



**AUSPI's Response to the TRAI's Consultation Paper No. 2/2014 on
"Recommendation for allocation and pricing of Microwave Access (MWA) and
Microwave Backbone (MWB) RF carriers".**

- 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.*

TRAI has rightly acknowledged in the consultation paper that at present nearly 80% of cell sites in India have microwave-based backhaul link and its usage is likely to go further up due to the expected growth in the data traffic of the new data centric technologies such as LTE, LTE-Advanced etc. and other factors like proliferation of new mobile devices and applications which generate significantly higher traffic across the mobile networks, choice of access technology, availability of fiber network, possible interference between the sites, modulation technologies in use in a network, network topology etc.

It is therefore important that the Microwave spectrum should be used diligently so as to meet the present/future requirements of higher data usage and some spectrum Cap should apply to avoid any excess allocation to any set of TSPs.

We therefore propose that 3-4 Microwave Carriers (including 1 carrier for MWB) may be allotted initially with the access spectrum to enable TSP to roll out its backbone network. It is also essential that the first MWA carrier be allocated in 15 GHz band. Any allocation above the initial allocation should be based on justification (As mentioned in Nov'06 & various orders of DoT) of the additional carrier requirement and availability on the case to case basis.

We also propose a capping of max. 6-8 Microwave Carriers (including 2 carriers for MWB) allotted to a TSP irrespective of the technologies used. This will not only check the misuse/excess allotment of MW spectrum but will also lead to usage/laying of fibre backbone network where the demand is higher.

To address the increasing demand, there is a need to open up new bands like E-Band & V-band as well for PTP outdoor networks which is addressed in later section in this response.

We would also like to highlight that under the first category "2G Only", there would be 3 set of operators such as the operators operating on GSM Only, CDMA only and GSM & CDMA Both. Since the CDMA & GSM networks of dual technology operators are altogether different and independent from each other having their independent



requirements, Microwave carriers should be allocated for both the networks separately.

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.

- a. As stated above, it is suggested that 3-4 Microwave Carriers (including 1 carrier for MWB) may be allotted initially with the access spectrum to enable TSP to roll out its backbone network. It is also essential that the first MWA carrier be allocated in 15 GHz band. Any allocation above the initial allocation should be based on justification (As mentioned in Nov'06 & various orders of DoT) of the additional carrier requirement and availability on the case to case basis.
- b. Since 2006, WPC started allocating one MW Access carrier for exclusive use in a circle (non-metro) and further additional carrier on districts basis based on full technical justification. Though these additional MWA carriers are allocated for only few districts, operators are paying the spectrum usage charges on the AGR for entire service area to use these carriers only in few districts. We suggest that once a carrier is allocated, it should be allocated for the entire service area for an exclusive use. It would allow simplification in the allocation procedure and better network planning besides efficient use of backhaul spectrum.
- c. If Government decides to continue with the existing procedure of partial allocation (district-wise) of MWA carriers, there is a genuine need to levy spectrum charges in the proportion of the no. of districts in a service area the carrier is allocated for use and not for the entire service area.
- d. Similarly, the Microwave Backbone (MWB) carriers should also be allocated for exclusive usage, for the entire service area in place of the current criteria of link-wise allocation on the basis of technical justifications which are required each time an operator apply even for a single additional link and that too for the carrier already allocated to it for which it is already paying spectrum usage charges on the AGR of entire service area.

Q3. Should excess spectrum be withdrawn from existing TSPs?

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?

Currently, the Microwave carrier allocations to operators are disproportionate. Some operators hold more carriers while some do not hold sufficient Microwave carriers resulting in delay in their network expansion.

To ensure that the backhaul spectrum is available to all the operators in most optimum manner, it is essential that the carriers in excess of the limit as prescribed (see response to Q1) be withdrawn. We also suggest that at least one carrier should be allocated in 15 GHz band to all TSPs with a cap of max. 3 carriers in any band.

Withdrawing the excess spectrum and its reallocation to the operators having insufficient amount of carriers would ensure efficient utilization of MW bands by all



operators. We suggest that the 13 GHz and 15 GHz bands be considered on priority for such withdrawal of excess carriers.

- 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'?***

Allocation of Microwave carrier should be kept simple and easy to implement. Due to continuous increase in the number of microwave links in the mobile networks, WPC migrated from link-to-link assignment regime to exclusive basis assignment for MWA carriers in 2006 as it was difficult to process and allocate on link-to-link basis and maintain records for the same. However, allocation of Microwave Backbone continued to be on link-to-link basis.

We are of the view that for better management of microwave spectrum allocation and its usage, MWA & MWB carriers should be allocated on exclusive usage basis for the entire service area.

- 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.***

Microwave Access & Backbone spectrum is used for specific destinations and not used for everywhere coverage like access spectrum. Therefore, Microwave spectrum should be allocated administratively as being done in the current regime.

Microwave spectrum is being allocated administratively in international markets. This is due to the highly technical and site specific nature of the spectrum usage. A fixed-microwave link is typically just one small part of a complex network, with users requiring highly customized configurations. This limits the market appeal of fixed link spectrum.

An overview of the microwave allocation methodologies followed globally indicates prevalence of administrative allocation of spectrum with a mix of cost recovery and incentive based pricing. In India, microwave spectrum is allocated administratively to the operators for building backhaul networks. This is in line with the international practice and hence, should be continued to be allocated administratively.

- 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?***

We do not recommend link to link assignment in sub 42 GHz band however carriers allocation in higher band i.e. above 42 GHz should be done on link to link basis. .

- 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?***

Microwave Carriers may be allocated to the operators as and when they require subject to the capping as prescribed in response to Q1 above.



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

At the outset, we would like to bring to the notice of the Authority that there are many challenges in laying OFC for mobile networks in India such as difficult terrain, requires time for deployment, logistic challenges. Additionally, heavy government levies are imposed while obtaining RoW permissions and there are cumbersome approval procedures which hinders its deployment.

To encourage the operators to move towards OFC deployment, the TRAI is requested to help the industry with the following:

- Single window and time bound RoW clearances at State level
- RoW charges particularly intra-city , railway crossing , Gas and Oil pipelines crossings etc should be one-time and reasonable
- Bandwidth charges (Leased line) paid to other operators should be allowed as pass thru charges in AGR.

Setting aside the above challenges and the support required from the Government in this regard, we would like to mention that pricing methodology of Microwave resources is based on percentage of AGR in India. As the AGR of an operator increases, the payment liability of TSP increases. Also, if an operator uses more number of carriers, it needs to pay the spectrum usage charges as per higher slab rate which also increases its liability. These factors we believe are sufficient to encourage an operator to replace microwave links with OFC network. With the advent of LTE and increasing demand of higher capacity backhaul network, operators should be encouraged to lay more and more Fibre network and also use Microwave access spectrum in higher spectrum bands. Above suggested measures should be taken immediately to incentivize operators to switch to fibre.

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

Microwave resources should be allocated administratively and without any upfront charge. Operators are already paying AGR based spectrum usage charge for use of microwave spectrum.

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.*

We are of the view that the current method of payment for Microwave carriers based on revenue share basis on percentage of AGR should continue.



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.*

Not applicable in view of our response above.

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?

Presently in India, allotment of carriers for microwave point-to-point links is done in the various sub-42 GHz bands viz. 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 carrier, we should explore more sub-42 GHz bands if possible and the higher frequency bands like E-Band & V-Band to cater to the increasing capacity/traffic requirements.

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?

In AUSPI's view, it is the right time to explore the feasibility to allot E-Band spectrum 71-76/81-86 GHz and V-band spectrum 57-64 GHz for PTP applications.

At present, only 6 GHz, 7 GHz, 13 GHz, 15 GHz, 18 GHz and 21 GHz are used for fixed point to point communication purposes. The available carriers in these bands are exhausting day-by-day with increasing demands. The channel/ RF carrier bandwidth of around 28 MHz is mostly used so far. But, with the large data growth, larger number of channels/ RF carrier would be needed along with larger RF carrier bandwidths of 56 MHz, 108 MHz and even greater bandwidth.

All these growth needs can't be met with the existing bands as mentioned above. Hence, it is imperative that higher frequency bands - upto 100 GHz would need to be allowed for usage with emphasis on Broadband exploration in higher frequency bands e.g. E-band & V-band wireless system offers an excellent alternative with certain advantages.

Some advantages of using these bands are as under:

- a. Large quantum of spectrum i.e. around 8-10 GHz spectrum is available in each band which enables deployment of multi-gigabit wireless links.



- b. Its unique propagation characteristics allow use of highly directional ‘pencil beams’ minimizing interference concerns.
- c. Due to shorter link distances it has highly efficient reuse of spectrum.
- d. It is a globally harmonized band ensuring economies of scale. Carrier class products are now available for multi gigabit per second transmission at distances of 1 to 2 km.
- e. It can be used as Fiber Extension in Metropolitan Area Networks; where deploying high capacity fiber is not feasible.
- f. Also suitable for providing redundancy for fiber links in Last Mile/ Metropolitan Area Networks.

A proposal has already been submitted by AUSPI to WPC for opening of these bands for PTP outdoor applications. Same is attached as **Annexure-I** for the consideration of the TRAI as well.

Allotment of carriers in E and V band should be done on link to link basis.

Q16. *Should E-band be fully regulated or there should be light touch regulations?*

Q17. *What charging/pricing mechanism would be appropriate for these bands?*

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 regulators in many countries viz. USA, UK, Australia & Russia. Under the “light licensing” scheme, the spectrum charge reflects only the cost of administering the allocation process.

While these higher frequency bands needs to be explored for PTP outdoor applications, there are several challenges/constraints like competitive price for the equipment in these bands, economic viability etc. which needs to be addressed. The administrations/regulators must encourage the usage with favourable charging mechanism. The present charging mechanism of MW based on revenue share would not be suitable & commercially viable & would discourage the usage of these higher bandwidths.

The equipment in higher frequency bands utilize RF carrier bandwidths of 250 MHz, 500 MHz or even 1 GHz for each carrier. In India, the present system of spectrum charging – both under revenue share as well as the formula basis – results in exorbitantly high spectrum charge for such RF carriers. Hence, the economic viability of using links in these higher frequency bands is poses a herculean challenge and, therefore, suitable charging methodology be worked out to encourage the utilization of these bands.

Therefore, it is necessary that global best practices for the utilization of these bands – light licensing and nominal/ token spectrum charges adopted at the earliest in line with the objective of NTP-2012 for making available affordable and effective communication for the citizens. The use of these bands would lead to optimal



utilization of spectrum, bring large socio-economic benefits besides and reasonable revenues from these unused bands.

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



Association of Unified Telecom Service Providers of India

AUSPI /13/2014/014 (ca)

20th March, 2014

Shri R. B. Prasad,
Joint Wireless Advisor,
Department of Telecommunications,
6th Floor, Sanchar Bhawan,
20, Ashoka Road,
New Delhi.

**Subject: Submission of proposal for consideration of Working Group-3
(beyond 10 GHz) of NFAP review/revision committee.**

Dear Sir,

This is with reference to the review/revision of National Frequency Allocation Plan, NFAP-2011.

As discussed during the second meeting of NFAP review/revision committee meeting held on 14th March, 2014 at DoT under the Chairmanship of the Wireless Advisor, please find enclosed two (02) proposals pertaining to 60 GHz band and E-Band i.e. 71-86 GHz band for consideration of Working Group-3.

We request you to kindly consider these proposals to suitably include in new National Frequency Allocation Plan.

Thanking you,

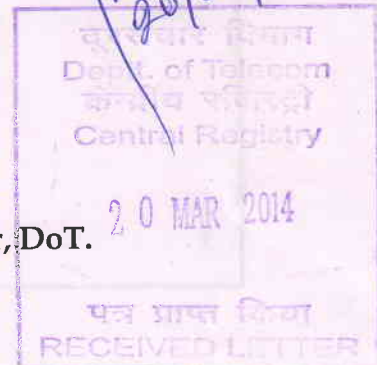
Yours faithfully,

Ashish Gay

Secretary General

Encl: As above

Copy to: Shri R.J.S. Kushwaha, Wireless Advisor, DoT.





Proposal for Consideration of WG-3 for NFAP review

60 GHz Band Proposal – NFAP

Association of Unified Telecom Service Providers of India (AUSPI)

20th March 2014

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- Introduction
- 60 GHz Band Value Proposition
- Applications
- Worldwide Regulation
- Commercial Availability
- Recommendations

Introduction



- 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 multi Gbps bandwidth is becoming common
- Deployment of fiber which enables high bandwidths is difficult in metros due to difficult to obtain RoW permission.
- Wireless using 60 GHz spectrum is becoming essential in such dense metro areas
- 60 GHz band has been de-licensed in many countries
- It should be de-licensed in India also to help strengthen the nation's communications infrastructure

60 GHz Band Value Proposition



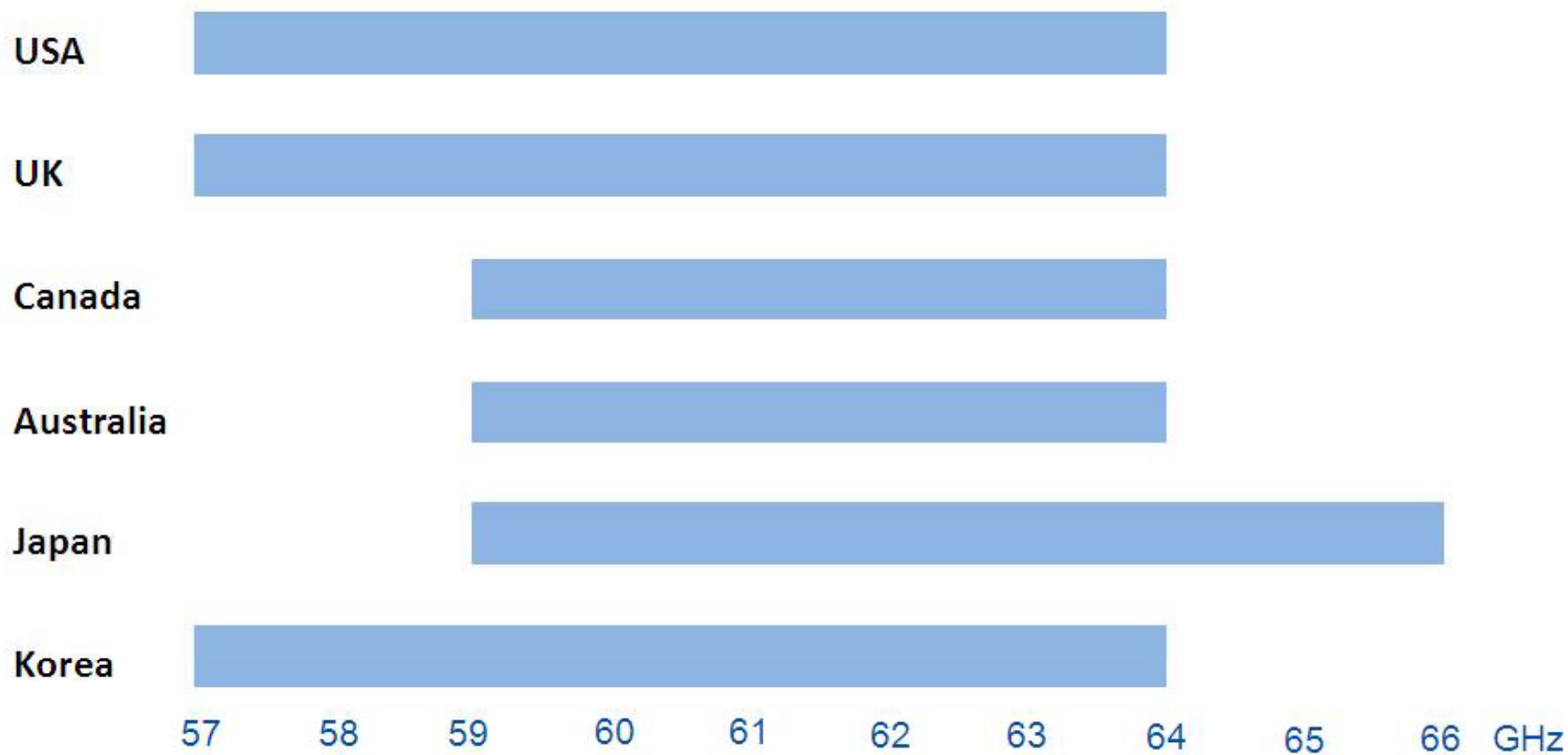
- Large quantum of available spectrum
 - ~ 7-8 GHz of unutilized spectrum is available
 - Enables deployment of multi-gigabit wireless links
- Short link distances due to high frequency of operation and high atmospheric oxygen absorption
- Narrow antennas beams reduce potential for interference
 - Allow high level of frequency re-use
- Carrier class products are now available for multi gigabit per second transmission at distances of up to 1 km
- Globally harmonized band ensuring economies of scale

Applications



- Last Mile Connectivity
 - Bandwidth requirements are increasing (> 1 Gbps) for high end users.
- Fiber Extension in Metropolitan Area Networks
 - Can be used where deploying high capacity fiber is not feasible
- Suitable for providing redundancy for fiber links in Last Mile/ Metropolitan Area Networks
- Cellular Backhaul
 - Multiple radio access technologies are being simultaneously utilized, as a result, required backhaul capacity is increasing

Worldwide Regulation - Frequency Ranges - Outdoor Unlicensed Band Use



Worldwide Regulation - Technical Parameters - Outdoor Unlicensed Band Use



	UK	Japan	Korea
Frequency Range	57.1 - 63.9 GHz	59 - 66 GHz	57 - 64 GHz
Max. Transmit Power	10 mW	10 mW	10 mW
Max. Antenna Gain	Not Specified	47 dBi	47 dBi
Max. EIRP	55 dBm	57 dBm	57 dBm

Commercial Availability



- Equipment operating in 60 GHz band are commercially available from a number of manufacturers
- A representative list of vendors is provided below:

Sr. No.	Vendor	Product Family	Country
1	BridgeWave Communications	AR60 and AR60X FE60U GE60	USA
2	LightPointe	AireBeam	USA
3	DragonWave Inc	Avenue Link Avenue Link Site Avenue Site	Canada
4	Proxim Wireless	Tsunami QB-62000	USA
5	Sub 10 Systems	Liberator V-320 Liberator V-1000	UK
6	Siklu	Etherhaul 600	Israel

AUSPI Recommendations



- Include 60 GHz in new NFAP 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 high speed communications infrastructure

Recommended Technical Parameters	
Frequency Range	57 - 66 GHz
Max. Transmit Power	10 mW
Max. Antenna Gain	50 dBi
Max. EIRP	60 dBm
Licensing Requirements	Un-licensed
Operating Environment	Outdoors



THANK YOU !

***Contact us :
auspi@auspi.in***



Proposal for Consideration of WG-3 for NFAP review

E-Band (71-76/81-86 GHz) Proposal – NFAP

Association of Unified Telecom Service Providers of India (AUSPI)

20th March 2014

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- Introduction
- E-Band Value Proposition
- Applications
- Worldwide Regulation
- Light Licensing Principle
- Commercial Availability
- Recommendations

Introduction



- 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 multi Gbps bandwidth is becoming common
- Deployment of fiber which enables high bandwidths is difficult in metros due to difficult to obtain RoW permission.
- E-Band (71-76 / 81-86 GHz) spectrum is becoming essential in such dense metro areas
- This band has been allocated in many countries.

E-Band Value Proposition



- Large quantum of available spectrum
 - 10 GHz of unutilized spectrum is available for allocation
 - Enables deployment of multi-gigabit wireless links
- Unique propagation characteristics allow use of highly directional 'pencil beams' minimizing interference concerns
- Short link distances due to high frequency of operation
- Enables highly efficient reuse of spectrum
- Carrier class products are now available for multi gigabit per second transmission at distances of 1 to 2 km
- Globally harmonized band ensuring economies of scale

Applications



- Last Mile Connectivity
 - Bandwidth requirements are increasing (> 1 Gbps) for high end users.
- Fiber Extension in Metropolitan Area Networks
 - Can be used where deploying high capacity fiber is not feasible
- Suitable for providing redundancy for fiber links in Last Mile/ Metropolitan Area Networks
- Cellular Backhaul
 - Multiple radio access technologies are being simultaneously utilized, as a result, required backhaul capacity is increasing

Worldwide Regulation

- 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

Worldwide Regulation - Technical Parameters and Licensing Approach



	US	UK	Europe
Frequency Range	71-76/81-86 GHz	71-76/81-86 GHz	71-76/81-86 GHz
Max. Transmit Power	3 W	1 W	1 W
Min. Antenna Gain	43 dBi	-	43 dBi
Max. EIRP	55 dBW	55 dBW	45 dBW
Licensing Process	Light License	Light License	-

“Light Licensing” Principle



- The “light licensing” approach was pioneered by the FCC in the USA and adopted by others like UK, Australia & Russia
- Under the “light licensing” scheme, the spectrum charge reflects only the cost of administering the allocation process
- As E-band allows high level of frequency reuse, the process for allocation of frequencies can be automated, thus keeping the cost of administration low

Commercial Availability



- E-Band Equipment are commercially available from a number of manufacturers
- A representative list of vendors is provided below:

Sr. No.	Vendor	Product Family	Country
1	Siklu	Etherhaul 1200T/TL Etherhaul 1200F/FL	Israel
2	Ericsson	MINI LINK PT 6010	Sweden
3	Huawei	RTN 380	China
4	Cergaon	FibeAir 70F	Israel
5	BridgeWave Communications	AR80/80X GE80/80X	USA
6	LightPointe	AireBeam G80-LX/MX AireBeam G80-2.5-LX/MX	USA
7	DragonWave Inc	Horizon E-Series	Canada
8	E-Band Communications Corporation	E-Link Series	USA

AUSPI Recommendations



- Allocate 71-76 / 81-86 GHz (E-Band) for outdoor PTP applications
- A “light licensing” scheme should be adopted with nominal fee

Recommended Technical Parameters	
Frequency Range	71 – 76/81-86 GHz
Max. Transmit Power	1 W
Min. Antenna Gain	43 dBi
Max. EIRP	55 dBW
Channel Size	1000 MHz



THANK YOU !

***Contact us :
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