



Received: 7 July 2021

Document 4A/345-E
7 July 2021
English only

Subject: WRC-23 agenda item 1.16
Resolution **173 (WRC-19)**

ITU-APT Foundation of India (IAFI)¹

PROPOSALS ON WRC-23 AGENDA ITEM 1.16

1 Background

WRC-23 agenda item 1.16 considers the study and development of technical, operational and regulatory measures, as appropriate, to facilitate the use of the frequency bands 17.7-18.6 GHz and 18.8-19.3 GHz and 19.7-20.2 GHz (space-to-Earth) and 27.5-29.1 GHz and 29.5-30 GHz (Earth-to-space) by earth stations in motion (ESIM) communicating with non-GSO satellites in the FSS (“non-GSO ESIM”), while ensuring due protection of existing services in those frequency bands, and in adjacent frequency bands, including passive services, in accordance with Resolution **173 (WRC-19)**.

As part of the sharing and compatibility studies to be conducted between non-GSO ESIM and other in-band and adjacent band services, all space and terrestrial services that are allocated in the adjacent and in-band frequency bands where ESIM would communicate with non-GSO FSS systems under this agenda item are tabulated in the working document towards a draft CPM text for WRC-23 agenda item 1.16 ([Annex 24 to Working Party 4A Chairman’s Report, Doc 4A/246](#)).

2 Discussion

Studies were carried out during the previous study cycles relating to ESIMs communicating with geostationary satellites (GSO), leading to successful regulatory framework for ESIM communicating with GSO satellites and adoption of Resolution **156 (WRC-15)** for the frequency bands 19.7-20.2 GHz and 29.5-30 GHz and Resolution **169 (WRC-19)** for the frequency bands 17.7-19.7 GHz and 27.5-29.5 GHz.

In the 17.7-20.2 GHz, ESIM communicating with non-GSO satellites are not expected to cause interference as they are receiving in this frequency band.

A proposal for a possible way forward to address protection of incumbent services in 27.5-29.1 GHz and 29.5-30.0 GHz from non-GSO ESIM is provided in Tables 1-4 below, together with the equivalent outcome for GSO ESIMs from WRC-15 and WRC-19.

¹ IAFI is a new Sector Member of ITU-R. For details of IAFI please see <https://itu-apt.org/>.

2.1 Fixed-satellite service

In the frequency bands 27.5-29.1 GHz and 29.5-30 GHz FSS (GSO and non-GSO) space services are incumbent services.

TABLE 1

Outcomes for GSO ESIM and possible solution for non-GSO ESIM to protect FSS

Incumbent service	Regulations for GSO ESIMs approved at WRC-15 & WRC-19	Proposed way forward for non-GSO ESIM
GSO FSS (uplink)	Remain within characteristics and coordination “envelope”	In the frequency bands 27.5-28.6 GHz and 29.5-30.0 GHz, non-GSO ESIM shall comply with epfd limit in RR Article 22 (Table 22-2) to protect GSO FSS. In the frequency band 28.6-29.1 GHz, non-GSO ESIM shall remain within the characteristics of typical non-GSO earth stations associated with the satellite network with which the ESIM communicate, and coordination will be based on RR No. 9.11A
Non-GSO FSS (uplink)	Remain within characteristics and coordination “envelope” and within on-axis and off-axis e.i.r.p. spectral density limits (in 27.5-28.6 GHz)	Remain within characteristics and coordination “envelope” of non-GSO FSS networks and coordination under RR No. 9.12

2.2 Broadcasting-satellite service

BSS is an incumbent service in the frequency band 27.5-30 GHz.

It is noted that satellites which receive transmission from the BSS earth stations, will already be protected under the measures undertaken to protect GSO FSS networks.

TABLE 2

Outcomes for GSO ESIM and possible solution for non-GSO ESIM to protect BSS

Incumbent service	Regulations for GSO ESIMs approved at WRC-15 & WRC-19	Proposed way forward for non-GSO ESIM
BSS in 27.5-30.0 GHz	Remain within characteristics and coordination “envelope”	In the frequency band 27.5-28.6 GHz and 29.5-30.0 GHz, non-GSO ESIM shall comply with epfd limits in RR Article 22 (Table 22-2) to protect GSO FSS. In the frequency band 28.6-29.1 GHz, non-GSO ESIM shall remain within the characteristics of typical non-GSO earth stations associated with the satellite network which the ESIM communicate, and coordination will be based on RR No. 9.11A

2.3 Earth exploration-satellite service

In the frequency bands 28.5-30 GHz EESS is an incumbent service.

TABLE 3

Outcomes for GSO ESIM and possible solution for non-GSO ESIM to protect EESS

Incumbent service	Regulations for GSO ESIMs approved at WRC-15 & WRC-19	Proposed way forward for non-GSO ESIM
EESS (Earth-to-space) in 28.5-30 GHz (secondary)	Remain within characteristics and coordination “envelope”	Remain within the envelope characteristics of typical non-GSO earth stations associated with the satellite network with which the ESIMs communicate.

2.4 Terrestrial services

In the frequency bands 17.7-18.6 GHz, 18.8-19.3 GHz and 27.5-29.1 GHz, both FS and MS are incumbent services.

TABLE 4

Outcomes for GSO ESIM and possible solution for non-GSO ESIM to protect FS and MS

Incumbent service	Regulations for GSO ESIMs approved at WRC-15 & WRC-19	Proposed way forward for non-GSO ESIM
Terrestrial services receiving in 17.7-18.6 GHz, 18.8-19.3 GHz and 27.5-29.5 GHz	<p>Aeronautical ESIM shall meet a PFD mask on the ground as per Annex 3 to Resolution 169 (WRC-19).</p> <p>Maritime ESIM shall: Stay 70 km away from the shore Limit e.i.r.p. spectral density towards the horizon as per Annex 3 to Resolution 169 (WRC-19)</p>	<p>Aeronautical ESIM: Studies to be conducted to determine the PFD mask to be met at any point on the ground by aeronautical non-GSO ESIMs.</p> <p>Maritime ESIM: Studies to be conducted to determine the e.i.r.p. spectral density towards the horizon and the distance from shore to be complied by maritime non-GSO ESIMs.</p>

3 Conclusion

It is proposed that this WP 4A meeting could consider the above principles in resolving the issue on sharing studies between the incumbent services and non-GSO ESIM to progress the work on WRC-23 agenda item 1.16.