



**TRAI Consultation Paper on Assignment of Spectrum in E&V Bands, and Spectrum for Microwave Access (MWA) & Microwave Backbone (MWB) dated 27th September, 2023**

As a trade association, the SIA-India is pleased to provide comments to TRAI on the consultation on Auction Process for Satellite Spectrum.

SIA-India is a non-profit organisation established with the objective of serving and promoting the common interests of the satellite communication ecosystem in India

By taking into consideration of the interests of satellite services, SIA-India is pleased to provide the following responses to Q3 and Q25 on TRAI's consultation.

**Background:**

Of late, demand for satellite communications services continues to grow steadily coupled with modern techniques such as multi-beam antennas and enhanced frequency reuse. The size of the satellite communications sector is growing manifold based on an increasing number of satellites (with some NGSO systems deploying hundreds of thousands of satellites). This is being driven by innovation and technology development in the sector. Next generation and High Throughput GSO satellite systems that deploy frequency reuse and spot beam technologies can provide cost-effective broadband throughout India. There has been an increase in the number of entrants into the satellite communications market, mainly driven by new LEO operators due to significant reduction in launching costs, efficient payload integration to suit more applications. This has given a boost to the New Space Economy. The issue is therefore to ensure that access to spectrum that is already available is suitably protected and that this spectrum can be used flexibly for fixed, mobile, geostationary and non-geostationary constellations.

The growing role of satellite networks in delivering terrestrial services is tremendous. The development of small Low Earth Orbit (LEO) satellites, which are smaller in size and cheaper to launch, is opening up a wide variety of opportunities to use non-terrestrial networks (NTNs) to deliver greater capacity and lower latency especially in providing broadband to remote and rural areas hitherto remain unconnected.

All of this means that additional spectrum, in frequencies that are already allocated, may be needed to support satellite services.

**SIA-India Responses:**

Q3. Keeping in view the provisions of ITU's Radio Regulations on coexistence of terrestrial services and space-based communication services for sharing of the same frequency range, do you foresee any challenges in ensuring interference-free operation of terrestrial networks (i.e., MWA/ MWB point to point links in 6 GHz, 7 GHz, 13 GHz, and 18 GHz bands) and space-based communication networks using the same frequency range in the same geographical area? If so, what could be the measures to mitigate such challenges? Suggestions may kindly be made with justification.

**i. 13 GHz (12.75-13.25 GHz)**

The frequency band 12.75-13.25 GHz is currently allocated on a primary basis to the fixed, fixed-satellite (FSS) (Earth-to-space) and mobile services, and on a secondary basis to the space research (deep space) (space-to-Earth) service globally. In the FSS, both geostationary (GSO) and non-geostationary (NGSO) satellite systems already operate. It is to be noted that the ongoing WRC-23 is earmarking this frequency band 12.75-13.25 GHz (Earth-to-space) for links of earth stations in-motion (ESIM) on aircraft and vessels operating to GSO FSS satellite networks that could contribute as an additional use of the spectrum and enhance broadband communications for passengers. In this regard, Final Acts of WRC-23 is expected on 15 December 2023.

**ii. 15 GHz (14.5-15.5 GHz)**

The continue access to 14.25 – 14.5 GHz is absolutely inevitable to meet the increasing demand for uplink capacity of Ku-band user terminals provided by both GSO and NGSO systems to provide a range of applications such as such as inflight broadband and consumer satellite broadband services as sell as to allow aeronautical and maritime earth stations in motion (ESIMs) in this band as a sequel to WRC-23 outcomes shortly. Therefore, this spectrum is a vital resource for satellite uplinks (Earth-space) and supports new and growing FSS applications. The roll out of new applications by the FSS requires increased deployments in the 14.25 - 14.5 GHz band, Furthermore, significant investments in the High Throughput Satellite (HTS) networks have already been made to bring a transformational resource to everyone and everywhere and can provide cost-effective broadband throughout India. By providing a cost-efficient and high-capacity alternative for backhauling in future networks, HTS may have a significant impact to the future spectrum needs of FS. A range of companies are looking to expand the role of satellites in providing broadband. Additionally, LEO satellites can provide cost effective backhaul services, extending mobile coverage into areas where traditional terrestrial backhaul like fibre might not be economic.

**iii. 18 GHz (17.7-19.7 GHz):**

It is foreseen that an extensive use of the Ka-band i.e. in the frequency band 17.7-19.7 GHz for uncoordinated FSS earth stations such as High Throughput Satellite systems (HTS) remains significant. Therefore, it is crucial that spectrum availability for FSS earth stations in the band 17.7-19.7 GHz may be ensured in the long term. This band is also used for fixed wireless links to support backhaul for mobile services and these wireless links are adequately protected

based on Article 21 of the ITU Radio Regulations, which sets out PFD limits at the earth's surface to facilitate sharing with terrestrial services such as fixed wireless links.

Also, the below-mentioned documents may also be referred:

- a) ECC Report 241: Enhanced access to spectrum for FSS uncoordinated earth stations in the 17.7-19.7 GHz band/Approved: 05 February 2016.<sup>1</sup>
- b) ERC Decision (00)07: The shared use of the band 17.7-19.7 GHz by the fixed service and earth stations of the fixed-satellite service (space-to-Earth)/ Approved 19 October 2000 and Amended: 04 March 2016<sup>2</sup>

It is expected that the measures delineated in the above documents and the strict compliance to the provisions contained therein will ensure regulatory certainty and promote efficient frequency sharing in the band 17.7-19.7 GHz to permit a wider use of FSS uncoordinated receive earth stations and associated satellite services to meet the growing needs.

Furthermore, an important factor to be noted here is that the satellite beams are inherently narrow and directed to specific and definite points, either in space or on the ground and hence the gateway earth stations for geostationary (GSO) and non-Geostationary (NGSO) systems are prone to potential interference from these FS networks. Therefore, effective interference mitigation measures are invariably put in place. Furthermore, the concept of operator-to-operator coordination in order to ensure the coexistence between satellite and terrestrial networks operating in the 17.7-19.7 GHz band.

#### **SIA-India's View:**

***Given the above, since some of MWA/MWB bands are overlapping with above FSS bands, it should be invariably ensured that changes, if any, to the FS characteristics of the above bands to accommodate the growing AWA/AWB requirements do not cause unacceptable interference and create constraints to satellite services.***

Q25. Do you agree that the issues relating to the assignment of E-band and V-band for space-based communication services and its coexistence with terrestrial networks may be taken up at a later date? If not, the concerns and measures to overcome such concerns may kindly be suggested with relevant details.

The frequency ranges mentioned in both E-band and V-band are allocated on primary basis to both FS and satellite services (inter-satellite/FSS).

A steady increase in demand for fixed links to be backhaul for public mobile networks in 5G environment may be expected. However, given the continued improvement in fibre

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<sup>1</sup> <https://docdb.cept.org/document/347>

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<https://docdb.cept.org/download/2376#:~:text=The%20band%20covered%20by%20this,a%20rapid%20and%20local%20deployment.>

connectivity and NTN applications such as satellite connectivity, the current spectrum assignments for fixed links will be sufficient to meet demand. Furthermore, any spare capacity in the fixed link spectrum to be re-farmed for other uses is not expected and the existing allocations remain intact.

**Accordingly, SIA-India is of the opinion that as of now it is premature to consider using high frequency microwave in the E-Band (71 to 76 & 81 to 86 GHz) and V-band (57-64 GHz) spectrum, as sufficient bandwidth is already available.**

**Ongoing WRC-23 developments:**

As a coincidence and correlated incident, SIA-India is pleased to bring the ongoing developments at WRC-23 currently in session in Dubai from 20 November 2023 to 15 December 2023 as under:

**i. Revision of ITU-R Resolution 775( Rev.WRC23):**

It may be recalled that that WRC-2000 made various changes to allocations in the frequency bands 71-76 GHz and 81-86 GHz based on the requirements known at the time. Also, the sharing conditions between the fixed service (FS), mobile service (MS) and satellite services in the frequency bands 71-76 GHz and 81-86 GHz could not be fully developed at WRC-2000 due to lack of available information on these services at the time. These bands are being considered potential for high-capacity fixed-service links, including backhaul for future mobile networks. At the same time, that there are an increasing number of satellite filings in the frequency bands 71-76 GHz and 81-86 GHz and some satellites are equipped with payload ready to utilise these bands.

Now, new WRC-27 agenda item (Resolution 775( Rev.WRC23) seeks to conduct appropriate studies to determine power flux-density (pfd) and equivalent isotropically radiated power (e.i.r.p.) limits to be included in Article 21 of the Radio Regulations for satellite services (FSS, MSS and BSS), to protect the current and planned FS and MS in the frequency bands 71-76 GHz and 81-86 GHz without unduly constraining satellite systems.

***Accordingly, till the competent WRC-27 consider the results of relevant ITU-R studies being conducted during WRC-27 study cycle and take necessary action, it is premature to discuss these bands for MWA/ MWB at this stage.***

**ii. Draft New Resolution (COM6/XXX) (WRC-23) on using IMT bands below 5 GHz for Mobile Satellite Service (MSS) to complement IMT network coverage.**

It is pertinent to note that the ongoing WRC-23 in Dubai is bringing in a new WRC-27 agenda item to consider, based on the results of the ITU-R studies, the appropriate regulatory actions, including possible new allocations to the MSS to enable direct connectivity to IMT user equipment to complement terrestrial IMT network coverage, in the IMT frequency bands {(tentatively [450][470][614][698] MHz) [to][below] [2.5][2.7][5] GHz or parts thereof} and the exact bands will be known after the WRC-23 final acts are approved at the final WRC-23 plenary on 15 December 2023.

In this context, it is expected that the harmonization of MSS allocations in the abovementioned frequency bands would help to achieve the benefits of economies of scale, noting the global nature of the service, bridge the digital divide and coverage gaps within and between countries.

When the competent WRC-27 consider the proposed MSS allocations in the IMT bands below 5 GHz, it is expected to ease the need for more frequency bands for the use of MWA/MWB.

We also understand that an option for 5G is to use the same radio access technology for both access and backhaul with dynamic sharing of the spectrum resources (i.e. self-backhauling or Integrated Access Backhaul/IAB) This might provide a complement to microwave backhaul in some specific ultra-dense deployments (indoor and also outdoor) by providing backhaul connectivity to/ between small cells.

Also, it is important to consider the future spectrum needs for all parts of a country, from remote rural to dense urban areas. Consideration has to take into account that 5G will have different backhaul performance needs in different areas, just as is the case in today's mobile backhaul networks.

Together, these developments are allowing satellite communication companies to significantly increase the amount of capacity they can deliver whilst re-using the same spectrum. While Ku-band is slowly becoming congested, Ka-band is taking up the strain, and the availability of Q, V and W bands should provide sufficient spectrum to allow expansion of satellite communication to continue.

**SIA-India's View:**

**In view of the above cogent reasons, SIA-India is the opinion that TRAI may defer the proposal to consider assignment of Spectrum in E&V Bands for Microwave Access (MWA) & Microwave Backbone (MWB), till WRC-27 final outcomes and reiterates that existing frequency bands are obviously adequate to meet the MWA/MWB backhaul needs as of now.**

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