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1.5 The Messy Mesh of Overhead Cables & How to Abate the Clutter

Sh. Keshav Kumar Jha

Abstract

One of the most common problems in any of the Indian urban setting, across India, is the dangling overhead cables, which causes visual clutter, accidents due to electrocution, and traffic congestions. The present article analyses the cable situation world-wide, going into details of how and why some countries choose to deploy overhead cables, even after being a high-income economy, and proposes a new meta-hybrid model by synthesizing some existing models of underground ducts & overhead cables combined with some new and innovative ideas. The article also proposes a more critical role of Department of Telecommunication (DoT), outlining the historical developments of the telecom policy framework in the country and envisages a cooperation between the Centre and Urban Local Bodies (ULBs).

Keywords

Urban Infrastructure; Overhead Cables; Underground Utility Ducts; Telecom; Cable Trays; Aesthetics; Electrocution; Department of Telecommunications (DoT); Digital Bharat Nidhi (DBN)

Introduction

"Urbanism works when it creates a journey as desirable as destination" (Frederick & Mehta, 2018). Urban planning as a concept has been defined by many scholars in their works, but in the context of many countries it only has been an unplanned and unstructured sprawl of dissimilar building, roads, and living and market spaces.

A city requires a plan and a plan needs execution. Even if the execution part is left, India does not have master plans for most of its cities. According to the report- "Reforms in Urban Planning Capacity in India", published by the NITI Aayog in 2021, 65 percent of the 7933 urban settlements do not have any master plan. These numbers may seem huge but they do not matter. Even the cities having a master plan, have been postponing the execution by decades. The situation is such that the ordinary people traversing the lengths and breadths of these cities on a daily basis are now accustomed to the persisting issues and seldom complain about them. Issues such as traffic congestion, air and water pollution are now a part of daily lives of city residents and many more problems that have been plaguing the urban setup are not given enough attention.

Among such persistent issues plaguing our cities, there is also a problem of Overhead Cables. Overhead cables in Indian cities pose serious safety and infrastructure challenges. Street-level hazards from tangled, sagging or illegal telecom and power lines frequently cause fatal electrocutions, traffic congestions and vehicle accidents. There are, however, ways to follow and lessons to learn, in order to deal with this problem.

The Challenge: The Messy Mesh of Overhead Cables

The problem of overhead cables is a pan-India problem, spreading across every urban pocket. India has the highest number of electrocution-related deaths per day globally. Three percent of all accidental deaths in 2022, according to National Crime Records Bureau (NCRB) data, could be attributed to electrocution. In 2022, 12,971 people died due to electrocution, as per the last data available for such deaths. In the same year, 423 people died all over India by 'touching electric wires' and 1,567 fires were caused by electric short circuits, claiming 1,486 lives (Mishra, 2025). The condition is similar in countries such as Brazil and Mexico, which also have the problem of dangling power cables across their major cities.

Apart from posing fatal hazards, these cables are also infamous for causing traffic congestions, obstructing pedestrians, and damaging the urban aesthetics. The system in itself, damages the life of the cables due to weathering and augments the instances of power outages and internet connectivity disruptions

There is, however, one more severe risk that is caused due to the overhead wires, which is not urgent, yet likely-the risk of destruction due to natural calamities. Most of the higher income countries around the world possess underground utility duct systems, but there are exceptions. Japan still employs the system of overhead cables.

The United States of America (USA) has a hybrid system of using both, underground as well as overhead systems deployed according to geographical conditions, cost implications, and disaster resilience. Singapore is an excellent example of transition from overhead to underground system. China, which is a middle-income country, has a system similar to the USA. Therefore, upon acknowledging that overhead cables issue is an urban conundrum, the next step is to determine the possible solutions. For that to happen, however, a careful study of the systems deployed in various countries becomes an imperative.

Overhead vs Underground: The Global Comparison

Japan

Surprisingly, just like India, the Japanese cities are also cramming with overhead wires of all sorts. The streets of Japan are remarkably clean and orderly, but one peek above the ground turns the perception diametrically opposite. After World War II (WWII), the Japanese with the help of the USA, decided to expand their cities rapidly but in a frugal manner. This made them to lay power line using the same kinds of pole, that are deployed in India. Over the years, more and more cables started entangling these poles. Alongside power cables, telephone lines, cable TV wires, and broadband cables-all started dangling the poles and the situation today in Japan is somewhat similar to that of India, if not worse.

Overhead cables are susceptible to a certain kind of natural calamity. In 2019, Typhoon Faxai triggered a massive blackout, mainly due to utility poles being destroyed by the powerful winds. Around 2,000 poles had fallen as a result of the typhoon (Shimbun, 2019). This incident may project a perception that it is high time Japan deployed the subterranean system, but it is not that simple. Japan is a country sitting on top of a highly active collision zone of four major tectonic plates, which makes it highly prone to severe earthquakes and tsunamis. Therefore, if Japan today deploys the underground system, and a severe earthquake hits tomorrow, the cracks on the ground might expose all the utility ducts making the whole exercise futile. Moreover, the dense cities of Japan leave little space for underground tunnels and digging becomes highly costly and disruptive.

Even citizens have not yet reached a consensus on whether to make these cables subterranean or keep them overhead as they are. Many in Japan think that these overhead cables have a kind of aesthetic appeal in itself. Even the Tokyo Electric Company, or TEPCO has put forward an argument against subterranean systems that-*"in the event of flooding or landslides, it's harder to isolate damaged areas of subterranean system. That can increase the amount of time necessary to restore power to damaged areas."* (Baseel, 2014).

Thus, it may be concluded that Japan has chosen a system of agility and quick responsiveness over aesthetics. Japan has kept its current system because geographical constraints prevent massive underground cabling investments from guaranteeing reliable power and infrastructure.

Europe

Europe prioritizes aesthetics over cost. The very first underground cables were not meant for electricity but for telecommunication, when London tried to lay telegraph cables underground in 1843, but ended up in failure as water seeped into the joints, almost immediately. With the advent of innovative insulation techniques, cities like London and Paris slowly started establishing telegraph and electric cables underground. The real subterranean transition began way before World War-II (WW-II), in 1890, when Vienna virtually banned overhead wires to preserve its baroque skyline and historical infrastructure, and started burying the cables underground, one of the first policy interventions. Post WW-II, nations started rebuilding the bombed cities and opted to heavily underground their local municipal grids rather than re-stringing the wires overhead. The result is clearly visible. Most of the European cities today are not exposed to overhead cables making their streets cleaner and more orderly.

This was, however, easy for Europe, as most of the countries are small in size as compared to a bigger country like India or the USA. The high risk of calamities like typhoons and earthquakes are almost absent. Average population density of Europe is 34 per Sq. Km (Worldometer, 2026a), whereas that of India and Japan are 497 and 336, respectively (Worldometer, 2026b). Thus, the situations in Europe and India are vastly different from each other.

United States of America (USA)

The USA employs a hybrid system. In dense cities or upscale suburban areas, cables are typically placed underground using methods such as horizontal boring, trench undergrounding, and utility duct banks. The distant countryside is almost entirely covered with overhead cables, as the scale and the cost of undergrounding are financially impractical for the utility companies. In general, the cost of installing cables underground is 4-5 times higher than that of laying overhead (MacDonald, 2025).

The USA is spread over a large area and geographical diversity compels the country to adopt multiple strategies to lay cables. Disaster prone areas which are prone to high velocity winds and thunderstorms use overhead cables as they are cheaper to re-install and have considerably lower repair time in the event of breakdown as compared to subterranean cables. Even though the public opinion in the storm prone areas is now rapidly shifting towards the subterranean system due to safety concerns, overhead system still dictate the picture. In case of fibre, deployment, only about 40 percent of optical fibre in the US is laid underground (Fiber Deployment Cost Annual Report, 2024). For power lines, only 20 percent of total electric distribution lines are underground (United States Department of Energy, 2024).

The major dense cities and tourist places that prefer minimizing the aesthetic clutter have already shifted to underground duct utilities decades ago. Such a hybrid system may prove to be the most suitable for India.

India

In India, the regulatory framework to govern overhead cables can broadly be categorized into Electrical Power Lines, Cable TV wires and Telecommunication Cables. The electrical power lines are governed by The Electricity Act, 2003 and Central Electricity Authority (CEA) safety regulations, Cable TV wires are governed by Cable Television Networks (Regulation) Act, 1995, and the telecommunication cables are governed by Indian Telegraph Right of Way (RoW) Rules, 2021 in conjunction with local civic bodies. Most of the country has deployed overhead cables without proper planning and regulations.

Some of the major cities are now planning to move these cables underground and have even allocated funds of hundreds of crores, but the projects have not been able to resolve the issue and are lingering in execution. Thus, India needs to have a multipronged approach to tackle this predicament.

The Resolution: Policy Framework, Financial Nudge and Innovative Solutions

Exploring the Options

When the question of finding viable solutions is asked, almost everyone suggests underground utility ducts as the best possible resolution for this pressing issue. There is little discussion of other viable solutions that may be adopted. The examples of European countries and cities like New York are often floated to bolster the case in favour of underground systems, but the case of India is different considering its population and size. The situation of India is far from being comparable to that of any European country or even the USA for that matter. Therefore, in case of India, a multipronged approach has to be taken bearing in mind the population density, cost effectiveness and inconvenience cause to the public.

A multipronged approach means deploying a system that prioritizes safety without causing prolonged transient inconvenience to the public, a system that may be aesthetically appealing yet pocket-friendly and one that considers the needs of existing cities and upcoming urban areas in the future. Such a system cannot be relied on a black and white analysis of overhead vs underground. Rather, such a system shall incorporate both these systems along with other possible options. Therefore, in case of India, a composite system integrating 3-4 types of cable management and transmission techniques has to be adopted. A strategy of conglomeration of underground ducts, light-weighted ducts/trays for bundling overhead cables, and running cables alongside flyovers is being presented here.

1. Underground Utility Ducts

As seen from the examples of Europe, USA, and Japan, undergrounding cables is not a viable solution for long distances, earthquake prone areas, or compact zones crammed into narrow lanes. In this context, the example of Christchurch, New Zealand, during the earthquake of 2010-11 becomes an imperative. Significant damage was reported to the underground buried cables due to cracking and liquefaction, whereas the above-ground electrical systems performed fairly well (Australian Earthquake Engineering Society, 2016). As a result, the city faced a massive outage which lasted for weeks, and local utility company had to build temporary overhead lines just to get power back to the city.

Notwithstanding the subterranean challenges, underground utility ducts can prove to be outstanding for posh locales with wide streets, well-organized segments of the city, and historical or tourist destinations that prioritize aesthetics. Cables can be laid under the footpaths made for pedestrians because in case of an outage, roads need not be dug, preventing traffic congestions. Also, in the narrow lanes of many Indian cities, digging underground ducts might not be possible due to overcrowded spaces, 24x7 uninterrupted markets, and high costs. Moreover, as India is a country of 5 earthquake zones, special attention must be paid for cable management in areas under Earthquake Zone V. Cities such as those located in the Himalayan terrain may not be subjected to undergrounding operations as it may also lead to other pitfalls. Even when it is imperative to setup underground systems, proper scientific studies using fragility curves etc. can be done. Therefore, undergrounding may be done only in the following cases-

- Areas not prone to earthquakes/landslides
- Localities within cities with open spaces, wide streets, well-segmented layouts
- Historical and tourist destinations, where the value of aesthetic appeal is high

2. Aerial Tray Encased Overhead Cables

The most pressing issue (in case of most Indian cities) is not the wires being overhead, rather it is the messed, dangled, tangled, and disarranged stretches and clogs of wires. If these cables could be arranged on the poles in a streamlined manner, where they are not laid anywhere haphazardly, like on trees, buildings, etc., many of the problems would not have arisen at the first place. Therefore, a large-scale project of bundling all these cables and laying them on lightweighted overhead ducts or trays and mounting these trays on poles, can prove to be the most viable and economical solution. Encasing cables in overhead trays might seem trivial, but looking at the situation of cables on ground, enforcing strict rules for laying cables only inside these trays can significantly transform the urban picture. It is important to mention here that these cable trays are widely used across industrial setups as indoor cable runways. These can also be used outdoors, and many solar plants have started using them to lay cables over long distances, but they do come with drawbacks.

Conventional Cable Trays need structural supports such as brackets, every 3-5 metres, to provide continuous, rigid support. That is why they are not considered standard for spanning long distances between utility poles. Even though USA's National Electrical Code (NEC) Article 392, permits outdoor use of cable trays, it comes with a caveat of mechanical and structural guidelines (Cable Tray Manual, 2005). There are a few options in trays that can be explored, such as aerial/space trays, that are specifically made for such operations. Therefore, aerial cable trays can be used for the following-

- Narrow lanes
- Bundling Cables inside and outside building and establishments
- Rooftops, etc.

3. Laying Cables Alongside Flyovers

Cities such as Chennai and Surat are often recognized for their extensive flyover networks. There are long stretches of flyovers in many major cities now. For areas adjoining the flyovers, instead of laying cables underground, they can be mounted beneath the flyover, running across its length. All possible spaces that are available, can be used to reduce the cost while resolving the issue.

4. **Utility Poles and Overhead Cables for Long Distances**

   As discussed above, undergrounding operations can be five times costlier than overhead and as illustrated that trays are not standard for longer distances, the only economically viable solution for connectivity through cables to distant rural areas are the utility poles.

Addressing the Financial and Policy Gaps

According to various print media reports based on interviews of officials from local civic bodies, optical fibre cables and cable TV wires constitute around 70-80 percent of the overhead cables (Jahnvi, 2024). Some of these are illegally laid on electric poles without seeking necessary permission, despite checks. Civic bodies of various cities have been contending this issue for long as many of the Internet Service Providers (ISPs) claim that they get permission from the Central Government, which is sufficient for them to lay cables wherever needed and local permission is not required for this (Shree D N, 2024).

In 2021, the Department of Telecommunication (DoT), in a significant move, amended the Indian Telegraph ROW Rules, which has paved the way for simplified and standardized process of getting permissions to lay telecom cables and install towers. This has set a regulatory framework for establishing overhead cables with a one-time compensation (PIB, 2021). Its effective implementation could be further supported through greater awareness among Urban Local Bodies (ULBs) and improved institutional coordination.

The role of the DoT becomes pivotal here. As the country's urban infrastructure needs a radical revamp, expert guidance and financial nudge become critical. The DoT can provide both. It has been seen from the examples of Smart City Mission (SCM), Atal Mission for Rejuvenation and Urban Transformation (AMRUT), Jal Jeevan Mission (JJM) and many more, that handholding by the Centre can transform the project execution at the level of ULBs.

The DoT is the largest net contributor of Non-Tax Revenue to the Government of India[1]. It generates revenue through direct operations, licensing and user fees. Spectrum Auction fees, License Fees and Spectrum Usage charges constitute the

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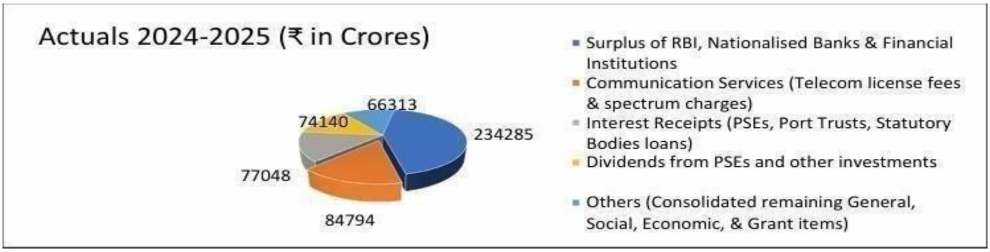
major portion of this revenue.

Figure 1

Revenue Receipts (Non-Tax) in Consolidated Fund of India[2]



Digital Bharat Nidhi (DBN) is a specialized, non-lapsable fund collected, managed and disbursed by the DoT. It constitutes 62.5 percent of the license fee collected by the department. DoT is mandated to disburse funds to various projects that are aimed at providing quality telecommunication services to the unserved populations. Over the years, DoT has setup many projects in rural areas such as rural wireline broadband, Telecom Towers, public Wi-Fi at the level of Gram Panchayats, etc., but the major transition came after 2023, when the Telecommunication Act of 2023 widened the scope of DBN. Table 1 helps understand the transition from USOF to DBN.

Table 1

Transition from USOF to DBN

Feature	Old USOF Framework (2002-2023)	Modern Digital Bharat Nidhi (Telecommunications Act)
Geographic Mandate	Focused strictly on rural and remote villages.	Expanded to include undeserved urban pockets alongside remote areas.

[1]According to the Abstract of Receipts, Receipts Budget 2026-27 published by Budget Division, Ministry of Finance, under non-tax revenue part-Communication Services (which constitutes license fees and Spectrum Usage Charges) contribute the second highest corpus of fund to the Consolidated fund of India (CFI), second only to the Dividend/Surplus of Reserve Bank of India, Nationalized Banks and Financial Institutions. Thus, in terms of component wise contribution, communication service is the second largest contributor, whereas in terms single department wise contribution to the CFI, the DOT is the largest contributor of Non-Tax Revenue to the CFI.

[2]Source-Ministry of Finance. (2026). Receipt budget 2026-2027. Government of India, Budget Division. https://www.indiabudget.gov.in/

Target Demographics	Broadly community-focused (villages/highways).	Introduces targeted funding for specific undeserved groups (e.g. women, persons with disabilities, economically weaker sections)
Scope of Spending	Restricted strictly to physical infrastructure rollout (towers, optical fibre)	Expanded to fund Research & Development(R&D), commercializing indigenous tech, and setting up Regulatory Sandboxes for startups.
Open Access Rule	Dependent on individual operator agreements.	Mandates that any operator using this fund must share their network infrastructure on an open, non-discriminatory basis.

But since the fund available with DBN is non-lapsable[3], over the years ₹ 1,06,552.5 Crores (upto 2025-26) of funds have been accumulated in the Consolidated Fund of India (Fund Status, 2026).

The structural evolution from the USOF to the DBN has also fundamentally enhanced the regulatory and operational powers of the DBN Administrator, transforming the entity from a rigid funding pool focused strictly on basic rural connectivity into an agile catalyst for nationwide technological innovation (Maheshwari & Sharma, 2025a). This restructured paradigm provides distinct avenues for key stakeholders to leverage the digital ecosystem. ULBs can capitalize on this transformation by pitching targeted digital inclusion projects for underserved urban peripheries and integrating smart-city Internet of Things (IoT) frameworks directly into the mandated open-access fibre networks without bearing prohibitive capital costs (Maheshwari & Sharma, 2025b). Concurrently, State Governments can strategically utilize the DBN by forming dedicated Special Purpose Vehicles (SPVs) to secure massive central infrastructure grants for state-wide fibre saturation,

[3]In Indian public finance, standard budgetary allocations are 'lapsable,' meaning unspent balances expire on March 31 and revert to the general pool of the Consolidated Fund of India (CFI). Conversely, a 'non-lapsable' fund allows unspent allocations to legally accumulate and carry forward across fiscal years for a specific purpose. This fund was originally established as the Universal Service Obligation Fund (USOF) under the Indian Telegraph (Amendment) Act, 2003, and was later renamed and restructured as the Digital Bharat Nidhi (DBN) under the Telecommunications Act, 2023, while retaining its non-lapsable status. Funded by a Universal Access Levy (UAL) on telecom operators, the money is first credited to the CFI as revenue receipt and then transferred to the DBN via parliamentary appropriation. The accumulated balance of ₹1,06,552.5 crores (up to 2025–26) represents the multi-year variance between the total levy collected by the exchequer and the actual amounts disbursed for project execution.

while simultaneously accelerating RoW clearances to drive local economic growth (Maheshwari & Sharma, 2025c).

Furthermore, early-stage deep-tech startups can tap directly into this ecosystem by securing research, development, and commercialization grants through the Telecom Technology Development Fund (TTDF) arm of the DBN, utilizing risk-exempt regulatory sandboxes to test next-generation communication protocols, and commercializing their consumer applications over the federally subsidized open-access infrastructure (Maheshwari & Sharma, 2025d). Consequently, this enables stakeholders to leverage unutilized DBN resources to cultivate a technologically inclusive, architecturally refined, and disaster-resilient digital ecosystem.

Conclusion

The urban landscape needs a radical transformation, if India aspires to see itself as Viksit Bharat in 2047, but this transition cannot be at the cost of environment and disaster risks. Therefore, any action has to look beyond the examples from around the world and look closely to the requirements of present day and future India. Transformation from Overhead to Underground has to be ascertained by also keeping in mind the environmental impact and financial viability. Blanket undergrounding operations can lead to disasters like one that happened in Christchurch, New Zealand during the 2010 earthquakes. Therefore, a careful scientific study must be done before implementing any project even in a small suburb. Proper utilization of all the existing infrastructure along with application of mixed/hybrid models suitable for the spatial and topographical requirement of the region has to be taken into consideration.

References

Frederick, M., & Mehta, V. (2018). *101 things I learned® in urban design school. Crown.*

NITI Aayog. (2021). *Reforms in urban planning capacity in India.* Government of India.

Delhi Development Authority. (2021). *Master Plan for Delhi–2021 (MPD-2021).* https://dda.gov.in/sites/default/files/Master-Plan-for-Delhi-2021(updated%2031.12.2020).pdf

Worldometer. (2026). *Europe population (2026).* Retrieved July 10, 2026, from https://www.worldometers.info/world-population/europe-population/

Fiber Broadband Association. (2024). *When fiber leads, the future follows: Fiber deployment cost annual report.* https://fiberbroadband.org/wp-content/uploads/2025/01/FBA_Cartesian_Fiber-Deployment-Cost-Annual-Report-2024.pdf

U.S. Department of Energy. (2024). *Undergrounding transmission and distribution lines: Resilience investment guide.* https://www.energy.gov/sites/default/files/2024-11/111524_Undergrounding_Transmission_and_Distribution_Lines.pdf

Department of Telecommunications. (n.d.). *Unified licence agreement*. Government of India. https://www.saras.gov.in/main/License%20Agreement/Unified 20Licence.pdf

World Bank. (n.d.). *GDP (constant 2015 US$) – India.* World Bank Open Data. Retrieved July 10, 2026, from https://data.worldbank.org/indicator /NY.GDP.MKTP.KD?locations=IN

Worldometer. (2026). *India demographics 2026 (population, age, sex, trends).* Retrieved July 10, 2026, from https://www.worldometers.info/demographics/india-demographics/

Ministry of Finance. (2026). *Receipt budget 2026–2027.* Government of India. https://www.indiabudget.gov.in/doc/rec/allrec.pdf

Maheshwari, D., & Sharma, B. (2025). *Governing Digital India: A report on institutions and instruments.* Centre for Social and Economic Progress. https://csep.org/wp-content/uploads/2025/10/GOVERNING-DIGITAL-INDIA.pdf

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Author's Profile

Shri Keshav Kumar Jha is a Senior Accountant in the Office of the Controller of Communication Accounts (CCA), Karnataka Circle, and is presently posted in the License Fee Section. He holds a Bachelor of Technology in Mechanical and Automation Engineering from IP University, Delhi. Through his engagement with Telecom Service Providers (TSPs)and Internet Service Providers (ISPs) in Karnataka, he has developed practical insights into licensing, compliance, and operational challenges in the telecom sector. Apart from his official responsibilities, he is a writer and poet with interests in literature, science, technology, patriotism, environmental issues, and personal motivation. He also actively participates in social initiatives including Swachh Bharat Abhiyan and tree plantation drives, reflecting his commitment to public service and community engagement.