5G NTN Use Cases
Summary of 3GPP TR 22.865 v19.2.0
3GPP Document Scope

1 Scope

The present document describes use cases and aspects related to enhancements of the 5G system over satellite, including:

- Store and Forward (S&F) Satellite operation for delay-tolerant communication service
- UE-Satellite-UE communication
- GNSS independent operation
- Positioning enhancements for satellite access

Potential service requirements are derived for these use cases and are consolidated in a dedicated chapter.

The report ends with recommendations regarding the continuation of the work.
Overview

The present document captures a set of use cases and potential service requirements related to the 5G system with satellite access taking into account new capabilities such as:

1. **S&F Satellite operation for delay-tolerant communication services**: S&F Satellite operation is an operation mode of a 5G system with satellite-access, where the 5G system can provide some level of service (in storing and forwarding the data) when satellite connectivity is intermittently/temporarily unavailable, e.g. to provide communication service for UEs under satellite coverage without a simultaneous active feeder link connection to the ground segment. This is particularly relevant for delay-tolerant IoT services via NGSO space segment.
List of Store-and-Forward Use Cases

- **Mobile originated/terminated messages**
  - S&F service between a UE with satellite access and an Application Server for a delay-tolerant/non-real-time IoT NTN service.

- **Inter-satellite**
  - To expand the market of delay-tolerant IoT devices, store and forward operations are necessary to be developed to sustain the user plane data during the feeder link disconnection between the satellite and the terrestrial gateway.

- **Data transfer for IoT devices in remote areas**
  - In remote areas, there is no terrestrial network for various reasons, e.g. it is difficult to build and maintain communication towers. As a result, this makes it challenging to collect information for environmental protection purposes in these areas.

- **Emergency report**
  - Store and forward emergency report and position with confirmation of receipt; no end-to-end connectivity

Figures 5.3.1-1 and 5.4.3-1 from TR 22.865
• Subject to operator’s policies, a 5G system with satellite access shall be able to support S&F Satellite operation for authorized UEs; e.g. store data on the satellite when the feeder link is unavailable, and forward the data once the feeder link between the satellite and the ground segment becomes available.

• Subject to operator’s policies, a 5G system with satellite access supporting S&F Satellite operation shall be able to support forwarding of the stored data from one satellite to another satellite (e.g., which has an available feeder link to the ground network), through ISLs.

• Subject to operator’s policies, a 5G system with satellite access supporting S&F Satellite operation shall be able to allow the operator or a trusted 3rd party to apply, on a per UE and/or satellite basis, an S&F data retention period.

• Subject to operator’s policies, a 5G system with satellite access supporting S&F Satellite operation shall be able to allow the operator or a trusted 3rd party to apply, on a per UE and/or satellite basis, an S&F data storage quota.

• A 5G system with satellite access supporting S&F Satellite operation shall be able to support a mechanism to configure and provision specific required QoS and policies for UE’s data subject to store and forward operation (e.g. forwarding priority, acknowledgment policy).
List of Other Use Cases

• **LAN using satellite access**
  • LAN access to users over 5G satellite network

• **Information exchange between ships at sea**
  • Maintain ship-to-ship communications even when feeder link to ground station becomes unavailable

• **Support of UE-satellite-UE phone call**
  • Phone call over a roaming 5G satellite network

• **Enabling multiple communication services between UEs**
  • Alerts/notifications, voice calls, and streaming video over 5G satellite network; maintaining quality of service

• **Usage of satellite connectivity for collection of information to aid terrestrial network planning**
  • Collect 5G satellite usage statistics to plan for a terrestrial network

• **Vehicle fleet management in the desert**
  • Status updates among trucks over 5G networks, switching from terrestrial to satellite and back to terrestrial

Figures 5.6.3-1 and 5.8.2-1 from TR 22.865
List of Other Use Cases

- **Service differentiation for UEs via satellite access**
  - Determine available services to users based on the positioning capability and mobility

- **UAVs using satellite access**
  - High-fidelity images and location from UAV to a fire monitoring center; commands to the UAV

- **Enhanced Positioning Service using satellite access**
  - Emergency phone calls and location services via 5G satellite after a natural disaster

- **Service continuity for UE-to-UE communication between satellites**
  - Maintain voice and data connectivity during handovers between satellites

- **Service continuity for UE-to-UE communication in case of mobility between satellite and terrestrial network**
  - Maintain connectivity among small aircraft as one or all of them move out of terrestrial network coverage

Figures 5.6.3-1 and 5.8.2-1 from TR 22.865