CHAPTER 5

GST's Role in 5G Rollout in India: A Critical Analysis of Its Impact on Telecom Infrastructure

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ABSTRACT

The rollout of 5G in India represents one of the most capital-intensive transitions in the country's telecom history. While the Goods and Services Tax (GST) simplified the earlier fragmented tax structure, its current design has created unintended financial frictions for telecom operators. This paper examines how GST, particularly restrictions on Input Tax Credit (ITC), affects the cost dynamics of 5G deployment. Using secondary data from regulatory bodies and industry reports, the study compares pre- and post-GST conditions, evaluates the cost composition of 5G infrastructure, and models potential rollout outcomes under existing and reformed tax frameworks. The findings indicate that nearly ₹18,000 crore worth of ITC remains unutilized annually, largely due to exclusions on passive infrastructure such as towers and power systems. Additionally, GST on spectrum payments without credit availability further inflates capital costs. If these structural issues persist, 5G expansion may fall significantly short of national targets by 2030, particularly in non-urban regions. However, targeted GST reforms, especially around ITC eligibility, could improve rollout efficiency without materially affecting government revenue. The paper argues that aligning tax policy with infrastructure economics is essential for achieving equitable and timely 5G deployment in India.

Keywords: GST, 5G Rollout, Input Tax Credit, Telecom Infrastructure, Tax Policy Reform.

1.0 Introduction

India's transition to 5G, launched in October 2022, is not just a technological upgrade, it is a large-scale infrastructure challenge with long-term economic implications. Unlike previous network generations, 5G requires dense deployment of towers, fiber networks, and reliable power systems. Industry estimates suggest that telecom operators may need to invest between ₹2 to ₹3 lakh crore over the coming decade.

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This comes at a time when the sector is already carrying substantial debt, placing additional pressure on investment decisions. In this context, taxation plays a far more critical role than it might in less capital-intensive industries. The introduction of GST in 2017 replaced a complex system of indirect taxes, offering greater transparency and reducing cascading effects. On the surface, this reform appeared beneficial for telecom operators by simplifying compliance and standardizing tax rates. However, the experience post-GST has been mixed. Certain high-value inputs especially those linked to infrastructure development do not qualify for Input Tax Credit. Civil works for tower construction, diesel generators required for backup power, and even significant portions of spectrum-related costs fall outside the credit mechanism. As a result, telecom companies are often unable to offset a large share of the taxes they pay, effectively increasing the overall cost of network deployment. This paper seeks to examine a central question: how do GST provisions, particularly ITC restrictions, influence the financial feasibility and pace of 5G rollout in India? By analysing industry data and policy frameworks, the study explores both the scale of the issue and the potential outcomes under alternative tax scenarios.

2.0 Literature Review

The relationship between taxation and infrastructure investment has long been recognized in economic literature. When firms are required to pay taxes on inputs without the ability to offset them through credits, the effective cost of investment rises. This is particularly significant in sectors that rely heavily on upfront capital expenditure, such as telecommunications, energy, and transport infrastructure. In such industries, even relatively small cost distortions can influence the pace and scale of deployment. In the Indian telecom sector, this issue has become increasingly visible over time. Reports published by the Telecom Regulatory Authority of India (TRAI) consistently highlight the sector's financial stress, driven by rising capital requirements alongside relatively constrained revenue growth. Each successive generation of technology, moving from 3G to 4G and now 5G has required significantly higher levels of investment, without a proportional increase in returns.

This imbalance has made cost efficiency a critical factor in determining the viability of expansion. Within this context, the structure of the Goods and Services Tax (GST) has drawn attention. While GST simplified the earlier multi-layered tax system, certain provisions particularly those relating to Input Tax Credit (ITC) have created unintended cost pressures. In its consultation paper on ease of doing business, TRAI pointed out that restrictions on ITC eligibility, especially for passive infrastructure, add to the overall cost of network deployment. Although the regulator recommended bringing such components within the ITC framework, concrete policy action in this area has remained limited. Industry

estimates further illustrate the scale of the issue. Submissions by the Cellular Operators Association of India (COAI) indicate that nearly ₹18,000 crore worth of input tax credit is effectively locked each year. A substantial portion of this is linked to civil works such as tower construction and base station infrastructure, which are currently excluded from credit eligibility under existing GST provisions.

Independent assessments, including sectoral analysis by Grant Thornton Bharat, suggest that these blocked credits account for a significant share nearly 40 percent of the sector's total GST burden. For a capital-intensive industry, this represents a considerable inefficiency. International comparisons reinforce this concern. Cross-country analysis by the International Telecommunication Union (ITU) shows a clear pattern: markets where telecom operators are unable to recover input taxes tend to experience slower 5G rollout. In high tax-burden environments, average population coverage after three years remains significantly lower than in countries where tax systems allow more efficient credit recovery. This indicates that tax design can directly influence the speed of technological diffusion.

In the Indian context, researchers such as Rao and Kumar (2022) and Agarwal (2023) argue that the ITC challenge is not merely procedural but structural. The issue arises from a mismatch between the long investment cycles typical of infrastructure sectors and the annual framework through which tax credits are applied and adjusted. As a result, firms are unable to fully utilize credits in a timely manner, leading to persistent accumulation and reduced liquidity. An additional dimension worth considering is the impact on long-term sectoral competitiveness. When capital costs rise due to tax inefficiencies, firms may prioritize short-term returns over long-term infrastructure expansion. This can slow innovation, delay rural connectivity, and widen the digital divide. Moreover, it may discourage new entrants, reinforcing market concentration among a few large players. In this sense, ITC restrictions do not only affect financial metrics, they shape the broader trajectory of telecom development in the country.

3.0 Methodology

This study adopts a descriptive and analytical approach, relying entirely on secondary data. No primary data collection methods such as surveys or interviews were used, as the focus of the research is on industry-wide financial patterns and the structural design of tax policies. These aspects are more effectively examined through established reports, regulatory publications, and institutional analyses rather than individual-level responses. The analysis draws upon four key categories of sources.

These include regulatory publications and statistical reports from the Telecom Regulatory Authority of India (TRAI) and the Department of Telecommunications (DoT);

industry submissions and financial data compiled by the Cellular Operators Association of India (COAI); sector-specific insights from the Grant Thornton Bharat (2024) report on GST in telecom; and international benchmarks provided by organizations such as the International Telecommunication Union (ITU) and GSMA. All financial figures used in the study are expressed in current Indian Rupees to maintain consistency and comparability. The analytical framework is structured in three stages.

In the first stage, a comparative assessment of the telecom sector before and after the implementation of GST is conducted. This comparison is based on four parameters: tax complexity, transparency in compliance, overall cost burden, and the effectiveness of input tax credit (ITC) utilization. Each parameter is evaluated using a standardized scoring approach on a ten-point scale, informed by trends and observations reported in the selected literature. In the second stage, the study breaks down the overall cost structure of 5G deployment into key components. These include spectrum acquisition, infrastructure development, equipment and technology, tax-related costs, and financing elements. The purpose of this step is to identify where GST has the greatest financial impact and to examine the extent to which ITC benefits are actually realized across different cost categories. The third stage involves a scenario-based analysis to estimate the potential trajectory of 5G rollout under different policy conditions.

Two scenarios are modelled: one reflecting the continuation of the current GST framework, and another incorporating targeted reforms suggested in this paper. Based on these scenarios, projections are made regarding the extent of 5G tower coverage by 2030. These projections are calibrated using publicly available investment estimates from COAI and coverage benchmarks reported by TRAI. To support the analysis, the findings are presented through a series of visual representations, including charts and comparative figures. These visuals are integrated with the discussion to improve clarity and interpretation, and all data sources are clearly cited in accordance with academic and conference guidelines. An additional methodological consideration is the use of triangulation. By comparing data across regulatory, industry, and international sources, the study aims to improve the reliability of its conclusions and reduce dependence on any single perspective. While the absence of primary data may limit the ability to capture firm-level variations, the approach ensures a broader and more policy-relevant understanding of the issue.

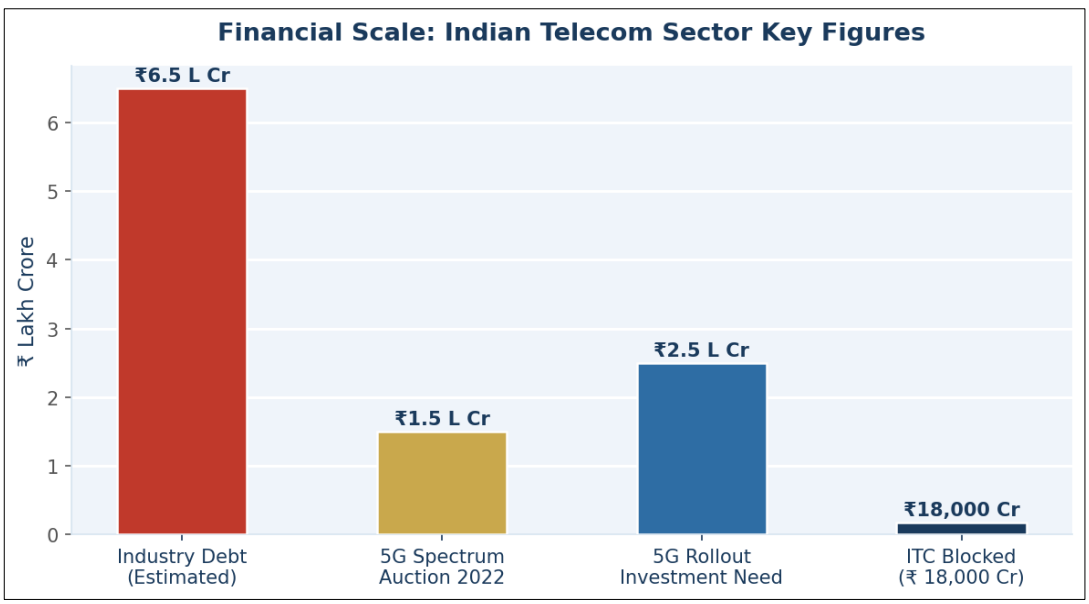
4.0 Findings and Analysis

4.1 How big is the financial challenge?

Before isolating the impact of GST, it is important to first understand the broader financial position of the telecom sector. The scale at which the industry operates is substantial,

and any additional cost pressures must be viewed in this larger context. As illustrated in Figure 1, key financial indicators sectoral debt, spectrum payments, projected 5G infrastructure investment, and blocked input tax credit (ITC) highlight the magnitude of the challenge. The sector is currently burdened with debt estimated at around ₹6.5 lakh crore, which exceeds both the revenue generated from the 2022 spectrum auction (approximately ₹1.5 lakh crore) and the expected capital expenditure required for nationwide 5G infrastructure (around ₹2.5 lakh crore).

Figure 1: Key Financial Metrics — Indian Telecom Sector (₹ Lakh Crore).



Source: COAI (2024); TRAI (2024); DoT (2023).

While the annual ITC blockage of roughly ₹18,000 crore appears relatively small when compared to these headline figures, such a comparison can be misleading. The significance of this amount becomes clearer when viewed from a liquidity and financing perspective. Telecom is a capital-intensive sector with a relatively high cost of capital, typically in the range of 10–12 percent. When ITC remains unutilized, it effectively locks up funds that could otherwise be deployed for network expansion. In practical terms, this blockage is comparable to the financial burden of servicing a much larger volume of debt, thereby tightening cash flows for operators already operating under significant leverage. This constraint has direct implications for investment decisions. Telecom companies tend to

prioritize projects with clearer and quicker returns, which often means that expansion into semi-urban and rural areas where demand is still developing gets delayed.

As 5G networks require a denser and more capital-intensive infrastructure compared to previous generations, even relatively modest inefficiencies in cash flow can translate into a meaningful slowdown in rollout. An additional aspect that merits attention is the cumulative effect of such blockages over time. Since 5G deployment is a multi-year process, persistent ITC accumulation can compound financial stress, limiting the sector's ability to reinvest internally generated funds. This not only affects the pace of infrastructure creation but may also increase reliance on external borrowing, further elevating financial risk. Taken together, these factors suggest that the issue of blocked ITC is not merely a marginal accounting concern. Instead, it represents a structural constraint that influences how, where, and how quickly telecom infrastructure is deployed across the country.

4.2 Pre-GST vs. Post-GST: Not a simple story

Table 1 below compares the sector across four parameters before and after GST. Figure 2 shows the same data visually.

Table 1: Pre-GST vs. Post-GST Parameter Comparison — Indian Telecom Sector

Parameter	Pre-GST Score	Post-GST Score	Net Effect
Tax Complexity (lower = better)	8	4	Significant improvement — compliance simplified
Compliance Transparency	4	8	Major improvement — unified portal, audit trail
Overall Cost Burden	6	7	Marginal increase — ITC gaps outweigh cascading gains
ITC Utilisation Efficiency	5	6	Moderate improvement — blockages persist

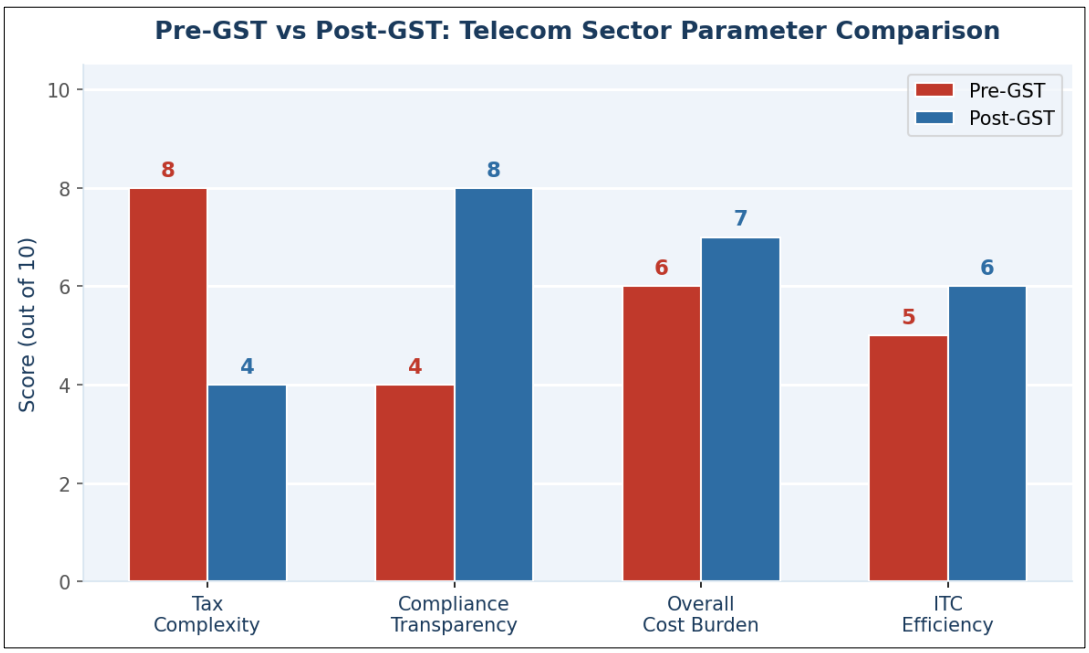
Source: COAI (2024); Grant Thornton Bharat (2024).

Table 1 is a mixed results set which is a fair point to admit. GST actually really made the tax complex quite a way down - the score actually went down to 4 which is the number of separate levies which have been amalgamated into a single system. Openness increased significantly as well. However, on the cost burden, life really deteriorated (by 6 to 7). The ITC restrictions that are being introduced under GST comes at a cost which is greater than the savings in cascade tax brings-at least to capital-intensive operators. The essence of the problem is that.

4.3 Where does the money go in 5G rollout?

Table 2 and Figure 3 break down the cost structure of 5G deployment. This is important because it shows exactly where GST hits hardest.

Figure 2: Pre-GST vs. Post-GST Comparative Analysis — Four Sector Parameters (Score out of 10)



Source: Authors' analysis based on COAI (2024); Grant Thornton Bharat (2024).

Table 2: 5G Rollout Cost Structure and GST Incidence by Category

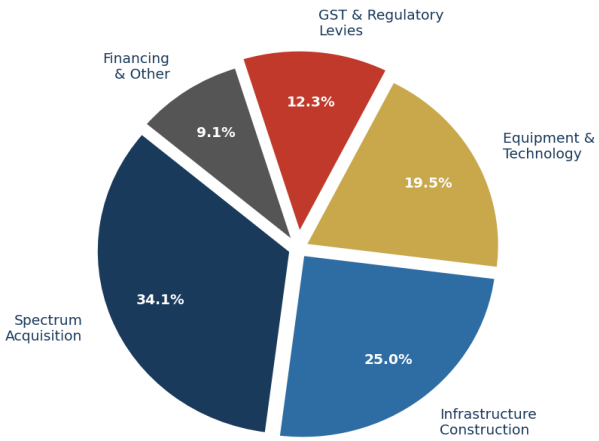
Cost Category	Est. Share (%)	ITC Available?	GST Implication
Spectrum Acquisition	37.5%	No	18% GST; zero ITC — full cost to operator
Infrastructure Construction	27.5%	Partial	Civil works excluded; equipment partly eligible
Equipment & Technology	21.5%	Yes	ITC largely available; net cost limited
GST & Regulatory Levies	13–15%	No	Direct unrecoverable tax embedded in total cost
Financing & Other	~10%	N/A	Indirectly inflated by liquidity cost of ITC blockage

Source: Authors' analysis based on COAI (2024); DoT (2023).

What stands out from Table 2 is how poorly aligned the ITC rules are with the actual cost structure. Spectrum (37.5%) and infrastructure construction (27.5%) together make up about 65% of total 5G investment costs and these are precisely the two areas where ITC is either completely blocked or only partially available. Equipment, where ITC does flow fairly

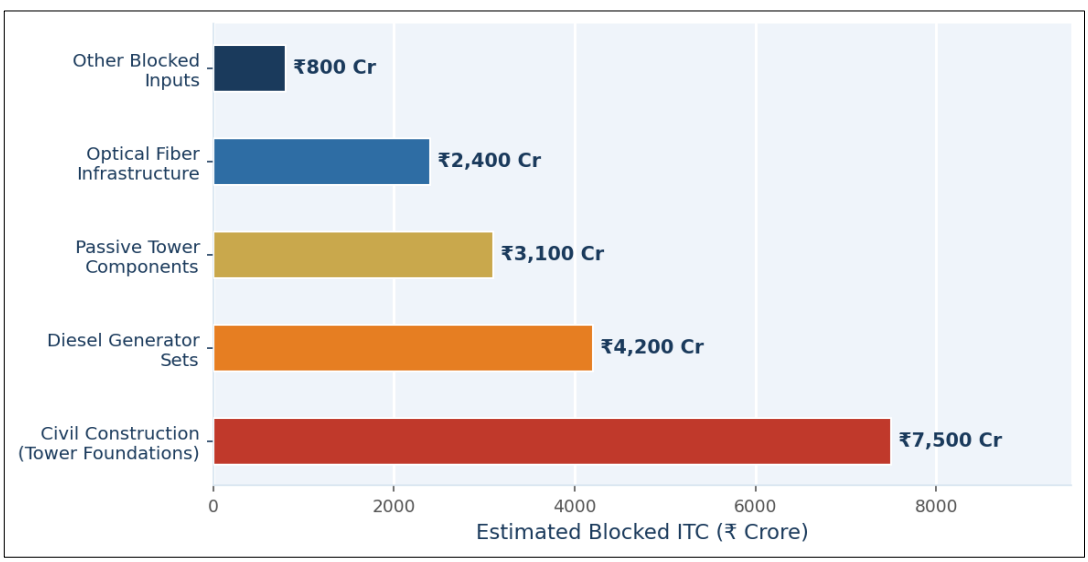
well, is less than a quarter of total costs. So the effective tax rate on 5G investment ends up being significantly higher than the headline 18%.

Figure 3: Estimated 5G Rollout Cost Structure — Proportional Breakdown by Category



Source: Authors' analysis based on COAI (2024); DoT (2023).

Figure 4: Estimated Annual ITC Blockage by Telecom Infrastructure Category (₹ Crore)



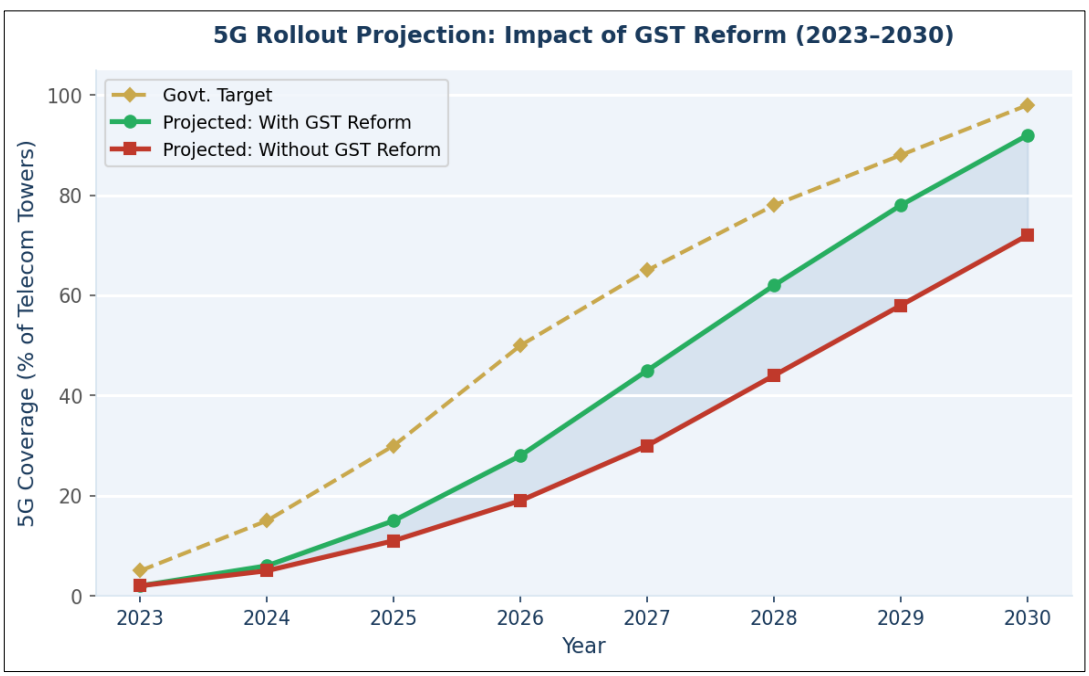
Source: COAI (2024); Grant Thornton Bharat (2024).

4.4 Breaking down the ₹18,000 Crore ITC blockage

Figure 4 shows where exactly the ₹18,000 crore of blocked ITC is sitting. This level of detail matters because fixing the problem requires different interventions for different categories. The largest amount ₹7,500 crore is tied up in civil construction expenses such as tower foundations and base station enclosures. These are not included in ITC under Schedule II of the CGST Act, which is an indivisible rule that was likely not intended to consider telecom densification. The next largest category is that of diesel generators (₹4,200 crore), which are problematic to say the least: the requirement of backup power is obligatory according to the licensing requirements in the DoT, but the GST on the generators is not credible at all. The main categories are topped off by passive tower components (₹3,100 crore) and optical fibre infrastructure (₹2,400 crore). There is no good news, of course, but the best news is that most of the blockage is confined to a small number of specific categories - which suggests a focused solution, as opposed to a wholesale GST redesign.

4.5 What happens to 5G rollout if nothing changes?

Figure 5: 5G Rollout Projections 2023–2030 — Reform vs. No-Reform vs. Government Target (% of towers)



Source: Authors' scenario model; calibrated against COAI (2024) and TRAI (2024).

Figure 5 illustrates three coverages of 5G between 2023 and 2030 - what the government wants, what we forecast will occur with the existing GST framework and what could occur with the proposed reforms outlined in Section 5. This would leave the difference in percentage between the reform and no-reform lines at approximately 20 percentage points in 2030- 92 vs 72 per cent of towers in coverage. Reducing it to the real world, that would equate to between 80,000 and 100,000 towers that would be postponed or never constructed on the status quo. And it will not be the cities that will suffer the most - 5G in Metro areas, even with increased taxes, remains economic. The semi-urban and rural situations are those that have thinner margins, and those that most readily bear the additional cost burden, switching a borderline project to the non-viability side.

4.6 Does GST reform actually cost the government too much?

A common objection to extending ITC is that the government will lose revenue. Table 3 and Figure 6 below look at this question directly. The blocked ITC has been operating at an average of 38-49 percent of the annual GST revenue in the sector as seen in Table 3. It would cost the government about ₹18,000 crore annually in revenue forgone to give complete ITC relaxation on categories that are already blocked. This is a lot alone - but the total GST collections in India in FY 2024 were approximately ₹20 lakh crore. Thus the reform cost is less than 0.1-percent of the total GST base. And the payoffs of the faster rollout of 5G, which multiple studies suggest could contribute between 1.5 and 2.0 percent per annum to annual GDP, are worth several lakh crore/year at the present GDP growth levels. There is no close math.

Table 3: GST Revenue from Telecom Sector vs. Estimated ITC Blockage — FY 2020 to FY 2024

Financial Year	GST Revenue (₹ Cr)	Blocked ITC (₹ Cr)	Blockage as % of Revenue
FY 2019–20	32,000	14,000	43.8%
FY 2020–21	30,500	14,800	48.5%
FY 2021–22	36,000	16,000	44.4%
FY 2022–23	41,000	17,200	41.9%
FY 2023–24	47,500	18,000	37.9%

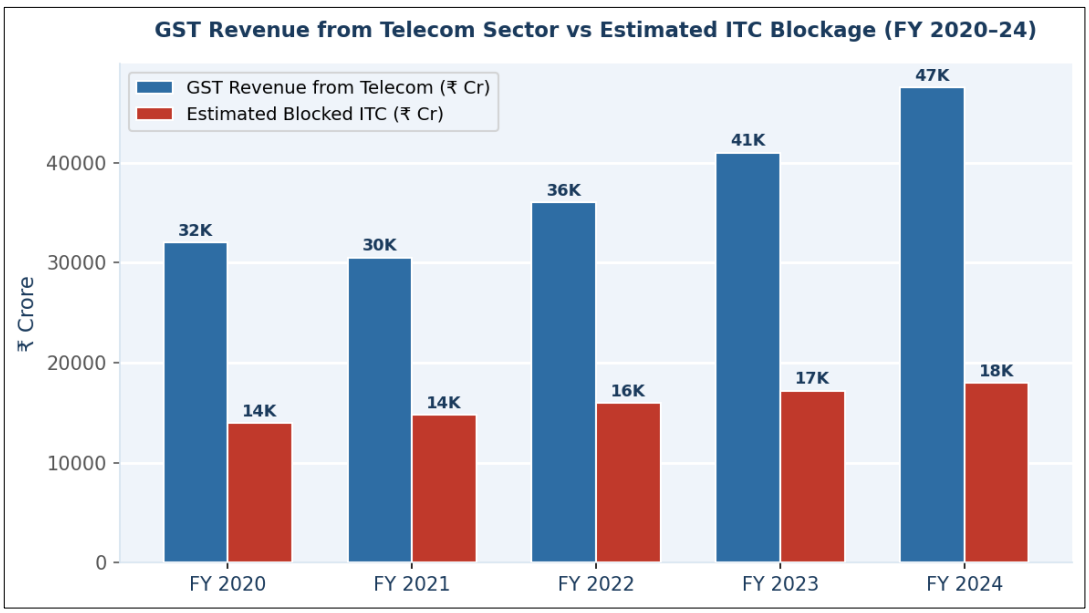
Source: Authors' estimates based on COAI (2024); Ministry of Finance (2024).

5.0 Policy Recommendations

The findings of this study suggest that the challenges posed by GST to 5G deployment are not insurmountable, but they do require targeted and carefully sequenced reforms. Rather than proposing a complete overhaul of the existing system, a phased approach

is more practical beginning with measures that can be implemented quickly and progressing toward more structural adjustments over time. This ensures that immediate relief is provided to the sector while maintaining policy stability.

Figure 6: GST Revenue from Telecom Sector vs. Estimated Blocked ITC, FY 2020–24 (₹ Crore)



Source: Authors' estimates based on COAI (2024); Ministry of Finance (2024).

5.1 Immediate measures (0–12 months: Within existing framework)

Certain issues can be addressed without legislative amendments, making them suitable for quick implementation through notifications or administrative clarifications.

- Allow ITC on diesel generators used in telecom operations: Backup power is not optional but a regulatory necessity for telecom towers, especially in regions with unstable electricity supply. Allowing input tax credit on diesel generators would correct this inconsistency in policy design and release approximately ₹4,200 crore in blocked credits annually. This step would directly improve cash flow without altering the broader tax structure.
- Clarify ITC eligibility for optical fibre infrastructure: Uncertainty around the classification of optical fibre cables and ducting has led to disputes and delays. Issuing a clear classification guideline would reduce litigation and unlock an estimated ₹2,400

crore in credits each year. More importantly, it would create predictability for long-term network planning, which is essential for fiber-intensive 5G architecture.

- Introduce time-bound processing of ITC refunds: Delays in refund approvals increase the effective cost of capital for telecom operators. Establishing a fixed timeline such as 30 days for processing ITC claims, along with interest on delays, would not change eligibility but would significantly ease liquidity pressures. Faster credit cycles can have a meaningful impact on the pace of infrastructure rollout.
- Enable provisional ITC utilization for large infrastructure projects: For long-gestation telecom projects, allowing provisional or partial utilization of ITC subject to later reconciliation—could ease short-term financial constraints. This would be particularly useful during the initial years of heavy capital expenditure.

5.2 Medium-term reforms (12–36 months: Policy adjustments required)

More substantive changes will require deliberation within the GST Council but remain achievable within the current institutional framework.

- Create a dedicated ITC framework for passive telecom infrastructure: A significant share of blocked credits arises from civil works related to towers, foundations, and enclosures. Introducing sector-specific provisions to allow ITC on these components would address the largest bottleneck, estimated at around ₹7,500 crore annually. Given the infrastructure nature of telecom networks, aligning tax treatment with investment realities is both logical and necessary.
- Re-evaluate GST treatment of spectrum payments: Spectrum represents one of the largest cost components in 5G deployment, yet the GST paid on it does not currently allow for credit utilization. Two potential approaches could be considered: treating spectrum as a capital asset (thereby enabling ITC) or introducing a deferred credit mechanism that allows operators to claim ITC gradually over the license period. Either approach would reduce the upfront financial burden.
- Introduce sector-linked tax offsets tied to rollout milestones: ITC benefits could be partially linked to measurable deployment outcomes, such as rural tower installation or fibre expansion. This would align fiscal incentives with policy goals, ensuring that tax relief translates into tangible infrastructure growth.

5.3 Long-term structural reforms (beyond 36 months)

Over the longer term, the focus should shift toward building a more adaptive and future-ready tax framework.

- Institutionalize periodic policy review mechanisms: Given the rapid pace of technological change, a static tax framework may become misaligned with industry

needs. Establishing a formal review cycle such as every three years would allow GST provisions affecting telecom to be reassessed in light of evolving technologies and market conditions.

- Design targeted fiscal incentives for underserved regions: To address disparities in network coverage, GST policy can be used as a tool to encourage investment in rural and semi-urban areas. Preferential ITC treatment or additional credits for infrastructure deployed in low-revenue regions could help bridge the digital divide.
- Integrate GST policy with digital infrastructure goals: Tax policy should not operate in isolation but be aligned with broader national initiatives such as Digital India and rural connectivity programs. A coordinated approach linking taxation, spectrum policy, and infrastructure funding would create a more coherent ecosystem for telecom expansion.
- Encourage infrastructure sharing through tax neutrality: Allowing full ITC benefits on shared telecom infrastructure (such as common towers and fibre networks) could promote collaboration among operators, reduce duplication of investment, and accelerate rollout efficiency.

6.0 Conclusion

This study set out to examine three key issues: the extent of input tax credit (ITC) blockage in the telecom sector, its implications for 5G rollout, and the scope for policy intervention. The analysis indicates that the magnitude of the problem is substantial. On an annual basis, nearly ₹18,000 crore of ITC remains unutilized, with a significant portion tied to infrastructure components that form the backbone of 5G networks (COAI, 2024; Grant Thornton Bharat, 2024). The consequences of this inefficiency extend beyond accounting constraints. By increasing the effective cost of investment, ITC restrictions directly influence the pace at which telecom operators can expand network coverage. The scenario analysis suggests that if the current GST framework continues without modification, 5G deployment could lag meaningfully behind its potential trajectory.

The estimated gap around 20 percentage points in tower coverage by 2030 highlights the long-term implications of what may appear, at first glance, to be a technical tax issue (TRAI, 2024; COAI, 2024). At the same time, the fiscal trade-off associated with reform appears relatively modest. The revenue impact of unlocking blocked ITC is small when compared to overall GST collections (Ministry of Finance, 2024). In contrast, the broader economic gains from faster and more widespread 5G adoption ranging from productivity improvements to digital ecosystem growth are likely to be far more significant (GSMA, 2023; ITU, 2023). This creates a strong case for re-evaluating existing provisions. An important takeaway from the study is that the current GST structure was not designed with next-generation telecom networks in mind.

As a result, certain provisions particularly those affecting passive infrastructure, backup power systems, and spectrum-related costs do not align well with the investment realities of the sector (Grant Thornton Bharat, 2024). Addressing these gaps does not require a complete redesign of the tax system. Even targeted adjustments in a few critical areas could ease financial pressure and improve rollout efficiency. Looking ahead, the challenge is not only technical but also institutional. Policy responses need to balance revenue considerations with long-term infrastructure goals. A phased reform strategy, as outlined in this paper, provides a practical pathway starting with immediate administrative changes and gradually moving toward deeper structural alignment. Beyond the immediate scope of telecom, this issue also raises a broader policy question: how should tax systems adapt to sectors that are both capital-intensive and strategically important?

As India continues its digital transformation, ensuring that fiscal frameworks support rather than constrain infrastructure expansion will be essential (World Bank, 2023). Ultimately, the issue is less about identifying solutions and more about prioritizing their implementation. The evidence suggests that relatively limited policy adjustments could unlock significant gains in network expansion and digital inclusion. What remains critical is the willingness to act on these insights in a timely manner.

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