6G TECHNOLOGY: SCIENCE & TECHNOLOGY

NEWS: India among top six patent-filing nations in 6G technology: MoS Pemmasani

WHAT'S IN THE NEWS?

India has emerged among the top six countries in 6G patent filings, with its Bharat 6G Vision aiming to deploy inclusive, AI-driven, ultra-fast 6G infrastructure by 2030, boosting digital innovation and global telecom leadership.

Context:

- At the Bharat 6G International Conference, the Union Minister of State for Communications highlighted India's emergence as one of the top six nations globally in 6G patent filings.
- This marks a significant leap in India's ambition to lead the next generation of wireless technology, driven by innovation, collaboration, and strategic vision.

India's Leadership in 6G Patent Filings:

- Over 111 research projects funded, with total investment exceeding ₹300 crore.
- India's 6G research spans terahertz communication, AI-native networks, and advanced signal processing.
- Global strategic partnerships with Japan, Singapore, and Finland are accelerating innovation and knowledge sharing.
- 6G is projected to contribute US$ 1 trillion (₹85.37 lakh crore) to India's economy by 2035, creating entirely new digital industries and enhancing existing sectors.

Bharat 6G Vision:

- Aims to establish India's leadership in digital connectivity by 2030 through the development and deployment of homegrown 6G technologies.
- Aligned with India's broader policy goals of:
    - Domestic innovation and intellectual property creation.
    - Affordable and inclusive digital access.

    - Global collaboration and standard-setting.
- Designed to ensure equity in access, prevent digital exclusion, and accelerate India's digital economy.

Phased Approach to 6G Development:

1. Phase I: Research & Development (2023–2025):

- Emphasis on:
    - Foundational 6G technology development.
    - Pilot testing of early use cases.
    - New network architecture innovations (AI-based, energy-efficient, scalable).

2. Phase II: Infrastructure Rollout (2025–2030):

- Focused on:
    - Large-scale deployment of 6G infrastructure.
    - Seamless integration into India's digital economy ecosystem.
    - Ensuring pan-India access across rural and urban areas.

Promise of 6G Technology:

- Sub-millisecond latency enabling real-time applications like autonomous vehicles and telesurgery.
- Volumetric and multi-dimensional connectivity across underwater, terrestrial, and aerospace systems.
- Self-healing, intelligent networks with AI-driven automated optimization and fault recovery.
- Terahertz frequency communication enabling ultra-high-speed data transfer.
- Deep integration of AI in core network management to improve spectrum efficiency, routing, and service customization.

Comparison: 5G vs 6G

Feature	5G	6G (Proposed)

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Latency	~1 millisecond	< 1 millisecond (sub-millisecond)
Peak Data Rate	Up to 10 Gbps	Up to 1 Tbps
Connectivity Scope	Ground-based	Underwater to satellite integration
Network Management	Semi-automated	AI-native and autonomous
Spectrum	mmWave, Sub-6 GHz	Terahertz and high-frequency bands

Technology Innovation Group on 6G (TIG-6G):

- A multi-stakeholder initiative launched by the Department of Telecommunications (DoT).
- Comprises:
    - Industry leaders
    - Academic institutions
    - Research organizations
- Responsible for:
    - Drafting India's 6G development roadmap.
    - Identifying policy frameworks to guide R&D and commercial deployment.
    - Ensuring alignment with international standards.

Spectrum Allocation for 6G (IMT2030):

1. International Coordination:

- India is actively engaged with the International Telecommunication Union (ITU) to define spectrum bands for IMT-2030 (6G).
- Frequency bands under study include:
    - 4400–4800 MHz

    - 7125–8400 MHz
    - 14.8–15.35 GHz
- The final decision will be taken at the World Radiocommunication Conference 2027.

2. India's Spectrum Strategy:

- India has already identified and earmarked multiple frequency bands for IMT-based telecom services, including:
    - 600 MHz, 700 MHz, 800 MHz, 900 MHz
    - 1800 MHz, 2100 MHz, 2300 MHz, 2500 MHz
    - 3300 MHz and 26 GHz

Bharat 6G Alliance (B6GA):

- A proposed cross-sectoral consortium involving:
    - Startups
    - Academia
    - Corporates
    - Research bodies
- Intended to:
    - Foster a self-reliant and collaborative ecosystem for 6G innovation.
    - Facilitate technology transfer, skill development, and standardization efforts.
    - Provide policy feedback and engage with global stakeholders to promote India's leadership in 6G standards.

Conclusion:

- India's rapid advancements in 6G patents, R&D, and strategic vision reflect its intent to be a global technology leader in next-generation telecommunications.
- Through initiatives like Bharat 6G Vision, TIG-6G, and Bharat 6G Alliance, India is laying a strong foundation for a secure, inclusive, and high-speed digital future.

- With ongoing investments and global partnerships, India's digital growth story is poised for a transformative leap by 2030.

Source: https://www.thehindu.com/business/india-among-top-six-patent-filing-nations-in-6g-technology-mos-pemmasani/article69576235.ece