



VIL Comments to the TRAI's Consultation Paper on "Assignment of Spectrum in E&V Bands, and Spectrum for Microwave Access (MWA) & Microwave Backbone (MWB)" dated 27.09.2023

At the outset, we are thankful to the Authority for giving us this opportunity to provide our comments to the Consultation Paper on "Assignment of Spectrum in E&V Bands, and Spectrum for Microwave Access (MWA) & Microwave Backbone (MWB)" dated September 27, 2023.

In this regard, we would like to submit our comments for Authority's kind consideration, as given below:

Executive Summary

1. The requirement of backhaul carriers is critical to rollout newer technologies and hence, should be treated as an essential resource. It is a complementary facility for enabling the expeditious rollout of networks using the RF access spectrum.
2. Indian telecom industry is a matured market presently as such, **there is no need to depart from the existing administrative assignment methodology for backhaul spectrum which has been tested over more than a two decades and has been adopted by the industry.**
3. **Microwave equipment deployed in network are sub-band specific. It means that all carriers of a band is not supported by an equipment deployed in network. Hence, no change should be done in the current policy related to MWA and MWB carriers.**
4. **Any change in frequency carrier is equivalent to change in network design and hence, it would result in disruption of services or deterioration of quality of service for the customers, besides adding huge incremental cost to the TSP for purchasing new equipment as well as sunk cost of existing equipment.**
5. The prevalent regime of allocation backhaul spectrum on administrative basis has enabled greater competition and faster deployment of network infrastructure including in urban as well as non-urban areas.
6. **We strongly urge that the spectrum in MWA-MWB bands should continue to be allocated on administrative basis on the entire LSA basis to access service providers only.**
7. This backhaul spectrum has critical need and importance for access services as such, these spectrum bands i.e. 6/7/13/15/18/21 GHz should be reserved as Backhaul spectrum only.

8. **The carrier size for both MWB and MWA microwave spectrum bands, should be 28 MHz (paired spectrum), with possibility to use multiple adjacent channels forming higher channel bandwidth per carrier.**
9. All assigned carriers should be contiguous so that the operator should be able to use higher channel bandwidth using two or more carriers to ensure optimal cost solution. As the equipment deployed in the network for MWA/MWB carriers, are specific to spectrum bands as well as frequency spots therefore, the right of access service providers already holding administrative spectrum in these bands should always have precedence over the right of access service providers who subsequently take administrative spectrum in these bands.
10. **The existing ceiling on maximum number of carriers per LSA in MWA/MWB bands prescribed by DoT vide its guideline dated 25.07.2022 holds good at present i.e. 8 carriers for Metro/Category A LSA and 6 carriers for Category-B/Category-C LSA, hence, there is no need to depart from the said ceiling and methodology.**
11. The scope of spectrum should not be curtailed and the services of non-commercial services like captive services, should be served in collaboration with licensed access service providers. For this, the policy framework should allow spectrum leasing on P2P links basis, to other licensed entities or non-licensed entities for captive/isolated/non-commercial usage.
12. Considering the need of MWA-MWB spectrum to support access services as well as in line with prevalent DoT norms related to administrative assignment, the backhaul spectrum assignments should continue to remain valid till an access service provider is providing access services in a given service area.
13. DoT's surrender guidelines for MWA-MWB spectrum issued vide its office memorandum no. L-14042/01/2022-IMT, dated 10.11.2022, which contains associated terms for the said surrender should continue in future as well for surrender of MWA-MWB spectrum assigned administratively.
14. There should not be any rollout obligation associated with MWA/MWB carrier assignments.
15. The requirement of E-band and V-band carriers is critical to rollout newer technologies and hence should be treated as an essential resource.
16. For catering to the backhaul requirements for explosive data growth expected under 5G, **higher number of contiguous E-Band spots are required.**
17. **Considering the importance of E band and V band for backhaul purposes, its scope should be restricted to backhaul services only. It would cause huge complications in**



pricing and assignment framework if this spectrum is allowed to be used both for backhaul and access services.

18. **Most importantly, as E band and V band are very crucial for the growth of 5G services and there are limited number of carriers which will support the requirement only till next few years, it should be assigned for the entire LSA, only to access service licensees offering access services.**
19. Flexibility should be provided to the spectrum assignee to utilize the spectrum as per business-technology requirements. If the configuration is to be fixed, we recommend that it would be appropriate to continue with the Frequency Division Duplexing (FDD) based configuration for E-band spectrum and Time Division Duplexing (TDD) based configuration for V-band spectrum.
20. Majority of the OEMs in E Band supports channel size upto 2000 MHz, hence, it is advisable to consider contiguous spectrum of E-band & V-Band, if TSP acquires more than one carrier.
21. 19 carriers of 250 MHz paired spectrum is available in E Band. It is estimated that 4 such carriers should be enough to meet the 5G demand in next few years. Hence, **maximum of 4 contiguous E band carriers per TSP should be considered for allocation.**
22. In case of V-band, 138 carriers of 50 MHz TDD spectrum is available. It is estimated that 20 such carriers should be enough to meet the 5G demand. Hence, **maximum of 20 contiguous V band carriers per TSP should be considered for allocation.**
23. **There should not be different ceilings based on the service area category i.e. Metro / Category 'A' circles / Category 'B' circles / Category 'C' circles.**
24. While we don't foresee any demand from non TSPs licensees or non-licensees, we are of the view that TRAI can look into recommending a framework allowing sharing option through spectrum leasing on P2P links or geography basis. The revenue emanating from such spectrum leasing should form part of ApGR of a TSP, which will take care of any potential concern.
25. SMRA method of auction as adopted for IMT spectrum auction, should be adopted for auction of spectrum in E-band and V-band, as this is an established method.
26. **In case of E-band and V-band, spectrum validity should be 20 years.**
27. There should be a clear framework for spectrum surrender so that TSPs have a freedom and are encouraged to keep on optimising the backhaul infrastructure as well as to adopt more efficient technologies and spectrum bands.



28. **The lock-in period for surrender of backhaul spectrum should be a shorter lock-in time-period i.e. 2 years for spectrum acquired through auction, thereby allowing greater flexibility to operators for optimising and upgrading their backhaul network.**
29. **There should not be any rollout obligation associated with E-band and V-band carrier assignments.**
30. **No spectrum in V-band should be considered for any standalone low-powered indoor use.**
31. **The valuation of E band should be at 95% discount to the auctioned value of mmWave spectrum band considering the scope of services being backhaul and propagation characteristics. The pricing for V band can be at best be kept at 50% of the E band pricing.**
32. **The pricing per carrier for MWA-MWB should continue to be as per DoT's October 2015 circular without any change for 6/7/13/15/18/21/23 GHz spectrum bands, however, there is an immediate need to rationalise the spectrum charges to be paid for MWA/MWB spectrum.**
33. **On the similar principal, the MW charges on all the backhaul spectrum should be computed on a weighted average rate, basis the current applicable rate of MW charges for MWA and MWB and nil MW charges for E and V Band spectrum acquired by operators.**
34. **The reserve price of spectrum should be set at 70% of the valuation of spectrum, as has been recommended by Authority during last recommendations dated 11.04.2022.**
35. **The payment options and terms and conditions should be same as has been provided under the NIA 2022 as well as TRAI's recommendations dated 11.04.2022.**
36. **In line with the telecom reforms announced in 2021 which provided for moratorium / deferment for upto four years on the dues for the spectrum purchased in past auctions; all future spectrum auctions should have option of moratorium/deferment upto four years.**
37. **Rate of Interest in case of Deferred Payment and Prepayment should be 7.2% p.a. as considered by DoT for 2022 Spectrum Auction.**

In continuation to the above executive summary, kindly find below our question-wise comments.

Question-wise Comments

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 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 with detailed justification: (i) Present demand

(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)			

VIL Comments to Q1

A. Importance of Microwave Backhaul Spectrum

1. As per the recent Nokia MBIT report 2023, mobile data traffic in India jumped 3.2x in last five years and reached 14.4 EB per month in 2022 while the average data per user per month grew 2x to reach 19.5 GB. It is expected to grow more than double by 2024, with 5G as the new accelerator. Delivering flawless connectivity for 5G, demands a transport backhaul that can support massive connectivity, super-high data rates and ultra-low latency.
2. To lay modern high capacity networks, TSPs require equally efficient backhaul networks to enable the customers to have an always connected experience. Due to proliferation of high data rate radio network, the need for high-density and high-capacity backhaul networks will keep on increasing every year.
3. The MWA and MWB networks are essential to deliver high performance in a cost effective way, as we migrate to high speed data-rate modern communication system and services. With proliferations of the high capacity all IP Access networks and ever improving technologies, the TSPs we have been always looking at various ways to make efficient use of the available resources.
4. The demand for wider channels for backhaul will continue to grow as TSPs rollout next generation technologies or migrate the systems to new efficient networks.
5. The requirement of Microwave carriers is critical to rollout newer technologies and hence should be treated as an essential resource. It is a complementary facility for enabling the expeditious rollout of networks using the RF access spectrum.
6. The new data rich services will place additional demands on the access network and backhaul spectrum which may become the constraining factor in high speed data-rate modern communications systems, if its allocation and pricing issues are not addressed.
7. The mobile broadband services especially through the next generation networks will require quantum increase in the capacity of mobile access and backhaul network. The data carrying capacity of access technologies can be effective only if these are complemented by equally supportive and capable backhaul networks.

8. The main driving factors for backhaul spectrum should be industry's financial health, expansion/deployment of 5G networks and securing investments in 4G networks.
9. To cater to the consumption levels of present 4G services or for upcoming 5G services, the backhaul has to either move to fibre or to a dedicated high-bandwidth spectrum band. As fiberization would take time, the backhaul spectrum bands including E-band, V-band, MWA and MWB would gain prominence and would be highly useful.

B. Present and Likely Demand

10. Kindly find below details of present demand and likely future demand of quantum of spectrum required in MWA and MWB bands. The likely demand is based on assumptions and can't be provided with a higher certainty. The demand for backhaul will grow with the uptake of 5G services as well as deployment of new use-cases or high quality content which will require higher amount of access and backhaul capacities.
11. Any decision on spectrum which is in natural evolution of IMT services, should not be influenced with information on likely demand after 5 years. Adequate supply of spectrum for IMT services is the key for digital growth of the country.

Present Demand

Band	Quantum of spectrum required (per entity per LSA)
	TSPs with Access Service License/ Authorization
6 GHz (5.925-6.425 GHz)	
7 GHz (7.125-7.425 GHz)	
7 GHz (7.425-7.725 GHz)	1
13 GHz (12.750-13.250 GHz)	
15 GHz (14.5-15.5 GHz)	5
18 GHz (17.7-19.7 GHz)	2
21 GHz (21.2-23.6 GHz)	1

Likely Demand after 5 years

Band	Quantum of spectrum required (per entity per LSA)
	TSPs with Access Service License/ Authorization
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)	5
18 GHz (17.7-19.7 GHz)	2
21 GHz (21.2-23.6 GHz)	1

12. Currently and post 5 years, 5G + 4G needs to be backhauled with this spectrum, in addition to E-band to support capacity and reliability demand together.

C. MWA-MWB bands as Backhaul spectrum for Access Service providers only: As explained above, the backhaul spectrum is important and critically required for access services as such, these spectrum bands i.e. 6/7/13/15/18/21 GHz should be reserved as Backhaul spectrum only and for the access service providers. Also, there are many other frequency bands which support access services.

D. Assignments only for Access TSPs and on administrative basis:

13. At present, sufficient amount of backhaul spectrum is available which is being assigned to TSPs to support the growth of access services. TSPs have taken backhaul spectrum as per their present needs across various bands in MWA-MWB spectrum bands. Further, not much interest has been shown by licensees other than access service providers, to utilize these bands so far.

14. In 2022 itself, DoT has doubled the number of MWA-MWB carriers which can be assigned to Access service providers. This shows that with growth in traffic, the demand for backhaul spectrum would continue to rise as such, it would be imperative to reserve spectrum in these bands for backhaul purposes for access service providers.

15. At present, there is no supply or demand issue which may invite any separate assignment methodology like auctioning of spectrum.

16. Indian telecom industry is a matured market presently as such, there is no need to depart from the existing administrative assignment methodology for backhaul spectrum which has been tested over more than a two decades and has been adopted by the industry. We strongly urge that the spectrum in above-stated MWA-MWB bands should continue to be allocated on administrative basis to access service providers only.

17. A progressive guideline has already been issued by Government through DoT's circular dated 23.07.2019, which provide ample opportunities for research and development. Thus, in principle, all spectrum should be assigned to licensees only and non-licensees should be catered under the said guideline dated 23.07.2019. Neither any spectrum should be assigned nor should it be kept reserved, for non-licensed entities.

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)			

VIL Comments to Q2

1. Spectrum assignment on LSA basis only:

- a. It is important to maintain robustness, certainty and uniformity in spectrum assignment and pricing methodologies. Spectrum being one of the major cost-element of telecom networks, any deviation from uniform policies, can disturb level playing field and provide benefit to certain entities at the cost of others.
 - b. The present access licensing and spectrum assignment framework is LSA based hence, the network designing, planning and deployments are on LSA level only. TSP may require different quantity of channels in different LSAs depending upon their stage of their deployments, traffic etc. Any depart from LSA based framework, is expected to bring inefficiencies as well as non-level playing field.
 - c. Most importantly, no detailed studies or research has been provided in the consultation paper, of any other geographic area/pan-India basis assignment benefitting all the stakeholders in the ecosystem.
 - d. **Therefore, the spectrum for MWA and MWB in the stated bands, should be assigned administratively for the entire LSA, on an exclusive basis to access service providers.**
2. A progressive guideline has already been issued by Government through DoT's circular dated 23.07.2019, which provide ample opportunities for research and development. Thus, in principle all spectrum should be assigned to licensees only and non-licensees should be catered under the said guideline dated 23.07.2019. Neither any spectrum should be assigned nor should it be kept reserved, for non-licensed entities.

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.

VIL Comments to Q3

1. **These spectrum bands to be reserved as Backhaul spectrum only:** As explained in our comments given above, the backhaul spectrum has critical need and importance for access services as such, these spectrum bands i.e. 6/7/13/15/18/21 GHz should be reserved as Backhaul spectrum only.
2. The backhaul spectrum cannot be used for satellite communications as satellite is not a backhaul service.
3. Allocation of same channels may induce interference in both networks. Hence should be avoided.
4. Further, this is a commercially required spectrum for terrestrial networks and there is a clear demand curve. Hence, this should only be used for backhaul specifically for terrestrial based telecom networks.

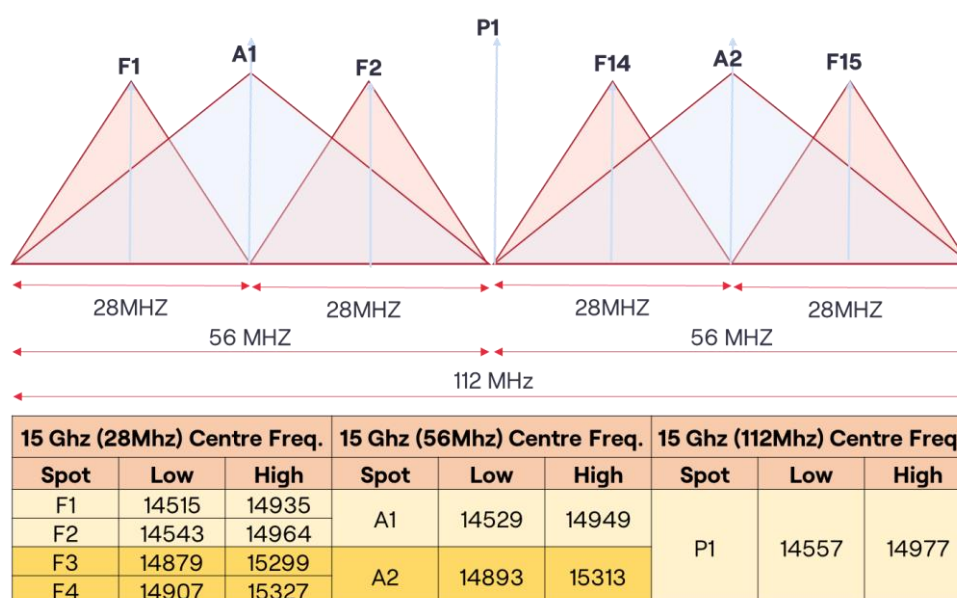
Q4. What should be the carrier size for MWA and MWB carriers in each band viz. 6/7/13/15/18/21 GHz bands? Whether there is a need to prescribe a different carrier size based on different LSA categories or different user categories viz. (i) TSPs with Access Service License/ Authorization, (ii) TSPs with 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)			

VIL Comments to Q4

1. The carrier size should be 28 MHz (paired spectrum) for both MWB and MWA microwave spectrum bands, with possibility to use multiple adjacent channels forming higher channel bandwidth per carrier.
2. Carriers of 56 MHz (Paired) and 112 MHz (paired) should be allowed to use and counted as 2 and 4 carries respectively. When operator has such adjacent carriers, it should be explicitly clarified that there is no separate permission required from DoT for its use as either 56 MHz or 112 MHz or any combination which falls under assigned spectrum range. In this regard, kindly refer below sample illustration.

Illustration-1: Channel BW and its usage (Sample for 15 GHz)



When an operator is having four spots of 28 MHz each (F1, F2, F3 and F4) it should be possible to use them as two carriers of 56 MHz each (A1, A2) as well as single carrier of 112 MHz (P1) without any special permission from DoT.

3. **MWA-MWB bands as Backhaul spectrum for Access Service providers only:** As explained above, the backhaul spectrum is important and critically required for access services as such, these spectrum bands i.e. 6/7/13/15/18/21 GHz **should be reserved as Backhaul spectrum and for the access service providers only**. Also, there are many other frequency bands which support access services.
4. A progressive guideline has already been issued by Government through DoT's circular dated 23.07.2019, which provide ample opportunities for research and development. Thus, in principle all spectrum should be assigned to licensees only and non-licensees should be catered under the said guideline dated 23.07.2019. Neither any spectrum should be assigned nor should it be kept reserved, for non-licensed entities.

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?

VIL Comments to Q5

1. Yes, all assigned carriers should be contiguous so that the operator should be able to use higher channel bandwidth using two or more carriers to ensure optimal cost solution. For all new frequency assignments in MWA-MWB bands, we urge the TRAI for its supporting recommendations to DoT, for adopting the same, but it should be without impacting the existing assignments on administrative basis and without seeking any change in the existing frequency spots allocated to TSPs.
2. As we are aware that current allocation is on administrative basis and above is not practiced, Operators should be given chance on time to time basis to harmonize available carriers so as to have maximum possible contiguous carriers in a LSA.
3. As the equipment deployed in the network for MWA/MWB carriers, are specific to spectrum bands as well as frequency spots therefore, the right of access service providers already holding administrative spectrum in these bands should always have precedence over the right of access service providers who subsequently take administrative spectrum in these bands.

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.

VIL Comments to Q6

1. MWA and MWB carriers are essential for the roll-out of any mobile network. Also, MWA/MWB carriers only support the infrastructure for mobile backhaul and are critical tool to facilitate TSP to use Radio Access Network and spectrum efficiently. Microwave backhaul is the principle enabler, considering the huge challenges of infrastructure, feasibility of building fibre and related cost.
2. As MWA and MWB acts as backhaul spectrum and not for any revenue generating services, it also do not cater to any competitive services. Its usage only helps faster infrastructure deployment and better utilisation of access spectrum.

3. Microwave equipment deployed in network are sub-band specific. It means that all carriers of a band is not supported by an equipment deployed in network. For example, in 15 GHz if available equipment supports 14515/14935 MHz, it is not necessary that the same equipment should support 14879/15299 MHz frequency. Hence, no change should be done in the current policy related to MWA and MWB carriers.
4. As mentioned above, MWA and MWB should continue to be made available on administrative basis. Also, any change in frequency carrier is equivalent to change in network design and hence, it would result in disruption of services or deterioration of quality of service for the customers, besides adding huge incremental cost to the TSP for purchasing new equipment as well as sunk cost of existing equipment.
5. Further, VIL is having optimal number of MWA/MWB carriers in each circle to backhaul the traffic generated by available access (radio) spectrum. The number of spots allowed by DoT as administrative spectrum vide its circular dated 25.07.2022 are optimal. Any reduction in the said number of spots is not feasible, as it will impact the quality of the service to the customers coupled with another huge impact of the network restructuring with the lesser number of spots which will further require additional Capex and Opex.
6. **Therefore, spectrum in MWA-MWB bands should continue to be assigned as backhaul spectrum on administrative basis, as per DoT's guideline of October 16, 2015. The prevalent regime of allocation backhaul spectrum on administrative basis has enabled greater competition and faster deployment of network infrastructure including in urban as well as non-urban areas.**
7. The pricing of MWA/MWB spectrum was fixed at 0.15% of AGR for 1 carrier (with non-linear increase with additional no. of spots) at a time when access spectrum was being provided administratively. From 2010 onwards, access spectrum is provided through auction and it takes care of the revenue potential from access services. **Therefore, there is an immediate need to rationalise the spectrum charges to be paid for MWA/MWB spectrum.**

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 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 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.

And

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 provided?
- (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.

VIL Comments to Q7, Q8 and Q9

1. Ceilings are crucial part of spectrum allocation policy as it provides a pillar to support adequate competition and competitive players in the market, which in this case would be at least 4 access service providers (3 private + 1 PSU).
2. As stated in CP para 2.24, majority of the carriers in MWB are unutilized, as such, ceiling thresholds would appear to be not required here. However, from uniform policy perspective, ceiling should be prescribed and it should be separate for each frequency band of MWA and MWB spectrum.
3. **Existing ceiling on maximum number of carriers per LSA in MWA/MWB bands prescribed by DoT vide its guideline dated 25.07.2022 holds good at present i.e. 8 carriers for Metro/Category A LSA and 6 carriers for Category-B/Category-C LSA.**
4. In general, not every band i.e. 6 GHz, 7GHz, 13 GHz, 15 GHz, 18 GHz and 21 GHz will have same commercial value and ecosystem. In such case, their appeal to the TSPs will be different and will depend upon various dynamic factors. To avoid monopolization of spectrum within one or two prominent bands, it is imperative that there should be an

additional ceiling of 35% for each of the spectrum band i.e. separate for 6/7 GHz, 13 GHz, 15 GHz, 18 GHz as well as 21 GHz, besides the overall ceiling.

5. **Service area category - wise Ceilings:** At present, the present ceiling of 8 and 6 carriers for Metro/Category-A and Category B/C LSA respectively under existing administrative allocations, is working fine and there is no need to depart from the said ceiling and methodology.
6. **Indian telecom industry is a matured market presently as such, there is no need to depart from the existing administrative assignment methodology which has been tested over more than a decade and has been adopted by the industry. We strongly urge that the spectrum in above-stated MWA-MWB bands should continue to be allocated on administrative basis to access service providers only.**
7. A progressive guideline has already been issued by Government through DoT's circular dated 23.07.2019, which provide ample opportunities for research and development. Thus, in principle all spectrum should be assigned to licensees only and non-licensees should be catered under the said guideline dated 23.07.2019. Neither any spectrum should be assigned nor should it be kept reserved, for non-licensed entities.

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)		

And

Q11. 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)		

And

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.

And

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.

VIL Comments to Q10, Q11, Q12, Q13 and Q14

For both MWA and MWB carriers, our comments are given below in the table as well as points mentioned after the table.

User category	Assignment methodology [Auction/ Administrative/ Any other (please specify)]	Justification
For both MWA and MWB		
(i) TSPs with Access Service License/ Authorization	Administratively as prescribed in DoT's guidelines dated 16.10.2015 and 25.07.2022.	As given below
(ii) TSPs with other than Access Service License/ authorization	Spectrum should be allotted only to access service providers.	
(iii) Other entities (non-TSP, for non-commercial/ captive/ isolated use)	Spectrum should be allotted only to access service providers.	

1. MWA and MWB carriers are essential for the roll-out of any mobile network. Also, MWA/MWB carriers only support the infrastructure for mobile backhaul and are critical tool to facilitate TSP to use Radio Access Network and spectrum efficiently. Microwave backhaul is the principle enabler, considering the huge challenges of infrastructure, feasibility of building fiber and related cost.
2. As MWA and MWB spectrum is for backhaul only and not for any revenue generating services, it do not cater to any competitive services. Its usage only helps faster infrastructure deployment and access spectrum usage.
3. Microwave equipment deployed in network are sub-band specific. It means that all carriers of a band is not supported by an equipment deployed in network. For example, in 15 GHz if available equipment supports 14515/14935 MHz, it is not necessary that the same equipment should support 14879/15299 MHz frequency.
4. As mentioned above, MWA and MWB should continue to be made available on administrative basis. Also, any change in frequency carrier could result in disruption of services or deterioration of quality of service for the customers, besides adding huge incremental cost to the TSP for purchasing new equipment as well as sunk cost of existing equipment. To avoid this, already assigned carriers should be assigned back to a TSP.
5. Further, VIL is having optimal number of MWA/MWB carriers in each circle to backhaul the traffic generated by available access (radio) spectrum. The number of spots allowed by DoT as administrative spectrum vide its circular dated 25.07.2022 are optimal. Any reduction in the said number of spots is not feasible, as it will impact the quality of the service to the customers coupled with another huge impact of the network restructuring with the lesser number of spots which will further require additional CAPEX and OPEX.
6. **Therefore, spectrum in MWA-MWB bands should continue to be assigned on administrative basis, as per DoT's guideline of October 16, 2015 and July 25, 2022. The**

prevalent regime of allocation backhaul spectrum on administrative basis has enabled greater competition and faster deployment of network infrastructure including in urban as well as non-urban areas.

7. The pricing of MWA and MWB spectrum was fixed at 0.15% of AGR with non-linear increase with additional no. of spots, at a time when access spectrum was being provided administratively. From 2010 onwards, access spectrum is provided through auction and it takes care of the revenue potential from access services. **Therefore, there is an immediate need to rationalise the spectrum charges to be paid for MWA and MWB spectrum.**
8. **Indian telecom industry is a matured market presently as such, there is no need to depart from the existing administrative assignment methodology which has been tested over more than two decades and has been adopted by the industry. We strongly urge that the spectrum in above-stated MWA and MWB bands should continue to be allocated on administrative basis to access service providers only.**
9. A progressive guideline has already been issued by Government through DoT's circular dated 23.07.2019, which provide ample opportunities for research and development. Thus, in principle all spectrum should be assigned to licensees only and non-licensees should be catered under the said guideline dated 23.07.2019. Neither any spectrum should be assigned nor should it be kept reserved, for non-licensed entities.

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.

VIL Comments to Q15

1. For a scarce and valuable resource like spectrum, it is imperative to provide flexible use which promotes efficient utilization over next generation networks. Considering the importance of this spectrum for backhaul, it should only be provided for backhaul purposes to licensed entities only.
2. As commercial price of this spectrum would be taken even under administrative holding, the licensed entities should be allowed to share MWA/MWB spectrum with other licensees through intra-band or inter-band spectrum sharing or spectrum leasing.

3. The scope of spectrum should not be curtailed and the services of non-commercial services like captive services, should be served in collaboration with licensed access service providers. For this, the policy framework should allow spectrum leasing on P2P links basis, to other licensed entities or non-licensed entities for captive/isolated/non-commercial usage.
4. We reiterate our comments given above to Q1 and Q 10 to Q 14 that MWA-MWB spectrum bands should continue to be allocated as backhaul spectrum on administrative basis, to access service providers only.

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 for 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.

VIL Comments to Q16

Kindly refer to our comments to Q1 and Q 10 to Q 14 above, we reiterate that the MWA/MWB carriers should continue to be assigned as backhaul spectrum on administrative basis, to access service providers only.

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.

And

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.

VIL Comments to Q17 and Q18

1. **Spectrum Validity:**

- a. Kindly refer to our comments to Q1 and Q 10 to Q 14 above, we reiterate that the MWA/MWB carriers should continue to be assigned as backhaul spectrum on administrative basis, to access service providers only.
- b. **Considering the need of backhaul spectrum to support access services as well as in line with prevalent DoT norms related to administrative assignment, the backhaul spectrum assignments should continue to remain valid till an access service provider is providing access services in a given service area.**

2. Spectrum Surrender:

- a. With evolvment of technologies, capacity requirements, new bands being introduced, fiberization, the cellular networks have to keep on optimising backhaul infrastructure including the spectrum bands and quantum.
 - b. Spectrum surrender allows TSPs to have freedom and encourage them to keep on optimising the backhaul infrastructure as well as to adopt more efficient technologies and spectrum bands.
 - c. DoT has recently issued surrender guidelines for Backhaul spectrum vide its office memorandum no. L-14042/01/2022-IMT, dated 10.11.2022, which contains associated terms for the said surrender. Therefore, these associated terms should continue in future as well for surrender of MWA-MWB spectrum assigned administratively.
3. Indian telecom industry is a matured market presently as such, there is no need to depart from the existing administrative assignment methodology which has been tested over more than a decade and has been adopted by the industry. **We strongly urge that the spectrum in above-stated MWA-MWB bands should continue to be allocated on administrative basis to access service providers only.**
 4. A progressive guideline has already been issued by Government through DoT's circular dated 23.07.2019, which provide ample opportunities for research and development. Thus, in principle all spectrum should be assigned to licensees only and non-licensees should be catered under the said guideline dated 23.07.2019. Neither any spectrum should be assigned nor should it be kept reserved, for non-licensed entities.

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.

VIL Comments to Q19

1. As explained in our comments to Q1 above, backhaul spectrum in these bands is crucial for Access service licensees and so far not much interest has been shown by non-access service providers.
2. Indian telecom industry is a matured market presently as such, there is no need to depart from the existing administrative assignment methodology which has been tested over more than a decade and has been adopted by the industry.
3. **We strongly urge that the spectrum in above-stated MWA-MWB bands should continue to be allocated on administrative basis to access service providers only. The access service providers would mean TSPs who are providing access services through access spectrum.**
4. A progressive guideline has already been issued by Government through DoT's circular dated 23.07.2019, which provide ample opportunities for research and development. Thus, in principle all spectrum should be assigned to licensees only and non-licensees should be catered under the said guideline dated 23.07.2019. Neither any spectrum should be assigned nor should it be kept reserved, for non-licensed entities.

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.

And

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.

VIL Comments to Q20 and Q21

1. Unlike access spectrum, the backhaul spectrum is used within the network elements, and is not used for directly serving the end consumers. The TSPs may choose to deploy mix of backhaul spectrum across bands or across channel size, depending upon various factors like location, traffic growth, availability of fiber etc.

2. TSP should have freedom to choose spots and channel size as per their strategy and observed traffic growth in network.
3. Further, commercial price (as % of AGR) for the backhaul spectrum is currently being paid by the licensees, for using backhaul spectrum including MWA/MWB spectrum. Thus, no additional restrictive conditions are desirable for a spectrum for which commercial price is being paid.
4. **Considering above, there should not be any rollout obligation associated with MWA/MWB carrier assignments.**
5. Indian telecom industry is a matured market presently as such, there is no need to depart from the existing administrative assignment methodology which has been tested over more than a decade and has been adopted by the industry. **We strongly urge that the spectrum in above-stated MWA-MWB bands should continue to be allocated on administrative basis to access service providers only. The access service providers would mean TSPs who are providing access services through access spectrum.**
6. A progressive guideline has already been issued by Government through DoT's circular dated 23.07.2019, which provide ample opportunities for research and development. Thus, in principle all spectrum should be assigned to licensees only and non-licensees should be catered under the said guideline dated 23.07.2019. Neither any spectrum should be assigned nor should it be kept reserved, for non-licensed entities.

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.

VIL Comments to Q22

Rationalisation of Pricing:

1. The pricing of MWA/MWB spectrum was fixed at 0.15% of AGR (with non-linear increase with additional no. of spots) at a time when access spectrum was being provided administratively. From 2010 onwards, access spectrum is provided through auction and it takes care of the revenue potential from access services.
2. Therefore, there is an immediate need to rationalise the spectrum charges to be paid for MWA/MWB spectrum.

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)			

VIL Comments to Q23

- As per the recent Nokia MBit report 2023, mobile data traffic in India jumped 3.2x in last five years and reached 14.4 EB per month in 2022 while the average data per user per month grew 2x to reach 19.5 GB. It is expected to grow more than double by 2024, with 5G as the new accelerator. Delivering flawless connectivity for 5G, demands **a transport backhaul that can support massive connectivity, super-high data rates and ultra-low latency.**
- To lay modern high capacity networks, TSPs require equally efficient backhaul networks to enable the customers to have an always connected experience. Due to proliferation of

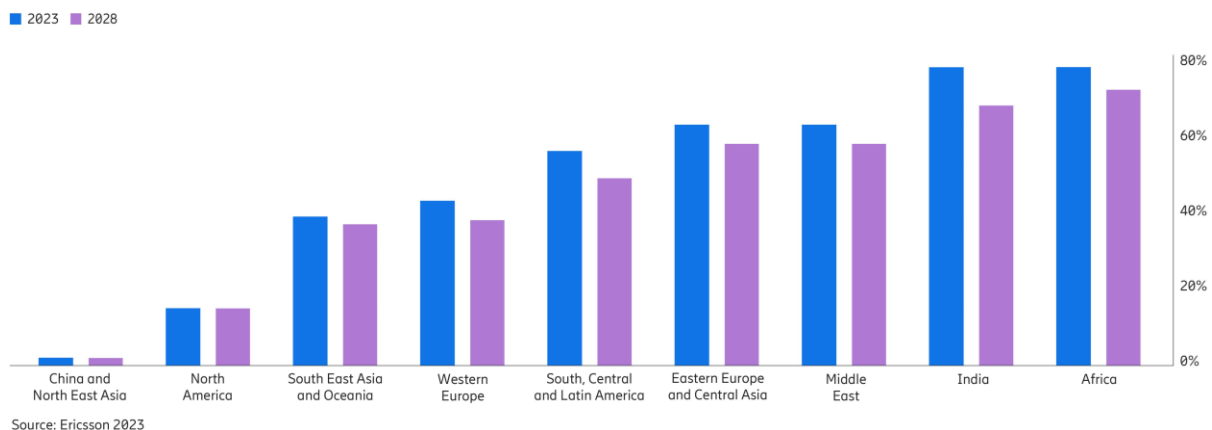
high data rate radio network, the need for high-density and high-capacity backhaul networks **will keep on increasing every year.**

3. With fiber penetration being low in India (35% till June'22 end combined for all operators on national basis – Para 2.15 of CP), the demand for wider channels for backhaul will continue to grow as TSPs rollout next generation technologies or migrate the systems to new efficient networks.
4. **The requirement of E-band and V-band carriers is critical to rollout newer technologies and hence should be treated as an essential resource.** To cater to the consumption levels of present 4G services or for upcoming 5G services, the backhaul has to either move to fiber or to a dedicated high-bandwidth spectrum band. As fiberization would take time, the backhaul spectrum bands including E-band, V-band, MWA and MWB would gain prominence and would be highly useful.
5. For catering to the backhaul requirements for explosive data growth expected under 5G, **higher number of contiguous E-Band spots are required.**
6. **Data growth:** Considering technology evaluation, data growth expected is given in illustration below:

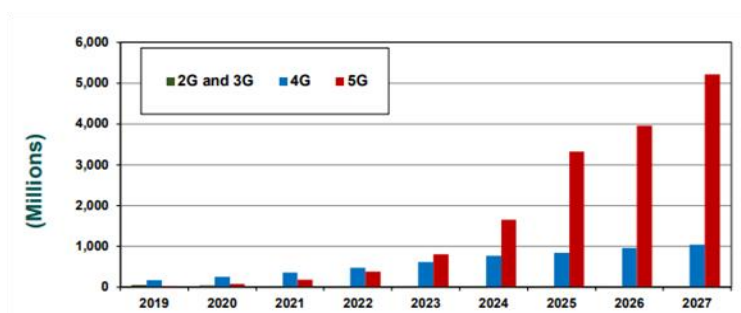
4G and 5G requirements vs Spectrum bands and channel size

Max Capacity	MW Backhaul Bands	56 MHz	112 MHz	224/250 MHz	1000 MHz	2000MHz	+XPIC	
Traditional	6-8 GHz	500 Mbps	n.a.				x 2	4G
	11-15 GHz		1 Gbps	n.a.				
	18-42 GHz		n.a.					
Last coming	E-band (70/80GHz)	n.a.	1.5 Gbps		6 Gbps	12 Gbps	5G	
Future	W & D-band (->170GHz)	n.a.		1.5 Gbps		6 Gbps		12 Gbps

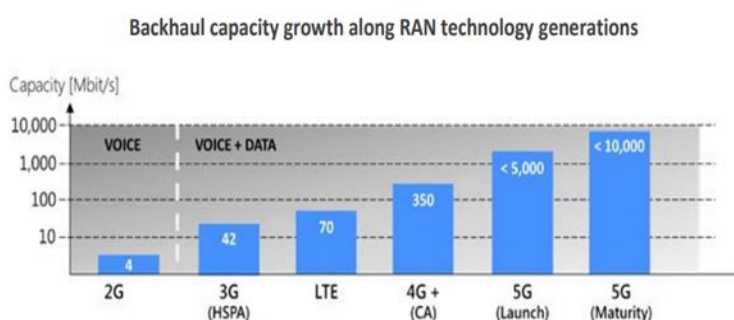
Regional differences in deployment of microwave backhaul 2023 and 2028



Future Forecast for traffic & backhaul growth



[wireless-backhaul-spectrum.pdf\(gsma.com\)](https://www.gsma.com/wireless-backhaul-spectrum.pdf)



[ETSI-WP-58-Wireless-transport-network-fast-mobile-backhaul-network-modernization.pdf](https://www.etsi.org/ETSI-WP-58-Wireless-transport-network-fast-mobile-backhaul-network-modernization.pdf)

7. Considering all above, the present and likely demand after 5 years is given below. Infact the demand of 4 carriers in E band is likely to be reached much earlier than 5 years as 5G data is expected to grow faster.

Present Demand

Band	Quantum of spectrum required (per entity per LSA)
	TSPs with Access Service License/ Authorization
E-band (71-76/81-86 GHz)	3 x 250 MHz
V-band (57-64 Hz)	20 x 50 MHz

Likely Demand after 5 years

Band	Quantum of spectrum required (per entity per LSA)
	TSPs with Access Service License/ Authorization
E-band (71-76/81-86 GHz)	4 x 250 MHz
V-band (57-64 GHz)	20 x 50 MHz

8. E-Band Carriers required:

- a. Each carrier can support ~1.5 Gbps of bandwidth as such, it will require at least 3 E-Band links per PoP and hence, minimum 3 carriers will be required in the initial phase of deployments. This will help plan an interference free network for better consumer experience.
- b. There will be 200% rise in the 5G backhaul demand once technology is matured (basis ETSI WP 58) and expected fiber penetration is approx. 35% (TRAI consultation paper) hence, there will be higher demand of backhaul spectrum on E Band.
- c. **Therefore, in our view atleast 4 carriers (250 MHz each) would be required in E-band.**

9. V band carriers required:

- a. Each carrier (50 MHz) provides ~150 Mbps of bandwidth. V Band will be primarily required for the small cell connectivity. There will be multiple (~4-5) small cells connected from Fiber PoP. Each small cell capacity requirement would be around 600 Mbps hence four channels of 50 MHz each can be combined for each small cell for connecting 5 such small cell. V-Band has very high oxygen absorption and hence link distances are limited.
- b. **Considering this, 20 such channels will be sufficient as backhaul, for 5G small cell deployment.**

10. Considering the importance of E band and V band for backhaul purposes, its scope should be restricted to backhaul services only. It would cause huge complications in pricing and assignment framework, if this spectrum is allowed to be used both for backhaul and access services.

11. Most importantly, as E band and V band are very crucial for the growth of 5G services and there are limited number of carriers which will support the requirement only till next few years, it should be assigned only to access service licensees offering access services.

12. A progressive guideline has already been issued by Government through DoT's circular dated 23.07.2019, which provide ample opportunities for research and development. Thus, in principle all spectrum should be assigned to licensees only and non-licensees should be catered under the said guideline dated 23.07.2019. Neither any spectrum should be assigned nor should it be kept reserved, for non-licensed entities.

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 bands	Spectrum should be assigned for the entire LSA on 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)
E-band (71-76/81-86 GHz)			
V-band (57-64 GHz)			

VIL Comments to Q24

1. Spectrum assignment on LSA basis only:

- a. It is important to maintain robustness, certainty and uniformity in spectrum assignment methodologies. Spectrum being one of the major cost-element of telecom networks, any deviation from uniform policies, can disturb level playing field and provide benefit to certain entities at the cost of others.
- b. The present access licensing and spectrum assignment framework is LSA based hence, the network designing, planning and deployments are on LSA level only. TSP may require different quantity of channels in different LSAs depending upon their stage of their deployments, traffic etc. Any depart from LSA based framework, is expected to bring inefficiencies as well as non-level playing field.
- c. Further, In E band and V band, large number of backhaul links are expected to be deployed. This will make co-ordination for P2P link very complex, cumbersome and would impede faster roll-out.
- d. Most importantly, no detailed studies or research has been provided in the consultation paper, of any other geographic area/pan-India basis assignment benefitting all the stakeholders in the ecosystem.
- e. **Therefore, the spectrum for E-band and V-band, should be assigned for the entire LSA, on an exclusive basis to licensed entities only.**

2. **Considering the importance of E band and V band for backhaul purposes, its scope should be restricted to backhaul services only.** It would cause huge complications in pricing and assignment framework, if this spectrum is allowed to be used both for backhaul and access services.
3. **Most importantly, as E band and V band are very crucial for the growth of 5G services and there are limited number of carriers which will support the requirement only till next few years, it should be assigned only to access service licensees offering access services.**
4. A progressive guideline has already been issued by Government through DoT's circular dated 23.07.2019, which provide ample opportunities for research and development. Thus, in principle all spectrum should be assigned to licensees only and non-licensees should be catered under the said guideline dated 23.07.2019. Neither any spectrum should be assigned nor should it be kept reserved, for non-licensed entities.

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.

VIL Comments to Q25

1. In accordance with Resolution 775 (WRC-19), one may contend that it may be appropriate to consider E-band spectrum for satellite-based communication network at a later date, in accordance with the outcome of WRC-27.
2. V-band frequency range from 57 GHz to 64 GHz, as per NFAP 2022, this frequency range has not been allocated for commercial satellite communication services to be provided on the Earth's Surface. Presently, there is no case for satellite-based telecom networks in V Band.
3. Thus, we 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 must be taken up at a later date.
4. We further submit that:
 - a. Backhaul spectrum cannot be used for satellite communications as satellite is not a backhaul service. E-band and V-band spectrum are commercially required for terrestrial IMT networks and there is a clear demand curve. Hence, these bands should only be used for backhaul specifically for terrestrial based IMT networks.

- b. **Most importantly, as E band and V band are very crucial for the growth of 5G services and there are limited number of carriers which will support the requirement only till next few years, it should be assigned only to access service licensees offering access services.**
- c. Also, allocation of same channels may induce interference in both networks. Hence, should be avoided.

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.

VIL Comments to Q26

1. Principally, flexibility should be given to licensees who have acquired spectrum through auction and/or basis commercial price being paid, to use the spectrum in any configuration.
2. While the ITU-R Recommendation F.2006 cites two possible frequency arrangements – FDD and TDD – Most OEM and global deploy base indicates that the commercial equipment for the E-Band support FDD configuration, especially when the mobile transport service is concerned.
3. While the TDD configuration is theoretically possible, some drawbacks of using TDD (as compared with FDD) arise, such as higher latency.
4. High capacity and low latency mobile backhaul and front haul are the main applications. Such applications require FDD arrangement as mandatory.
5. **Therefore, we would like to recommend as follows:**
 - a. **All fresh spectrum to be assigned through auction, in which case, flexibility should be provided to the spectrum assignee to utilize the spectrum as per business-technology requirements.**
 - b. **If the configuration is to be fixed, we recommend that it would be appropriate to continue with the Frequency Division Duplexing (FDD) based configuration for E-band spectrum.**

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.

VIL Comments to Q27

1. Principally, flexibility should be given to licensees who have acquired spectrum through auction and/or basis commercial price being paid, to use the spectrum in any configuration.
2. In case of V-band, global OEMs support TDD mode of operation.
3. V-band is having limited spectrum available from 57 – 64 GHz and it does not provide enough space for FDD operations with higher channel bandwidths.
4. As such V-band carrier would require Time Division Duplexing (TDD) based configurations. This is in line with recommendation from TRAI in earlier recommendation in 2014.
5. **Therefore, we would like to recommend as follows:**
 - a. **All fresh spectrum to be assigned through auction, in which case, flexibility should be provided to the spectrum assignee to utilize the spectrum as per business-technology requirements.**
 - b. **If the configuration is to be fixed, we recommend that it would be appropriate to continue with the Time Division Duplexing (TDD) based configuration for V-band spectrum.**

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.

VIL Comments to Q28

1. The basic channel size of higher frequency bands is larger, allowing to higher transport capacity required for 5G.

2. The use of channel size should not be mandated and operators should be allowed to make the strategy as per Radio spectrum availability, their backhaul requirement and Fiber penetration in respective LSA.
3. E-Band should have channel size of 250 MHz for auction and assignment purposes. However, each Carrier equivalent to 250 MHz paired spectrum should have flexibility of usage in split (i.e. 62.5 / 125MHz per link) or in aggregated (i.e. 500 / 750 / 1000MHz per link), without any additional restriction/disincentives.
4. V-Band should have channel size of 50 MHz for auction and assignment purposes. Each Carrier equivalent to 50 MHz should have flexibility of usage in aggregated (i.e. 100 / 150 / 1000MHz per link) without any additional restriction/disincentives.
5. This channel size has been recommended by TRAI earlier as well, vide its recommendations on 'Allocation and Pricing of Microwave Access (MWA) and Microwave Backbone (MWB) RF carriers' dated 29.08.2014.
6. **Considering the importance of E band and V band for backhaul purposes, its scope should be restricted to backhaul services only. It would cause huge complications in pricing and assignment framework, if this spectrum is allowed to be used both for backhaul and access services.**
7. **Most importantly, as E band and V band are very crucial for the growth of 5G services and there are limited number of carriers which will support the requirement only till next few years, it should be assigned only to access service licensees offering access services.**
8. A progressive guideline has already been issued by Government through DoT's circular dated 23.07.2019, which provide ample opportunities for research and development. Thus, in principle all spectrum should be assigned to licensees only and non-licensees should be catered under the said guideline dated 23.07.2019. Neither any spectrum should be assigned nor should it be kept reserved, for non-licensed entities.

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.

VIL Comments to Q29

1. There should be flexibility to have diverse range of channel size in multiples of 250MHz upto 2000 MHz in E Band and channel size in multiples of 50 MHz upto 1000 MHz in V Band.

2. Larger channel size allows higher backhaul throughput and more efficient use of available power and multiplexing schemes.
3. **Majority of the OEMs in E Band supports channel size upto 2000 MHz.**
4. **Hence it is advisable to consider contiguous spectrum of E-band & V-Band, if TSP acquires more than one carrier.** Operators should be given chance on time to time basis to harmonize available carriers so as to have maximum possible contiguous carriers in a LSA. Further, the auction methodology for E&V bands should ensure contiguous spectrum being allotted to licensees.

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.

VIL Comments to Q30

1. Unlike equipment deployed in MWA/MWB bands, most of the available E-band equipment is capable of operating across entire E-band spectrum. To that extent, there is no requirement of retaining the same frequency carrier if it is getting utilised by a TSP under existing assignment on administrative basis. An explicit information can also be sought from the existing TSPs about the capability of the equipment deployed in the E-band as well as level of use of this band.
2. Having said that, even if equipment is capable, changes in the carrier will practically attract configuration changes in the deployed links. To avoid this, TSP should be given choice to retain same frequency carrier.

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.

And

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 ceilings based on the service area category i.e., Metro/ Category 'A' Circles/ Category 'B' Circles/ Category 'C' Circles, need 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.

VIL Comments to Q31 and Q32

1. Yes, there is a need to prescribe maximum number of carriers that can be held by an access service licensee in E-band and V-band.
2. Ceilings are crucial part of spectrum policies as it provides a pillar to support adequate competition and competitive players in the market, which in this case would be at least 4 TSPs (3 private + 1 PSU).
3. E-band and V-band have different commercial value and ecosystem. In such case, their appeal to the TSPs will be different and will depend upon various dynamic factors. To avoid monopolization of spectrum within either of these bands, it is imperative that there should be a ceiling for each of the spectrum band i.e. separate for E-band and V-band.
4. **E-Band:**
 - a. 19 carriers of 250 MHz paired spectrum is available in E Band. It is estimated that 4 such carriers should be enough to meet the 5G demand in next few years.
 - b. As such, maximum of 4 contiguous E band carriers per TSP should be considered for allocation.
5. **V-band:**
 - a. 138 carriers of 50 MHz TDD spectrum is available in V Band. It is estimated that 20 such carriers should be enough to meet the 5G demand.
 - b. As such, maximum of 20 contiguous V band carriers per TSP should be considered for allocation.
6. **Service area category - wise Ceilings:** No, there should not be different ceilings based on the service area category i.e. Metro / Category 'A' circles / Category 'B' circles / Category 'C' circles.
7. We further submit that considering the importance of E band and V band for backhaul purposes, its scope should be restricted to backhaul services only. It would cause huge

complications in pricing and assignment framework, if this spectrum is allowed to be used both for backhaul and access services.

8. **Most importantly, as E band and V band are very crucial for the growth of 5G services and there are limited number of carriers which will support the requirement only till next few years, it should be assigned only to access service licensees offering access services.**
9. A progressive guideline has already been issued by Government through DoT's circular dated 23.07.2019, which provide ample opportunities for research and development. Thus, in principle all spectrum should be assigned to licensees only and non-licensees should be catered under the said guideline dated 23.07.2019. Neither any spectrum should be assigned nor should it be kept reserved, for non-licensed entities.

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)		

And

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.

And

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.

VIL Comments to Q33, Q34 and Q35

<p>User category</p>	<p>Assignment methodology [Auction/ Administrative/ Any other (please specify)]</p> <p><u>For both E-band and V-band</u></p>	<p>Justification</p>
<p>(i) TSPs with Access Service License/ Authorization</p>	<p>Auction</p>	<p>As given below</p>
<p>(ii) TSPs with other than Access Service License/ authorization</p>	<p>E band and V band should only be allotted to Access Licensees providing access services.</p>	
<p>(iii) Other entities (non-TSP, for non-commercial/ captive/ isolated use)</p>		

1. **Most importantly, as E band and V band are very crucial for the growth of 5G services and there are limited number of carriers which will support the requirement only till next few years, it should be assigned only to access service licensees offering access services, through auction.**
2. The scope of spectrum provided for IMT purposes and access services licenses, can't be curtailed and the services of non-commercial services like captive services, should be served in collaboration with licensed entities. For this, the policy framework should allow spectrum leasing on P2P links basis. Introducing different terms & conditions of high-level impact (like spectrum assignment with low prices or license exempt basis) in the name of supporting certain usages, will give rise to regulatory uncertainty and non-level playing field besides, loss to national exchequer.
3. All policy decisions should be tested on the principle of same service, same rules and same commercials. Therefore, all fresh spectrum assignments including in E-band and V-band should be through a fair and transparent auction.
4. Further, before reserving any carrier from E-Band and V-band for use other than backhaul for access service providers, detailed opportunity cost and value analysis should be carried out before fragmenting spectrum. There is no clear use cases or demand studies, which have been carried out or provided with the DoT's reference or TRAI's consultation paper.

5. We further submit that:

- a. **Considering the importance of E band and V band for backhaul purposes, its scope should be restricted to backhaul services and only for access service providers.** It would cause huge complications in pricing and assignment framework, if this spectrum is allowed to be used both for backhaul and access services.
- b. A progressive guideline has already been issued by Government through DoT's circular dated 23.07.2019, which provide ample opportunities for research and development. Thus, in principle all spectrum should be assigned to licensees only and non-licensees should be catered under the said guideline dated 23.07.2019. Neither any spectrum should be assigned nor should it be kept reserved, for non-licensed entities.

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.

VIL Comments to Q36

1. **It is utmost desirable that all spectrum being allocated through auction should be on LSA basis and all related flexibilities should be extended to auction purchased spectrum viz. spectrum trading, intra and inter-band spectrum sharing, spectrum leasing through P2P links or geography based.** Allowing such flexibilities will ensure optimum utilization of spectrum and also, allow market forces to play role in determining value proposition to consumers as well as no loss of revenue to national exchequer.
2. **Therefore, we recommend that spectrum leasing as well as intra-band and inter-band spectrum sharing should be allowed between TSPs, for E-band and V-band Spectrum bands.**
3. **While we don't foresee any demand from non TSPs licensees or non-licensees, we are of the view that TRAI can look into recommending a framework allowing sharing option through spectrum leasing on P2P links or geography basis. The revenue emanating from such spectrum leasing should form part of ApGR of a TSP, which will take care of any potential concern.**
4. It is important to recognize that regulated structures (in this case administrative assignments on P2P links basis) should be resorted to, only if there is market failure for a reasonable period of time and it is not possible to course-correct such market failure.

5. TRAI and DoT can review the market after few years, if there is demand from non-TSP licensees and non-licensed entities and if it is not met through spectrum leasing option provided to Access service providers.

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.

VIL Comments to Q37

1. It is important to maintain robustness, certainty and uniformity in spectrum assignment and pricing methodologies. Spectrum being one of the major cost-element of telecom networks, any deviation from uniform policies, can disturb level playing field and provide benefit to certain entities at the cost of others.
2. In the instant case, if spectrum in E-band and V-band is provided on Pan-India basis, it would be beneficial to the financially strong players and at the cost of financially weaker players.
3. The present access licensing and spectrum assignment framework is LSA based hence, the network designing, planning and deployments are on LSA level only. TSP may require different Quantity of channels in different LSAs depending upon their stage of their deployments, traffic etc. Any depart from LSA based framework, is expected to bring inefficiencies as well as non-level playing field.
4. Further, access spectrum is being auctioned on a LSA basis for more than 10 years, and it a very well tested and adopted method. Most importantly, no detailed studies or research has been provided in the consultation paper, of any other geographic area/pan-India basis assignment benefitting all the stakeholders in the ecosystem.
5. However, reservation of carriers while assigning on exclusive basis through auction, for each TSP on PAN India basis will be preferable since this will ensure future acquisition of carrier in such a way that entire spectrum will be always contiguous.

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.

VIL Comments to Q38

1. Kindly refer to our comments given above to Q no. 23, thereby highlighting the critical need to have E-band and V-band spectrum for backhaul of access services.
2. E-band and V-band represents the opportunity for deploying adequate transport solutions required to support 5G and its evolution, as access to channels of 250 MHz and multiples up to 1 GHz enables the possibility of transporting high capacities.
3. **Scope of services/usages for spectrum in E-band and V-band should remain restricted to providing backhaul to cater for ever growing data demand of telecom users.**
4. **Most importantly, as E band and V band are very crucial for the growth of 5G services and there are limited number of carriers which will support the requirement only till next few years, it should be assigned only to access service licensees offering access services.**

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.

VIL Comments to Q39

1. Yes, SMRA method of auction as adopted for IMT spectrum auction, should be adopted for auction of spectrum in E-band and V-band, as this is an established method.
2. The entire quantum of spectrum available in E-band and V-band should be put to auction and any artificial scarcity/limitation should be avoided.

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.

VII Comments to Q40

1. **Spectrum Validity:** In case of E-band and V-band, spectrum validity should be 20 years, as is the case of access spectrum so far.
2. **Spectrum Surrender:**
 - a. Yes, there is a need to create provision of Spectrum Surrender in case of E-band and V-band.
 - b. With evolvement of technologies, capacity requirements, new bands being introduced, fiberization, the cellular networks have to keep on optimising backhaul infrastructure including the spectrum bands and quantum.
 - c. Therefore, there should be a clear framework for spectrum surrender so that TSPs have a freedom and are encouraged to keep on optimising the backhaul infrastructure as well as to adopt more efficient technologies and spectrum bands.
 - d. Further, access spectrum has linkage to network of TSP, services being given to consumer and user devices as such, the lock-in period of 10 years for spectrum surrender can be said to be appropriate. However, in case of backhaul spectrum including E-band and V-band spectrum, there is no direct linkage of use of this spectrum to services to the consumer or devices used by consumers. The backhaul spectrum being inter-twined in between the network infrastructure hence, its cycle of upgradation could be much faster as compared to access network.
3. Considering the same, there has to be a progressive and agile licensing framework for the backhaul spectrum (i.e. E band and V band) including terms for surrender. **The lock-in period for surrender of backhaul spectrum should be a shorter lock-in time-period i.e. 2 years for spectrum acquired through auction, thereby allowing greater flexibility to operators for optimising and upgrading their backhaul network.**
4. **Other Associated terms:** The Guidelines for surrender of access spectrum by Access service providers have been issued by DoT on 15.06.2022, which contains associated terms and conditions as well. In our view, same terms and conditions can apply to backhaul spectrum (E-band and V-band) allocated through auction except the lock-in period of 10 years and 12 month advance intimation. The lock-in period for E band and V band should be 2 years and advance intimation should be of 3 months.
5. **Most importantly, as E band and V band are very crucial for the growth of 5G services and there are limited number of carriers which will support the requirement only till next few years, it should be assigned only to access service licensees offering access services.**

6. A progressive guideline has already been issued by Government through DoT's circular dated 23.07.2019, which provide ample opportunities for research and development. Thus, in principle all spectrum should be assigned to licensees only and non-licensees should be catered under the said guideline dated 23.07.2019. Neither any spectrum should be assigned nor should it be kept reserved, for non-licensed entities.

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.

VIL Comments to Q41

1. Our comments to Q33, 34 and 35 may please be referred to.
2. **We recommend that E band and V band should be allocated through a fair and transparent auction, as backhaul spectrum to access service providers only.**

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.

VIL Comments to Q42

1. **Eligibility Conditions:** As mentioned above, the backhaul spectrum is crucial for licensed entities especially access service providers to give new generation services to their consumers. **As such, only access service providers should be eligible for assignment of spectrum in E-band and V-band.**
2. **Associated conditions:**
 - a. **The scope of use of E band and V band should be for backhaul only.**
 - b. As licensees would be paying commercial price for the backhaul spectrum, there should not be any restrictive associated conditions on said spectrum.
 - c. Spectrum trading and leasing should also be allowed for backhaul spectrum obtained through auction.

3. A progressive guideline has already been issued by Government through DoT's circular dated 23.07.2019, which provide ample opportunities for research and development. Thus, in principle all spectrum should be assigned to licensees only and non-licensees should be catered under the said guideline dated 23.07.2019. Neither any spectrum should be assigned nor should it be kept reserved, for non-licensed entities.

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 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.

VIL Comments to Q43 and Q44

1. Unlike access spectrum, the backhaul spectrum is used within the network elements, and is not used for directly serving the end consumers. The TSPs may choose to deploy mix of backhaul spectrum across bands or across channel size, depending upon various factors like adoption of 5G services, associated traffic demand, location availability of fiber etc.
2. TSP should have freedom to choose spots and channel size as per their strategy and observed traffic growth in network.
3. Most importantly, market price is to be paid by the TSPs for purchasing the spectrum in E-band and V-band through auction. Thus, no additional restrictive conditions including roll out obligations are desirable for such spectrum where market price has been paid.
4. **Considering above, there should not be any rollout obligation associated with E-band and V-band carrier assignments.**
5. A progressive guideline has already been issued by Government through DoT's circular dated 23.07.2019, which provide ample opportunities for research and development. Thus, in principle all spectrum should be assigned to licensees only and non-licensees should be catered under the said guideline dated 23.07.2019. Neither any spectrum should be assigned nor should it be kept reserved, for non-licensed entities.

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.

VIL Comments to Q45 and Q46

1. Such feasibilities should not be assessed on paper or through any research/study conducted in some other countries. Such feasibilities should be assessed through proper research/studies within the country.
2. Before deliberation on delicensing or license exempt, it is imperative for TRAI to seek Report from DoT containing Utilization audit of present delicensed spectrum, demand studies for new frequency range and interested parties, use cases etc. In our view, there are no compelling use-cases for standalone indoor use of V band.
3. Interference can be a major challenge and we recommend that interference should be examined in detail through a study.
4. Keeping this in view, we recommend that:
 - a. **No spectrum in V-band should be considered for any standalone low-powered indoor use.**
 - b. A progressive guideline has already been issued by Government through DoT's circular dated 23.07.2019, which provide ample opportunities for research and development. For any other commercial purposes, the spectrum should be obtained through a fair and transparent auction, by paying market determined price. **Therefore, No spectrum should be considered for any license-exempt allocation.**

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.

VIL Comments to Q47

No further 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)**

VIL Comments to Q48

1. **E-band and V-band:** It should be given only through auction to access service providers for backhaul purpose only, as explained in our comments to Q 33 to Q35 above.
2. **MWA-MWB carriers:** We would like to reiterate our comments given above to Q1 and Q10 to Q14, given as follows:
 - a. The scope of MWA-MWB carriers should be restricted for backhaul purposes only.
 - b. Considering the critical need and importance of backhaul spectrum for access services as explained above in detail, backhaul spectrum in these bands should continue to be allocated administratively, only to access TSPs providing access services.
 - c. A progressive guideline has already been issued by Government through DoT's circular dated 23.07.2019, which provide ample opportunities for research and development. Thus, in principle all spectrum should be assigned to licensees only and non-licensees should be catered under the said guideline dated 23.07.2019. Neither any spectrum should be assigned nor should it be kept reserved, for non-licensed entities.

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.

And

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?

And

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.

VIL Comments to Q49 to Q 55

E-band and V-band:

1. E and V band spectrum required by an operator can be allocated through auction as standalone spectrum only for backhaul purposes and not for access services.
2. Further, TRAI should use the earlier method of arriving at valuation using the auction pricing of closest spectrum band. In the instant case of E band and V band, the valuation can only be in co-relation with the auctioned value of mmWave spectrum band.
3. While mmWave band spectrum can be used for access services as well as backhaul, E band and V band should only be auctioned for backhaul purposes. Backhaul spectrum not being a revenue generating spectrum, it only supports the network infrastructure for carrying traffic within the TSP network. Further, the propagation characteristics of spectrum in mmWave band and E/V bands are also different.
4. **E band pricing: As per our analysis, the valuation of E band should be at 95% discount to the auctioned value of mmWave spectrum band considering the scope of services being backhaul and propagation characteristics.**
5. **V-band pricing:** The effects of atmospheric attenuation (rain and oxygen absorption) are severe in this band, and rain and humidity can cause significant reduction in signal strength even over short distances. **Keeping in mind this factor, the pricing for V band can be at best be kept at 50% of the E band pricing.**
6. **Spectrum Usage Charge (SUC):** There should be NIL SUC for both the E-band and V-band spectrum acquired through auction, as per the Government reforms of 2021.

MWA/MWB band

7. **The MWA/MWB should continue to be allotted on administrative basis and its pricing per carrier should continue to be as per DoT's October 2015 circular without any change for 6/7/13/15/18/21/23 GHz spectrum bands.**
8. However, the existing pricing of MWA/MWB spectrum was fixed at 0.15% of AGR (with non-linear increase with additional no. of spots) at a time when access spectrum was being provided administratively. From 2010 onwards, access spectrum is provided through auction and it takes care of the revenue potential from access services.

9. **Therefore, there is an immediate need to rationalise the spectrum charges to be paid for MWA/MWB spectrum.**

Weighted Average Rate for Charges of all Backhaul spectrum:

10. In the latest auction held in July 2022, for all new spectrum acquired in the auction the SUC was reduced to zero and the resultant new weighted average SUC basis Nil rate for new spectrum and respective applicable rates for spectrum acquired before 2022 auction is calculated to determine the applicable SUC for each operator.
11. **On the similar principal, the MW charges on all the backhaul spectrum should be computed on a weighted average rate, basis the current applicable rate of MW charges for MWA and MWB and nil MW charges for E and V Band spectrum acquired by operators.**

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.

VIL Comments to Q56

1. **E band and V band:** Yes, the valuation for spectrum in E-band (71-76/81-86 GHz) and V-band (57-64 GHz) **should be done separately for each LSA. As mentioned above, E band valuation should be at 95% discount to the auctioned value of mmWave band. Similarly, V band valuation should be 50% of valuation of E band.** As mentioned in our comments to Q24 above, there is no reason to depart from the present LSA based policies being followed for spectrum auction and the same is also aligned with present licensing framework.
2. **MWA (13 GHz/15 GHz/ 18 GHz/ 21 GHz) and MWB (6 GHz/ 7 GHz) spectrum bands:** For these bands, the present applicable DoT policy of administrative allocation to access service providers is working fine and should continue to remain applicable. The % to AGR payment (with non-linear increments for additional carriers) was decided at the point in time when the access spectrum was administratively allocated, however given that access spectrum is allocation only via auction, there is an immediate need to rationalize these charges.

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.

VIL Comments to Q57, Q58 and Q59

Kindly refer to our comments to Q49 to Q54.

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.

VIL Comments to Q60

1. The Authority in its recommendations on “Auction of Spectrum in frequency bands identified for IMT/5G” dated April 11, 2022 recommended that the reserve price for the 800 MHz, 900 MHz, 1800 MHz, 2100 MHz, 2300 MHz, and 2500 MHz bands should be set as follows:
 - a) *At 70% of the average valuation;*
 - b) *In the LSAs where spectrum in a band was completely sold in the March, 2021 auction, the reserve price shall be the higher of the two figures – (1) 70% of the*

average valuation; and (2) auction determined price of the March, 2021 auction, duly indexed.

2. **It is to be noted that while many stakeholders including all three private access TSPs recommended reserve price at 50% of the average valuation, TRAI recommended 70% citing that such price would go a long way in helping discover the market clearing price of the spectrum. Also, the Authority was of the view that a reserve price set at the level of 70% of average valuation in view of the context of the 2022 auctions, will ensure healthy competition, leading to the discovery of the true market price.**
3. It has been realized over the years that high reserve price may discourage competitiveness of the auction and low participation leading to low sales and revenue. Also, on the other hand, too low a reserve price may hamper the realization of the true value of the underlying asset by incentivizing collusive behavior among participants.
4. A balanced intermediate reserve price satisfies the basic objectives of reserve price setting viz., ensuring realization of the underlying value of the asset being auctioned and deterring collusive behavior among bidders. Further, in order to ensure competitive bidding and price discovery, the reserve price should not be too close to the expected/predicted valuation of the object put up for auction. The level at which reserve prices are set has implications for each of the objectives normally set for spectrum auctions: efficiency, competition, transparency, market development, and Government revenue.
5. We understand that there have been enough deliberations and reserve price of 70% was set as an optimal level to ensure efficiency of the auction process and has been exercised in the recent auctions.
6. **Considering above, the reserve price of spectrum should be set at 70% of the valuation of spectrum, as has been recommended by Authority during last recommendations dated 11.04.2022.**

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.

VIL Comments to Q61

1. The terms of payment are equally important as the reserve prices. Keeping in mind the financial stress faced by the industry, the payment terms for spectrum acquired in the auction shall be such that it supports both investments as well as network deployment, in place of revenue collection. Significant amount of capital expenditure will be required for deployment of equipment to support new bands for backhaul thereby, supporting 5G expansion as well as enhancement of coverage in uncovered areas.
2. In the 2021 reform package, Government has also acknowledge the same by announcing a moratorium/ deferment for upto four years on the dues for the spectrum purchased in past auctions.
3. TRAI, in its last recommendations i.e. on “Auction of Spectrum in frequency bands identified for IMT/5G” dated April 11, 2022 had recommended the following flexible payment options:
 - a. **Option I:** *Full or part upfront payment of the bid amount within 10 days of declaration of final price;
Where part upfront payment has been made, the buyer shall have the option of availing moratorium for the proportionate number of years for which the upfront payment has been made, and the balance amount shall be payable in equal annual instalments over the remaining period in advance at the beginning of the year, after the period of moratorium if any (duly protecting the net present value of the bid amount at the applicable rate of interest); the annual instalments shall become due and payable on the same date of each year.*
 - b. **Option II:** *Payment of 30 equal annual instalments of the bid amount (duly protecting the net present value of the bid amount at the applicable rate of interest) in advance at the beginning of the year, the first instalment becoming payable within 10 days of declaration of final price. The balance 29 instalments shall become due and payable on the same date of each following year.*

(The Authority noted that the recent reform package announced by the Government had, inter alia, increased the duration of assignment of spectrum from 20 years to 30 years.)
4. While recommending these options, the Authority mentioned being cognizant of the need for the long-term growth and sustainability of the telecom sector, infusing liquidity and encouraging investment, and the need for TSPs to be in good health so as to make regular and substantial capital expenditure for transitioning to 5G technology.

5. In the NIA dated June 15, 2022, DoT provided the following two options to successful Bidders to make the payment:

Option 1: Full or part upfront payment of the bid amount within 10 days of declaration of final price. Where part upfront payment has been made, which can be a multiple of complete years with a minimum of two years, the buyer shall have the option of availing moratorium for the corresponding number of years for which the upfront payment has been made, and the balance amount shall be payable in equal annual instalments over the remaining period, payable in advance at the beginning of each year, after the period of moratorium if any, duly protecting the Net Present Value (NPV) of the bid amount at the applicable rate of interest. The annual instalments shall become due and payable on the Effective Date anniversary of each following year.

Option 2: Payment of 20 equal annual instalments of the bid amount, duly protecting the NPV of the bid amount at the applicable rate of interest, in advance at the beginning of the year, the first instalment becoming payable within 10 days of declaration of final price. The balance 19 instalments shall become due and payable on the Effective Date anniversary of each following year.

(Option 2 considered 20 equal annual instalments as the validity period of right to use of the spectrum in 600 MHz, 700 MHz, 800 MHz, 900 MHz, 1800 MHz, 2100 MHz, 2300 MHz, 2500 MHz, 3300 MHz and 26 GHz bands won in the auction shall be twenty (20) years from the 'Effective Date' as per NIA)

6. **As submitted in comments to above questions, we request the Authority to maintain consistent policies and ensure level playing field as such, the payment options and terms and conditions should be same as has been provided under the NIA 2022 as well as TRAI's recommendations dated 11.04.2022.**
7. **Moratorium Period:** In line with the telecom reforms announced in 2021 which provided for moratorium / deferment for upto four years on the dues for the spectrum purchased in past auctions; all future spectrum auctions should have option of moratorium/deferment upto four years.
8. **Rate of Interest in case of Deferred Payment and Prepayment:** Rate of Interest in case of Deferred Payment and Prepayment should be 7.2% p.a. as considered by DoT for 2022 Spectrum Auction.

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