**3GPP TSG-WG SA2 Meeting #140E e-meeting  *S2-200xxxx***

**Elbonia, August 19 – September 02, 2020**

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| *CR-Form-v12.0* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **23.501** | **CR** |  | **rev** |  | **Current version:** | **16.5.0** |  |
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| *For* [***HELP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network |  | Core Network | **X** |

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| ***Title:*** | Addition of new values to RAT type IE | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | TNO | | | | | | | | | |
| ***Source to TSG:*** | SA2 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | 5GSAT\_ARCH | | | | |  | ***Date:*** | | | 2020-07-16 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***Release:*** | | | Rel-17 |
|  | *Use one 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](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one 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:*** | | This change facilitates CN awareness of satellite access by introducing new (satellite) RAT Types. RAT Type can be signalled from the AMF towards the SMF to impose restriction on which QoS profiles can be used for PDU sessions going via the new RAT. This RAT Type is used by the AMF for any mobility procedures that need RAT Type awareness (such as RAT Restrictions) and it can be passed to any NF that needs it for other reasons, such as Policy Control or charging. The SMF needs to be able to handle this new RAT Type to know which QoS values should be excluded. Charging will also need to be aware of the new RAT Type if it is necessary to be able to apply specific charging on satellite access.  Different orbits introduce substantially different delays on the signalling path. Consequently it is necessary to distinguish the different orbits for QoS and policy control purposes. This distinction can be created by introducing different RAT types for different orbits e.g. NR(LEO), NR(MEO), NR(GEO) and NR(OTHERSAT). | | | | | | | | |
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| ***Summary of change:*** | | New, satellite related, RAT Types are introduced. | | | | | | | | |
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| ***Consequences if not approved:*** | | Inability of 5GS to recognize QoS limitations (e.g. latency) related to satellite access. | | | | | | | | |
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| ***Clauses affected:*** | | 7.10 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | | **X** |  | Other core specifications | | | | 29.571, 23.502 | | |
| ***affected:*** | |  | **X** | Test specifications | | | |  | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | |  | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

## 3.1 Definitions

For the purposes of the present document, the terms and definitions given in TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in TR 21.905 [1].

\*\*\* Begin of Change \*\*\*

**(Radio) Access Network**: See 5G Access Network.

**RAT type:** Identifies the transmission technology used in the access network for both 3GPP accesses and non-3GPP Accesses, for example, NR, NR(LEO), NR(MEO), NR(GEO), NR(OTHERSAT), NB-IOT, Untrusted Non-3GPP, Trusted Non-3GPP, Trusted IEEE 802.11 Non-3GPP access, Wireline, Wireline-Cable, Wireline-BBF, etc.

**Requested NSSAI:** NSSAI provided by the UE to the Serving PLMN during registration.

\*\*\* End of Change \*\*\*

\*\*\* Begin of Change \*\*\*

#### 5.3.2.3 Registration Area management

Registration Area management comprises the functions to allocate and reallocate a Registration area to a UE. Registration area is managed per access type i.e., 3GPP access or Non-3GPP access.

When a UE registers with the network over the 3GPP access, the AMF allocates a set of tracking areas in TAI List to the UE. When the AMF allocates registration area, i.e. the set of tracking areas in TAI List, to the UE it may take into account various information (e.g. Mobility Pattern and Allowed/Non-Allowed Area (refer to clause 5.3.4.1)). An AMF which has the whole PLMN as serving area may alternatively allocate the whole PLMN ("all PLMN") as registration area to a UE in MICO mode (refer to clause 5.4.1.3).

The 5G System shall support allocating a Registration Area using a single TAI List which includes tracking areas of any NG-RAN nodes in the Registration Area for a UE.

A single TAI dedicated to Non-3GPP access, the N3GPP TAI, is defined in a PLMN and applies within the PLMN.

When a UE registers with the network over the Non-3GPP access, the AMF allocates a registration area that only includes the N3GPP TAI to the UE.

When generating the TAI list, the AMF shall include only TAIs that are applicable on the access type (i.e. 3GPP access or Non-3GPP access) where the TAI list is sent.

NOTE 1: To prevent extra signalling load resulting from Mobility Registration Update occurring at every RAT change, it is preferable to avoid generating a RAT-specific TAI list for a UE supporting more than one RAT.h

For all 3GPP Access RATs in NG-RAN and for Non-3GPP Access, the 5G System supports the TAI format as specified in TS 23.003 [19] consisting of MCC, MNC and a 3-byte TAC only.

The additional aspects for registration management when a UE is registered over one access type while the UE is already registered over the other access type is further described in clause 5.3.2.4.

To ensure a UE initiates a Mobility Registration procedure when performing inter-RAT mobility to or from NB-IoT, a Tracking Area shall not contain both NB-IoT and other RATs cells (e.g. WB-E-UTRA, NR), and the AMF shall not allocate a TAI list that contains both NB-IoT and other RATs Tracking Areas.

For 3GPP access the AMF determines the RAT type the UE is camping on based on the Global RAN Node IDs associated with the N2 interface and additionally the Tracking Area indicated by NG-RAN. This approach can be used to distinguish among different NR satellite RAT Types, corresponding to different orbits:

* NR(LEO):which RAT would be NR RAN based on LEO satellite constellations, for which the satellite altitude would be below 2000 km.
* NR(MEO): which RAT would be NR RAN based on MEO satellite constellations, for which the satellite altitude would be between 8000 km and 25000 km.
* NR(GEO): which RAT would be NR RAN based on GEO satellites constellations, for which the satellite altitude would be on geo-stationary orbit 35786 km.
* NR(OTHERSAT): which RAT would be NR RAN based on other type of satellites that are not identified yet.

When the UE is accessing NR using unlicensed bands, as defined in clause 5.4.8, an indication is provided in N2 interface as defined in TS 38.413 [34].

The AMF may also determine more precise RAT Type information based on further information received from NG-RAN:

- The AMF may determine the RAT Type to be LTE-M as defined in clause 5.31.20; or

- The AMF may determine the RAT Type to be NR using unlicensed bands, as defined in clause 5.4.8.

For Non-3GPP accesses the AMF determines the RAT type the UE is camping based on the 5G-AN node associated with N2 interface as follows:

- The RAT type is Untrusted Non-3GPP if the 5G-AN node has a Global N3IWF Node ID;

- The RAT type is Trusted Non-3GPP if the 5G-AN node has a Global TNGF Node ID or a Global TWIF Node ID; and

- The RAT type is Wireline -BBF if the 5G-AN node has a Global W-AGF Node ID corresponding to a W-AGF supporting the Wireline BBF Access Network. The RAT type is Wireline-Cable if the 5G-AN node has a Global W-AGF Node ID corresponding to a W-AGF supporting the Wireline Cable Access Network. If not possible to distinguish between the two, the RAT type is Wireline.

NOTE 2: How to differentiate between W-AGF supporting either Wireline BBF Access Network or the Wireline (e.g. different Global W-AGF Node ID IE or the Global W-AGF Node ID including a field to distinguish between them) is left to Stage 3 definition.

NOTE 3: If an operator supports only one kind of Wireline Access Network (either Wireline BBF Access Network or a Wireline Cable Access Network) the AMF may be configured to use RAT type Wireline or the specific one.

For Non-3GPP access the AMF may also use the User Location Information provided at N2 connection setup to determine a more precise RAT Type, e.g. identifying IEEE 802.11 access, Wireline-Cable access, Wireline-BBF access.

When the 5G-AN node has either a Global N3IWF Node ID, or a Global TNGF Node ID, or a Global TWIF Node ID, or a Global W-AGF Node ID, the Access Type is Non-3GPP Access.

\*\*\* End of Change \*\*\*