

December 13, 2023

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GSMA's Response to TRAI CP on Assignment of Spectrum in E&V Bands, and Spectrum for Microwave Access (MWA) & Microwave Backbone (MWB)

Dear Mr. Trivedi,

At the outset, the GSMA commends the TRAI for undertaking a collaborative approach for this consultation and seeking the views of stakeholders. The GSMA views this topic as a key part of unlocking the full opportunities offered by the evolution of the 5G ecosystem.

The transition to 5G will need a sizable backhaul evolution to accommodate growing traffic and new network capabilities. Despite the growing importance of fibre, wireless backhaul is set to play a central role in these developments. This means the TRAI has a vital role as the decisions will help or hinder the development of the 5G market.

India is among the fastest growing 5G markets globally and this was possible due to the timely and strategic policy reforms implemented by the TRAI and the DoT, including making available required spectrum in various frequency ranges for 5G rollout. As the demand for 5G grows, there will be a need for more access and backhaul spectrum to ensure the required QoS and performance is delivered. Without additional spectrum intense network densification will be necessary which will result in increased carbon emissions and network costs.

India has over 1.1 Bn mobile subscribers¹ out of which almost 110 million are now using 5G. By the end of the decade, GSMA estimates that 5G connections in India are expected to grow to more than 600 million. As noted in the GSMA report "India's 5G Future – Maximising Spectrum Resources"², spectrum management policy that includes availability

¹ https://traf.gov.in/sites/default/files/PR_No.98of2023_0.pdf

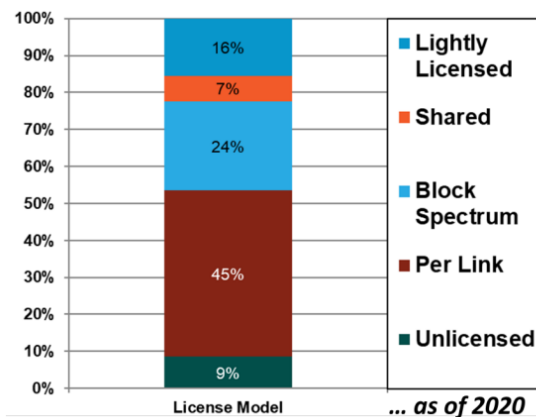
² <https://www.gsma.com/spectrum/resources/indias-5g-future-depends-on-affordable-spectrum/>

of sufficient amount of affordable spectrum, will be core to the success of 5G in India and will play a vital role in India’s effort in becoming a \$5 trillion economy.

Almost 99% of the population has access to 4G and 5G networks, and consumers enjoy some of the world’s most affordable rates for mobile services and devices. However, the low Average Revenue Per User (ARPU) and high regulatory expenses have constrained the operators’ capacity to enhance their networks. Considering the substantial investments made by Mobile Network Operators in India, they are perfectly positioned to drive much-needed innovation. As a vital national infrastructure, the TRAI must safeguard and promote these significant investments. The GSMA highlights that higher capacity backhaul bands will be vital in meeting 5G traffic demands. The high costs associated with backhaul spectrum can create a significant burden for mobile operators and discourage them from upgrading their technology. Below the GSMA addresses topics which are important to our members in this consultation.

Different approaches towards backhaul licensing globally:

Wireless backhaul bands are made available through a variety of licensing regimes; most commonly per link and block licenses, and, to a lesser extent, unlicensed, shared, and lightly licensed. These provide different access rights and guarantees – ranging from exclusive access to a portion of spectrum, to unlicensed access which provides no service guarantees.



- **Per Link:** Conventional link-by-link coordination and managed by the administration’s regulation. This is traditionally the most popular method for PTP networks, accounting for about 45% of the countries surveyed. Interference checks are included under the administration’s responsibilities.
- **Shared Licensing:** Of the countries surveyed, shared licensing is the least used licensing approach at only 6.9%. Microwave frequencies in shared licenses are not exclusive for any operator and are to be shared with other operators on a first-

come, first-served basis in a particular location. Shared licenses require additional administrative complexity that pertains to issues, such as the management of different classes of users, delineation of usage periods, implementing enforcement mechanisms, etc.

- **Block licence:** Exclusive rights to a block of spectrum in a defined area or geography. This supports the growth of dense small cell networks and especially point-to-multipoint backhaul links, without adding any additional commercial implications on the licensees and QoS.
- **Light licence:** This can be a complementary option for small cells as it reduces much of the burden by letting users register with a database and often coordinate their usage amongst themselves. It should be noted that as backhaul links are between fixed points, coordination is far easier compared with access spectrum and the same frequency can be much more densely re-used in a given area. However, this non-exclusive licensing is not widely adopted so far due to service assurance and quality issues.
- **Unlicensed:** Unlicensed bands include 2.4 GHz, 5 GHz and, in numerous countries, the 60 GHz 'V-band', but there are no guarantees of interference protection with unlicensed type of usage. This has not been successful for backhaul to date so cannot currently be widely encouraged as an effective approach. Operators have not used the 2.4 GHz and 5 GHz unlicensed bands for backhauling significantly due to QoS concerns arising from potential interference.

The E-band (71-76/81-86 GHz)

The E-band has large bandwidth (10 GHz), allowing transmission of high-speed data over short distances (2 km to 3 km). E-band's frequencies enable point-to-point and line-of-sight radio communication. The importance of the E-band has increased as 5G networks are rolled out because it boosts capacity in dense urban sites and is also the ideal high frequency complement with traditional microwave frequencies in Band & Carrier Aggregation (BCA) combinations in suburban sites.

Government of India has also recognised the importance of E-band for 5G rollout and decided to provisionally assign two carriers of 250 MHz each in E-band to operators to meet the increasing backhaul demands.

E-band is generally being assigned on a licensed or lightly licensed basis. Light license approach gives non-exclusive access to backhaul spectrum to operator and they manage the interference together, typically using a database. This type of access and the mechanisms to control, and mitigate, interference have a significant impact on quality of service and thus levels of operator investment. In markets with link-based assignment and

pricing, there can be a lack of flexibility for operators to control their spectrum costs without having to make unfavourable compromises in the QoS, such as reducing channel bandwidth or link length. This is counterproductive in dealing with the increased capacity demands of 5G.

Backhaul links are typically designed to guarantee high availability as outages can affect so many end-users. Therefore, block-based licensing which is exclusive in nature can be a preferred approach for E-band assignment. Prices should also be set reasonably to ensure commercial viability and allow operators to use the spectrum more efficiently.

The V-Band 57-71 GHz

Many countries have adopted unlicensed approach for V-band and the most popular application is the WiGig (based on the 802.11ad standard) adopted by FCC in USA, which can be used for indoor or outdoor applications.

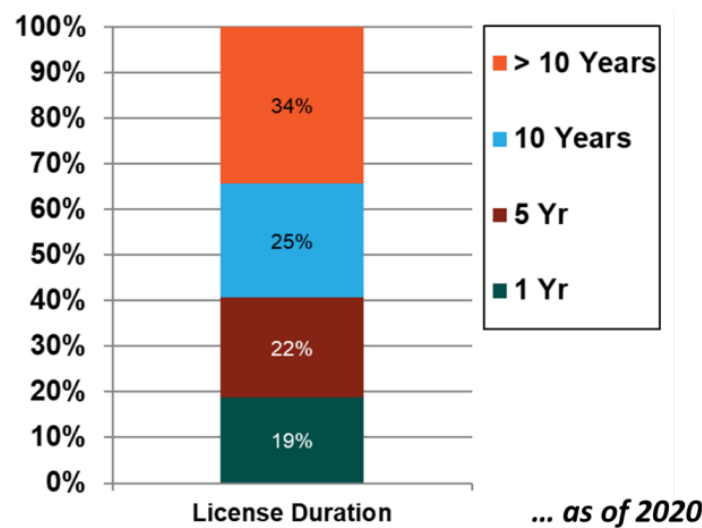
Some other countries such as the Europe and Singapore regulate this frequency band for outdoor links through licensed/light licensing schemes. The rationale for this is based on the concern that being a highly dense urban environment (like India), it was prudent to regulate the location of high-powered links to ensure that there is no interference between band receivers. The main drawback with unlicensing is that the non-exclusive use of the spectrum makes links susceptible to interference.

V-Band frequency range possesses around 13 GHz of available spectrum at little to low cost (mostly unlicensed/lightly licensed in most countries). The non-exclusive nature of the V-band (due to it being unlicensed) creates higher vulnerabilities of signal interference.

License Duration:

Wireless backhaul licences provide access for a fixed duration. In a recent study, almost 60% of countries offered long licences (i.e. 10 years or more). The chart below is an analysis of types of license duration across block, per link, shared, and light licensing across all frequencies of selected 40 countries³.

³ A country may have more than one license duration type.



- Long-Term Licenses: 10 or >10-Year licenses are the most common license duration types across the surveyed countries in 2020; accounting for 59% of the licenses surveyed. These licenses are typically sold to operators with provision for renewals to protect their capital investment in their respective network infrastructure and to ensure consistent revenue generation for the regulators. Considering the duration of access spectrum licences in India, it will be appropriate to align backhaul licence validity to at least 20 years with adequate provisions for renewal,
- Short-Term Licenses: In contrast, license durations that last for 1 year, accounting for 19% of licenses surveyed, is the least preferred license duration among the countries surveyed.

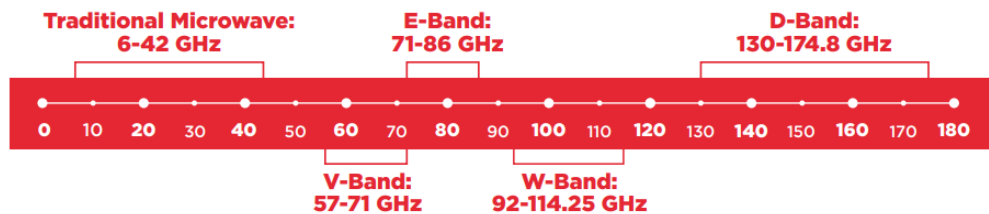
Terms and Conditions for backhaul spectrum assignment.

- The GSMA believes that it is inappropriate to include coverage obligation as a licence condition for backhaul spectrum including the V and E-band, as backhaul spectrum is not the same product and not used in the same way as access/mobile spectrum.
- A review of backhaul capacity needs and channel sizes should be undertaken from time to time, in consultation with all operators to make the assignments contiguous to the extent possible. This will also enable operators to take the benefit of carrier aggregation based upon its requirements.

The TRAI should take into account following aspects for the assignment of E&V Bands, and Microwave Access (MWA) & Microwave Backbone (MWB) spectrum:

- **New backhaul bands are needed:** The significant increase in backhaul capacity is required to support 5G, and wider channel bandwidth solutions vital. While fiber

has an important role to play, new bands in higher frequency ranges also needs to be made available for meeting backhaul requirements.



In the near/immediate-term the E-band (70/80 GHz) will be the most important, to support initial 5G growth, followed by V-band (66-71 GHz). In future, the trends are likely to move towards the use of W-band (92-114 GHz) and D-band (130-175 GHz) to help power 5G networks in subsequent years.

- **Existing Microwave/backhaul bands are still important but need support to maintain relevance:** Traditional microwave backhaul bands continue to have a key role to play especially as they can cover longer distances with fewer hops than newer higher frequency bands (e.g., E-band). They are vital in many suburban and rural areas, where less capacity is typically needed, as well as to provide added resiliency when combined with higher frequency backhaul bands.

The amount of spectrum available in traditional microwave backhaul bands varies significantly between countries. Sufficient spectrum and wider channel sizes are needed to support evolving mobile services and uptake. Operators in various markets highlight the need to increase narrow channel sizes to 56 MHz-250 MHz bandwidths (as opposed to 6-56 MHz).

- **Spectrum Roadmap:** Plans to make more spectrum available should be announced well in advance through a spectrum roadmap and consultation process. A balance must also be struck between supporting wider channel sizes and having sufficient channels in the band to support demand from the mobile operator community. In the existing MW bands (access and backbone), existing channel sizes can be maintained to support legacy systems.
- **Backhaul licensing:** There are a variety of approaches for licensing backhaul bands, especially with the emergence of higher frequency bands and dense small cell networks. Block licensing is being adopted increasingly now especially in higher bands for backhaul (e.g., 70/80 GHz, 32 GHz etc.) where in operators can be granted exclusive access to a block of spectrum on a nationwide or regional basis. This supports the growth of dense small cell networks and especially point-to-multipoint backhaul links. These situations do not lend themselves to traditional

'per link' licensing as the administrative burden can be significant, deployments can be slowed, and licence costs can be prohibitive due to high number of links.

- **Duration:** Longer licence duration encourages more extensive network investment and optimum use of spectrum. This also gives operators greater assurances of their continued access to spectrum and thus justify increased investments. Licences of at least 20 years provide such access guarantees.

High backhaul spectrum prices present a barrier to 5G: A central challenge facing backhaul evolution for many mobile operators is the high spectrum costs associated with wider channels and the use of more efficient technologies. High prices can discourage investment in backhaul spectrum, and harm network investment more widely, which in turn reduces the speed of networks and coverage levels. It is essential that regulators are realistic when determining the price for backhaul spectrum. To summarise the submission, the GSMA would like to reemphasise that regulatory decisions play a key role in determining the cost, performance, and coverage of mobile broadband services. Therefore, effective backhaul spectrum policy is critical, and the TRAI should carefully consider mobile operators' network rollout plans and the challenges.

As part of a successful backhaul strategy, the GSMA recommends TRAI:

- ✓ **Supports widespread, competitive fiber rollouts and ensure the timely availability of a sufficient amount of affordable backhaul spectrum under reasonable licensing approaches, terms, and conditions. This includes rapidly issuing new licenses and permits to build out fiber and radio backhaul infrastructure.**
- ✓ **New backhaul bands such as E & V bands on immediate basis and W-band (92-114 GHz) and D-band (130-175 GHz) on long-term basis should be made available to support evolving network requirements and growing traffic.**
- ✓ **Existing backhaul (Access and Backbone) bands with existing channel sizes should be maintained to support legacy systems. A further flexibility should also be allowed to operators to implement carrier aggregation techniques to meet their backhaul requirements in the existing bands to maintain relevance in the 5G era.**
- ✓ **Block-based licensing should be preferred to avoid complexity and administrative burden and also ensure commercial viability in implementation.**
- ✓ **Backhaul spectrum should be reasonably priced to promote use of more efficient backhaul technologies and improved coverage.**

- ✓ **Publishes a spectrum roadmap and/or national broadband plan, in consultation with the industry, that includes all new backhaul bands, proposed licensing approaches, and proposed changes to existing bands. The roadmap should cover at least the next five years and is continually updated.**

We trust our submission will merit your kind consideration and will be considered before taking any final decision on the matter. We remain available for any clarification or additional information that may be required in this regard.

Sincerely,



Jeanette Whyte
Head of Public Policy, APAC
GSMA

Copy to:

1. Ms. Meenakshi Gupta, acting Chairperson and Member, TRAI
2. Mr. V. Raghunandan, Secretary, TRAI
3. Mr. Rajiv Sinha, Principal Advisor (NSL), TRAI