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Shri Akhilesh Kumar Trivedi
Advisor (Networks, Spectrum and Licensing)
Telecom Regulatory Authority of India
Mahanagar Doorsanchar Bhawan
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New Delhi – 110 002

Subject: Tata Communications Ltd. comments to TRAI Consultation Paper on ‘Assignment of Spectrum in E&V Bands, and Spectrum for Microwave Access (MWA) & Microwave Backbone (MWB)’

Dear Sir,

This is with reference to the TRAI Consultation Paper No. 22/2023 dated 27-09-2023 on ‘Assignment of Spectrum in E&V Bands, and Spectrum for Microwave Access (MWA) & Microwave Backbone (MWB)’.

In this regard, please find enclosed herewith Tata Communication Limited’s comments for your kind consideration as Annexure.

We request you to kindly consider our submissions while finalizing the recommendations and would be happy to provide any additional information, if required.

Thanking You,

Yours Sincerely,
For Tata Communications Limited,

Alka Selot Asthana
Vice President and Head Regulatory Affairs
(Authorized Signatory)

Enclosed: As mentioned above

TATA COMMUNICATIONS

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**Tata Communications Limited's response to TRAI Consultation Paper on
'Assignment of Spectrum in E&V Bands, and Spectrum for Microwave Access (MWA)
& Microwave Backbone (MWB)'**

At the outset, we thank TRAI for providing us an opportunity to share our comments/inputs on this important consultation paper on Assignment of Spectrum in E&V Bands, and Spectrum for Microwave Access (MWA) & Microwave Backbone (MWB) for TSPs with Access Service License / Authorizations, TSPs having licenses other than Access Service License / Authorizations and other entities (non-TSP, for non-commercial/ captive/ isolated use).

Tata Communications being an Enterprise Service Provider is required to deliver services to its Enterprise Customers' premises / locations as per their business requirements which is not feasible at all the times in terms of technical feasibility to access customer location(s) or areas where availability of fixed line connectivity (e.g. Fiber) is a challenge due to exorbitantly higher ROW cost. Tata Communications being an ISP licensee was administratively allocated spectrum in 3.3-3.6 GHz band which was used to provide services to Enterprise Customers since 2006 and was surrendered in Jan 2020 as the spectrum allocated in 3.3.-3.6 GHz was required to be vacated being identified for IMT/5G services. In order to serve Enterprise customers efficiently, there is need to have spectrum in licensed band for ensuring good quality internet connectivity for various Enterprises to meet their business requirement and digitization of their applications and services.

It is also pertinent to highlight that~40-50 percent of the Enterprise market in the country is being served by larger ISPs incl. Tata Communications alone (non-Access Service Providers) who are deprived of administrative allocation of spectrum for last mile access / connectivity to serve their Enterprise customers in an efficient manner whereas the Access Service Providers are still enjoying such administrative allocated spectrum (point to point) in the form of back-haul spectrum. The non-availability of spectrum for establishing last mile connectivity has put us into a competitive disadvantage as compared to the Access Service Providers providing services to the same Enterprise market segment. This creates non-level playing field between Access Service Providers and non-Access Service Providers in the Enterprise market resulting into Enterprise Customer churn due to deterioration in quality of service as per industry norms/ agreed SLAs on account of not having adequate spectrum for establishing last mile access / connectivity.

In the absence of availability of spectrum, non-Access Service Providers like Tata Communications has been finding it very difficult to retain existing Enterprise Customers due to increasing cost of maintaining the network on suboptimal unlicensed band using Unlicensed Band Radio (UBR). The use of UBR for last mile connectivity as against to earlier used spectrum in 3.3 GHz has many operational and technical challenges.

In order to meet the ISPs enterprise customer requirements, there is a need to create a new network to meet last mile access / connectivity requirement. In this regard, the assignment of



spectrum in the E & V band should be done in an administrative manner as it has the ability to deliver higher bandwidths to all Licensed Operators.

Tata Communications is of the view that the MWA (13/15/18/21 GHz) / MWB (7 GHz) spectrum is also required by TSPs having authorizations other than Access Service License/ authorization, and other entities (non-TSP, for noncommercial/captive/ isolated use). Therefore, assignment of MWA/ MWB spectrum would also be made to TSPs having authorizations other than Access Service License/ authorization administratively as has been provided to TSPs having Access Service License/ authorization. The MWA and MWB spectrum band should be assigned on a Point-to-Point (P2P) link on administrative allocation for PAN India basis with minimum two numbers of 28MHz FDD paired channel profile.

The E & V Band spectrums has the ability to deliver higher bandwidths and can be deployed for last mile connectivity and backhaul applications, high-capacity P2P links and Private Networks. Therefore, it is recommended that the E-band be lightly licensed and made available to all licensed service providers. The V-Band should be delicensed due to the limited propagation characteristics of the band in line with global practices. The policy framework earlier recommended by TRAI vide its recommendations dated 29-08-2014 and 17-11-2015 for opening up of E&V band with “light touch regulation” and allotment on First Cum First Served basis should be reiterated.

Additionally, it is submitted that the 6 GHz band in the frequency range from 5.925GHz -6.425 GHz should be extended as 5.925GHz -7.125GHz in accordance with the global standards and spectrum Regulations. TRAI also in its white paper dated 25 September 2023 on 6 GHz Spectrum band has assessed potential benefits of 6 GHz band in both unlicensed use and 5G use cases. Therefore, it is recommended that the entire 6 GHz band (5.925GHz -7.125GHz) should be de-licensed in line with the Global practices.

With the above submissions, we are hereby providing our inputs on the issues raised in the Consultation Paper:

Q1. What quantum of spectrum in different MWA and MWB frequency bands is required to meet the demand of TSPs with Access Service License/ Authorization? Whether MWA/ MWB spectrum is also required by TSPs having authorizations other than Access Service License/ authorization, and other entities (non-TSP, for noncommercial/captive/ isolated use)? Information on present demand and likely demand after five years may kindly be provided as per the proforma given below with detailed justification:



(i) Present demand

Band	Quantum of spectrum required (per entity per LSA)		
	TSPs with Access Service License/ Authorization	TSPs with other than Access Service License/ Authorization	Other entities (non-TSP, for non-commercial/ captive/ isolated use)
6 GHz (5.925-6.425 GHz)			
7 GHz (7.125-7.425 GHz)			
7 GHz (7.425-7.725 GHz)			
13 GHz (12.750-13.250 GHz)			
15 GHz (14.5-15.5 GHz)			
18 GHz (17.7-19.7 GHz)			
21 GHz (21.2-23.6 GHz)			

(ii) Likely demand after five years

Band	Quantum of spectrum required (per entity per LSA)		
	TSPs with Access Service License/ Authorization	TSPs with other than Access Service License/ Authorization	Other entities (non-TSP, for non-commercial/ captive/ isolated use)
6 GHz (5.925-6.425 GHz)			
7 GHz (7.125-7.425 GHz)			



7 GHz (7.425-7.725 GHz)			
13 GHz (12.750-13.250 GHz)			
15 GHz (14.5-15.5 GHz)			
18 GHz (17.7-19.7 GHz)			
21 GHz (21.2-23.6 GHz)			

Tata Communications Response:

- It is submitted that MWA (13/15/18/21 GHz) / MWB (7 GHz) spectrum is also required by TSPs having authorizations other than Access Service License/ authorization, and other entities (non-TSP, for noncommercial/captive/ isolated use).
- Tata Communications being a non-Access Service Provider is required to deliver services to its Enterprise Customers' premises / locations as per their business requirements which is not feasible at all the times in terms of technical feasibility to access customer location(s) or areas where availability of fixed line connectivity (e.g. Fiber) is a challenge due to exorbitantly higher ROW cost.
- Therefore, assignment of MWA/ MWB spectrum would also be made to TSPs having authorizations other than Access Service License/ authorization administratively as has been provided to TSPs having Access Service License/ authorization.
- The MWA and MWB spectrum band should be assigned on a Point-to-Point (P2P) link on administrative allocation for PAN India basis with minimum two numbers of 28MHz FDD paired channel profile. (Ref: GSMA report on wireless BH Feb 2021¹)

¹ <https://www.gsma.com/spectrum/wp-content/uploads/2022/01/wireless-backhaul-spectrum-positions-v2.pdf>



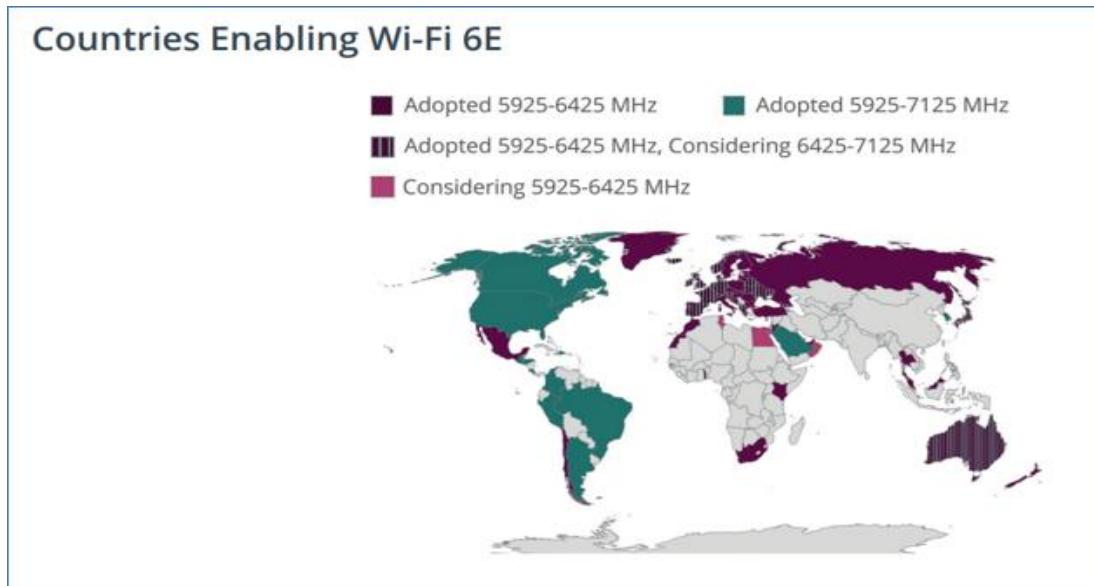
Backhaul Licensing Regime Analysis by Country

Country	Unlicensed	Per Link	Block Spectrum	Shared	Lightly Licensed	1 Yr	5 Yr	10 Years	> 10 Years
Europe									
France									
Germany									
Italy									
Spain									
Sweden									
UK									
Czech Republic									
Hungary									
Poland									
Russia									
Turkey									
NE Asia									
China									
Japan									
Korea									
South & Southeast Asia									
Australia									
Bangladesh									
India									
Indonesia									
Malaysia									
New Zealand									
Pakistan									
Philippines									
Singapore									
Myanmar									
North America									
United States									
Latin America & Caribbean									
Argentina									
Brazil									
Chile									
Mexico									
Peru									
Uruguay									
Venezuela									
Middle East & North Africa									
Jordan									
Kuwait									
Saudi Arabia									
UAE									
Sub Saharan Africa									
Egypt									
Nigeria									
South Africa									
Tanzania									
World-wide Analysis									
Total	5	26	14	4	9	6	7	8	11
Spectrum Share	8.6%	44.8%	24.1%	6.9%	15.5%	19%	22%	25%	34%
Source: ABI Research									

- Further, we would also like to submit that the 6 GHz band as mentioned in this consultation paper as 5.925GHz -6.425 GHz should be extended as 5.925GHz -7.125GHz in accordance with the global standards and spectrum Regulations. TRAI in its white paper² dated 25 September 2023 on 6 GHz Spectrum band has assessed potential benefits of 6 GHz band in both unlicensed use and 5G use cases.
- It is recommended that the entire 6 GHz band (5.925GHz -7.125GHz) should be de-licensed in line with the Global regulations as referred below in the table. TRAI in its above referred paper has also mentioned that the unlicensed spectrum available in India is around 689 MHz which is far lower in comparison to other countries like USA-15403 MHz, UK-15404 MHz, Japan 15377 MHz, Brazil 15360 MHz and unlicensed spectrum is also spread across various spectrum bands. Also, it may be importantly noted that in ref. to the 6 GHz band (5.925GHz - 7.125GHz) it is proposed to be assigned for fixed wireless applications usage (in line with the NFAP-2022 pg-84 ch-3 frequency allocation table “5 925-7 235 MHz”).

² https://traigov.in/sites/default/files/White_Paper_25092023.pdf

- Kindly see below chart and table on 6GHz band in support of our above statements -



6 GHz Band Global Adoption for Unlicensed Use		
Country	Spectrum	Status
United States	5925-7125 MHz	Unlicensed
Brazil		
Argentina		
Canada		
Saudi Arabia		
South Korea		
Colombia		
Costa Rica		
Dominican Republic		
El Salvador		
Guatemala		
Honduras		
Peru		
Australia	5925-6425 MHz	Unlicensed
United Kingdom		
Bahrain		
Japan		
New Zealand		



Singapore
Germany
Spain
Switzerland
Belgium
France
UAE
Ireland
South Africa
Luxembourg
Netherlands
Norway
Portugal
Austria
Belgium

Further, please also refer below allowed power levels for unlicensed use of 6GHz band as recommended by FCC for USA -

Device Class	Operating bands	Maximum EIRP(dBm)	Maximum Power spectral Density(dBm/MHz)	purpose
Standard power Access point (AFC controlled)	U-NII-5 (5.925-6.425 GHz) U-NII-7 (6.525-6.875 GHz)	36 dBm	23 dBm/MHz	Outdoor
Client connected to Standard power Access point		30 dBm	17 dBm/MHz	Outdoor
Low power Access Point (Indoor only)	U-NII-5 (5.925-6.425 GHz) U-NII-6 (6.425-6.525 GHz)	30 dBm	5 dBm/MHz	Indoor
Client connected to Low power Access point	U-NII-7 (6.525-6.875 GHz) U-NII-8 (6.875-7.125 GHz)	24 dBm	-1 dBm/MHz	Indoor



Recommended applications

Sub-Band Reference	Band Frequency (GHz)	primary incumbent applications	Operation condition of Wi-Fi devices	Requirements for Wi-Fi devices
U-NII-5	5.925-6.425	Fixed service	Standard- Power	AFC
U-NII-6	6.425-6.525	Mobile service	Low- Power	LPI
U-NII-7	6.525-6.875	Fixed service	Standard- Power	AFC
U-NII-8	6.875-7.125	Fixed service Mobile Service	Low- Power	LPI

Note:

1. AFC (Automated Frequency Coordination) will be applied to the sub-bands U-NII-5 and U-NII-7 as these are mainly for outdoor application.
2. For all the Wi-Fi devices on sub-bands U-NII-6 and U-NII-8, they will be restricted to LPI (Lower Power) Indoor use only.

Source Ref: *FCC document on Unlicensed Use of the 6 GHz Band, dated 2nd April 2020*

TRAI may kindly consider the above mentioned global references and recommend that 6 GHz band should be extended as 5.925GHz -7.125GHz in accordance with the global standards and spectrum Regulations and same should be unlicensed so that same can be made available for all service providers.

Q2. Whether spectrum for MWA and MWB should be assigned for the entire LSA on an exclusive basis, or on Point-to-Point (P2P) link basis? Response may be provided separately for (i) TSPs with Access Service License/ Authorization, (ii)TSPs having authorizations other than Access Service License/ authorization, and (iii) Other entities (non-TSP, for non-commercial/ captive/ isolated use) in the table given below with detailed justification:

Microwave bands	Spectrum should be assigned for the entire LSA on an exclusive basis, or on P2P link basis for -		
	TSPs with Access Service License/ Authorization	TSPs with other than Access Service License/ Authorization	other entities (non-TSP, for non-commercial/ captive/ isolated use)
MWB (6/7 GHz)			



MWA (13/15/18/21 GHz)			
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Tata Communications Response:

We are of the view that MWA & MWB spectrum should be assigned administratively to ensure efficient utilization of the spectrum resource and only on non-exclusive basis to all TSPs with other than Access Service License/Authorization including category 'A' ISPs, NLDOs at Pan India basis as these licensees has National area licenses. The MWA and MWB spectrum band should be assigned on a Point-to-Point (P2P) link on administrative allocation for PAN India basis with minimum two numbers of 28MHz FDD paired channel profile.

Microwave bands	Spectrum should be assigned for the entire LSA on an exclusive basis, or on P2P link basis for -		
	TSPs with Access Service License/ Authorization	TSPs with other than Access Service License/ Authorization	other entities (non-TSP, for non-commercial/ captive/ isolated use)
MWB (6/7 GHz)	No comments	Point-to-Point (P2P) link on administrative allocation for PAN India basis	
MWA (13/15/18/21 GHz)	No comments	Point-to-Point (P2P) link on administrative allocation for PAN India basis	

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.

Tata Communications Response:

- Radio frequency spectrum is a scarce natural resource. Any amount of frequency spectrum, if not in use optimally and efficiently, it is an opportunity loss to allow the benefits of the spectrum to a wider category of users/end customers across all service providers under



various licenses/ authorizations, thus also hinders socio-economic development of the country. Considering the growing capacity and thus spectrum, government must explore better methods to tap the full potential of the spectrum.

- We can consider the below potential spectrum bands that can be considered for co-existence of Point-to-point Microwave backhaul links along with Satellite-based uplink communication on secondary basis -
 - 24.65 – 25.25 GHz
 - 27 – 28.5 GHz,
 - 29.1 – 29.5 GHz
- Co-existence of Ka band satellite uplink transmission, P2P microwave links to be made available by way of administratively assigned spectrum through an efficient process of shared spectrum mechanism to ISPs. Microwave backhaul/access to the spectrum should be on secondary, non-interference basis to satellite links, non-protection from satellite link basis.
- Following mitigation measures can be adopted to avoid interference between these two types of stations.
 - Using frequency coordination to prevent interference.
 - Selecting microwave sites that are far apart or with suitable terrain features (e.g. hills or mountains) to reduce the likelihood of interference.
 - Using directional antennas with high gain and narrow beamwidths to minimize the amount of energy radiated in unwanted directions.
 - Transmission power of the stations can be adjusted to minimize interference.
 - Using filters to eliminate or reduce the number of unwanted signals or noise that can cause interference.
 - Maintaining communication and coordination between the operators of the satellite station and the microwave station to ensure that any interference is identified and addressed promptly.

Q4. What should be the carrier size for MWA and MWB carriers in each band viz. 6/7/13/15/18/21 GHz bands? Whether there is a need to prescribe a different carrier size based on different LSA categories or different user categories viz. (i) TSPs with Access Service License/Authorization, (ii) TSPs with other than Access Service License/Authorization and (iii) other users (non-TSP, for non-commercial/ captive/ isolated use)? If yes, suggestions may be made in the table given below with detailed justification.



Microwave bands	Carrier size (in MHz) for -		
	TSPs with Access Service License/ Authorization	TSPs with other than Access Service License/ Authorization	other users (non-TSP, for non-commercial/ captive/ isolated use)
MWB (6/7 GHz)			
MWA (13/15/18/21 GHz)			

Tata Communications Response:

- Tata Communications recommends standard carrier size of 20/40/80/160 MHz (TDD) on 6 GHz band, and it should be permitted for unlicensed use.
- The carrier size for MWA and MWB band carriers should have paired 28 MHz (FDD) to meet the fair allocation of spectrum resource to both the categories (TSPs with access service license/TSPs other than access service license).
- ITU Traditional Microwave Frequencies - These are the most widely used microwave bands globally today and will continue to be very important in the coming years. The introduction of wider channels (28 MHz to 56 MHz and eventually toward 112 MHz to 224 MHz) has started, which, together with new spectrum-efficient technologies

Q5. Whether there is a need to assign MWA and MWB carriers in such a way that if a TSP acquires more than one carrier in a band, all assigned carriers are contiguous, and assigned frequency range(s) can be catered through a single equipment? If yes, kindly provide details of the frequency range(s) supported by the available equipment in each band. Any other suggestion(s) may kindly be made with detailed justification?

Tata Communications Response:

- At the outset, it is reiterated that the entire 6 GHz band (5.925-7.125 GHz) to be de-licensed. Please refer to our submissions provided in response to the Q1 above.
- We believe that it will be a positive step to assign MWA and MWB carriers in such a way that a TSP can acquire more than one contiguous carrier in a band. As mentioned in the response to Q4 above.



- Licensed Service provider should have a flexibility to choose multiple adjacent/contiguous carriers in the band. With this provision, a Licensed Service provider can plan low-capacity, medium capacity, and high-capacity links by choosing an appropriate number of adjacent carriers. This will improve overall efficiency and flexibility. Proportionately, it will reduce the cost of the network deployment in rural, sub-urban and urban areas since the same equipment can be used for wider channel bandwidth deployment provided adjacent carriers are allotted to operators.
- Regarding Broadband MWA/ MWB equipment specifications (Wide-band support), ecosystem support for contiguous channels (as per question in any given spectrum band and not across bands in scope) in the MWA/MWB devices, generally, all equipment in these bands supports operating in contiguous channels in multiples of 7/14/28MHz profiles. The equipment can also support 2 channels of 28MHz FDD contiguous channels for higher capacity requirements.

Q6. For the existing service licensees holding MWA/ MWB carriers, whether there is a need to create some specific provisions (as discussed in para 2.38 of this CP) such that if the licensee is successful in acquiring the required number of carriers through auction/ assignment cycle, its services are not disrupted? If yes, kindly provide a detailed response with justification.

Tata Communications Response:

No Comments

Q7. Whether there is a need to review the existing ceiling on number of MWA carriers that can be held by a licensee? In case it is decided to review the ceiling on the number of MWA carriers that a licensee can hold,

- (a) Whether a separate ceiling for each band (13 GHz/ 15 GHz/ 18 GHz/ 21 GHz) should be prescribed or an overall ceiling for MWA carriers taking all bands together?**
- (b) Whether different ceilings based on the service area category to be prescribed?**
- (c) What should be the ceiling in terms of the number of carriers of 28 MHz per licensee in each case i.e., band-wise ceiling and overall ceiling for each service area category for -**
 - (i) TSPs with Access Service License/ Authorization , and**
 - (ii) TSPs with other than Access Service License/ Authorization?**
- (d) Any other relevant suggestion may be made with justification.**

Kindly justify your response.



Tata Communications Response:

We do not recommend any ceiling on number of MWA carriers can be held by a licensee as this spectrum will be shared across the LSA by multiple number of Users and there will not be any exclusive assignment of the same.

Q8. In case it is decided to assign MWB carriers exclusively on LSA basis to the TSPs, whether there is a need to prescribe any ceiling on the maximum number of MWB carriers that can be held by a TSP? Kindly justify your response.

And

Q9. In case it is decided to prescribe a ceiling on the number of MWB carriers that a TSP can hold,

- (a) Whether separate ceiling for each band (6 GHz, 7 GHz (7.125-7.425 GHz) and 7 GHz (7.425-7.725 GHz)) should be prescribed or an overall ceiling for MWB carriers should be prescribed?**
- (b) Whether different ceiling based on the service area category i.e. Metro/ Category 'A' Circles / Category 'B' Circles / Category 'C' Circles needs to be prescribed?**
- (c) What should be the ceiling in terms of number of carriers of 28 MHz per licensee in each case i.e., band-wise ceiling and overall ceiling for each service area category for**
 - (i) TSPs with Access Service License/ Authorization , and**
 - (ii) TSPs with other than Access Service License/ Authorization?**
- (d) Any other relevant suggestion may be made with justification.**

Tata Communications Response to Q8 & Q9: Spectrum in MWA & MWB band should be assigned administratively to ensure efficient utilization of the spectrum resource and only on non-exclusive basis to all TSPs with other than Access Service License/Authorization including category 'A' ISPs, NLDOs at Pan India basis as these licensees has National area licenses.

Q10. Which methodology should be used for assignment of MWA carriers? Response may be provided in the table given below:

User category	Assignment methodology [Auction/ Administrative/ Any other (please specify)]	Justification



(i) TSPs with Access Service License/ Authorization		
(ii) TSPs with other than Access Service License/ authorization		
(iii) Other entities (non- TSP, for non- commercial/ captive/ isolated use)		

Tata Communications Response:

Tata Communications' response is limited only to the TSPs other than Access service licensees who does not have any current allocation in these bands. We recommend that the spectrum in the MWA Bands (13/15/18/21 GHz) & MWB (7 GHz) band should also be assigned on a Point-to-Point (P2P) link basis on administrative allocation at pan India level with minimum two numbers of 28MHz FDD paired channel profile to TSPs other than access service license for meeting their critical business requirements.

Q 11. In case you are of the opinion that certain user categories should be assigned MWA carrier P2P links by any methodology other than auction, should some MWA carriers be earmarked for such users? If yes, how many carriers should be earmarked for each of such user category? Kindly justify your response.'

And

Q12. Which methodology should be used for assignment of MWB carriers? The response may be provided in the table given below:

User category	Assignment methodology [Auction/ Administrative/ Any other (please specify)]	Justification
(i) TSPs with Access Service License/ Authorization		
(ii) TSPs with other than Access Service License/ authorization		



(iii) Other entities (non- TSP, for non- commercial/ captive/ isolated use)		
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Tata Communications Response to Q 11 & Q 12:

- For TSPs other than access service license, the mentioned MWA (13/15/18/21 GHz) band should be assigned on a Point-to-Point (P2P) link on administrative allocation for PAN India basis with minimum two numbers of 28MHz FDD paired channel profile to meet their customers' requirements.
- Assignment criteria for allocation of additional carries for MWA and MWB should be on need-basis, after examining full justification of the requirements and availability of spectrum and upon taking into consideration spectrum requirement of other users with a view to ensuring electromagnetic compatibility etc.
- Further, it is also suggested that while finalizing the recommendations, TRAI may prefer to maintain technological neutrality, allowing any user category to adopt the most efficient and cost-effective technologies for their services. Earmarking may lock up spectrum in specific brands or areas, limiting its flexibility for adaptation to changing technological and service needs.
- Additionally, it is recommended that the entire 6 GHz (5.925-7.125 GHz) MWB band should be de-licensed in line with global practices. The standard carrier size of 20/40/80/160 MHz (TDD) on 6 GHz band and it should be permitted for unlicensed use.

Q13. In case you are of the opinion that certain user categories should be assigned MWB carrier by any methodology other than auction, should some MWB carriers be earmarked for such users? If yes, how many carriers should be earmarked for such users? Kindly justify your response.

Tata Communications Response:

- At the outset, we wish to reiterate that for TSPs other than access service license and other certain user categories MWA and MWB band should be assigned on a Point-to-Point (P2P) link on administrative allocation for PAN India basis with minimum two numbers of 28MHz FDD paired channel profile to meet their business requirements which do not need ubiquitous coverage.
- In our view, there is no need to reserve any specific no. of carriers for MWB considering number of Service Providers & their simultaneous usage along with Geospatial separation assumptions as it would be difficult to assume number of non-access service providers which may have future plan to provide PAN India Internet services & intern would be needing the wireless spectrum bands to provide the services and their bandwidth requirements (as it would



vary from ISP to ISP). Also, MWA bands are discrete (From 13 GHz to 21 GHz) with different available bandwidths for usage hence to make assumption to keep reserve spectrum bandwidth in each band would not be a practical solution and same should be left to the evolution of use cases to address customer requirements.

Q14. In case it is decided to assign MWA/MWB carriers to the TSPs with Access Service License/ Authorization through auction and to continue the existing P2P assignment of MWA/MWB carriers for TSPs other than Access Service License/ Authorization, who may be requiring to establish only a few links, what threshold limit in terms of number of links, may be prescribed, beyond which, the TSPs with other than Access Service License/ Authorization should also be required to acquire MWA/ MWB carriers through auction? Kindly justify your response.

Tata Communications Response:

- In our view, no threshold limit in terms of number of links should be prescribed for the TSPs with other than Access Service License/ Authorization under existing P2P assignment of MWA/MWB carriers as same is being shared among multiple Service Providers and considering their simultaneous usage along with Geospatial separation assumptions.
- The threshold should be imposed only for spectrum assigned through auction for exclusive uses.

Q15. In case it is decided to assign MWA/ MWB carriers to all types of licensed TSPs through auction, should such TSPs be permitted to lease their spectrum acquired through auction, on P2P link basis, to other TSPs and other entities (non-TSP, for non-commercial/ captive/ isolated use) who may be requiring establishing only a few links? If yes,

- a) suggest a mechanism and regulatory framework for such leasing arrangement.**
- b) Do you foresee any regulatory issues and potential misuse of such a regime? If yes, what measures could be put in place to mitigate the concerns?**

Kindly justify your response.

Tata Communications Response:

- At the outset, it is reiterated that MWA Bands (13/15/18/21 GHz) & MWB (7 GHz) band should be assigned on a Point-to-Point (P2P) link on administrative allocation at pan India basis with minimum Two numbers of 28MHz FDD paired channel profile to TSPs other than access service license. Further, smaller ISPs / TSPs and non-commercial entities may be unable to compete effectively in spectrum auctions, especially for limited resources like MWA/MWB spectrum. Preserving a limited number of links for existing P2P administrative assignments can support their operations and enable them to compete effectively in their area of operations.
- The MWA spectrum should be assigned administratively to Enterprises / Entities who would like to deploy Captive Non-public network (CNP) in their premises provided these



Enterprises / Entities are required to obtain CNPN license from DoT. Such entities should be kept separate from the above requirement of spectrum leasing.

Q16. In case MWA/MWB carriers are decided to be assigned through auction,

- a) Should the auction be conducted based on Simultaneous Multiple Rounds Ascending Auction (SMRA) method as adopted or IMT spectrum auction? Any other auction method may be suggested with detailed justification.
- b) what quantum of spectrum in each band (6/7/13/15/18/21 GHz) should be put to auction?

Kindly justify your response.

And

Q17. In case it is decided to assign MWA and MWB carriers through auction,

- a) What should be the validity period of the assigned spectrum?
- b) Whether there is a need to create a provision for surrender of

MWA / MWB carriers? If yes, what should be the lock-in period and other associated terms and conditions? Response may be given for each user category viz. (i) TSPs with Access Service License/ Authorization, (ii) TSPs with other than Access Service License/ Authorization, and (iii) Other entities (non-TSP, for non-commercial/ captive/ isolated use) with detailed justification.

Tata Communications Response to Q 16 & Q17:

- It is reiterated that MWA Bands (13/15/18/21 GHz) & MWB (7 GHz) band should be assigned on a Point-to-Point (P2P) link on administrative allocation at pan India basis with minimum Two numbers of 28MHz FDD paired channel profile to TSPs other than access service license.
- We do not support assignment of MWA/MWB carriers through auction.

Q18. In case it is decided to continue with the existing methodology of assignment of MWA/ MWB carriers, whether any change in the validity period, or process for augmentation/ surrender of carriers is required to be made? If yes, suggestions may be made with detailed justification.

Tata Communications Response:

- It is reiterated that MWA Bands (13/15/18/21 GHz) & MWB (7 GHz) band should be assigned on a Point-to-Point (P2P) link on administrative allocation at pan India basis with minimum Two numbers of 28MHz FDD paired channel profile to TSPs other than access service license.



- The validity period of the MWA/ MWB Carrier assignment should provide sufficient timeframe to allow licensees to make the necessary investments, innovations & optimize networks. Therefore, a validity period of 15-20 years with annually renewable would be appropriate.
- The option of surrendering the spectrum should also be provided in the administrative allocation framework. The TSPs should be able to surrender the spectrum after five years of the assignment and thereafter annual review of usage of such spectrum may be done with an option of surrender spectrum after every two years till the validity period.

Q19. What should be the eligibility conditions and associated conditions for assignment of spectrum in 6/ 7/ 13/ 15/ 18/ 21 GHz bands? Response may kindly be given for each user category viz. (i) TSPs with Access Service License/ Authorization, (ii) TSPs with other than Access Service License/ Authorization, and (iii) Other entities (non-TSP, for non-commercial/ captive/ isolated use) with detailed justification.

Tata Communications Response:

For TSPs with other than Access Service License/ Authorization, in our view, there should not be any condition prescribed for assignment of spectrum in 6/ 7/ 13/ 15/ 18/ 21 GHz bands and allocation of same should be market driven considering following factors -

- Size of network
- Net worth
- Pan India presence
- Number of customers to be served using such spectrum.
- No rollout obligation to be made applicable considering Point-to-Point (P2P) link on administrative allocation at pan India basis.

Q20. Whether there is a need to prescribe any roll out obligations for MWA/MWB carrier assignment? Should the roll out obligations be linked to the number of carriers assigned to a TSP? Kindly justify your response.

Tata Communications Response:

- As suggested earlier in our response, MWA Bands (13/15/18/21 GHz) & MWB (7 GHz) band should be assigned on a Point-to-Point (P2P) link on administrative allocation at pan India basis with minimum Two numbers of 28MHz FDD paired channel profile to TSPs other than access service license to meet their business requirements which do not need ubiquitous coverage such as last mile connectivity for customers.
- In view of the above, we recommend that there is no requirement to prescribe any roll out obligations for MWA/MWB carrier assignment considering administrative allocation of the spectrum as per need basis only. The administrative allocation of spectrum gives flexibility to the regulator to allocate spectrum to operators only on need basis for deployment of the MWA and MWB networks only in geographies with specific business needs of the respective TSPs other than access service license. Moreover, Service providers like Tata Communications



who is catering the needs of B2B segment and use of such spectrum is entirely dependent upon business requirements, hence there is no case for prescribing any rollout obligation.

Q21. In case it is decided to prescribe roll out conditions, what should be the roll-out obligations associated with the assignment of spectrum in 6/ 7/ 13/ 15/ 18/ 21 GHz bands? What provisions should be prescribed for non-fulfilment of the prescribed roll-out obligations? Response may kindly be given for each user category viz. (i) TSPs with Access Service License/ Authorization, (ii) TSPs with other than Access Service License/ Authorization, and (iii) Other entities (non-TSP, for non-commercial/ captive/ isolated use) with detailed justification.

Tata Communications Response:

Not applicable in view of our response to Q.20 above.

Q22. Any other suggestions relevant to assignment of spectrum for MWA and MWB in 6/ 7/ 13/ 15/ 18/ 21 GHz frequency bands, may kindly be made with detailed justification.

Tata Communications Response:

In response to this question, we would like to submit as follows:

- MWA or MWB carriers are natural resources and do not need any upfront investment to make them available for use. Therefore, apart from administrative charges, no upfront charges should be levied on their administrative assignment to TSPs / Other entities.
- Annual spectrum charges for MWA and MWB carriers should be levied on “link-by-link” basis.
- For a TSP procuring MWA/MWB under the captive category, an AGR based model is justified only if the annual spectrum charges are applied to AGR directly arising from the use of microwave spectrum, i.e. excluding any AGR arising as a result of use of any other media.

Q23. What quantum of spectrum in E-band (71-76 / 81-86 GHz) and V band (57-64 GHz) is required to meet the demand of TSPs with Access Service License/ Authorization? Whether spectrum in E-band and V band is also required by the TSPs other than Access Service License/ Authorizations, and other entities (non-TSP, for non-commercial/captive/ isolated use)? Information on present demand and likely demand after five years may kindly be provided as per the proforma given below:

(i) Present demand



Band	Quantum of spectrum required (per entity per LSA)		
	TSPs with Access Service License/ Authorization	TSPs with other than Access Service License/ Authorization	Other entities (non-TSP, for non-commercial/ captive/ isolated use)
E-band (71-76/81-86 GHz)			
V-band (57-64 GHz)			

(ii) Likely demand after five years

Band	Quantum of spectrum required (per entity per LSA) -		
	TSPs with Access Service License/ Authorization	TSPs with other than Access Service License/ Authorization	Other entities (non-TSP, for non-commercial/ captive/ isolated use)
E-band (71-76/81-86 GHz)			
V-band (57-64 GHz)			

Tata Communications Response:

- In order to meet the ISPs enterprise customer requirements, there is a need to create a new network to meet last mile access / connectivity requirement. In this regard, the assignment of spectrum in the E & V band should be done in an administrative manner as it has the ability to deliver higher bandwidths to all Licensed Operators.
- Tata Communications is of the view that the E & V Band spectrums which has the ability to deliver higher bandwidths and can be deployed for last mile connectivity and backhaul applications, high-capacity P2P links and Private Networks. Therefore, the E&V band should be opened-up and spectrum to be assigned administratively to all Licensed Operators as a priority. The policy framework earlier recommended by TRAI vide its recommendations dated 29-08-2014 and 17-11-2015 for opening up of E&V band with “light touch regulation” and allotment on First Cum First Served basis should be reiterated.
- For E-Band spectrum, we recommend using the lightly licensed administrative methodology for assignment of E-band (71-76/81-86 GHz) as per global practice (please refer table below)

E-band: Country-wise License Regime & Administrative Fees, Source: *ETSI's Database (*European Telecommunications Standards Institute)					
Country	Freq. Band [GHz]	Status of the band	FDD/TDD	License Regime	License Cost Estimation for 250MHz/Year [Euro]
USA	71-76;81-86	Open	FDD/TDD	Light licensing	100
Australia	71-76;81-86	Open	FDD/TDD	Light licensing	2240
Brazil		Open		Light licensing	950
Canada		Open	FDD/TDD	Licensed	240
Greece	71-76;81-86	Open	FDD/TDD	Link by link	230
Indonesia	71-76;81-86	Open		Light licensing	2360
Turkey	71-76;81-86	Open		Link by link	1600
Italy	71-76;81-86	Open	FDD	Link by link	2800
South Korea	71-76;81-86	Open	FDD/TDD	Light licensing	190
New Zealand	71-76;81-86	Open	FDD/TDD	Link by link	115
Iraq		Open		Link by link and Block	3600
Russia	71-76;81-86	Open	FDD/TDD	Unlicensed	-
Saudi Arabia		Open		Link by link	8083
Malaysia	71-76;81-86	Open	FDD/TDD	Link by link	1000
Nigeria	71-74;81-84	Open			50
Finland	71-76;81-86	Open	FDD		35



- For assignment of V-Band Spectrum, it is proposed to de-license the V-band (57-64 GHz) in line with global practice due to its limited propagation characteristics of the band. The V band is already unlicensed in Europe, Australia, Canada, Japan, Republic of Korea and the United States. Pls refer below table for country wise status of V-Band –

V-Band Country-wise status (60 GHz) Source: *BIF White Paper (*Broadband India Forum)	
Country	V Band Status
USA	License-Exempt
UK	License-Exempt
Switzerland	License-Exempt
South Africa	License-Exempt
Spain	License-Exempt
Slovakia	License-Exempt
Singapore	License-Exempt
Poland	License-Exempt
Philippines	License-Exempt
New Zealand	License-Exempt
Malesia	License-Exempt
Korea	License-Exempt
Japan	License-Exempt
China	License-Exempt
Canada	License-Exempt
Brazil	License-Exempt
Belgium	License-Exempt
Austria	License-Exempt
Australia	License-Exempt

Q24. Whether spectrum in E-band and V-band should be assigned exclusively on an LSA-basis, or on P2P link basis? Response may be provided separately for (i) TSPs with Access Service License/ Authorization, (ii) TSPs other than Access Service License/Authorization, and (iii) other users (non-TSP, for non-commercial/captive/ isolated use) in the table given below with detailed justification.

Microwave	Spectrum should be assigned for the entire LSA on exclusive basis, or on P2P link basis for -		
	TSPs with	TSPs with other	other entities (non-



bands	Access Service License/ Authorization	than Access Service License/ Authorization	TSP, for non-commercial/ captive/ isolated use)
E-band (71-76/81-86 GHz)			
V-band (57-64 GHz)			

Tata Communications Response:

- Tata Communications being an Enterprise Service Provider is required to deliver services to its Enterprise Customers' premises / locations as per their business requirements which is not feasible at all the times in terms of technical feasibility to access customer location(s) or areas where availability of fixed line connectivity (e.g. Fiber) is a challenge due to exorbitantly higher ROW cost.
- It is important to note that ~40-50 percent of the Enterprise market in the country is being served by larger ISPs incl. Tata Communications alone (non-Access Service Providers) who are deprived of administrative allocation of spectrum for last mile access / connectivity to serve their Enterprise customers in an efficient manner whereas the Access Service Providers are still enjoying such administrative allocated spectrum (point to point) in the form of back-haul spectrum. The non-availability of spectrum for establishing last mile connectivity has put non-Access Service Providers into a competitive disadvantage as compared to the Access Service Providers providing services to the same Enterprise market segment. This creates non-level playing field between Access Service Providers and non-Access Service Providers in the Enterprise market resulting into Enterprise Customer churn due to deterioration in quality of service as per industry norms/ agreed SLAs on account of not having adequate spectrum for establishing last mile access / connectivity.
- We are of the view that the E & V Band spectrums which have the ability to deliver higher bandwidths and can be deployed for last mile connectivity and backhaul applications, high-capacity P2P links and Private Networks.
- In order to meet the ISPs enterprise customer requirements, there is a need to create a new network to meet last mile access / connectivity requirement. In this regard, the assignment of spectrum in the E & V band should be done administratively on P2P link basis.
- Therefore, the E&V band should be opened-up and spectrum to be assigned administratively to all Licensed Operators as a priority.
- Please also refer to our response provided in Q.23.



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.

Tata Communications Response:

- Regarding coexistence with terrestrial networks mentioned spectrum in E band has not been yet allocated for satellite in India/Globally, so no specific comments at this point of time.
- Utilization of the V-band under a license-exempt regime with the applications and power levels authorized in other countries do not present an interference or coexistence risk to space-based services.
- Please also refer to our response provided in Q3 for this issue.

Q26. Whether it will be appropriate to continue with the Frequency Division Duplexing (FDD) based configuration as adopted for the provisional assignment of E-band carriers or Time Division Duplexing (TDD) based configuration should be adopted? Kindly justify your response.

Tata Communications Response:

- It is reiterated that since E Band spectrum has the ability to deliver higher bandwidths and can be deployed for last mile connectivity and backhaul applications, high-capacity P2P links and Private Networks, therefore, the E band should be opened-up and spectrum to be assigned administratively to all Licensed Operators as a priority.
- Tata Communications recommends adopting the FDD allocation of E-band spectrum in India considering the usage for BH application, global adoption and ecosystem availability.
- Please also refer to our response provided in Q.23.

Q27. Whether Frequency Division Duplexing (FDD) or Time Division Duplexing (TDD) based configuration should be adopted for V-band carriers? In case you are of the opinion that FDD based configuration should be adopted, detailed submissions may be made with band plan, ecosystem availability, and international scenario.

Tata Communications Response:

- For V-Band Spectrum, it is proposed to de-license the V-band (57-64 GHz) in line with global practice due the limited propagation characteristics of the band. V band is already unlicensed in Europe, Australia, Canada, Japan, Republic of Korea and the United States. Please also refer to our response provided in Q.23.
- Tata Communications recommends adopting the TDD mode of operation for unlicensed use of V-band spectrum in India considering global adoption and ecosystem availability.



Q28. What should be the carrier size for assignment of spectrum in E-band (71-76/81-86 GHz) and V-band (57-64 GHz)? Whether there is a need to prescribe a different carrier size based on different LSA categories or different user categories viz. (i) TSPs with Access Service License/Authorization, (ii) TSPs other than Access Service License/Authorization and (iii) other users (non-TSP, for non-commercial/ captive/ isolated use)? If yes, suggestions may be made with detailed justification.

Tata Communications Response:

- The carrier size in E-band (71-76/81-86 GHz) should be 250 MHz allocated to TSPs other than Access Service License/ Authorization. *Global reference: (Ref: ETSI white paper on E band regulation)*
- Tata Communications recommends delicensing the V-band (57-64 GHz) according to global regulation as in Europe, Australia, Canada, Japan, Republic of Korea and the United States due to typical propagation characteristics of the band. The channel bandwidth 50/100/125/250/500 MHz in TDD mode should be permitted for unlicensed use.
- The above suggested carrier size for assignment of spectrum in E&V Bands will provide have flexibility for the TSP to choose multiple adjacent/contiguous carriers in the band. With this provision TSP can plan low-capacity, medium capacity, and high-capacity links by choosing an appropriate number of adjacent carriers. This will improve overall efficiency, increase flexibility and will reduce the cost of the network deployment in rural, suburban and urban areas.

Q29. Whether there is a need to assign spectrum in E-band and V-band in such a way that if a TSP acquires more than one carrier, all the assigned carriers to a TSP are contiguous? Kindly justify your response.

And

Q30. Since E-band carriers will be reassigned as per the assignment methodology that will be finalized, to avoid any disruption of services to the consumers of the existing TSPs holding E-band carriers, whether there is a need to create a provision such that the TSP is given a choice to retain the same frequency carrier as long as such TSP is able to acquire the carriers in the new regime? Kindly justify your response.

Tata Communications Response to Q29 & Q30:

- Presently, E&V Band spectrum has been assigned administratively only to TSPs with Access Service License/Authorization. Therefore, Tata Communications recommendation in ref. to E-band is limited to and for the TSPs other than access service license.
- It is suggested that the assignment methodology should have flexibility for the TSP to choose multiple adjacent/contiguous carriers in the band. With this provision TSP can plan low-capacity, medium capacity, and high-capacity links by choosing an appropriate number of



adjacent carriers. This will improve overall efficiency, increase flexibility and will reduce the cost of the network deployment in rural, suburban and urban areas.

Q31. Whether there is a need to prescribe the maximum number of carriers that can be held by a TSP in E-band and V-band? Kindly justify your response.

Q32. In case it is decided to prescribe a ceiling on the number of carriers that a licensee can hold in E-band and V-band,

(a) Whether different ceiling based on the service area category i.e. Metro/ Category 'A' Circles / Category 'B' Circles / Category 'C' Circles needs to be prescribed

(b) Considering a carrier of 250 MHz (paired) spectrum for E-band, and 50 MHz (unpaired) spectrum for V-band, what should be the ceiling in terms of the number of carriers per licensee for each service area category for

- (i) TSPs with access service License/ authorization holding IMT spectrum,**
- (ii) TSPs with access service License/ authorization not holding IMT spectrum,**
and
- (iii) TSPs with other than Access Service License/ Authorization?**

(c) Any other relevant suggestion may be made with justification.

Tata Communications Response to Q 31 & 32:

- It is reiterated that V-Band Spectrum (57-64 GHz) spectrum should be delicensed in line with global practice due the limited propagation characteristics of the band. V band is already made unlicensed in Europe, Australia, Canada, Japan, Republic of Korea and the United States. Please also refer to our response provided in Q.23. Thus, there is no need for prescribing any ceiling.
- For E-band spectrum assignment, Tata Communications recommends that the minimum two number of paired 250 MHz FDD carriers should be prescribed to the TSPs other than Access Service License/ Authorization. *Global reference: (Ref: ETSI white paper on E Band regulation)*

Q33. Which methodology should be used for assignment of spectrum in E band and V-band? Response may be provided in the table given below:

User category	Assignment methodology [Auction/ Administrative/ Any other (please specify)]	Justification
(i) TSPs with Access Service License/ authorization		



(ii) TSPs with other than Access Service License/ authorization		
(iii) Other entities (non- TSP, for non- commercial/ captive/ isolated use)		

Tata Communications Response:

- As submitted above in response to Q 23, in order to meet the ISPs enterprise customer requirements, there is a need to create a new network to meet last mile access / connectivity requirement. In this regard, the assignment of spectrum in the E & V band should be done in an administrative manner as it has the ability to deliver higher bandwidths to all Licensed Operators.
- Tata Communications is of the view that the E &V Band spectrums which has the ability to deliver higher bandwidths and can be deployed for last mile connectivity and backhaul applications, high-capacity P2P links and Private Networks. Therefore, the E&V band should be opened-up and spectrum to be assigned administratively to all Licensed Operators as a priority. The policy framework earlier recommended by TRAI vide its recommendations dated 29-08-2014 and 17-11-2015 for opening up of E&V band with “light touch regulation” and allotment on First Cum First Served basis should be reiterated.
- For E-Band spectrum, we recommend using the lightly licensed administrative methodology for assignment of E-band (71-76/81-86 GHz) as per global practice for all user categories.
- For V-Band Spectrum, it is proposed to de-license the V-band (57-64 GHz) in line with global practice due the limited propagation characteristics of the band. V band is already unlicensed in Europe, Australia, Canada, Japan, Republic of Korea and the United States.
- Please also refer to our response provided in Q.23.

Q34. In case you are of the opinion that certain user categories should be assigned spectrum in E-band and V-band for P2P links by any methodology other than auction, should some carriers be earmarked for such users? If yes, how many carriers should be earmarked for such users? Kindly justify your response.

Tata Communications Response:

- Tata Communications is of the view that the E &V Band spectrums which has the ability to deliver higher bandwidths and can be deployed for last mile connectivity and backhaul applications, high-capacity P2P links and Private Networks. Therefore, the E&V band should be opened-up and spectrum to be assigned administratively to all Licensed Operators as a priority.



- We recommend a minimum Two number of paired 250 MHz FDD carriers in E-Band spectrum to the TSPs other than Access Service License/ Authorization on PAN India basis.
- For V-Band Spectrum, it is proposed to de-license the V-band (57-64 GHz) in line with global practice due the limited propagation characteristics of the band. V band is already unlicensed in Europe, Australia, Canada, Japan, Republic of Korea and the United States.
- It is also suggested to assign carrier of 250 MHz (paired) spectrum in E- Band administratively to Enterprises / Entities who would like to deploy Captive Non-public network (CNPN) in their premises provided these Enterprises / Entities are required to obtain CNPN license from DoT.

Some suggested terms and conditions that could be considered for the assignment of spectrum to the Users - Other entities (non- TSP, for non- commercial/ captive/ isolated use):

- **Eligibility conditions:** Spectrum assignees may need to meet certain eligibility criteria, such as technical competence, financial capability, and compliance with relevant regulatory requirements.
- **Technical specifications:** Spectrum assignees may need to comply with certain technical specifications, such as power limits, frequency bands, and distance to ensure efficient use of the spectrum and minimize the risk of harmful interference.
- **Spectrum sharing arrangements:** Spectrum assignees may need to develop spectrum sharing arrangements to ensure that CNPN services can co-exist without causing harmful interference with other Users of these spectrum bands.
- **Interference management:** Spectrum assignees may need to develop interference management plans to address any interference issues that may arise between CNPN licensees and other users. This may involve developing advanced interference mitigation techniques, conducting regular interference monitoring, reporting, and coordinating with other spectrum users to manage interference issues.

Q35. In case it is decided to assign spectrum in E & V bands to the TSPs with Access Service License/ Authorization through auction and adopt P2P links assignment for TSPs other than Access Service License/ Authorization, who may be requiring to establish only a few links, what threshold limit in terms of number of links, may be prescribed, beyond which, the TSPs with other than Access Service License/ Authorization should be required to acquire spectrum in E band and V-band bands through auction? Kindly justify your response.

Tata Communications Response:

- Tata Communications being an Enterprise Service Provider is required to deliver services to its Enterprise Customers' premises / locations as per their business requirements which is not feasible at all the times in terms of technical feasibility to access customer location(s) or areas where availability of fixed line connectivity (e.g. Fiber) is a challenge due to exorbitantly higher ROW cost. Further, E &V Band spectrums have a ability to deliver higher bandwidths and can



be deployed for last mile connectivity and backhaul applications, high-capacity P2P links and Private Networks.

- In order to meet the ISPs enterprise customer requirements, there is also a need to create a new network to meet last mile access / connectivity requirement. In this regard, the assignment of spectrum in the E & V band should be done administratively on P2P link basis.
- We recommend a minimum Two number of paired 250 MHz FDD carriers in E-Band spectrum to the TSPs other than Access Service License/ Authorization on PAN India basis.
- For V-Band Spectrum, it is proposed to de-license the V-band (57-64 GHz) in line with global practice due the limited propagation characteristics of the band. V band is already unlicensed in Europe, Australia, Canada, Japan, Republic of Korea and the United States.
- As mentioned above the requirement is point-to-point mode for the TSPs other than access service license, any threshold limit is unnecessary.
- Please also refer to our response provided in Q.23.

Q36. In case it is decided to assign spectrum in E & V bands to all the TSPs through auction, should such TSPs be permitted to lease their spectrum acquired through auction, on P2P link basis, to the TSPs and other entities for non-commercial/ captive/ isolated use, who may be requiring to establish only a few links? What could be the regulatory issues and potential misuse of such a regime? What measures could be put in place to mitigate the concerns? Kindly justify your response.

Tata Communications Response:

- For V-Band Spectrum, it is proposed to de-license the V-band (57-64 GHz) in line with global practice due the limited propagation characteristics of the band. V band is already unlicensed in Europe, Australia, Canada, Japan, Republic of Korea and the United States.
- In respect to the E-band, Tata Communications recommends using the lightly licensed administrative methodology for assignment of E-band (71-76/81-86 GHz) as per global practice (Australia, Brazil, Indonesia, S. Korea etc.) to the TSPs with other than access service license/authorization.
- As mentioned above the requirement of spectrum for TSPs other than Access service license is limited to point-to-point link connectivity, leasing out of the spectrum is not recommended for TSPs other than access service license. Additionally, it must be stated that for TSPs with access service license leasing out of E-band spectrum band must not be allowed to avoid any hogging of spectrum by any such players.

Q37. In case it is decided to assign spectrum in E-band (71-76/ 81-86 GHz) and V-band (57-64 GHz) on an exclusive basis, should the spectrum be assigned on an LSA basis, or pan-



India basis or for any other geographic area should be defined? Kindly justify your response.

Tata Communications Response:

- For V-Band Spectrum, it is proposed to de-license the V-band (57-64 GHz) in line with global practice due the limited propagation characteristics of the band. V band is already unlicensed in Europe, Australia, Canada, Japan, Republic of Korea and the United States.
- In respect to the E-band, Tata Communications recommends using the lightly licensed administrative methodology for assignment of E-band (71-76/81-86 GHz) as per global practice (Australia, Brazil, Indonesia, S. Korea etc.) to the TSPs with other than access service license/authorization with minimum Two number of paired 250 MHz FDD carriers in E-Band spectrum on PAN India basis.
- Please also refer to our response provided in Q.23.

Q38. What should be the scope of services/ usages for spectrum in E-band (71-76/ 81-86 GHz) and V-band (57-64 GHz) assigned through auction or any other assignment methodology? Kindly justify your response.

Tata Communications Response:

- For V-Band Spectrum, it is proposed to de-license the V-band (57-64 GHz) in line with global practice due the limited propagation characteristics of the band. V band is already unlicensed in Europe, Australia, Canada, Japan, Republic of Korea and the United States. V-Band has the highest oxygen absorption and therefore atmospheric loss and higher rain loss render these frequencies unsuitable for long distance transmission. With “best effort” connectivity, systems can transmit up to a few hundred meters only. Hence, many administrations do not license this band. For the V-band spectrum, the specific applications are still under evolution for use in short ranges, indoor etc. TRAI in its recommendations must keep the options open for any relevant applications in this band.
- E-Band frequencies have several unique characteristics not experienced by conventional lower frequency radio systems. At high E-band frequencies, antennas are highly directional, with systems communicating point-to-point via highly focused “pencil beam” transmissions. Thus, interference concerns are greatly reduced, and frequency reuse is promoted. Propagation limitations, particularly rain fading, limit high frequency links to relatively short-range distances (a few kilometers). This would result in greater frequency reuse and easier path planning.
- The E-band (71-76/ 81-86 GHz) spectrum can be used to support a wide range of services and applications. These bands are well-suited for a variety of services like:
 - High-speed backhuls.
 - Point-to-point links to extend network coverage to specific geographies with business potential.



- E-band spectrum should also be allowed to be used for a variety of innovative and emerging applications. Regulators must keep the options open for any relevant applications on the band.
- E & V Band spectrum can also be used for extending coverage for captive non-public networks where fiber deployment is a constraint. Examples include mines, remote area ports, Agriculture areas etc.

Q39. In case spectrum in E-band and V-band is decided to be assigned through auction,

- a) Should the auction be conducted based on Simultaneous Multiple Rounds Ascending Auction (SMRA) method as adopted for IMT spectrum auction? Any other auction method may be suggested with detailed justification.**
- b) What quantum of spectrum in each band should be put to auction?**

Kindly justify your response.

And

Q40. In case it is decided to assign spectrum in E & V bands through auction,

- a) What should be the validity period?**
- b) Whether there is a need to create a provision for surrender of E & V band? If yes, what should be the lock-in period and other terms and conditions?**

Response may be given for each user category viz. (i) TSPs with Access Service License/ authorization, (ii) TSPs with other than Access Service License/ authorization, and (iii) Other entities (non- TSP, for non-commercial/ captive/ isolated use) with detailed justification.

Tata Communications Response to Q39 and Q40:

- For V-Band Spectrum, it is proposed to de-license the V-band (57-64 GHz) in line with global practice due the limited propagation characteristics of the band. V band is already unlicensed in Europe, Australia, Canada, Japan, Republic of Korea and the United States.
- In respect to the E-band, Tata Communications recommends using the lightly licensed administrative methodology for assignment of E-band (71-76/81-86 GHz) as per global practice (Australia, Brazil, Indonesia, S. Korea etc.) to the TSPs with other than access service license/authorization with minimum Two number of paired 250 MHz FDD carriers in E-Band spectrum to the TSPs other than Access Service License/ Authorization on PAN India basis.
- Hence in the above context, Tata Communications do not recommend auction of the E & V Band spectrum.
- Please also refer to our response provided in Q.23.



Q41. In case it is decided to assign spectrum in E-band and V-band through any methodology other than auction, what should be the validity period, process for augmentation/ surrender of carriers, and other terms and conditions? Suggestions may be made with detailed justification.

Tata Communications Response:

- For V-Band Spectrum, it is proposed to de-license the V-band (57-64 GHz) in line with global practice due the limited propagation characteristics of the band. V band is already unlicensed in Europe, Australia, Canada, Japan, Republic of Korea and the United States. So being an unlicensed band there should not be any validity period limit for the V-band.
- In respect to the E-band, Tata Communications recommends using the lightly licensed administrative methodology for assignment of E-band (71-76/81-86 GHz) as per global practice (Australia, Brazil, Indonesia, S. Korea etc.) to the TSPs with other than access service license/authorization with minimum Two number of paired 250 MHz FDD carriers in E-Band spectrum to the TSPs other than Access Service License/ Authorization on PAN India basis.
- The validity period of the spectrum assignment in E-Band should provide sufficient timeframe to allow licensees to make the necessary investments, innovations & optimize networks. A validity period of 15-20 years would be appropriate. However, in the case of administrative Point to point allocations Licensees should be allowed to augment/surrender their carriers as per dynamic needs of the network during annual renewal cycles. (*Ref: GSMA report on wireless BH Feb 2021*)

Q42. What should be the eligibility conditions and associated conditions for assignment of spectrum in E-band (71-76/81-86 GHz) and V-band (57-64 GHz)? Response may be given for each user category viz. (i) TSPs with Access Service License/ authorization, (ii) TSPs with other than Access Service License/ authorization, and (iii) Other entities (non-TSP, for non-commercial/ captive/ isolated use) with detailed justification.

Tata Communications Response:

- For V-Band Spectrum, it is proposed to de-license the V-band (57-64 GHz) in line with global practice due the limited propagation characteristics of the band. V band is already unlicensed in Europe, Australia, Canada, Japan, Republic of Korea and the United States. So being an unlicensed band there should not be any validity period limit for the V-band.
- In respect to the E-band, Tata Communications recommends using the lightly licensed administrative methodology for assignment of E-band (71-76/81-86 GHz) as per global practice (Australia, Brazil, Indonesia, S. Korea etc.) to the TSPs with other than access service license/authorization with minimum Two number of paired 250 MHz FDD carriers in E-Band spectrum to the TSPs other than Access Service License/ Authorization on PAN India basis.



- For TSPs with other than Access Service License/ Authorization, in our view, there should not be any condition prescribed for assignment of spectrum in E band and allocation of same should be market driven considering following factors -
 - Size of network
 - Net worth
 - Pan India presence

Q43. Whether there is a need to prescribe any roll out obligations for spectrum in E-band and V-band? Should the roll out obligations be linked to the number of carriers assigned to a TSP? Kindly justify your response.

And

Q44. In case it is decided to prescribe roll out conditions, what should be the roll-out obligations associated with the assignment of spectrum in E-band and V-band? What provisions should be prescribed for nonfulfillment of the prescribed roll-out obligations? Response may kindly be given for each user category viz. (i) TSPs with Access Service License/ Authorization, (ii) TSPs with other than Access Service License/ Authorization, and (iii) Other entities (non-TSP, for noncommercial/ captive/ isolated use) with detailed justification.

Tata Communications Response to Q43 and Q44:

- Tata Communications is of the view that the E & V Band spectrums which has the ability to deliver higher bandwidths and can be deployed for last mile connectivity and backhaul applications, high-capacity P2P links and Private Networks. Therefore, the E&V band should be opened-up and spectrum to be assigned administratively to all Licensed Operators as a priority. The policy framework earlier recommended by TRAI vide its recommendations dated 29-08-2014 and 17-11-2015 for opening up of E&V band with “light touch regulation” and allotment on First Cum First Served basis should be reiterated.
- For V-Band Spectrum, it is proposed to de-license the V-band (57-64 GHz) in line with global practice due the limited propagation characteristics of the band. V band is already unlicensed in Europe, Australia, Canada, Japan, Republic of Korea and the United States. So being an unlicensed band, no rollout obligation should be prescribed for the V-band.
- In respect to the E-band, Tata Communications recommends using the lightly licensed administrative methodology for assignment of E-band (71-76/81-86 GHz) as per global practice (Australia, Brazil, Indonesia, S. Korea etc.) to the TSPs with other than access service license/authorization with minimum Two number of paired 250 MHz FDD carriers in E-Band spectrum to the TSPs other than Access Service License/ Authorization on PAN India basis to TSPs other than access service license to meet their business requirements which do not need ubiquitous coverage such as last mile connectivity for customers.

- The administrative allocation of spectrum gives flexibility to the regulator to allocate spectrum to operators only on need basis for deployment of networks only in geographies with specific business needs of the respective TSPs other than access service license.
- In view of the above submissions, we recommend that E-Band should be exempted from any rollout obligation considering administrative allocation of the spectrum as per need basis only.

Q45. Whether it is feasible to allow low powered indoor consumer device to-consumer device usages on license-exempt basis in V-band (57-64 GHz), in parallel to use of the auction acquired spectrum by telecom service providers for establishment of terrestrial and/ or satellite-based telecom networks? If yes, whether it should be permitted? Kindly justify your response.

And

Q46. In case it is decided to allow low powered indoor consumer device to-consumer device usages on license-exempt basis in V-band (57-64 GHz),

- a) Whether it should be permitted in entire band or part of the band? Kindly provide detailed response including the frequency carriers, which should be considered for license exemption with justification.**
- b) Whether there is a need to define such indoor use? If yes, what should be the definition for such indoor use?**
- c) What technical parameters should be prescribed including EIRP limits? Suggestions may kindly be made with supporting justification and international scenario.**

Tata Communications Response:

- For V-Band Spectrum, it is proposed to de-license the V-band (57-64 GHz) in line with global practice due the limited propagation characteristics of the band. V band is already unlicensed in Europe, Australia, Canada, Japan, Republic of Korea and the United States.
- Further, for any delicensed band any restrictions of applications must not be allowed and regulator must allow TSPs to use the spectrum as per their business needs and allow new innovative applications, including low power indoor applications to evolve.

Q47. Any other suggestions relevant to assignment of spectrum in E-band (71-76/81-86 GHz) and V-band (57-64 GHz) may kindly be made with detailed justification.

Tata Communications Response:

No comments.

Q48. In case it is decided for assignment of spectrum on administrative basis, what should be the spectrum charging mechanism for assignment of spectrum for

(i) E band



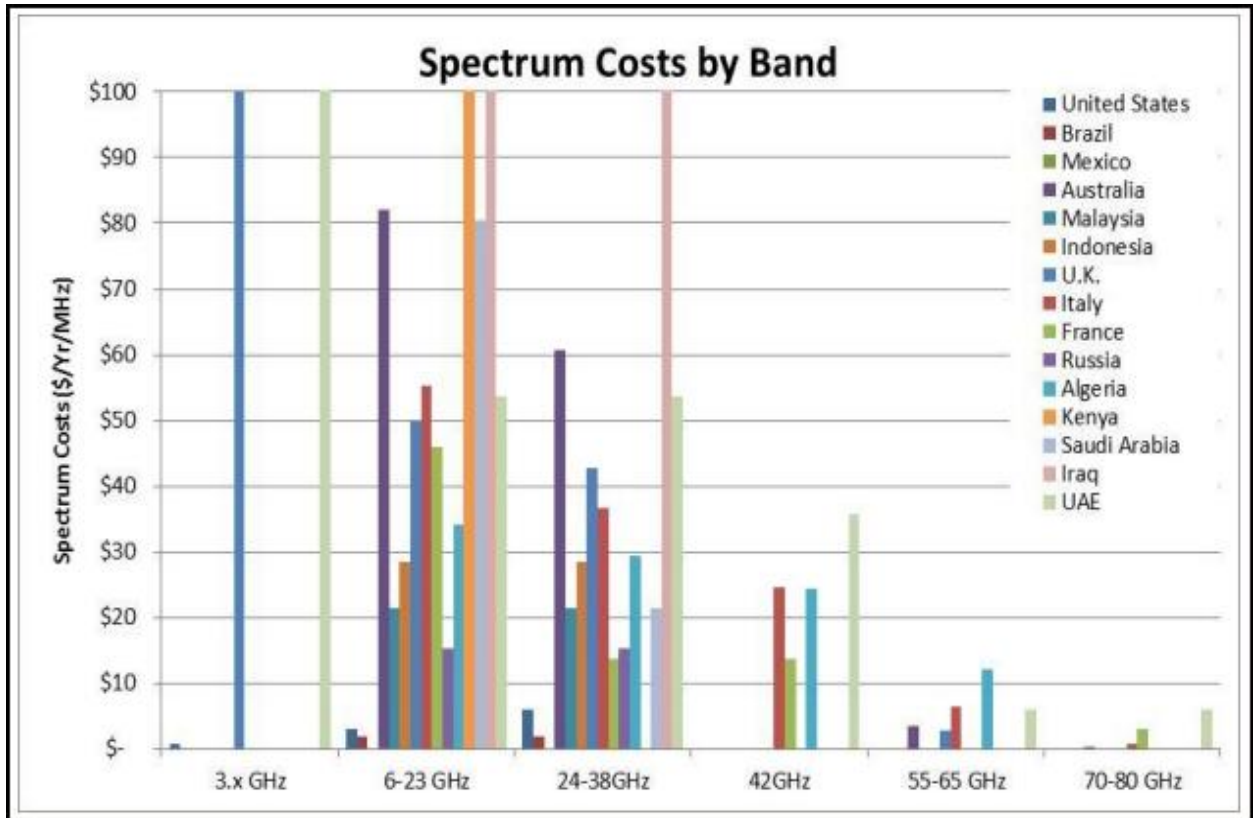
- (ii) V band**
- (iii) MWA carriers and**
- (iv) MWB carriers**

separately for each of the following three categories: -

- a) TSPs with Access Service Authorization**
- b) TSPs with other than Access Service Authorization**
- c) Other entities (non-TSP, for non-commercial/ captive/ isolated use)**

Tata Communications Response:

- For V-Band Spectrum, it is proposed to de-license the V-band (57-64 GHz) in line with global practice due to the limited propagation characteristics of the band. V band is already unlicensed in Europe, Australia, Canada, Japan, Republic of Korea and the United States.
- In respect to the E-band, Tata Communications recommends using the lightly licensed administrative methodology for assignment of E-band (71-76/81-86 GHz) as per global practice (Australia, Brazil, Indonesia, S. Korea etc.) to the TSPs with other than access service license/authorization with minimum Two number of paired 250 MHz FDD carriers in E-Band spectrum to the TSPs other than Access Service License/ Authorization on PAN India basis. It will promote fair and efficient allocation of the spectrum.
- Hence in the above context, Tata Communications do not recommend auction of the E & V Band spectrum.
- Regarding the Spectrum charging mechanism, it is recommended that same should be in line with global references/trends. Please also refer to our response provided in Q.23 for details of global practices.
- Global spectrum cost reference for the MWA, MWB and E-band as per Dragonwave report 2018 is given below: *(Ref: Dragonwave report on MW BH)*.



Q49. Should the auction determined prices of spectrum bands for IMT/5G services be used as the basis for valuation of:

- (i) E band**
- (ii) V band**
- (iii) MWA carriers and**
- (iv) MWB carriers**

Please justify your responses.

And

Q50. Whether the value of spectrum in

- (i) E band**
- (ii) V band**
- (iii) MWA carriers and**
- (iv) MWB carriers**

be derived by relating it to the value of other bands by using spectral efficiency factor? If yes, with which spectrum band, should this band be related and what efficiency factor or formula should be used? Please justify your suggestions.

And



Q51. Should the current method of levying spectrum fees/charges for E band, MWA carriers and MWB carriers on AGR basis as followed by DoT, serve as a basis for the purpose of valuation of

- (i) E band**
- (ii) V band**
- (iii) MWA carriers and**
- (iv) MWB carriers**

If yes, please specify in detail what methodology is to be used in this regard.

Tata Communications Response to Q49, Q50 and Q51:

- For V-Band Spectrum, it is proposed to de-license the V-band (57-64 GHz) in line with global practice due the limited propagation characteristics of the band. V band is already unlicensed in Europe, Australia, Canada, Japan, Republic of Korea and the United States.
- In respect to the E-band, Tata Communications recommends using the lightly licensed administrative methodology for assignment of E-band (71-76/81-86 GHz) spectrum inline with the global practices (Australia, Brazil, Indonesia, S. Korea etc.) to the TSPs with other than access service license/authorization with minimum Two number of paired 250 MHz FDD carriers in E-Band spectrum to the TSPs other than Access Service License/ Authorization on PAN India basis.
- Hence in the above context, Tata Communications do not recommend auction of the E & V Band spectrum.
- Please also refer to our response provided in Q.23 and Q48 above.

Q52. Should the International administrative annual spectrum charges estimated based on specific channel case (250 MHZ/Year) of E-Band serve as a basis for the purpose of valuation of

- (i) E band**
- (ii) V bands**

Please provide detailed justification. If the answer to the question is yes, should the administrative annual spectrum charges be normalized for cross country differences? Please specify in detail the methodology to be used in this regard?

Tata Communications Response:

- Tata Communications recommends the E-band to be lightly licensed and V-Band should be delicensed due the limited propagation characteristics of the band in line with global practices.
- The license cost is estimated for 250 MHz/year (Euro) under lightly license regime across various countries. Same reference can be used for estimation of E-band spectrum fee in India.

- Please also refer to our response provided in Q.23 above.

Q53. Should international benchmarking by comparing the auction determined price in countries where auctions have been concluded in E and V bands, if any, be used for arriving at the value of

- (i) E band**
- (ii) V band**

If yes, then what methodology can be followed in this regard? Please provide detailed information.

And

Q54. Whether any fixed administrative annual spectrum charges/ auction determined prices are available for other jurisdictions in case of MWA and MWB links? If yes, whether these charges/ prices can serve as a basis for the purpose of valuation of

- (i) MWA**
- (ii) MWB carriers**

Please provide with detailed justification.

And

Q55. Should the methodology, as adopted by the Authority in 2014 Recommendations for calculating spectrum charges for MWB links, be used as one of the valuation approach for MWB links? If yes, please provide detailed methodology for arriving at the valuation along with justification.

And

Q56. Whether the valuation for spectrum in E-band (71-76/ 81-86 GHz) and V-band (57-64 GHz), MWA (13 GHz/ 15 GHz/ 18 GHz/ 21 GHz), MWB (6 GHz/ 7 GHz) be done separately for each LSA, or pan-India basis, or any other geographic area/ link basis? Kindly justify your response.

And

Q57. Apart from the approaches highlighted above which other valuation approaches should be adopted for the valuation of

- (i) E band**
- (ii) V band**
- (iii) MWA carriers and**
- (iv) MWB carriers**

Please support your suggestions with detailed methodology, related assumptions and other relevant factors, etc.



And

Q58. Whether the value arrived at by using any single valuation approach for a particular spectrum band should be taken as the appropriate value of that band? If yes, please suggest which single approach/ method should be used. Please support your answer with detailed justification.

And

Q59. In case your response to the above question is negative, will it be appropriate to take the average valuation (simple mean) of the valuations obtained through the different approaches attempted for valuation of a particular spectrum band, or some other approach like taking weighted mean, median etc. should be followed? Please support your answer with detailed justification.

And

Q60. Should the reserve price be taken as 70% of the valuation of spectrum? If not, then what ratio should be adopted between the reserve price for the auction and the valuation of the spectrum in different spectrum bands and why? Please support your answer with detailed justification.

And

Q61. In case of auction-based assignment of

- (i) E band**
- (ii) V band**
- (iii) MWA carriers and**
- (iv) MWB carriers**

what should the payment terms and associated conditions relating to:

- i. Upfront payment**
- ii. Moratorium period**
- iii. Total number of installments to recover deferred payments**
- iv. Rate of interest in respect of deferred payment and prepayment**

Please support your answer with detailed justification.

Tata Communications Response from Q53 to Q60:

- Tata Communications recommends the E-band to be lightly licensed and V-Band should be delicensed due the limited propagation characteristics of the band in line with global practices.
- Please also refer to our response provided in Q.23 and Q 48 above.
