

Seamless Connectivity

How to reach true interruption free ubiquitous coverage with
6G and new assets in space

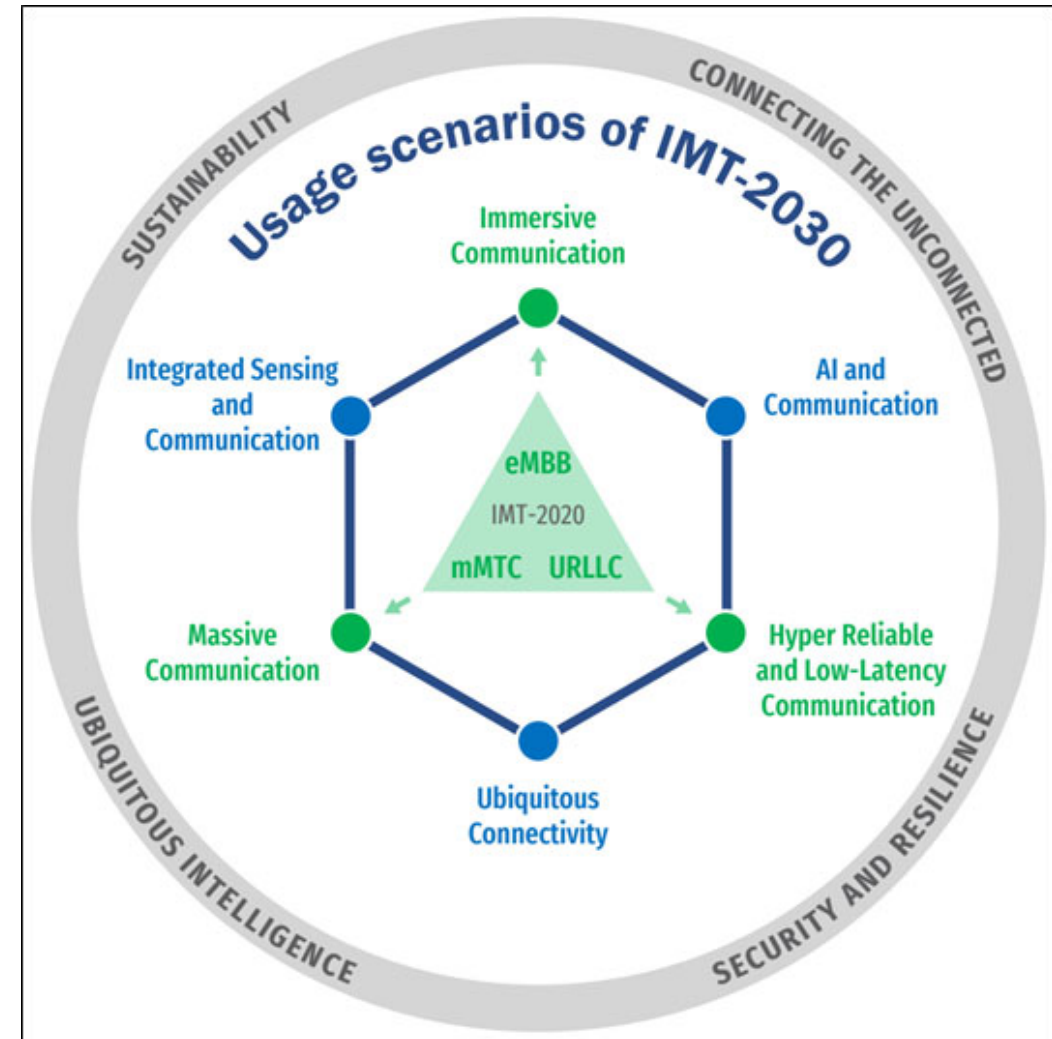
5G Connect Advanced
Nuremberg
19th of September 2024
Alexander Hofmann

Seamless Connectivity

Usage scenarios of IMT-2030

Ubiquitous Connectivity:

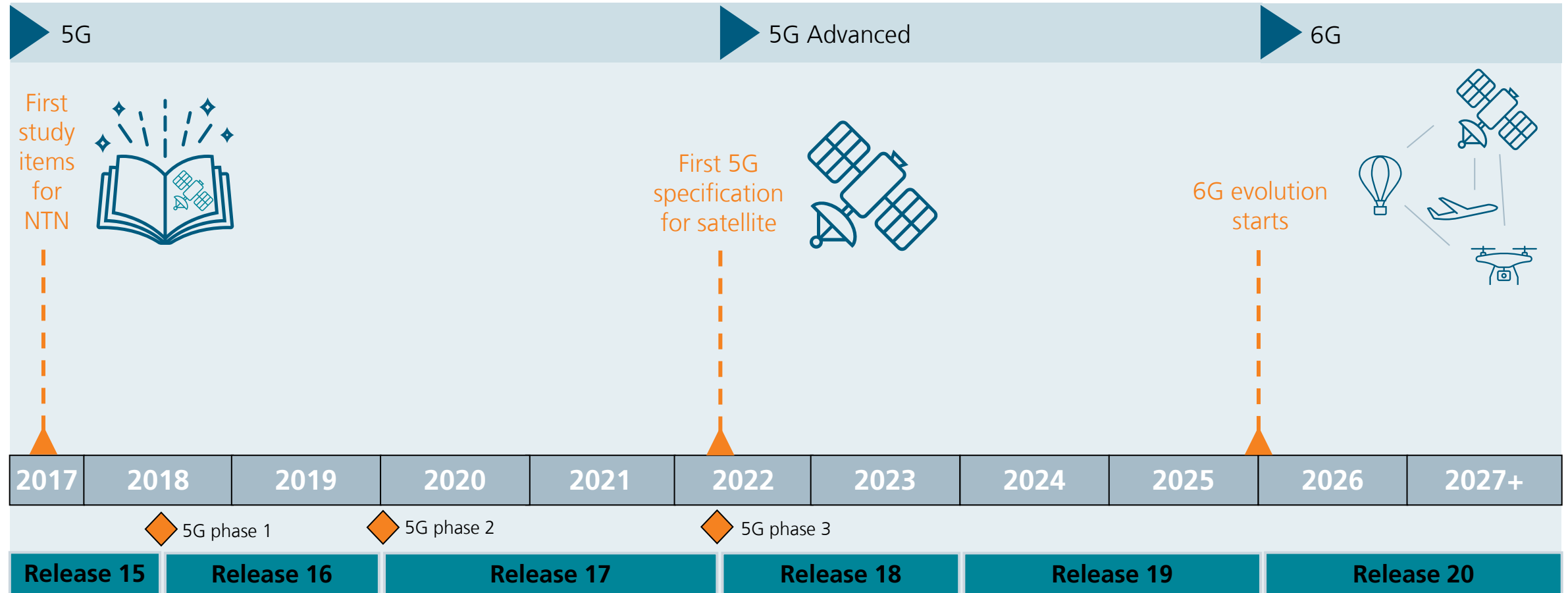
Ensuring seamless coverage in remote and underserved areas for applications like smart agriculture and education, with enhancements including non-terrestrial, aerial, and maritime communications.



Source: 3GPP [SWS-240022](#) Workshop Update from ITU-R

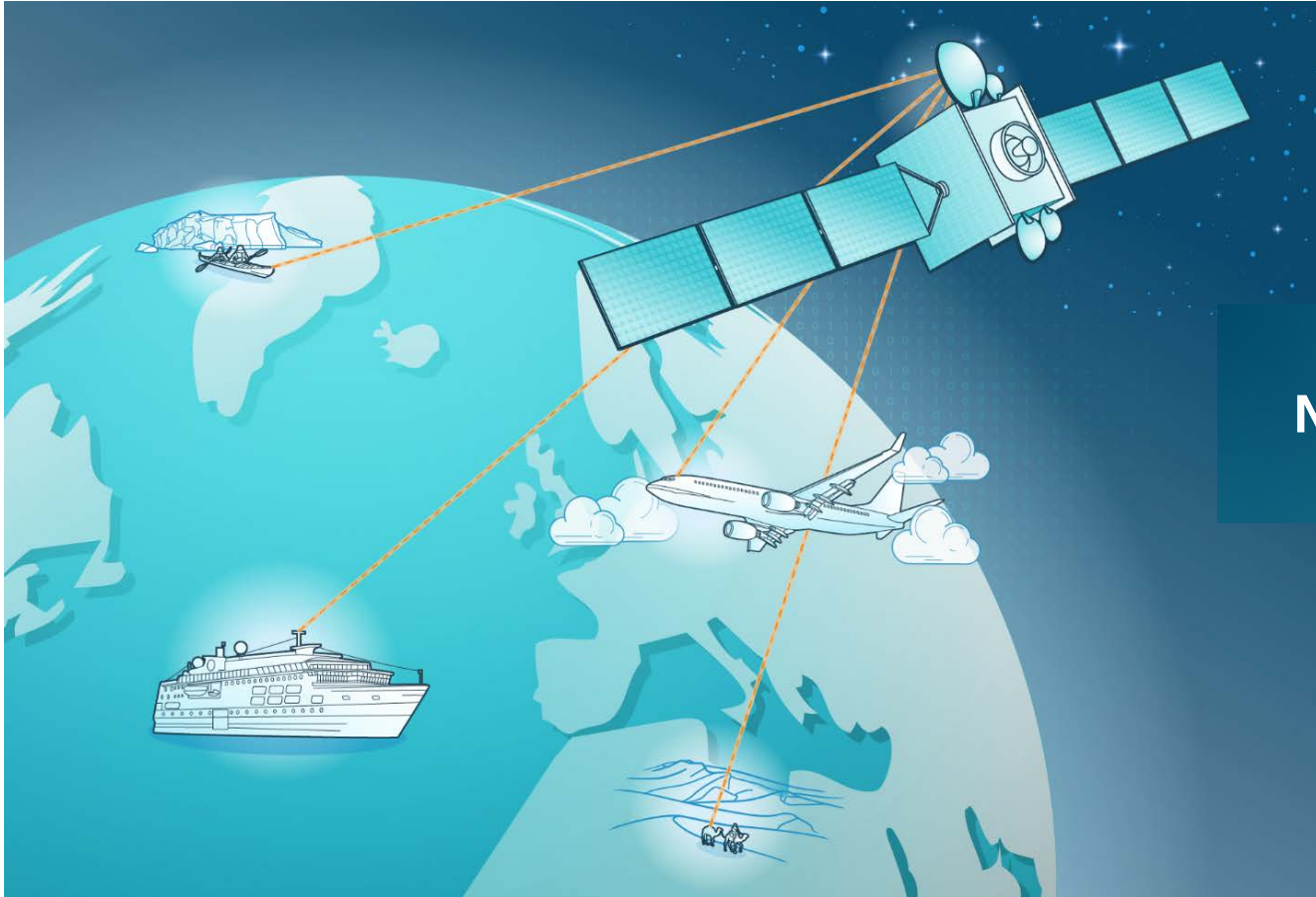
Seamless Connectivity

3GPP Standardization Timeline for Non-terrestrial Networks



Seamless Connectivity

What is non-terrestrial communication?



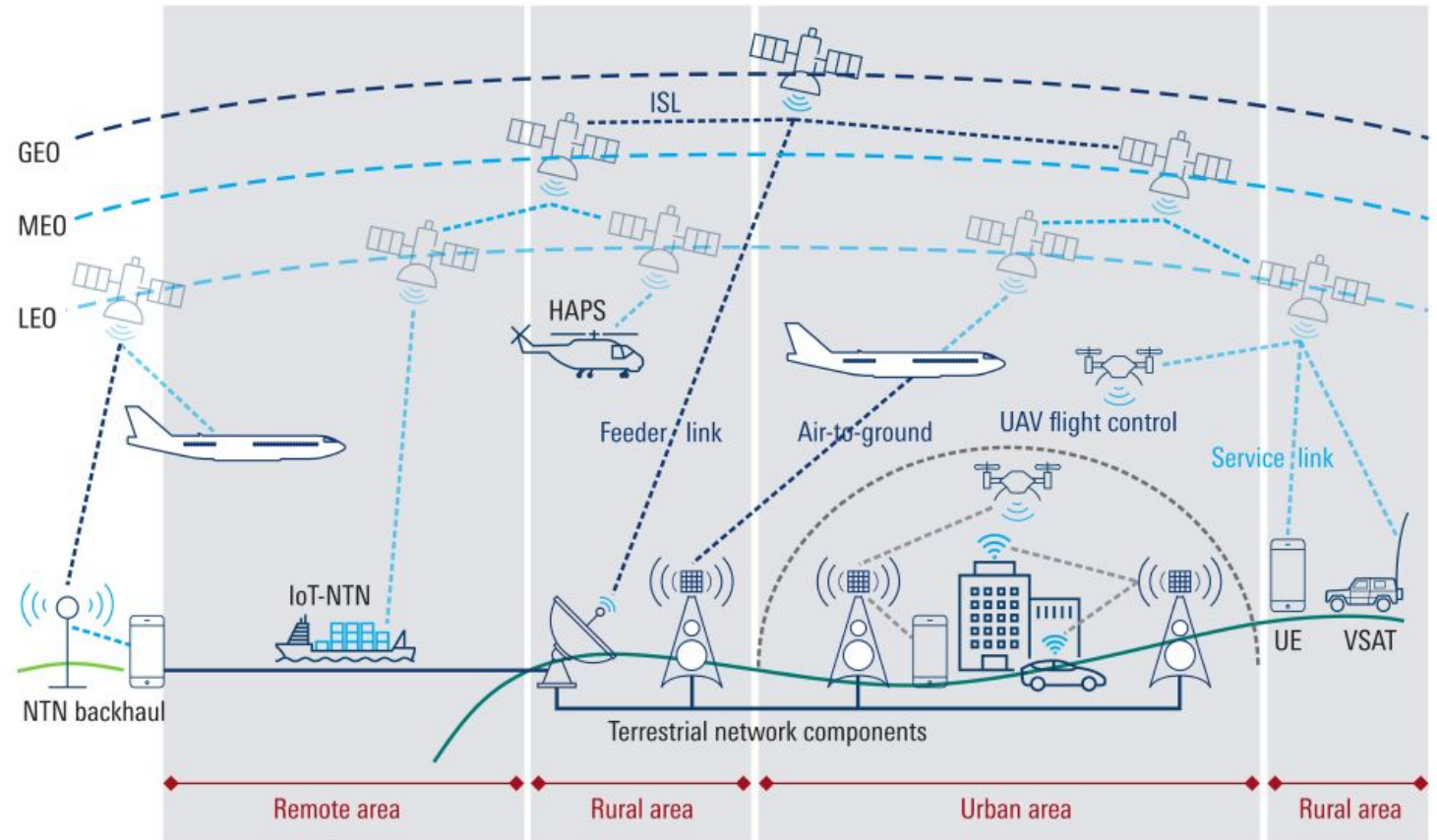
Non-terrestrial Networks (NTN)

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Non-terrestrial Networks Overview

NTN Elements

- **Satellites:**
 - GEO (Geostationary Earth Orbit)
 - MEO (Medium Earth Orbit)
 - LEO (Low Earth Orbit)
- **HAPS** (High Altitude Platforms), **Planes**, **Drones**, **UAVs**, etc.
- **NTN User Equipment (UE)**
 - Classical Handheld Devices (UE Class 3)
 - VSATs (Very Small Aperture Terminal)
 - RedCap (Reduced Capability) Devices



Source: Rohde & Schwarz

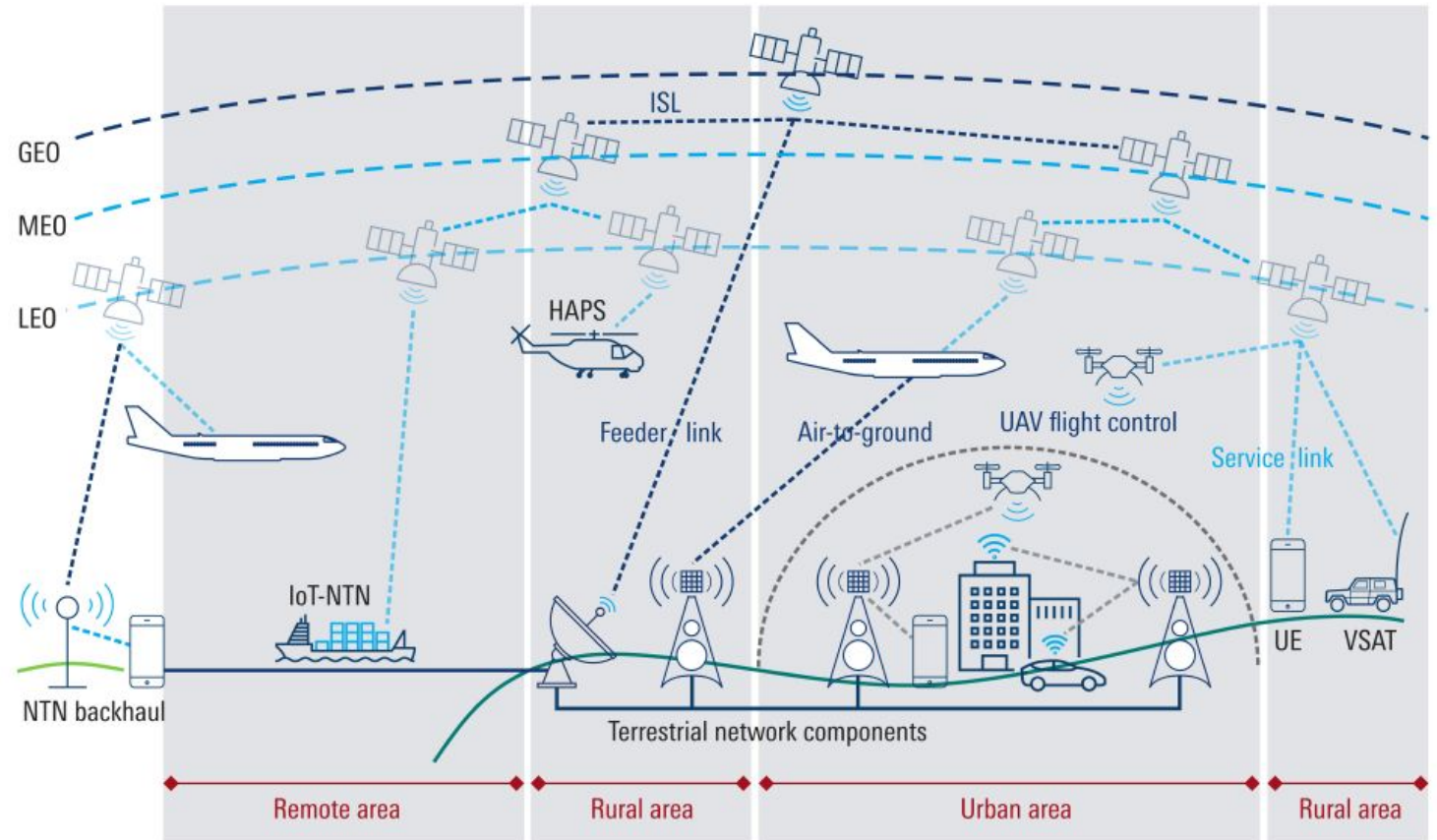
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Non-terrestrial Networks Overview

NTN combines two different technologies:

- **NTN-NR:** Direct access based on NR (New Radio)
- **NTN-IoT:** Direct access based on:
 - NB-IoT
 - LTE-M

→ NTN aims to reach ubiquitous and resilient coverage



Source: Rohde & Schwarz

Non-Terrestrial Networks (NTN)

Satellites in the mobile network: Current main challenges



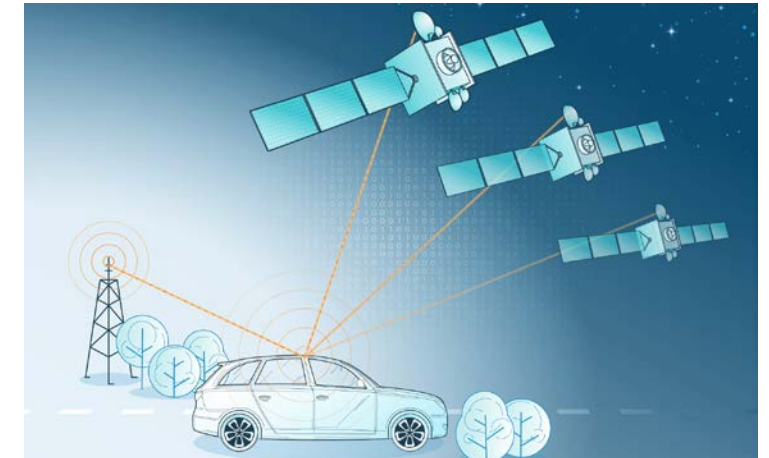
Coverage enhancement

Transmission technique improvements affect a satellite's potential coverage area and the reliability of the satellite link



Regenerative payload

Satellites with on-board processors serve as 5G base stations and forward data to each other via inter-satellite links (ILS)



Handover

Advanced inter-satellite and NTN/TN handover procedures ensure seamless connections

Enhanced satellite coverage, cellular base stations on satellites, and advanced handover procedures are the technological prerequisites for worldwide seamless mobile coverage

Contact

Alexander Hofmann
Chief Business Development Manager, Program Line Manager: NTN
RF and Satellite Communications Department
Division Communication Systems
Phone +49 9131 776 3151
Mobile +49 151 233 63485
alexander.hofmann@iis.fraunhofer.de

Fraunhofer IIS
Am Wolfsmantel 33
91058 Erlangen
Germany
www.iis.fraunhofer.de