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**TOPIC**

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**TELECOM INFRASTRUCTURE & NEED  
OF STRONG FIBRE NETWORK IN  
INDIA**

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## TELECOM INFRASTRUCTURE & NEED OF STRONG FIBRE NETWORK IN INDIA

### Context

- The **telecom infrastructure** in India **remains fragile and suboptimal** without **deep fibre penetration**, as these **optical fibre networks form the invisible backbone** that determines the efficiency, speed, and scalability of telecom services.

### Status of Telecom Infrastructure in India

- India has over **1 billion telecom subscribers**, compared to 25.15 crore in 2014, and among the **lowest data tariffs globally**.
- Broadband connections rose from 6.1 crore in 2014 to 99.56 crore in September, 2025 growing by 1532.13%.
- Optical Fiber Cable (OFC) length increased from 19.35 lakh route km (2019) to 42.36 lakh route km (Sep, 2025).
- **Components of telecom infrastructure** include mobile towers (passive infrastructure)
  - ♦ Optical Fibre Cable (OFC) networks;
  - ♦ Spectrum and wireless systems;
  - ♦ Data centres and switching networks;

### Why Fibre is Critical to Telecom Infrastructure?

- **Backbone of 5G and Future Networks:** 5G networks require dense deployment of small cells, all of which needs to be connected through high-capacity backhaul, primarily fibre.
  - ♦ Fibre provides **ultra-low latency and high bandwidth**, essential for real-time applications like autonomous vehicles and telemedicine.
  - ♦ Wireless backhaul alternatives (e.g., microwave) are insufficient for sustained high data loads.
- **Scalability and Reliability:** Optical fibre networks offer **virtually unlimited capacity upgrades** without replacing physical infrastructure.
  - ♦ It makes fibre future-proof for 6G and beyond, and ensures **network resilience**, reducing outages and congestion.
- **Economic Multiplier Effects:** Robust digital infrastructure boosts productivity, innovation, and GDP growth with **economic development and digital inclusion**.
  - ♦ Fibre networks enable **cloud computing, IoT ecosystems, and Industry 4.0 applications**.
- **Bridging the Digital Divide:** Fibre deployment in rural and remote areas is crucial for inclusive growth.
  - ♦ BharatNet aims to connect gram panchayats, but progress remains uneven.
  - ♦ Fibre-based connectivity ensures **equitable access to education, healthcare, and governance services**.

### Challenges in India's Fibre Deployment

- **Low Fibre Penetration:** Fibre penetration in India is only about **30–36% of telecom towers fiberized**, compared to **70–80% in advanced economies**.
  - ♦ Telecom Regulatory Authority of India (TRAI) emphasizes that **optical fibre is the backbone**, while wireless is only the access layer.
- **High Right-of-Way (RoW) Costs and Delays:** Complex permissions and high fees across states delay fibre rollout.
  - ♦ Regulatory fragmentation increases project timelines.
- **Financial Stress in Telecom Sector:** Telecom operators face high debt burdens, limiting capital expenditure on fibre networks.
- **Urban-Rural Imbalance:** Fibre is concentrated in urban areas, leaving rural regions underserved.

### Major Government Initiatives

- **BharatNet Programme:** It was launched as **National Optical Fibre Network (NOFN)**, and later renamed as **BharatNet**.
  - ♦ It aims to connect **all Gram Panchayats (~2.5 lakh)** with high-speed broadband, and provides **middle-mile fibre connectivity**.
- **National Digital Communications Policy (NDCP), 2018:** It primarily targets universal broadband access, fiberization of telecom towers, and creation of the **National Broadband Mission**.
- **National Broadband Mission (NBM), 2019:** It primarily targets 50 Mbps connectivity to every citizen, fibre connectivity to all villages, and increases tower fiberization significantly.
- **PM Gati Shakti & Infrastructure Integration:** It integrates telecom infrastructure planning with roads, railways, and utilities.
- **Right of Way (RoW) Reforms:** These include **measures** like:
  - ♦ Indian Telegraph Right of Way Rules (amended)
  - ♦ **Time-bound approvals and nominal charges**
  - ♦ Promotion of **online single-window clearance systems**;
- **Telecommunications Act, 2023:** Its key **provisions** are to simplify **infrastructure deployment and RoW permissions**, promote **ease of doing business in the telecom sector**, and support rapid expansion of fibre networks.

### Policy and Strategic Imperatives

- **Accelerate Fibersization of Towers:** Target at least **70% fiberization** to support 5G efficiently.
  - ♦ Incentivize infrastructure sharing among telecom operators.
- **Reform Right-of-Way Policies:** Implement **uniform, low-cost, and time-bound RoW approvals** across states.
  - ♦ Promote a single-window clearance system.
- **Promote Public-Private Partnerships (PPP):** Leverage private investment alongside government initiatives like BharatNet.
- **Encourage Infrastructure Sharing:** Establish **common duct infrastructure** and open-access fibre networks to reduce duplication and costs.
- **Focus on Rural Connectivity:** Expand fibre networks to underserved areas to ensure digital inclusion.

Source: BL

### Daily Mains Practice Question

- [Q] Examine the importance of optical fibre networks in strengthening telecom infrastructure in India. Discuss the challenges and suggest measures for improvement.