

**BMW  
GROUP**

**No connection is not an option**



# NON-TERRESTRIAL NETWORKS. MOTIVATION OF BMW.

NOVEMBER 22, 2022

BMW Innovation

# WHY DO WE HAVE TO ACT ON NON TERRESTRIAL NETWORKS NOW?

## Drivers for the emergence of Non-terrestrial Networks (NTN).



### **New space approaches enable Low Earth Orbit Mega Constellations at comparable low costs.**

Following the example of Starlink, several Mega-Constellations of thousands of satellites in low earth orbits are about to be launched and will enable broadband internet access at comparable low cost .



### **Terrestrial Networks still have connectivity gaps, especially in rural areas.**

Connectivity of 3-,4- and 5G Networks is still limited in non-urban areas. Non-Terrestrial networks can provide a low cost alternative to extend high connectivity to rural areas at comparable low cost.



### **Upcoming releases of 5G and 6G Networks offer the chance to integrate NTN.**

Key factor for the success of terrestrial networks was the global standardisation of xG Networks. This success can now be extended to Non Terrestrial Networks if we take the chance to integrate NTN in the next releases.



### **Ubiquitous connectivity is a game changer for mobile digital services.**

New digital services like Online Shopping, 4k Video streaming, AAA Online Gaming, upcoming Metaverse and autonomous driving applications drive the demand for ubiquitous connectivity.



### **Digital services are disrupting traditional business models.**

The revenue share by digital services like on demand services will grow significantly. OEMs which do not explore the new business opportunities risk to be out of business until the end of the decade.



# NTN AND TN ARE COMPLIMENTARY TECHNOLOGIES.

By Design NTN offers a certain bandwidth per area. The number of devices is in direct correlation with the available bandwidth.



Coverage extension for **ubiquitous connectivity**

Sustaining bandwidth capacity for **seamless connectivity**

Network **redundancy** is greatly improved

Discharge of terrestrial network traffic through **broadcast capabilities**



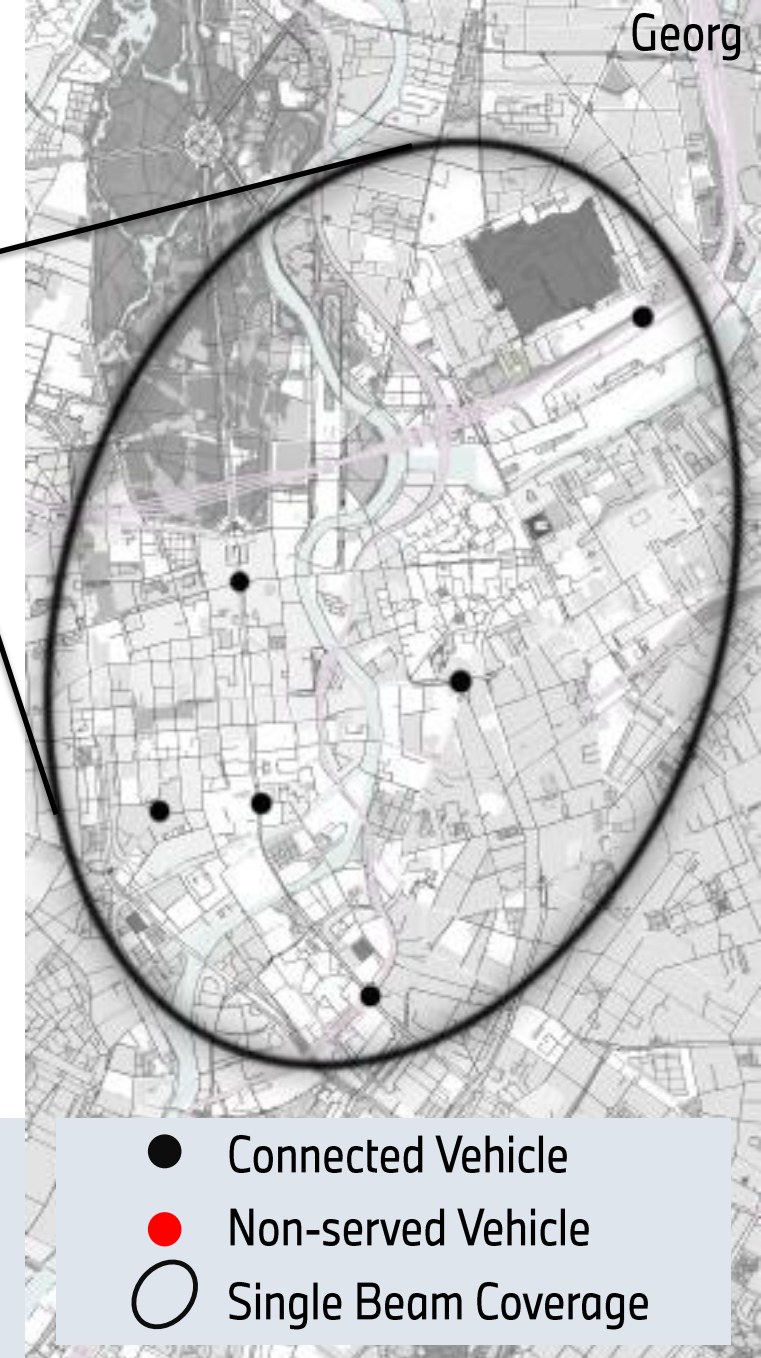
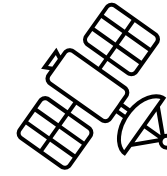
**Broadband** won't be available for everyone

Connection limited to **line-of-sight**

**Frequency** and **landing right regulations** are complex

NTN is nearly an unlimited resource of ubiquitous connectivity.

A seamless NTN and TN product offer is key for a better (premium) connected life.



# NTN MUST BE INTEGRATED IN MOBILE NETWORKS.

## **Ubiquitous** Connectivity:

Filling the gaps of mobile networks.

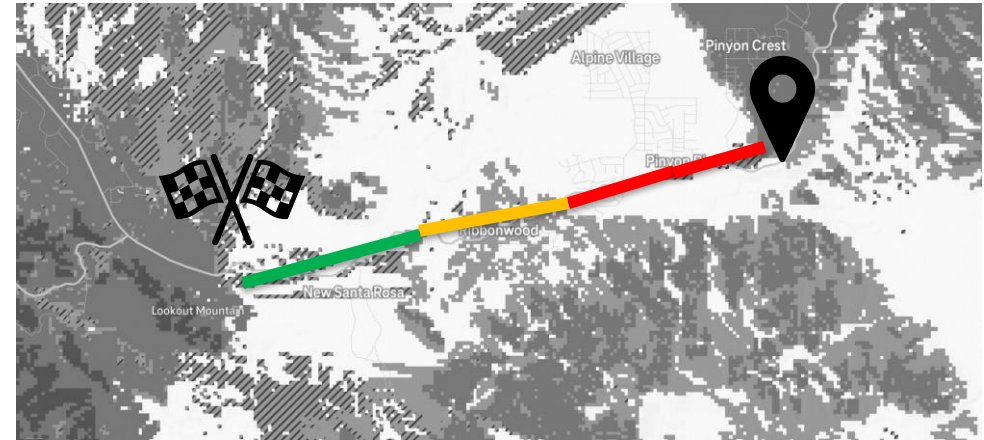


Mobile Network Coverage around Palm Springs CA

In some areas there is no coverage at all. Even narrowband applications like Emergency calls or remote control or service applications can't be guaranteed.

## **Seamless** connectivity:

Balancing inconsistent coverage.



Mobile Network Coverage around Palm Springs CA

Mobile Networks are not able to provide continuous connectivity even near-urban areas resulting in interrupted phone calls, streaming or entertainment services.



### Key Messages:

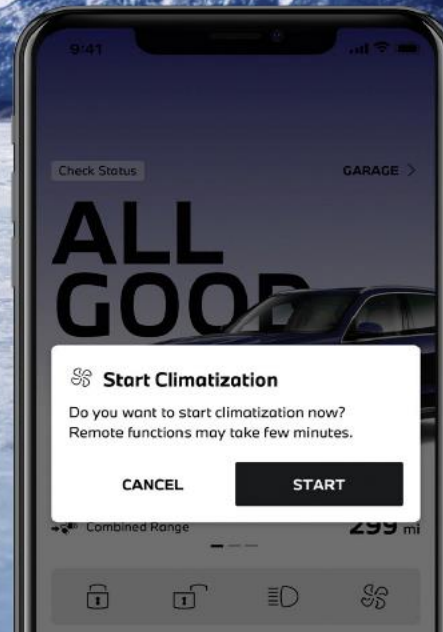
- No pure NTN Use cases have been identified. NTN acts as **complementary extension** of mobile networks.
- Integration of NTN and TN on the basis of **3GPP Standards** is our key requirement.



# UBIQUITOUS CONNECTIVITY A MUST FOR THE FUTURE CAR? YES!

YOUR WORLD.  
My BMW.

ALWAYS CONNECTED. The new My BMW App.



## Narrow Band

- Safety / Reliability
  - Remote Services
  - Connected Navigation, Charging
- Maintenance / Convenience
  - Pro Active Maintenance
  - Car Surveillance
  - Music Streaming

# UBIQUITOUS CONNECTIVITY A MUST FOR THE FUTURE CAR? YES!



## Broad Band

- Entertainment
  - Video Streaming
  - Remote Software Update
  - Map Update
  - Gaming
  - Video Conferencing
  - Metaverse