Telecom Sector: Inclusion, Innovation, Regulation

This editorial is based on "[Indian telecom: A global leader in the making](#)" which was published in The Financial Express on 03/03/2025. The article brings into picture the rapid growth of India's telecom sector with 1.18 billion subscribers, highlighting the urban-rural teledensity gap.

For Prelims: [India's telecom industry](#), [OTT services](#), [Right of Way (RoW) policy](#), [6G](#), [FDI liberalization](#), [Ayushman Bharat Digital Mission](#), [Teledensity](#), [Digital Personal Data Protection Act (DPDPA) 2023](#), [Production Linked Incentive (PLI) schemes](#), [BharatNet](#).

For Mains: Key Factors Driving the Development of the Telecom Sector in India, Key Issues Related to the Telecom Sector in India.

[India's telecom industry](#) is experiencing remarkable growth with **1.18 billion subscribers,** though a significant **urban-rural divide persists in teledensity.** The rapid **5G rollout,** supported by AI and localized data centers, promises further expansion. With leading global data consumption rates despite competitive pricing, the sector faces important challenges in **balancing [OTT services](#), [data security](#), and infrastructure costs**. Beyond technology, the industry's success depends on **skilled manpower development and strategic global partnerships** to sustain its growth trajectory

What Key Factors Driving the Development of the Telecom Sector in India?

- **Rapid 5G Rollout and Infrastructure Expansion:** India is witnessing one of the fastest **5G deployments globally,** enhancing connectivity and enabling new-age applications like AI-driven automation and IoT.
    - As of June, 2024, out of the **4.48 lakh 5G base stations** deployed in India, approximately **3.03 lakh have been fiberized.**
        - Telecom companies are **aggressively expanding fiber networks** and base stations to ensure seamless high-speed internet.
    - The government's **[Right of Way (RoW) policy reforms](#)** have streamlined network expansion, reducing bureaucratic delays.
- **Increasing Smartphone and Internet Penetration:** Rising **affordability of smartphones and data plans** has led to a surge in internet adoption, even in rural areas.
    - The increasing **digital literacy and government-backed initiatives** are promoting deeper smartphone usage across sectors like **e-commerce, fintech, and education.**
    - India will have **1 billion smartphone users by 2026** with rural areas driving the sale of internet-enabled phones
- **Government Policy Support and Telecom Reforms:** The Indian government has implemented **progressive telecom policies**, including s**pectrum pricing rationalization, [FDI liberalization](#), and financial relief packages.**

- The government's decision to **waive bank guarantees needed for past spectrum auctions** supports the telecom industry, enabling better utilization of banking resources for expanding **4G and 5G networks.**
- Within **3 years of the Telecom PLI scheme,** the scheme has attracted an investment of **Rs 3,400 crore,** the telecom equipment production has exceeded the milestone of Rs 50,000 crore.
- **Surge in Data Consumption and Digital Services:** India has emerged as the **world's largest consumer of mobile data**, driven by **video streaming, gaming, and social media.**

  - The rise of **Over-the-Top (OTT) platforms** and e-commerce has significantly increased internet demand.
    - The **work-from-home (WFH) and hybrid work models** post-pandemic have further fueled data consumption.
  - The **OTT video users** in India is expected to increase by 28.89% between 2024 and 2029, reaching **634.31 million users.**
- **Growth of Indigenous Telecom Manufacturing and R&D:** The push for **Atmanirbhar Bharat (Self-Reliant India)** has strengthened domestic telecom equipment manufacturing, reducing import dependency.
  - The government is encouraging **local production of semiconductors, 5G infrastructure, and network gear**.
  - India is also investing in **research and development (R&D)** for future telecom technologies, including **6G and AI-driven networks**.
  - In **FY 2023-24**, exports of telecom equipment and mobiles combined totaled over **Rs 1.49 lakh crore,** marking a significant growth.
- **Expansion of Satellite-Based Internet Services:** Satellite communication is revolutionizing rural and remote area connectivity, where terrestrial networks are impractical.
  - Companies like **OneWeb, Starlink, and JioSpaceFiber** are working on providing high-speed internet via **Low Earth Orbit (LEO) satellites**.
  - The government is supporting satellite-based internet to bridge the **digital divide** and improve broadband access in difficult terrains. This will play a crucial role in **last-mile connectivity**.
- **Increasing Role of Telecom in Governance and Public Services:** The government is leveraging telecom infrastructure for **e-governance, telemedicine, digital banking, and smart cities**.

  - Initiatives like **Aadhaar-based mobile authentication** and **UPI transactions** rely heavily on strong telecom networks.
  - The success of such programs demonstrates how telecom is now a **critical enabler of public service delivery**.
  - UPI transactions hit record high in January 2025, with over 16.99 billion transactions and ₹23.48 lakh crore value.
    - The **Ayushman Bharat Digital Mission** expanded **telemedicine services** using mobile-based platforms.

What are the Key Issues Related to the Telecom Sector in India?

- **Rural-Urban Digital Divide:** India's urban **teledensity** stands at **131.01%**, whereas rural teledensity lags at **58.31%**, highlighting severe disparity.

  - Poor infrastructure, low digital literacy, and affordability constraints hinder telecom penetration in rural areas.
    - The slow rollout of fiber networks and limited adoption of **5G-enabled handsets** exacerbate the issue.
  - As of January 2025, through the government's BharatNet programme, **only 1.99 lakh villages out of 6.5 lakh villages**, or 30.4%, had broadband.
- **High Spectrum Costs and Debt Burden:** Indian telecom operators face **one of the highest spectrum costs globally**, leading to massive debt accumulation.
  - The **Adjusted Gross Revenue (AGR)** dues imposed by the government have further strained telecom finances, with companies struggling to stay competitive.

- The need for **continuous infrastructure upgrades** for **5G and AI-driven networks** adds to the financial stress.
- India's major telecom operators held a **combined debt of Rs 4.09 lakh crore in FY24.**
  - Price wars between telecom players have reduced tariffs, lowering **Average Revenue Per User (ARPU)**.
- **Affordability and 5G Accessibility:** While 5G roll-out is progressing, affordability remains a barrier, particularly in rural areas.

  - **5G-enabled smartphones are still expensive**, limiting adoption among lower-income users.
    - Telecom operators have not significantly reduced **5G data prices**, further discouraging mass adoption.
  - **Network congestion and lack of indigenous 5G infrastructure** add to cost inefficiencies.
  - GSMA Intelligence reports over 40% 5G penetration in China, the US, Japan, and parts of Europe, **while India remains below 20%**.
    - Despite affordable data, limited sub-Rs 10,000 devices hinder 2G and 4G users from **upgrading to 5G.**
- **Cybersecurity and Data Privacy Risks:** With growing telecom penetration, **cyber threats, hacking, and data breaches** are rising, posing risks to national security.

  - The presence of **untrusted foreign telecom equipment**, especially from China, increases vulnerabilities.
    - **OTT services remain largely unregulated**, raising concerns about data misuse.
  - The **Digital Personal Data Protection Act (DPDPA) 2023** was introduced to address privacy concerns but lacks strict enforcement.
  - The **Telecom Regulatory Authority of India (TRAI)** has been alerted to fraudulent WhatsApp messages, SMS, and calls impersonating TRAI officials, with perpetrators using forged notices resembling official communications.
    - In 2024, the Telecom Ministry plans to disconnec**t 21.7 million fraudulently obtained mobile connections** and block 2.26 lakh handsets linked to cybercrime
- **Regulatory Uncertainty and OTT-ISP Conflict: OTT platforms (like WhatsApp, Zoom, and Netflix)** use telecom networks but do not contribute to network infrastructure costs.
  - Telecom companies argue this creates an **unfair playing field**, affecting revenue models.
  - The government is considering **OTT regulation**, but balancing industry interests remains a challenge.
  - Global comparisons suggest that unregulated OTT services impact telecom sustainability.
  - Telecom operators demand a **"fair share" mechanism**, similar to **EU's digital tax proposals** on OTTs.
- **Import Dependence and Lack of Indigenous Manufacturing:** Despite **Make in India** efforts, India remains **heavily reliant on telecom equipment imports**, mainly from China.
  - Lack of **domestic semiconductor manufacturing** and reliance on **foreign telecom software** limit self-reliance.
  - **Production Linked Incentive (PLI) schemes** have attracted investment, but challenges remain in building a robust supply chain.
  - India's telecom equipment imports stood at **₹1.53 lakh crore in FY 2023-24.** with a significant share from China.
- **Foreign Investment Challenges and Geopolitical Risks:** The Indian telecom sector requires **large-scale foreign investments** for 5G, AI, and satellite connectivity.

  - However, **policy unpredictability, bureaucratic delays, and geopolitical concerns** discourage potential investors.
  - The government's **security concerns regarding Chinese telecom firms (Huawei, ZTE)** have also led to restrictions, impacting supply chains.
    - Indian telecom companies depend on foreign satellites, which could become a point of contention, as seen recently when **Starlink blocked Russia's use of Starlink satellites in the Ukrainian War.**
- **Sustainability and E-Waste Management Issues:** The rapid expansion of telecom

infrastructure has **increased energy consumption and e-waste generation**.

- **5G networks consume 2-3 times more energy** than 4G, raising sustainability concerns.
- Lack of robust **e-waste recycling mechanisms** exacerbates environmental degradation.
- India's e-waste generation surged by **73% in 5 years**, reaching 1.751 million MT in 2023-24, with telecom equipment being a major contributor.

What Measures can India Adopt to Reform and Revamp India's Telecom Sector?

- **Enhancing Rural Connectivity and Digital Inclusion:** Expanding **fiber-optic networks, satellite-based internet, and mobile tower infrastructure** in underserved areas is crucial to bridge the rural-urban digital divide.
    - The government should incentivize **private telecom players** to invest in remote regions through **subsidies and viability gap funding**.
    - Strengthening **public-private partnerships (PPPs)** can accelerate last-mile connectivity.
    - Initiatives like **BharatNet and universal service obligations (Digital Bharat Nidhi)** must be fast-tracked with a clear implementation roadmap.
    - Ensuring **affordable 5G smartphones and low-cost data plans** will further drive digital inclusion.
- **Rationalizing Spectrum Pricing and Licensing Norms:** India's **high spectrum costs and complex licensing framework** burden telecom operators, affecting financial sustainability.

    - The government should adopt a **graded pricing mechanism** and introduce **long-term payment flexibility** to ease financial pressure.
    - Spectrum allocation should prioritize **usage efficiency** over revenue maximization.
    - Simplifying regulatory approvals and ensuring **uniform right-of-way (RoW) policies** across states can accelerate infrastructure rollout.
        - Moving towards a **light-touch regulatory framework** will encourage investments and innovation.
- **Strengthening Cybersecurity and Data Protection:** As telecom networks handle sensitive personal and national security data, a **robust cybersecurity framework** is essential.

    - The government should mandate **end-to-end encryption, AI-driven fraud detection, and regular cybersecurity audits** for telecom operators.
    - Implementing a **zero-trust security model** will mitigate risks from foreign telecom vendors and cyber threats.
    - The **Digital Personal Data Protection Act (DPDPA)** must be effectively enforced with clear **data localization and privacy safeguards**.
        - Collaboration between **government, telecom firms, and cybersecurity experts** is necessary to build resilient telecom networks.
- **Regulating OTT Services and Ensuring Fair Revenue Sharing:** OTT platforms like **WhatsApp, Zoom, and Netflix** use telecom networks but do not contribute to infrastructure costs, creating an **imbalance in the digital ecosystem**.

    - India should introduce a **fair revenue-sharing mechanism** where OTTs contribute to telecom infrastructure development.
    - Ensuring **regulatory parity between OTTs and telecom service providers** can create a level playing field.
    - A **transparent policy framework** should govern net neutrality while allowing reasonable network usage fees.
        - Encouraging **telecom-OTT collaborations** can drive innovation while ensuring sustainable revenues for both sectors.
- **Boosting Indigenous Telecom Manufacturing and R&D:** Reducing dependence on foreign telecom equipment requires a strong **domestic manufacturing ecosystem** for **5G gear, semiconductors, and network infrastructure**.

- The government should **expand Production-Linked Incentive (PLI) schemes**, offer tax benefits, and provide **low-interest credit for telecom startups**.
- Strengthening **indigenous 5G and 6G research** through collaborations with **IITs, NITs, and private research labs** can drive innovation.
  - Encouraging **Open RAN** (O-RAN) deployment will foster a **self-reliant telecom ecosystem** and enhance global competitiveness.
- **Addressing Financial Distress and Telecom Sector Viability:** The government should create a **long-term financial restructuring plan**, including relief on **adjusted gross revenue (AGR) dues**.

  - Encouraging **consolidation and strategic mergers** can improve financial stability while ensuring competition.
  - Introducing **floor pricing for telecom tariffs** will help sustain revenues without hurting consumers.
    - Facilitating **long-term foreign direct investment (FDI) inflows** through transparent policies will strengthen capital infusion.
- **Accelerating Fiberization and 5G Infrastructure Expansion:** The government must incentivize **fiber deployment across rural and urban areas** by reducing **RoW charges and bureaucratic hurdles**.

  - Encouraging **municipal-level infrastructure sharing** can optimize resources and reduce costs.
  - Telecom operators should integrate **energy-efficient and AI-driven network management systems** for smart infrastructure growth.
    - Strengthening **public-sector and private-sector collaboration** can fast-track India's digital transformation.
- **Promoting Satellite-Based Internet and Last-Mile Connectivity:** Satellite broadband can revolutionize **telecom access in remote areas, disaster-prone regions, and high-altitude terrains**.

  - The government should create a **dedicated policy framework for satellite-based communication**, ensuring smooth spectrum allocation and regulatory approvals.
  - Integrating **satellite and fiber-optic networks** can create a **hybrid telecom model for nationwide digital inclusion**.
    - Partnerships between **ISRO, private firms, and global satellite operators** will ensure seamless deployment.
- **Leveraging AI, Blockchain, and Emerging Technologies:** AI-driven solutions can enhance **network efficiency, predictive maintenance, and fraud detection** in telecom.

  - Implementing **blockchain-based subscriber verification systems** can curb SIM-related fraud and identity theft.
  - Encouraging telecom firms to deploy **AI-powered chatbots and automated customer service** will improve user experience.
  - AI-enabled network optimization can **reduce downtime and enhance bandwidth allocation**.
    - Creating a **regulatory sandbox** for testing new telecom innovations can accelerate **5G and 6G deployment**.

Conclusion:

India's telecom sector stands at a critical juncture, balancing **rapid expansion with regulatory, financial, and technological challenges**. Strengthening **indigenous telecom manufacturing and ensuring fair revenue sharing between OTT platforms** and telecom operators will be key. With strategic reforms and investments, India can solidify its position as a **global telecom powerhouse** while ensuring **digital inclusion for all.**

Drishti Mains Question:

The rise of OTT platforms has sparked debates over fair revenue-sharing with telecom service providers.

Discuss the challenges and suggest a balanced regulatory framework.