



ETSI Conference on  
Non-Terrestrial Networks,  
A Native Component of 6G

# Satellite components in 6G networks

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# Standardization approach towards the inclusion of satellite components in 6G networks

- The specification of 5G NTN in 3GPP has been a first step towards the integration of a satellite component into the 3GPP ecosystem. 5G proved to be a robust and flexible basis for the integration of NTN. This was enabled through the necessary enhancements had to be added into the existing baseline of specifications designed for the needs of terrestrial networks
- 6G should natively support satellite connectivity from the start and in a more use-centric fashion
- In this presentation, we will share our vision towards the inclusion of satellite components in 6G networks and the associated standardization process

The table is dressed, inviting both terrestrial & satellite ecosystems to a common dinner. Here's the menu.

# Entrées

## NTN in 5G



# NTN in 5G



- In 5G, NTN was added after the fact, when all basic principles of the technology were already settled
- **5G NTN is a very flexible framework that supports a wide range of scenarios:**
  - UEs: Smartphones, connected devices, UEs with directive antennas
  - Access type: UE to Earth Station, UE to UE
  - Frequency range: FR1 & FR2
  - Orbits: LEO to GEO
  - Cells: Moving or (quasi) Earth-fixed cells
  - Architectures: Transparent and regenerative
- **Dependency on GNSS**

**NTN support is an additional feature, that not all Rel-17 UEs will support**



# Main course: Markets and Use Cases



# NTN in 6G: Markets and Use Cases



- **3GPP NTN should focus on the main use cases, common with terrestrial networks**
- **Mass market: this should be the main initial focus of 6G standardization for inclusion of satellite:**
  - Consumer market
  - Enterprise market
- **Verticals**
- **Should requirements of some market segments be not initially addressed**
  - Later introduction would be considered
  - Alternative approaches may also be envisioned, such as adaptation of satellite technologies or other standards



# Cheese: Native Integration of Satellite Components in 6G Networks



# From 5G to 6G



- In 5G, NTN was added after the fact, when all basic principles of the technology were already settled
- Even for 6G, radio network design principles will be driven by the needs of the terrestrial market segments
- However, NTN should be natively taken into account when designing and specifying the 6G radio protocols
- A single set of specifications would ensure natively included support for satellite components by 6G baseband and UE chipsets
- 6G will add significant value with respect to previous “G”s (as every new generation of mobile technologies), calling for significant improvements also when considering NTN!



# Native Inclusion of Satellite Components in 6G

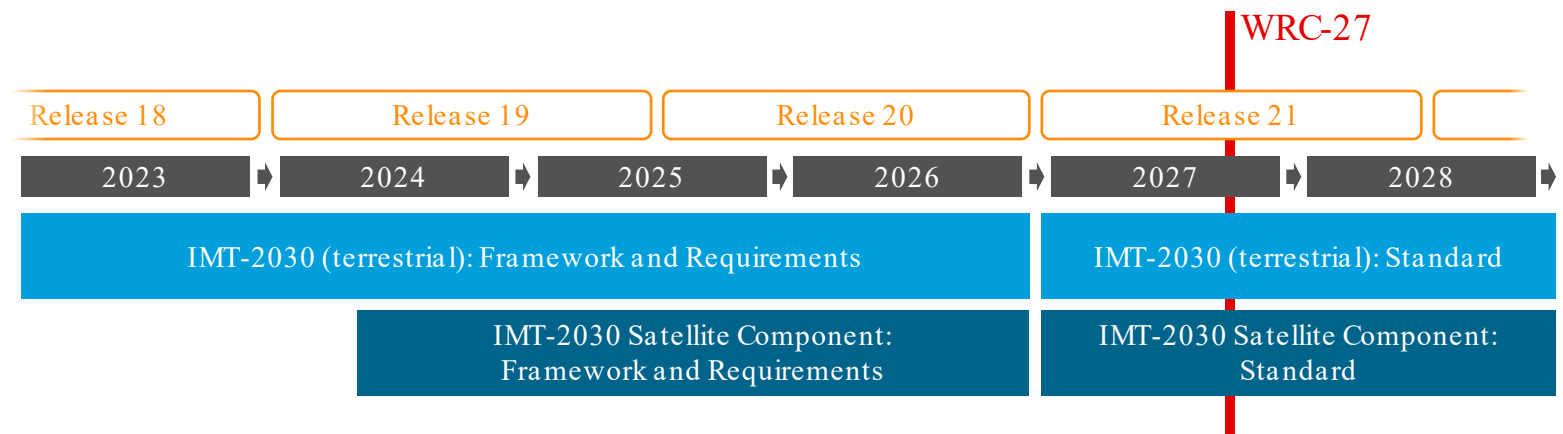


- The goal for 6G should be to address the mass market and associated requirements as a priority
- All 6G UEs should be able to access at least networks based on the corresponding satellite components
- RANs
  - As few as possible NTN-specific features
- UEs
  - Ideally, a UE does not know if it is connected to NTN or TN
  - Key aspect: remove GNSS dependency
  - Other UE types (vehicular, drone-mounted, ..)
- CNs
  - Native inclusion of satellite components is not expected to impact architecture/ interfaces of 6G core networks

# Dessert: Access to spectrum



- 3GPP has submitted 5G NTN as IMT-2020 satellite component which is under evaluation by ITU right now
- IMT-2030 work has started in ITU, addressing terrestrial components, satellite components, as well as WRC-27 Agenda items.
- 6G should be promoted as IMT-2030 technology, both for terrestrial and satellite components
- 3GPP activities should also be promoted towards WRC-27 in the context of identifying new frequency allocations for MSS (AI 1.13 & 1.14)





Dining Place:  
3GPP, the place to be



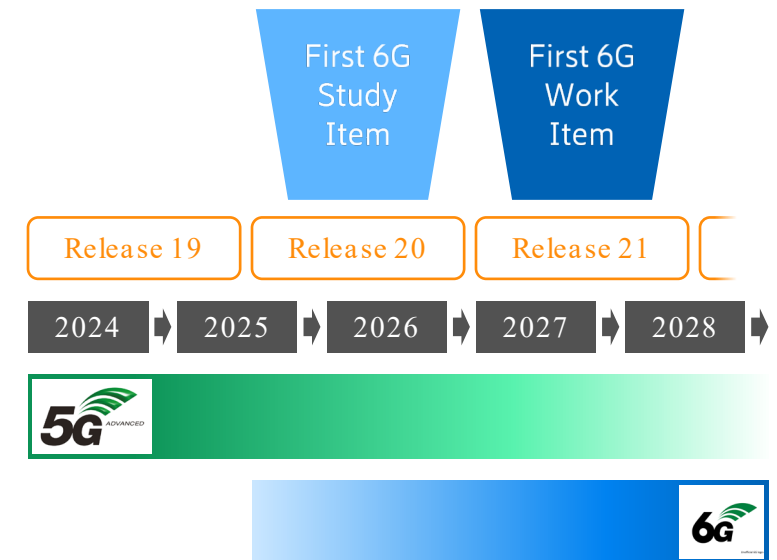
# 3GPP for Standardization



- 3GPP has proven to be the forum to endeavor a truly efficient collaboration between market and vertical representatives, chipset vendors, UE manufacturers, network vendors, as well as network operators
- Satellite industry representatives, whether satellite operators, service providers, infrastructure vendors or suppliers, and members of 3GPP are encouraged to contribute actively to 3GPP working groups and associated plenary meetings
- NTN should be included in the baseline 6G study item in Rel-20, and the first normative work item in Rel-21



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# Dinner's ready Enjoy!





