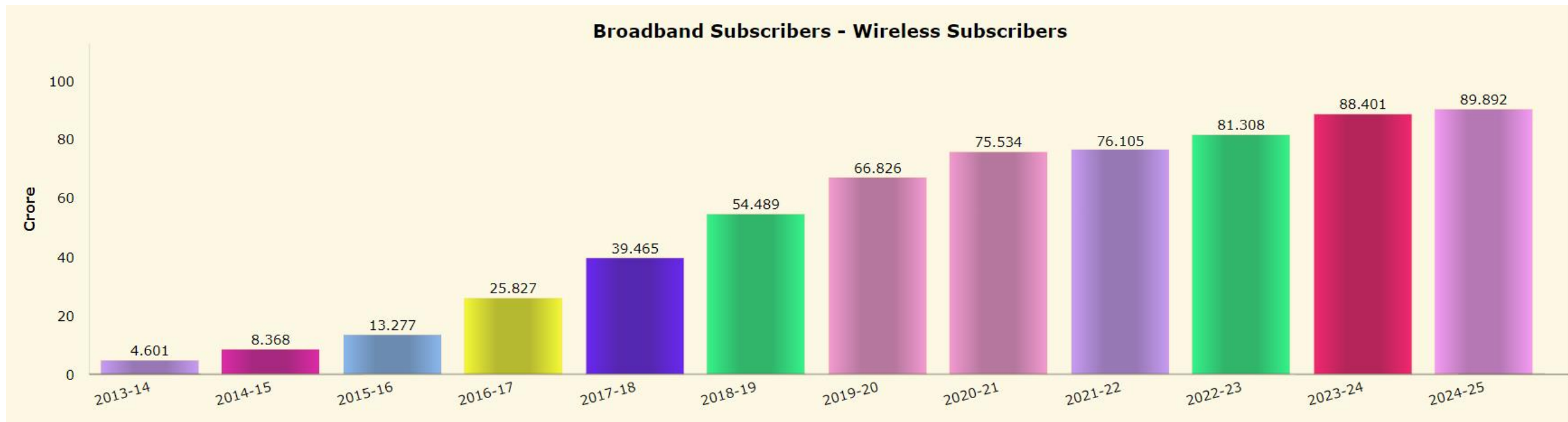


Framework for Planning the 6 GHz band – Need for IMT Identification in India

Role of Spectrum in India's Digital Growth

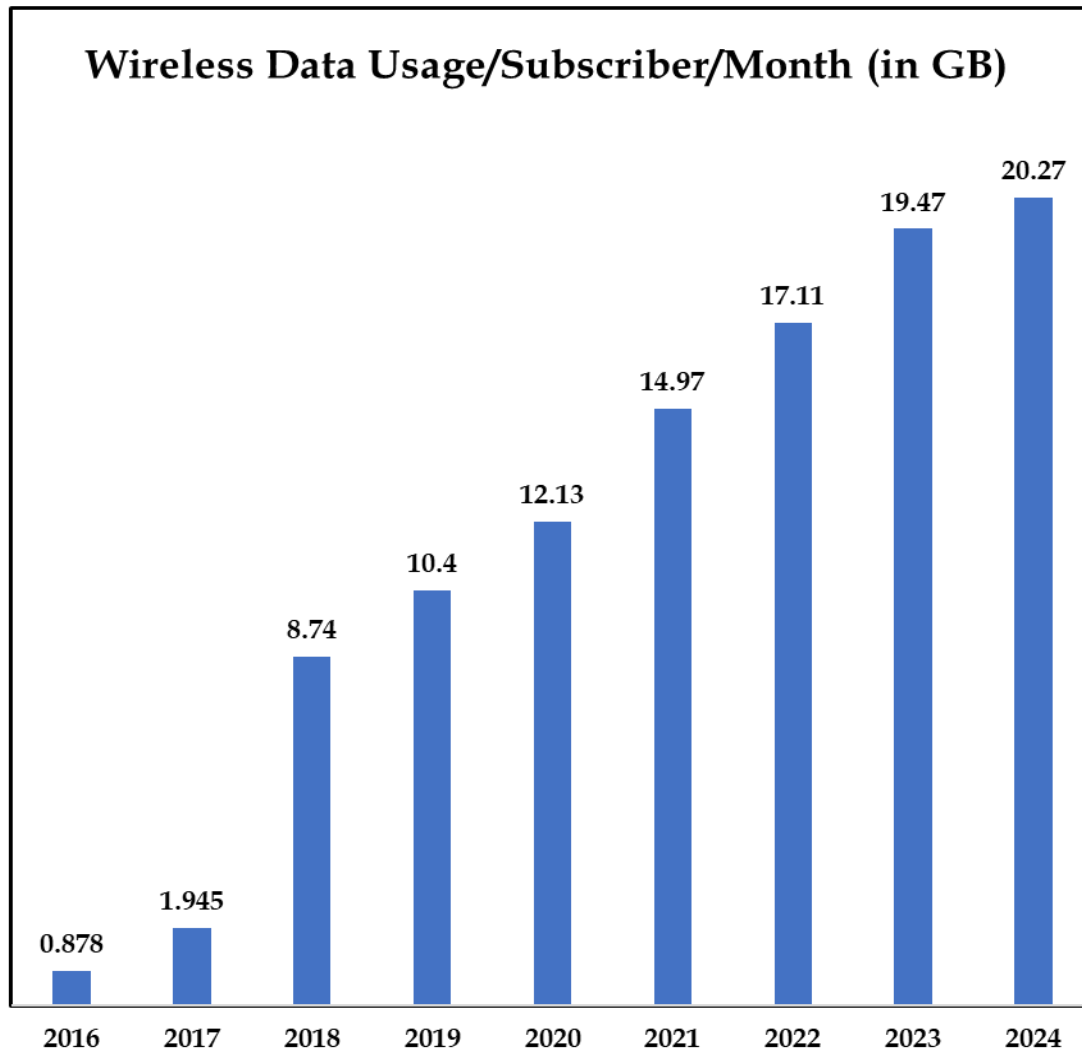


- The Telecom Sector is a key enabler for making India a “**Digital Society**”
- The industry witnessed exponential growth primarily driven by “**faster network rollouts**” & “**Timely availability of Spectrum**”.
- Over the years, there is significant growth in Wireless Broadband subscribers.

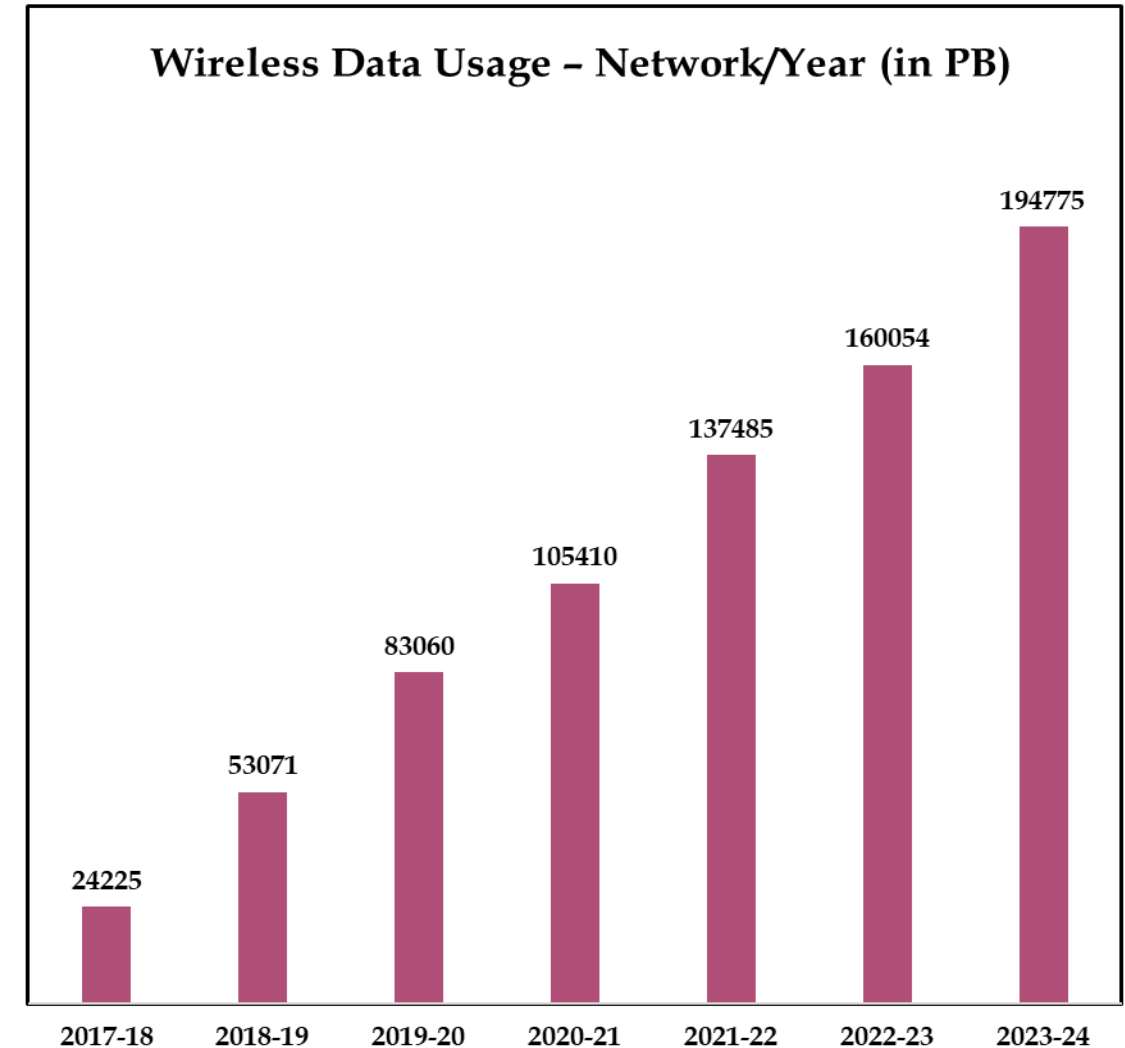


Source: DoT Dashboard

Subscriber & Network Level – Wireless Data Usage Trends



Source: TRAI Performance Indicators

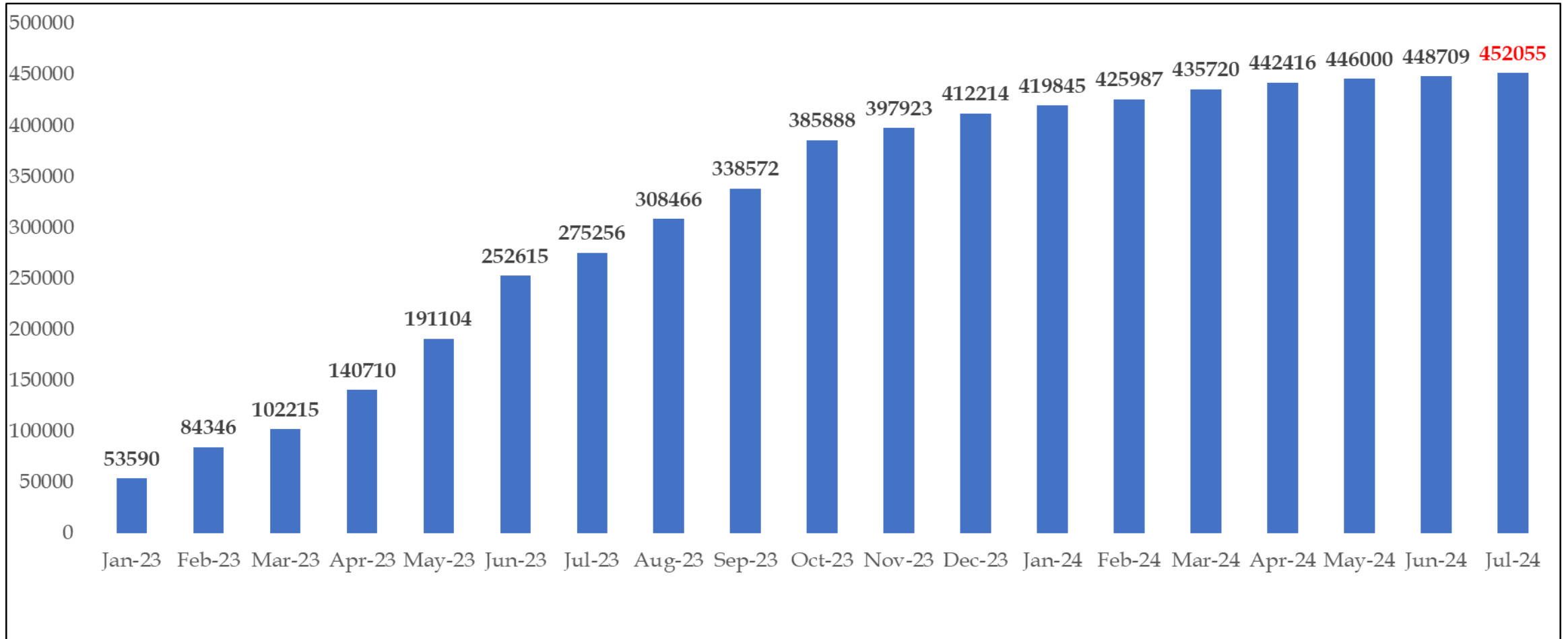


Source: DoT Dashboard

Mid Band spectrum Facilitating Fastest 5G Deployment Globally



- The 5G services were launched by Hon'ble Prime Minister on 1st Oct, 2022.
- The 5G rollout in India has been the fastest around the world.

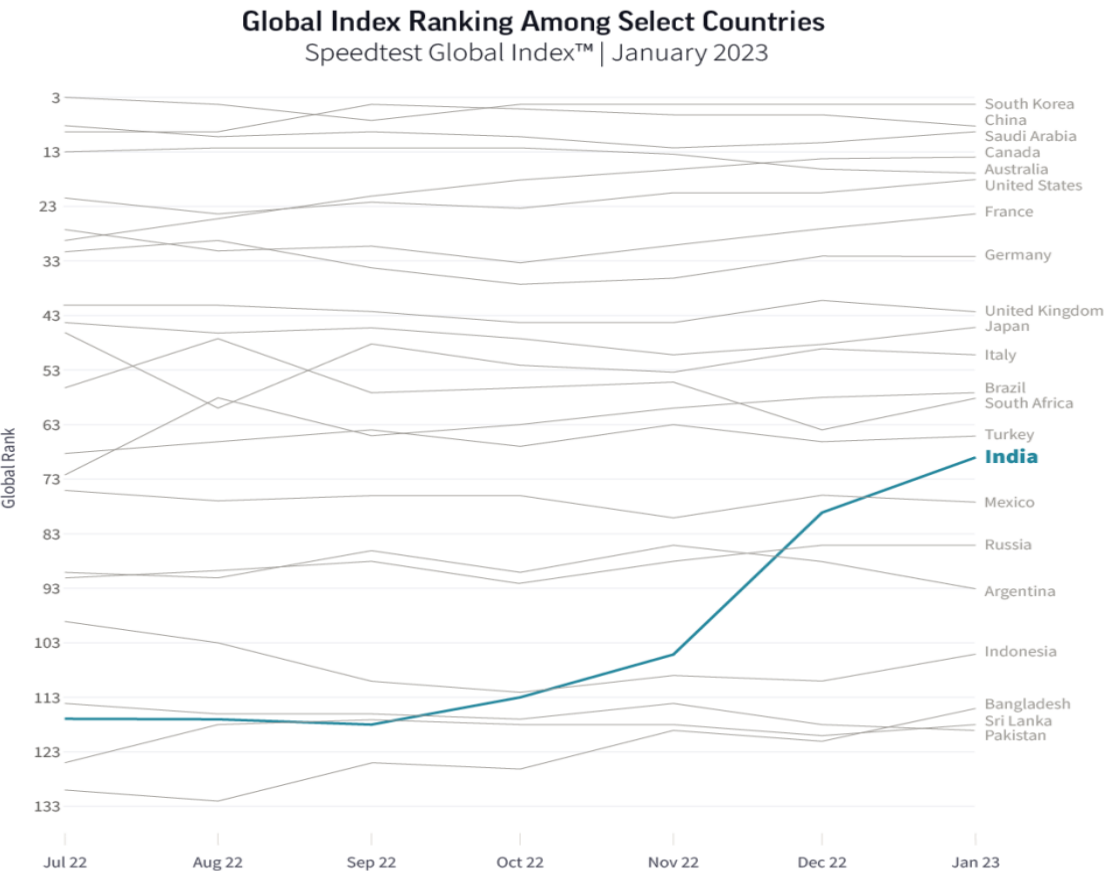


Source: DoT Dashboard

5G Spectrum - Improved India's Global Ranking



With 5G service - India jumped 72 places, from 119th to 47th position in the Speedtest Global Index

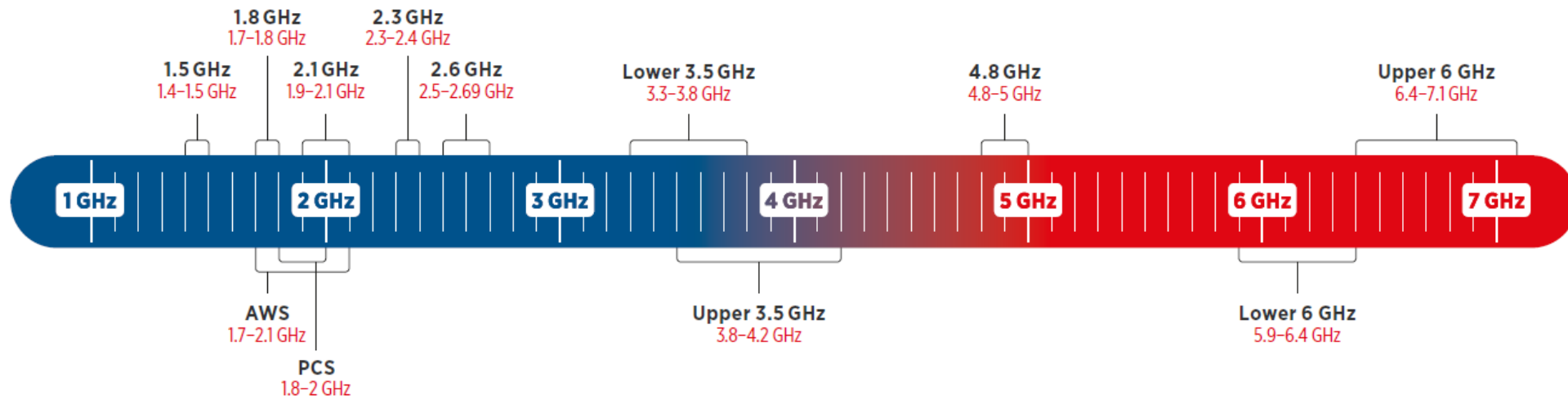


In June 2024, India stands #12 for Mobile Download speed

#	Country	Mbps
1	Qatar	334.63
2	United Arab Emirates	323.61
3	Kuwait	226.56
4	Norway	145.19
5	Denmark	144.93
6	South Korea	139.04
7	China	135.71
8	Saudi Arabia	128.03
9	Netherlands	120.96
10	Bahrain	113.87
11	United States	113.1
12	India	107.03

GSMA: 2GHz Mid-band Spectrum and 6GHz band is the Key

1. 2 GHz of mid-bands spectrum (on average) will be required to meet the IMT-2020 user experience mobile data rate of of DL 100Mbps and UL 50Mbps
2. 6GHz, 4.5~5GHz, 3.3~4.2GHz are the most popular potential new mid-band for 5G advance and 6G.
3. Prepare spectrum **5-10 years** in advance.

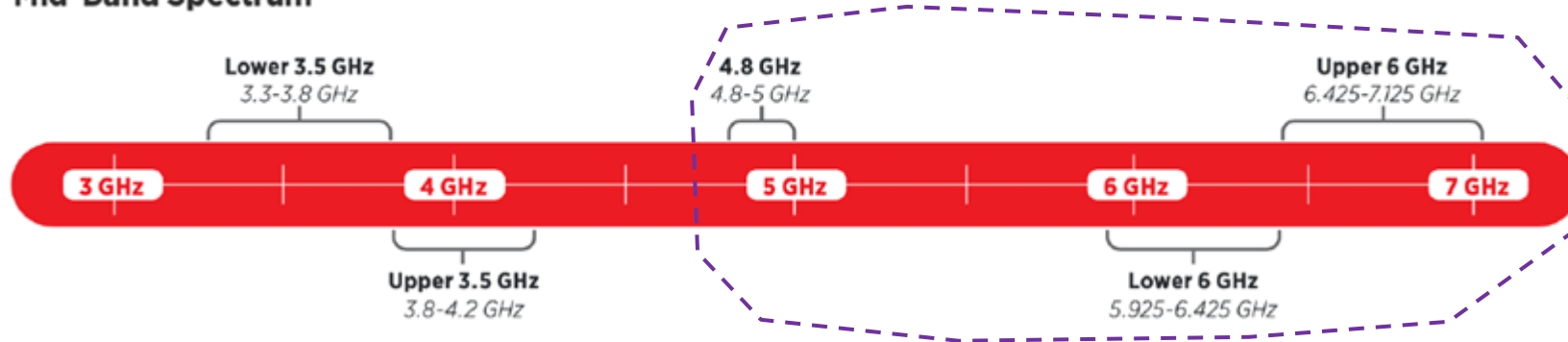


Thus additional spectrum is required in mid-bands beyond currently planned 300 MHz allocated in 3300-3600MHz for 5G

Potential Mid-band Spectrum Sources in India

Operator needs a surety for business continuity to risk-proof initial investments in 5G.
This spectrum must be reserved for 2025+ time frame for IMT in India

Mid-Band Spectrum



No known plans beyond 3 670 MHz

6GHz is the only opportunity offering contiguous spectrum up to 300 MHz per MNO

Current 5G IMT allocation in 3300-3670 MHz band already restricted near airports due to Radio Altimeter interference apprehensions

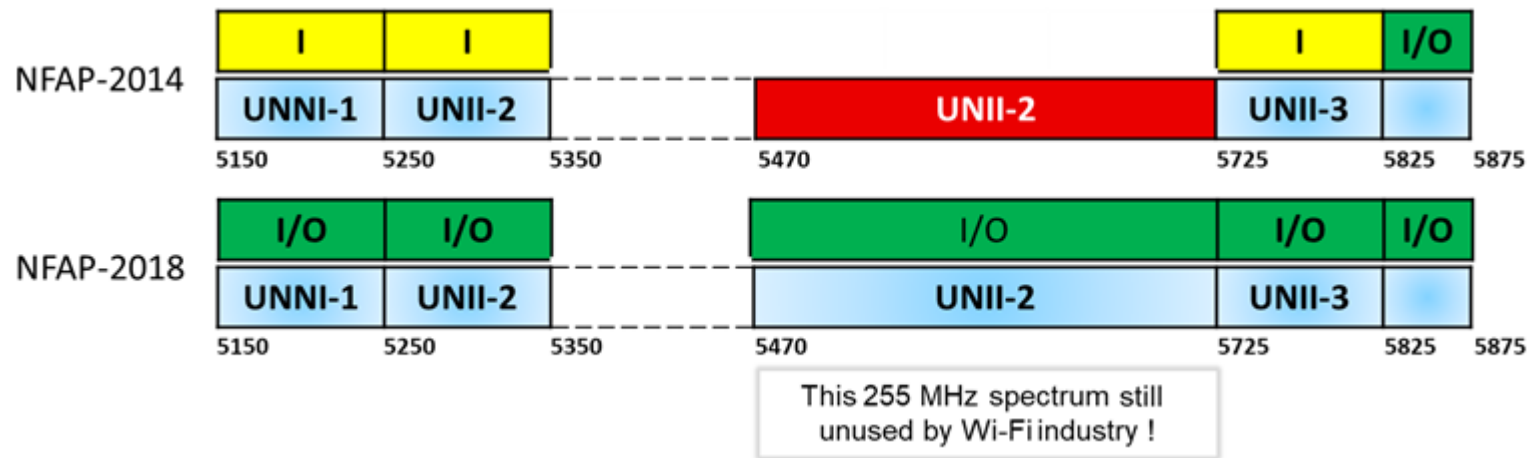
6GHz will be the key frequency band for future 5G

- a. Good propagation property and large contiguous bandwidth
- b. Ideal to meet capacity and coverage needs
- c. Quick deployment with lower costs compared with millimeter-band

Status of current Unlicensed spectrum in India



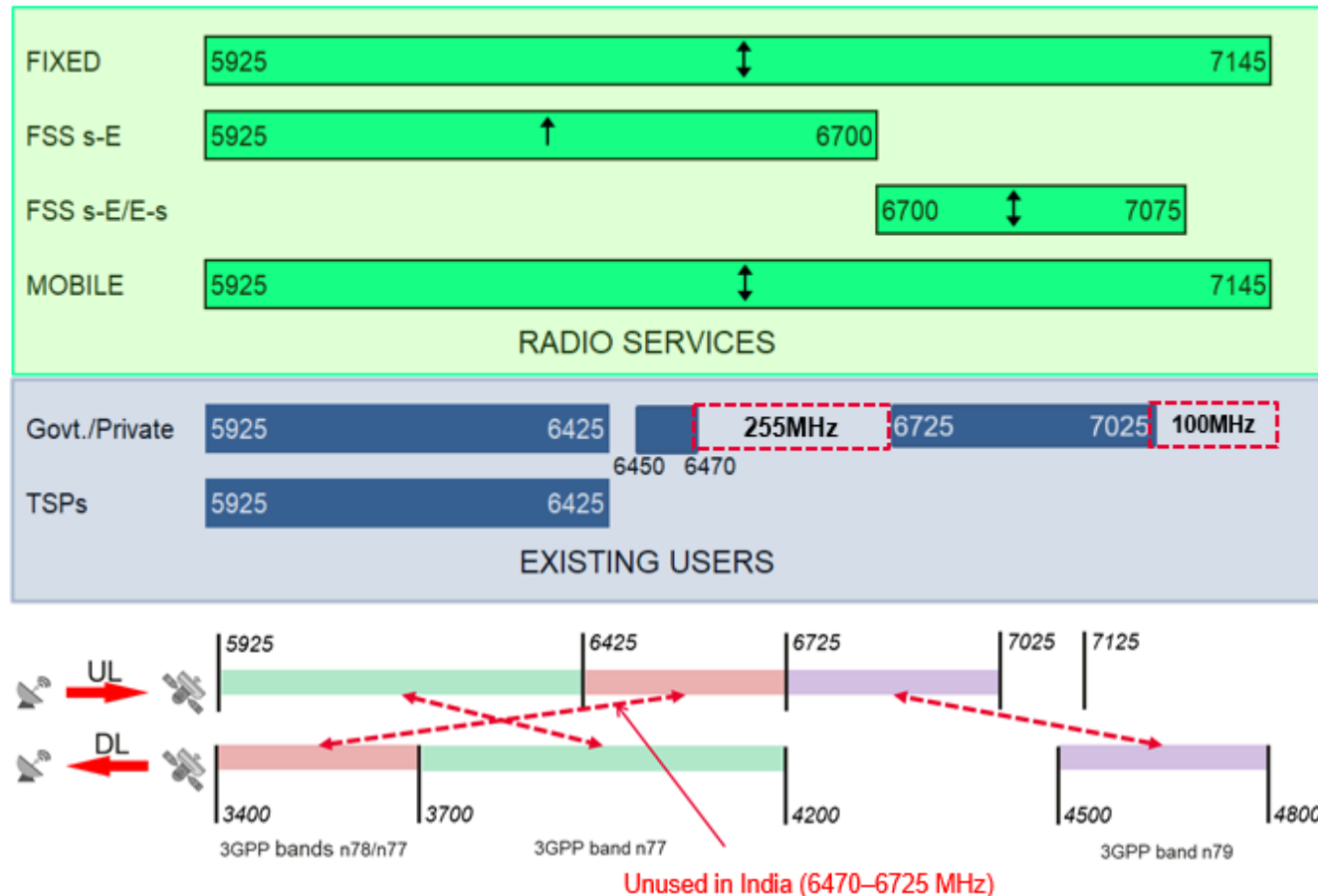
1. 2400-2483.5GHz (83MHz) ISM band
2. 5150-5350 & 5470-5875 MHz (605MHz) U-NII bands
3. 605 MHz for Outdoor use in 2018 NFAP (GSR 1048, Oct 2018)



1. India is primarily a mobile-first with reliance on Wireless broadband penetration as key source for internet access.
2. More than adequate spectrum has already been delicensed & this is still under-utilised
3. Wi-Fi already has more mid-band spectrum than IMT in India (688 MHz)
4. Wi-Fi6 can reach Wi-Fi6E's Peak Data Rate even in existing 2.4/5GHz spectrum, with technical enhancements.
5. Hence spectrum is not the bottleneck for Wi-Fi.
6. No additional Unlicensing of spectrum for WiFi is recommended

1. Evolution of satellites to Ka/Ku-band due to smaller form factor and large bandwidth.
2. Indian C-band satellites may hit their EOL by 2030.
3. As satellite services migrate to higher bands, the IMT coexistence conditions for the operation of 5G in the 6 GHz range will become less restrictive over time.
4. **Promote the use of Ku/Ka and other higher frequency band for satellite FSS communications which are more efficient for the future & beneficial for India.**

6GHz band - IMT Identification in India



1. Mobile is co-primary with FSS in 6 GHz band
2. 6470–6725 MHz i.e. **255 MHz** is **not currently utilized** by any FSS Uplink in India.
3. In **APG23-6**, consensus was established for IMT identification of 7,025-7,125 MHz band in Region 3
4. This means a total of **355 MHz** spectrum in 6 GHz band is immediately feasible for IMT identification in India without any studies.
5. It is vital to consider the intermediate 6425–7025 MHz range for IMT.
6. DoT should ensure active participation and cooperation by DoS (ISRO) in moving ahead with this objective.

Freq. Band (MHz)	NFAP Allocation	Satcom Usage
5 925 – 6 700	FIXED FSS (E-s) 5.457A MOBILE 5.457C 5.149 5.440 5.458	TV/Broadcast Uplink, VSAT, GAGAN, TT&C, MSS Feeders
6 700 – 7 075 (AP30B FSS Plan)	FIXED 5.457 FSS (E-s/s-E) 5.441 MOBILE 5.458 5.458A 5.458B	VSAT, IRNSS, GAGAN

Enable 6GHz IMT identification via country FN in WRC27

1 IMT Mid-band Spectrum need

1. 150Mn subscriber base covered for 5G rollouts with spectrum in 3.5GHz
2. Additional **300MHz** contiguous **mid-band** spectrum **per network** is needed for 5G growth in **2025-2026**
3. Further **300-550MHz mid-band** spectrum **per network** needed for **6G** by 2030

2 Sources ?

4.4 – 4.8 GHz

Immediate next to Altimeter in 4.2-4.4GHz. Already grappling with restrictions on 5G. Minimal potential for harmonization and affordable ecosystem

4.8 – 4.9 GHz

Consistent objections from Defence. If agrees, only 100MHz

5.925 – 6.425 GHz

Available option. Not under WRC discussion. Offers 500MHz contiguous range.

6.425 – 7.025 GHz

Available option. Offers 700MHz contiguous range.

3 What it takes ?

Strategic will. Policy decision

Policy decision needed to facilitate 5G growth

Vendor commitment for ecosystem

✓ 3GPP defined band n104 for Licensed IMT

WRC-23 endorsement for Region 3

India can leverage on R3 decision w/o legality

4 Options for India

Country specific stakeholder consultation

Re-alignment of incumbent services to free-up 6GHz

Conduct IMT trials in 6GHz for evaluations

Enhanced scale with legal stamp of WRC FN



Key Takeaways – Improved 6 GHz band access for IMT



1. Mid-bands are essential for economically viable high-capacity wider area mobile coverage across cities for eMBB and vertical use cases
2. MNOs expect assured policy commitment for mid-band spectrum for business continuity and risk-proof initial investments in 5G.
3. 300-400MHz/MNO spectrum be reserved for 2025-2026 time frame for IMT in National spectrum roadmap. **The 6 GHz band (5925-7125 MHz) plays a critical role in meeting these spectrum needs.**
4. Insufficient spectrum at mid-bands would imply extreme densification to meet mobile demand.
5. Extreme densification imposes unsustainably high costs (ultimately borne by users) and increased carbon footprint, and may not even be feasible due to interference or site availability challenges.
6. Already 605MHz delicensed spectrum allocated in India in 5GHz band with Outdoor use and which is still not effectively utilized. There is no clear justification of any additional spectrum for Wi-Fi.
7. National authority should conduct national C-band satellites survey for - Utilization efficiency of spectrum, and demand projections, and Cost value efficiencies
8. Promote the use of Ku/Ka and other higher frequency band for satellite FSS communications which are more efficient and the future.

Thank You