla No. II | Prioridad |
| ☐ Casilla No. III | No establecimiento de opinión con respecto a la novedad, la actividad inventiva y la aplicabilidad industrial |
| ☐ Casilla No. IV | Falta de unidad de invención |
| ☒ Casilla No. V | Declaración motivada según el artículo 35(2) con respecto a la novedad, la actividad inventiva o la aplicabilidad industrial; citas y explicaciones que respaldan dicha declaración |
| ☒ Casilla No. VI | Ciertos documentos citados |
| ☒ Casilla No. VII | Ciertos defectos en la solicitud internacional |
| ☒ Casilla No. VIII | Ciertas observaciones sobre la solicitud internacional |

2. ACCIONES ADICIONALES

Si se hace una solicitud de examen preliminar internacional, esta opinión generalmente se considerará como una opinión escrita de la Autoridad encargada del examen preliminar internacional "IPEA", excepto que esto no se aplica cuando el solicitante elige una autoridad distinta a esta para que sea la IPEA. y la IPEA elegida ha notificado a la Oficina internacional conforme a la Regla 66.1bis(b) que las opiniones escritas de esta autoridad encargada de la búsqueda internacional no serán consideradas.

Si, como se indica anteriormente, esta opinión se considera una opinión escrita de la IPEA, se invita al solicitante a que presente a la IPEA una respuesta por escrito junto, cuando corresponda, con enmiendas, antes de la expiración de 3 meses a partir de la fecha de envío por correo. del formulario PCT/ISA/220 o antes del vencimiento de 22 meses a partir de la fecha de prioridad, lo que venza más tarde.

Para obtener más opiniones, consulte el formulario PCT/ISA/220.

Nombre y dirección de la ISA

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D-80298 Munich

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Fecha de terminación de
esta opinión

Ver Formulario
PCT/ISA/210

Funcionario Autorizado

Bosch, Michael

Telefono No. +49 89 2399-0

Casilla No. I Bases de la opinión

1. Con respecto al **idioma**, este reporte se basa en
 - ☒ la solicitud internacional en el idioma en que se presentó
 - ☐ una traducción de la solicitud internacional a , que es el idioma de una traducción proporcionada con el propósito de búsqueda internacional (según las Reglas 12.3 (a) y 23.1 (b))
2. ☐ Esta opinión ha sido establecida teniendo en cuenta la **rectificación de un error obvio** autorizado o notificado a esta Autoridad bajo la Regla 91 (Regla 43bis.1(a)).
3. ☐ Con respecto a cualquier **nucleótido y/o secuencia de aminoácidos** divulgada en la aplicación internacional, esta opinión ha sido establecida con base en una lista de secuencias:
 - a. ☐ formando parte de la aplicación internacional como se presentó.
 - ☐ en forma de un Anexo C/ST.25 archivo de texto.
 - ☐ en papel o en ella forma de un archivo de imagen.
 - b. ☐ proporcionado junto con la solicitud internacional en virtud de la Regla 13ter.1(a) del PCT a los efectos de la búsqueda internacional únicamente en el formato de anexo en un archivo de texto C/ST.25.
 - c. ☐ proporcionado posterior a la fecha de solicitud internacional para los efectos de la búsqueda internacional únicamente
 - ☐ en forma de anexo en un archivo de texto C/ST.25 (Regla 13ter.1(a))
 - ☐ en papel o en ella forma de un archivo de imagen (Regla 13ter.1(b) y la sección 713 de las instrucciones administrativas)
4. ☐ En adición, en caso de que una o más de una versión o copias de los listados de secuencias hayan sido presentadas o proporcionadas, se proporcionaron las declaraciones requeridas de que la información en las copias posteriores o adicionales es idéntica a la que forma parte de la solicitud presentada o no excede a la solicitud presentada, según corresponda.
5. Comentarios adicionales:

Casilla No. II Prioridad

1. ☒ No se ha considerado la validez de la reivindicación de prioridad porque la Administración encargada de la búsqueda internacional no tiene en su poder una copia de la solicitud anterior cuya propiedad se ha reivindicado o, en su caso, una traducción de la solicitud anterior. Sin embargo, esta opinión se ha establecido en el supuesto de que la fecha pertinente (Reglas 43bis, 1 y 64.1) es la fecha de prioridad reivindicada.
2. ☐ Esta opinión se ha establecido como si no se hubiera reivindicado la prioridad debido a que la reivindicación de prioridad se ha declarado inválida (Reglas 43bis. 1 y 64.1). Por lo tanto, a los efectos de esta opinión, se considera que la fecha de presentación internacional indicada anteriormente es la fecha pertinente.
3. Observaciones adicionales, si son necesarias:

Ver hoja separada

**REPORTE PRELIMINAR
INTERNACIONAL SOBRE
PATENTABILIDAD**

Solicitud internacional No.
PCT/EP2021/054185

Casilla No. IV Declaración de motivos según la Regla 43bis. 1(a)(i) sobre la novedad, la actividad inventiva y aplicabilidad industrial; citas y explicaciones de soporte para dicha declaración

1. Declaración

Novedad (N)	Si:	Reivindicaciones	<u>2, 5, 6, 11, 12</u>
	No:	Reivindicaciones	<u>1, 3, 4, 7-10, 13, 14</u>
Nivel Inventivo (IS)	Yes:	Reivindicaciones	
	No:	Reivindicaciones	<u>1-14</u>
Aplicacion Industrial (IA)	Yes:	Reivindicaciones	<u>1-14</u>
	No:	Reivindicaciones	

2. Citaciones y explicaciones

Ver Hoja Separada

Casilla No. VI Ciertos documentos citados

1. Ciertos documentos publicados (Reglas 43bis. 1 y 70.10)

y/o

2. Divulgaciones no escritas (Reglas 43bis. 1 y 70.9)

Ver hoja separada

Casilla No. VII Ciertos efectos en la aplicación internacional

Los siguientes defectos en la forma o contenidos de la aplicación internacional fueron evidenciados:

Ver hoja separada

Casilla No. VIII Ciertas observaciones de la aplicación internacional

Las siguientes observaciones en la claridad de las reivindicaciones, descripción y dibujos o en la cuestión si las reivindicaciones están completamente soportadas por la descripción, fueron hechas:

Ver hoja separada

1. Se hace referencia a los siguientes documentos, que se citan en el Informe de búsqueda internacional:

D1 US 2020/053554 A1 (KIM SUNGHOON [KR] ET AL) 13 de febrero 2020 (2020-02-13)

D2 NOKIA ET AL: "Soporte de RACS en PLMN con filtrado distribuido y no coordinado de capacidades de radio de UE", 3GPP DRAFT; S2-1907073 23.501 CR EN ID MÚLTIPLES, PROYECTO DE ASOCIACIÓN DE 3.^a GENERACIÓN (3GPP), CENTRO DE COMPETENCIA MÓVIL; 650, RUTA DES LUCIOLES; F-06921 SOPHIA-ANTIPOLIS CEDEX; FRANCIA, vol. SA WG2, no. Sapporo, Japón; 20190624 - 20190628 18 de junio de 2019 (2019-06-18), XP051752048, Obtenido de Internet: URL:<http://www.3gpp.org/ftp/tsg%5Fsa/WG2%5FArch/TSGS2%5F134%5FSapporo/Docs/S2%2D1907073%2Ezip> [obtenido el 2019-06-18]

D3 "Proyecto de asociación de tercera generación; Servicios del grupo de especificaciones técnicas y aspectos del sistema; Arquitectura del sistema para el sistema 5G (SGS); Etapa 2 (Versión 16)", ESTÁNDAR 3GPP; ESPECIFICACIÓN TÉCNICA; 3GPP TS 23.501, PROYECTO DE ASOCIACIÓN DE 3.^a GENERACIÓN (3GPP), CENTRO DE COMPETENCIA MÓVIL; 650, RUTA DES LUCIOLES ; F-06921 SOPHIA-ANTIPOLIS CEDEX ; FRANCIA, vol. SA WG2, no. V16.3.0 22 de diciembre de 2019 (2019-12-22), páginas 1-417, XP051840930, Obtenido de Internet: URL:<ftp://ftp.3gpp.org/Specs/archive/23 series/23.501/23501-g30 .zip> 23501-g30.docx [obtenido el 22/12/2019]

D4 "Proyecto de asociación de tercera generación; Red central y terminales del grupo de especificaciones técnicas; Sistema 5G; Servicios de gestión de capacidad de radio de la UE Etapa 3 (Versión 16)", ESTÁNDAR 3GPP; ESPECIFICACIÓN TÉCNICA; 3GPP TS 29.673, PROYECTO DE ASOCIACIÓN DE 3.^a GENERACIÓN (3GPP), CENTRO DE COMPETENCIA MÓVIL; 650, RUTA DES LUCIOLES; F-06921 SOPHIA-ANTIPOLIS CEDEX ; FRANCIA, No. V1.0.0 2 de diciembre de 2019 (2019-12-02), páginas 1-37, XP051840666, Obtenido de Internet: URL:<ftp://ftp.3gpp.org/Specs/archive/29 series/29.673/29673-100 .zip> 29673-100.docx [obtenido el 2019-12-02]

D5 ERICSSON ET AL: "Relleno de ID de nueva versión mediante notificación", 3GPP DRAFT; C4-203231, PROYECTO DE COLABORACIÓN DE 3.^a GENERACIÓN (3GPP), CENTRO DE COMPETENCIA MÓVIL; 650, RUTA DES LUCIOLES; F-06921 SOPHIA-ANTIPOLIS CEDEX; FRANCIA, vol. CT WG4, no. reunión electrónica; 20200602 - 20200612 21 de mayo de 2020 (2020-05-21), XP051887319, Obtenido de Internet: URL: <https://ftp.3gpp.org/tsg ct/ WG4 protocollars ex-CN4/TSGCT4 98e meeting/Docs/C4-203231.zip> C4-203231 poblando la versión id 29674.docx [obtenido el 2020-05-21]

**OPINION ESCRITA DE LA AUTORIDAD
INTERNACIONAL DE BÚSQUEDA (Hoja
separada)**

Aplicación internacional No.

PCT/EP2021/054185

- | | |
|----|---|
| D6 | "Proyecto de asociación de tercera generación; Terminales y red central del grupo de especificaciones técnicas; Sistema 5G; Servicios de gestión de capacidad de radio de la UE; Etapa 3 (Versión 16)", BORRADOR 3GPP; 29673-G10, PROYECTO DE ASOCIACIÓN DE 3ª GENERACIÓN (3GPP), CENTRO DE COMPETENCIA MÓVIL; 650, RUTA DES LUCIOLES ; F-06921 SOPHIA-ANTIPOLIS CEDEX ; FRANCIA, 8 de julio de 2020 (2020-07-08), XP051907255, Obtenido de Internet: URL: https://ftp.3gpp.org/3gulinernal/3GPP ultimate versions to be transposed/sentToDpc/29673- g10.zip 29673-g10.docx [obtenido el 08-07-2020] |
| D7 | WO 2020/222842 A1 (NOKIA TECHNOLOGIES OY [FI]; NOKIA USA INC [US]) 5 Noviembre 2020 (2020-11-05) |

Item VI

Ciertos documentos citados

2. Ciertos documentos publicados (ver regla 70.10 PCT)

Numero de publicación	Fecha de publicación	Fecha de solicitud	Fecha de prioridad
D5= C4-203231 (XP051887319)	21.5.21	-	-
D6= TS 29.673 V16.1.0 (XP01907255)	8.7.20	-	-
D7= WO 2020/222842 A1	5.11.20	1.5.19	-

Item II

Prioridad de la aplicación internacional

3. Los documentos D5, D6, D7 indicados en el Informe de búsqueda internacional como documentos P no se consideran actualmente (ver Regla 64.3 PCT) como estado de la técnica de acuerdo con los Artículos 33(2) y (3) PCT, ya que en realidad se asume que la fecha de prioridad reivindicada puede permitirse para las partes pertinentes de la presente solicitud (véase la Regla 64.1 b) ii) PCT).
4. Sin embargo, D5 y D6 pueden adquirir gran relevancia si esta suposición no es correcta, y D7 puede adquirir cierta relevancia al entrar en la fase nacional (p. ej., véase el artículo 54(3) EPC).

Item V

Declaración motivada sobre novedad, actividad inventiva o aplicabilidad industrial

5. La presente solicitud no cumple con los requisitos del Artículo 33(2) PCT, porque el objeto de las Reivindicaciones 1, 8 no es nuevo.

- 5.1. El objeto respectivamente reivindicado no es nuevo, porque el documento D1 ya revela
- a) un método de operación de una entidad de red central en una red central de un sistema de comunicaciones celular (ver D1, párrafos 98, 119, figuras 7, 8, la UDR que puede ser reemplazada por una UCMF definida en 3GPP), el método comprende:
 - enviar, a otra entidad de red central, un mensaje de notificación que comprende una solicitud para reemplazar un ID de capacidad de radio de UE PLMN que contiene un ID de primera versión con un ID de capacidad de radio de UE PLMN que contiene un ID de segunda versión, el segundo el ID de la versión es más reciente que el ID de la primera versión (ver D1, párrafos 113, 116, 125, figuras 7, 8, pasos 721, 723, 819, 821), y
 - b) un método de operación de una entidad de red central en una red central de un sistema de comunicaciones celular (ver D1, figuras 7, 8, AMF, AMF2), comprendiendo el método:
 - recibir de otra entidad de red central, un mensaje de notificación que comprende una solicitud para reemplazar un ID de capacidad de radio de UE PLMN que contiene un ID de primera versión con un ID de capacidad de radio de UE PLMN que contiene un ID de segunda versión, la segunda versión ID más reciente que la primera versión ID (ver D1, párrafos 113, 116, 125, figuras 7, 8, pasos 721, 723, 819, 821); y
 - realizar una o más acciones en respuesta a la recepción del mensaje de notificación (ver D1, párrafos 113, 116, 125).
- 5.2. En consecuencia, todas las características de las Reivindicaciones independientes 1, 8 se conocen a partir de D1 y, por lo tanto, el objeto reivindicado no es novedoso en el sentido del Artículo 33(2) del PCT.
6. El objeto de la Reivindicación 14 del nodo de red correspondiente carece de novedad en el sentido del Artículo 33(2) del PCT por las mismas razones.
7. Además, se señala que incluso si la objeción de novedad anterior fuera superada por enmiendas de naturaleza menor, el objeto de las Reivindicaciones independientes 1, 8, 14 aún no parecería implicar actividad inventiva (ver Artículo 33(3) PCT) a la luz del documento D1 citado anteriormente o una combinación de D2 y D3, especialmente porque estos documentos revelan (D1) o sugieren (D1+D3, o D2+D3) el mismo tipo de solución que la presente solicitud (por favor ver D2, secciones 5.4.4.1a, 6.2.21, 5.2.18.2, ver D3, secciones 5.4.4.1a, 5.9.10, 6.2.21).
8. Las reivindicaciones dependientes 2-7, 9-13 no parecen contener características adicionales que, en combinación con las características de cualquier reivindicación a la que se refieran, cumplan los requisitos del PCT con respecto a la novedad o la actividad inventiva, las razones siendo que sus características ya han sido empleadas para el mismo propósito en el estado de la técnica o consisten en ligeros cambios de construcción que entran dentro del alcance de la práctica habitual seguida por los expertos en la materia (Reivindicación 2: ver D2, sección 5.4.4.1a , Reivindicaciones 3, 7, 9, 13: ver párrafos anteriores, Reivindicaciones 4, 5, 10, 11: ver D1, párrafo 113, figura 7, paso 717, ver D3, secciones 5.2.18.2, 6.2.21, ver D4 , apartados 5.2.1, 5.2.2.4.1, 5.2.2.6.1, etc.).
9. El objeto reivindicado es aplicable industrialmente. Por tanto, se cumplen los requisitos del artículo 33, apartado 4, del PCT.

Item VIII

Claridad de la aplicación internacional

10. La solicitud no cumple con los requisitos del Artículo 6 PCT.

- 10.1. Las reivindicaciones independientes 1, 8 no definen claramente la materia por la que se solicita la protección y carecen de una característica aparentemente esencial de la invención. Por lo tanto, no se cumplen los requisitos del Artículo 6 del PCT en combinación con la Regla 6(3)(b) del PCT en relación con la claridad.
- 10.2 Queda claro a partir del párrafo 31, figura 4, pasos 3, 11, de la solicitud (ver también D5, D6), que la contribución al arte de la presente invención es una nueva operación "reemplazar" para solicitar el AMF/MME para usar uno o más ID de capacidad de radio de UE asignados a PLMN con una versión más nueva, que se incluye en la notificación y/o UcmfNotificationData.
- 10.3 Dado que las Reivindicaciones independientes 1, 8 no contienen esta característica, no cumplen con el requisito que se deriva del Artículo 6 PCT tomado en combinación con la Regla 6(3)(b) PCT de que cualquier reivindicación independiente debe contener todas las características técnicas esenciales para la invención.

Item VII

Ciertos defectos (forma, contenido) en la solicitud internacional:

- 11 Al entrar en la fase nacional/regional, los siguientes aspectos también deben recibir atención:
 - 11.1 Si corresponde, las reivindicaciones independientes deben redactarse en la forma adecuada "caracterizada" en dos partes recomendada por la Regla 6.3.(b), (i), (ii) del PCT, con un preámbulo que refleje correctamente el estado de la técnica más cercano, presumiblemente la representada por los D1 o D2 indicados anteriormente.
 - 11.2 Si es necesario, la descripción debe ajustarse a las reivindicaciones presentadas recientemente (véase la Regla 5.1(a)(iii) del PCT).
 - 11.3 La descripción (p. ej., párrafos 9-13, 42) debe presentarse en el orden especificado en la Regla 5.1 (a) PCT (ver Regla 5.1 (b) PCT).
 - 11.4 Para cumplir con los requisitos de la Regla 5.1 (a), (ii) del PCT, los documentos D1-D3 deben identificarse en la descripción y el antecedente relevante revelado en ellos debe discutirse brevemente.
 - 11.5 Finalmente, se llama la atención del Solicitante sobre el hecho de que la solicitud no puede modificarse de tal manera que contenga un objeto que se extienda más allá del contenido de la solicitud tal como fue presentada (véanse los Artículos de la ley nacional correspondientes al Artículo 34.2 (b) PCT como, por ejemplo, el Artículo 123(2) EPC).



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(54) Title: NOTIFY AMF/MME WITH UE RADIO CAPABILITY ID WITH VERSION ID INCREMENT

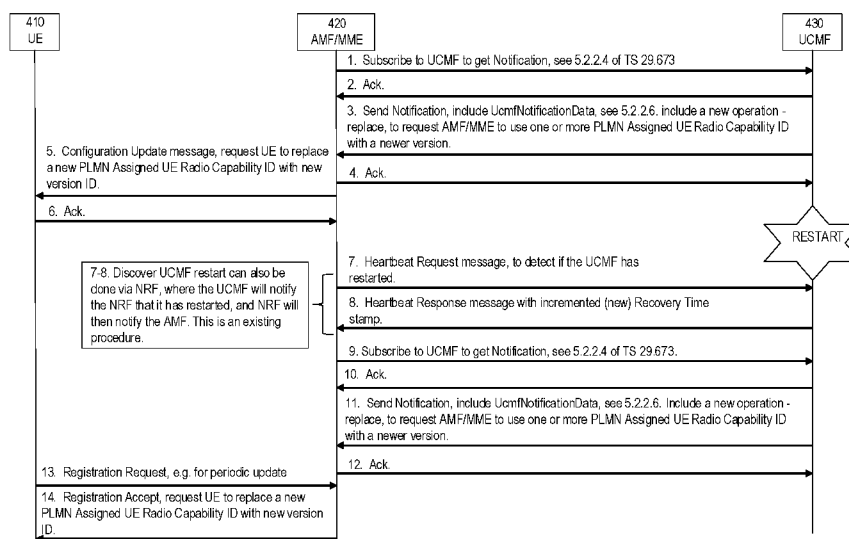


FIG. 4

(57) **Abstract:** Disclosed herein is a method of operation a core network entity (e.g. an AMF or MME) in a core network of a cellular communications system. The method comprises: receiving (Fig. 4, step 3; Fig. 4, step 11), from another core network entity (e.g., UCMF), a notification message that comprises a request to replace a PLMN UE radio capability ID(s) containing a first version ID with a PLMN UE radio capability ID(s) containing a second version ID, the second version ID being newer than the first version ID; and performing (Fig. 4, step 5; Fig. 4, step 14) one or more actions responsive to receiving the notification message.



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- *with international search report (Art. 21(3))*
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NOTIFY AMF/MME WITH UE RADIO CAPABILITY ID WITH VERSION ID INCREMENT

BACKGROUND

5 **[0001]** Generally, all terms used herein are to be interpreted according to their ordinary meaning in the relevant technical field, unless a different meaning is clearly given and/or is implied from the context in which it is used. All references to a/an/the element, apparatus, component, means, step, etc. are to be interpreted openly as referring to at least one instance of the element, apparatus, component, means, step, etc., unless explicitly stated otherwise.

10 The steps of any methods disclosed herein do not have to be performed in the exact order disclosed, unless a step is explicitly described as following or preceding another step and/or where it is implicit that a step must follow or precede another step. Any feature of any of the embodiments disclosed herein may be applied to any other embodiment, wherever appropriate. Likewise, any advantage of any of the embodiments may apply to any other embodiments, and
15 vice versa. Other objectives, features, and advantages of the enclosed embodiments will be apparent from the following description.

[0002] The 3rd Generation Partnership Project (3GPP) Technical Specifications Group (TSG) Service and System Aspects (SA) Working Group 2 (i.e., "SA2") has introduced a field referred to as "Version ID" in the Public Land Mobile Network (PLMN) Assigned User Equipment
20 (UE) Radio Capability ID. However, SA2 has not clearly defined how this field should be used.

[0003] Clause 5.4.4.1a of TS 23.501 states:

 UEs, AMFs and RAN nodes which support RACS learn the current value of the Version ID when a new PLMN assigned UE Radio Capability ID is received from the UCMF and the Version ID it contains is different from the ones in
25 their PLMN Assigned UE Radio Capability ID cache. PLMN assigned UE Radio Capability IDs related to old values of the Version ID can be removed from cache with priority.

[0004] Clause 5.9.10 of TS 23.501 states:

 The PLMN assigned UE Radio Capability ID includes a Version ID in its format.
30 The value of the Version ID is the one configured in the UCMF, at time the UE Radio Capability ID value is assigned. The Version ID value makes it possible to detect whether a UE Radio Capability ID is current or outdated.

[0005] Clause 6.2.21 of TS 23.501 states:

 The UCMF stores a Version ID value for the PLMN assigned UE Radio Capability IDs so it is included in the PLMN assigned UE Radio Capability IDs it assigns. This shall be configured in the UCMF.
35

[0006] Nokia has submitted a CR that tries to make use of Version ID, but they failed to explain how it should work. See contribution from Nokia attached hereto as Appendix I. It

seems other companies are quite positive to the mechanism using the Version ID in the PLMN Assigned UE Radio Capability ID.

[0007] Appendix I contains the intended use of Version ID, but it does not work.

[0008] The CR attached hereto as Appendix II contains the definition of Version ID and UE
5 Radio Capability ID.

SUMMARY

[0009] There currently exist certain challenge(s). The key issues here are: (1) how the UE radio Capability Management Function (UCMF) can notify the Access and Mobility Management Function (AMF) or Mobility Management Entity (MME) (denoted herein as "AMF/MME") that a
10 new version of UE Radio Capability is created and (2) how the AMF/MME can update the UE with new version of UE Radio Capability ID, to replace the staled UE Radio Capability ID stored in the UE.

[0010] As of today, the UCMF can only use Notification Request to send a request to the AMF/MME to DELETE PLMN assigned UE Radio Capability ID, and then the AMF/MME sends a
15 request to the UE to switch to use Manufacturer Assigned UE Radio Capability ID. See below copied from TS 23.501, 5.4.4.1a.

When a PLMN decides to switch to request a particular type of UE to use manufacturer-assigned UE Radio Capability ID(s):

- The UCMF sends a Nucmf_UECapabilityManagement_Notify message to the AMF including either a list of UE Radio Capability IDs (if the UE was previously using any PLMN assigned IDs) or the TAC values corresponding to UE types that are requested to use manufacturer-assigned UE Radio Capability ID. These values are stored in a "Manufacturer Assigned operation requested list" in the AMF.
- The AMF uses the Registration Accept message or the UE Configuration Update command message to request the UE to delete all the PLMN-assigned UE Radio Capability ID(s) for this PLMN if the UE is, respectively, registering or is registered with PLMN assigned ID or TAC values matching one value in the Manufacturer Assigned operation requested list.

NOTE 1: It is expected that in a given PLMN the UCMF and AMFs will be configured to either use a Manufacturer Assigned operation requested list based on a list of PLMN assigned UE Radio Capability IDs or a list of TACs, but not both.

NOTE 2: The strategy for triggering of the deletion of PLMN-assigned UE Radio Capability ID(s) in the UE by the AMF is implementation-specific (e.g. can be used only towards UEs in CM_Connected state).

- a UE that receives indication to delete all the PLMN-assigned UE Radio Capability IDs in the Registration Accept message, or UE Configuration Update command message, shall delete any PLMN-assigned UE Radio Capability IDs for this PLMN. The UE proceeds to register with a Manufacturer assigned UE Radio Capability ID that is applicable to the current UE Radio configuration.
- When the "Manufacturer Assigned operation requested list" contains PLMN assigned UE

Radio Capability IDs, the UCMF shall avoid re-assigning PLMN assigned UE Radio Capability IDs that were added to the "Manufacturer Assigned operation requested list" in the AMFs to any UE.

- The AMF stores a PLMN assigned ID in the Manufacturer Assigned operation requested list for a time duration that is implementation specific, but TACs are stored until the UCMF require to remove certain TACs from the list (i.e. the list of TACs which are requested to use Manufacturer Assigned IDs in the AMF and UCMF is synchronised at all times).
- The UCMF can request at any time the AMF to remove PLMN assigned ID(s) or TAC(s) values from the Manufacturer Assigned operation requested list.

NOTE 3: The AMF can decide to remove a UE Radio Capability ID from the "Manufacturer Assigned operation requested list" list e.g. because no UE with that UE Radio Capability ID has connected to the network for long time. If later a UE with such UE Radio Capability ID connects to the network, the AMF contacts the UCMF to resolve the UE Radio Capability ID, and at this point the UCMF can trigger again the deletion of the UE Radio Capability ID by including this in the Manufacturer Assigned operation requested list of the AMF.

The serving AMF stores the UE Radio Capability ID for a UE in the UE context and provides this UE Radio Capability ID to NG-RAN as part of the UE context information using N2 signalling. During inter PLMN mobility, the new AMF shall delete the UE Radio Capability ID received from the old AMF, unless the operator policy indicates that all UE Radio Capability IDs used in the old PLMN is also valid in the new PLMN.

The UE stores the PLMN-assigned UE Radio Capability ID in non-volatile memory when in RM-DEREGISTERED state and can use it again when it registers in the same PLMN.

[0011] Certain aspects of the present disclosure and their embodiments may provide solutions to the aforementioned or other challenges. Embodiments disclosed herein introduce a mechanism to enable a UCMF to notify the AMF/MME to replace one or more PLMN Assigned UE Radio Capability IDs containing a lower version (i.e. staled/deprecated UE Radio Capability ID) with one or more PLMN Assigned UE Radio Capability IDs containing a newer version correspondingly.

[0012] In one embodiment, the mechanism includes:

1. If the UCMF has not restarted and has a valid subscription (from the AMF/MME) to send the notification to the AMF/MME:
 - a. The UCMF sends a notification request message to the AMF/MME, in the UcmfNotificationData. It includes an operation to request the AMF/MME to REPLACE one or more PLMN Assigned UE Radio Capability IDs containing a lower version (i.e. staled/deprecated UE Radio Capability ID) with one or more PLMN Assigned UE Radio Capability IDs containing a newer version correspondingly.
2. If the UCMF has restarted and it should indicate to AMF/MME it has restarted e.g. via Recovery Time Stamp, the AMF/MME which has contacted to UCMF before its restart subscribes (e.g., immediately) to the UCMF to receive Notification Request. After the

AMF/MME subscribes to get UCMF's notifications, the UCMF sends a notification request message to the AMF/MME, in the UcmfNotificationData. It includes an operation to request the AMF/MME to REPLACE one or more PLMN Assigned UE Radio Capability IDs containing a lower version (i.e. staled/deprecated UE Radio Capability ID) with one or more PLMN Assigned UE Radio Capability IDs containing a newer version correspondingly.

3. Once the AMF/MME receives such a request (operation) to REPLACE the PLMN Assigned UE Radio Capability ID, the AMF/MME acts accordingly. For instance, the AMF/MME requests the respective UE to replaces the one or more PLMN Assigned UE Radio Capability IDs containing a lower version (i.e. staled/deprecated UE Radio Capability ID) with one or more PLMN Assigned UE Radio Capability IDs containing a newer version correspondingly.

[0013] Certain embodiments may provide one or more of the following technical advantage(s). The proposed solution enables to make use of Version ID, and efficiently to update AMF/MME and UE to replace a staled PLMN assigned UE Radio Capability.

BRIEF DESCRIPTION OF DRAWINGS

The accompanying drawings, which are included to provide a further understanding of the disclosure and are incorporated in and constitute a part of this application, illustrate certain non-limiting embodiments of inventive concepts. In the drawings:

Figure 1 is a reproduction of Figure 4.2.5a-1 from TS 23.501;

Figure 2 is a reproduction of Figure 4.2.5-1 from TS 23.401;

Figure 3 illustrates one example of a cellular communications system 300 in which embodiments of the present disclosure may be implemented;

Figure 4 illustrates a procedure in accordance with one example embodiment of the present disclosure;

Figure 5 is a schematic block diagram of a network node 500 according to some embodiments of the present disclosure;

Figure 6 is a schematic block diagram that illustrates a virtualized embodiment of the network node 500 according to some embodiments of the present disclosure;

Figure 7 is a schematic block diagram of the network node 500 according to some other embodiments of the present disclosure;

Figure 8 is a schematic block diagram of a wireless communication device 800 according to some embodiments of the present disclosure;

Figure 9 a schematic block diagram of the wireless communication device 800 according to some other embodiments of the present disclosure.

DETAILED DESCRIPTION

[0014] Some of the embodiments contemplated herein will now be described more fully with reference to the accompanying drawings. Other embodiments, however, are contained within the scope of the subject matter disclosed herein, the disclosed subject matter should not be construed as limited to only the embodiments set forth herein; rather, these embodiments are provided by way of example to convey the scope of the subject matter to those skilled in the art. Additional information may also be found in the document(s) provided in the Appendices.

[0015] Radio Node: As used herein, a "radio node" is either a radio access node or a wireless communication device.

[0016] Radio Access Node: As used herein, a "radio access node" or "radio network node" or "radio access network node" is any node in a Radio Access Network (RAN) of a cellular communications network that operates to wirelessly transmit and/or receive signals. Some examples of a radio access node include, but are not limited to, a base station (e.g., a New Radio (NR) base station (gNB) in a Third Generation Partnership Project (3GPP) Fifth Generation (5G) NR network or an enhanced or evolved Node B (eNB) in a 3GPP Long Term Evolution (LTE) network), a high-power or macro base station, a low-power base station (e.g., a micro base station, a pico base station, a home eNB, or the like), a relay node, a network node that implements part of the functionality of a base station (e.g., a network node that implements a gNB Central Unit (gNB-CU) or a network node that implements a gNB Distributed Unit (gNB-DU)) or a network node that implements part of the functionality of some other type of radio access node.

[0017] Core Network Node: As used herein, a "core network node" is any type of node in a core network or any node that implements a core network function. Some examples of a core network node include, e.g., a Mobility Management Entity (MME), a Packet Data Network Gateway (P-GW), a Service Capability Exposure Function (SCEF), a Home Subscriber Server (HSS), or the like. Some other examples of a core network node include a node implementing a Access and Mobility Function (AMF), a UPF, a Session Management Function (SMF), an Authentication Server Function (AUSF), a Network Slice Selection Function (NSSF), a Network Exposure Function (NEF), a Network Function (NF) Repository Function (NRF), a Policy Control Function (PCF), a Unified Data Management (UDM), or the like.

[0018] Communication Device: As used herein, a "communication device" is any type of device that has access to an access network. Some examples of a communication device include, but are not limited to: mobile phone, smart phone, sensor device, meter, vehicle,

household appliance, medical appliance, media player, camera, or any type of consumer electronic, for instance, but not limited to, a television, radio, lighting arrangement, tablet computer, laptop, or Personal Computer (PC). The communication device may be a portable, hand-held, computer-comprised, or vehicle-mounted mobile device, enabled to communicate voice and/or data via a wireless or wireline connection.

[0019] Wireless Communication Device: One type of communication device is a wireless communication device, which may be any type of wireless device that has access to (i.e., is served by) a wireless network (e.g., a cellular network). Some examples of a wireless communication device include, but are not limited to: a User Equipment device (UE) in a 3GPP network, a Machine Type Communication (MTC) device, and an Internet of Things (IoT) device. Such wireless communication devices may be, or may be integrated into, a mobile phone, smart phone, sensor device, meter, vehicle, household appliance, medical appliance, media player, camera, or any type of consumer electronic, for instance, but not limited to, a television, radio, lighting arrangement, tablet computer, laptop, or PC. The wireless communication device may be a portable, hand-held, computer-comprised, or vehicle-mounted mobile device, enabled to communicate voice and/or data via a wireless connection.

[0020] Network Node: As used herein, a "network node" is any node that is either part of the radio access network or the core network of a cellular communications network/system.

[0021] Note that the description given herein focuses on a 3GPP cellular communications system and, as such, 3GPP terminology or terminology similar to 3GPP terminology is oftentimes used. However, the concepts disclosed herein are not limited to a 3GPP system.

[0022] Note that, in the description herein, reference may be made to the term "cell"; however, particularly with respect to 5G NR concepts, beams may be used instead of cells and, as such, it is important to note that the concepts described herein are equally applicable to both cells and beams.

[0023] Systems and methods are disclosed herein for notifying AMF or MME with UE Radio Capability ID with version ID increment.

[0024] Systems and methods are disclosed herein for replacing staled PLMN Assigned UE Radio Capability with out-of-dated version ID with a new UE Radio Capability ID (with new version).

Figure 3

[0025] Figure 3 illustrates one example of a cellular communications system 300 in which embodiments of the present disclosure may be implemented. In the embodiments described herein, the cellular communications system 300 is a 5G system (5GS) including a NR RAN or NG-RAN and a 5G Core (5GC) or a Evolved Packet System (EPS) including an LTE RAN (i.e., an

E-UTRAN) and a Evolved Packet Core (EPC). In this example, the RAN includes base stations 302-1 and 302-2, which in the 5GS are referred to as gNBs (i.e., NR RAN nodes) or ng-NBs (i.e., LTE RAN nodes connected to 5GC) and in the EPS are referred to as eNBs, controlling corresponding (macro) cells 304-1 and 304-2. The base stations 302-1 and 302-2 are generally referred to herein collectively as base stations 302 and individually as base station 302. Likewise, the (macro) cells 304-1 and 304-2 are generally referred to herein collectively as (macro) cells 304 and individually as (macro) cell 304. The RAN may also include a number of low power nodes 306-1 through 306-4 controlling corresponding small cells 308-1 through 308-4. The low power nodes 306-1 through 306-4 can be small base stations (such as pico or femto base stations) or Remote Radio Heads (RRHs), or the like. Notably, while not illustrated, one or more of the small cells 308-1 through 308-4 may alternatively be provided by the base stations 302. The low power nodes 306-1 through 306-4 are generally referred to herein collectively as low power nodes 306 and individually as low power node 306. Likewise, the small cells 308-1 through 308-4 are generally referred to herein collectively as small cells 308 and individually as small cell 308. The cellular communications system 300 also includes a core network 310, which in the 5GS is referred to as the 5G core (5GC) and in the EPS is referred to as the EPC. The base stations 302 (and optionally the low power nodes 306) are connected to the core network 310.

[0026] The base stations 302 and the low power nodes 306 provide service to wireless communication devices 312-1 through 312-5 in the corresponding cells 304 and 308. The wireless communication devices 312-1 through 312-5 are generally referred to herein collectively as wireless communication devices 312 and individually as wireless communication device 312. In the following description, the wireless communication devices 312 are oftentimes UEs, but the present disclosure is not limited thereto.

Figure 1

[0027] **Figure 1** is a reproduction of Figure 4.2.5a-1 from TS 23.501, which illustrates the Radio Capability Signaling optimization architecture in the 5GS.

Figure 2

[0028] **Figure 2** is a reproduction of Figure 4.2.5-1 from TS 23.401, which illustrates the Radio Capability Signaling optimization architecture in the EPS.

[0029] Figure 4.2.5-1 of TS23.501 (Figure 2) depicts the EPS architecture supporting RACS. RACS is further described in clause 5.11.3a of TS 23.401. The EPS architecture supporting provisioning of UCMF is described in TS 23.682.

Figure 4

[0030] **Figure 4** illustrates a procedure in accordance with one example embodiment of the present disclosure. Note that not all steps shown in Figure 4 are required. For example, steps 1-6 may be performed without the remaining steps. Likewise, steps 7-14 may be performed without steps 1-6. Other examples are also possible.

[0031] The steps of the procedure of Figure 4 are as follows:

- Step 1: The AMF/MME subscribes to UCMF to get notification(s), preferably notification(s) about UE Radio Capability for an UE served by the AMF/MME, e.g. about an update of a UE Radio Capability ID for the UE, e.g. an update of a PLMN Assigned UE Radio Capability ID for the UE.
- Step 2: The UCMF replies with an ACK.
- Step 3: The UCMP sends a notification to the AMF/MME in response to said subscription to get notification(s). The notification includes UcmfNotificationData, preferably as in TS 29.673 clause 5.2.2.6. However, in accordance with an embodiment of the present disclosure, the notification and/or the UcmfNotificationData includes a new operation "replace" to request the AMF/MME to use one or more PLMN Assigned UE Radio Capability IDs with a newer version.
- Step 4: The AMF/MME responds with an ACK.
- Step 5: The AMF/MME sends a Configuration Update message to the UE that requests the UE to replace a PLMN Assigned UE Radio Capability ID with a new version ID.
- Step 6: The UE responds with an ACK.
- Steps 7-8: At some point, the UCMF restarts and the AMF/MME detects or otherwise discovers that the UCMF has restarted. In this example, this is done by the AMF/MME sending a Heartbeat Request message to the UCMF and receiving Heartbeat Response message with incremented (new) Recovery Time Stamp or similar. Alternatively, the AMF/MME may discover the restart via a NRF, where the UCMF notifies the NRF that it has restarted, and the NRF will then notify the AMF/MME.
- Step 9: The AMF/MME subscribes to UCMF to get notification(s). For example, as in step 1 above.
- Step 10: The UCMF replies with an ACK.
- Step 11: The UCMP sends a notification to the AMF/MME in response to said subscription to get notification(s). The notification includes UcmfNotificationData, preferably as in TS 29.673 clause 5.2.2.6. However, in accordance with an embodiment of the present disclosure, the notification and/or the UcmfNotificationData includes a new operation "replace" to request the AMF/MME to use one or more PLMN Assigned UE Radio Capability IDs with a newer version.

- Step 12: The AMF/MME responds with an ACK.
- Step 13: The UE sends a Registration Request to the AMF/MME, e.g., for periodic update.
- Step 14: The AMF/MME responds to the UE with a Registration Accept message that requests the UE to replace a PLMN Assigned UE Radio Capability ID with a new version ID.

Figure 5

[0032] **Figure 5** is a schematic block diagram of a network node 500 according to some embodiments of the present disclosure. Optional features are represented by dashed boxes.

The network node 500 may be, for example, a network node that implements all or part of the functionality of a UMCF, a MME, or an AMF according to any of the embodiments described herein. As illustrated, the network node 500 includes one or more processors 504 (e.g., Central Processing Units (CPUs), Application Specific Integrated Circuits (ASICs), Field Programmable Gate Arrays (FPGAs), and/or the like), memory 506, and a network interface 508. The one or more processors 504 are also referred to herein as processing circuitry. The one or more processors 504 operate to provide one or more functions of the network node 500 as described herein (e.g., all or part of the functionality of a UMCF, a MME, or an AMF according to any of the embodiments described herein). In some embodiments, the function(s) are implemented in software that is stored, e.g., in the memory 506 and executed by the one or more processors 504.

Figure 6

[0033] **Figure 6** is a schematic block diagram that illustrates a virtualized embodiment of the network node 500 according to some embodiments of the present disclosure. Again, optional features are represented by dashed boxes.

[0034] As used herein, a “virtualized” network node is an implementation of the network node 500 in which at least a portion of the functionality of the network node 500 (e.g., all or part of the functionality of a UMCF, a MME, or an AMF according to any of the embodiments described herein) is implemented as a virtual component(s) (e.g., via a virtual machine(s) executing on a physical processing node(s) in a network(s)). As illustrated, in this example, the network node 500 includes one or more processing nodes 600 coupled to or included as part of a network(s) 602. Each processing node 600 includes one or more processors 604 (e.g., CPUs, ASICs, FPGAs, and/or the like), memory 606, and a network interface 608.

[0035] In this example, functions 610 of the network node 500 described herein (e.g., all or part of the functionality of a UMCF, a MME, or an AMF according to any of the embodiments described herein) are implemented at the one or more processing nodes 600 or distributed

across the two or more processing nodes 600 in any desired manner. In some particular embodiments, some or all of the functions 610 of the network node 500 described herein are implemented as virtual components executed by one or more virtual machines implemented in a virtual environment(s) hosted by the processing node(s) 600.

5 **[0036]** In some embodiments, a computer program including instructions which, when executed by at least one processor, causes the at least one processor to carry out the functionality of the network node 500 or a node (e.g., a processing node 600) implementing one or more of the functions 610 of the radio access node 500 in a virtual environment according to any of the embodiments described herein is provided. In some embodiments, a
10 carrier comprising the aforementioned computer program product is provided. The carrier is one of an electronic signal, an optical signal, a radio signal, or a computer readable storage medium (e.g., a non-transitory computer readable medium such as memory).

Figure 7

[0037] **Figure 7** is a schematic block diagram of the network node 500 according to some
15 other embodiments of the present disclosure. The network node 500 includes one or more modules 700, each of which is implemented in software. The module(s) 700 provide the functionality of the network node 500 described herein (e.g., all or part of the functionality of a UMCF, a MME, or an AMF according to any of the embodiments described herein). This discussion is equally applicable to the processing node 600 of Figure 6 where the modules 700
20 may be implemented at one of the processing nodes 600 or distributed across multiple processing nodes 600.

Figure 8

[0038] **Figure 8** is a schematic block diagram of a wireless communication device 800 according to some embodiments of the present disclosure. As illustrated, the wireless
25 communication device 800 includes one or more processors 802 (e.g., CPUs, ASICs, FPGAs, and/or the like), memory 804, and one or more transceivers 806 each including one or more transmitters 808 and one or more receivers 810 coupled to one or more antennas 812. The transceiver(s) 806 includes radio-front end circuitry connected to the antenna(s) 812 that is configured to condition signals communicated between the antenna(s) 812 and the processor(s)
30 802, as will be appreciated by one of ordinary skill in the art. The processors 802 are also referred to herein as processing circuitry. The transceivers 806 are also referred to herein as radio circuitry. In some embodiments, the functionality of the wireless communication device 800 described above (e.g., functionality of a UE) may be fully or partially implemented in software that is, e.g., stored in the memory 804 and executed by the processor(s) 802. Note
35 that the wireless communication device 800 may include additional components not illustrated

in Figure 8 such as, e.g., one or more user interface components (e.g., an input/output interface including a display, buttons, a touch screen, a microphone, a speaker(s), and/or the like and/or any other components for allowing input of information into the wireless communication device 800 and/or allowing output of information from the wireless communication device 800), a power supply (e.g., a battery and associated power circuitry), etc.

[0039] In some embodiments, a computer program including instructions which, when executed by at least one processor, causes the at least one processor to carry out the functionality of the wireless communication device 800 according to any of the embodiments described herein is provided. In some embodiments, a carrier comprising the aforementioned computer program product is provided. The carrier is one of an electronic signal, an optical signal, a radio signal, or a computer readable storage medium (e.g., a non-transitory computer readable medium such as memory).

Figure 9

[0040] **Figure 9** is a schematic block diagram of the wireless communication device 800 according to some other embodiments of the present disclosure. The wireless communication device 800 includes one or more modules 900, each of which is implemented in software. The module(s) 900 provide the functionality of the wireless communication device 800 described herein.

[0041] Any appropriate steps, methods, features, functions, or benefits disclosed herein may be performed through one or more functional units or modules of one or more virtual apparatuses. Each virtual apparatus may comprise a number of these functional units. These functional units may be implemented via processing circuitry, which may include one or more microprocessor or microcontrollers, as well as other digital hardware, which may include Digital Signal Processor (DSPs), special-purpose digital logic, and the like. The processing circuitry may be configured to execute program code stored in memory, which may include one or several types of memory such as Read Only Memory (ROM), Random Access Memory (RAM), cache memory, flash memory devices, optical storage devices, etc. Program code stored in memory includes program instructions for executing one or more telecommunications and/or data communications protocols as well as instructions for carrying out one or more of the techniques described herein. In some implementations, the processing circuitry may be used to cause the respective functional unit to perform corresponding functions according one or more embodiments of the present disclosure.

[0042] While processes in the figures may show a particular order of operations performed by certain embodiments of the present disclosure, it should be understood that such order is

exemplary (e.g., alternative embodiments may perform the operations in a different order, combine certain operations, overlap certain operations, etc.).

EMBODIMENTS

Some of the embodiments described above can be summarized in the following manner:

5

1. A method of operation a core network entity (e.g., an AMF or MME) in a core network of a cellular communications system, the method comprising:

receiving (Fig. 4, step 3; Fig. 4, step 11), from another core network entity (e.g., UMCF), a notification message that comprises a request to replace a PLMN UE radio capability ID(s) containing a first version ID with a PLMN UE radio capability ID(s) containing a second version ID, the second version ID being newer than the first version ID; and

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performing (Fig. 4, step 5; Fig. 4, step 14) one or more actions responsive to receiving the notification message.

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2. The method of embodiment 1 wherein performing (Fig. 4, step 5; Fig. 4, step 14) the one or more actions comprises sending (Fig. 4, step 5; Fig. 4, step 14), to a UE, a request to replace the PLMN UE radio capability ID(s) containing the first version ID with the PLMN UE radio capability ID(s) containing the second version ID.

20

3. The method of embodiment 1 or 2 wherein the other network entity is a UMCF.

4. The method of embodiment 3 further comprising:

subscribing (Fig. 4, step 1) to the UMCF to get notifications;

wherein receiving (Fig. 4, step 3; Fig. 4, step 11) the notification message comprises

25

receiving (Fig. 4, step 3) the notification message responsive to subscribing (Fig. 4, step 1) to the UMCF to get notifications.

5. The method of embodiment 3 further comprising:

discovering (Fig. 4, steps 7-8) that the UMCF has restarted; and

30

responsive to discovering (Fig. 4, steps 7-8) that the UMCF has restarted, subscribing (Fig. 4, step 9) to the UMCF to get notifications;

wherein receiving (Fig. 4, step 3; Fig. 4, step 11) the notification message comprises receiving (Fig. 4, step 11) the notification message responsive to subscribing (Fig. 4, step 9) to the UMCF to get notifications.

35

6. The method of embodiment 5 wherein discovering (Fig. 4, steps 7-8) that the UMCF has restarted comprises:

sending (Fig. 4, step 7) a heartbeat request message to the UMCF; and

receiving (Fig. 4, step 8) a heartbeat response message comprising an incremented

5 recovery time stamp.

7. The method of any of embodiments 1 to 6 wherein the core network entity is an AMF.

8. The method of any of embodiments 1 to 6 wherein the core network entity is an MME.

10

9. A method of operation a core network entity (e.g., UMCF) in a core network of a cellular communications system, the method comprising:

sending (Fig. 4, step 3; Fig. 4, step 11), to another core network entity (e.g., AMF or MME), a notification message that comprises a request to replace a PLMN UE radio capability ID(s) containing a first version ID with a PLMN UE radio capability ID(s) containing a second

15

version ID, the second version ID being newer than the first version ID.

10. The method of embodiment 9 wherein the core network entity is a UMCF.

20 11. The method of embodiment 10 further comprising:

receiving (Fig. 4, step 1), from the other core network entity, a subscription message to get notifications;

wherein sending (Fig. 4, step 3; Fig. 4, step 11) the notification message comprises sending (Fig. 4, step 3) the notification message to the other core network entity responsive to receiving (Fig. 4, step 1) the subscription message.

25

12. The method of embodiment 10 wherein the UMCF is restarted, and the method further comprises, upon restarting:

receiving (Fig. 4, step 9), from the other core network entity, a subscription message to get notifications;

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wherein sending (Fig. 4, step 3; Fig. 4, step 11) the notification message comprises sending (Fig. 4, step 11) the notification message to the other core network entity responsive to receiving (Fig. 4, step 9) the subscription message.

35 13. The method of embodiment 12 further comprising, upon restarting:

receiving (Fig. 4, step 7) a heartbeat request message from the other core network entity; and

sending (Fig. 4, step 8) a heartbeat response message to the other core network entity, the heartbeat response comprising an incremented recovery time stamp.

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14. The method of any of embodiments 9 to 13 wherein the other core network entity is an AMF.

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15. The method of any of embodiments 9 to 13 wherein the other core network entity is an MME.

16. A network node (500) for implementing a core network entity for a core network of a cellular communications system, the network node (500) adapted to perform the method of any one of embodiments 1 to 15.

15

ABBREVIATIONS

At least some of the following abbreviations may be used in this disclosure. If there is an inconsistency between abbreviations, preference should be given to how it is used above. If listed multiple times below, the first listing should be preferred over any subsequent listing(s).

20

- 3GPP Third Generation Partnership Project
- 5G Fifth Generation
- 5GC Fifth Generation Core
- 5GS Fifth Generation System
- 25 • AF Application Function
- AMF Access and Mobility Management Function
- AN Access Network
- AUSF Authentication Server Function
- DN Data Network
- 30 • DSP Digital Signal Processor
- eNB Enhanced or Evolved Node B
- EPC Evolved Packet Core
- E-UTRA Evolved Universal Terrestrial Radio Access
- gNB New Radio Base Station
- 35 • HSS Home Subscriber Server
- IP Internet Protocol

	•	LTE	Long Term Evolution
	•	MME	Mobility Management Entity
	•	MTC	Machine Type Communication
	•	NEF	Network Exposure Function
5	•	NF	Network Function
	•	NR	New Radio
	•	NRF	Network Function Repository Function
	•	NSSF	Network Slice Selection Function
	•	OTT	Over-the-Top
10	•	PCF	Policy Control Function
	•	P-GW	Packet Data Network Gateway
	•	QoS	Quality of Service
	•	RAN	Radio Access Network
	•	SCEF	Service Capability Exposure Function
15	•	SMF	Session Management Function
	•	UDM	Unified Data Management
	•	UE	User Equipment
	•	UPF	User Plane Function

APPENDIX I

3GPP TSG-CT WG4 Meeting #96e
E-Meeting, 17th – 28th February 2020
200445

C4-200445v1
revision of C4-

CR-Form-v12.0

CHANGE REQUEST

23.007 CR 0366 rev 3 Current version: 16.0.0

For HELP on using this form: comprehensive instructions can be found at
<http://www.3gpp.org/Change-Requests>.

Proposed change affects: UICC apps ☐ ME ☐ Radio Access Network ☐ Core Network ☒

Title:	UCMF restart		
Source to WG:	Nokia, Nokia Shanghai Bell		
Source to TSG:	CT4		
Work item code:	RACS	Date:	2020-02-18
Category:	B Use <u>one</u> of the following categories: F (correction) A (mirror corresponding to a change in an earlier release) B (addition of feature), C (functional modification of feature) D (editorial modification) Detailed explanations of the above categories can be found in 3GPP TR 21.900.		Release: Rel-16 Use <u>one</u> of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) Rel-12 (Release 12) Rel-13 (Release 13) Rel-14 (Release 14) Rel-15 (Release 15) Rel-16 (Release 16)

Reason for change:	SA2 introduced the concept of Version ID for network assigned UE Radio Capability IDs. See S2-1912520
Summary of change:	Add subclause on UCMF restoration.
Consequences if not approved:	Stale network assigned UE Radio Capability IDs cannot be detected.

Clauses affected:	1.1, 31 (new)										
Other specs affected: (show related CRs)	<table border="1"> <tr> <td>Y</td> <td>N</td> </tr> <tr> <td>☐</td> <td>☒</td> </tr> <tr> <td>☐</td> <td>☒</td> </tr> <tr> <td>☐</td> <td>☒</td> </tr> </table>	Y	N	☐	☒	☐	☒	☐	☒	Other core specifications Test specifications O&M Specifications	TS/TR ... CR ... TS/TR ... CR ... TS/TR ... CR ...
Y	N										
☐	☒										
☐	☒										
☐	☒										
Other comments:											

This CR's revision history:

* * * * First Change * * * *

* * * * Next Change * * * *

31 Restoration of the UCMF

31.1 Restart of the UCMF

A UCMF is configured with a Version ID value to be included in the value of the network-assigned UE Radio Capability IDs (see 3GPP TS 23.501 [x]). When a UCMF restarts, e.g. after change of UE Radio Capability ID assignment algorithm, or Vendor swap, it shall update its configured Version ID value which is to be used in subsequent assignments of network-assigned UE Radio Capability IDs.

If a UCMF receives a request to retrieve UE Radio Capability Information and the request contains a stale UE Radio Capability ID (i.e. the Version ID within the received UE Radio Capability ID is not up to date), the UCMF shall return an appropriate error response which triggers fresh assignment of the UE Radio Capability ID.

31.2 Procedures in the AMF/MME

When the AMF/MME detects that a cached network-assigned UE Radio Capability IDs is stale, it shall delete the stale network-assigned UE Radio Capability ID from its cache and may request a fresh network-assigned UE Radio Capability ID from the UCMF and may update the UEs with the new value of the UE Radio Capability ID for UEs that store the stale value in their context in the AMF/MME.

* * * * End Of Change * * * *

APPENDIX II

3GPP TSG-CT WG4 Meeting #96e
E-Meeting, 17th – 28th February 2020

C4-200340

CR-Form-v12.0

CHANGE REQUEST

23.003 CR 0564 rev 1 Current version: 16.1.0

For HELP on using this form: comprehensive instructions can be found at
<http://www.3gpp.org/Change-Requests>.

Proposed change affects: UICC apps ☐ ME ☐ Radio Access Network ☐ Core Network ☒

Title:	UE Radio Capability ID		
Source to WG:	Nokia, Nokia Shanghai Bell, Qualcomm Incorporated		
Source to TSG:	CT4		
Work item code:	RACS	Date:	2020-01-13
Category:	C Use <u>one</u> of the following categories: F (correction) A (mirror corresponding to a change in an earlier release) B (addition of feature), C (functional modification of feature) D (editorial modification) Detailed explanations of the above categories can be found in 3GPP TR 21.900.		Release: Rel-16 Use <u>one</u> of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) Rel-12 (Release 12) Rel-13 (Release 13) Rel-14 (Release 14) Rel-15 (Release 15) Rel-16 (Release 16)

Reason for change:	SA2 have decided that the network assigned UE Radio Capability ID shall contain a Version ID (see S2-1912520); SA2 also decided to replace TAC & SVN with Vendor ID in manufacturer assigned UE Capability IDs (see S2-1912549).
Summary of change:	Replace TAC & SVN with Vendor Id in manufacturer-assigned UE Radio Capability ID; Add Version ID to network-assigned UE Radio Capability ID. Editor's Note on Restart counter is removed.
Consequences if not approved:	Requirements from stage 2 are not met.

Clauses affected:	29.2										
Other specs affected:	<table border="1"> <tr> <th>Y</th> <th>N</th> </tr> <tr> <td>☒</td> <td>☐</td> </tr> <tr> <td>☒</td> <td>☐</td> </tr> <tr> <td>☒</td> <td>☐</td> </tr> </table>	Y	N	☒	☐	☒	☐	☒	☐	Other core specifications Test specifications O&M Specifications	TS/TR ... CR ... TS/TR ... CR ... TS/TR ... CR ...
Y	N										
☒	☐										
☒	☐										
☒	☐										
(show related CRs)											
Other comments:	See LS from SA2 in S2-1912521										

This CR's revision history:

***** First Change *****

29.2 UE radio capability ID

The UE radio capability ID is an identifier used to represent a set of UE radio capabilities, defined in 3GPP TS 23.501 [119] and in 3GPP TS 23.401 [72], composed as shown in figure 29.2-1.

5

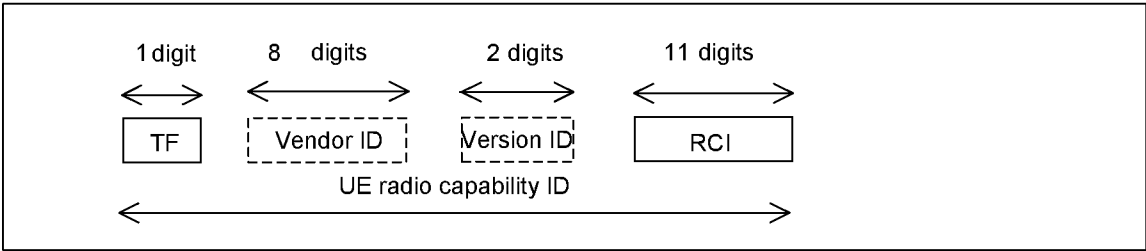


Figure 29.2-1: Structure of UE radio capability ID

The UE radio capability ID is composed of the following elements (each element shall consist of hexadecimal digits only):

10

- 1) Type Field (TF): identifies the type of UE radio capability ID. The following values are defined:
 - 0: manufacturer-assigned UE radio capability ID;
 - 1: network-assigned UE radio capability ID; and
 - 2 to F: spare values for future use.

15

- 2) The Vendor ID is an identifier of UE manufacturer. This is defined by a value of Private Enterprise Number issued by Internet Assigned Numbers Authority (IANA) in its capacity as the private enterprise number administrator, as maintained at <https://www.iana.org/assignments/enterprise-numbers/enterprise-numbers>. Its length is 8 hexadecimal digits. This field is present only if the Type Field is set to 0;

20

Note: The private enterprise number issued by IANA is a decimal number in the range between 0 and 4294967295 that needs to be converted to a fixed length 8 digit hexadecimal number when used within the UE Radio Capability ID. E.g. 32473 is converted to 00007ED9.

25

- 3) The Version ID is the current Version ID configured in the UCMF. This field is present only if the Type Field is set to 1. Its length is 2 hexadecimal digits. A different value from recently used values (if any) shall be configured in the UCMF whenever the Database of network-assigned UE Radio Capability IDs needs changing or is populated from scratch (e.g. change of Algorithm, change of UCMF).
- 4) Radio Configuration Identifier (RCI): identifies the UE radio configuration. Its length is 11 hexadecimal digits.

***** End Of Change *****

CLAIMS

1. A method of operation a core network entity (420) in a core network of a cellular communications system, the method comprising:
 - receiving (3; 11), from another core network entity (430), a notification message that
 - 5 comprises a request to replace a PLMN UE radio capability ID(s) containing a first version ID with a PLMN UE radio capability ID(s) containing a second version ID, the second version ID being newer than the first version ID; and
 - performing (5; 14) one or more actions responsive to receiving the notification message.
- 10 2. The method of claim 1 wherein performing (5; 14) the one or more actions comprises sending (5; 14), to a UE (410), a request to replace the PLMN UE radio capability ID(s) containing the first version ID with the PLMN UE radio capability ID(s) containing the second version ID.
- 15 3. The method of claim 1 or 2 wherein the other network entity (430) is a UMCF.
4. The method of claim 3 further comprising:
 - subscribing (1) to the UMCF to get notifications;
 - wherein receiving (3;11) the notification message comprises receiving (3) the notification
 - 20 message responsive to subscribing (1) to the UMCF to get notifications.
5. The method of claim 3 further comprising:
 - discovering (7-8) that the UMCF has restarted; and
 - responsive to discovering (7-8) that the UMCF has restarted, subscribing (9) to the
 - 25 UMCF to get notifications;
 - wherein receiving (3;11) the notification message comprises receiving (11) the notification message responsive to subscribing (9) to the UMCF to get notifications.
6. The method of claim 5 wherein discovering (7-8) that the UMCF has restarted
- 30 comprises:
 - sending (7) a heartbeat request message to the UMCF; and
 - receiving (8) a heartbeat response message comprising an incremented recovery time stamp.

7. The method of any of claim 1 to 6 wherein the core network entity (420) is an Access and Mobility Management Function, AMF, or a Mobility Management Entity, MME.

8. A method of operation a core network entity (430) in a core network of a cellular communications system, the method comprising:

sending (3; 11), to another core network entity (420), a notification message that comprises a request to replace a PLMN UE radio capability ID(s) containing a first version ID with a PLMN UE radio capability ID(s) containing a second version ID, the second version ID being newer than the first version ID.

9. The method of claim 8 wherein the core network entity (430) is a UMCF.

10. The method of claim 9 further comprising:

receiving (1), from the other core network entity, a subscription message to get notifications;

wherein sending (3;11) the notification message comprises sending (3) the notification message to the other core network entity responsive to receiving (1) the subscription message.

11. The method of claim 9 wherein the UMCF is restarted, and the method further comprises, upon restarting:

receiving (9), from the other core network entity, a subscription message to get notifications;

wherein sending (3;11) the notification message comprises sending (11) the notification message to the other core network entity responsive to receiving (9) the subscription message.

12. The method of claim 11 further comprising, upon restarting:

receiving (7) a heartbeat request message from the other core network entity; and
sending (8) a heartbeat response message to the other core network entity, the heartbeat response comprising an incremented recovery time stamp.

13. The method of any of claim 8 to 12 wherein the other core network entity is an Access and Mobility Management Function, AMF, or a Mobility Management Entity, MME.

14. A network node (500) for implementing a core network entity (420; 430) for a core network of a cellular communications system, the network node (500) adapted to perform the method of any one of embodiments 1 to 13.

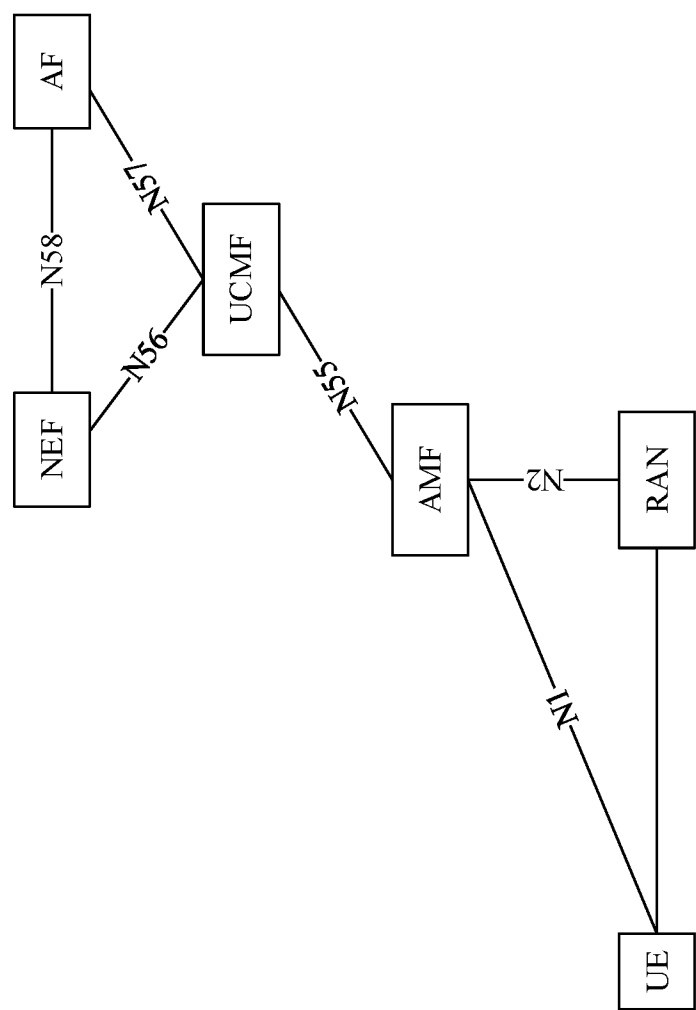


FIG. 1

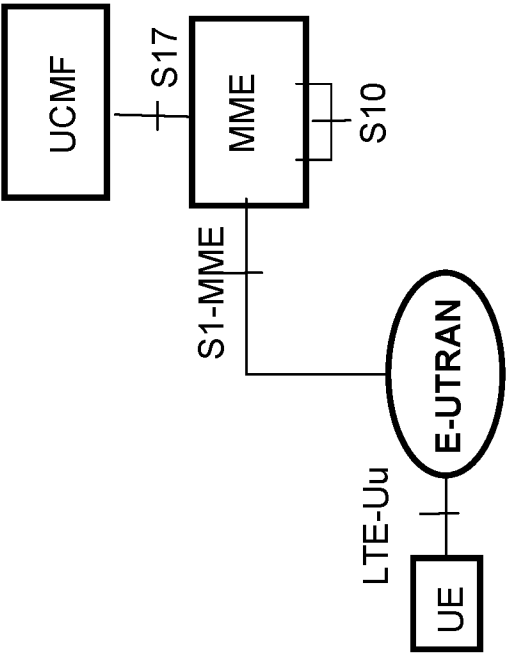


FIG. 2

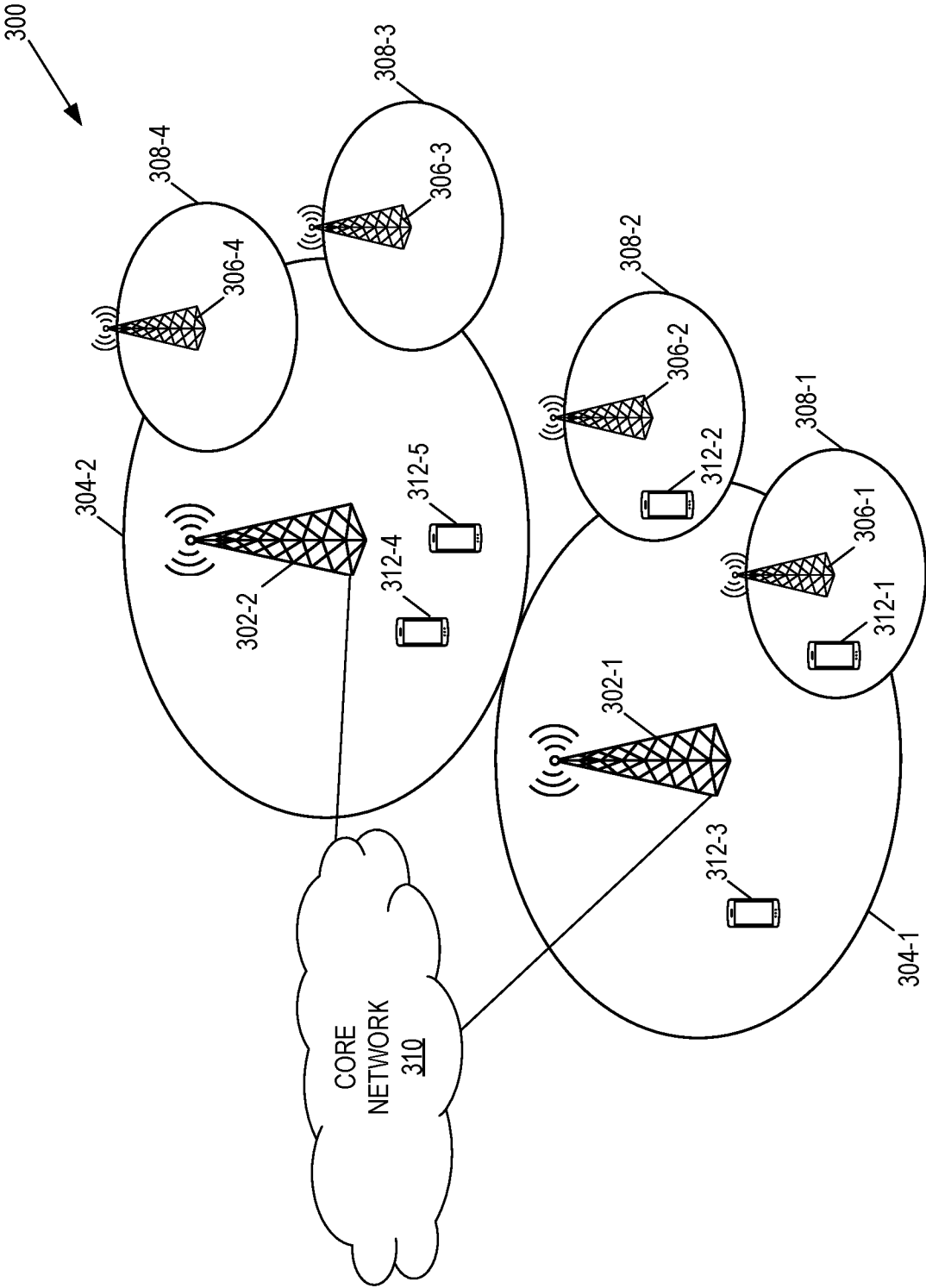


FIG. 3

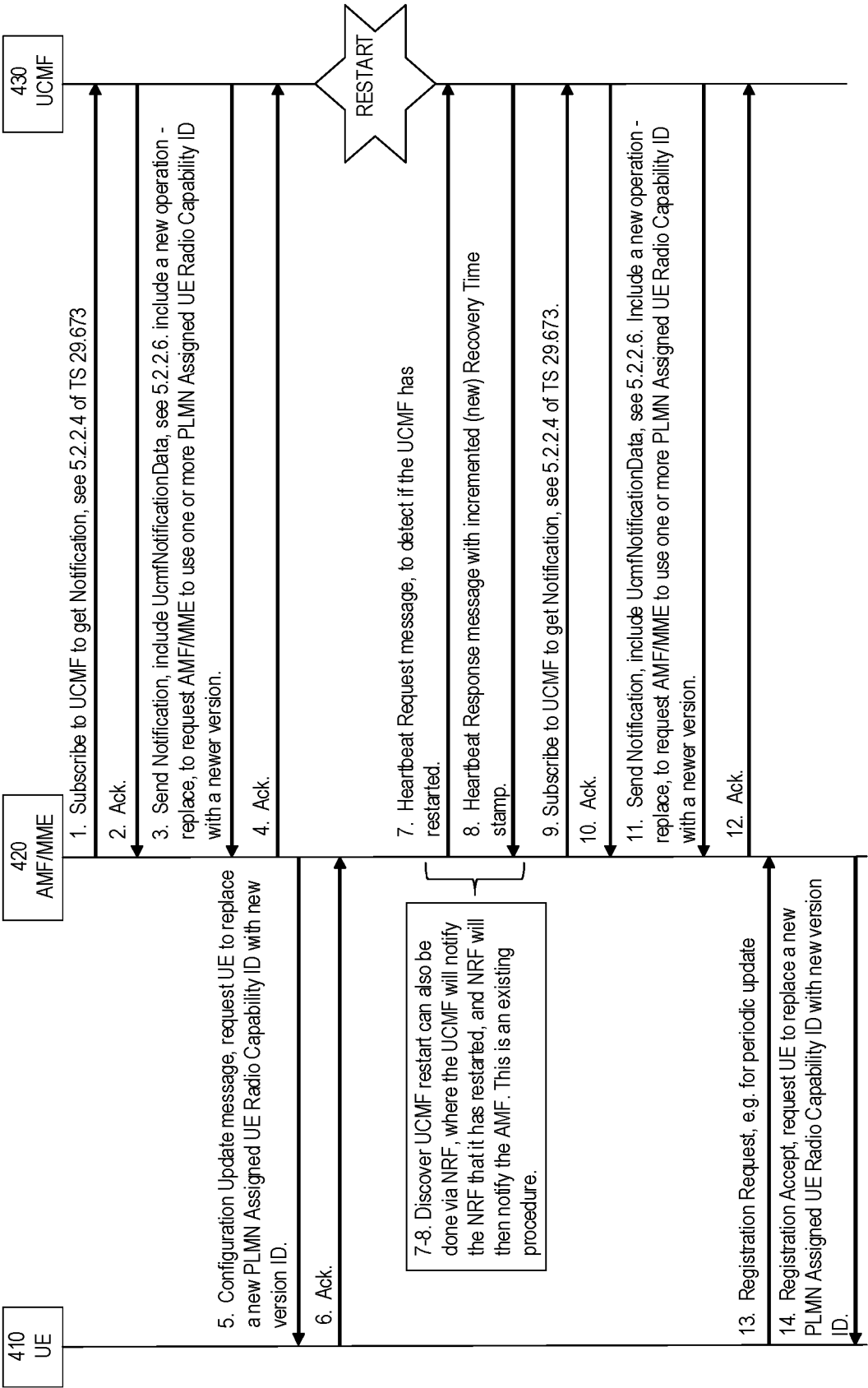
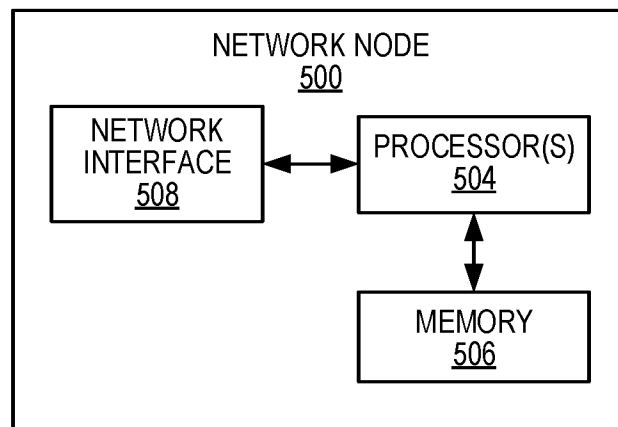
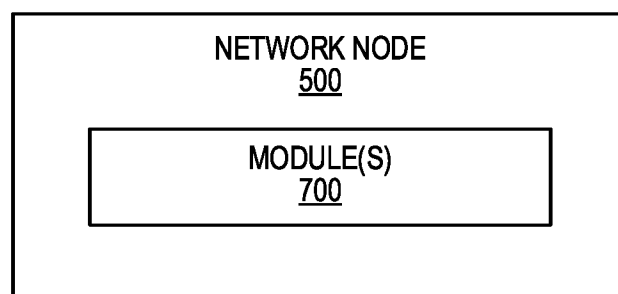


FIG. 4

5/7

**FIG. 5****FIG. 7**

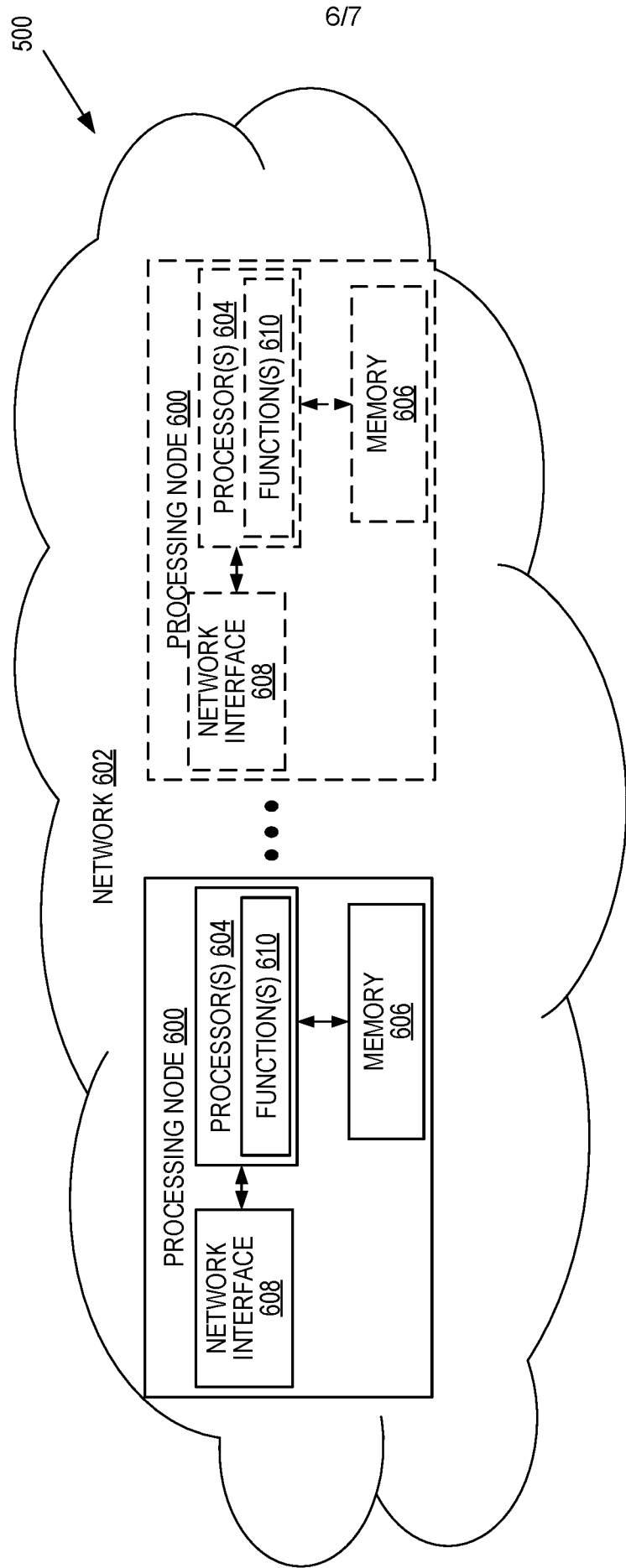


FIG. 6

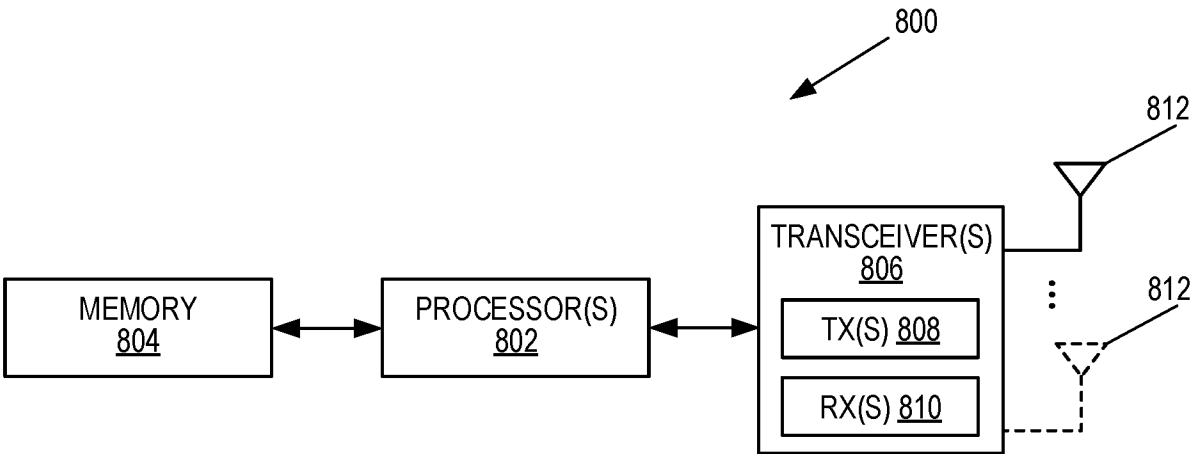


FIG. 8

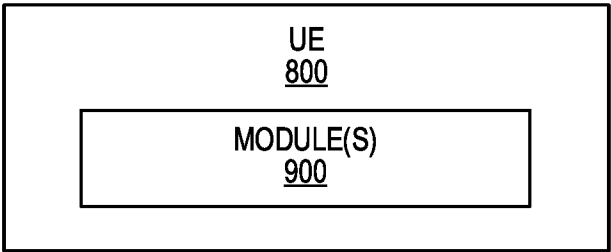


FIG. 9

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2021/054185

A. CLASSIFICATION OF SUBJECT MATTER

INV. H04W8/24
ADD. H04W92/24

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)
H04W

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2020/053554 A1 (KIM SUNGHOON [KR] ET AL) 13 February 2020 (2020-02-13) paragraph [0098] paragraphs [0113], [0116], [0119] paragraph [0125] figures 7,8 ----- -/--	1-14



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"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)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"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

"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

"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

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Date of the actual completion of the international search

3 May 2021

Date of mailing of the international search report

23/06/2021

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Authorized officer

Bösch, Michael

INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2021/054185

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	NOKIA ET AL: "Support of RACS in PLMNs with distributed and-non coordinated filtering of UE radio capabilities", 3GPP DRAFT; S2-1907073 23.501 CR ON MULTIPLE IDS, 3RD GENERATION PARTNERSHIP PROJECT (3GPP), MOBILE COMPETENCE CENTRE ; 650, ROUTE DES LUCIOLES ; F-06921 SOPHIA-ANTIPOLIS CEDEX ; FRANCE , vol. SA WG2, no. Sapporo, Japan; 20190624 - 20190628 18 June 2019 (2019-06-18), XP051752048, Retrieved from the Internet: URL:http://www.3gpp.org/ftp/tsg%5Fsa/WG2%5FArch/TSGS2%5F134%5FSapporo/Docs/S2%2D1907073%2Ezip [retrieved on 2019-06-18] paragraph [5.4.4.1a] paragraph [6.2.21] paragraph [5.2.18.2] -----	1-14
Y	"3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; System architecture for the 5G System (5GS); Stage 2 (Release 16)", 3GPP STANDARD; TECHNICAL SPECIFICATION; 3GPP TS 23.501, 3RD GENERATION PARTNERSHIP PROJECT (3GPP), MOBILE COMPETENCE CENTRE ; 650, ROUTE DES LUCIOLES ; F-06921 SOPHIA-ANTIPOLIS CEDEX ; FRANCE , vol. SA WG2, no. V16.3.0 22 December 2019 (2019-12-22), pages 1-417, XP051840930, Retrieved from the Internet: URL:ftp://ftp.3gpp.org/Specs/archive/23_series/23.501/23501-g30.zip 23501-g30.docx [retrieved on 2019-12-22] paragraph [5.4.4.1a] paragraph [5.9.10] paragraph [6.2.21] paragraph [5.2.18.2] ----- -/--	1-14

INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2021/054185

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	"3rd Generation Partnership Project; Technical Specification Group Core Network and Terminals; 5G System; UE Radio Capability Management Services Stage 3 (Release 16)", 3GPP STANDARD; TECHNICAL SPECIFICATION; 3GPP TS 29.673, 3RD GENERATION PARTNERSHIP PROJECT (3GPP), MOBILE COMPETENCE CENTRE ; 650, ROUTE DES LUCIOLES ; F-06921 SOPHIA-ANTIPOLIS CEDEX ; FRANCE , no. V1.0.0 2 December 2019 (2019-12-02), pages 1-37, XP051840666, Retrieved from the Internet: URL:ftp://ftp.3gpp.org/Specs/archive/29_series/29.673/29673-100.zip 29673-100.docx [retrieved on 2019-12-02] paragraph [5.2.1] paragraph [5.2.2.4.1] paragraph [5.2.2.6.1] -----	1-14
X,P	ERICSSON ET AL: "Populating New Version Id via Notification", 3GPP DRAFT; C4-203231, 3RD GENERATION PARTNERSHIP PROJECT (3GPP), MOBILE COMPETENCE CENTRE ; 650, ROUTE DES LUCIOLES ; F-06921 SOPHIA-ANTIPOLIS CEDEX ; FRANCE , vol. CT WG4, no. E-Meeting; 20200602 - 20200612 21 May 2020 (2020-05-21), XP051887319, Retrieved from the Internet: URL:https://ftp.3gpp.org/tsg_ct/WG4_protocols/ex-CN4/TSGCT4_98e_meeting/Docs/C4-203231.zip C4-203231_populating_version_id_29674.docx [retrieved on 2020-05-21] the whole document ----- -/--	1-14

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2021/054185

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X,P	"3rd Generation Partnership Project; Technical Specification Group Core Network and Terminals; 5G System; UE radio capability management services; Stage 3 (Release 16)", 3GPP DRAFT; 29673-G10, 3RD GENERATION PARTNERSHIP PROJECT (3GPP), MOBILE COMPETENCE CENTRE ; 650, ROUTE DES LUCIOLES ; F-06921 SOPHIA-ANTIPOLIS CEDEX ; FRANCE 8 July 2020 (2020-07-08), XP051907255, Retrieved from the Internet: URL:https://ftp.3gpp.org/3guInternal/3GPP ultimate versions to be transposed/sentToD pc/29673-g10.zip 29673-g10.docx [retrieved on 2020-07-08] paragraph [5.2.1] paragraph [5.2.2.4.1] paragraph [6.1.5.2] paragraph [6.2.6.2.8] -----	1-14
X,P	WO 2020/222842 A1 (NOKIA TECHNOLOGIES OY [FI]; NOKIA USA INC [US]) 5 November 2020 (2020-11-05) paragraph [0018] - paragraph [0026] paragraph [0034] - paragraph [0054] figures 2-4 -----	1-14

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2021/054185

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		WO 2020032491 A1	13-02-2020

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