Analysis Of The Bharat Net Project And The Way Forward

EXECUTIVE SUMMARY

1. BharatNet, inaugurated in 2011 and increased in 2015, intends to supply rural India with high-speed broadband. In **Budget 2025**, broadband services were declared for every government secondary school and rural health center, adding to its functions in healthcare and education.
2. Developed by Bharat Broadband Network Ltd. (BBNL) under the Department of Telecommunication and sponsored by the Universal Service Obligation Fund (USOF), BharatNet aims to cover 6,40,000 villages and 2,50,000 gram panchayats with 100 Mbps bandwidth. The Amended BharatNet Program (ABP) in 2023 added ring topology to improve network resilience with a budget of ₹1,39,579 crores. Nevertheless, Right of Way (RoW) delays, state participation issues, PSU inefficiencies, and last-mile connectivity gaps have stalled progress.
3. Major reforms are a Single Window Clearance System for RoW clearances, as in South Korea's broadband rollout, and the adoption of Kerala and Gujarat effective RoW policies. Using Village Level Entrepreneurs (VLEs) for last-mile connectivity, satellite broadband for far-flung areas, and the adoption of Brazil, Finland, and Australia's global best practices will enhance results.
4. A contractor grievance redressal system, a CAG-managed financial audit, and online financial monitoring will increase transparency. Rural uptake will be led by digital literacy programs.

I. Introduction

Under the Budget 2025, the Finance Minister announced plans to provide broadband connectivity to all government secondary schools and rural primary health centers under the BharatNet Project. This aims to alleviate the digital divide and leverage the new technical aspects of education to students and connect PHC's operating in remote areas.

It was launched as the National Optical Fibre Network in October 2011 and was renamed as Bharat Net Project in 2015. This initiative stands as the largest rural broadband connectivity program in the world, utilizing Optical Fiber technology. It is a flagship mission spearheaded by Bharat Broadband Network Ltd. (BBNL), which is crucial in expanding digital infrastructure across rural regions.BBNL functions as a Special Purpose Vehicle (SPV) established by the Government of India under the Companies Act of 1956. The project is being executed under the supervision of the Department of Telecommunication, which operates within the Ministry of Communications. A key aspect of this initiative involves modifying the implementation strategy and engaging Village Level Entrepreneurs (Udyamis) to facilitate fiber connections at the last mile. This approach is expected to significantly

accelerate the connectivity process over the next 2.5 years, ensuring wider and faster internet access in remote areas.The program is financially supported by the Universal Service Obligation Fund (USOF).

The primary objective of the project is to compete with private telecom providers like Jio and Airtel by leveraging its strong presence in rural areas, where these private companies have a limited footprint. BharatNet aims to attract users by offering high-quality internet services. The initiative seeks to connect all 6,40,000 villages across India with high-speed broadband access. Additionally, it plans to extend connectivity to over 2,50,000 gram panchayats nationwide, ensuring seamless digital access. The government aims to deliver a minimum of 100 Mbps bandwidth at each gram panchayat, making online services accessible, particularly to rural populations. It aims to enable access providers like mobile operators, Internet service providers, Cable TV operators, content providers to launch various services such as applications like e-health, e-education and e-governance in rural and remote areas.

The project has been structured into three phases. The first phase aimed to provide broadband connectivity to over 100,000 gram panchayats by laying underground Optical Fiber Cable (OFC) lines, with a target completion date of December 2017. The second phase focused on connecting all gram panchayats nationwide using a combination of underground fiber, fiber over power lines, radio, and satellite technology, with a deadline set for March 2019. The third phase, spanning from 2019 to 2023, aimed to develop a state-of-the-art, future-proof network. This phase emphasized establishing fiber connections between districts and blocks, incorporating a ring topology to ensure network redundancy and reliability.

In August 2023, the government approved the Amended BharatNet Program (ABP), which focuses on expanding internet access through Optical Fiber (OF) connectivity. The initiative aims to connect 2.64 lakh gram panchayats (GPs) using a ring topology and extend fiber connectivity to approximately 3.8 lakh non-GP villages on a demand basis. With a budget allocation of ₹1,39,579 crores, the program introduces several design enhancements to improve efficiency and reliability.

The key improvements under ABP include establishing optical fiber connectivity from Block to GP in a ring topology, ensuring better network stability. It also incorporates an IP-MPLS (Multiprotocol Label Switching) network with routers deployed at both Block and GP levels. Additionally, the program allows for optical fiber connectivity to non-GP villages upon request, addressing the connectivity needs of remote areas.

To ensure the long-term sustainability of the network, ABP includes provisions for operation and maintenance for a period of 10 years. This involves continuous network monitoring through a Centralized Network Operating Centre (CNOC) and structured payments to the Project

Implementation Agency (PIA) based on a Service Level Agreement (SLA). The program also ensures adequate power backup at both GP and Block levels to maintain uninterrupted service. Furthermore, a Remote Fibre Monitoring System (RFMS) will be deployed at the Block level to facilitate real-time fiber network monitoring and maintenance.

II.   Analysis

BharatNet has played a pivotal role in transforming rural India by driving socioeconomic progress in several key areas.

A. **Digital Inclusion and Socioeconomic Progress:** BharatNet has significantly enhanced digital accessibility in rural India by providing high-speed internet and facilitating access to e-governance, online education, and telemedicine. It has empowered local governance and strengthened public service delivery through e-governance initiatives at the grassroots level.

B. **Economic Growth and Connectivity Expansion:** The project has enabled digital commerce, financial services, and entrepreneurship in remote areas, contributing to economic growth. As of October 2024, the number of 4G Base Transceiver Stations (BTS) has grown to 24,96,644, covering 783 districts nationwide. India has also achieved the fastest rollout of 5G services globally, with 4,62,084 BTS deployed across 779 districts. The affordability of mobile data has improved significantly, with the cost per GB dropping from ₹269 in March 2014 to just ₹9.08. Meanwhile, median mobile broadband speeds have surged from 1.30 Mbps in March 2014 to 95.67 Mbps, marking a substantial improvement in Internet performance. The average wireless data consumption per user has also risen, reaching 22.24 GB per subscriber per month. In terms of rural connectivity, out of 6,44,131 villages in India, 6,15,836 villages now have access to 4G mobile services, demonstrating the government's commitment to bridging the digital divide and expanding high-speed internet access across the country.

III. Challenges In Implementation

The implementation of the BharatNet program has faced several challenges that have impacted its progress and effectiveness. These challenges can be categorized into planning and execution issues, last-mile connectivity, state participation, public and private sector involvement, regulatory hurdles, and future preparedness.

A. **Challenges in Planning and Execution:** BharatNet faced delays due to inadequate planning, design flaws, and lack of preparedness, particularly in Phase-I (2011–2014). Procurement issues and the absence of state participation further hindered progress, leading to slow implementation.

B. **Last-Mile Connectivity and State Involvement:** Initially, BharatNet lacked last-mile infrastructure, limiting its usability despite gram panchayats being service-ready. The introduction of Wi-Fi hotspots

and village-level entrepreneurs (VLEs) later addressed this gap. State participation was initially low, but a state-led model was introduced in eight states to improve implementation.

C. **Public and Private Sector Execution Issues:** The project was initially executed by three PSUs—BSNL, RailTel, and Power Grid—whose performance in Phase-I was unsatisfactory. Phase-II saw greater private sector involvement, but concerns remain about adherence to project timelines.

D. **Regulatory Hurdles and Infrastructure Development:** Right of Way (RoW) permissions have been a major obstacle despite the Indian Telegraph Right of Way Rules, 2016. As of May 2018, 296 cases affecting 1,241 gram panchayats were still pending, delaying infrastructure development.

E. **Future Preparedness and Policy Delays:** Phase-III of BharatNet, aimed at upgrading the network for future demands, has not yet received Union Cabinet approval. The Department of Telecommunications has been urged to expedite approvals to avoid delays seen in earlier phases.

IV. Recommendations

The BharatNet initiative can transform rural connectivity in India, but for its success, a number of strategic enhancements are required. Through the implementation of global best practices, the use of technological innovation, and better governance, BharatNet can serve as a model for rural digitalization.

A. **Enhancing Last-Mile Connectivity:** BharatNet must integrate Fiber-to-the-Home (FTTH) solutions and expand Wi-Fi hotspots in villages, drawing inspiration from initiatives like Google's Station Initiative and Kenya's Mawingu Networks. Village Level Entrepreneurs (VLEs) should be incentivized to install and maintain Wi-Fi services.

B. **State Participation and Private Investment:** Strengthening the state-driven implementation model and fostering public-private partnerships, as seen in Peru's Internet para Todos project, can accelerate rural broadband expansion. Revenue-sharing models should be introduced to attract telecom operators and startups.

C. **Improving PSU Efficiency and Performance Monitoring:** CPSUs like BSNL, RailTel, and Power Grid must be subject to strict performance appraisals, financial incentives, and third-party audits. Service Level Agreements (SLAs), as used in Australia's NBN, should ensure quality standards, while BSNL should focus on specialized training programs to enhance service reliability.

D. **Addressing Right of Way (RoW) Delays:** A Single Window Clearance System with time-bound approvals, modeled on South Korea's broadband deployment strategy, should be implemented. Best practices from Kerala and Gujarat, such as digitized clearances and grievance redressal mechanisms, should guide national policy.

E. Alternative Connectivity Solutions: In difficult terrains like the Himalayas and Northeast, BharatNet should complement optical fiber with satellite broadband and wireless solutions, following Brazil's National Broadband Plan and Elon Musk's Starlink initiative.

F. Innovative Pricing and Digital Literacy: BharatNet should explore low-cost prepaid data plans and community broadband cooperatives, inspired by Finland's Open Access Network (OAN). Digital literacy programs like Rwanda's Digital Ambassadors Program should be integrated to boost rural adoption.

G. Future-Ready Infrastructure: Phase-III of BharatNet must incorporate ring topology for network resilience, support 5G rollout in rural areas, and adopt AI-driven network management and blockchain for secure data exchange, akin to China's Rural Informatization Development Plan.

H. Centralized Network Monitoring: A Centralized Network Operations Center (CNOC) should be established for real-time tracking of uptime, service quality, and fiber health. Public dashboards, modeled after Singapore's IMDA, should enhance transparency and accountability.

I. Financial Oversight and Accountability: The government should mandate periodic financial audits by the Comptroller and Auditor General (CAG) or an independent watchdog. A real-time financial tracking system and public dashboard should be implemented to ensure transparency and efficiency in fund utilization.

J. Global Best Practices for BharatNet's Success: To make BharatNet a leading rural broadband initiative, India must integrate lessons from successful broadband deployment models in South Korea, Finland, Australia, and Brazil, ensuring high state involvement, sustainable business models, and strong governance.

V. Conclusion

BharatNet holds immense potential to transform India's digital landscape by enabling seamless rural broadband connectivity. The initiative has already made significant strides in expanding digital access, fostering socioeconomic development through e-governance, digital education, and telemedicine services. However, delays in implementation, lack of last-mile infrastructure, and bureaucratic inefficiencies have slowed progress.

For BharatNet to reach its full potential, a multi-pronged strategy is essential. Strengthening state involvement, adopting public-private partnership (PPP) models, and enforcing strict Service Level Agreements (SLAs) for project execution will enhance efficiency. The revival of BSNL, introduction of performance-linked incentives for PSUs, and implementation of innovative pricing strategies—such as community-based broadband cooperatives—will further ensure financial viability and user adoption.

The government must proactively leverage emerging technologies like 5G, AI-driven network management, and blockchain for secure and efficient broadband expansion. Establishing a Centralized Network Operations Center (CNOC) for real-time monitoring and enforcing global best practices will ensure that BharatNet remains future-proof and resilient.

By addressing key challenges through governance reforms, enhanced accountability, and technological innovation, BharatNet can emerge as a world-class rural broadband model, effectively bridging India's digital divide and fostering inclusive growth.

VI. REFERENCES

A. BBNL, Ministry of Communications & Information Technology, Govt. of India. (n.d.). *BharatNet Project Report (pb-BharatNet.pdf)*.

B. Committee Reports. (n.d.). *BharatNet*. Retrieved from https://usof.gov.in/en/bharatnet-project

C. Press Information Bureau. (n.d.). *Press Release on BharatNet*.

D. Department of Telecommunications, Ministry of Communications, Govt. of India. (n.d.). *BharatNet: Transforming India's Digital Landscape*.

E. Telecom Regulatory Authority of India. (2024). *India's Digital Growth Report: Mobile & Broadband Connectivity Expansion*.

F. International Telecommunication Union. (2023). *Global Best Practices in Rural Broadband Expansion: Lessons for BharatNet*.