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Your Reference: TRAI CP on Assignment of Microwave Spectrum dated 28th May 2025
Your Date: 2025-07-02

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Sub: Inputs to TRAI CP on Assignment of Microwave Spectrum in 6 GHz (lower), 7 GHz, 13 GHz, 15 GHz, 18 GHz, 21 GHz Bands, E-Band, and V-Band

Dear Sir

This is with reference to TRAI Consultation Paper on Assignment of Microwave Spectrum in 6 GHz (lower), 7 GHz, 13 GHz, 15 GHz, 18 GHz, 21 GHz, E-Band, and V-Band dated 28th May 2025.

Please find enclosed Ericsson's submission as Annexure-1 on the matter for your consideration.

Regards

Vijeta Arya

ERICSSON INDIA PRIVATE LIMITED

Vijeta Arya
Vice President
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Annexure-1

Consultation Paper on Assignment of the Microwave Spectrum in 6 GHz (lower), 7 GHz, 13 GHz, 15 GHz, 18 GHz, 21 GHz Bands, E-Band, and V-Band

Telecom Regulatory Authority of India

Consultation Paper No. 05/ 2025

Ericsson Response, June 2025

The Value of Microwave

Microwave solutions continue to be a key enabler for building timely, cost-effective mobile coverage and capacity across the globe. Even if there are many advantages of fibre transport, it is simply too costly and not sufficiently reliable to be used in all locations. Advances in technology including higher modulation schemes, broader channel bandwidth and the introduction of new spectrum, such as E-band, are examples of new developments introduced to keep pace with evolution and traffic growth in mobile networks.

Going forward to 2030, the global trend is expected to be a gradual increase in the share of installed sites connected through fibre, reaching a 50/50 share of the media used[1] (Figure 1). Existing microwave connections, especially those in urban areas closer to the aggregation network, will slowly be replaced with fibre. For new mobile sites, the key factor is the availability of fibre. In 2030 there will still be new sites where fibre is unavailable, in which case a microwave solution will be the main option for connecting to the grid. In rural areas, microwave is most often preferred, as the business case to motivate fibre investments can be challenging.

[1] Ericsson Microwave Outlook 2023

Annexure-1

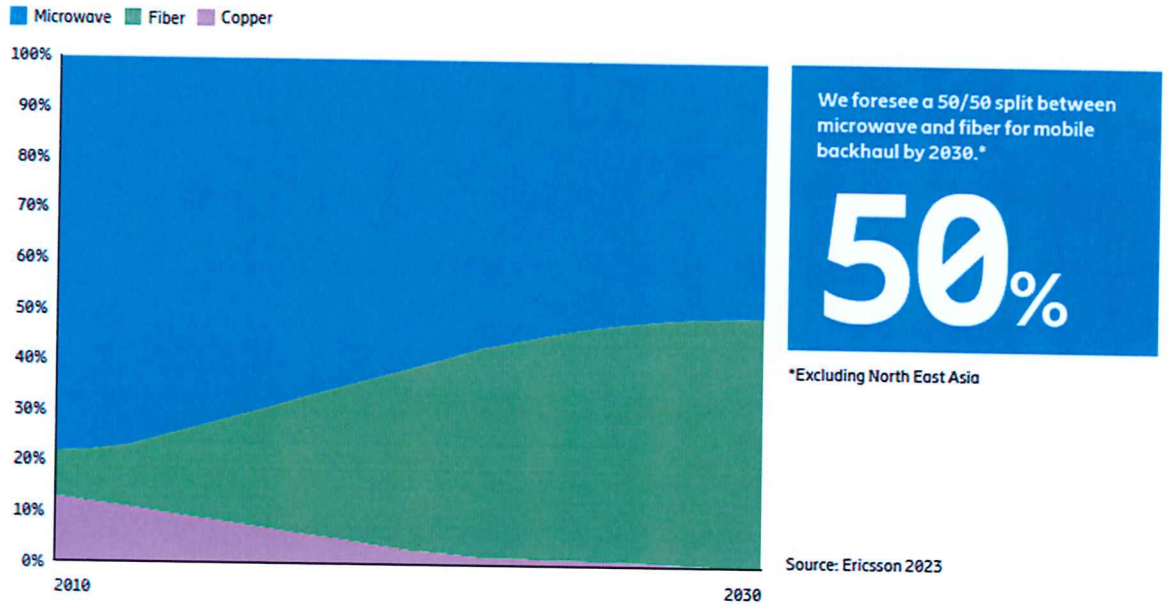

Figure 1: Predicted global backhaul media distribution up until 2030

As India is a country with one of the largest growth expectations in terms of 5G subscriptions and the highest levels of usage, it is expected to continue to have a high share of microwave backhauled sites. Higher than the global average. A key component in this is the introduction of E-band spectrum for backhaul, allotted to the mobile operators where they hold 5G spectrum. E-band is crucial for supporting the expected 5G evolution in India, both in standalone deployment, covering shorter distances, and in multi-band combination, combining E-band with 13, 15, 18 and 23 GHz to support longer distances.

Figure 2 below, from Ericsson Microwave Outlook report 2023, shows the predicted share of Microwave backhaul from 2023 to 2028, including India. The prediction shows that Microwave continues to have a strong need, with a slight decrease in share. However, this slight decrease is countered by more carriers per hop to support increased capacity.

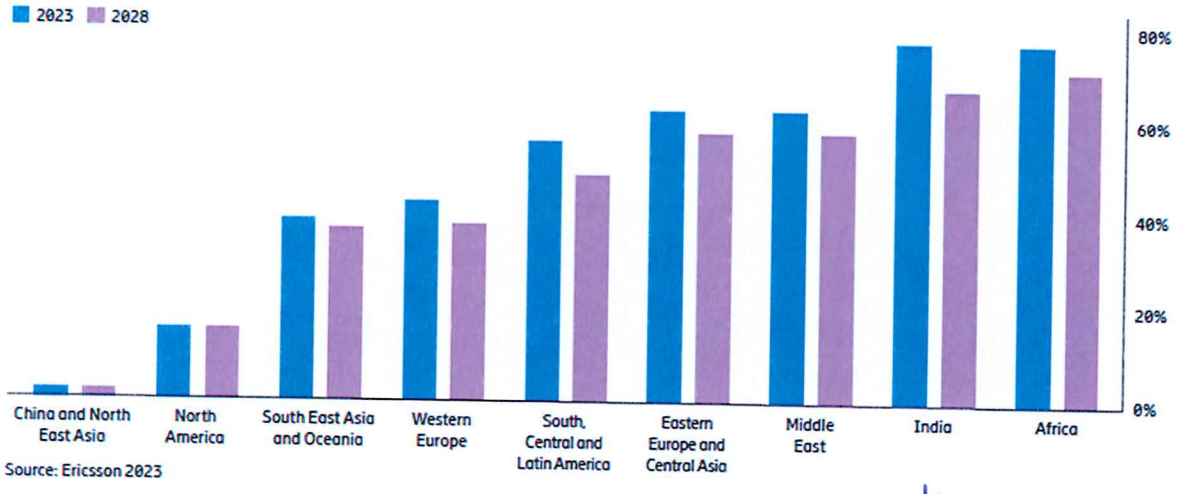

Figure 2: Predicted regional differences in deployment of microwave backhaul 2023 and 2028

These networks will carry significant more traffic to support the 5G traffic growth. Global forecast from **Ericsson Mobility Report**[2], Nov 2024 indicate that Mobile data traffic expected to grow around 2.5X between 2024 and 2030. 5G share of mobile data traffic forecast to grow to 80% in 2030. Total mobile network data traffic (including FWA) expected to grow around 3X between 2024 and 2030.

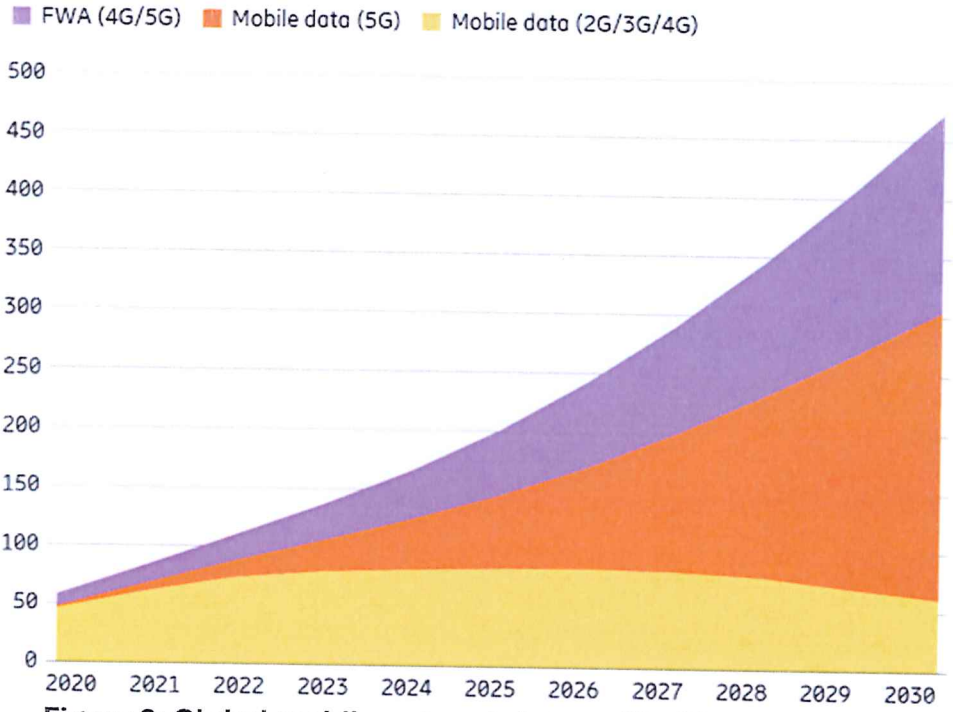

Figure 3: Global mobile network data traffic (EB per month)

Considering the use of 6–15 GHz bands for wireless (microwave) backhaul today, typically referred to as Fixed Services (FS), as well as considering future demand; these bands, especially 6–8 GHz, are key for long-range wireless backhaul due to their superior propagation characteristics for distances from about 20 km to beyond 100 km. These are typically used in rural areas and for connecting them to urban centers. A global and regional overview of the use of wireless backhaul spectrum can be found in the **Ericsson Microwave Outlook 2022**, reporting approximately 10 million transceivers globally.

In countries such as India, that experience high rainfall, these low bands for Fixed Services (FS) microwave backhaul are needed to provide reliable services, even when used with high bands (such as E-Band).

Spectrum is a scarce and very valuable resource. Spectrum sharing and coexistence capabilities are becoming more important than ever due to the demand for more spectrum for different types of wireless broadband use, with technologies such as 5G/6G, Wi-Fi, satellite and wireless backhaul. Opportunities for coexistence in parts of

[2] Ericsson Mobility Report November 2024

the 6–15 GHz range is a key consideration for backhaul spectrum[3], as shown in **Figure 4**. Access to spectrum can be achieved in different ways, such as through the ITU World Radiocommunication Conferences (WRC), regional decisions, or decisions on a per-country basis. Whichever method is pursued, harmonization of the selected frequency bands and technical conditions, ideally on a global or at least a regional basis, is key to unlocking economies of scale and to provide numerous benefits to consumers and enterprises.

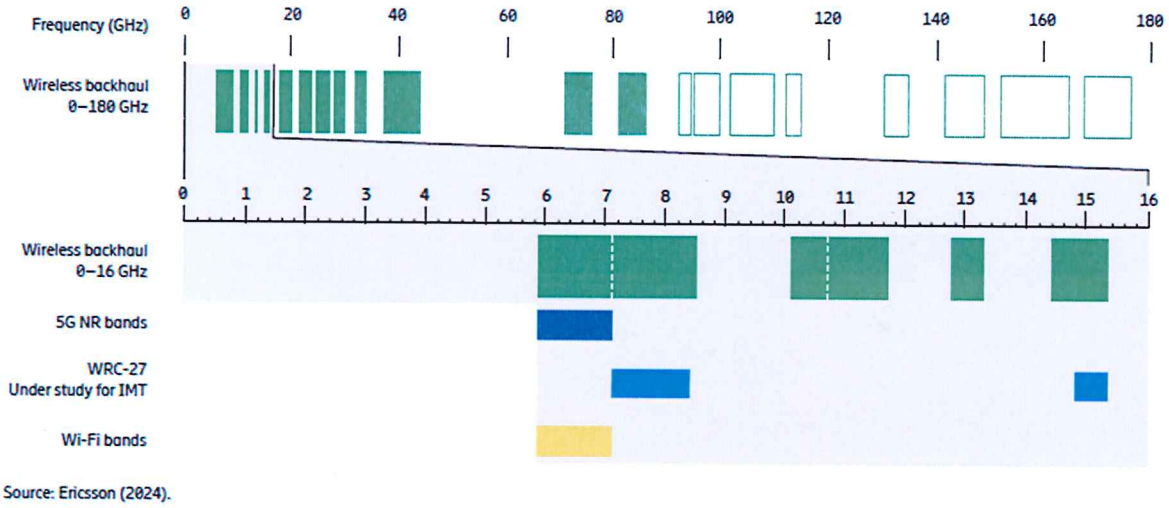

Figure 4: Wireless backhaul bands under consideration for radio access

National usage of wireless backhaul spectrum in seven large countries around the world is shown in **Figure 5**[4]. The size of each circle represents the installed base of transceivers, with in total more than 1 million for these countries.

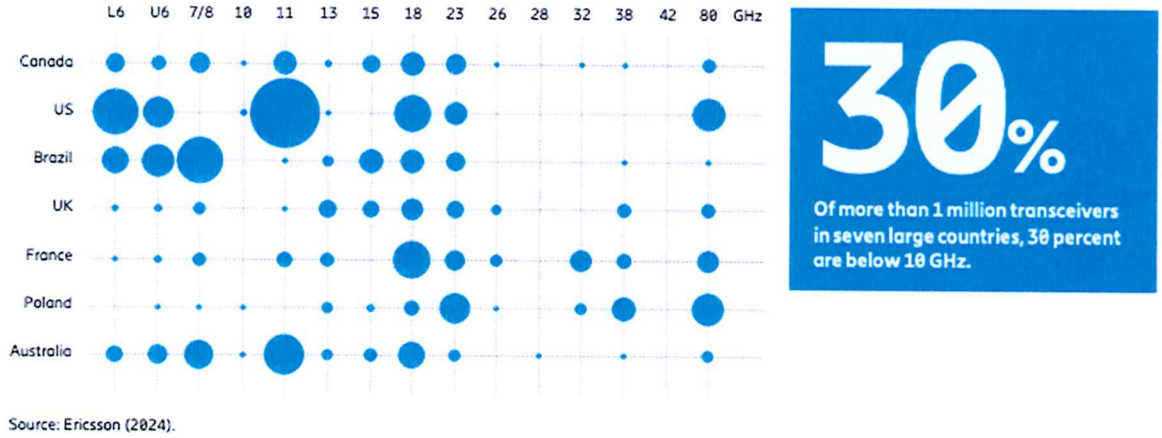

Figure 5: Wireless backhaul spectrum use in seven countries with public deployment data

[3] Ericsson Microwave Outlook report 2024
[4] Ericsson Microwave Outlook report 2024

There are large variations in how much each backhaul band is used in different locations, countries and regions. Many of the bands are used in most countries, but the relative use varies. For example, 30 percent of all transceivers in Figure 5 are used for the essential long-range bands in 6–8 GHz, but it varies per country from around 10 percent to more than 60 percent.

Position on 6GHz

Lower 6GHz

Lower 6 GHz (5925-6425 MHz) is used extensively for FS in many countries globally especially for long distance links and Island communication providing mobile backhaul for operators/CSP's and, also for non-CSP's like Mission Critical Networks where high reliability and availabilities are needed. At the same time Wi-Fi has been introduced for unlicensed services coexisting with FS, such as indoor and lower power devices outdoor. To protect dense FS links from standard power Wi-Fi countries, such as US, uses an AFC (Automatic Frequency Coordination) mechanism on Wi-Fi nodes has been introduced. Fixed services with lower bands provide complementary services to fibre where it is not a viable option. Hence, it is vital to have lower frequency bands available for FS.

Upper 6GHz

The WRC in 2023 (WRC-23) decided on an international harmonization of the upper 6 GHz spectrum, 6.425–7.125 GHz (or parts thereof), for International Mobile Telecommunications (IMT), i.e. mobile systems, such as 5G. The decision has support from countries representing 60 percent of the global population, and more countries are expected to support this at the next WRC in 2027.

The upper 6GHz band (6.425–7.125 GHz) has been allocated for IMT in India in the recent revision of NFAP through IND 16.

Ericsson recommends the entire upper 6GHz be made available for expansion of 5G and towards future 6G networks.

Position on 7/8GHz (7.125-8.400 GHz)

5G and 5G-Advanced networks are being commercially deployed, and work has already started to define how 6G networks will be characterized. Among the various bands being studied for identification for IMT as part of WRC-27[5] under Agenda Item (AI 1.7), the band 7.125-8.4 GHz is one that provides large contiguous spectrum suitable for coverage and capacity. This band is supported by GSA[6] and GSMA[7]; from 7.125 GHz to 8.4 GHz in Regions 2 and 3, and of the sub-bands 7.125 GHz to 7.25 GHz and 7.75 GHz to 8.4 GHz in Region 1, to enable wide-area IMT deployments in these regions. Ericsson strongly supports the identification of the band 7.125-8.4 GHz for IMT.

According to Ericsson's recently published whitepaper on 6G spectrum for future mobile life beyond 2030, the centimetric range of frequency band is needed to drive the 6G use

[5] https://www.itu.int/en/ITU-R/study-groups/rcpm/Pages/wrc-27-studies.aspx

[6] https://gsacom.com/paper/6g-networks-status-update/

[7] https://www.gsma.com/connectivity-for-good/spectrum/the-road-to-wrc-27-a-new-cycle-begins/

cases (see the Ericsson white paper[8]). As FS are the incumbent service in this band, ITU-R is studying, in preparation for WRC-27, how IMT can coexist with FS. Typical co-existence conditions with FS links are implemented at national level and varies on site-to-site basis. Hence, having large number of FS links in this band must not create a limitation of future deployment of IMT network.
Access to the band 7/8 GHz for IMT (with specifications to be available in early 2030) is important for industry development and potential identification of IMT for this band is expected in 2027 during the WRC-27. Widespread deployment of 7/8 GHz by FS links may limit future deployment of 7/8GHz IMT networks in some areas.
In summary:

- Ericsson recommends that any MW / FS link deployment should not prevent IMT deployment, hence, avoid widespread deployment of 7/8 GHz for FS links that can limit deployment of 7/8GHz IMT networks
- Any deployment of FS before 2030 should take cognizance of potential IMT 6G deployment in this band
- Recommend existing license users to also take cognizance of the ongoing WRC studies and allocation in WRC-27 for IMT.

Position on E-Band (71-76 GHz, and 81-86 GHz)

The E-band (80 GHz) has been on a remarkable journey over the last decade and is now extensively used as a 5G backhaul band.

As the demand for strong packet-based capacity increases in mobile backhaul networks, due to the growth of 4G and 5G Radio Access Networks (RAN), there is a need for robust high-capacity backhaul solutions that can handle large amounts of data. While microwave technology is commonly used in transmission networks, communication service providers (CSPs) are now turning to the E-band, a high-capacity, lightly licensed, microwave spectrum operating in the 70/80 GHz range. The E-band presents a notable advantage owing to its wide channel spacing, facilitating substantial capacity. Its application extends to backhauling RAN sites and protecting fibre optic links.

India is a country with one of the largest growth expectations in terms of 5G subscriptions and the highest levels of usage, it is expected to continue to have a high share of microwave backhauled sites. A key component in this is the introduction of E-band spectrum for backhaul, allotted to the mobile operators where they hold 5G spectrum. E-band is crucial for supporting the expected 5G evolution in India, both in standalone deployment, covering shorter distances, and in multi-band combination, combining E-band with 13, 15, 18 and 23 GHz to support longer distances.

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[8] 6G Spectrum – enabling the future mobile life beyond 2030

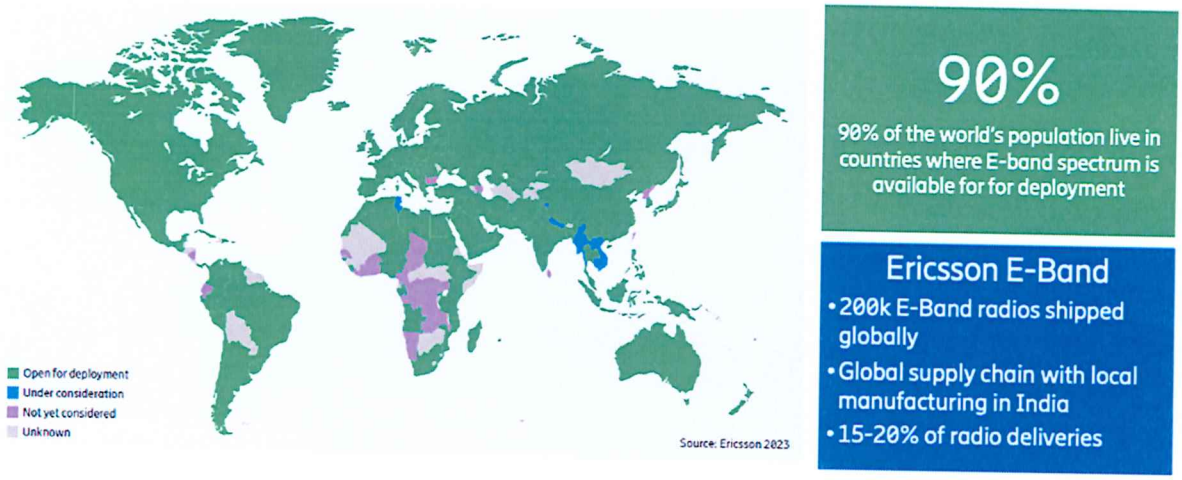

Figure 6: Global E-band deployment status

Based on data from analyst companies (SkyLight & DellOro) we see that between 2011-2024 almost 1.2M E-band radios have been deployed globally. The predicted traffic growth in the RAN is driving the need for high capacity backhaul links, this is illustrated in Figure 7, Backhaul capacity per distributed site, highlighting the anticipated capacity increases expected at different site types. Many of the capacities seen in the example below require wide channels, which in many cases are only available in the E-band, or at least at a significantly lower cost in the E-band.

		2024	2027	2030
4G and selective 5G mid-band	Urban	1 Gbps – 3 Gbps	2 Gbps – 4 Gbps	3 Gbps – 5 Gbps
	Suburban	250 Mbps – 2 Gbps	500 Mbps – 3 Gbps	2 Gbps – 4 Gbps
	Rural	100 Mbps – 400 Mbps	300 Mbps – 1 Gbps	500 Mbps – 2 Gbps
4G and 5G mid-band	Urban	1 Gbps – 5 Gbps	3 Gbps – 10 Gbps	5 Gbps – 15 Gbps
	Suburban	500 Mbps – 3 Gbps	1 Gbps – 5 Gbps	3 Gbps – 10 Gbps
	Rural	200 Mbps – 700 Mbps	300 Mbps – 2 Gbps	500 Mbps – 3 Gbps
4G, 5G mid-band and selective 5G high-band	Urban	5 Gbps – 10 Gbps	7 Gbps – 15 Gbps	10 Gbps – 25 Gbps
	Suburban	3 Gbps – 5 Gbps	4 Gbps – 10 Gbps	5 Gbps – 15 Gbps
	Rural	200 Mbps – 700 Mbps*	300 Mbps – 2 Gbps*	500 Mbps – 3 Gbps*

Source: Ericsson (2024).

* High-band spectrum not deployed in rural regions

Figure 7: Backhaul capacity per distributed site

Ericsson recommends that the E-band should continue to be used as license band for backhauling. There is a high number of E-band links deployed in India for FS and this band should be continued as Licensed band for FS and backhaul links.

Position on V-Band (57-64/66 GHz)

V-band is expected to be used by unlicensed services, both indoor and outdoor, as short-range devices. This is not a priority band for IMT or FS/microwave.

Spectrum requirements in scenarios where the lower portion of the V-Band is used for backhauling and the upper portion for IMT.

- There are no 3GPP bands defined for the 60GHz band for IMT operation
- There is band n263 defined for 57.095 – 70.9 GHz, NOTE 1: This band is for unlicensed operation and subject to regional and/or country specific regulatory requirements.

There is little to no demand for V-band for mobile backhaul applications. Being unlicensed creates uncertainty whether it is good enough for the user to meet network performance criteria.

Summary & Recommendations

Wireless backhaul (microwave, E-Band) has significantly contributed to enabling the current global communication networks. It is important to carefully consider the extensive and essential use of long-range wireless backhaul in these bands – today, as well as tomorrow. Introducing unlicensed use raises many concerns, while there are opportunities for coexistence with mobile systems with licensed bands.
In summary, Ericsson has the following recommendations:

- **6GHz Lower [5.925–6.425 GHz]:** Recently India has decided to de-license this band as with many other countries. The 'lower' 6GHz band has been identified by RLAN (Wi-Fi) for unlicensed services (like in US) on top of existing vital licensed Fixed Service infrastructure. Access to lower 6GHz remain critical for FS links deployment and, hence, should be protect from interference from any such unlicenced operations.

- **6GHz Upper [6.425–7.125 GHz]**: The 'upper' 6GHz band has already been identified for IMT in India and industry is preparing for future IMT deployment in this band. Ericsson recommends the entire upper 6GHz be made available for expansion of 5G and towards future 6G networks.

- **7/8GHz [7 125-8 400 MHz]:** Ericsson recommends that any MW / FS link deployment should not limit IMT deployment, hence, avoid widespread deployment of 7/8 GHz for FS links that can limit deployment of 7/8GHz IMT networks. Any deployment of FS links in this band before 2030 should take cognizance of potential IMT 6G deployment in this band.

- **E-Band [71-76 GHz, and 81-86 GHz]**: Ericsson recommends that the E-band should continue to be used as license band for backhauling. There is a high number of E-band links deployed in India for FS and this band should be continued as Licensed band for FS and backhaul links.

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