ITU-APT Foundation of India (IAFI)

2nd Preparatory Workshop for WRC-27

Satellite Direct to Device: WRC-27 Agenda Items 1.11, 1.12, 1.13 and 1.14

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April 07, 2025

Introduction:

- AI 1.11, 1.12, 1.13 and 1.14 are WRC 27 agenda items under Chapter 3 (Mobile Satellite issues).
- WP-4C identified as responsible group.
- Coordination with WP-5D to ensure compatibility between terrestrial and satellite systems .
- Studies conducted by WP-4C will ultimately inform potential regulatory changes regarding MSS allocations in relevant frequency bands.

Breakdown of agenda items from WRC 27:

- ✓ *Agenda item 1.11 -**MSS sat-sat link** (Resolution 249 (WRC-23))*
- ✓ *Agenda item 1.12 - **Low-data-rate MSS** (Resolution 252 (WRC-23))*
- ✓ *Agenda item 1.13 - **MSS in IMT** (Resolution 253 (WRC-23))*
- ✓ *Agenda item 1.14 - **MSS in 2 GHz** (Resolution 254 (WRC-23))*

Agenda item 1.11

➢ Invites WRC-27 to consider the technical and operational issues, and regulatory provisions, for space-to-space links among non-geostationary and geostationary satellites in the frequency bands 1 518-1 544 MHz, 1 545-1 559 MHz, 1 610-1 645.5 MHz, 1 646.5-1 660 MHz, 1 670-1 675 MHz and 2 483.5-2 500 MHz allocated to the mobile-satellite service, in accordance with Resolution 249 (Rev.WRC-23).

- Resolves that:
  - ✓ studies of the technical and operational characteristics of different types of non-GSO space stations that operate or plan to operate space-to-space links with GSO networks, without affecting existing primary services allocated in the same and adjacent frequency bands
  - ✓ studies of the technical and operational characteristics of different types of non-GSO space stations that operate or plan to operate space-to-space links with non-GSO systems or GSO networks
  - ✓ sharing and compatibility studies – between current and planned stations of the MSS, other existing primary services allocated in the same or alternative frequency band, etc.
  - ✓ development of technical conditions and regulatory provisions for the operation of space-to-space links in these frequency bands, including MSS (space-to-space) allocations or the addition of inter-satellite service (ISS)

32nd WP 4C meeting – Oct 2024 outcomes:

- ✓a working document relating to WRC-27 agenda item 1.11 (Annex 12 to 4C/204).
- ✓a liaison statement to WP 7B (see Doc. 7B/108) *with respect to the frequency overlap between the agenda items 1.11 and 1.15 (1 670-1 675 MHz)*

Agenda item 1.12

- Invites WRC-27 to consider, based on the results of studies, possible allocations to the mobile-satellite service and possible regulatory actions in the frequency bands 1 427-1 432 MHz (space-to-Earth), 1 645.5-1 646.5 MHz (space-to-Earth) (Earth-to-space), 1 880-1 920 MHz (space-to-Earth) (Earth-to-space) and 2 010-2 025 MHz (space-to-Earth) (Earth-to-space) required for the future development of low-data-rate non-geostationary mobile-satellite systems, in accordance with Resolution 252 (WRC-23).

- Resolves that:
  - ✓ sharing and compatibility between the non-GSO low-data-rate MSS systems and the existing primary services in above bands in order to ensure protection of existing services;
  - ✓ studies on spectrum requirements, technical and operational characteristics and conditions for non-GSO low-data-rate MSS systems, including mitigation techniques, that allow coexistence of these systems in the same frequency bands

Agenda item 1.12

- Aims to address growing need for Internet of Things (IoT)-style satellite communication
- Insufficient spectrum to operate in existing MSS freq. below 5 GHz.
- **Non-voice low-data-rate NGSO MSS (LDR-MSS)** systems, in the context of Res. 252 have following properties:
  - ✓not including telephony;
  - ✓transmitting data in bursts;
  - ✓capable of operating with periodic or intermittent data transmission;
  - ✓capable of maintaining a service while experiencing packet loss.

32nd WP 4C meeting – Oct 2024 outcomes:

- a working document relating to WRC-27 agenda item 1.12 (Annex 1 to 4C/204)
- a draft work plan for WRC-27 agenda item 1.12 (Annex 2 to 4C/204)
- a liaison statement to WP 4B (see Doc. 4B/88).

Agenda item 1.13

- invites WRC-27 to consider studies on possible new allocations to the mobile-satellite service for direct connectivity between space stations and International Mobile Telecommunications (IMT) user equipment to complement terrestrial IMT network coverage, in accordance with Resolution 253 (WRC-23).

- Resolves that:
  - ✓ studies on possible allocations to the MSS in the frequency range between 694/698 MHz and 2.7 GHz
  - ✓ spectrum requirements and on technical, operational and regulatory matters related to the implementation of the MSS for direct connectivity to the IMT user equipment
  - ✓ 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;
  - ✓ 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

Agenda item 1.13

- Working Party 4C is expected to provide details of frequency bands based on the IMT frequency arrangements contained in the most recent version of ITU-R M.1036 along with regulatory considerations on the protection of terrestrial component of IMT.

Agenda item 1.13

- Primarily focusing on enabling direct connectivity between space stations and IMT user equipment to complement terrestrial IMT networks;
- Essentially looking at how to integrate MSS into existing IMT bands for better coverage.
- Complementary coverage for mobile connectivity from space to areas such as high mountains, remote islands and deserts, where it may not be sufficient to deploy terrestrial base stations.
- Satellite systems may provide alternative network resilience in case of failure of terrestrial IMT base stations due to unexpected incidents, such as natural disasters and network outages.
- Conditions for such satellite system are-
  - ✓Frequency bands for satellite system and terrestrial IMT networks are to be same
  - ✓Same user equipment as those for terrestrial IMT networks is used.

32nd WP 4C meeting – Oct 2024 outcomes:

- Initial consideration on the possible description and functionality of MSS systems for direct connectivity between space stations and IMT user equipment (Annex 3 to 4C/204).
- Working document on sharing and compatibility studies in relation to WRC-27 agenda item 1.13 (Annex 4 to 4C/204).
- Working document on technical and operational characteristics of MSS for direct communication with IMT user equipment (Annex 5 to 4C/204).
- Work plan for WRC-27 agenda item 1.13 (Annex 7 to 4C/204).
- Terms of Reference for Working Party 4C Correspondence Group on WRC-27 agenda item 1.13 (Annex 8 to 4C/204).
- a liaison statement to WP 5D (see Doc. 5D/419)
- a liaison statement to WPs (3L, 3M, 4A, 4B, 5A, 5B, 5C, 7B, 7C, 7D) (see Doc. 4B/89) in order to inform them of the list of possible frequency bands

Agenda item 1.14

- Invites WRC-27 to consider possible additional allocations to the mobile-satellite service, in accordance with Resolution 254 (WRC-23).
- Resolves that:
  - ✓studies on relevant spectrum requirements and technical, operational and regulatory matters for possible new MSS allocations in the frequency bands 2 010-2 025 MHz (Earth-to-space) and 2 160-2 170 MHz (space-to-Earth) in Regions 1 and 3 and 2 120-2 160 MHz (Earth-to-space) in all Regions;
  - ✓sharing and compatibility studies to ensure the protection of existing services
  - ✓Ensure protection of existing services and their continued operation and future development without imposing additional regulatory or technical constraints on those services.

32nd WP 4C meeting – Oct 2024 outcomes:

- a working document relating to WRC-27 agenda item 1.14 (Annex 9 to 4C/204).
- a draft work plan for WRC-27 agenda item 1.14 (Annex 11 to 4C/204).
- a working document relating to draft CPM text on WRC-27 agenda item 1.14 (Annex 10 to 4C/204).

Further, SWG 4C1a, 4C1b, 4C1c are established to address work on WRC-27 agenda items 1.12, 1.13 and 1.14 respectively.

National Working Party 4C

- 1st meeting on March 04, 2024 to 13th meeting on March 28, 2025
- Contribution by ISRO under AI 1.11 and 1.13
  - Incumbent system characteristics in the 2483.5-2500 MHz frequency bands for sharing and compatibility studies in preparation for WRC-27 agenda item 1.11;
  - Incumbent system characteristics in the 2.5/2.6 GHz frequency bands for sharing and compatibility studies in preparation for WRC-27 agenda item 1.13
- Input contribution from IAFI on Agenda Item 1.13.
  - Proposals for working document on sharing and compatibility studies in relation to WRC-27 agenda item 1.13
- NSG 4 has accepted all these contributions in meeting dt. April 02, 2025.

Thank You for your kind attention !!!

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