**3GPP TSG-SA WG6 Meeting #57 S6-23xxxx(draft-V0.2)**

**Xiamen, China, 09-13 October 2023** (revision of S6-232776, S6-232772, S6-232605, S6-232530, S6-232492, 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 |
| 1010033 | FS\_5GSAT\_ARCH\_Ph3 | The study will take into account Rel-19 stage-2 study on the support of satellite access phase 3 |

# 3 Justification

3GPP has developed specifications to support the integration of satellite components into EPS and 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.

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.

Further study is required to understand applicability and utility of Satellite access in the 5G system for the Mission Critical Services. Some example aspects to study in Satellite access for Mission Critical Services are:

1. Use 5G Satellite access Network to enable communication to very large coverage for Mission Critical Services

2. Analyse the impacts to Mission Critical Service due to QoS, latency aspects and bandwidth limitations if any due to Satellite access.

3. Application context transfer handling when UEs switch between Satellite access and 5G Terrestrial network.

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.

Below aspects and the related objectives can be included in future meeting:

1. Rel-19 Stage-1 work is in progress for:

- Store and Forward Satellite operation from a data service perspective (when no simultaneous active feeder link connection to the ground segment),

- UE-Satellite-UE communication (unicast, multicast and broadcast),

- Application inputs (e.g. based on Application KPIs) in selection and establishment of suitable satellite access or terrestrial access for delivering user traffic over selected access technology (e.g. for IoT services)

2. Identify potential enabler layer issues for supporting edge computing on-board the satellite.

NOTE : For the above aspects, SA6 depends on progress and decisions made by SA2.

# 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. Enhancements to Group and Configuration management corresponding to the access the UE is connected to.

ii. Enhancements at the Application enablement layer for the Latency difference between Users/UEs in terrestrial and non-terrestrial networks for better QoE and QoS.

iii. Potential optimizations to the delivery of content from a content caching application by taking advantage of satellites in supporting ubiquitous service.

2. Enable application layer to support the predictable discontinuous /intermittent connectivity patterns between UEs and AS/AFs for IoT services with satellite access e.g. asset tracking, critical infra asset monitoring delivered through low density NGSO satellite constellations, especially in discontinuous satellite coverage.

3. Identify satellite communication issues, solutions, and conclusions when applicable to Mission Critical services.

4. Identify key issues and develop solutions to ensure support of satellite access to SA6 enablers, for capabilities identified in 1 to 3.

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

NOTE : Mission Critical solution development shall only consider study based on the existing Mission Critical specifications.

# 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#104 | TSG#105 | 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 |
| China Telecom |