

HRCF response to Consultation Paper on Assignment of Spectrum in E&V Bands, and Spectrum for Microwave Access (MWA) & Microwave Backbone (MWB)

Telecom:

Spectrum

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This document presents the detailed response of HRCF to the TRAI open consultation paper titled "Assignment of Spectrum in E&V Bands, and Spectrum for Microwave Access (MWA) & Microwave Backbone (MWB)." Our focus primarily lies in the discussion surrounding the allocation and regulation of V band spectrum.

Kindly find our responses to question numbers;

1-2, 23-25, 27-29, 31-34, 37-38, 41-46

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

	Quantum of spectrum required (per entity per LSA)
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Band	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)			

A1. Due to use of MWB band for backbone network of cellular networks, the allocation of MWB band may need to continue under license.

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)			

A2. The use for cellular networks may be governed by the LSA approach,

however, the unlicensed use for short range, indoor and closed spaces should be permitted on pan-India basis.

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

A3. – No comment offered

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)			

A4. – No comments offered

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?

A5. - No comments offered

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.

A6. - No comments offered

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.

A7. - No comments offered

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.

A8. - No comments offered

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.

A9. - No comments offered

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)		

A10. - No comments offered

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.

A11. - No comments offered

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)		

A12. – No comments offered

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.

A13. - No comments offered

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.

A14. - No comments offered

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.

A15. - No comments offered

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.

A16. – No comments offered

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.

A17. - No comments offered

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.

A18. - No comments offered

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.

A19. - No comments offered

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.

A20. - No comments offered

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.

A21. - No comments offered

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.

A22. - No comments offered

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

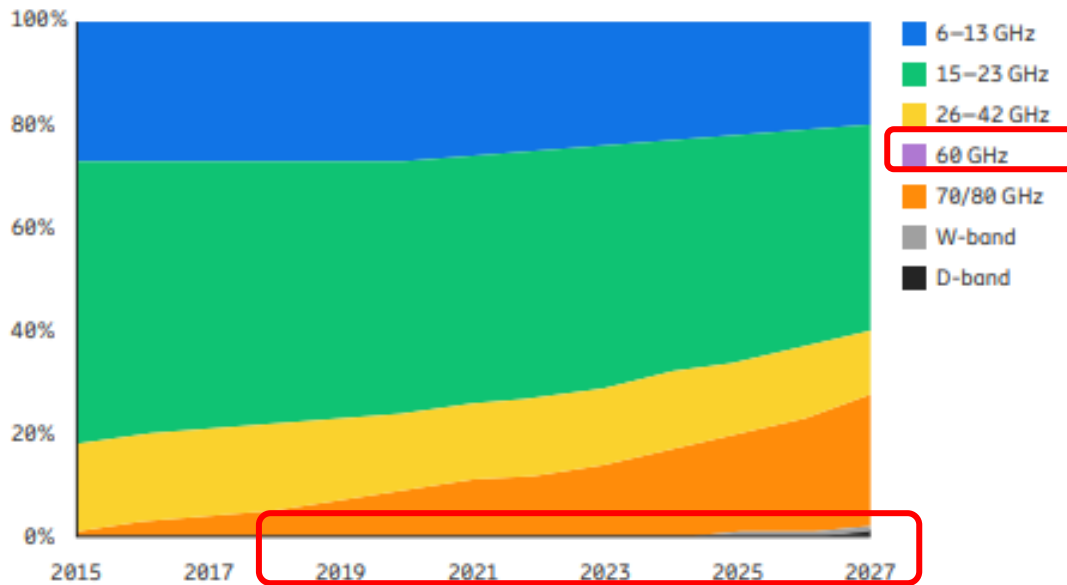
Band	Quantum of spectrum required (per entity per LSA)		
	TSPs with Access Service License/ Authorization	TSPs with other than Access Service License/ Authorization	Other entities (non-TSP, for non-commercial/ captive/ isolated use)
E-band (71-76/81-86 GHz)	-	-	-

V-band (57-64 GHz)	-	-	<u>59-64</u>
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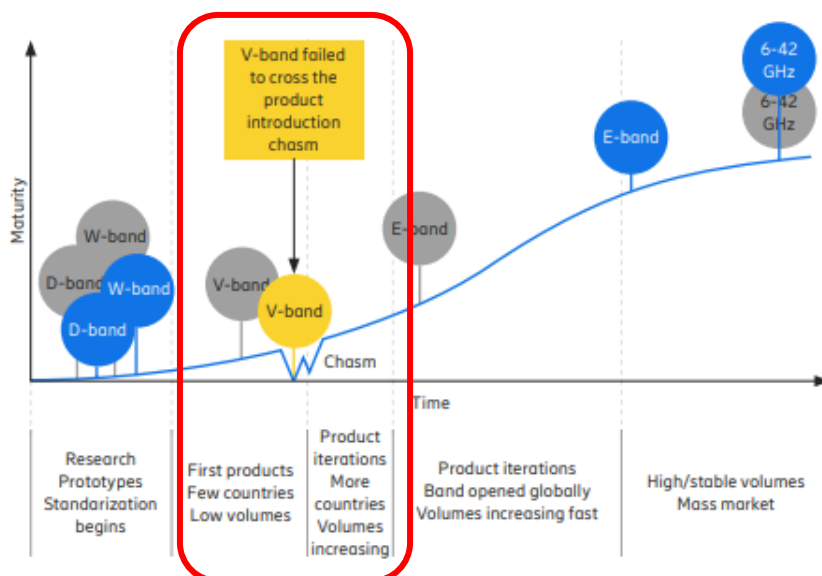
(ii) Likely demand after five years

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)			<u>57-66 or</u> <u>57-70</u>

A23. - As observed in the Ericsson Microwave Report, October 2022, the V-band was predicted to grow, especially in small cell backhaul applications. However, the predictions, while quite modest, did not materialize inter alia due to small cells not taking off and scattered spectrum availability. The demand projection for V-band use by TSPs continues to remain relatively small as has also been noted by the Authority and is highlighted below.



This supply-demand gap of V-band based usage, allows for nurturing the growth of intermediary products and services that are under development and will act as a bridge between the backbone and network connectivity provided by the TSPs with the devices and services provided by non-TSPs thereby contributing to the overall growth of the eco-system.



For non-TSP V-band devices, it is preferable to specify the frequency bands designated by IEEE 802.15.3e or ITU-R. Initially, to avoid interference with the default Channel 2 as per the standards, supporting an additional Channel

3 should be considered. After five years, it would be beneficial to support the newer standards.

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)			<u>LSA, ideally on pan-India basis</u>

A24. Since the V-band has stronger directionality compared to microwaves and is more susceptible to attenuation and shielding effects, there is less interference in the same area. We would like to recommend permitting use of V-band on LSA, preferably on pan-India basis.

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.

A25. Yes, for the same reasons mentioned earlier, significant interference with Non-Terrestrial Networks (NTN) is not anticipated. Therefore, it is considered acceptable to defer this discussion to a later date without concern.

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.

A26. - No comments offered

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.

A27. In the V-band, all standards listed in IEEE and ITU-R are Time Division Duplexing (TDD) based. Therefore, at the very least, TDD should be adopted for non-TSP applications.

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.

A28. As specified in IEEE and ITU-R, unless there is a specific reason, the channel bandwidth should be set to 2.16 GHz per channel. This will ensure congruency with global standards.

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.

A29. Given the propagation characteristics of the V-band, which suggest its suitability for local connections, allocating bandwidth for specific purposes would be inefficient. In the event that licenses are granted to TSPs, they should be issued based on a point-to-point (P2P) basis to ensure no impact on non-TSP applications.

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.

A30. - No comments offered

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.

A31. As discussed in response to [Q29], given the propagation characteristics of the V-band, which suggest its suitability for local connections, allocating bandwidth for specific purposes would be inefficient. In the event that licenses are granted to TSPs, they should be issued based on a point-to-point (P2P) basis to ensure no impact on non-TSP applications.

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.

A32. For the V-band, in the case of TSPs where fixed station operations are anticipated, we support setting an upper limit on the maximum number of carriers held. However, for non-TSP applications, where temporary connections are more common, there should be no such restrictions. As long as this is adhered to, there is no particular preference for how the maximum number of carriers for TSPs is determined.

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	Justification
	[Auction/ Administrative/ Any other (please	

	specify))]	
(iv) TSPs with Access Service License/ authorization		
(v) TSPs with other than Access Service License/authorization		
(vi) Other entities (non-TSP, for non-commercial/ captive/ isolated use)	<u>Administrative or free</u>	<u>per the international recommendation s from ITU-R.</u>

A33. As has been evident from the Ericsson Microwave Outlook Report, the deployment of V-band has been very limited and future projections also suggest very slow growth, inter alia, due to scattered spectrum availability. Its use is projected to be mainly in short-range devices with WiGig technology. In order to create momentum for V-band adoption, especially for non-TSPs, we recommend that it should either be administratively allocated or be available in unlicensed mode as per the international recommendations from ITU-R.

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.

A34. As noted above, for non-TSP V-band devices, it is preferable to specify the frequency bands designated by IEEE 802.15.3e or ITU-R. Initially, to avoid interference with the default Channel 2 as per the standards,

supporting an additional Channel 3 should be considered. After five years, it would be beneficial to support the newer standards. Of course, in line with international developments, it would be better to make other channels available as well.

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.

A35. - No comments offered

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.

A36. - No comments offered

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.

A37. Although LSA based approach will be more appropriate for TSPs, for non-TSP and indoor applications, it would be more desirable to align with international standards and make it usable pan-India.

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.

A38. For non-TSP applications in the V-band, using devices compliant with standards such as IEEE 802.15.3e could enable low-cost, high-capacity data transmission between two sites for industrial and infrastructure purposes. Wide-use of these bands without a license could lead to simplified maintenance and improved safety. In such cases, to ensure usability in crowded environments, it would be beneficial to introduce regulations on output and antenna gain in line with other countries' V-band low-power standards.

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.

A39. - No comments offered

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.

A40. - No comments offered

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.

A41. For the V-band, a review every 20 years is desirable. Especially since interference issues are expected to be minimal, the frequency of revisions should also be less frequent.

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.

A42. For non-TSP applications in the V-band, as they are not telecom operations, ensuring the stability of the devices used should be sufficient. Requirements could include entities manufacturing prototypes or products, providers of V-band based services and successful demonstration of services using these devices.

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.

A43. For V-band, non-TSP implementation, a period of 6 months for roll-out may be permitted. This will create sufficient urgency to bring new solutions to the market and help build momentum for creating a

viable eco-system.

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.

A44. For V-band non-TSP applications, a requirement should be the actual initiation of some service utilizing those frequencies. On failure of meeting the rollout obligations, the provider may be asked to re-apply for the spectrum along with supporting documentation justifying delay in roll out.

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.

A45. Yes, it should be permitted. In many other countries, low-power devices can be used without a license, and the same should apply in India. For example, in Japan, devices with an output of 10dBm or less can be used without a license. As there is minimal risk of interference, India should adopt a similar standard for indoor cases.

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.

A46. For the V-band: a) For the entire band, in accordance with ITU-R should be adhered to. b) For indoor use, considering the capabilities of current devices, a range of 20 meters or less is deemed appropriate. c) Taking into account the practices in countries like the USA and Japan, an Effective Isotropic Radiated Power (EIRP) of 40dBm should be considered.

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.

A47. - No comments offered

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)

A48. - No comments offered

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.

A49. - No comments offered

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.

A50. - No comments offered

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.

A51. - No comments offered

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?

A52. - No comments offered

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.

A53. - No comments offered

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.

A54. - No comments offered

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.

A55. - No comments offered

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.

A56. - No comments offered

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.

A57. - No comments offered

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.

A58. - No comments offered

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.

A59. - No comments offered

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.

A60. - No comments offered

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.**

A61. - No comments offered