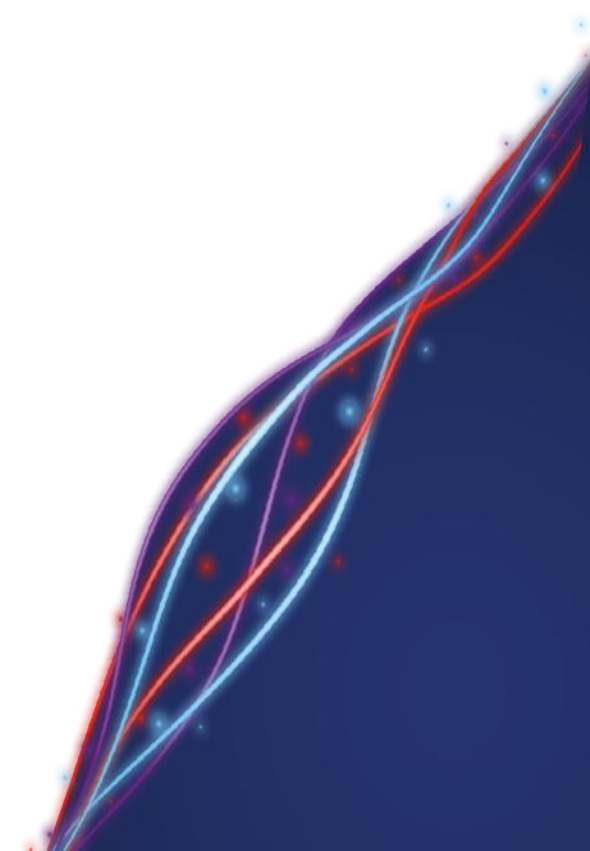


Future Wireless Spectrum



About IAFI

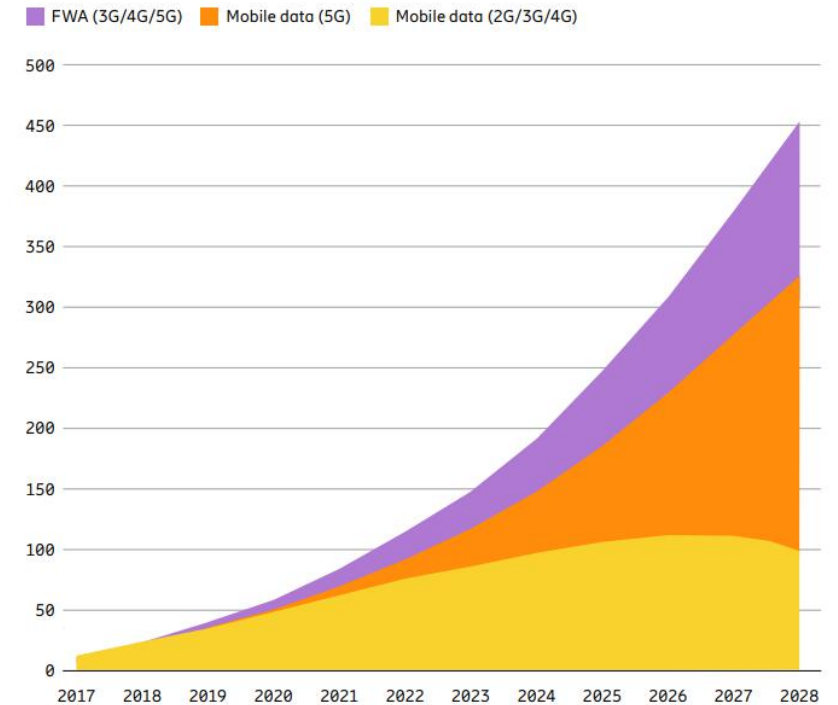
- ITU-APT Foundation of India (IAFI) is a non-profit, non-political registered society in India.
- IAFI is a non-partisan Foundation and does not identify with any Industry sector or group. We support all telecom and IT sectors: 4G, 5G, GSO –NGSO Satellites, Wi-Fi, Broadcasting, Aviation, etc.
- IAFI is recognized by the ITU as an international/regional Telecommunications organization and granted complimentary sector membership of all the three ITU Sectors - ITU-R, ITU-T and ITU-D, IAFI increased its participation and contributions in ITU and APT:
- IAFI is an affiliate member of the Asia Pacific Telecommunity (APT)
- Despite Covid, IAFI continued and expanded its activities with almost one event every month
- IAFI activities continued to be well covered by the Media with 30 stories during the year
- IAFI submitted more than 20 responses to TRAI, DOT and other consultations
- IAFI moved into a new and larger office in the World Trade Center in New Delhi in response to our increased activities.

10 billion Mobile connections surpassed in 2022*

Number of Mobile based connections per head of the population in 2Q22



Global mobile data traffic (EB per month)

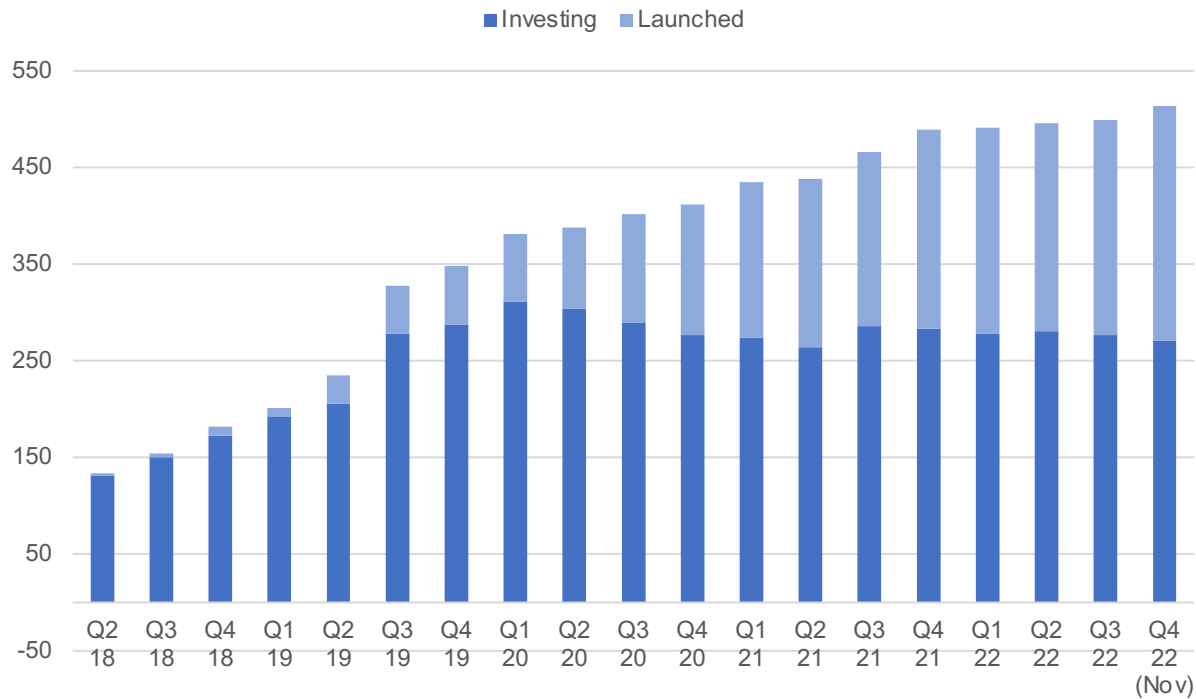


Source: Ericsson Mobility Report, November 2022

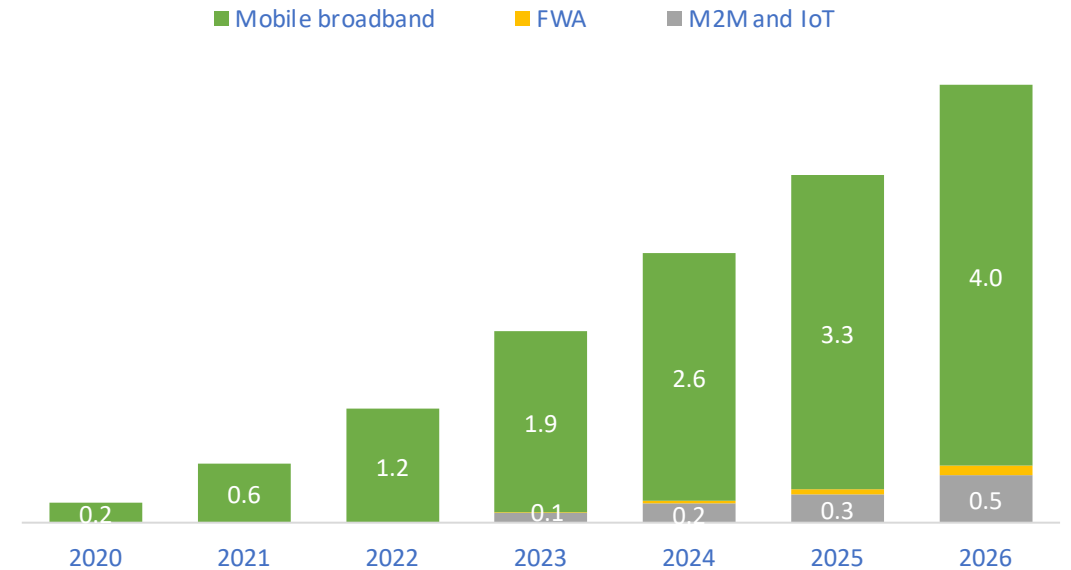
Note: Data traffic forecast, both global and regional, represents the estimated traffic volume in all networks over the duration of a month. Traffic, in terms of throughput, in high-traffic areas will be much higher than the average traffic.

5G roll-out and uptake continues to grow

Growth of 5G: number of operators investing in and operating commercial networks

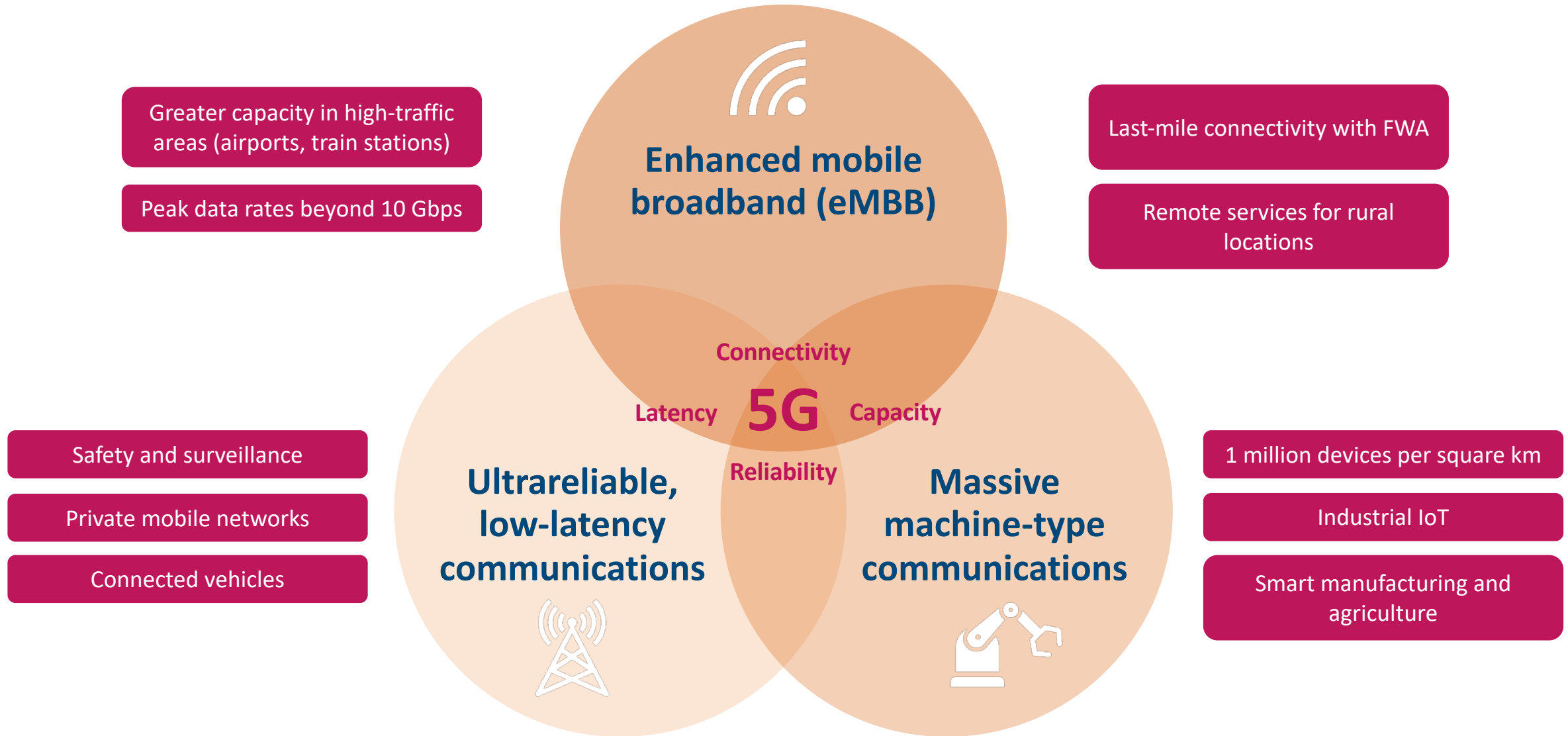


5G connections by type, worldwide (billions)



- By end-November 2022, 514 operators are investing in 5G, 47% of which have launched commercial services
- 5G connections are set to double in 2022 to reach 1.2 billion

5G brings unique use cases and benefits

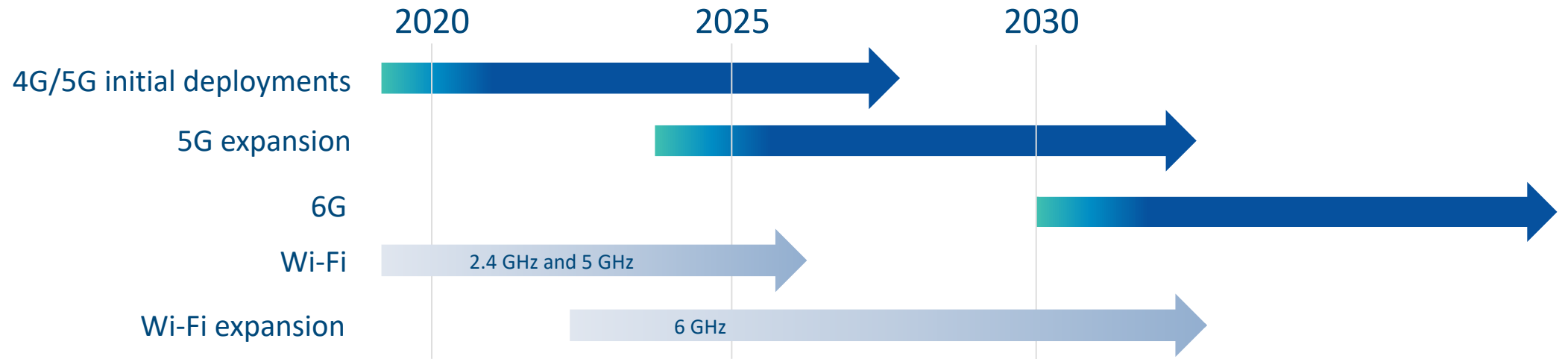


Future use cases require much faster data

- Immersive experiences such as robotic surgeries, Industrial automation, AR/VR
- Require expansive computational resources and connectivity hundreds, if not thousands, of times faster than 5G, which are difficult to be delivered by a wide-area networks
- These use cases require local-area, short range communications such as the next generation Wi-Fi technologies designed for extremely high throughput and spectral reuse

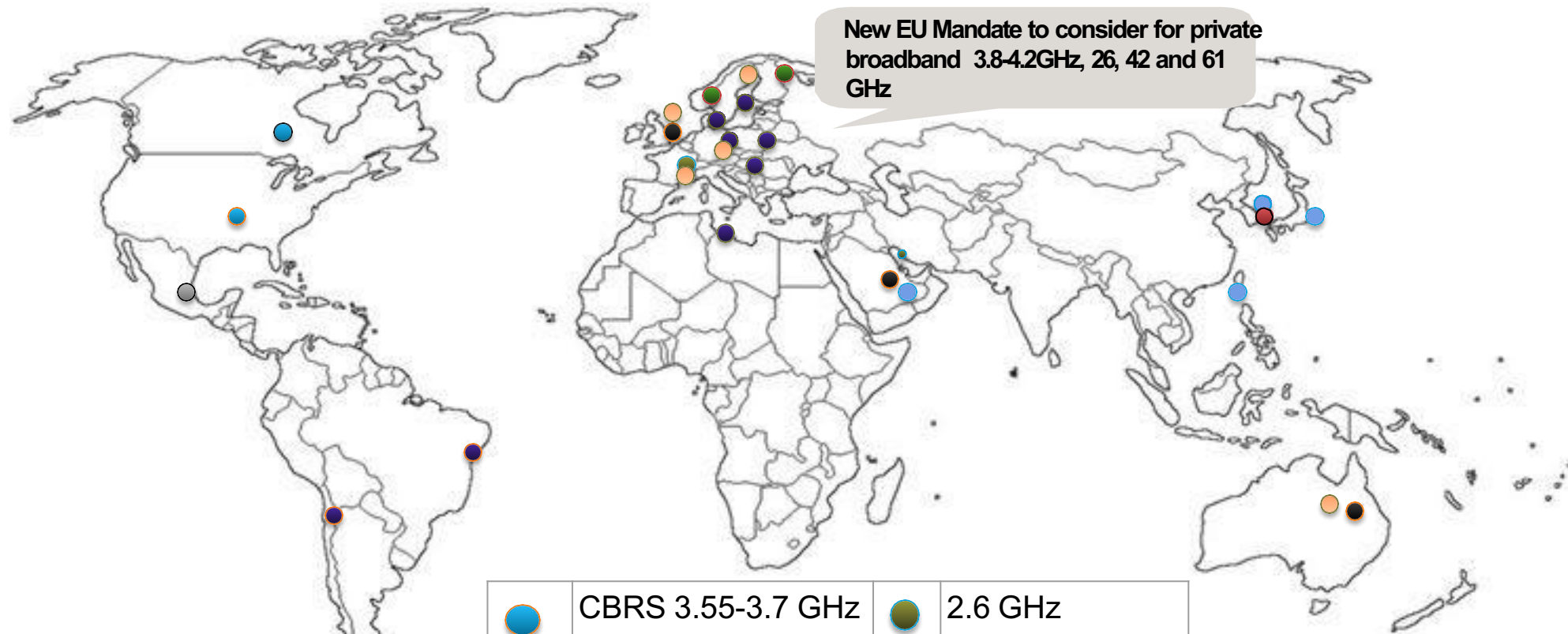


5G will continue to need more spectrum from 2023 to 2030



Band (MHz)	600-960 MHz	1.4 GHz, 2GHz, 2.5 GHz	3.6 GHz	4.4 - 6 GHz	6-24 GHz	26 GHz	40,50, 60 GHz	80-400 GHz
5G Initial	700 MHz	1700-2300 MHz	3300-3670 MHz			26 GHz		
5G Expansion	600 MHz	1.4 GHz	3800-4200 MHz	4.4 - 4.95 GHz		26 GHz	40 GHz	
6G	600-960 MHz	2.5 GHz		4.4- 4.95 GHz	Parts of 7-24 GHz		40. 50, 60 GHz	80-400 GHz
Wi-Fi		2.4 GHz		5 GHz	6 GHz		60-70 GHz (V band)	
CNPN	700 MHz		3700-3800	4.95-4.99 GHz		28 GHz		

Many Countries are already allocating Spectrum for the vertical markets/Private Broadband/Local Area Licensing

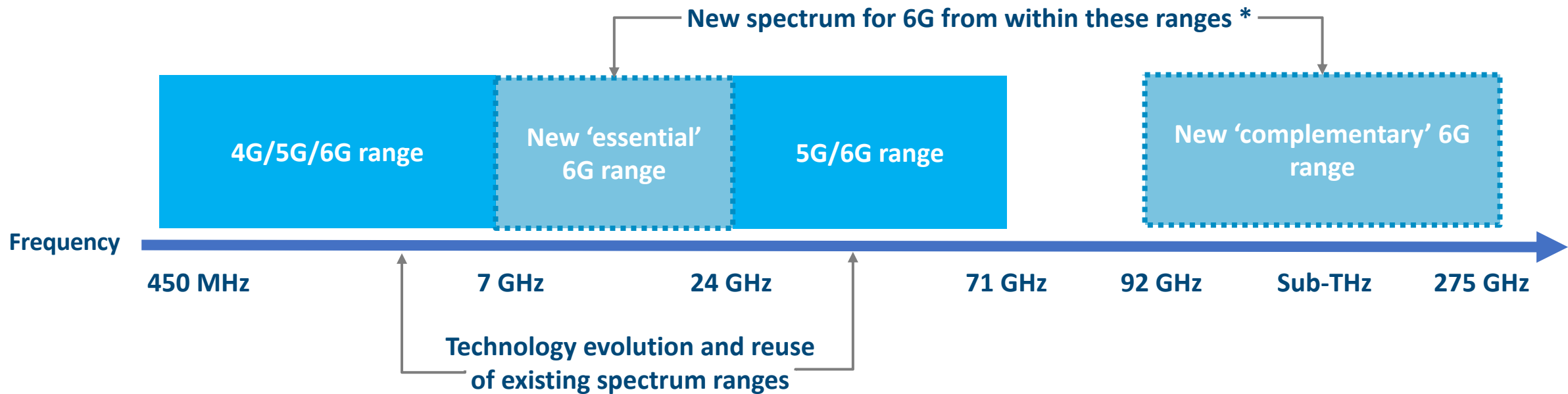


	CBRS 3.55-3.7 GHz		2.6 GHz
	3.4-3.8 GHz		Carrier lease
	2.3 GHz		26 GHz
	3.8-4.2 GHz		In 4.4-4.9 GHz
	28 GHz mmWave		

Most Industrial Countries have already allocated Mid Band spectrum for Private 5G Networks

Country	Spectrum (MHz)	Comments
Brazil	3700-3800	Considering allocation
Finland	2300-2320	Available 2020
France	2575-2615	Available 2019
Germany	3700-3800	Available 2019
Japan	2575-2595	Available 2019
	4600-4900	Available 2020
Poland	3410-3480	Considering allocation
Korea	4720-4820	Available 2021
Sweden	3760-3800	Available 2021
Taiwan	4800-4900	Considering allocation
UK	2390-2400	Available 2019
	3800-4200	Available 2019
US	3550-3700	Available 2020

New Spectrum is needed for 6G



- * Frequency bands from within these ranges will need to be selected for further study, taking into account sharing possibilities of IMT with other Radiocommunication Services allocated on a primary basis.
- * Existing users of mobile applications such as those supported by UWB should also be considered for relevant bands where applicable.
- * The lower the frequency the better from within the 'essential range' in terms of propagation, cell size and economic network deployments.
- * IMT Agenda Item for WRC-27 is a key step towards a successful device ecosystem and economies of scale

Many countries have already adopted 6GHz WiFi

- Adopted 5925-6425 MHz
- Adopted 5925-7125 MHz
- Considering 5925-6425 MHz
- Considering 5925-7125 MHz

Americas	Asia Pacific	Europe	Middle East -Africa
<ul style="list-style-type: none"> • <u>Argentina</u> • <u>Brazil</u> • <u>Canada</u> • <u>Chile</u> • <u>Colombia</u> • <u>Costa Rica</u> • <u>Dominican Republic</u> • <u>Guatemala</u> • <u>Honduras</u> • <u>Mexico</u> • <u>Peru</u> • <u>United States</u> 	<ul style="list-style-type: none"> • <u>Australia</u> * • <u>Hong Kong</u> • <u>Japan</u> * • <u>Malaysia</u> • <u>New Zealand</u> • <u>South Korea</u> 	<ul style="list-style-type: none"> • <u>European Union</u> • <u>Norway</u> • <u>Switzerland</u> • <u>Turkey</u> • <u>United Kingdom</u> * 	<ul style="list-style-type: none"> • <u>Egypt</u> • <u>Jordan</u> • <u>Kenya</u> • <u>Morocco</u> • <u>Oman</u> • <u>Qatar</u> • <u>Saudi Arabia</u> • <u>Tunisia</u> • <u>UAE</u>

* considering 6425-7125 MHz

Summary

- 5G services will continue to need additional spectrum.
 - A number of IMT bands identified by ITU are still to be made available to the operators in South Asia:
 - 600 MHz
 - L band: 1427-1512 MHz
 - C band: 3700-4200 MHz
 - 4.9 GHz – 4400-4900 MHz
- ❖ 6GHz band is increasingly being harmonized for unlicensed technologies such as WiFi6e
- ❖ For 6G the band 7-24 GHz and mm wave bands from 80 GHz to 400 GHz needs to be studied



THANK
YOU

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