**3GPP TSG-CT WG1 Meeting #125eC1-20xxxx**

**E-meeting, 20-28 August 2020**

**Source: Qualcomm Incorporated**

**Title: New WID on CT aspects of 5GC architecture for satellite networks**

**Document for: Agreement**

**Agenda Item: 17.1.1**

3GPP™ Work Item Description

Information on Work Items can be found at <http://www.3gpp.org/Work-Items>   
See also the [3GPP Working Procedures](http://www.3gpp.org/specifications-groups/working-procedures), article 39 and the TSG Working Methods in [3GPP TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm)

# Title: CT aspects of 5GC architecture for satellite networks

## Acronym: 5GSAT\_ARCH-CT

## Unique identifier: *{A number to be provided by MCC at the plenary}*

Potential target Release: Rel-17

Note that this field above indicates the proposed Release at the time of submission of the WID to TSG approval. It can later be changed without a need to revise the WID. The updated target Release is indicated in the Work Plan.

## 1 Impacts

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Affects:** | UICC apps | ME | AN | CN | Others (specify) |
| **Yes** |  | X |  | X |  |
| **No** |  |  | X |  |  |
| **Don't know** | X |  |  |  |  |

## 2 Classification of the Work Item and linked work items

### 2.1 Primary classification

This work item is a building block

|  |  |
| --- | --- |
|  | Feature |
| X | Building Block |
|  | *Work Task* |
|  | Study Item |

### 2.2 Parent Work Item

|  |  |  |  |
| --- | --- | --- | --- |
| Parent Work / Study Items | | | |
| Acronym | Working Group | Unique ID | Title (as in 3GPP Work Plan) |
| 5GSAT | SA1 | 800010 | Integration of Satellite Access in 5G |
| 5GSAT\_ARCH | SA2 | 860005 | Integration of satellite systems into 5GS architecture |

### 2.3 Other related Work Items and dependencies

|  |  |  |  |
| --- | --- | --- | --- |
| Other related Work Items (if any) | | | |
| Unique ID | Title | Nature of relationship |
| 800026 | FS\_5GSAT\_ARCH (Study on architecture aspects for using satellite access in 5G) | *SA2 study item identifying the architecture solutions for the normative phase. Includes PLMN selection aspects.* |
| 860005 | 5GSAT\_ARCH (Integration of satellite systems into 5GS architecture)) | *SA2 work item (normative phase for 800026)* |
| 800099 | Study on solutions for NR to support non-terrestrial networks (NTN) | *RAN3 led study item* |
| 860046 | Solutions for NR to support non-terrestrial networks (NTN) | *RAN2 led work item “Solutions for NR to support non-terrestrial networks (NTN)”* |

**Dependency on non-3GPP (draft) specification**: N/A

## 3 Justification

SA1 has introduced the requirements for the integration of satellite access into 5G system in TS 22.261. SA2 has concluded the study item on the architecture for satellite access and documented the issues and conclusions in TR 23.737. RAN has also concluded their study item on the support for non-terrestrial networks (NTN) and documented the outcome in TR 38.821. The normative work in SA2 is expected to start in August 2020. There is a need for a container for the corresponding normative stage 3 work.

Stage 2 work on PLMN selection is in the purview of CT1. SA1 requirements on the support of satellite access need to be taken aboard. In addition, the new characteristics of satellite access networks discussed in SA2 and RAN create potential impact on PLMN selection for satellite networks, including:

* New deployment scenarios:
  + terrestrial access and satellite access in the same PLMN
  + PLMNs with shared satellite access networks
  + Mobility between PLMNs with terrestrial-only and satellite-only access.
* Large satellite radio cell sizes that my span multiple countries
* Satellite radio cells that may broadcast multiple PLMN IDs with different MCC
* Earth-fixed TAI
* New RAT type(s) for satellite access networks

In addition to the above, SA3-LI has provided new requirements for PLMN selection for satellite access:

* use of a Core Network of PLMN in the country where the UE is physically located
* PLMN selection for satellite networks needs to address the scenario of extraterritorial locations (e.g. international waters and airspace).

CT1 needs a container to identify the issues and study the solutions related to the PLMN selection for satellite access.

It is proposed to start a two-phased work item for satellite networks in CT1:

- the first phase would be a stage 2 study of the requirements and solutions for PLMN selection for satellite access.

- the second phase would be a stage 3 normative phase for specifying solutions for:

- the stage 2 requirements for integration of satellite access in 5G system specified by SA2 and SA3-LI; and

- the requirements for PLMN selection specified by SA1 (stage 1), and by CT1 (stage 2) in the study phase of this work item.

## 4 Objective

Study phase (CT1 only):

The objective of the study phase is to study the issues and propose solutions related to PLMN selection for satellite access as mandated by SA1 requirements. The issues to be studied may include:

a) Determination of the country of the UE location for the purpose of PLMN selection for satellite networks

b) Lawful Intercept (LI) requirements for satellite networks

c) New RAT type(s) for satellite networks

d) Cells broadcasting multiple MCCs

e) Rules for PLMN search

f) Equivalent PLMN

g) Networks using global MCC(s)

The above list is not exhaustive. Input from other WGs (e.g. a response to LS S2-2004688 and Conclusion on Key Issue #10 in TR 23.737) and any further inputs and clarification from SA1will be considered.

The work of the study phase will be documented in a new TR. This study phase and included in the new TR will be studies and investigation if the changes and additions for PLMN selection for satellite access are better documented in a new Stage 2 TS or be added as additions to existing TS 23.122.

Normative phase:

The objective of the normative phase is to enhance the necessary CT1 specifications to:

- support the stage 2 requirements for integration of satellite access in he 5G System as defined in stage 2 specifications. Stage 3 work shall be started only after the applicable normative stage 2 work is available.

- support the requirements and solutions for PLMN selection for satellite access as defined by stage 1 specifications and in the study phase of this work item. Normative work shall be started only after the study phase has been completed.

## 5 Expected Output and Time scale

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **New specifications** *{One line per specification. Create/delete lines as needed}* | | | | | |
| Type | TS/TR number | Title | For info  at TSG# | For approval at TSG# | Rapporteur |
| Internal TR | 24.xxx | Study on PLMN selection for satellite access | CT#90 (Dec 2020) | CT#91 (Mar 2021) | Catovic, Amer, Qualcomm Incorporated, amerc@qti.qualcomm.com |

|  |  |  |  |
| --- | --- | --- | --- |
| **Impacted existing TS/TR** *{One line per specification. Create/delete lines as needed}* | | | |
| TS/TR No. | Description of change | Target completion plenary# | Remarks |
| TS 23.122 | Updates to PLMN selection related to satellite access depending on outcome of study phase | TSG#93 (Sep 2021) | Under CT1 responsibility |
| TS 24.501 | Updates related to satellite access | TSG#93 (Sep 2021) | Under CT1 responsibility |
| TS 24.008 | Potential updates related to satellite access | TSG#93 (Sep 2021) | Under CT1 responsibility |
| TS 24.301 | Potential updates related to interworking between EPS and 5GC using satellite access | TSG#93 (Sep 2021) | Under CT1 responsibility |

Impact on specifications under CT3, CT4 and CT6 responsibility, as well as other specification under CT1 responsibility will be added when the normative work in stage 2 progresses.

## 6 Work item Rapporteur(s)

Catovic, Amer, Qualcomm Incorporated, amerc@qti.qualcomm.com

## 7 Work item leadership

CT1

## 8 Aspects that involve other WGs

SA2 : system architecture

SA3-LI: LI requirements

SA1: service requirements for PLMN selection for satellite networks

CT6 : impact in the USIM to support the PLMN selection for satellite networks

## 9 Supporting Individual Members

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| Supporting IM name |
| Qualcomm Incorporated |
| Thales |
| Nokia |
| Nokia Shanghai Bell |
| OPPO |
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