**3GPP TSG-SA WG6 Meeting #56 S6-23xxxx**

**Goteborg, Sweden, 21-25 August 2023** (revision of S6-232225, S6-232192, S6-232067, S6-231929)

**Source: Samsung**

**Title: New SID on Application enablement for Satellite access enabled 5G Services**

**Document for: Approval**

**Agenda Item: 10**

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: Study on application enablement for Satellite access enabled 5G Services

Acronym: FS\_5GSAT\_App

Unique identifier: TBD

Potential target Release: Rel-19

# 1 Impacts

{For Normative work, identify the anticipated impacts. For a Study, identify the scope of the study}

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

# 2 Classification of the Work Item and linked work items

## 2.1 Primary classification

### This work item is a Feature

|  |  |
| --- | --- |
| X | Study  |
|  | Normative – Stage 1 |
|  | Normative – Stage 2 |
|  | Normative – Stage 3 |
|  | Normative – Other\* |

**\* Other = e.g. testing**

## 2.2 Parent Work Item

For a brand-new topic, use “N/A” in the table below. Otherwise indicate the parent Work Item.

|  |
| --- |
| Parent Work / Study Items  |
| Acronym | Working Group | Unique ID | Title (as in 3GPP Work Plan) |
| N/A |  |  |  |

### 2.3 Other related Work Items and dependencies

|  |
| --- |
| Other related Work /Study Items (if any) |
| Unique ID | Title | Nature of relationship |
| 800048 | Integration of Satellite Access in 5G (5GSAT) | The study will take into account Rel-17 stage-1 Normative Work on the support of satellite |
| 860005 | Integration of satellite systems in the 5G architecture (5GSAT\_ARCH) | The study will take into account Rel-17 stage-2 Normative Work on the support of satellite |
| 980014 | 5GC/EPC enhancement for satellite access Phase 2 (5GSAT\_Ph2) | The study will take into account Rel-18 stage-2 Normative Work on the support of satellite |
| 970056 | 5G system with satellite backhaul | The study will take into account Rel-18 stage-2 Normative Work on the support of satellite backhaul |
| 960016 | Study on satellite access - Phase 3 | The study will take into account Rel-19 stage-1 study on the support of satellite access phase 3 |
| 1000024 | Satellite access - Phase 3 | The study will take into account Rel-19 stage-1 Normative Work on the support of satellite |

# 3 Justification

3GPP has developed specifications to support the integration of satellite components in the 5G System (5GS), beginning in Release 17. In TS 22.261, 3GPP SA1 has specified service requirements for 5G for satellite access. The service requirements specified are to support 5G system with satellite access, service continuity between 5G terrestrial access network and 5G satellite access networks, roaming of UE supporting both satellite access and terrestrial access between 5G satellite networks and 5G terrestrial networks, satellite backhaul connections, optimise the delivery of content (e.g. content cashing supporting ubiquitous service, broadcasting/multicasting on very large to global coverages), suitable QoS parameters for traffic over a satellite backhaul, support relay UE's with satellite access etc.

In Rel-17 and Rel-18, 3GPP SA2 specified architecture and solutions considering the above service requirements including the support of discontinuous coverage which is inherent to NGSO (Non-Geostationary Orbit) satellite deployments.

Further, 3GPP SA1 is developing new requirements in Rel-19 within TR 22.865 to support new capabilities such as Store and Forward Satellite operation (which is relevant for IoT services) , UE-satellite-UE communication. These capabilities are implicitly requiring a regenerative payload (non transparent) approach (Rel-17 and Rel-18 assumed transparent mode satellite access).

The service requirements for satellite-enabled IoT service have been specified in 3GPP SA1 TS 22.261. E.g. the 5G system with satellite access shall be able to support low power MIoT type of communications, a 5G system with satellite access shall be able to optimise the delivery of content from a content caching application by taking advantage of satellites in supporting ubiquitous service, as well as broadcasting/multicasting on very large to global coverages, the 5G system shall support a mechanism to determine suitable QoS parameters for traffic over a satellite backhaul, etc.

Moreover, it is important to note that there are now several IoT NTN 3GPP Rel-17 based satellite solutions that have been or are about to be deployed commercially.

3GPP SA6 developed several 5G vertical application enablers (e.g. V2X, UAS), enabler frameworks (e.g. SEAL, EDGEAPP) and Mission Critical service with various capabilities that enable the vertical applications communication over terrestrial 3GPP networks. Satellite access for 5G will increase the network coverage and availability of 5G services with the integration of satellite access in 5G System. In addition, FS\_ACE\_IOT study item has studied application capability exposure for IoT platforms. However, it didn’t cover the IoT services over satellite access.

Service enablers defined by SA6 should also take advantage and ensure that these enablers support satellite access, and hence study the impacts and the necessary changes to the SA6 enabler specifications aligned with SA2 architecture and work.

# 4 Objective

The SA6 objectives of this study item include the following:

1. Identify the impacts and the necessary changes to the SA6 enabler specifications for supporting satellite access.

a) Develop common approach to support multiple services using satellite access for capabilities identified below (not exhaustive list):

i. Application Group spanning Users/UEs under terrestrial and non-terrestrial coverage i.e. with heterogeneous connectivity

ii. Application layer service continuity with Satellite in motion (in particular the impact on the IoT services)

iii. Handling the Application Latency difference between Users/UEs in terrestrial and non-terrestrial networks for better QoE and QoS

iv. AF influence in selection and establishment of suitable satellite access or terrestrial access or dual connectivity

v. Exposure of satellite access and backhaul information (e.g. bandwidth, latency, changes of the satellite coverage) from application layer enabler

vi. Clearly and distinctly identify KPIs, issues, solutions, and conclusions when applicable to Mission Critical.

b) Identify the existing SA6 enablers that should be supported with satellite access

2. Identify key issues and develop solutions to ensure support of satellite access to multiple SA6 enablers, for capabilities identified in 1.

3. Enable application layer to support IoT services with satellite access by identifying relevant requirements, defining corresponding functional model and potential solutions

4. Possible deployment models for SA6 enablers with satellite access integrated 5G System.

5. Enhancements from Rel-19 such as supporting Store and Forward Satellite operation, UE-Satellite-UE communication also need to at the enablement layer.

NOTE 1: For objective 5, SA6 can be dependent on progress and decisions made by SA2.

NOTE 2: Rel-19 Stage-1 work is in progress and may change. The justification and objectives will be updated accordingly, if needed.

NOTE 3: Enhancements to existing SA6 defined enablers (like SEAL, CAPIF) may be required.

# 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 | 23.XXX | Study on application enablement for Satellite access enabled 5G Services | TSG#105 | TSG#106 | Relja Djapic, TNO, <relja.djapic@tno.nl> |

# 6 Work item Rapporteur(s)

Basavaraj (Basu) Pattan, Samsung, basavarajjp@samsung.com

# 7 Work item leadership

SA6

# 8 Aspects that involve other WGs

SA2 for system aspects, SA3 for security aspects, SA5 for management aspects.

# 9 Supporting Individual Members

|  |
| --- |
| Supporting IM name |
| Samsung |
| Thales S.A. |
| Novamint |
| TNO |
| Orange |
| One2many |
| Vivo |
| CEWiT |
| TTP |
| Terrestar Solutions |
| Hispasat |
| Ericsson |
| Airbus |
| Netherlands Police |
| FirstNet |
| Motorola Solutions |
| UK Home Office |
| IRT Saint Exupery |
| Avanti |
| Intelsat |
| JSAT |
| SES |
| Sateliot |
| Oneweb |
| Lockheed Martin |
| Ligado |
| Gilat |
| Eutelsat |
| EDF |
| EUTC |
| ESA |
| CATT ? |