

“The role of Satellite NTN in 6G”

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We are the global association representing the entire satellite industry



GSOA provides a platform for collaboration between member companies involved in the satellite ecosystem globally and a unified voice for the sector

6G: Towards a fully integrated ecosystem

4G & Before

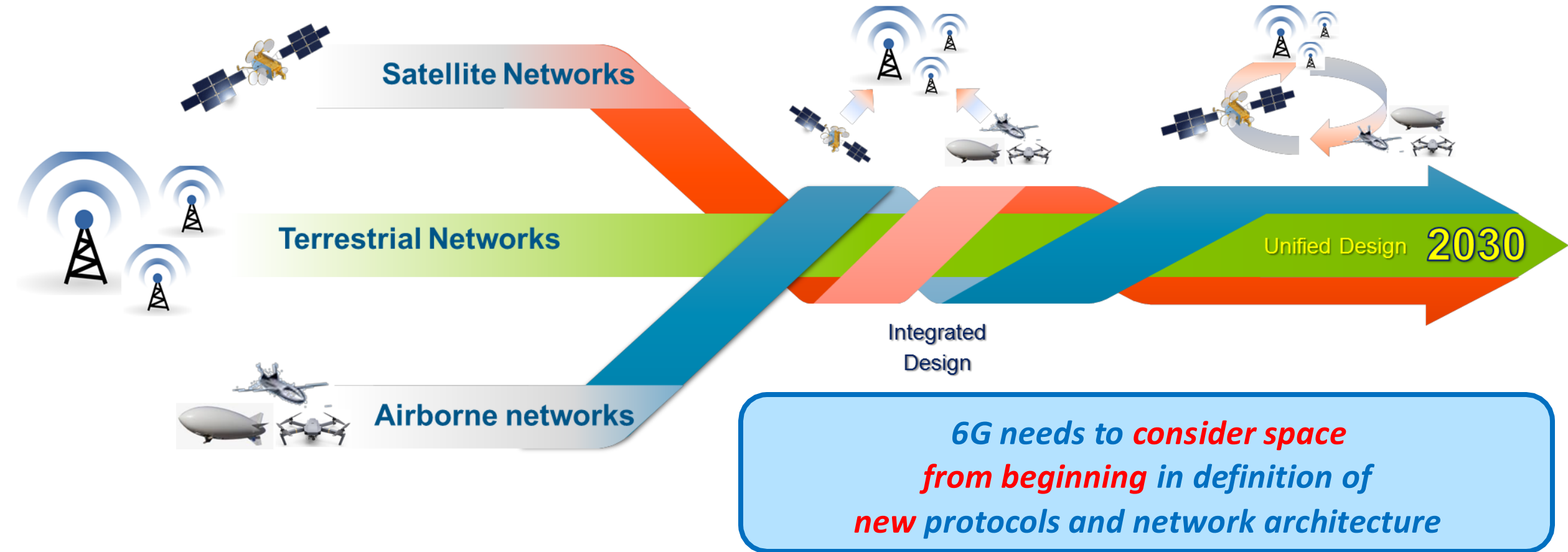
Little or No Integration

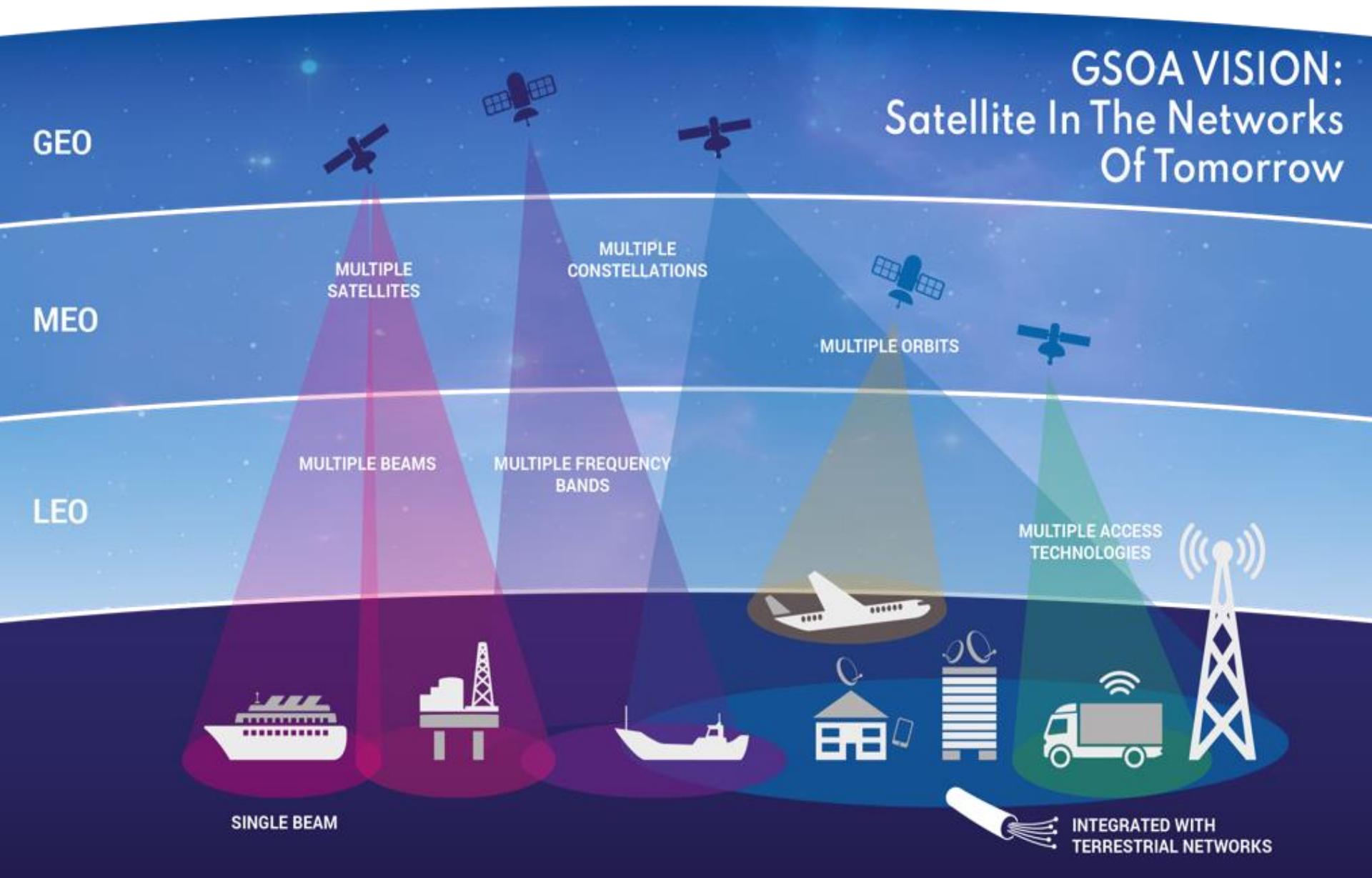
5G & B5G

Move towards Partial Integration

6G & beyond

Full Space & Terrestrial Integration





- ⇒ 6G should build on joint evolution/
interoperability of 5G
NTN & TN to leverage
the most advantageous
characteristics of
satellite & terrestrial
systems
- ⇒ 6G will support &
combine TN & NTN
components for users to
benefit from both
network components
added value
- ⇒ 6G network will be able
to dynamically
reconfigure itself to
adapt to traffic
load/distribution &
operational conditions

Satellite-Mobile Regional Outreach

What Satellite Brings to the 6G Mix

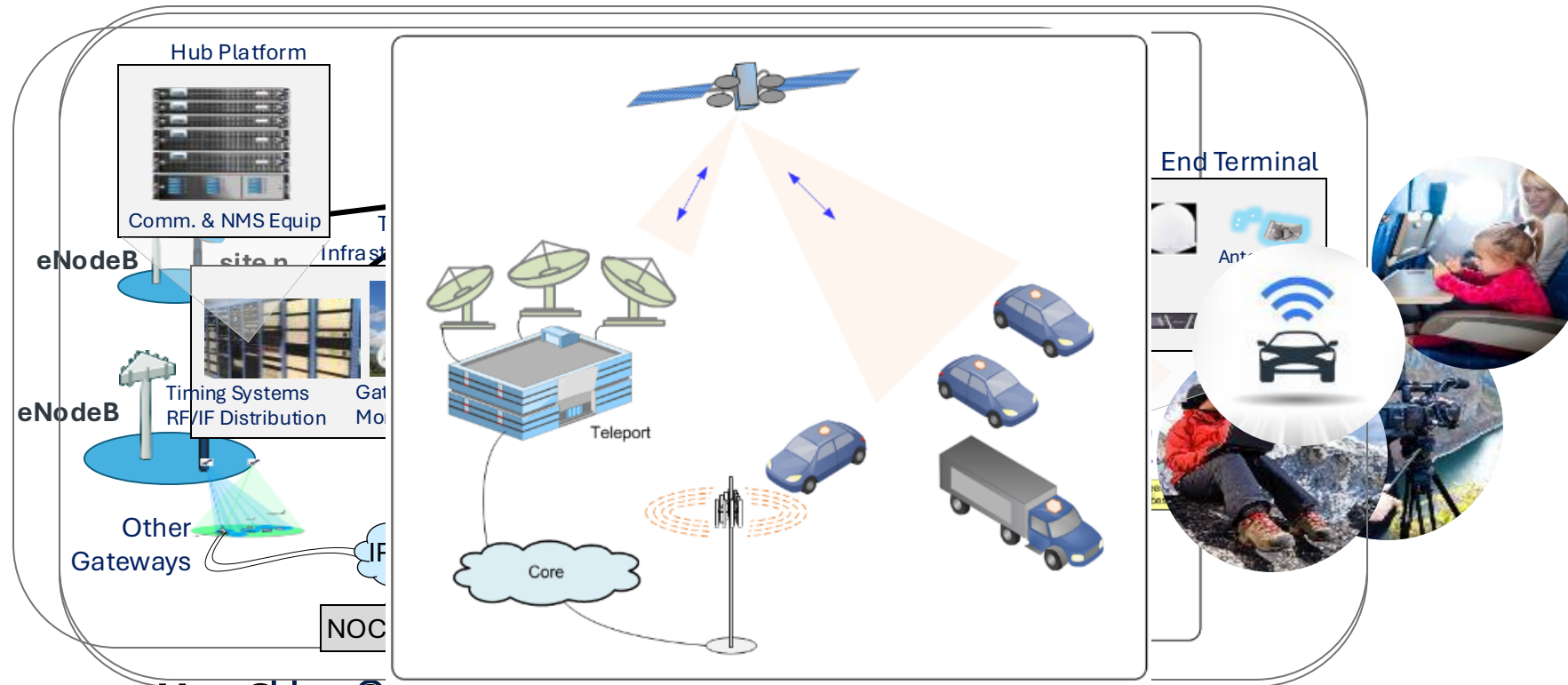
Coverage

Reliability

Resilience

Reaching everyone, everywhere, at all times

A Few Top Satellite 5G Use Cases



Use Case 2: Cellular Backhaul
Use Case 3: Aero and Maritime
Use Case 4: Connected Car

COLLABORATION IS KEY

Cooperation Agreement



Memorandum of Intent



Partnerships & Collaborations



...and many more

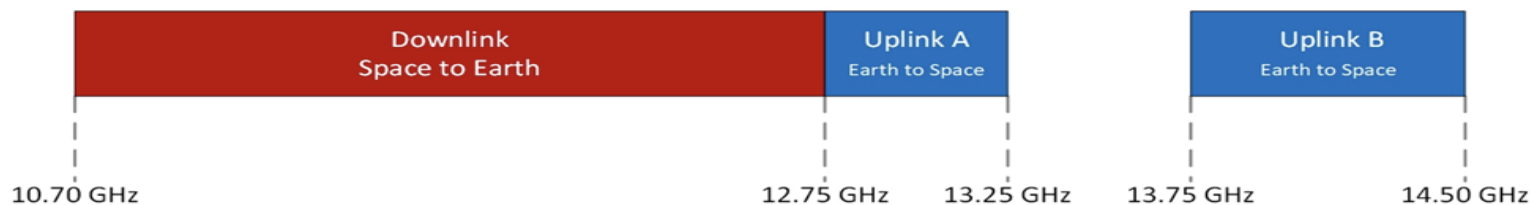
Matrix of industry initiatives/areas of interest led by satellite network operators for the different deployment scenarios:

	Narrowband connectivity to IoT devices (NTN-IoT in FR1)		Narrowband/Broadband connectivity to handheld devices (NTN-NR in FR1)	Broadband connectivity to non-handheld devices (VSAT) (NTN-NR in above 10 GHz Band)	
Space Segment	Re-use of existing GSO	NGSO	NGSO	GSO	NGSO
Operators	EchoStar Viasat-Inmarsat TerreStar Solutions	Sateliot EchoStar OmniSpace Viasat-Inmarsat	EchoStar OmniSpace Viasat-Inmarsat SES	Intelsat Eutelsat-Oneweb Viasat-Inmarsat SES - Hispasat	Intelsat Eutelsat-Oneweb Viasat-Inmarsat SES
Timeline Indication	2023-2025	2024-2029	2026-2029		

Existing NTN NR bands

REL	WI	NR band	Uplink (UL) operating band Satellite Access Node receive / UE transmit $F_{UL,low} - F_{UL,high}$	Downlink (DL) operating band Satellite Access Node transmit / UE receive $F_{DL,low} - F_{DL,high}$	Remarks
REL-17	NR NTN solutions	n256	1980 – 2010 MHz	2170 – 2200 MHz	FR1, FDD, S-band
REL-17	NR NTN solutions	n255	1626.5 – 1660.5MHz	1525 – 1559 MHz	FR1, FDD L-band
REL-18	NR NTN LSband	n254	1610 – 1626.5MHz	2483.5 – 2500MHz	FR1, FDD, LS-band
REL-18	NR NTN enh	n512*, n511*, n510*	27.5 – 30.0GHz 28.35 – 30.0GHz 27.5 – 28.35GHz	17.3 -20.2GHz 17.3 -20.2GHz 17.3 -20.2GHz	FR2, FDD, Ka-band

Ku-band also included for Rel-19

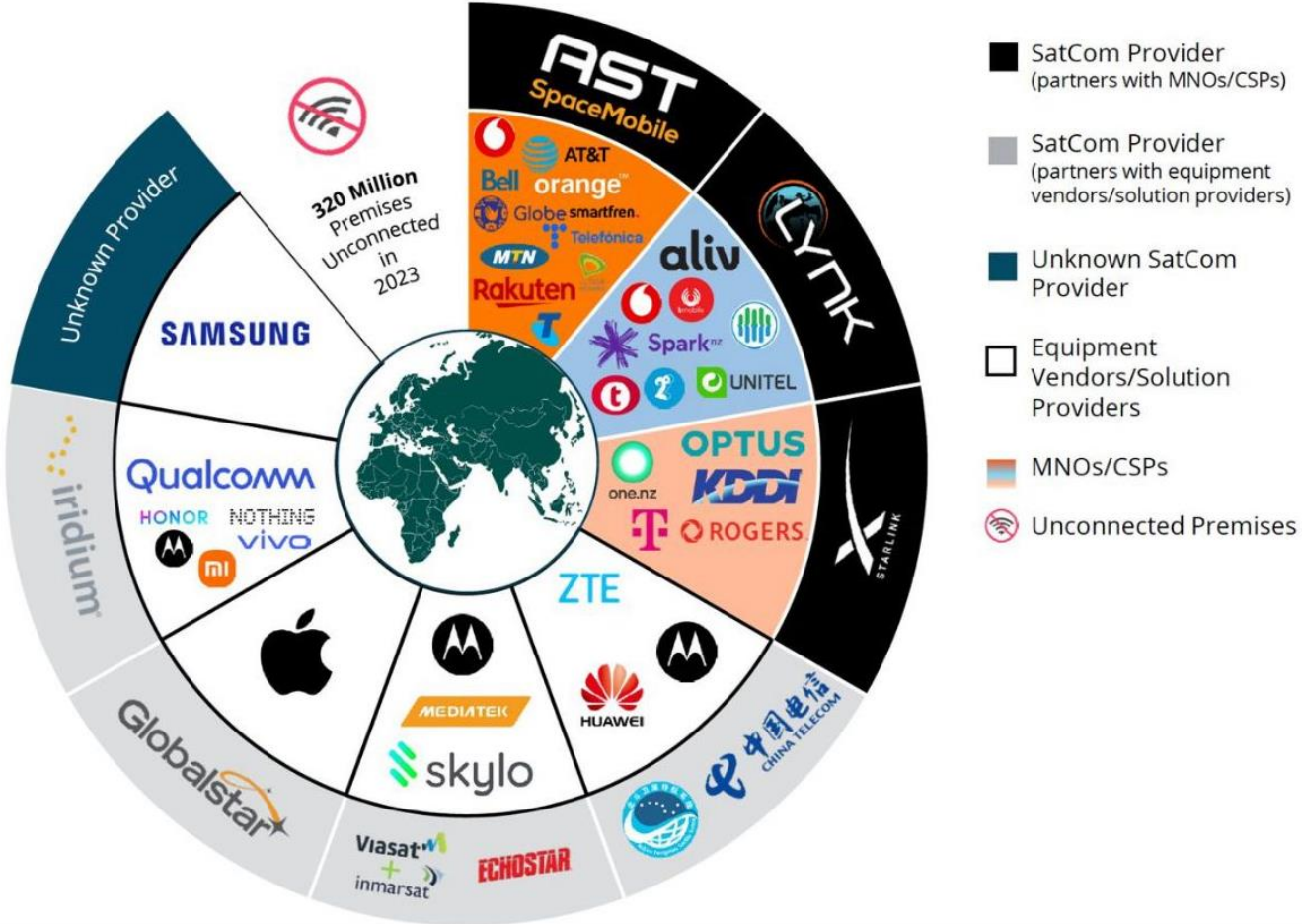
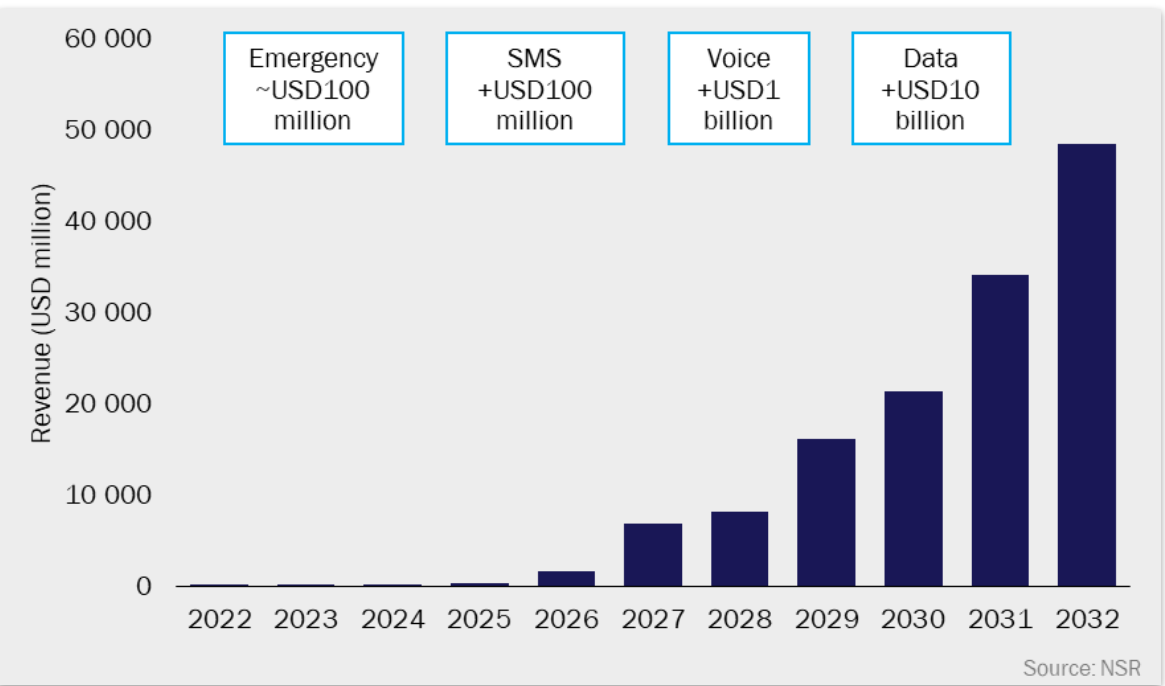


Existing partnerships between telecoms & satellite operators have a potential coverage footprint of more than 2 billion subscribers

Figure 1: NTN-Mobile Ecosystem

(Source: ABI Research)

Satellite D2D service revenue, worldwide, 2022–2032



Benefits: Ubiquitous and seamless connectivity, especially in areas with limited terrestrial coverage,

D2D in MSS bands

- Uses spectrum allocated to Mobile Satellite Service
- Leverages 3GPP Release 17 NTN specifications
- Requires no additional regulatory action if MSS authorized
- Support L- and S-Band, and Ka- Ku in future release
- Additional MSS spectrum allocations studies in WRC-27 agenda items 1.12 and 1.14

Challenges:

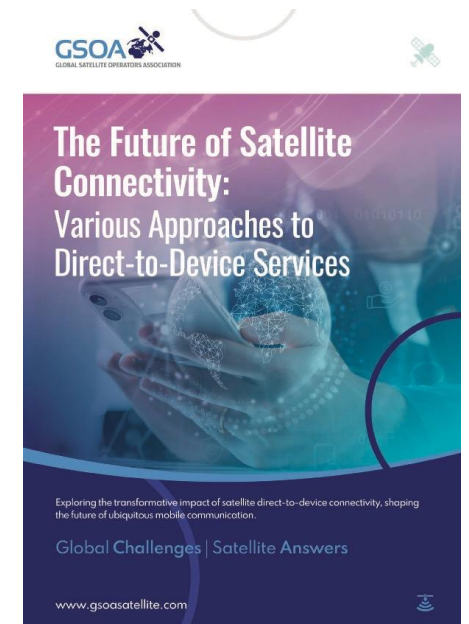
- Needs mobile chipset vendors to include those 3GPP bands

D2D in Terrestrial bands

- Uses terrestrial spectrum (IMT bands)
- Requires partnerships with MNOs
- Complements existing mobile coverage
- Can use off-the-shelf mobile handsets
- IMT bands <3GHz

Challenges:

- Interference management between MNO and satellite operator
- Regulatory hurdles (ITU RR 4.4)
- Coexistence being studied under WRC-27 agenda item 1.13



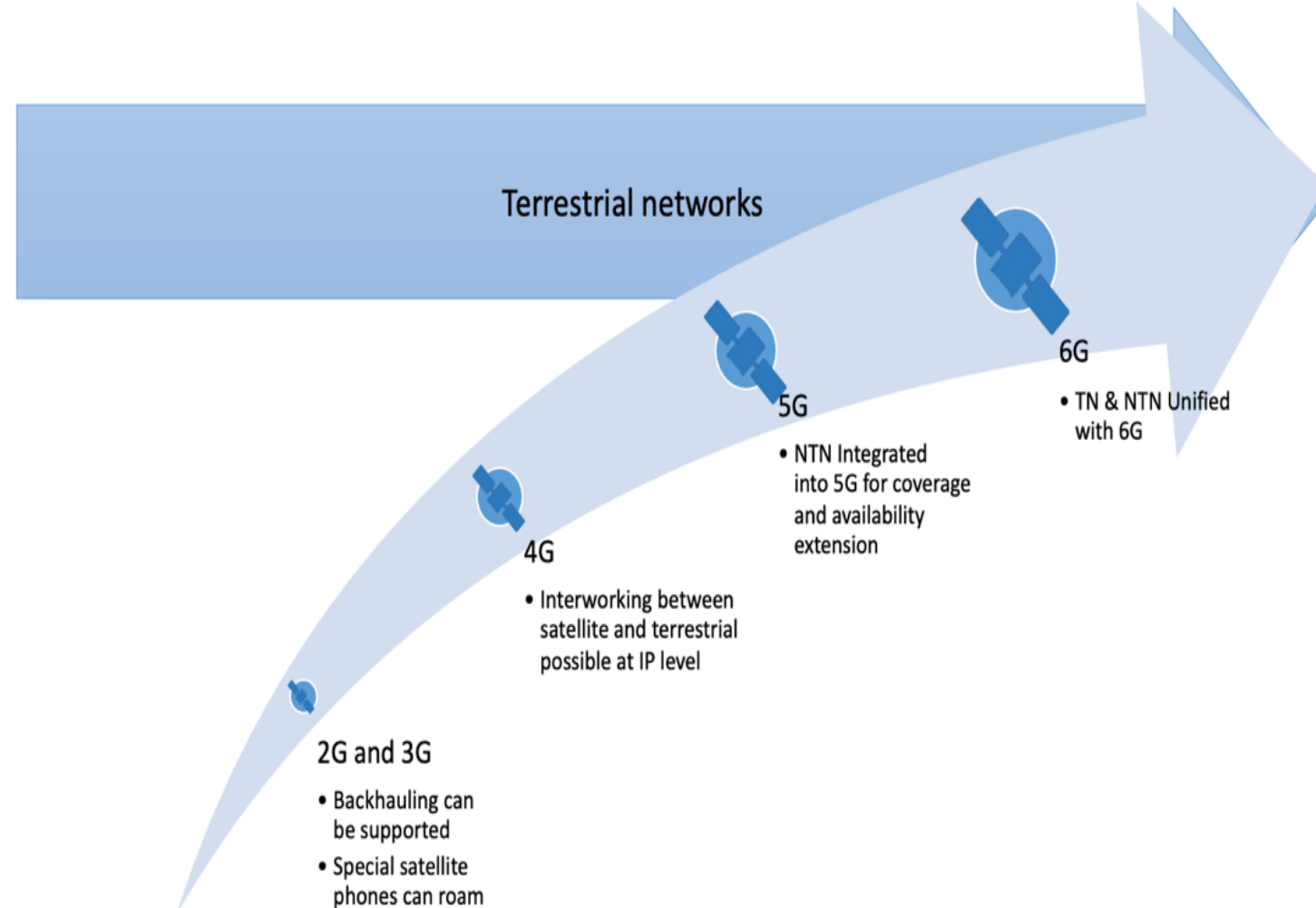
<https://gsoasatellite.com/wp-content/uploads/GSOA-D2D-Paper-Aug-24.pdf>

⇒ **Key Satellite bands include L, S, C, Ku, Ka, V, Q bands**

- Innovative new services making more efficient use of existing spectrum resources e.g. direct access, ESIM

⇒ **Due to scarcity, satellite spectrum is always shared among operators, and often shared with other services**

- Satellite primary reliance on ITU level & European level harmonisation should be respected



Support for satellite access to spectrum on the international scene remains crucial



Thank you!

