

Annexure-2: DoT letter dated 16.08.2022 (with its Annexure-I, III and IV)

Government of India
Ministry of Communications
Department of Telecommunications
Wireless Planning & Coordination (WPC) Wing

6th Floor, Sanchar Bhawan,
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No. J-19022/01/2022-SAT

Date: 16 August, 2022

To

The Secretary
Telecom Regulatory Authority of India
Mahanagar Doorsanchar Bhawan
Jawahar Lal Nehru Marg (Old Minto Road)
New Delhi-110002

Subject: Seeking TRAI recommendations for the auction of spectrum in the frequency bands identified for International Mobile Telecommunications (IMT)/5G-reg.

Reference: TRAI letter No. C-15/2/(1)/2021-NSL-II dated 23rd November 2021.

Sir,

In response to DoT's reference dated 13.09.2021, Telecom Regulatory Authority of India (TRAI), vide its above referenced letter (enclosed), requested DoT to provide additional information in respect of space-based communication services.

2. In this regards, the following information is provided to TRAI with a request to provide the recommendations on 7(c) of the DoT's letter No. L-14006/01/2021-NTG dated 13.09.2021 (enclosed).

2.1 **Details of the frequency bands and quantum of spectrum available in each band required to be put to auction and associated information in respect of space-based communication:**

(a) The frequency bands and quantum of spectrum that may be considered by TRAI for providing recommendations with respect to space-based communication services are provided in **Annexure-I**.

(b) These frequency bands include "Planned bands" that when used by GSO systems in accordance with Appendices 30, 30A & 30B of Radio Regulations are reserved by ITU for use by National systems. Use of 'Planned Bands' by foreign GSO satellites is not permitted in India. TRAI may, *inter-alia*, take into account this aspect with respect to GSO systems, in the consultation process. Further, the NGSO network has to provide the protection to GSO networks as per ITU framework.

(c) While Annexure-1 includes both spectrum band and quantum of spectrum in each band, however, the demand of spectrum is not known. Therefore, TRAI, through consultations, may assess the demand for space-based communication services and accordingly provide recommendations on the quantum of spectrum in each band required to be put to auction.

2.2 Whether spectrum for space-based communication is being envisaged to be assigned on exclusive basis or will the same be shared among multiple service licensees:

(a) It is envisaged to auction the Space Spectrum on exclusive basis. TRAI may explore the feasibility and procedure of sharing auctioned spectrum among multiple service licensees. TRAI may provide recommendations on sharing of auctioned frequency bands between satellite networks and terrestrial networks also, the criteria for sharing and appropriate interference mitigation techniques for sharing and coexistence.

(b) In frequency bands 27.5-28.5 GHz (identified for IMT) and 28.5-29.5 GHz (being studied for Captive Non-Public Networks), TRAI may recommend mechanism for sharing of auctioned frequency bands in which both IMT/CNPN and satellite based services (both user terminal and Gateways) can be provided in a flexible manner.

2.3 Details of spectrum assignment mechanism and methodology of charging currently being followed by DoT for space-based communication services:

(a) Spectrum for space based communications services is currently being assigned through administrative mechanism with formula-based charging for some applications and percentage AGR based charging for others. This assignment is subject to conditions provided in the WPC Wing OM No. R-11014/15/2012-NT(Pt.) dated 05 January 2021(revised from time to time)- **Annexure-III**.


(b) Relevant spectrum charging orders are provided in **Annexure-IV**. Spectrum charges are levied as per administrative orders issued in 2012. Commercial VSAT operations are governed by an order issued in 2003 where charges were levied on a revenue sharing basis. This order is under revision, where the percentage AGR basis charging has been retained but a uniform rate of charging is proposed. Until June, 2021, the spectrum charges for Mobile Satellite Service provided by BSNL ("Sui generis") were being levied on formula basis. However, in June 2021, a separate order for this service has been issued, as per which spectrum charges are being collected from M/s BSNL on a revenue sharing basis, with retrospective effect (from the date of inception of this service). In 2021, spectrum charges for captive VSAT users were also modified.

3. Since the service providers may require spectrum both in user link as well as in feeder link, TRAI may take inputs from the stakeholder and recommend the appropriate auction methodology so that the successful bidder gets spectrum for user link (shared with IMT in flexible) as well as feeder link.



4. In addition, TRAI is requested to provide any other recommendation as deemed fit for the purpose of spectrum auction in these frequency bands, including the regulatory/technical requirements as enunciated in the relevant provisions of the latest ITU-R Radio Regulations.

This issues with the approval of the competent authority.



(Gulab Chand)
Joint Wireless Advisor

Enclosure:

1. **Annexure-I**: Frequency bands to be considered by TRAI for providing recommendations with respect to space-based communication services.
2. **Annexure-II**: Frequency assignment issued in these bands.
3. **Annexure-III**: WPC Wing OM No. R-11014/15/2012-NT(Pt.) dated 05 January 2021
4. **Annexure-IV**: Extant Spectrum charging orders.
5. TRAI letter No. C-15/2/(1)/2021-NSL-II dated 23rd November 2021.
6. DoT letter No. L-14006/01/2021-NTG dated 13.09.2021.

Frequency bands to be considered by TRAI for providing recommendations with respect to space-based communication services

1. TRAI can consider the following frequency bands for providing recommendations with respect to space-based communication services.
 - i. 10.7- 12.75 GHz (space to Earth)
 - ii. 12.75-13.25 GHz (Earth-to-space)
 - iii. 13.75- 14.5 GHz (Earth-to-space)
 - iv. 17.7-18.6 GHz (space to Earth) [17.7-18.4 is used for Earth to space also]
 - v. 18.8-19.3 GHz (space to Earth)
 - vi. 19.3-19.7 GHz (space to Earth)
 - vii. 19.7-21.2 GHz (space to Earth)
 - viii. 27.5-29.5 GHz (Earth-to-space) [27.5-28.5 GHz has been identified for implementation of IMT in India]
 - ix. 29.5- 31 GHz (Earth-to-space)
2. TRAI can however provide recommendations for other frequency bands also.

Note: The Planned bands are:

- i. 12.75 -13.25 GHz & 6725-7025 MHz (Uplink) and 10.7-10.95 GHz, 11.2-11.45 GHz & 4500-4800 MHz (Downlink): FSS Plan (RR Appendix 30B)
- ii. 11.7-12.2 GHz (Downlink) : BSS Plan (RR Appendix 30)
- iii. 14.5-14.8 GHz & 17.3-18.1 GHz (Uplink): BSS feeder links Plan (RR Appendix 30A)



Quantum of Spectrum

S. No.	Downlink (GHz)	Total Spectrum (GHz)	Uplink (GHz)	Total Spectrum (GHz)	Current Users	Applications	Remarks	
1.	10.7 - 12.75*	2.05	12.75 - 13.25** 13.75 - 14.5	1.25	Terrestrial networks		<ul style="list-style-type: none"> Entire band can be used by Non-GSO FSS networks. Currently, MWA in 12.75 - 13.25 GHz coexists with FSS. 	
					Telecom Service Providers/ISP	Microwave Access		
					GSO Systems#			
					Dish TV India Ltd., Sun TV Ltd., Tata Play Ltd., Bharti Telemedia Pvt. Ltd., Doordarshan	DTH		* 11.7 - 12.2 GHz, Only National system For GSO.
					Nelco Ltd., Hughes Communications India Pvt. Ltd.	Commercial VSAT/IFMC		** For GSO national systems only. Corresponding downlink of 500 MHz in 10.7-10.95 GHz and 11.2 - 11.45 GHz.
					HCL Comnet, Infotel Satcom, BSNL	Commercial VSAT		
					Cloudcast	IFMC		
					Planetcast Media Services Ltd., TV18, TV Today, AIR, Lamhas Satellite Services Ltd., Indiasign Pvt. Ltd.	DSNG		
	ONGC, AAI, ISRO, DRDO	Captive VSAT						

					Terrestrial networks		<ul style="list-style-type: none"> Available total spectrum can be used by Non-GSO FSS Networks. Currently, MWA in 17.7 – 19.7 GHz coexists with FSS.
					Telecom Service Providers/ISP	Microwave Access	
					GSO Systems#		
2.	17.7 – 18.6 18.8 – 21.2	3.3	27.5 – 31***	2.5***	BSNL	IFMC	*** CoS decision: 27.5-28.5 GHz identified for IMT.
					Hughes Communications India Pvt. Ltd.	Commercial VSAT	
					ISRO	High Throughput Satellites' Gateways	
Total (1+2)		5.35	-	3.75	-		

Note: These bands are both for Geo-stationary orbit (GSO) & Non-GSO networks. In general, Non-GSO networks shall not cause unacceptable interference to and, unless otherwise specified in the Radio Regulations, shall not claim protection from GSO satellite networks in the fixed-satellite service and the broadcasting-satellite service.

Showing major users only.

Existing/Planned deployments by various satellite operators in NGSO
(as per information available in Public domain)

Sl. No	Satellite Operator	Deployment (Frequency Bands)	Planned Satellite numbers	Live Satellite numbers	Frequency Bands (in GHz)			
					User Link		Feeder Link	
					Space to Earth	Earth to Space	Space to Earth	Earth to Space
1.	SpaceX (USA)	Ku/Ka* (1 st Gen)	4408	1892	10.7-12.75	14-14.5	17.8-18.6 18.8-19.3	27.5-29.1 29.5-30.0
		Ku/Ka/E* (2 nd Gen)	30000	-	10.7-12.75 17.8-18.6 18.8-19.3 19.7-20.2	12.75-13.25 13.85-14.5 28.35-29.1 29.5-30.0	17.8-18.6 18.8-19.3 71-76	27.5-29.1 29.5-30.0 81-86
		V Band*	7518	-	37.5-42.5	47.2-50.2 50.4-52.4	37.5-42.5	47.2-50.2 50.4-52.4
2.	Kuiper Systems (Amazon) (USA)	Ka Band	3236	-	17.7-18.6 18.8-20.2	28.35-29.1 29.5-30	17.7-18.6 18.8-20.2	27.5-30 37.5-42.0 42.0-42.5
		Ku/V***	7774	-	10.7-12.7 37.5-42.0 42.0-42.5	12.75-13.25 14-14.5 47.2-50.2 50.4-51.4	37.5-42.0 42.0-42.5	47.2-50.2 50.4-51.4
3	Boeing (USA)	V	5921	-	37.5-42	47.2-50.2 50.4-51.4	37.5-42	47.2-50.2 50.4-51.4
4	Astra Space (USA)	V	13620	-	37.5-42	47.2-50.2 50.4-51.4	37.5-42	47.2-50.2 50.4-51.4
5	OneWeb (UK)	Ku/Ka (Phase 1)	648	394	10.7-12.7	12.75-13.25 14-14.5	17.8-18.6 18.8-19.3 19.7-20.2	27.5-29.1 29.5-30.0
		Ku/Ka (Phase 2)	6372	-	10.7-12.7	12.75-13.25 14-14.5	17.8-18.6 18.8-19.3 19.3-19.7 19.7-20.2	27.5-29.1 29.1-29.5 29.5-30.0
		V Band	6372	-	40.0-42.0	48.2-50.2	37.5-42.5	42.5-43.5 47.2-50.2 50.4-51.4
6	O3B (UK)	Ka	70	20	17.8-18.6 18.8-20.2	27.5-30	17.8-18.6 18.8-20.2	27.5-30
		V	24	-	37.5-42	47.2-50.2 50.4-51.4	37.5-42	47.2-50.2 50.4-51.4
7	Telesat (CANADA)	Ka Band**	300	-	17.8-18.6 18.8-19.3 19.7-20.2	27.5-29.1 29.5-30	17.8-18.6 18.8-19.3 19.7-20.2	27.5-29.1 29.5-30
		V Band**	1671	-	37.5-42	47.2-50.2 50.4-51.4	37.5-42	47.2-50.2 50.4-51.4

*SpaceX not seeking authorization in USA for 12.7-12.75 GHz; 40-42.5 GHz & 51.4-52.4 GHz

**The frequency band 50.4-51.4 GHz is presently not identified in the USA for FSS.

*** 42-42.5 GHz (non-USA only)