

IAFI Conference

Learnings from WRC-23

A perspective on MSS in IMT Bands

Ashwani Kumar
Head of Spectrum & 6G Engagement
Nokia Strategy & Technology
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A large white graphic element on the right side of the slide, consisting of a thick, stylized arrow pointing to the left. The arrow is composed of two parallel lines that converge to a point on the left, creating a large, hollow arrow shape. The Nokia logo is centered within this arrow shape.

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Agenda

- WRC-23 AI 1.13 scope
- Drivers for TN-NTN integration
- Current status, challenges and way forward
- 3GPP bands for NTN
- Initial actions for India.

WRC-23 AI 1.13

Agenda for WRC-27 on IMT/MSS

To consider **studies on possible new allocations** to the **MSS** for direct connectivity between Space stations and IMT user equipment **to complement** terrestrial IMT network coverage, in accordance with Resolution 253 (WRC-23);

1 studies on possible allocations to the MSS in the **frequency range between 694/698 MHz and 2.7 GHz**, taking into account the **IMT frequency arrangements addressed in ITU-R M.1036**;

2 **studies on spectrum requirements and on technical, operational and regulatory matters** related to the implementation of the MSS for direct connectivity to the IMT user equipment to complement the terrestrial IMT network coverage,

further resolves

1 to conduct **studies on sharing and compatibility between incumbent services**, including in adjacent frequency bands, ensuring the protection of incumbent services in accordance with the Radio Regulations;

2 to **study possible technical and operational measures** to ensure that the stations in the **MSS do not cause harmful interference to, or claim protection from, stations operating in the mobile service**,

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to consider, based on the results of studies, the **appropriate regulatory actions**, including possible new allocations to the MSS for direct connectivity between space stations and IMT user equipment to complement terrestrial IMT network coverage.

Responsible Group - WP4C

Contributing Groups - WP 3L, WP 3M, WP 4A, WP 4B, WP 5A, WP 5B, WP 5C, WP 5D, WP 6A, WP 7B, WP 7C, WP 7D

Convergence between Terrestrial and Non-Terrestrial Networks

Key motivations for synergy

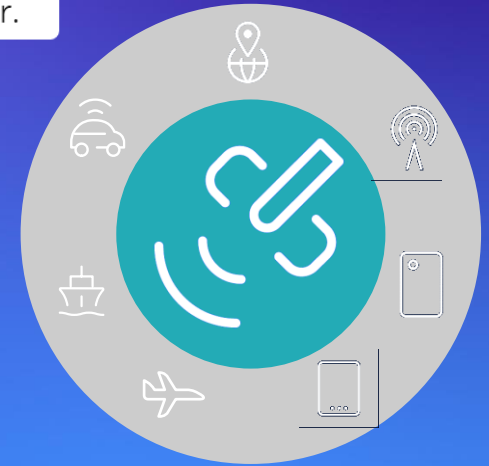
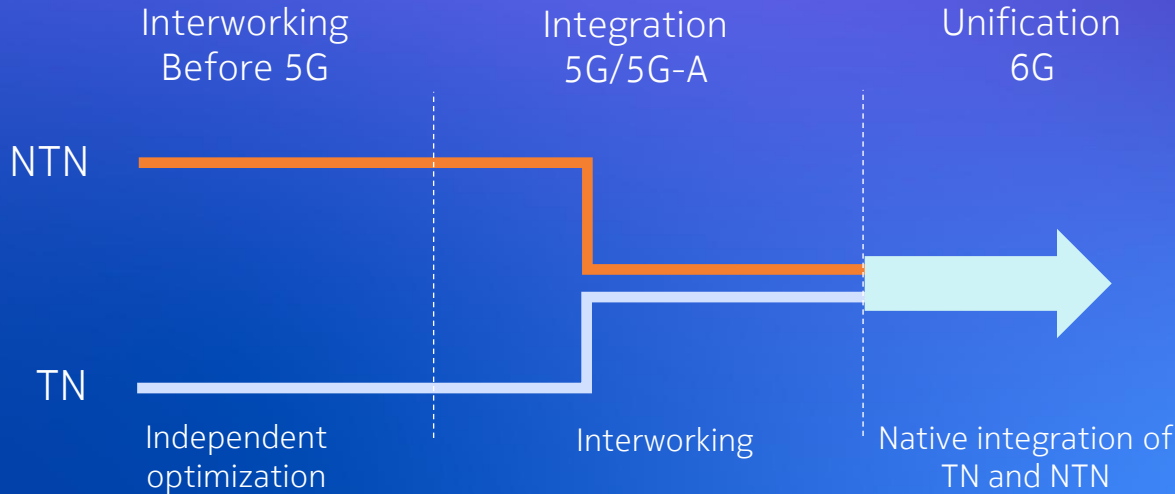
Terrestrial Network

- Capacity
- Large customer base
- Cost issues in remote areas

Non-Terrestrial Network

- Large coverage
- Short time to deploy
- Deployment costs reducing fast

Incentives exist to integrate both sides, complementing each other.



NTN ecosystem

Consortia initiatives, challenges, possible way forward

STATUS

- Most initial ventures are proprietary (pre Rel-17)
- Initial offering is VSAT / Home terminals, or mounted CPEs (cars), low data rate NTN IoT / Emergency / SOS messaging
- NR NTN is next step and will take time.

- Initial lead by Phone makers, ODMs, could not take off -
 - Proprietary (pre Rel-17), Subscription model, Lack of volumes
- Clearly, this is **a game of numbers** and an **efficient business and operational models** needed
 - Trend to migrate towards 3GPP standards-based offerings
 - MNOs are in good position with large customer base to offer this Supplementary coverage

Nokia is considering the Supplementary Coverage from Space (MSS) in IMT bands, and we want to ensure existing IMT deployments are not disrupted.

NTN features in 3GPP Release Cycle

From NTN stand-alone towards integrated NTNs

pre Rel-17

- Connectivity solution from space with pre Rel-17 UEs e.g., AST SpaceMobile
- 3GPP started with feasibility study on channel models and NTN deployment scenarios

Rel-17

- 1st 3GPP NTN release
- Transparent architecture
- No NTN-TN integration (NTN standalone)
- NTN-NTN handover
- GNSS is mandatory

Rel-18

- Further enhancements
- Lightweight NTN-TN integration via PLMN/cell (re)selection
- Network verified UE location mandatory

Rel-19

- Scope currently under discussion
- Expected features: optimized regenerative architecture tighter NTN-TN integration

NTN comes in **two flavors**:

- Transparent (Bent-pipe) and Regenerative
- gNodeB on earth versus gNodeB on satellite

NTN spectrum specified in 3GPP

Bands identified by 3GPP for satellite D2D are within the identified MSS allocation in ITU-R, but only band 256 is included in the ITU-R M.1036 IMT frequency arrangement.

Bands in 3GPP for satellite D2D

- Band n255: 1525 – 1559 MHz DL and 1626.5 – 1660.5 MHz UL (L Band)
- Band n256: 1980 – 2010 MHz UL and 2170 – 2200 MHz DL (S Band)
- Latest addition in Rel-18: 1610-1626.5 MHz UL and 2483.5-2500 MHz DL (S Band)

Regarding coexistence, the use of FDD IMT bands from MSS (compared to the use of TDD IMT bands) is anticipated to limit the interference scenarios.

Way forward for India

- IMT Characteristics will be available by end of 2024
- Interference scenarios are quite complicated for this agenda, depending upon the operational models
- Examine the frequency arrangements in M.1036, from Indian deployments perceptive
- Closely understand the incumbent operations in various ranges

Focus on such studies as a starting point

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