



5th May 2014

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Subject: TRAI Consultation Paper No 02/2014 on Allocation and Pricing of Microwave Access (MWA) and Microwave Backbone (MWB) RF carriers dated 28th March 2014.

Dear Sir,

This is in reference to your Consultation Paper No. 02/2014 dated 28th March 2014 on 'Allocation and Pricing of Microwave Access (MWA) and Microwave Backbone (MWB) RF carriers'.

As desired, we hereby enclose our response to the questions raised in your above-mentioned consultation paper. We sincerely hope that our views would be given due cognizance.

Thanking you and assuring you of our best attention always.

Yours sincerely,

Anand Dalal
Senior Vice President – Corporate Regulatory Affairs
Tata Teleservices Limited
And
Authorized Signatory
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Enclosure: As above



Tata Teleservices Response to TRAI Consultation Paper No 02/2014 on “Allocation and Pricing of Microwave Access (MWA) and Microwave Backbone (MWB) RF carriers” dated 28th March 2014

- Q1. How many total Microwave Access and Backbone (MWA/MWB) carriers should be assigned to a TSP deploying:**
- a. 2G technology only.
 - b. 3G technology only.
 - c. BWA technology only.
 - d. Both 2G and 3G technologies.
 - e. 2G and BWA technologies.
 - f. 2G, 3G and BWA technologies.

Please give rationale & justification for your answer.

TTL Comment:

Microwave technology is widely deployed in mobile communications to provide point-to-point (PTP) Radio Frequency (RF) links in mobile backhaul as well as in the backbone network. Though, in Backbone Networks Optical Fibres are also extensively deployed.

The requirement of Microwave backhaul carrier depends primarily on probable interference between nearby sites and also the amount of data carried on these links.

The unprecedented data growth facilitated by enhanced capabilities and availability of cheaper handsets, newer access technologies and increasing number of small cells (macro/small/ femto etc) is resulting in the requirement of higher and diversely spread capacity in the mobile microwave backhaul networks.

2G Technology:

The allocation technically should be linked to Access Spectrum allocation and number of BTSs those are required for coverage of the town/city. In case of 2G, even though capacity play a less significant role, but cluster density with number of BTSs basis allocated access spectrum drive for number of spots requirements to avoid interference. For example, in the event of allocation of frequency spectrum in 900 MHz, a city/town of 1200 Sq Kms can be covered decently with 998 BTSs in city link Mumbai and 883 BTSs in city like Delhi, whereas, the same will become 2437 BTSs and 2156 BTSs for 1800 MHz band respectively.



3G Technology:

In case of 3G, the capacity play a major role limiting number of nodes in a ring in ring architecture and number of nodes in chain in hub and spoke architecture depending on per BTSs capacity required to serve the geography. Even though new generation radios offer higher capacity backhaul, but high bandwidth requirement per BTS and Access frequency in the 2100 MHz increases BTSs density in cluster thereby increasing requirement of MW spots to avoid interference.

BWA Technology:

In case of BWA, the capacity play a significant role to limit number of nodes in a ring in ring architecture and number of nodes in chain in hub and spoke architecture since bandwidth requirement per BTS would be 100 Mbps. Even though new generation radios offer higher capacity backhaul, but high bandwidth requirement per BTS will limit 2-3 nodes in a chain or ring architecture.

Before we arrive at the requirement of number of optimized Microwave carriers; we would like to mention the following well considered facts:

- As per the network availability guidelines, there is a requirement to keep the threshold degradation within limit of less than 3 dB in order to maintain network availability greater than 99.999% in order to meet the TRAI stipulated quality standard for mobile network.
- Microwave Network Planning tools like “PATHLOSS” and similar ones are used for planning of MWA network in a circle.
- Analysis of use cases using inputs like Antenna Models, Discrimination Angle, Frequency and Link Distance etc.
- Such cases with interference threshold degradation higher than 3 dB as computed by various tools and models may be treated as probable interference cases.

The results of such analysis lead to some indicative numbers as various aggregated requirements of carriers for Microwave Access and Backbone in different types/ categories of circles.

Based on above, the optimum requirement of carriers for each and for combination of various technologies is indicated in the following Table:



Table 1

	Metro	A Circles		B Circles		C Circles	
	MWA	MWA	MWB	MWA	MWB	MWA	MWB
CDMA/GSM 2G	4	3	1	2	1	2	1
CDMA + GSM 2G	7	5	1	3	1	3	1
BWA Only	9	7	1	5	1	5	1
3G Only	8	6	1	4	1	4	1
2G+3G	8	6	1	4	1	4	1
2G + BWA	9	7	1	5	1	5	1
2G + 3G+ BWA	9	7	1	5	1	5	1

Note - An operator should be given a maximum of 2 carriers in 15 GHz (Also considering that 15 GHz carrier is quite occupied presently and required by many) and the rest in 18/21/ 23 GHz, etc.

Q2. How many MWA/ MWB carriers need to be assigned to TSPs in case of 2G, 3G and BWA at the start of their services [i.e. at beginning of rolling of services] Please justify your answer.

TTL Comment:

We are of the view that for an operator should be allocated half of the numbers of MWAB carriers as indicated in the Table 1 above to start the service in a particular circle and any additional carrier can be allotted basis justification with interference calculations.

These carriers should be allocated for the entire circle on exclusive basis to a TSP. This will help in well considered, optimized and better planning of the network and efficient use of Microwave resources.

As and when a TSP migrate its traffic on OFC, the requirement of Microwave carrier will reduce, in that situation, TSP should be advised to surrender its additional Microwave carrier.

**Q3. Should excess spectrum be withdrawn from existing TSPs?
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Q4. If yes, what should be the criteria for withdrawal of excess allocation of MWA and MWB carriers, if any, allocated to the existing service providers?



TTL Comment:

Currently, the Microwave carriers held by TSPs are disproportionate to their requirement. Some TSPs hold more than their requirement while, others do not have sufficient Microwave carriers resulting in delay in their network expansion.

Therefore, to have a level playing field, WPC Wing of DoT should carry out a rationalization exercise on holding of overall Microwave carriers by a TSP as per the Table 1 above and the excess Microwave carriers held by a TSP should be withdrawn. Any existing operator should be allowed to keep a maximum of 2 carriers in 15 GHz band and beyond that, the operator should be asked to surrender in a reasonable time of say 6 months.

Q5. What should be the preferred basis of assignment of MWA/MWB carriers to the TSPs i.e. 'exclusive basis assignment' or 'link-to-link based assignment'?

TTL Comment:

Allocation of Microwave carrier should be kept simple and easy to implement. In the initial stage of cellular mobile networks, WPC used to allocate Microwave carriers on link-to-link basis.

Administratively, it was very difficult to monitor its implementation and at times in less efficient use or even under utilization. Therefore, in 2006, WPC, started allocating at least one Microwave Access carrier for exclusive use in a circle and further additional carrier on districts basis. However, the allocation of Microwave Backbone still continued to be on link-to-link basis. We are of the view that for better and efficient utilization of Microwave resources both for Access and Backbone should be allocated on exclusive basis to a TSP.

Q6. In case 'exclusive basis' assignment is preferred, whether MWA and MWB carriers should be assigned administratively or through auction. Please comment with full justifications.

TTL Comment:

Different countries follow different method of assigning backhaul spectrum to its service providers. Unlike access spectrum which is assigned mostly by auction in a number of countries, backhaul spectrum in most of the countries is generally assigned administratively while taking care of various technical (spectrum bands, interference, antenna characteristics and path length) and link budget factors. In the recent past, some countries also tried to auction these microwave backhaul spectrum bands but they are very few in number.

Base on international practice, we are of the view that Microwave Access and backbone carriers should be allocated on the administrative basis only.



Q7. In case 'link-to-link basis' assignment is preferred, how the carrier assignment for different links should be carried out, particularly in nearby locations?

TTL Comment:

We do not recommend link to link assignment. In case of "link-to-link basis" assignment, while assigning carriers to nearby locations, WPC would need to undertake interference analysis and ensure the newly assigned carrier doesn't interfere with links of all other TSPs in the geography. To accomplish this, WPC must be equipped with all the necessary planning tools, complete details of all links, viz. antenna height, antenna gain, antenna radiation pattern, complete radio parameters of the device, etc. WPC would also need to ensure frequency coordination among the TSPs, to avoid inter-system interference. In view of the above, "link-to-link basis assignment" is NOT a preferred mechanism.

Q8. Considering the fact that different TSPs may require additional carriers at different point of time, what should be the assignment criteria for allocation of additional carriers for MWA and MWB?

TTL Comment:

We are of the view that for an operator should be allocated half of the numbers of MWAB carriers as indicated in the Table 1 above to start the service in a particular circle and any additional carrier can be allotted basis justification with interference calculations. The optimum number of carriers which should be allocated to a TSP is as given in the Table 1. For efficient utilization of Microwave resources and discourage its hoarding, any additional allocation, beyond as given in the Table 1, should attract very high rate of charging as discussed subsequently.

Q9. How can it be ensured that spectrum carriers assigned are used optimally and the TSPs are encouraged to move towards the OFC?

TTL Comment:

In India, pricing methodology of Microwave resources is based on the AGR. As it is dependent upon the AGR of the TSP rather than a fixed amount, the payment liability of the TSP is lesser at the time of initial network roll-out. This mechanism is quite simple and non-ambiguous. The slab of spectrum usage charge does not change as long as number of carriers assigned to a TSP remains the same, irrespective of the fact whether the TSP has deployed a few MW RF links in the LSA or is largely dependent upon MW RF links only.



All TSPs have experienced by now that data growth has started picking up. The trend has already kick started with increasing trend of data usage in GPRS, 3G and going forward when LTE services will get enable. The increasing trend demand more bandwidth for which TSPs are already working on deploying IP based technologies in backhaul. Therefore, at this juncture, if the TSPs are incentivized to lay more optical fiber cable by waiving-off ROW, then it may encourage the existing TSPs to surrender the excess Microwave spectrum.

Q10. Should an upfront charge be levied on the assignment of MWA or MWB carriers, apart from the annual spectrum charges?

TTL Comment:

We are of the view that Microwave resources should be allocated administratively and without any upfront charges.

Q11. What should be the pricing mechanism for MWA and MWB carriers? Should the annual spectrum charges be levied as a percentage of AGR or on link-by-link basis or a combination of the two?

Q12. In case of percentage AGR based pricing, is there any need to change the existing slabs prescribed by the DoT in 2006 and 2008? Please justify your answer.

TTL Comment:

We are of the view the current method of payment for Microwave carriers based on revenue share basis on percentage of AGR should continue. However, we do not agree with the current slabs as prescribed by DoT in 2006 and 2008. We would like to suggest a modified version of the slab rate where in the slab increment for additional carriers up the numbers of carriers as given in the Table 1 should be fixed at 0.15% per carrier. Any further allocation of carrier beyond as given in the Table 1 should attract additional 0.5% for each such additional carrier. For example if an operator has been allocated 4 carrier in Delhi, he should pay spectrum charges at the rate of 0.6%, if is allocated the 8th carrier, then the charges should be 1.2% and for the 9th carrier the payment should be 1.7%, 10th carrier 2.2% and so on.

TTL Comment:

Q13. In case link-by-link based charging mechanism is adopted then:

(a) Should the spectrum be priced differently for different MW spectrum bands (6GHz/7GHz/13GHz/15GHz/18GHz/21 GHz/26 GHz/28GHz/32GHz/42 GHz etc)? If yes, by what formula should these be charged?



(b) What are the factors (viz as mentioned in para 3.22), that should appear in the formula? Please elaborate each and every factor suggested.

TTL Comment:

Not applicable as we are of the view that charging for Microwave carrier should be based on percentage of AGR as given in answer to Q12.

Q14. Should the option of assignment of MWA carriers in all the spectrum bands in 6-42 GHz range be explored in line with other countries? What are the likely issues in its assignment MWA carriers in these additional spectrum bands?

TTL Comment:

Presently, in India, allotment of carriers for microwave point-to-point links is done in the 6 GHz, 7 GHz, 13 GHz, 15 GHz, 18 GHz and 21 GHz. As frequencies in the 6 GHz and 7 GHz bands are earmarked for the MWB carriers, only 13 GHz, 15 GHz, 18 GHz and 21 GHz are being used for MWA carriers. As mobile broadband network traffic is continuously growing, demand for PTP fixed links will also increase. It is quite likely that demand for fixed links in these frequency bands cannot be met and it may be required to use alternative frequencies.

We are of the view that to meet the additional requirement of Microwave carriers, we should explore the bands in 6-42 GHz and operators may use new radio propagation technology techniques to have longer hops as required.

Q15. In your opinion, what is the appropriate time for considering assignment of MWA carriers in higher frequency bands viz. E-band and V-band?

TTL Comment:

- Telecommunications is a key enabler for economic growth. With the launch of new generation data focused technologies and phenomenal growth in data usage, demand for much higher bandwidth is becoming necessary. Deployment of fiber, which enables high bandwidths, is difficult in metros and big cities due to difficult RoW permission issues.
- E-Band and V B-Band spectrum are becoming essential in such dense metro areas. This band has been allocated in many countries.
- Larger chunks of spectrum are considered to be available /reportedly available around frequency bands of other ranges as well range for usage.
- Such bands also could enable deployment of desired multi-gigabit wireless links. Their unique propagation characteristics allow use of highly directional 'pencil beams' minimizing interference issues to a large extent. . . The same can result in highly efficient



reuse of spectrum. Carrier class products are already available for multi gigabit per second transmission for link distances of 1 to 2 km.

- These are well known globally harmonized band ensuring economies of scale.
- The same can be used for Last Mile Connectivity for bandwidth requirement for higher BW capacities required by for high end corporate users.
- It can even be used as supplements of optical fibre links in Metropolitan Area Networks; where deploying high capacity fiber may not be feasible. It is suitable for providing redundancy for fiber links in Last Mile/ Metropolitan Area Networks.
- In our view, it is the right time to allocate E-Band spectrum 71-76 / 81-86 GHz and V-band spectrum 57-64 GHz for outdoor PTP applications.

**Q16. Should E-band be fully regulated or there should be light touch regulations?
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Q17. What charging/pricing mechanism would be appropriate for these bands?

TTL Comment:

- According to ITU Radio Regulations, the 71-76 GHz and 81-86 GHz bands are available for fixed and mobile services. Many countries have opened this E-band for outdoor point-to-point communication. A “light licensing” approach has been adopted by many regulators to encourage the adoption of E-band frequencies which have really become quite structured and matured based on focused research during last many years. These use smaller components and use less power. Thus as incentive to such usage there should be light licensing / regulation touch
- The “light licensing” approach was pioneered by the FCC in the USA and adopted by others like UK, Australia & Russia.
- Also, under the “light licensing” scheme, the spectrum charges reflect only the cost of administering the allocation process.
- Coincidentally, as E-band allows very high level of frequency reuse, the process for allocation of frequencies can be automated, even resulting in low administration costs.
- Therefore, we are of the view that a “light licensing” scheme should be adopted along with nominal fee for E-Band to incentivize the use of the same
- For V-band, inclusion of 60 GHz, in new NFAP is mainly for outdoor Point-to-point applications.
- The 60 GHz band to be de-licensed as has been done in many countries.
- De-licensing will help in the development of much desired high speed communications infrastructure



Q18. Apart from Q1-Q17, stakeholders are requested to bring out any other issue, which needs to be examined, with justification.

TTL Comment:

To encourage operators to go for more of Optical fiber cable connectivity, we are of the view that ROW should be waived off for the optical fiber routes laid to connect incremental requirement of setting up Access network.