

NATIONAL PREPARATORY COMMITTEE TOWARDS WRC-27 AGENDA ITEM BRIEF

Chapter : 3

Service: *Mobile-satellite issues*

Agenda Item: 1.14

Description of Agenda Item: *Studies on possible new frequency allocations to the mobile-satellite service 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 (space-to-Earth) in all Regions. Resolution 254 (WRC-23)*

Focus: *Additional frequency allocations to the mobile-satellite service (MSS) under WRC-27 Agenda Item 1.14*

Status of studies

Sharing spectrum between the Mobile-Satellite Service (MSS) and International Mobile Telecommunications (IMT) presents several primary challenges, primarily centered on technical interference and regulatory constraints:

- i. **Feasibility of Co-existence:** Co-coverage and co-frequency deployment of independent satellite and terrestrial IMT components is generally considered **not feasible** unless specific coexistence measures are implemented.
- ii. **Harmful Interference to MSS:** Studies indicate that MSS would experience harmful interference from incumbent IMT networks at significant distances. Specifically, interference occurs within:
 - 90 to 100 km of rural IMT base stations.
 - 50 to 60 km of suburban IMT networks.
 - 30 km of urban areas where IMT is deployed.
 - Because of this interference, MSS would likely be unable to provide **sufficiently high-quality services** in areas where IMT is already operational.
- iii. **Interference to IMT Services:** There is a risk that new MSS allocations would cause **unacceptable interference to** IMT services, which could jeopardize the reliable functioning and future development of IMT systems in globally harmonized bands.
- iv. **Constraints on Future Deployment:** Adding new co-primary MSS allocations is expected to inevitably impose **regulatory and technical constraints** on the future development and deployment of incumbent mobile services.
- v. **Regulatory Conflicts:** A significant challenge involves a conflict between different regulatory resolutions. For example, some existing coexistence measures, such as reducing the e.i.r.p. (Effective Isotropic Radiated Power) for IMT base stations, would contradict the requirement in **Resolution 254 (WRC-23)** that new allocations must not impose additional constraints on existing services.

Because of these challenges, some proposed methods for satisfying the agenda item suggest that new MSS allocations should only be permitted if they **claim no protection** from incumbent services and ensure the protection of existing primary services.

Objective of the studies

Under WRC-27 Agenda Item 1.14, the study and consideration of additional mobile-satellite service (MSS) allocations are guided by three major objectives derived from Resolution 254 (WRC-23):

- i. **Conduct Sharing and Compatibility Studies:** The primary technical objective is to perform studies regarding potential new MSS allocations in the identified frequency bands. This involves evaluating how these new satellite services can coexist with existing services.
- ii. **Ensure Protection of Existing Services:** Any new allocations must ensure the protection of incumbent services already allocated on a primary basis (such as fixed and mobile terrestrial services, including IMT, space operations, and radio astronomy), as well as services in adjacent frequency bands, without adversely affecting them.
- iii. **Preserve Future Development Without New Constraints:** A critical objective is to ensure that the continued operation and future development of these existing services are not compromised. The studies must aim to avoid imposing any additional regulatory or technical constraints on incumbent services.

Beyond these technical and regulatory objectives, the sources highlight that the broader goals of seeking additional MSS spectrum include enabling enhanced services, bridging the digital divide, and supporting global harmonization to create economies of scale and reduce equipment costs.

Frequency bands under consideration

Under Agenda Item 1.14, there are three specific frequency bands being studied for possible additional allocations to the **Mobile-Satellite Service (MSS)**:

Band	Frequency range (MHz)	Direction	ITU Region
1	2 010-2 025	Earth-to-space	1 and 3
2	2 160-2 170	space-to-Earth	1 and 3
3	2 120-2 160	space-to-Earth	All regions

These bands are being studied in accordance with **Resolution 254 (WRC-23)** to ensure that any new allocations protect existing primary services (such as IMT, fixed, and mobile terrestrial services) and their future development without imposing additional regulatory or technical constraints.

Proposed methods to address the agenda item

Several methods have been proposed to address WRC-27 Agenda Item 1.14, ranging from maintaining the status quo to providing new allocations with specific regulatory conditions. These methods are:

- i. **Method A: No Change:** This method proposes no changes to the Radio Regulations and the suppression of Resolution 254 (WRC-23). The rationale is that studies indicate new MSS allocations would cause unacceptable interference to IMT services and jeopardize their future development in globally harmonized bands.

Methods A2, A3, and A4 differ from Method A, based on **which specific frequency band** is proposed for a new Mobile-Satellite Service (MSS) allocation versus which bands remain unchanged. While Method A proposes "No change" for all three bands, these methods propose a new allocation for one band while maintaining "No change" for the other two. This is how:

- ii. **Method A2** proposes a possible new allocation for Band 1 (2 010-2 025 MHz) in Regions 1 and 3. It maintains "No change" for Band 2 (2 160-2 170 MHz) and Band 3 (2 120-2 160 MHz). This allocation would include regulatory conditions to protect existing primary services and may require that the MSS claim no protection from those incumbent services.

- iii. **Method A3** proposes a possible new allocation for Band 2 (2 160-2 170 MHz) in Regions 1 and 3. It maintains "No change" for Band 1 (2 010-2 025 MHz) and Band 3 (2 120-2 160 MHz). Similar to Method A2, it would include regulatory conditions for the protection of primary services and a potential "no protection" clause.
- iv. **Method A4** proposes a possible new allocation for Band 3 (2 120-2 160 MHz) in all Regions. It maintains "No change" for Band 1 (2 010-2 025 MHz) and Band 2 (2 160-2 170 MHz). It also includes associated regulatory conditions for protecting existing services and the possibility of claiming no protection from them.

Method 2: This is a broader proposal for new MSS allocations in some or all of the proposed frequency bands. The specific regulatory and procedural details for this method are currently being discussed.

Important note: For the 2 120-2 170 MHz range, any proposed consideration should either be based on a **no-protection** condition with respect to incumbent services or follow the **no change (NOC)** approach.

Technical and Regulatory Challenges

The technical and regulatory challenges of the study for Agenda Item 1.14 center on the difficulty of introducing new satellite services into frequency bands already heavily utilized by terrestrial systems.

The primary challenges identified in the sources include:

- i. **Incompatibility of Co-frequency Deployment:** Technical studies indicate that co-coverage and co-frequency deployment of independent satellite and terrestrial IMT components is not feasible without significant coexistence measures.
 - ii. **Harmful Interference from Terrestrial Services:** Results show that MSS receivers would experience harmful interference from IMT base stations at substantial distances, ranging from 30 km in urban areas up to 100 km in rural areas. Consequently, MSS may be unable to provide high-quality service in areas where IMT is already deployed.
 - iii. **Protection of Incumbent Services:** The study must ensure the protection of existing primary services including IMT, fixed services, space operations, and radio astronomy as well as services in adjacent bands. Studies suggest new MSS allocations could cause "unacceptable interference" to these systems.
 - iv. **No New Constraints Mandate:** A major regulatory hurdle is the requirement that new allocations must not impose any additional technical or regulatory constraints on the future development or operation of incumbent services. This creates a conflict because standard coexistence measures (such as power reductions for terrestrial stations) would violate this mandate.
 - v. **"No Protection" Requirements:** Due to these sharing difficulties, several proposed methods suggest that if MSS is allocated, it may have to claim no protection from interference caused by incumbent services.
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Conclusion

The conclusion drawn from the studies regarding additional mobile-satellite service (MSS) allocations can be summarized into three main points:

- i. **Technical Infeasibility of Co-existence:** Studies show that independent satellite and terrestrial IMT systems cannot practically share the same frequencies and coverage areas without significant coexistence measures. MSS receivers would experience harmful interference from IMT base stations at distances of up to 100 km in rural areas, making it impossible for MSS to provide high-quality service where IMT is already deployed.
- ii. **Conflict with Regulatory Mandates:** New MSS allocations raise two major concerns. First, they would impose additional constraints on the future development and deployment of incumbent

mobile services. Second, the coexistence measures needed to protect MSS, such as reducing the power of IMT base stations, would directly conflict with Resolution 254 (WRC-23), which requires that no new regulatory or technical constraints be imposed on existing services.

iii. **Recommended Regulatory Paths:** In light of these challenges, two main regulatory options emerge for addressing the agenda item.

- **Method A (No Change):** Retain the current Radio Regulations and discontinue further changes, since studies indicate that new MSS allocations would cause unacceptable interference to the reliable operation of IMT systems.
- **No-Protection Basis:** If any new allocations are considered under variations of Method A or Method 2, they should be permitted only on the condition that MSS does not claim protection from interference caused by incumbent services in those bands.