**SA WG2 Meeting #160S2-2313627**

**November 12th – 17th, 2023; Chicago, USA (revision of S2-2313368)**

**Source: Thales**

**Title: Example network and satellite configurations for WT3 in FS\_5GSAT\_ARCH\_Ph3**

**Document for: Approval**

**Agenda Item: 19.1**

**Work Item / Release:** **FS\_5GSAT\_ARCH\_Ph3 / Rel-19**

# 1 Discussion

The FS\_5GSAT\_Ph3 SID objectives read

WT3: Study UE-satellite-UE communication enhancements for 5GS, supporting NR NTN NGSO constellation with and without ISL, with feeder link available (at least for session establishment).

WT-3.1: Following SA1 requirements, study how at least IMS enablers including mission critical can be supported locally. Study minimum necessary set of 5GS network functions onboard the satellite(s) and study such UE-Satellite-UE communication. Co-ordinate with SA3 LI if needed.

To do this study and identification tasks, it is useful to document some generic scenarios. These scenarios are likely to help identify the topics that need to be solved, either by SA2, SA6 or by companion work in the RAN WGs (e.g. RAN 3).

# **2 Proposals**

It is proposed to update TR 23.700-29 on FS\_5GSAT\_ARCH\_Ph3 as follows (all text is new):

**\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* start of ALL NEW TEXT \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\***

Annex X:
Example of network scenarios for UE-Sat-UE generic architecture (regenerative payload capabilities on LEO satellite)

The following diagrams are examples of scenarios and situations that the 3GPP standards should handle to deliver good service for UEs – satellites – UEs over LEO constellations.

Complexity is increasing in between configurations with UEs served by same satellite and UEs served by different satellites and solutions shall start addressing the first configuration

These examples are not intended to be an exhaustive set.

For sake of clarity of figures:

-Only 2 UEs are represented to be in communication, but session of communication may involve more than 2 UEs. Note also in case satellite(s) serves more than one cell, the UEs may be in different cells.

- Inter Satellite link is represented as a transport bearer between 2 satellites but can involve more than 2 satellites.

 - AMF is the only represented NF for 5GC but other NFs might be implied (e.g: SMF).



Figure Annex X-1: Basic concept of UEs- SAT- UEs communications on LEO satellite in same cell without ISL

In case where satellites are connected with Inter Satellite Links, ISL may ensure that ground connectivity is always available.



Figure Annex X-2: Basic concept of UEs- SAT- UEs communications on LEO satellite in same cell with ISL

In case local switching capabilities are spread over more than one satellite, UE-Sat-UE communication can be extended to the coverage of the more than one satellites, and ISL may ensure that ground connectivity is always available.



Figure Annex X-3: Basic concept of UEs- SAT- UEs communications on LEO satellite in cells from different satellites connected with ISL

\*\*\*\*\*\*\*\*\*\* end of new text \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*