



Spectrum Roadmap to 6G

A B6GA Perspective

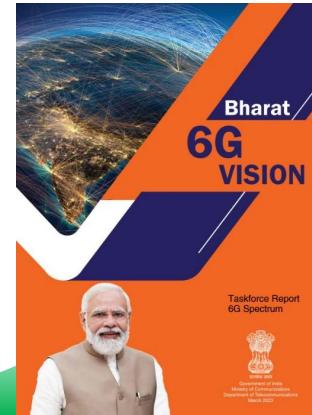
R. David Koilpillai

Chair, B6GA

EE Department, IIT Madras

16 December 2025

5th India Spectrum Management Conference (ISM) 2025
New Delhi



Bharat 6G Alliance (B6GA)



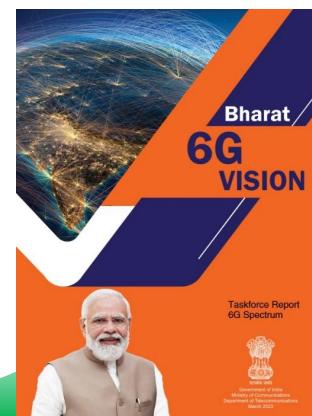
- Formed in July 3, 2023
- India to become ...
 - A global supplier of IP, products and solutions in 6G
 - Affordable 5G and 6G
- Deploy 6G technologies by 2030
- Support and energize Indian participation in SDOs

Founding members (16)

- 3 Operators, 2 Academia, 3 Government R&D Labs, 8 Tech companies
- Seven Working Groups
- Membership
- Corporate, Affiliate, Associate, Expert Members, and Guest Members
- MoU with International partners – 6G Flagship ([Finland](#)), 5G ACIA ([Europe](#)), 6G SNS-IA ([Europe](#)), Next G Alliance ([USA](#)), XGMF ([Japan](#)), 6G [Korea](#), ...

■ Seven Working Groups

1. Spectrum
2. Device technology, sensors and manufacturing ecosystem
3. Technology
4. Applications
5. Green and sustainability
6. Outreach
7. 6G use-cases and revenue stream



B6GA Whitepapers

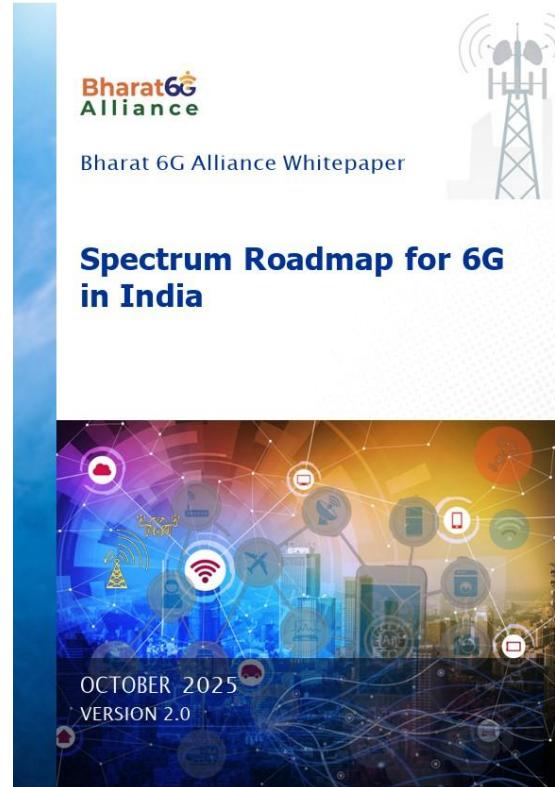


- Released by Hon. Minister of Communications

Ver 1 @ IMC 2024,



Ver 2.0 @ IMC 2025



India's Phased Approach towards 6G

■ Phase 1 (2025–2027):

- R&D, Standardization (contributions to ITU and 3GPP)
- Technology Testbeds
- Pre-Standardization Prototypes
- Spectrum trials

■ Phase 2 (2027–2030):

- Continued R&D
- Standard-based prototypes
- Pilot trials.

■ 2030 and Beyond:

- Medium-to-large scale PoC trials of standard-based prototypes
- Commercial readiness

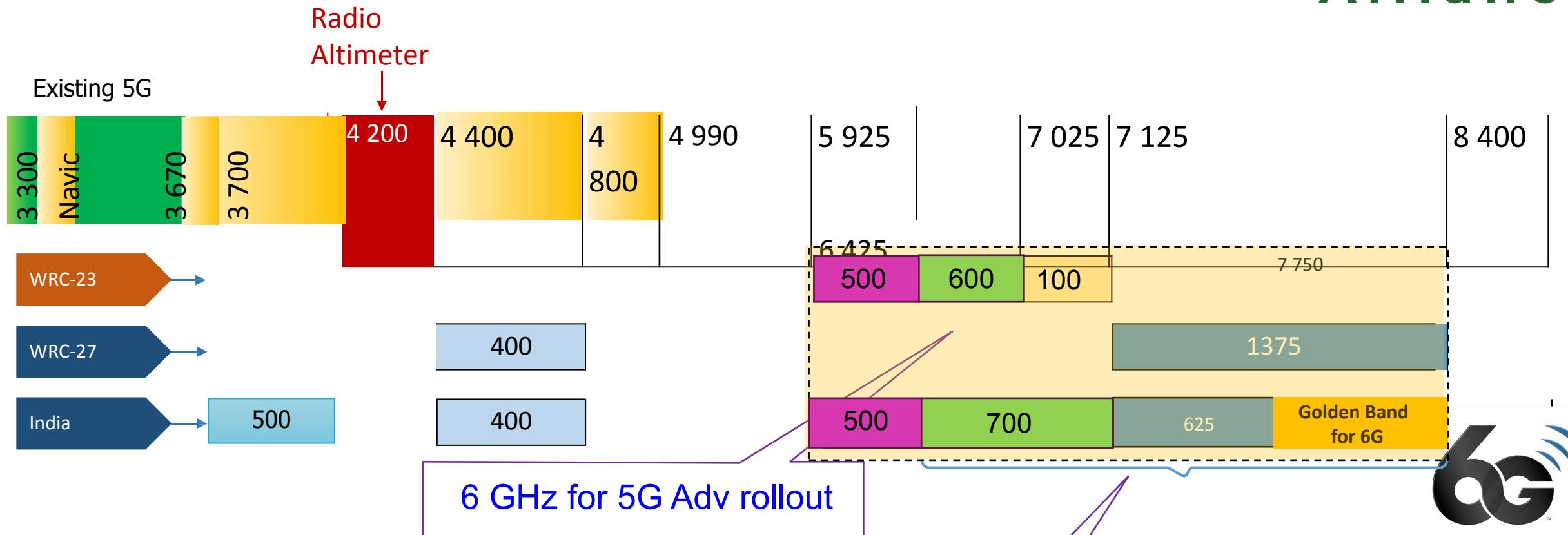
■ Current Focus on Phase 1



- 5G Market rollout
- Roadmap to 6G – Role of Bharat 6G Alliance (B6GA)
- Spectrum for 5G Adv and 6G
- 6G Roadmap Strategy
- Building the 6G ecosystem
- International Partnerships of B6GA

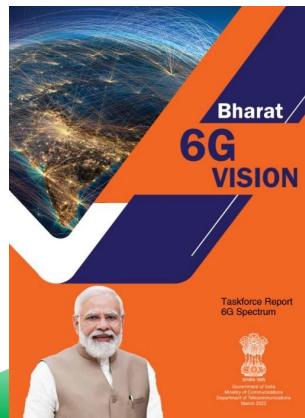


India Spectrum Situation



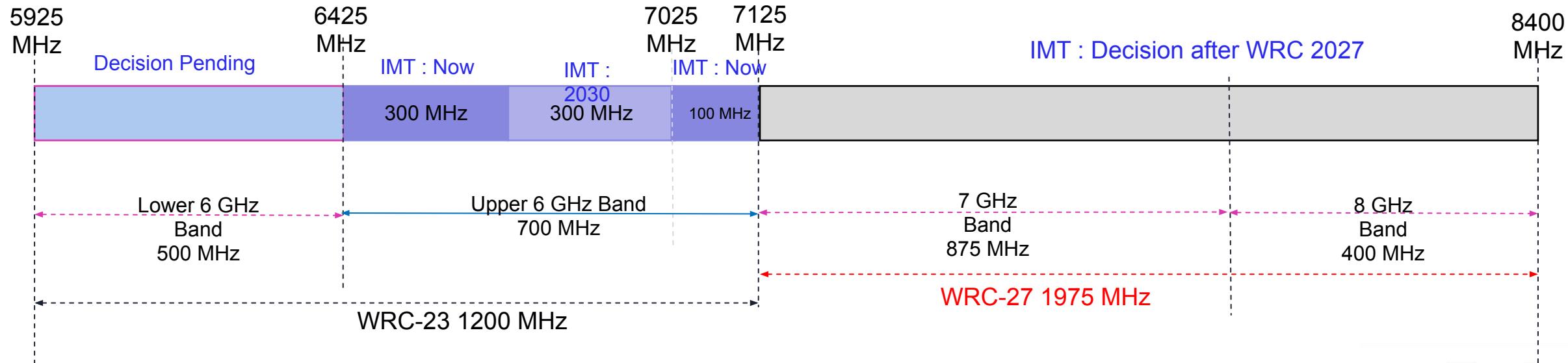
- 6 GHz Band
- (300 + 300 + 100) = 700 MHz identified for IMT services
 - 400 MHz spectrum available currently
- 500 MHz Spectrum under consideration for unlicensed operation
- 600 MHz band to complement 6G for coverage

Band for 5G Adv and 6G

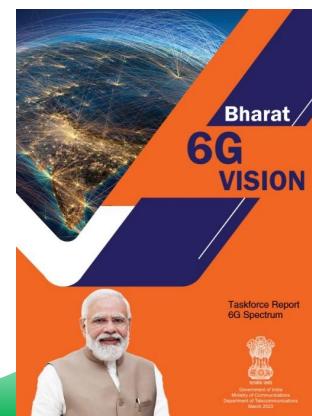
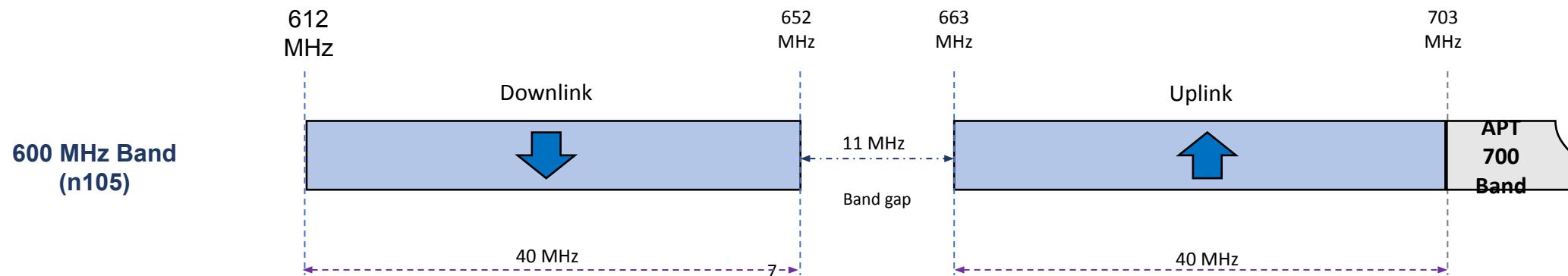


India 6G Bands

■ Mid-range



■ Sub-GHz Range



Key Technology Focus Areas for 6G

■ Technology Areas aligned with 6G (identified jointly with TSDSI)

- AI/ML
- Integrated Sensing and Communications (ISAC)
- Non-Terrestrial Networks (NTN)
- Physical Layer Technologies (Waveform, MIMO ...)
- Fixed Wireless Access
- ORAN
- L1/L2/L3 software
- IoT (5G, 5G Adv, 6G)

- Additional topics to be identified

6G Components ecosystem

- RF Components
- Transceiver Modules
- Baseband ASIC
- Antennas



■ Strengthen involvement of industry players, TSP

■ Broad engagement in 3GPP, ITU activities

■ Consortium Model (increase participating institutions) – Hub and Spoke

6G Spectrum Requirements

■ Drivers

- XR, Extensive Edge AI based use cases, Holographic communications
- Integrated sensing and communication (ISAC)

■ Spectrum requirements

- GSA – 400 MHz contiguous block per operator
- GSMA – 2 blocks of 200 MHz of contiguous blocks per operator

■ New Spectrum bands for 6G

- Greenfield spectrum must for 6G
- Existing bands to continue with 4G / 5G deployment till 6G gets stabilized
- 600 MHz band (n105 : 663-703 / 612-652 MHz) is an essential complimentary 6G band

■ Management of Incumbents by 2027

- For India's 6G leadership, spectrum bands 7/8 GHz should be made available by 2027 for initial trials/pilots by 2028
- Essential to plan migration path and refarming for incumbents using 7/8 GHz bands
- One India – One 6G Goal – Single alignment across all stakeholders including incumbents



Spectrum Roadmap for 6G in India



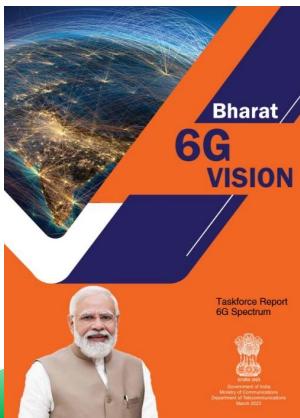
Gantt Chart

- Start date Q1, 2025
- End date – Q4 2027
- Duration of plan – 8 Quarters

	Task	Start	End
1	International coordination with MoU Partners	Q1, 2026	Q4, 2027
1.1	Whitepaper on with 6G Flagship Finland	Q3, 2026	
1.2	Spectrum for NTN : discussion with UK India - FNI (UK)	Q2, 2026	Q3, 2026
1.3	Spectrum sharing study	Q2, 2026	Q4, 2026
2	Consultation paper with industry stakeholders on 5G and 6G coexistence	Q1, 2026	Q3, 2026
2.1	Define clear pathways for 200 MHz mid band spectrum per operator for 5G advanced	Q2, 2026	Q4, 2026
3	Call for Proposal on Prototypes/ Field experiments in spectrum bands of interest (7-8 GHz)	Q3, 2026	
3.1	Initiate pilot projects and trials for emerging wireless technologies	Q4, 2026	Q2, 2027
4	Utilization Sub 1 GHz band		
4.1	Consultation on usage of 526-582 MHz	Q2, 2026	Q4, 2026
4.2	Commercialization of n105 band (612-652MHz, 663-703 MHz)	Q2, 2026	Q4, 2026
5	Track HAPS & NTN developments	Q1, 2026	Q4, 2027
6	Final position development for WRC-27	Q4, 2026	Q1, 2027
7	Technical input to 3rd APG 27	Q1, 2026	Q4, 2026
8	Based on WRC-27 outcomes, define spectrum for initial 6G deployments in India	Q2, 2027	Q3, 2027
8.1	Policy Recommendation for spectrum allocations for 6G launch in India with Global Harmonization	Q3, 2027	Q1, 2028



Recent Spectrum-related Events



- Spectrum WG meeting #15 : Invited Expert Presentations
 - A European Perspective on 6G Spectrum : Prof. Marja Matinmikko-Blue, U Oulu - 6G Flagship, Finland
 - An Industry Perspective on 6G Spectrum : Mr. Ross Bateson, Advisor (Spectrum), GSMA
- Spectrum WG meeting #14 : Invited Expert Presentations
 - Update on ITU (WP5D), WRC-27 and APG27 activities : Dr. Punit Rathod and Mr. Jitendra Singh, Qualcomm
 - Overview of TEC Draft Standard WoMT (WiFi over mmWave) : Dr. P.S.M. Tripathi, WPC
 - Salient aspects of NTP 2025 : Dr. P.S.M. Tripathi, WPC
 - Overview of CBRS and SAS Technology : Dr. Abhishek Chakraborty, Ahmedabad University and UC San Diego
 - Demonstrating the capabilities in new 6G “Mid Band” (7/8 GHz)
 - Dr. Sendil (Ericsson), Dr. Rathod (Qualcomm), Dr. Sarvendranath (IIT Tirupati)

- India ramping up 6G-related activities
- Investing to build the 6G ecosystem – R&D, Components, Products
- Globally aligned spectrum strategy
- Active preparations for WRC-27
- Importance of international cooperation and partnerships
 - India (B6GA) - active bilateral collaborations
 - Spectrum, Technology, Use cases, Sustainability
- An exciting time ahead ...

Thank You ...

