



India: on the road to a digital nation



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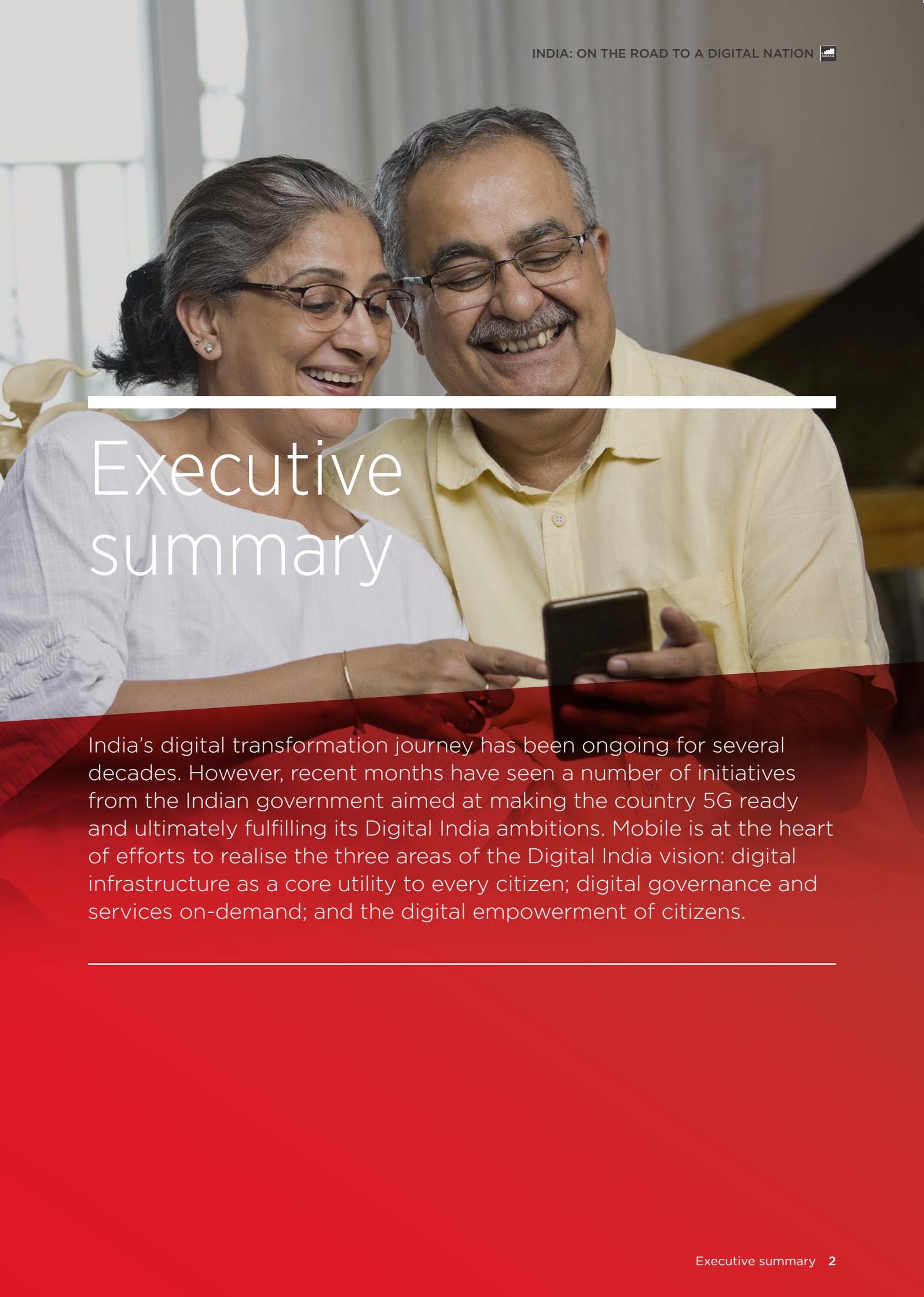
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Executive summary

India's digital transformation journey has been ongoing for several decades. However, recent months have seen a number of initiatives from the Indian government aimed at making the country 5G ready and ultimately fulfilling its Digital India ambitions. Mobile is at the heart of efforts to realise the three areas of the Digital India vision: digital infrastructure as a core utility to every citizen; digital governance and services on-demand; and the digital empowerment of citizens.

India on the cusp of the 5G era

Operators' commitments to network deployment and the development of applications and use cases will be key to ensuring 5G scales in India. The consumer and enterprise segments both present significant opportunities for 5G services in the country. To fully exploit these, operators in India are building new capabilities and partnerships across a range of 5G-related areas.

GSMA Intelligence analysis shows that 5G could benefit the Indian economy by INR36.4 trillion (\$455 billion) between 2023 and 2040, or more than 0.6% of the GDP forecast for 2040, reflecting the large number of 5G use cases that could be implemented in the main sectors of India's economy. 5G benefits are expected to be realised in new applications in the manufacturing sector (representing 20% of the total benefit) as well as the retail, ICT and agricultural sectors. The services sector, particularly healthcare and education, is also expected to benefit from 5G, driven by smart city and smart government applications.

Developing the components of a digital nation

Like many other countries around the world, India is making concerted efforts to integrate digital technologies and services into every sector of the economy. This is the hallmark of a 'digital nation'. 5G is at the heart of the digital infrastructure component of a digital nation, with the potential to reshape the economy by enabling new operating models for businesses and transforming the way citizens interact with the society and environment around them. To maximise the opportunity, policymakers in India should take steps to develop, through collaboration, the components of a digital nation and ensure the financial sustainability of the mobile industry.

The Indian government has undertaken several initiatives, such as amending the Right of Way Policy, working towards a framework for small cell deployment on street furniture, and lowering the reserve price of spectrum in 5G auctions. However, further supportive measures are needed. For example, the prescribed

electromagnetic field (EMF) limits in India continue to be much more stringent than the global standards prescribed by the International Commission on Non-ionizing Radiation Protection (ICNIRP). It would be helpful to harmonise domestic standards with the international standards adopted by several other countries. In particular, Poland and Lithuania have made these changes to accelerate 5G rollout.

An adequate amount of high-capacity backhaul spectrum is also important in view of the forthcoming rollout of 5G services and ever-increasing demand for mobile broadband. While the Indian government has assigned two carriers of 250 MHz each in the E-band to address the current need to support 5G rollouts, this may not be enough in the 5G era given the requirement for high-capacity backhaul to support use cases and increased data traffic. Clear policy guidelines on the allocation of backhaul spectrum are necessary.



1 Mobile at the heart of Digital India

1.1 Connecting citizens, delivering services

Enabling a digital nation

India is one of the largest and fastest-growing digital economies in the world, with more than half a billion internet subscribers and an array of digital services for consumers and businesses.

In 2015, the Indian government introduced the Digital India programme aimed at transforming the country into a digital society and economy. The Covid-19 pandemic has underscored the critical role of connectivity, leading to a renewed focus on these efforts by policymakers and encouraging them to take supportive measures and accelerate the rollout of 5G – a key enabler of a digital nation.

Mobile is at the heart of efforts to realise the three areas of the Digital India vision: digital infrastructure as a core utility to every citizen; digital governance and services on-demand; and the digital empowerment of citizens. For most people and businesses, mobile connectivity is the first and often only form of connectivity and access to the digital world. Since the launch of the initiative, nearly 270 million people across India have come online via the mobile internet, helped by the rapid expansion of mobile broadband networks. Today, 4G networks cover around 99% of India's population, from less than 50% in 2015, with operators investing around INR4.6 trillion (\$58 billion) in the rollout of high-speed networks over the same period.

Enhancing financial inclusion and spurring new digital services

Mobile has also been instrumental in enhancing financial inclusion in India, by enabling digital payment solutions for a growing number of consumers and businesses. Rising mobile adoption has facilitated digital payments through mobile banking, mobile wallets and USSD-based payment platforms. Following the launch of India's Unified Payments Interface (UPI) in April 2016, mobile has become the most prevalent digital payment channel, accounting for more than four in five transactions.¹ In March 2022, the Reserve Bank of India launched a UPI for feature phones, targeting hundreds of millions of users, with the potential to further enhance financial inclusion.²

Mobile has also become the foremost platform to create, distribute and consume digital services in India. Tech innovators are increasingly leveraging the reach and convenience of mobile networks and services to deliver a host of digital lifestyle and life-saving services, including e-commerce, digital entertainment, digital health and disaster response. For example, smartphones are now the most used devices for online purchases, accounting for around 83% of e-commerce sales as of June 2022, compared to just over 60% five years earlier.³

Responding to Covid-19

During the Covid-19 pandemic, mobile technology underpinned various response measures aimed at curbing the spread of infections and enabling everyday activities, such as learning and shopping, to continue in a safe manner. For example, the National Informatics Centre, under the Ministry of Electronics and Information Technology, developed a mobile app – Aarogya Setu – to facilitate Covid-19 contact tracing, self-assessment, vaccine booking and status checking. Furthermore, the prevalence of smartphones, relative to other devices, has meant that online education and other essential services have been optimised for mobile access in order to reach most users.

Contributing to economic growth

The mobile ecosystem – comprising mobile operators, device manufacturers, distributors and retailers, and infrastructure providers – continues to contribute significantly to economic growth and employment. In 2021, mobile technologies and services generated 4.7% of GDP in India – a contribution that amounted to more than INR10.8 trillion (\$136 billion) of economic value added. At the same time, the mobile sector and related industries supported just over 4.6 million jobs in India, of which more than 3.4 million jobs were provided directly by the mobile ecosystem.⁴

Transforming India into a manufacturing hub

Under the broader initiative of Make in India and the National Policy on Electronics 2019 (NPE 2019), the Indian government has set out to transform the country into a global manufacturing hub. Electronics manufacturing is a top goal. With mobile phones one of the most important electronic devices today, there is

a policy push to scale up mobile phone manufacturing and assembly operations in the country. In 2021, shipments of Make in India smartphones surpassed 190 million units. Under the NPE 2019, a production target of 1 billion mobile phones has been set for 2025; this includes around 600 million units for export.

1 "Fintech's Everywhere in India. Banks Need a Counterattack", Bloomberg, March 2022

2 "RBI deepens digital pay infra, launches UPI for 400 mn feature phone users", Business Standard, March 2022

3 Source: Statista

4 Mobile Economic Impact: India, GSMA Intelligence, 2022

India mobile market at a glance

Unique mobile subscribers



2015-2022
CAGR: **4.0%**

2015

587m



45%

Penetration rate
% of population

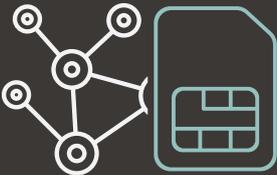
2022

770m

55%

SIM connections

(excluding licensed cellular IoT)



2015-2022
CAGR: **1.4%**

2015

1.0bn



76%

Penetration rate
% of population

2022

1.1bn

79%

Mobile internet users



2015-2022
CAGR: **9.8%**

2015

290m



22%

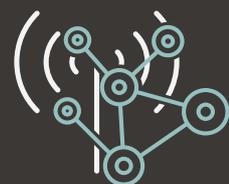
Penetration rate
% of population

2022

557m

39%

Licensed cellular IoT connections



2015-2022
CAGR: **13.7%**

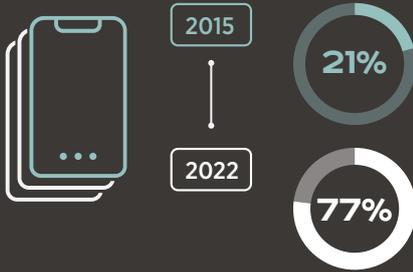
2015

5 million

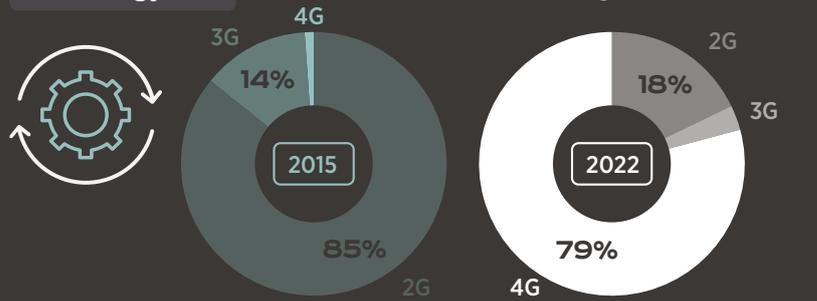
2022

13 million

Smartphone adoption*



Technology mix*



Operator revenues and investment



INR 14.4tn

2015 2022 Operator capex

INR 4.4tn

32%
of cumulative revenues

Mobile industry contribution to GDP



Public funding

 **Mobile ecosystem contribution to public funding in 2021**
(before regulatory and spectrum fees)

INR 1.4 trillion

Employment

Jobs supported by the mobile ecosystem in 2021



3.4 million direct jobs

1.3 million indirect jobs

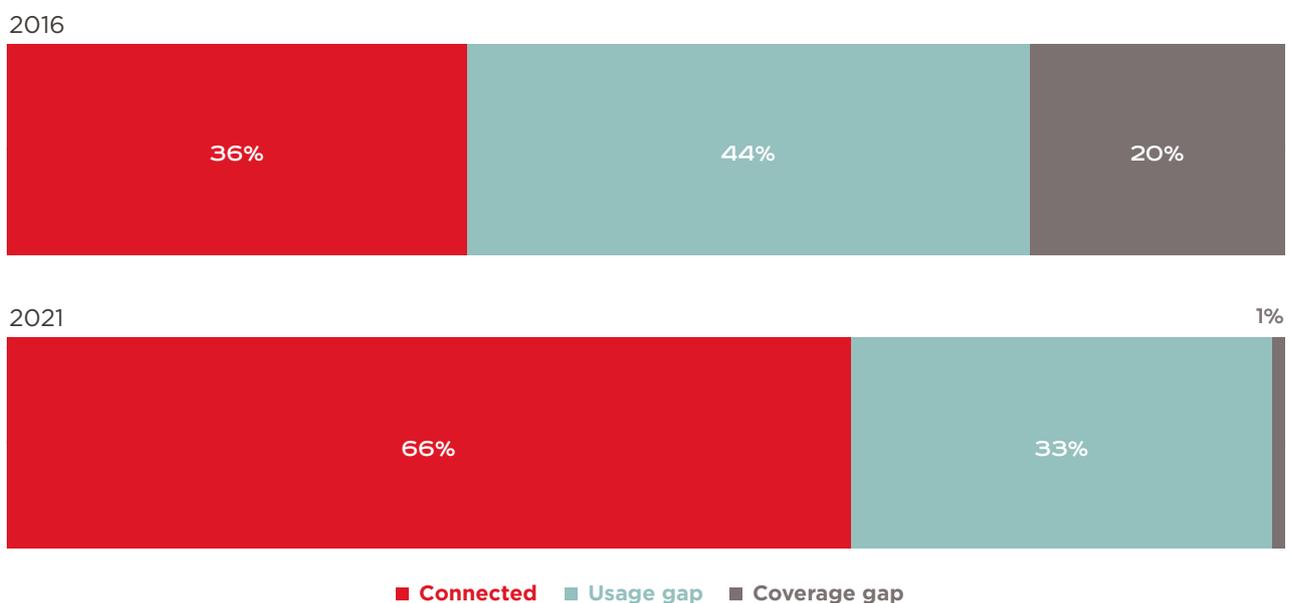
1.2 Closing the digital divide

India has made significant progress on its digital journey, particularly in terms of growth of the mobile internet over the last decade. However, there still exists a substantial digital divide in the country, which has the potential to exclude large swathes of the population from the digital economy and the social and economic benefits it can bring to their lives.

Figure 1

The proportion of connected adults⁵ in India has grown, but a third of those covered by mobile broadband networks do not yet use the service

Percentage of population



Source: GSMA Intelligence

Operator investments in network infrastructure have helped to shrink the coverage gap⁶ for mobile broadband networks to just 1% of India's population. Although the industry continues to invest in innovative solutions and partnerships to extend connectivity to underserved and far-flung communities, the bigger challenge is to close the usage gap⁷ among the adult population.

The GSMA's Mobile Connectivity Index provides an opportunity to understand the nature of the digital divide and the underlying factors that need to be addressed by policymakers and other stakeholders.

Figure 2 shows India's performance on the Index over the last few years across the four main enablers of mobile internet adoption:

- **Infrastructure** – the availability of high-performance mobile internet network coverage
- **Affordability** – the availability of mobile services and devices at price points that reflect the level of income across a national population
- **Consumer readiness** – citizens with the awareness and skills needed to value and use the internet
- **Content and services** – the availability of secure online content and services accessible and relevant to the local population.

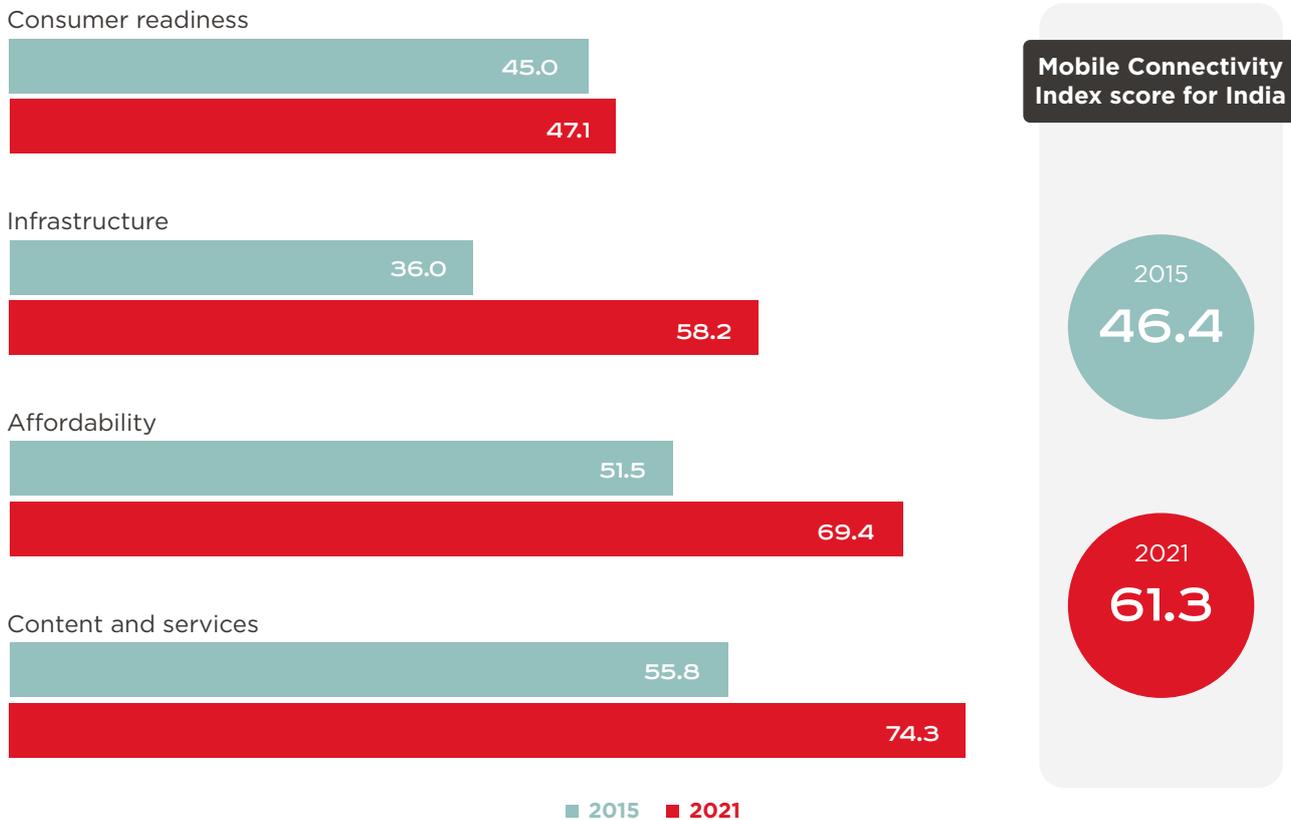
⁵ Adult population (18+)

⁶ Populations that do not live within the footprint of a mobile broadband network

⁷ Populations that live within the footprint of a mobile broadband network but do not use mobile internet

Figure 2

India needs to improve consumer readiness to address the usage gap and close the digital divide



Source: GSMA Intelligence

For most people in India who are aware of the mobile internet but do not use it, a lack of literacy and skills remains the greatest barrier.⁸ There is also a considerable gender gap in mobile ownership (14%) and mobile internet use (41%). A lack of awareness

and digital skills are among the top barriers to mobile internet adoption and usage among women in India.⁹ Addressing these challenges should be a top priority for stakeholders to ensure that every citizen is able to participate in India’s growing digital economy.

8 State of Mobile Connectivity Report, GSMA, 2021
 9 The Mobile Gender Gap Report, GSMA, 2022

2 Assessing the 5G opportunity in India

2.1 Scaling 5G

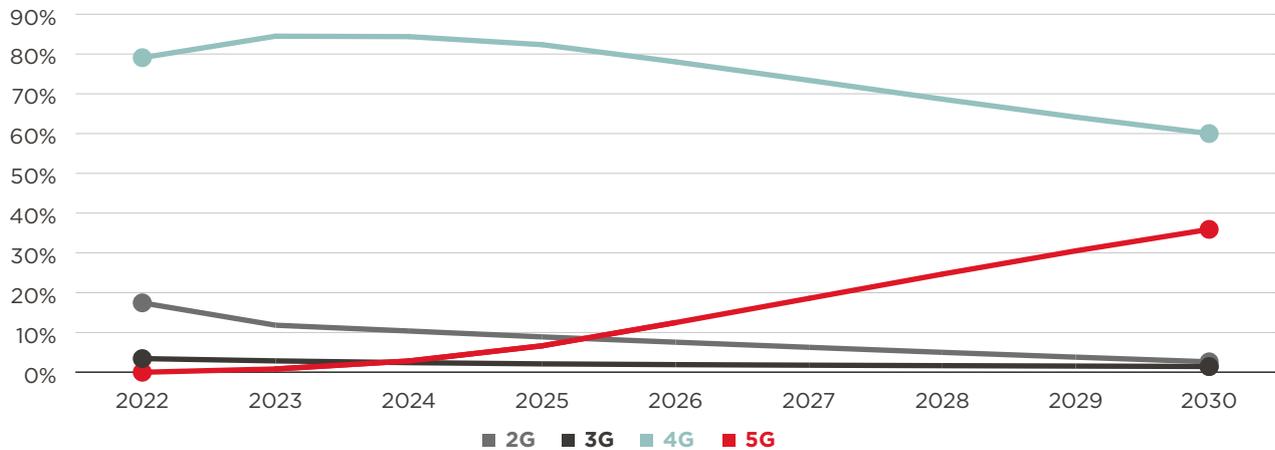
India is on the cusp of the 5G era. 5G adoption across the consumer and enterprise segments is expected to grow rapidly, building on extensive preparations by operators and other mobile ecosystem players. Specifically, operators have conducted a number of trials around 5G network deployment and application development, and have outlined plans to expand coverage across the country in the coming years. Meanwhile, device vendors have ramped up shipments of 5G-enabled smartphones in anticipation of commercial availability of the service.

Operators' commitments to network deployment and application development will be key in ensuring 5G scales in India. In August 2022, Reliance Jio announced plans to invest INR2 trillion (\$25.1 billion) in the rollout of a nationwide standalone 5G network by December 2023. Meanwhile, Bharti Airtel has completed its 5G rollout strategy for the top 5,000 cities and is aiming for nationwide coverage by March 2024.

India is among the biggest single markets for communication services, while a high level of 4G adoption (79%) is indicative of a subscriber base ready to transition to 5G. This view is supported by the growing demand for 5G smartphones, despite the considerably higher average selling price (ASP). As of June 2022, the ASP for 5G smartphones was INR32,000 (\$400), compared to INR8,000 (\$100) for all smartphones. The number of 5G smartphones in the market continues to rise; there were around 50 million 5G smartphones in June 2022, with another 20–30 million expected by the end of the year.¹⁰

Figure 3

5G will account for more than a third of total connections in India by 2030



Source: GSMA Intelligence

In India, enterprises across verticals are undergoing unprecedented digital transformation. This trend has accelerated in recent years in the wake of the pandemic and the attendant disruption to traditional business processes. 5G will be a key enabler of enterprise digital transformation processes; in a recent survey, nearly a third of respondent organisations ranked 5G as the most important technology for their digital strategy over the next two years.¹¹

To fully exploit this opportunity, operators in India are building new capabilities and partnerships across a range of areas. In particular, private networks are garnering significant attention as enterprise

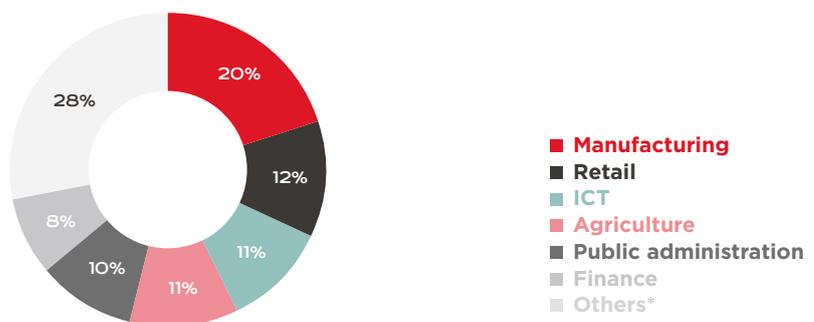
digitalisation drives the need for secure, low-latency connectivity.

GSMA Intelligence analysis¹² shows that 5G could benefit the Indian economy by INR36.4 trillion (\$455 billion) between 2023 and 2040, or more than 0.6% of GDP forecast for 2040, due to a large number of potential 5G use cases in the main sectors of India’s economy. 5G benefits are expected to be realised in new applications in the manufacturing sector (representing 20% of the total benefit) and in the retail, ICT and agricultural sectors. The services sector, particularly healthcare and education, is also expected to benefit from 5G, driven by smart city and smart government applications.

Figure 4

Manufacturing, retail, ICT and agriculture will see the most benefit from 5G in India

5G benefit by sector, 2040 (percentage of total benefit)



*Others includes the following sectors: construction, transport, services, education, mining, healthcare, utilities, accommodation and the arts sector.

Source: GSMA Intelligence analysis

11 "Indian enterprises have high expectations of 5G", Ericsson, June 2022

12 The Impacts of mmWave 5G in India, GSMA, 2020

Figure 5

Selected 5G activities by operators in India



Airtel

5G for consumers:

- The first operator in India to demonstrate 5G in standalone and non-standalone mode in Delhi, Bangalore, Mumbai, Kolkata and Chandigarh.
- The first operator to showcase a range of over 10 km using 3.5 GHz spectrum, with more than 100 Mbps throughput.
- The first operator to showcase cloud gaming on a 5G network, demonstrating a high-quality gaming experience using the high throughput and low latency of 5G networks.
- Showcased more than 4 Gbps of throughput using mmWave, with a fixed wireless terminal as the end device.
- Showcased 5G FWA and Mi-Fi on a 5G network.
- The first operator to deploy a 5G trial using open RAN architecture.

5G for business:

- Trialled a private 5G network at the Bosch Automotive Electronics facility, Bengaluru.
- Tested India's first wireless hologram over a 5G network.
- Announced a partnership with Tech Mahindra to set up a joint 5G innovation lab to develop Make in India 5G use cases.
- Partnered with Apollo Hospitals and Cisco to create 5G connected ambulance services.
- Showcased drone-based inventory management for retail and warehouse management.
- Showcased video surveillance-based worker safety and quality management across different industry verticals.



Reliance Jio

- Conducted 5G network field trials in multiple cities in India using its own domestically developed equipment and technology.
- Reliance Jio's 5G product line includes the following:
 - 5G RAN products – Macro gNodeB, Outdoor Small Cell (ODSC), mmWave ODSC, Indoor Small Cell (IDSC) and IDSC+Wi-Fi 6.
 - All 5G core network functions as per 3GPP Release 16.
 - 360 Degree Automation Platforms – Automated Cloud Installer (ACI), Management and Orchestration Platform (MANO), Core Network Operations Platforms (CNOPs), and Jio Cognitive Platform (JCP).
 - Cloud-native OSS/BSS Solutions – Network Management System (NMS), Integrated Performance Management Platform (IPM), OSS Fulfilment Management System (FMS), Product Catalogue and CRM.
- Demonstrated 5G experiences to the TEC, WPC and DOT members in multiple cities. Examples of initiatives include the following:
 - Bangalore Metro Rail Corporation has become the first metro in India to test a 5G network under a pilot project by TRAI. The 5G network was deployed by Reliance Jio at MG Road station.
 - Bhopal, the first 5G smart city in India, has been powered by Jio's 5G cells. Deployed as a trial, these are mounted on street furniture and connected to Jio's 5G standalone core.
 - 5G small cells have been tested as part of a pilot project carried out at GMR International Airport Delhi.
- Concluded 5G coverage planning in more than 1,000 cities, with trials of advanced use cases.
- Conducted live 5G network trials with a range of 5G device vendors such as Redmi India, a sub-brand of Xiaomi, and Oppo in India.



Vodafone Idea

- Conducted a 5G trial at the MG Road Metro Station in Bengaluru, alongside trials in other major cities, including at New Delhi International Airport, Kandla Port in Gujarat and Bhopal.
- Partnered with Ericsson to showcase 5G's potential to enable access to healthcare in remote parts of the country.
- Partnered with L&T Smart World & Communication to test private 5G network use cases leveraging L&T's Smart City platform.
- Conducted 5G trials on the use of street furniture (e.g. streetlights) to deploy small cells in Bhopal.
- Partnered with Athonet, an LTE and 5G solutions platform provider, to test 5G-based solutions for Industry 4.0.
- Partnered with US-based Ciena on 5G solutions to prepare for commercial 5G rollout.

Source: Company announcements

Impact beyond India

As the largest developing country to launch 5G, the arrival of the technology in India could have significant implications for the broader ecosystem, with potential benefits for countries around the world with similar social and economic features. Firstly, it could further incentivise the mass production of more affordable 5G devices to cater to consumers in lower income

brackets. Secondly, it could drive the development of new 5G applications for consumers and enterprises in emerging regions, considering the majority of solutions to date have been focused on more advanced markets. Finally, India is taking steps to develop 5G network infrastructure and business models which could ultimately be exported to other markets.

2.2 Reviewing India's 5G spectrum auction

India's 5G auctions successfully concluded on 1 August 2022, generating approximately INR1.5 trillion (\$19 billion). Spectrum in the following bands was on offer:

- low band – 600, 700, 800, 900, 1800, 2100 and 2300 MHz
- mid band – 3300 MHz
- high band – 26 GHz.

A total of 72 GHz was offered for sale, 71% of which was sold at the end of the process. All three major operators (Bharti Airtel, Reliance Jio and Vodafone Idea) secured core 5G spectrum in the 3.5 GHz and 26 GHz bands. New entrant Adani Group also participated, winning some 26 GHz spectrum in certain parts of the country.

The auction gives India's mobile operators access to plenty of mid-band spectrum. Access to capacity in the 1–7 GHz range is a must for 5G to flourish. Mid-bands help power innovation in sectors such as healthcare, education, manufacturing and public administration, including smart cities. Unleashing mid-bands can help start a new wave of economic growth and industrial transformation.

The highest bids were for 3300 MHz and 26 GHz in mmWave. The GSMA has previously underlined the key role that access to mmWave spectrum plays in the success of 5G in India. The mmWave auction therefore bodes well. While mid-band spectrum drives the most benefits, mmWave spectrum is essential for the deployment of high-capacity, low-latency 5G networks. It complements low- and mid-band spectrum implementations in dense urban areas and provides fibre-like connectivity through 5G fixed wireless access (FWA) technologies.

The success of the 5G auctions may be attributed to policy reforms recently introduced by Indian

policymakers. This year saw a lower spectrum reserve price (by 39%) on the recommendation of the Telecom Regulatory Authority of India. The GSMA has been advocating for the need to make sufficient amounts of affordable spectrum available to ensure the success of 5G. It is important to strike the right balance between raising revenues, delivering efficient spectrum awards and increasing mid-band spectrum allocations.

In addition to the reserve price, operators in India had been subject to a Spectrum Usage Charge (SUC), paid to the government annually. The SUC was defined as a percentage of annual revenue based on spectrum holdings. As part of telecoms reforms introduced in September 2021, the government removed the SUC on operators. This timely package for the industry has helped improve the financial sustainability of the sector, allowing operators to invest more in spectrum and future network rollouts.

Successful spectrum licensing is an ongoing process based on long-term planning and roadmaps. As such, a vision that can be integrated into 5G spectrum roadmaps for low, mid- and high bands (which have distinct characteristics) is necessary to ensure the timely availability of capacity for 5G.

- While low band is constrained by physics, and demand always outstrips supply, adding the 600 MHz band to the portfolio of spectrum holdings will increase download speeds by 30–50% in rural areas.
- 2 GHz of mid-band spectrum per market is required to provide city-wide capacity and meet the ITU's requirements for IMT-2020. Without access to the 6 GHz band, this goal will be difficult to achieve.
- 5 GHz of high-band spectrum per market will deliver pioneering ultra-fast speeds and the lowest latencies in high-capacity mmWave hotspots.



3 Towards a digital nation: maximising the 5G opportunity

3.1 Defining digital nation ambitions

In a bid to accelerate economic recovery from the pandemic and build more resilient, inclusive and sustainable economies that can withstand future shocks, governments around the world are making concerted efforts to integrate digital technologies and services into every sector of the economy. This is the hallmark of a 'digital nation'. India is already on the

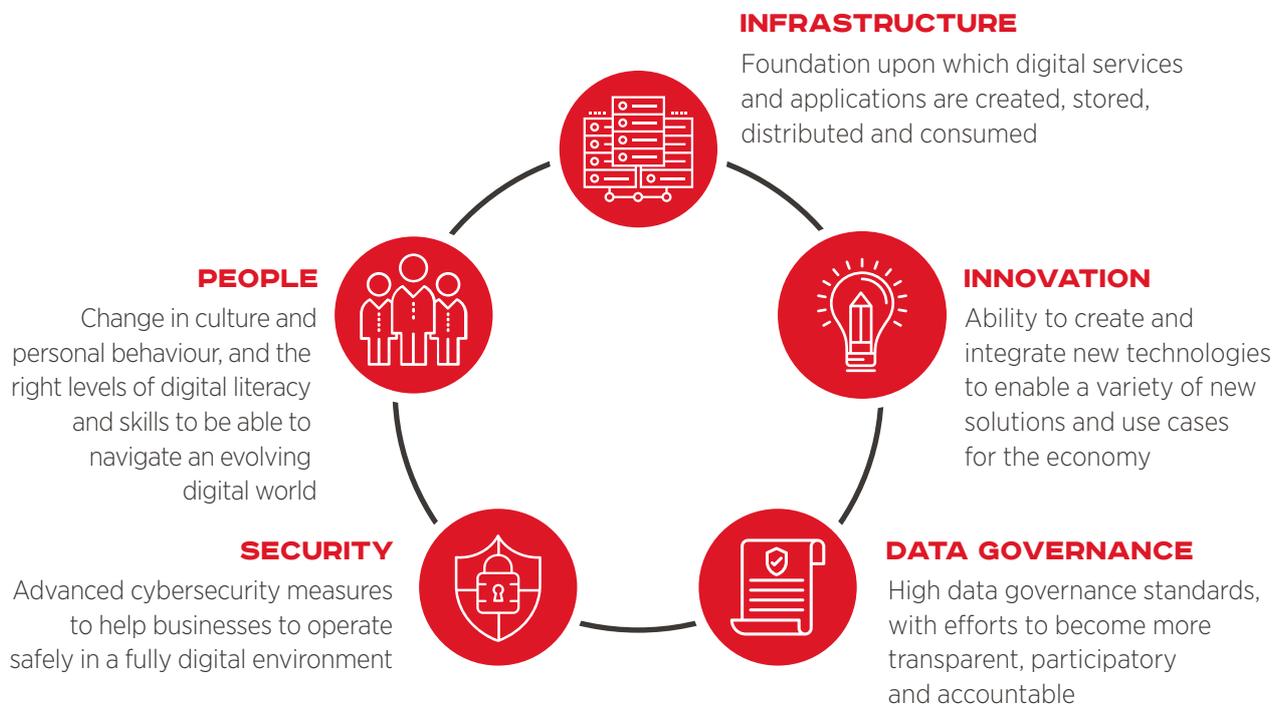
path to becoming a digital nation, through the Digital India initiative, and the successful completion of the 5G spectrum auctions marks a new phase in India's journey.

A recent GSMA report¹³ identified the five key components that need to be in place to support the realisation of digital nation ambitions (see Figure 6).

¹³ Digital societies in Asia Pacific: Progressing towards digital nations. GSMA, 2022

Figure 6

Key components of a digital nation



Source: GSMA Intelligence

Digital infrastructure is the foundation of a digital nation upon which digital services and applications are created, stored, distributed and consumed. 5G is at the heart of the digital infrastructure component of a digital nation, with the potential to reshape the economy by enabling new operating models for businesses and transforming the way citizens interact with the society and environment around them. This will, in turn, create significant social and economic value in a digital-centric, post-pandemic world.

5G also has a significant impact on the other components of a digital nation. For example, it is the primary platform on which innovative digital applications and services of the future will be built, while the increase in the volume of personal and non-personal data generated from the 5G-driven expansion of the digital economy calls for higher data governance

standards to build and maintain trust in digital interactions. Furthermore, honing the digital skills of citizens to navigate an evolving digital world, shaped by 5G, as well as countering growing cyberthreats (often a direct consequence of increased digitalisation) are top priorities for authorities in a digital nation.

Policymakers and other stakeholders in India need to take steps to maximise the opportunity that 5G presents to accelerate progress along the path to becoming a digital nation. Prerequisites to realising this goal include:

- developing the components of a digital nation through collaboration
- ensuring the sustainable growth of the mobile industry.

3.2 Developing the components of a digital nation through collaboration

The task of becoming a digital nation is multidimensional and involves many different actors from the public and private sectors and non-state institutions. In this context, collaboration – underpinned by a whole-of-government approach (WGA) – is essential to streamline efforts and realise efficiencies in formulating and implementing digital transformation initiatives. A WGA brings together multiple stakeholders and diverse resources to provide a common solution to a particular issue. Examples in India include the following:

- The Centre for Development of Telematics (C-DOT), the technology centre of the Department of Telecommunications (DoT), has formed the India 5G Alliance. This brings together multiple

players from industry and academia to undertake collaborative research on the development of local 5G deployment solutions.

- The Indian government has allowed recognised start-ups and micro, small and medium-sized enterprises (MSMEs) to use a 5G test bed for free for the six months to January 2023. This is part of efforts to achieve the objectives of the Atmanirbhar Bharat ('self-reliant India') and Make in India missions. Collaborating institutions include the Indian Institute of Science in Bangalore, the Society for Applied Microwave Electronics Engineering and Research, and the Centre of Excellence in Wireless Technology at IIT Madras.

Building a robust data governance framework

Despite being many years in the planning, India still lacks a clear framework for regulating data. As India's digital economy grows, particularly with the advent of 5G and the potential to generate even more data, the need to establish a robust and proportionate data governance framework has never been more urgent. Such a framework will provide the necessary legal backing to support Digital India ambitions and unleash the potential of 5G.

Collaboration among a broad range of stakeholders, within reasonable timelines, is essential to develop a framework that meets the highest standards and addresses local nuances. Specifically, India's data governance framework should be designed to:

- align with sectoral regulations – for example, mobile-specific obligations and licence requirements should be in line with the Personal Data Protection (PDP) Bill so that data-related consumer protection provisions can be removed where they overlap/conflict with the PDP Bill, or where they better fit with other legal instruments
- prioritise personal data in line with global privacy obligations and align with international practices (e.g. GDPR)
- separate personal and non-personal data regulatory governance – non-personal data regulatory proposals should be considered separately and in a subsequent process to the PDP framework.

3.3 Ensuring the sustainable growth of the mobile industry

Given the importance of 5G to India's digital future, it has become critical for the government and other stakeholders to collectively ensure the sustainable growth of the mobile industry. In recent times, steps have been taken by the Indian government that demonstrate it is mindful of this. For example, the recent 5G auctions saw an improvement over previous auctions; one reason was the lowered reserve prices offered. Prioritising 5G rollout is crucial, with certain areas – such as efficient network deployment and the development of locally relevant use cases – requiring greater attention in this regard.

The Indian government has undertaken several initiatives aimed at strengthening the development of broadband infrastructure, such as amending the Right of Way Policy 2016 and working towards a framework for small cell deployment on street furniture.

Right of way procedures

In May 2022, the government launched the GatiShakti Sanchar Portal for centralised right-of-way (RoW) approvals – a positive step towards facilitating the efficient deployment of network infrastructure.¹⁴ In August 2022, the DoT amended the RoW rules to support faster 5G rollout. Examples of the changes introduced include the following:

- Simplification of RoW application procedures for small cells. Telecoms licensees will now be able to use street infrastructure to deploy small cells at a nominal cost of INR150 (\$1.9) per annum in rural areas and INR300 (\$3.8) per annum in urban areas.
- The GatiShakti Sanchar Portal from the Ministry of Communications will be the single portal for all telecoms-related RoW applications.¹⁵
- Elimination of all administrative fees by central government or its agencies for establishing poles on land owned or controlled by them.

Small cell deployment

Small cells are crucial to meeting the densification requirements of 5G, especially considering the shortage of adequate backhaul infrastructure. In early 2022, the Telecoms Regulatory Authority of India (TRAI) started pilots with major operators at Bhopal Smart City, GMR International Airport New Delhi, Deendayal Port Kandla and Namma Metro Bengaluru on the use of street furniture for small cells and aerial fibre deployment.¹⁶

With the completion of the 5G auctions, a regulatory and policy framework is crucial to ensure the successful and rapid rollout of small cells and optical fibre using street furniture in all smart cities, other towns and cities, ports, airports, metro railways, industrial parks and estates.

EMF limits

Closely related to the above is the need to harmonise RM-EMF to International Commission on Non-Ionizing Radiation Protection (ICNIRP) EMF Exposure Guidelines. The prescribed EMF limits in India continue to be much more stringent than the global standards prescribed by ICNIRP. It would be helpful to harmonise domestic standards with the international standards adopted by several other countries. In particular, Poland and Lithuania have made these changes to accelerate 5G rollout. Such a change would be in line with a recommendation by TRAI to the DoT in April 2022 that the human-exposure requirements in India be revised and aligned with the ICNIRP requirements to ensure smooth 5G rollout and make deployments practically feasible.¹⁷

The requirement for compliance assessment of small cells in terms of RF-EMF exposure limits potentially presents one of the most significant barriers to rapid and sustainable network densification. This is due to the relatively larger number of small cell sites (both indoor and outdoor) that potentially need to undergo assessment. While prevailing stringent EMF norms might have been implementable for 2G and 3G technologies, the same will not be feasible with 5G and technologies beyond 5G, as these will be primarily deployed in the higher spectrum frequencies of the C-band and mmWave band.

¹⁴ "Department of Telecommunication Launches 'GatiShakti Sanchar' Portal for Centralised Right of Way (RoW) approvals", Ministry of Communications, May 2022

¹⁵ "Gati-Shakti Vision for Telecom Infrastructure – Right of Way Rules Amended for Faster 5G Roll-out", Ministry of Communications, August 2022

¹⁶ TRAI press release No. 47/2022

¹⁷ "Recommendations on Auction of Spectrum in frequency bands identified for IMT/5G", TRAI, April 2022

Both the World Health Organization and International Telecommunications Union (ITU) recommend the human exposure guidelines developed by the ICNIRP. In its recently updated guidelines, the ICNIRP (2020) states that there is no evidence that additional precautionary measures will result in a benefit to the health of the population. The updates to the limits are based on improved scientific accuracy and provide limits for exposure that were not considered in the ICNIRP (1998) guidelines.

High-capacity backhaul spectrum

The availability of an adequate amount of high-capacity backhaul spectrum is also important to support 5G. While the government has already assigned two carriers of 250 MHz each in the E-band to address the current need to support 5G rollouts, this

may not be sufficient to support all 5G use cases and increased data traffic. Clear policy guidelines on the allocation of backhaul spectrum are necessary.

Incentives to invest

5G networks also require capital investment and incentives for industry to invest. There is a need to improve ease-of-doing-business processes more broadly, with policymakers taking steps to create a stable business environment that fosters competition, protects consumers and encourages sustainable investment. High regulatory levies and taxes that are sector-specific can have a disproportionate impact on operators and in turn vulnerable consumers, and should be avoided to ease the enormous burden of network rollout by operators.



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