When the government announced its Smart Cities Mission in June 2015, the move elicited excitement and skepticism in equal part. On the one hand, the programme was hailed as one that would usher in an “urban renaissance” by promoting sustainable and inclusive urban development and drive economic growth. On the other, there was serious apprehension about India’s readiness to build technology-enhanced infrastructure that would address the structural inequalities and inadequacies in the cities. {K2Splitter} When the government announced its Smart Cities Mission in June 2015, the move elicited excitement and skepticism in equal part. On the one hand, the programme was hailed as one that would usher in an “urban renaissance” by promoting sustainable and inclusive urban development and drive economic growth. On the other, there was serious apprehension about India’s readiness to build technology-enhanced infrastructure that would address the structural inequalities and inadequacies in the cities.

Fast forward four years, and while it is difficult to pronounce a verdict on the success of the mission, it is clear that the programme is still work in progress. According to the Ministry of Housing and Urban Affairs, as of December 2018, almost two-thirds of the projects envisaged under the programme have either not started or are at the tender-issuing stage. While projects worth Rs 2 trillion for 100 smart cities were included in the original proposals, only 1,675 projects worth Rs 518 billion have been implemented so far.

That said, in a mission of this scale – with 100 cities across states that are diverse in every way – there are bound to be delays and cost escalations. Industry experts contend that globally, it has taken around 15 years to transform cities into smart cities. This explains why, despite the sluggish implementation, the euphoria surrounding smart cities, particularly how these will change the way urban India lives, refuses to die down.

At the heart of the massive technology-driven transformation envisaged under the mission lies the telecom industry. The successful deployment of various “smart” elements can be realised only on the back of robust network connectivity – the core competency of telcos. These smart applications require ubiquitous connectivity, which, in turn, needs a robust telecom infrastructure including towers, micro sites and fiberised backhaul networks.

Building blocks

The collection, management and interpretation of large amounts of data in a smart city require

the availability of an extensive, robust and scalable communications infrastructure. A mix of communication and networking technologies including wired networks, wireless networks, satellite networks and transmission protocols is being used in smart cities across the world.

Wireless connectivity

While 4G penetration is increasing steadily, smart cities will benefit immensely from the introduction of 5G services. The key attributes of 5G that will be particularly advantageous for a smart city ecosystem include ultra high network speeds, superior network coverage, the ability to support a large number of connections, enhanced reliability, and quick and more adaptive response times to support time-sensitive applications such as vehicle-to-vehicle communications. Compared to the current wireless technologies, 5G will help smart cities better connect their infrastructure, devices and people.

Another emerging wireless technology for smart cities is low power wide area networks (LPWANs). LPWAN technologies such as Sigfox, LoRa (long range), LTE-M (long term evolution for machines) and NB-IoT (narrow band internet of things) provide low power and low data rate communication over long distances, enabling battery-operated devices to run for up to 10 years without any human intervention. Besides, LPWAN technologies have unprecedented reach, enabling communications in deep water and up to 50 metres underground. The LPWAN ecosystem is experiencing exponential growth with the development of technical standards and nationwide network roll-outs. According to industry estimates, the number of connected LPWAN devices is expected to grow at a compound annual growth rate of 109 per cent during 2018-23. By 2023, it is expected to have more than 1.1 billion active LPWAN connections. Meanwhile, in India, Tata Communications has rolled out the country’s first LPWAN based on LoRa technology, which helps in overcoming the high-power consumption challenges of existing wireless solutions.

Fibre networks

Optic fibre cable (OFC), with its virtually unlimited capacity, provides the perfect backbone for running the bandwidth-intensive applications in a smart city. It also facilitates the installation of sensors, which are key to the development of intelligent solutions for a smart city. The cities selected under the Smart Cities Mission have submitted budget proposals for city-wide OFC deployments, ducting for OFC networks, OFC deployment for command and control centres and other OFC-related civil works. The Maharashtra government has awarded a contract to

Larsen & Toubro (L&T) to lay 1,200 km of OFC as part of the Nagpur Smart City project. Similarly, Sterlite Tech has been selected to deploy OFC networks in the Kakinada, Jaipur and Gandhinagar smart cities. Meanwhile, in order to expand the fibre infrastructure and overcome some of the challenges associated with OFC deployment such as high right-of-way costs, the new telecom policy has proposed according public utility status to OFC and devising new collaboration models involving state and local bodies, and the private sector for the provision of shared duct infrastructure in municipalities, rural areas and national highways.

Wi-Fi presence

In addition to wired broadband networks, ubiquitous Wi-Fi networks are a key prerequisite to enable various high-bandwidth, low-latency smart city applications. Wi-Fi offers several advantages over other technologies. These include high adoption rates, which allow a wide range of devices to connect and communicate, and a relatively low cost of deployment. Meanwhile, new Wi-Fi standards (802.11ah) that operate at frequencies of less than 1 GHz have been developed to increase the range of connected devices and allow for low-power sensors to transmit small data packages over a low bandwidth link. This is ideal for smart home devices and appliances that do not require constant network connectivity and are located in harder to reach places like kitchens and garages. Several cities selected under the Smart Cities Mission have awarded contracts to equipment vendors and telecom operators to deploy Wi-Fi networks. For example, Sterlite Tech will set up 400-500 Wi-Fi access points across the Gandhinagar smart city. In Nagpur, L&T will deploy 136 Wi-Fi hotspots at key locations across the city. Meanwhile, Surat Municipal Corporation, in partnership with Reliance Jio Infocomm Limited, has already rolled out the Surat Wi-Fi service, allowing citizens to get free Wi-Fi access for 30 minutes per day.

Besides rolling out public Wi-Fi networks, telecom operators can explore the option of deploying community Wi-Fi networks that generate connectivity by converting the customer premises equipment of the existing subscribers into public access points. These networks can help operators avoid the cost of additional Wi-Fi infrastructure deployment. Also, the data collected through community Wi-Fi networks could be used to capture metrics such as mobility patterns and concentration of people, thereby helping the local authorities implement smart city applications more efficiently.

Opportunities for telcos and towercos

The Smart Cities Mission has helped telcos improve their business prospects at a time when revenues from conventional voice services are drying up and the growth in the data market is yet to translate into any substantial financial gain. Operators are vying for contracts under various smart city projects in a bid to augment their revenues. For example, state-run operator Bharat Sanchar Nigam Limited (BSNL) is expecting to generate Rs 10 billion in revenues from the smart city projects it has secured in Dharamshala (Himachal Pradesh), Bhagalpur (Bihar), and Ahmedabad and Rajkot (Gujarat). Bharti Airtel and Reliance Jio are also betting big on the smart city opportunity to shore up their bottom lines.

That said, telcos need to urgently upgrade their networks to support the proliferation of millions of smart devices and the new traffic patterns they create. More importantly, operators need to deliver significantly higher quality of service to cater to critical smart city applications such as those in healthcare and transportation.

The mission has also opened up a gamut of new business avenues for tower companies, many of which are aspiring to become end-to-end communication infrastructure providers in the selected cities. In a smart city, the solutions offered by tower companies can be a mix of passive infrastructure, small cells, Wi-Fi, fibre connectivity, etc. Many tower companies have already started installing smart poles that ensure better cellular coverage and are more aesthetic. Besides providing Wi-Fi and smart lighting services, these poles can also be leased out to network operators and the government for surveillance and traffic management systems.

Indus Towers has collaborated with Vadodara Smart City Development Limited, a special purpose vehicle (SPV), for the implementation of smart city projects in the area. As a part of the collaboration, Indus Towers will install smart poles that will provide Wi-Fi services and host CCTV cameras, digital billboards, environment sensors, public address systems, emergency call boxes, traffic signals and LED lights.

Meanwhile, in Bhopal, Bharti Infratel will set up intelligent street poles as part of the smart city project. The Coimbatore Municipal Corporation has also collaborated with a tower company on a pilot project to transform traffic signal poles at major city junctions into smart poles. The New Delhi Municipal Corporation is also planning to install over 18,300 smart poles by 2020 as part of its smart city project, which has a budget of about Rs 18 billion.

Next-generation technologies set the stage

Next-generation technologies such as internet of things (IoT) and cloud computing are playing a critical role in enabling various smart city use cases globally. IoT provides the ability to remotely monitor, manage and control devices, and to create new insights and actionable information from massive streams of real-time data. IoT-enabled sensors are installed on devices such as vehicles, street lights and utility meters for intelligent recognition, location, tracking and monitoring.

Meanwhile, cloud computing is needed to ensure that the huge amount of data that is collected from various sources is handled efficiently. The cloud provides a platform where all data can be securely collected from various interconnected devices and sensors, and be made readily available for use by both the government and private stakeholders.

Another emerging technology that is likely to become an integral part of various smart city initiatives in the near future is artificial intelligence (AI). Using predictive intelligence models, AI can take the concept of a smart city up a notch by helping cities become “intelligent”. An intelligent city draws actionable insights from the data generated through connected devices to improve resource utilisation. According to a discussion paper released by NITI Aayog in June 2018, AI can be used in a smart city for predictive service delivery of citizen services, rationalisation of administrative personnel, grievance redressal through chatbots, efficient crowd management, multimodal transportation planning, optimisation of water usage, etc.

A long way to go

Going forward, the availability of ubiquitous connectivity that is accessible and reliable will be fundamental to the success of the mission. The benefits of various smart city applications can only be realised if there is all-encompassing connectivity that allows devices to communicate with each other and governments to capture and analyse the mountains of data collected by them. As such, the mission will continue to yield significant business opportunities for participants across the telecom and IT value chain, including telecom operators, tower companies, equipment vendors and technology solution providers.

That said, proper thought must also be put into addressing the challenge of cybersecurity, which is integral to technology-driven service delivery. Experts are of the view that city-wide connectivity will create many more avenues for cyberattacks. Moreover, cyber threats get

magnified in a smart city as an infinite supply of data is integral to a wide range of operations. Thus, there is a need to make smart technologies cyber-safe. The existing data privacy and security regulations need to be updated to incorporate new smart city security needs.

At a broader level, with an estimated 1 million people migrating from the rural and semirural areas to cities every month, the challenge will be to ensure that the urban renaissance in the country happens rapidly enough.

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