Satellite-based communication: benefits and requirements from the perspective of the automotive and transport industry

ITU-FNC-2025 Session 3: Automotive NTN Connectivity

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Connectivity for automotive: why 5GAA?

CONNECTIVITY is key to service capabilities, e.g.:

- Telephony/eCall
- Road safety (e.g., hazard warnings)
- Remote services
- Fleet monitoring & diagnostics
- Map and software updates
- Entertainment, video conferencing and gaming

CONNECTIVITY requires multi-stakeholder cooperation

CONNECTIVITY must be global…

- as vehicles are sold globally
- but regional flavours are required (e.g., China, US, EU, etc.)

OUR MISSION is to

- Align all global stakeholders
- Foster and initiate future connectivity solutions

Connected mobility for people, vehicles and transport infrastructure

5GAA bridges the automotive and telecommunication industries in order to address society's connected mobility needs, bringing inclusive access to smarter, safer and environmentally sustainable services and solutions, integrated into intelligent road transportation and traffic management.

AUTOMOTIVE INDUSTRY

Vehicle Platform, Hardware and Software Solutions

TELECOMMUNICATIONS

Connectivity and Networking Systems, Devices & Technologies

5GAA: a global cross-industry association

11 of the top 15 OEMs

8 of the top 10 MNOs

2 top smartphone vendors

Today, 5GAA unites **117 members** from around the world working together on all aspects of C-V2X

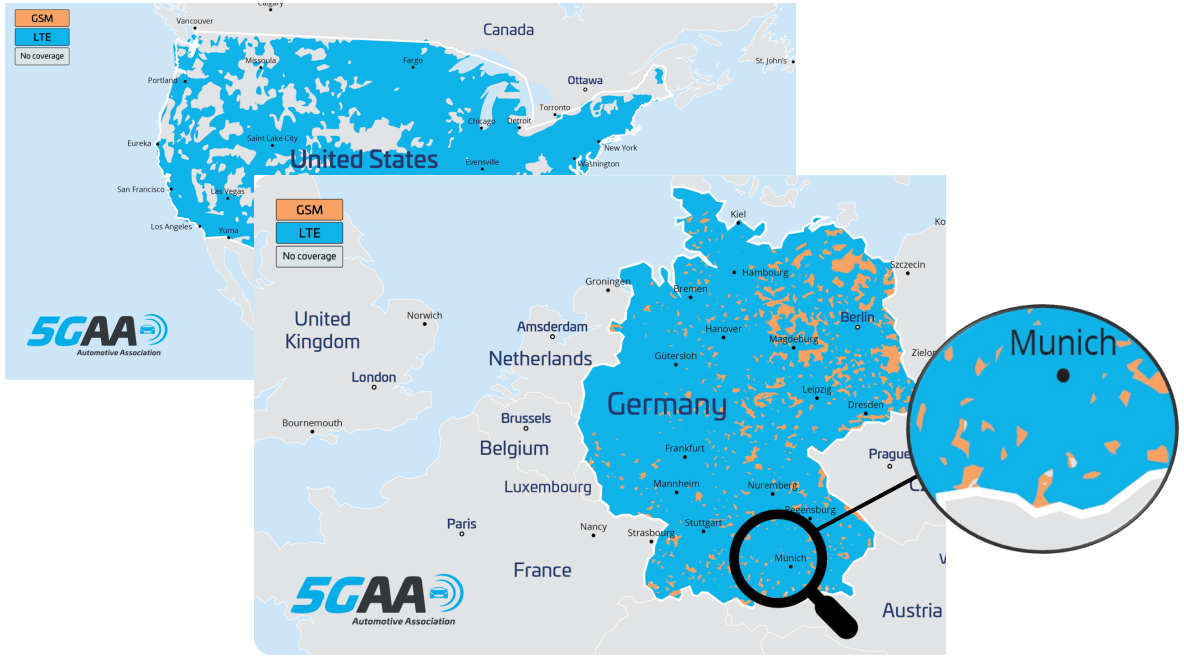
Q3 2024

In September 2016, **8 companies** teamed up to create the 5G Automotive Association (5GAA) to help develop, test, and promote 5G standards

SEPT 2016

Key benefit NTN: complementary extension of terrestrial coverage

NTN offers connectivity…



Source: TR: Maximizing the benefit of future satellite communications for automotive

In areas where the terrestrial networks have permanent coverage gaps **(ubiquity)**

Destroyed Infrastructure in Ahrtal/Germany

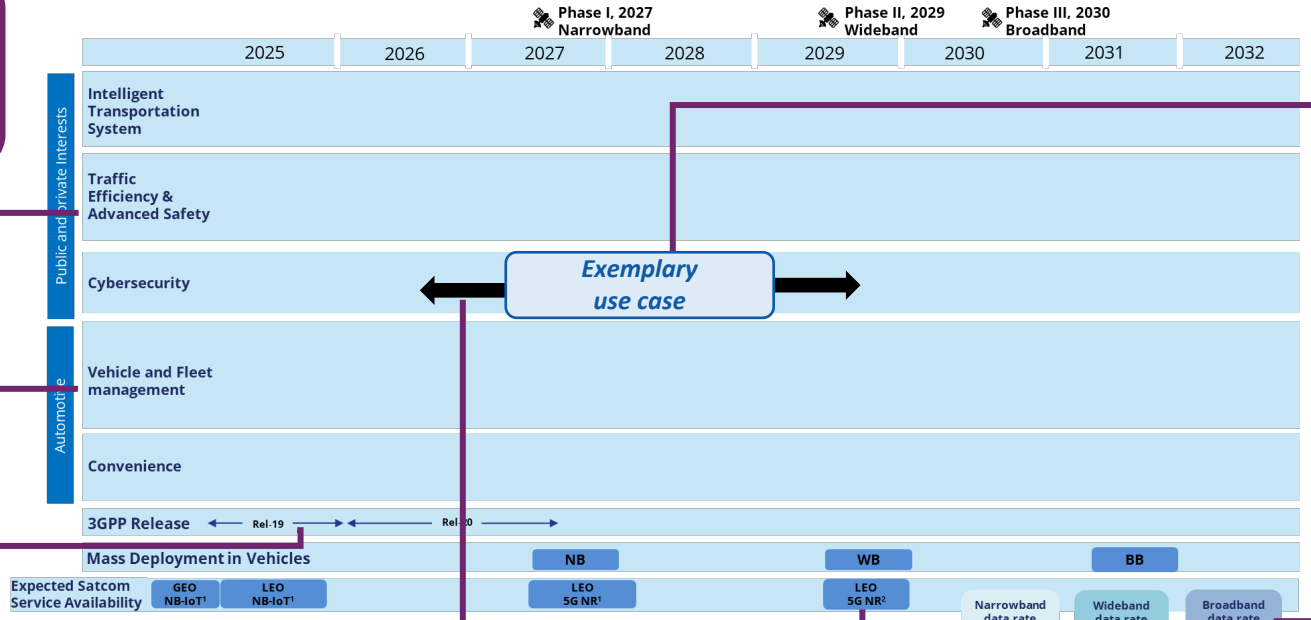
In situations where the terrestrial networks become temporarily unavailable due to outages and disaster situations **(resilience)**

https://5gaa.org/maximising-the-benefit-of-future-satellite-communications-for-automotive/

Creation of a joint vision for the mass deployment of use cases supported by NTN: A Methodology for building an industry roadmap

Clustering use cases into relevant categories:
- Public and private interest
- Automotive

Conducting a survey among 5GAA member companies
- What applications?
- What service level requirements?



Considering 3GPP timing

Predicting mass deployment including automotive lead times

Making assumptions regarding emergence of future satellite constellations

Defining data rate requirements

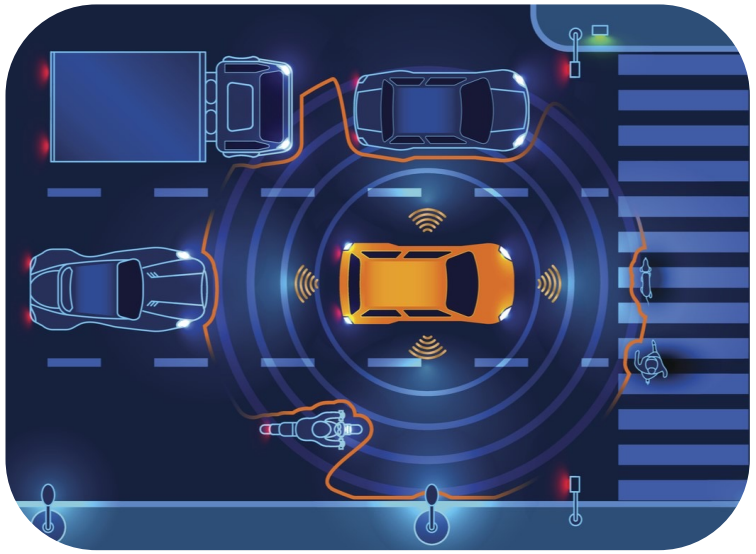
Identification of three clusters of use cases benefitting from NTN

Narrowband data rates

Telephony/e-call

Road safety

Remote services



Source: istock

Wideband data rates

Source: istock

Fleet monitoring & diagnostics

Map & sw update

Broadband data rates

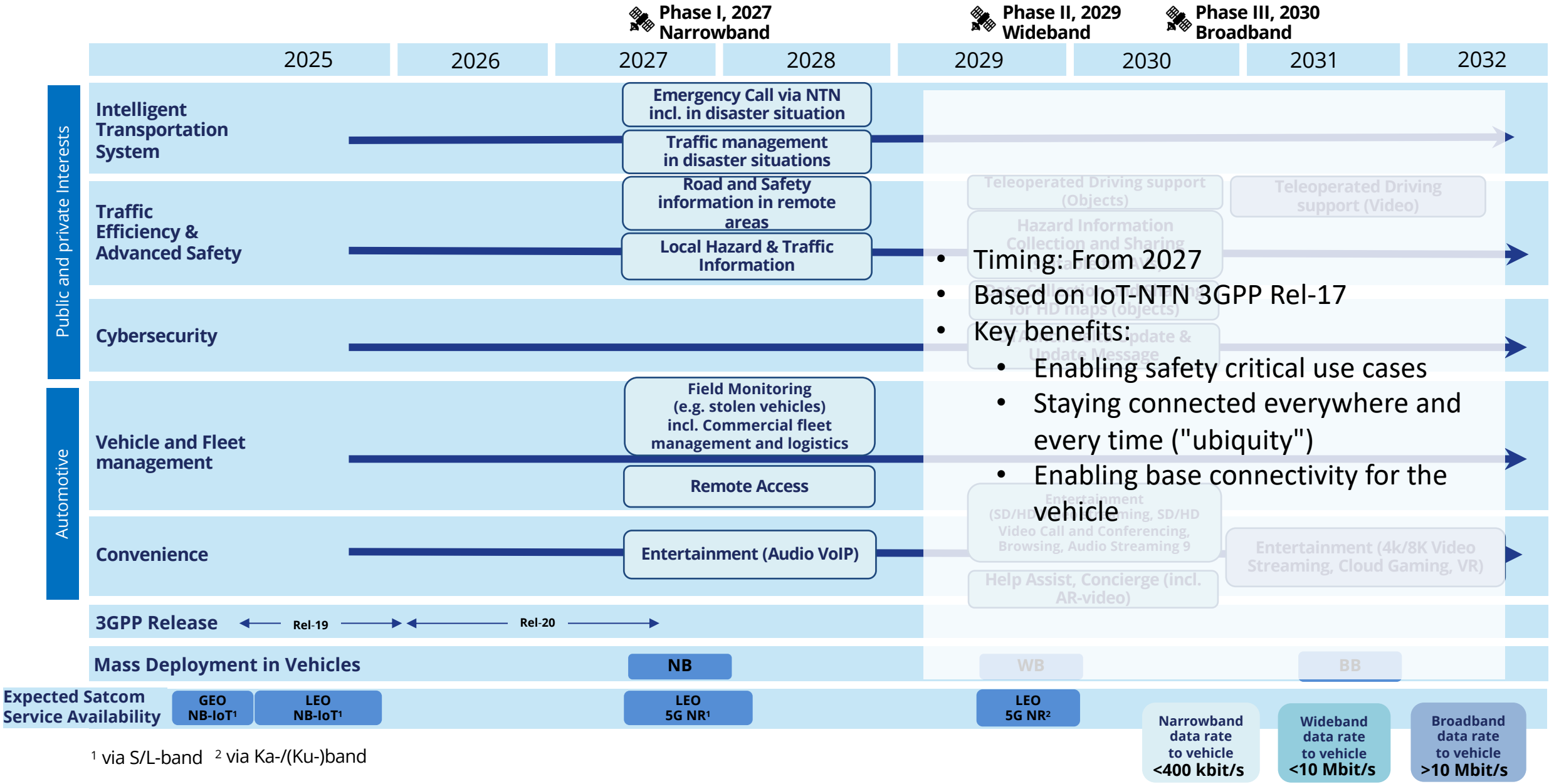
(Video) entertainment

Video conferencing

Gaming

Source: istock

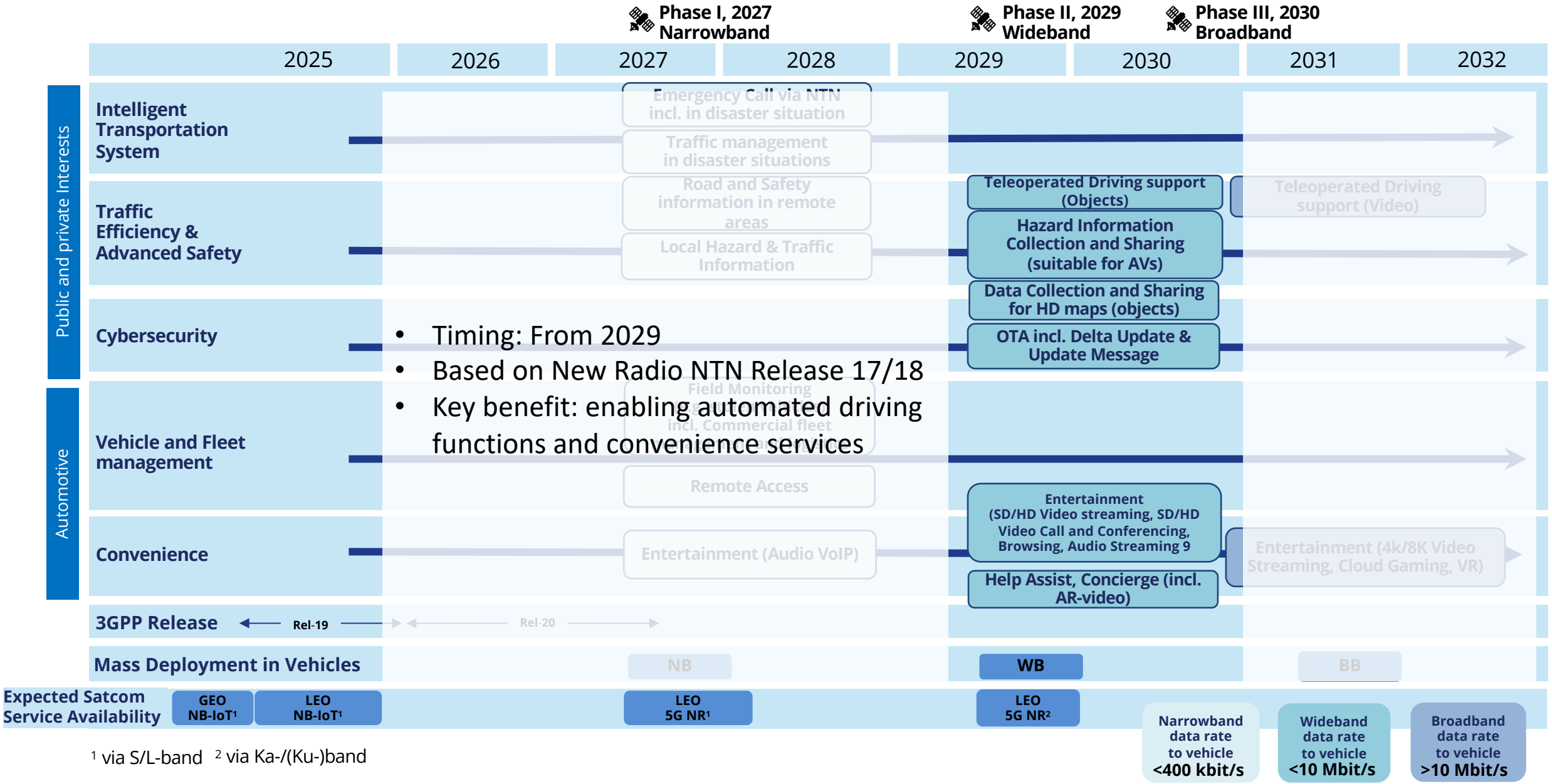
First use cases benefitting from NTN are expected from 2027



- Timing: From 2027
- Based on IoT-NTN 3GPP Rel-17
- Key benefits:
  - Enabling safety critical use cases
  - Staying connected everywhere and every time ("ubiquity")
  - Enabling base connectivity for the vehicle

¹ via S/L-band ² via Ka-/(Ku-)band

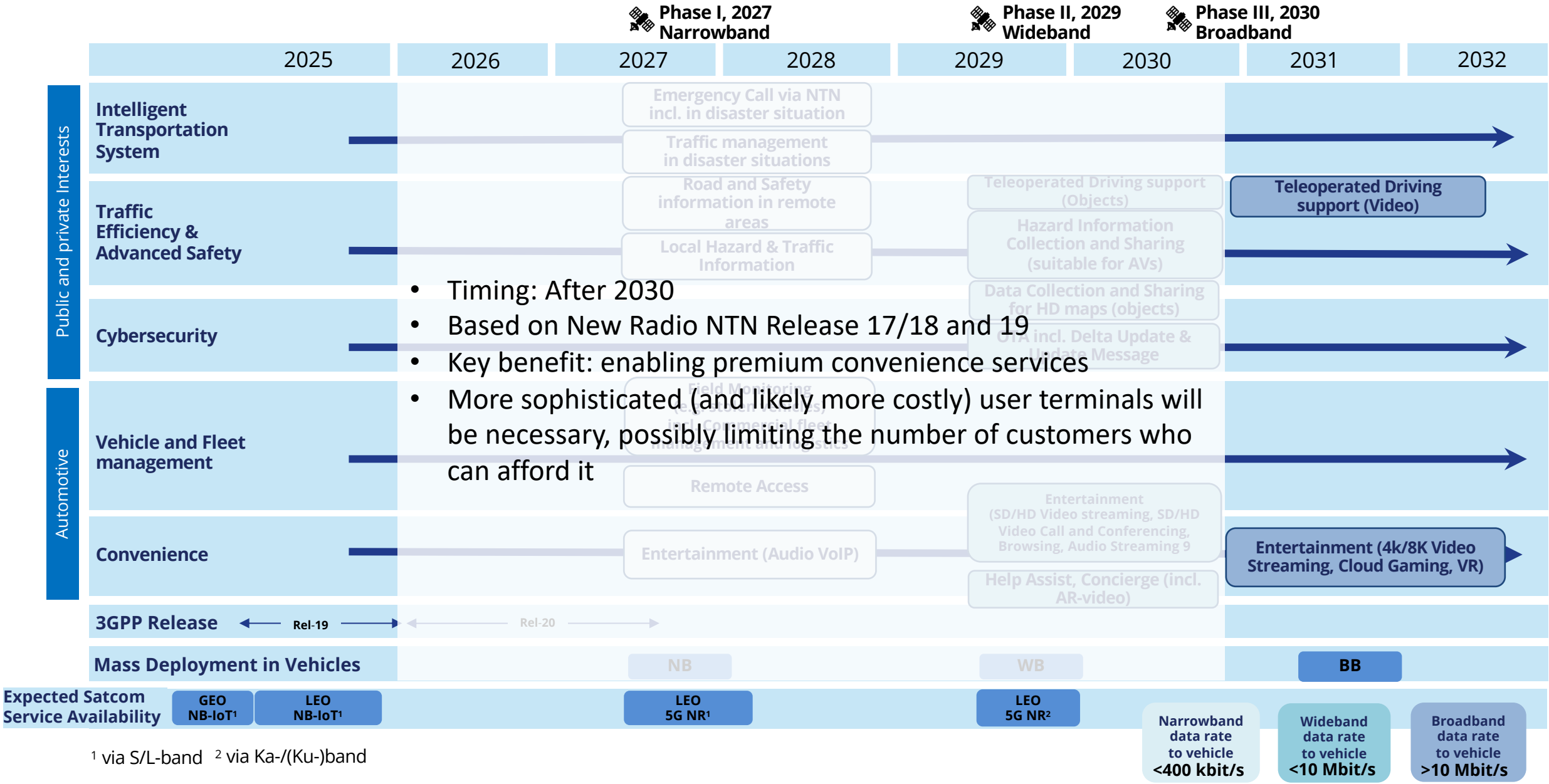
Wideband data rate use cases become available with 5G NR



- Timing: From 2029
- Based on New Radio NTN Release 17/18
- Key benefit: enabling automated driving functions and convenience services

¹ via S/L-band ² via Ka-/(Ku-)band

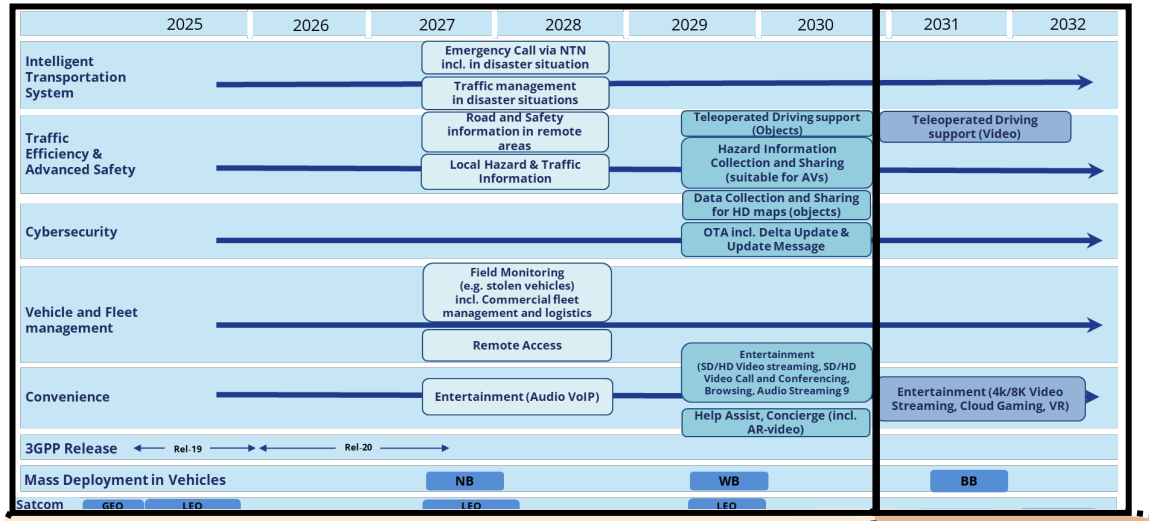
Broadband data rate use cases require a more complex and expensive technological approach



- Timing: After 2030
- Based on New Radio NTN Release 17/18 and 19
- Key benefit: enabling premium convenience services
- More sophisticated (and likely more costly) user terminals will be necessary, possibly limiting the number of customers who can afford it

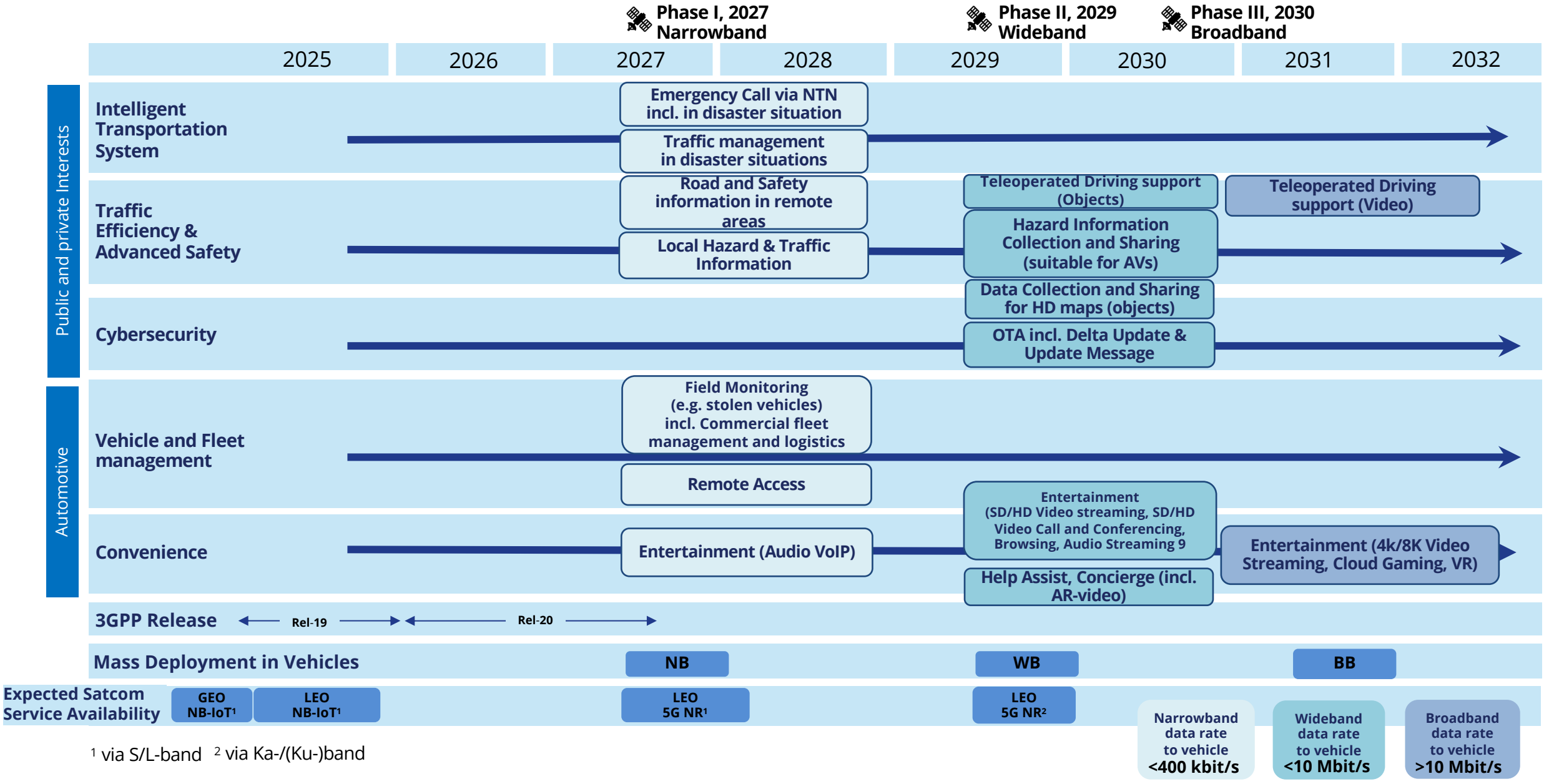
[1] via S/L-band [2] via Ka-/(Ku-)band

Deriving technical specifications for frequencies and ground terminals



	Narrowband and Wideband data rate use cases	Broadband data rate use cases
Data rate requirement:	< 10 Mbit/s	> 10 Mbit/s
Frequency range:	FR 1	FR 2
Antenna:	Omnidirectional patch antennas (e.g._5x5cm)	Directional phased array antennas (e.g. 20x20cm)
Key specifications:	DL: NF=7db; UL: Tx Power PC3 (23 dBm) and PC2 (26 dBm)	DL: NF=4 and 6 db; UL: Tx Power 37 dBm and 38,5 dBm
Feasible data rates:	DL: 10-50 Mbit/s; UL: 0,3 – 3,5 Mbit/s	DL: 13 -223 Mbit/s; UL: 2,6 – 428 Mbit/s
Antenna integration:	Low complexity, Reuse of existing terrestrial antennas	High complexity integration of additional antenna

NTN-use case roadmap proposal for mass deployment-GEO/LEO



[1] via S/L-band [2] via Ka-/(Ku-)band

Key take aways on NTN

- For the automotive, **connectivity is required everywhere and at all times** (no connectivity is not an option).
- Terrestrial coverage is available, but white spots will remain (**NTN provides complementary coverage** – also for cost reasons).
- NTN must be based on **3GPP principles** so that interworking of TN and NTN can be properly managed.
- A **phased introduction** of NTN usage is expected, starting with narrowband and wideband data rate use cases, ideally in spectrum/frequency bands where existing connectivity equipment can be reutilised.
- **Broadband data rate services** are expected to be introduced later and will require additional work to reduce costs and complexity.
- **Cross-industry cooperation and innovation** between telecommunications, vertical industries such as the automotive industry and satellite/space industry is needed to create viable business models.

Thank you

https://5gaa.org/maximising-the-benefit-of-future-satellite-communications-for-automotive/

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