Implementation of integration of Satellite with 5G Terrestrial networks

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SaT5G - Industry Day
University of Surrey
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Integration of Satellite with 5G Terrestrial networks

- SaT5G – implementation objectives
- Network of Networks – where does satellite fit?
- Adopting 3GPP 5G architecture in Satellite Networks
SaT5G – implementation objectives
SaT5G Implementation Objectives

- Virtualisation of satellite networks
- Integration of Satellite based solutions in the 5G network management system
- Innovative Transport protocols adapted to Multi link backhaul architecture and mitigating a variety of link characteristics
- Harmonization of satcom with 5G user and control planes
- 5G Security extension to satellite networks with efficient Authentication and Key management for SDN/NFV based 5G Satellite networks
- Caching / Multicast techniques

- Select the most relevant solutions for each of these features
- Research & Develop the necessary software and/or hardware building blocks of the selected solutions to be implemented in the testbeds
SaT5G use cases

UC 1: Edge delivery & offload for multimedia content and MEC VNF software

Integration of Satellite with 5G terrestrial networks

UC 2: 5G Fixed backhaul

Rural deployments in underserved areas.

UC 3: 5G to premises

Dual connectivity. Connectivity complementing terrestrial networks

UC 4: 5G Moving platform backhaul

Broadband connectivity to platforms on the move.
Implementation – 5GIC testbed
Network of Networks – where does satellite fit?
**Direct access:** satellite-capable UE has a direct access to the 5G network through a satellite link

**Indirect access or backhaul:** UE accesses to (R)AN via 3GPP or non-3GPP access technologies. (R)AN is connected to the 5G core through a satellite link.

(Network of Networks – where does satellite fit?)
Adopting 3GPP 5G architecture in Satellite Networks
5GC access agnostic

Integration of Satellite with 5G terrestrial networks
5G satellite network integration

- 5G core network will support multiple access networks
- Satellite service provider operates service using 5G core network
- Satellite RAN needs to be defined and interfaces to core network aligned to 5G
Satellite Service Provider’s network forms part of the mobile network operators backhaul network.

- Suitable for Multi-access Edge computing for distributing content to edge e.g. CDN caching, low latency services
- MNO and SNO are independent networks with separate management systems
Satellite & Mobile domains with single core

- Mobile network and satellite network operating using single 5GC
- Common management, control and use plane infrastructure at the network level
Satellite and 3GPP convergence

Integration of Satellite with 5G terrestrial networks

Edge Computing

UE | gNB | 5GC | Management

Satellite and Terrestrial network for 5G
Standards

ETSI TR 103 611 - Satellite Earth Stations and Systems (SES); Seamless integration of satellite and/or HAPS (High Altitude Platform Station) systems into 5G system and related architecture options.”

Scenario A3 - Indirect Mixed 3GPP Non Terrestrial Network (NTN) Access with Bent-Pipe Payload

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Classes of UE

NTN Relay UE
Integration of Satellite with 5G Terrestrial networks

- SaT5G implementation objectives
- Direct and Indirect Access
- Adopting 3GPP 5G architecture in Satellite Networks
Q&A

Integration of Satellite with 5G terrestrial networks
Thank you for your attention