

Chapter: one

Service: *Fixed-Satellite Service (FSS) and Broadcasting-Satellite Service (BSS)*

Agenda Item: 1.4

Description of Agenda Item: *To consider a possible new primary allocation to the Fixed-Satellite Service (space-to-Earth) in the frequency band 17.3-17.7 GHz and a possible new primary allocation to the Broadcasting-Satellite Service (space-to-Earth) in the frequency band 17.3-17.8 GHz in Region 3, while ensuring the protection of existing primary allocations in the same and adjacent frequency bands, and to consider equivalent power flux-density (EPFD) limits to be applied in Regions 1 and 3 to non-geostationary-satellite orbit (non-GSO) systems in the Fixed-Satellite Service (space-to-Earth) in the frequency band 17.3-17.7 GHz, in accordance with Resolution 726 (WRC-23).*

Focus: Reviewing the regulatory and technical conditions necessary to introduce new FSS and BSS allocations in Region 3 within the 17.3–17.8 GHz frequency range while ensuring compatibility with existing satellite and terrestrial services and maintaining adequate protection of incumbent systems.

Status of Studies

Studies supporting WRC-27 Agenda Item 1.4 are currently ongoing within ITU-R Working Parties and have not yet been finalized.

Key developments include:

- i.* Preliminary sharing and compatibility studies between proposed FSS/BSS operations and incumbent services have progressed.
- ii.* Initial assessments of non-GSO FSS downlink operations and their impact on GSO networks are under review.
- iii.* Various EPFD methodologies and protection criteria are being evaluated.
- iv.* Regulatory approaches ranging from no change to new allocations with associated technical provisions remain under consideration.
- v.* Draft regulatory texts and associated WRC methods are still under development.

Objective of the Studies

The objective of the studies is to assess the feasibility of introducing new primary satellite allocations in the 17 GHz band while ensuring continued protection of existing services.

The studies seek to:

- i.* Determine whether the frequency band 17.3-17.7 GHz can support a new primary FSS (space-to-Earth) allocation.
- ii.* Determine whether the frequency band 17.3-17.8 GHz can support a new primary BSS (space-to-Earth) allocation in Region 3.
- iii.* Develop appropriate technical conditions for operation of GSO and non-GSO satellite systems.

- iv. Establish Equivalent Power Flux-Density (EPFD) limits necessary to protect incumbent satellite networks and terrestrial services.
- v. Develop a stable international regulatory framework that supports future satellite deployment while maintaining spectrum efficiency.

The growing demand for broadband connectivity, high-throughput satellite systems, direct-to-home broadcasting services, and next-generation non-GSO constellations has increased pressure on existing satellite spectrum resources. The proposed allocations seek to provide additional downlink capacity to meet these growing requirements.

Studied Frequency Bands

The table below summarizes the frequency bands under study.

Frequency Band	Existing service (Region 3)	Proposed Service (Region 3)
17.3-17.7 GHz	FIXED SATELLITE (Earth-to-space)	FIXED SATELLITE (Earth-to-space) (Space to Earth)
17.3-17.8 GHz		BROADCASTING-SATELLITE SERVICE

Frequency Band	Existing service (Region 1)
17.3-17.7 GHz	FIXED-SATELLITE (Earth-to-space) 5.516 (space-to-Earth) 5.516A, 5.516B Radiolocation 5.514
17.7- 18.1 GHz	FIXED FIXED-SATELLITE (space-to-Earth) (Earth-to-space) MOBILE

Key Notings:

i. Regional Application

The proposed BSS allocation applies specifically to Region 3. However, studies must consider potential impacts on Regions 1 and 3 due to the global nature of satellite coverage.

ii. Non-GSO Considerations

The studies recognize the increasing deployment of non-GSO satellite constellations and seek to establish suitable EPFD (Equivalent Power Flux-Density) limits to ensure compatibility with existing GSO systems.

iii. Protection of Existing Services

Any new allocation must ensure protection of existing primary services operating within the same and adjacent frequency bands.

Methods to Satisfy the Agenda Item

Several methods are currently under consideration. These remain preliminary and have not yet achieved consensus.

Method	Brief Description
A	No Change (NOC) to the Radio Regulations.
B	Introduce a new primary FSS allocation in the 17.3-17.7 GHz band subject to technical and operational conditions.
C	Introduce a new primary BSS allocation in the 17.3-17.8 GHz band for Region 3 subject to sharing and compatibility conditions.
D	Introduce both FSS and BSS allocations together with associated Equivalent Power Flux-Density (EPFD) limits and regulatory provisions.
E	Introduce allocations with additional coordination and protection requirements for incumbent services.

Common Elements Under Consideration

Several technical and regulatory provisions are being examined across the various methods:

- i.* **Protection of Existing Allocations:** New satellite systems must not cause harmful interference to existing services operating in the same and adjacent bands.
- ii.* **Equivalent Power Flux-Density Limits (EPFD):** Non-GSO FSS systems may be required to comply with EPFD limits designed to protect GSO satellite networks and earth stations.
- iii.* **Coordination Requirements:** New systems may be subject to coordination procedures between administrations and satellite operators to ensure compatibility.
- iv.* **Aggregate Interference Assessment:** Studies are evaluating the cumulative impact of multiple non-GSO systems operating simultaneously within the band.

Interference Protection Mechanisms

1. Equivalent Power Flux-Density (EPFD) Limits

EPFD limits are being studied as the primary mechanism for protecting GSO networks from aggregate interference generated by non-GSO satellite constellations.

The studies aim to determine:

- i.* Appropriate EPFD (**Equivalent Power Flux-Density**) thresholds.
- ii.* Compliance methodologies.
- iii.* Validation procedures for satellite network filings.

2. Protection of Adjacent-Band Services

Measures are being considered to prevent unwanted emissions into neighbouring frequency bands used by terrestrial and satellite services.

3. Aggregate Interference Control

The studies seek to ensure that aggregate emissions from multiple satellite systems remain within acceptable protection criteria.

4. Regulatory Oversight

The Radiocommunication Bureau would verify compliance with applicable technical criteria through the notification and examination process.

Technical and Regulatory Challenges

Technical Challenges

- i.* **Non-GSO Aggregate Interference:** Large non-GSO constellations may generate aggregate interference levels that exceed acceptable protection criteria for GSO networks.
- ii.* **Sharing with Existing Services:** Compatibility between new FSS/BSS allocations and incumbent satellite and terrestrial services requires detailed analysis
- iii.* **Adjacent Band Protection:** Potential interference into neighbouring frequency bands must be carefully assessed, particularly for highly sensitive services.
- iv.* **Satellite Beam Management:** The use of advanced beamforming and high-gain antennas introduces additional complexity in interference assessment.

Regulatory Challenges

- i.* **Development of EPFD Criteria:** Establishing globally acceptable EPFD (Equivalent Power Flux-Density) limits that balance spectrum access and interference protection remains a significant challenge.
- ii.* **Regional Harmonization:** The proposed BSS allocation applies only to Region 3, but satellite coverage footprints may extend beyond regional boundaries.
- iii.* **Protection of Existing Rights:** Existing satellite operators seek assurance that new allocations will not diminish their operational rights or service quality.
- iv.* **Coordination Burden:** Additional coordination requirements may increase administrative complexity for administrations and satellite operators.

Conclusion

Studies under Agenda Item 1.4 seek to determine whether the frequency bands 17.3-17.7 GHz and 17.3-17.8 GHz can support new primary satellite allocations for FSS and BSS applications while maintaining protection of incumbent services.

The key issue remains the compatibility of proposed non-GSO FSS downlink operations with existing GSO satellite networks and other primary services. As a result, considerable attention is being focused on the development of appropriate EPFD limits and associated regulatory provisions.

While the proposed allocations could provide valuable additional spectrum resources for future broadband and broadcasting satellite systems, significant technical and regulatory work remains necessary to ensure that any new allocations can be implemented without causing harmful interference to existing services.

The outcome of the studies will determine whether new allocations can be introduced and, if so, under what technical and regulatory conditions they may operate.