

A person in a dark suit and red tie is holding a glowing, hexagonal grid globe. The globe is illuminated with blue and orange light, and a bright sunburst effect is visible at the bottom right of the globe. The background is a blurred city skyline at night with lights from buildings.

Role of cross- industry collaboration in India's 5G success

September 2022

The EY logo consists of the letters 'EY' in a bold, white, sans-serif font. Above the 'Y' is a yellow chevron shape pointing to the right.

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Foreword

I am glad to be associated with EY for the launch of this pertinent report on 5G. The report couldn't have come out at a more opportune time. Spurred on by the potential launch of 5G networks, a new era in Indian telecommunications and technology is about to dawn.

The telecommunications sector played a critical role in keeping India connected during the COVID-19 pandemic. While accelerating the transition from 'digital-first' to 'digital-throughout', the telecom sector contributed towards keeping Indians safe and healthy. The widespread availability of 4G has helped to unleash a data revolution in India. With 5G, the possibilities are limitless. Faster speeds, low latency, and ability to support a plethora of device endpoints makes 5G versatile. The advent of 5G is expected to revolutionise our lifestyle by transforming industries, enhancing experiences, and advancing the societies and at the same time open-up new opportunities for businesses.

India is gearing up to embrace the revolutionary technology. 5G will benefit our economy by bringing multi-dimensional growth across different economic verticals. For the telecom industry, 5G will be a gamechanger. 5G networks can bring exponential growth by paving the way for the rise of disruptive technologies that can transform the digital ecosystem. Enhanced digital technologies-based services in our smart cities programme, 5G enabled Internet of Things (IoT) can bring all-pervasive cross-sectoral growth bringing in real-time benefits to Consumers, Businesses, and the Government. Telecom Industry will become the spine, the enabler, the catalyst triggering lucrative exponential growth in other sectors.

The biggest value proposition of 5G will be in ushering innovative use cases across industries. Cross-industry collaboration will be key to drive the launch and adoption of 5G services. A number of telecom operators, manufacturing companies and network equipment vendors have already showcased a variety of 5G-enabled use cases in the advanced manufacturing sector. In India as well, 5G is set to introduce smart manufacturing and industrial automation to further the Industry 4.0 use case in the country. In healthcare, 5G is expected to accelerate digitization of hospitals by supporting faster data transmission and usage of immersive technologies in training for example. In the rural areas, 5G has the potential to enhance remote consultation and diagnosis, benefitting a larger part of the population.

For the Indian telecom sector, 5G will be a gamechanger and a catalyst to propel the vision of 'Digital India' forward. Overall, 5G will boost government service delivery and enhance the quality of life for citizens. Improved safety and security measures through HD security cameras and VR glasses for rescue operations, smart utility services, and high-speed connectivity in public places will help to significantly enhance the digital quotient of the nation.

In India, all Telecom Service Providers or TSPs are ready to deploy 5G network rollout in near future. 5G will bring exponential growth across all industries. It will advance societies, enhance experiences, transform industries, and pave way for smart agriculture, smart manufacturing, smart healthcare, and in turn, smart cities. It is imperative that extensive collaboration across industry verticals and their regulators is essential to leverage the potential of 5G in India.

Digital transformation of this scale has long held the promise of improving economic outcomes, and with the support of the Government, and the recently announced Gati Shakti initiative, I am sanguine that 5G will enhance the critical enabling capacity of communication services across the economy. I am confident that 5G adoption will gain pace and unleash the next wave of digital disruption in the country.



Lt. Gen. Dr. SP Kochhar
Director General, COAI

Foreword

The successful conclusion of the 5G spectrum auction heralds a new era for the Indian telecoms sector. 5G is expected to unleash innovative service offerings for consumers initially and transforming businesses eventually. The transition to 5G unlocks a new wave of opportunities and is expected to open-up new use cases and revenue streams through innovative business models and cross-industry collaboration.

5G has the potential to change the socio-economic fabric in India and transform the society at large. Providing pan-India connectivity through Fixed Wireless Access (FWA) services could be a game changer, especially in the rural areas. 5G FWA is expected to spawn new avenues of economic growth through high-speed internet connectivity in households, improving the fixed broadband penetration significantly. 5G has the potential to address some of the basic challenges owing to lack of optimum infrastructure in sectors such as healthcare and education. 5G is likely to improve access to education and quality of virtual learning.

5G is expected to lead to more job creation, bolster the start-up ecosystem, enable India to be a Research & Development (R&D) hub for 5G technology and maximize India's contribution to global value chain by focusing on domestic production and increasing exports. The introduction of Production Linked Incentive (PLI) scheme for handsets, and telecom and network equipment manufacturing is clearly a step in the right direction for the country.

As is the case globally, initial 5G use cases in India are likely to focus on offering enhanced mobile broadband for consumers as well as businesses. 5G is expected to support a host of applications and use cases in India across industries. The advanced manufacturing sector in India is touted to be an early proponent, with 5G advancing the Industry 4.0 agenda. Key functions where 5G is expected to have a profound impact are automation and control, maintenance, and tracking. The media and entertainment sector will greatly benefit from 5G's ability to offer a superior immersive content and gaming experience. On the other hand, 5G-based live broadcasting is likely to lead to substantial savings in production cost by eliminating the need for outside broadcasting (OB) vans. For the life sciences and healthcare sector, 5G enhances remote patient monitoring and diagnosis opportunities, especially in the rural areas. In addition, 5G will drive the digital hospital of the future through faster data transmission, immersive training, and advanced in-patient care.

For India, seizing the 5G opportunity is critical and all stakeholders must act immediately for early commercialization. India has the potential to become an innovator in 5G applications, supported by an enabling ecosystem and the right regulatory support. Above all, a collaborative approach involving all stakeholders - Government, sector regulator, telecom operators, network equipment vendors, technology players and companies across various industries - will help develop the 5G ecosystem roadmap in India. Since 5G impacts a wide range of industries, close coordination between various government departments and sector regulators is necessary for the success of 5G in India. At the same time, providing an incentive mechanism for identifying innovative 5G use cases and 5G rollout is of paramount importance. The Government can look at incentivizing key stakeholders working on 5G to pave the way for wider socio-economic reforms in the country.



Prashant Singhal
Emerging Markets TMT Leader, EY

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Cross-industry
collaboration
key to unlocking
value of 5G

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01

Executive summary

Impact of 5G

1.1. Sabki life badal dega 5G...

5G has the potential to radically transform the lives of Indians by enabling high-speed internet connectivity for the masses. New avenues of economic growth, especially in rural areas, will help to minimize the digital divide through increased access to online markets and e-commerce platforms. Through greater skills development and training using the power of internet, economic recovery in a post-pandemic world is likely to accelerate in rural areas in India.

To start with, 5G would improve connectivity in urban as well as rural areas through usage of Fixed Wireless Access (FWA). Globally, operators have significantly invested in 5G FWA. By the end of May 2022, 85 operators in 46 countries have launched 5G FWA services.¹ India households will be able to benefit from higher bandwidth availability through 5G FWA and connect more devices than currently possible. It is likely to lead to proliferation of ultra-high definition (UHD) video and 4K/8K content. 5G is set to unleash innovative service offerings for Indian consumers. Consumers will have access to array of immersive content related services, made more real with elements of Virtual and Augmented reality in, using specialized headsets or glasses.

5G promises to provide quality education and expected to take virtual learning to the next level by eliminating some of the bandwidth constraints currently faced by students, especially in rural areas. A recent survey by School Children's Online and Offline Learning (SCHOOL) highlighted that approximately 37% of students in rural areas were not studying at all. And out of the students regularly studying in rural areas, only 8% studied online. Given the fact that online education has a minuscule impact in rural areas, 5G FWA offers an economically feasible way to enhance broadband connectivity and help students to seamlessly connect to e-learning platforms and virtual classrooms. On an average, a 10% increase in school connectivity leads to a 1.1% increase in GDP per capita.² In addition, 3D holographic telepresence can virtually beam a teacher to a classroom in a remote location. Or for the matter, immersive lessons through AR and VR can make learning more fun and engaging.

5G is ideally placed to address some of the basic challenges due to lack of optimum infrastructure for healthcare. Approximately, 75% of India's population living outside urban cities has access to only 31.5% hospitals and 16% hospital beds.³ 5G has the potential to open-up remote patient monitoring and diagnosis opportunities in health care in the rural areas. With low doctor density and dismal doctor-patient ratio, the potential for teleconsultation is much more in rural areas in India. Currently, bandwidth limitations prevent using high quality video consultation. Remote diagnosis centers enabled by 5G will lead to a more decentralized patient treatment using technology and relieve some of the pressures from urban healthcare facilities.

Digital transformation initiatives are already underway in the government and public sector (GPS). Today, governments offer several services ranging from passports, AADHAR, e-district, PAN card, election card, pension and labor through the Common Services Centre (CSC). The centres act as the delivery points for essential public utility services, social welfare schemes, financial, educational and agricultural services. At the end of March 2021, there were approximately 4.3 million CSCs in urban as well as rural areas in India. The advent of 5G is expected to enhance government's digital service delivery through the CSCs and offer a better experience for citizens. Immersive technologies will be the key enabler. For instance, citizens can interact with government customer service agents through VR/AR-enabled devices. On the other hand, real-time biometric authentication and authorization can be done for passport security clearances.

5G desh ki aarthik tarakki, saakshrta, sarkaar ki seva aur aam aadmi ke jeewan mein sakaaraatmak prabhaav layen mein sahiyog karega

¹ "5G-Market Snapshot June 2022," GSA.

² "Connecting schools has the potential to boost GDP by up to 20 percent in world's least connected nations," UNICEF, June 2021.

³ Healthcare goes mobile: Evolution of teleconsultation and e-pharmacy in new Normal, EY, September 2020.

Key benefits of 5G to citizens

1

Education

- ▶ Holographic telepresence - a teacher can be virtually beamed to a classroom in a remote location.
- ▶ Immersive lessons and trainings with AR and VR
- ▶ Smart classrooms



2

Health care

- ▶ 5G-enabled tele medicine-improve access to care and quality of care
- ▶ Remove tele-surgery
- ▶ 5G enabled healthcare centers - connect various applications, people, devices, and processes for holistic digital experience for patients.

3

Immersive content

- ▶ AR/VR immersive content
- ▶ UHD/4K/8K content
- ▶ Gaming - cloud gaming and immersive gaming

4

Agriculture

- ▶ Autonomous drones - monitoring crops, pesticide optimization
- ▶ Precision agriculture - smart sensors on fields to get round-the-clock data on soil conditions

5

FWA high speed internet

- ▶ Utilizing BharatNet infrastructure to offer 5G services using Fixed Wireless Access (FWA)
- ▶ FWA provides a flexible and cost effective solution to connect sparsely populated areas
- ▶ Opens up a plethora of content and e-services, especially in rural areas

Source: EY analysis

1.2. India to be an innovation hub for 5G

5G ecosystem to benefit from increased technology play, focus on R&D and involvement of SMEs/start-ups

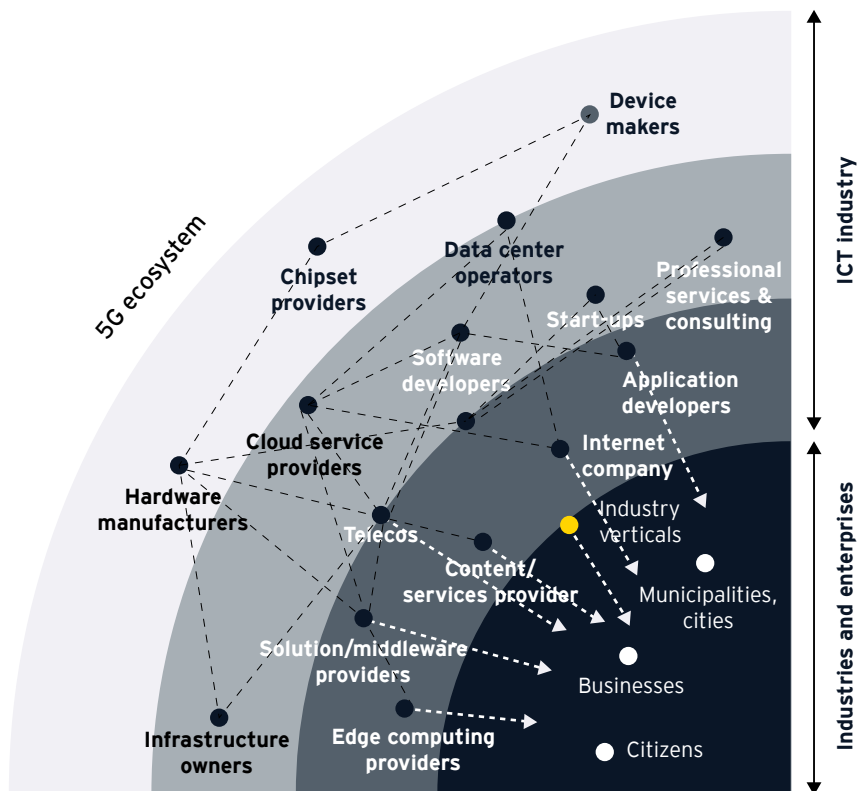
Today, India stands at the cusp of a technology revolution. The country is transitioning to become an innovation partner for the world. This is largely possible through large scale digital transformation initiatives underway, building intelligent platforms and products, and embracing emerging technologies such as analytics and Artificial Intelligence (AI), robotics and automation, blockchain, IoT, edge computing and AR/VR. 5G is expected to be a catalyst to bring all new technology together and propel India on the path of high-tech innovation. India's mature technology infrastructure is likely to provide the foundation for boosting innovation in the 5G era. Success in the 5G era will require a co-innovation approach between all

stakeholders - enterprises, telcos, technology players, start-ups, academia, and the government. At the same time, a razor-sharp focus on enhancing R&D capabilities will bolster 5G adaptability. The government is setting-up large-scale 5G testbeds to whet the appetite for localized 5G innovation.

India's ability to innovate will depend on the participation of SMEs/start-ups in the 5G ecosystem. Their greater agility and adaptability of new emerging technologies makes them an important component in developing, piloting, and deploying 5G. SMEs/start-ups can conceptualize and bring innovative 5G solutions in the market and cater to the needs of specific verticals. Building an ecosystem with SMEs/start-ups in the center is key to identifying future 5G use cases. India has the third largest start-up space globally. Utilizing local expertise will be instrumental in realizing a self-reliant 5G ecosystem in India.



Identifying ecosystem players with relevance for 5G service innovation



Source: EY analysis

5G to accelerate SMEs' digital transformation journey

Currently, there are about 63 million Micro Small and Medium Enterprises (MSMEs) in India accounting for approximately 29% of India's GDP. The MSME sector is pivotal to fostering entrepreneurship development especially in semi-urban and rural areas of India.⁴ 5G is expected to be a game changer for Indian MSMEs helping them to increase productivity and efficiency, enhance scalability, and open-up new opportunities across the value chain. 5G's biggest value addition to the MSME

sector in India will be in integrating the entire ecosystem together, like a marketplace construct. All stakeholders can come together to offer a bouquet of services to MSMEs and create significant value. Serving local businesses - in areas such as manufacturing, outdoor recreation, green energy production, and farming - and creating new revenue opportunities should be the key focus area. 5G presents a big opportunity for MSMEs to enhance their value proposition and influence the lives of all Indians.

⁴ "MSME Industry in India", IBEF, November 2021.

Potential benefits of 5G to the MSME sector



Source: OMDIA, EY analysis

Accelerate 5G equipment manufacturing and generate IPRs

Innovative 5G applications and indigenous manufacturing of 5G devices would help to develop globally recognized Intellectual Property Rights (IPRs) in India. For India, a head-start in 5G will enable the country to become an export hub for the 5G device ecosystem including handsets, IoT sensors, etc. This is in line with the government's vision envisaged in National Digital Communications Policy (NDCP) that aims to maximize India's contribution to global value chain by focusing on domestic production and increasing exports. Development of Intellectual Property Rights (IPRs) is a must to promote meaningful manufacturing and increase value addition in India. The Government may consider providing additional incentives where the IPRs are registered in India. The Government's move to launch a design-led manufacturing scheme as part of PLI will help to position India as a hub for 5G equipment manufacturing and exports.

With the evolving technology, the network is also expected to evolve, and the next-gen wireless devices would operate on Open Radio Access Networks (O-RAN). Software would be a major element for O-RAN. Adoption of O-RAN would help operators to reduce network-related capex and opex and bring in disaggregation and increased flexibility. India can look to capitalize on manufacturing O-RAN products under the 'Make in India' program to cost-effectively deploy 5G networks and launch innovative 5G use cases. In India, there is clear interest in the adoption of O-RAN among operators, which is likely to gather pace in coming years.

Therefore, it is important for the government to consider incentivizing the companies in such domain, specifically for the telecom products, as this may motivate large companies to invest further in these future technologies.

Leading to rise in employment and widespread prosperity

The advent of 5G is expected to create several new job opportunities in the country. This would be possible through continuous upskilling and reskilling of the workforce. It is important for the wider population to take advantage of the numerous opportunities that 5G technology presents for widespread economic growth and prosperity. The manufacturing sector is expected to lead job creation owing to impact of 5G, followed by transport, ICT, healthcare, and retail.

In the telecommunications sector alone, employment opportunities are expected to grow by 20% year-over-year in 2021, as telcos start preparing for commercial launch of 5G services in 2022. The telecommunications sector has the potential to add approximately 100,000 to 150,000 jobs during 2021-25.⁵ The IT sector is expected to be one of the biggest beneficiaries of 5G services from a jobs creation perspective. 5G will open-up a vast number of skillsets in the IT sector including development, IT infra, quality assurance, production support for 5G technologies. Between June to November 2021, IT organizations leading 5G projects have witnessed a 35% growth in demand for specialized 5G jobs.⁶

⁵ "Fiber layers and field engineers to researchers – telecom jobs may see a 20% spike in 2021 as India leaps into the 5G era", Business Insider, January 2021.

⁶ "A Big Boost to Job Market", Voice & Data, November 2021.



02

Adoption of 5G has accelerated globally

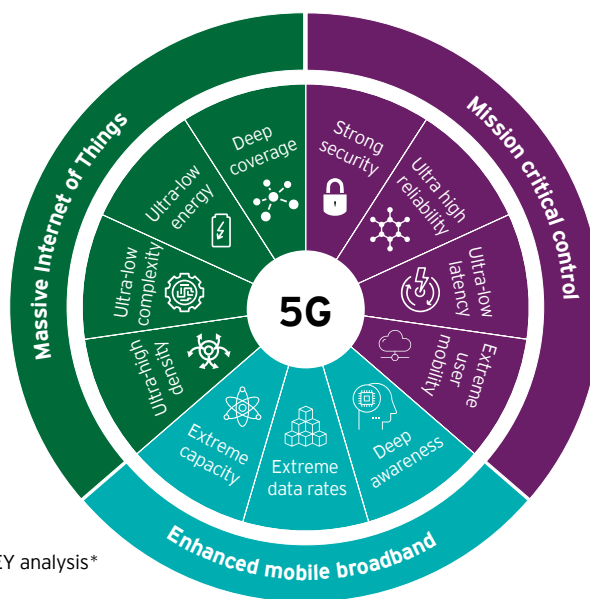
By the end of June 2022, 496 operators in 150 countries/territories have invested in 5G networks in the form of tests, trials, pilots, planned and actual deployments. Of those, 218 operators in 87 countries/territories have launched commercial 5G services - either mobile or FWA.⁷ By the end of December 2021, there were 521 million 5G subscribers globally.⁸

Since 2019, 5G has hit the world with an aggressively advertised technical features of superfast speed, extremely low latency and massive capacity. The technology promises to revolutionize the business landscape forever by bringing new level of connectivity and complexity that allow networks to be extremely agile. This opens-up huge opportunities for internet-of-things (IoT) innovation and commercial use - from driverless cars, drones, artificial Intelligence (AI), robotics and remote-controlled machinery, virtual and augmented reality - giving businesses at the forefront of creating and using 5G technology a competitive edge. 5G technology is touted as

the connectivity fabric that will fundamentally reshape the future of businesses. The fusion of 5G, AI and IoT is leading toward an era of intelligent connectivity that is envisioned to enable new disruptive digital services.

The promising technical aspects of 5G will translate into numerous commercial benefits for the businesses. Automation is one of the main benefits helping businesses work more quickly and more efficiently - in turn, saving costs and increasing revenue. Enterprises will realize new levels of productivity and efficiency as real time data analysis and AI drive constant process improvement. Extension of battery life of various devices means that businesses could see immediate cost savings when it comes to investing in IoT infrastructure and hardware. 5G networks allow companies to move toward a more cost-effective operating model that is more reliable on software and systems in the cloud. Besides that, 5G will make it much easier to collect and analyze vast amounts of real-time data from devices in the IoT network, machine learning software, and more.

Technical strengths of 5G translate into commercial benefits for businesses



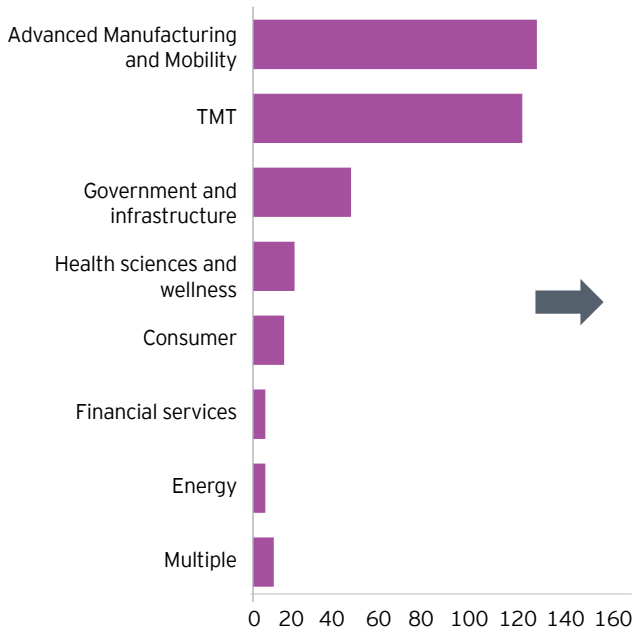
Initial 5G launches globally have focused on offering enhanced mobile broadband experiences for consumers as well as businesses. For consumers, telcos are offering an immersive experience. While for businesses, operators are offering tailored packages with faster speeds and large bandwidths. Telcos have been collaborating/partnering technology companies and leading players in

various industries to trial 5G business-to-business (B2B) uses cases. The advanced manufacturing and automotive verticals are leading in 5G trials and collaborations, followed by Technology, Media and Telecom (TMT). Among use cases, autonomous/connected vehicles, smart manufacturing/industrial automation and immersive content are key ones.

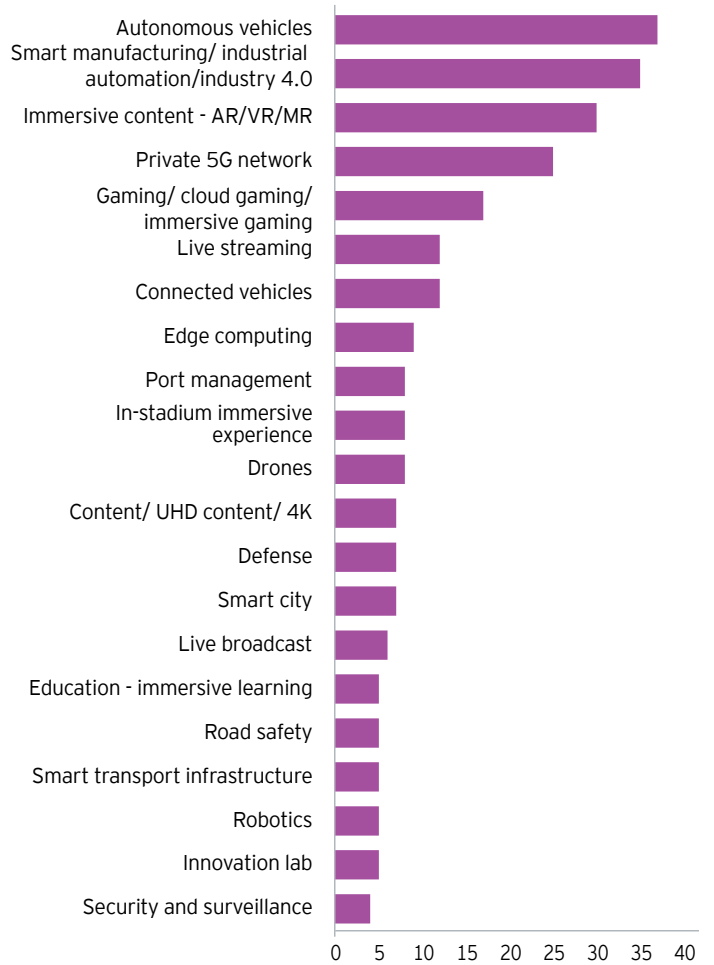
⁷ "NTS Statistics July 2022," GSA, July 2022.

⁸ "4G-5G Subscribers March 2022 - Quarterly update," GSA

N = 369 5G use cases/trials/collaborations of top 30 telcos by revenue since 2019



Top use cases



Source: EY analysis*





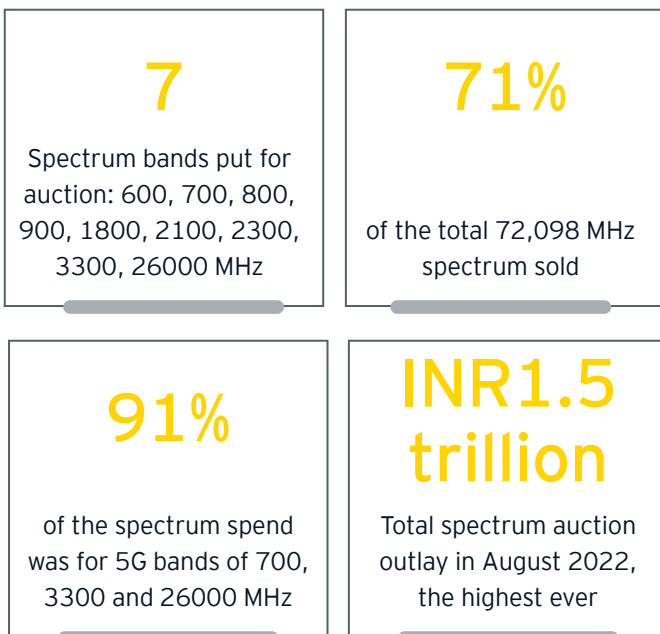
210.95
149.16
23.26

03

5G readiness in India

Completion of spectrum auction sets the stage for accelerated 5G deployments

The successful conclusion of the spectrum auction heralds a new era for the Indian telecom sector. Finally, India has jumped on the 5G bandwagon, with the highest spectrum outlay at over INR1.5t that the country has witnessed till date. A total of four operators have acquired the 5G spectrum. This is only the beginning of realizing the vision of India's Honorable Prime Minister, Shri Narendra Modi – US\$450b contribution of 5G technology to the economy.



Private networks to speed-up 5G deployment and transform businesses

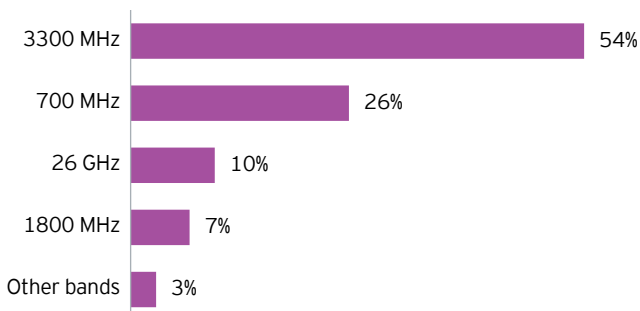
The Department of Telecommunications (DoT) has issued guidelines for setting up of captive non-public networks (CNPN). To enable enterprises to establish CNPN for enterprises, the government shall issue a license under section 4 of the Indian Telegraph Act, 1885.

The National Digital Communications Policy, 2018 focuses on emerging technologies as a growth pillar, including Artificial Intelligence, Robotics, IoT, Mobile-edge-computing (MEC), to catalyze fourth industrial revolution (Industry 4.0). Private captive networks can play a key role in automation and industry 4.0 by providing secure, ultra-reliable, low latency and high throughput communication using advanced technologies.

Based on the recommendations of TRAI, the government has decided to enable setting up of CNPN as follows:

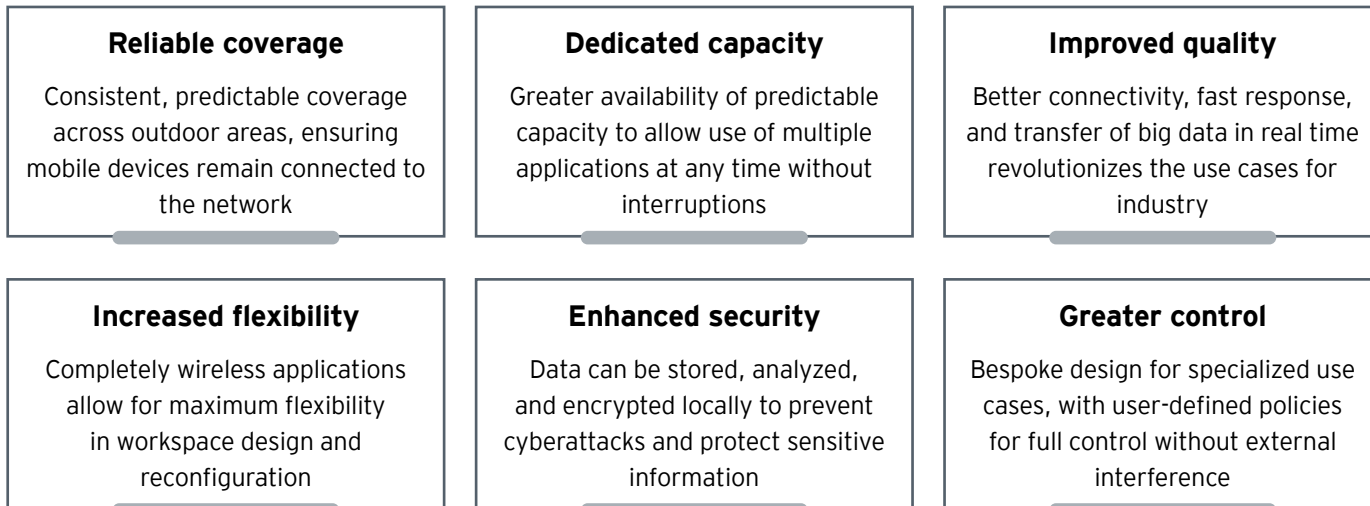
- ▶ Telecom Service Providers (TSPs) with access service license may provide private network-as-a-service
- ▶ TSPs with access service license may establish isolated CNPN for enterprises using IMT spectrum acquired by them
- ▶ Enterprises setting up private captive networks may obtain spectrum on lease from TSPs and establish their own isolated network
- ▶ Enterprises setting up private captive networks may obtain the spectrum directly from DoT and establish their own isolated networks

Proportion of auction spend by spectrum bands (%), N=INR1.5t



Source: DoT, EY analysis

Key benefits of private networks



Source: EY analysis

Globally, private network adoption has significantly increased, primarily driven by digitization, data security requirements and enterprise mobility requirements of businesses. Utilizing private network, companies are combining connected systems with big data and analytics to transform operations, increase automation and efficiency and deliver new services to their users.

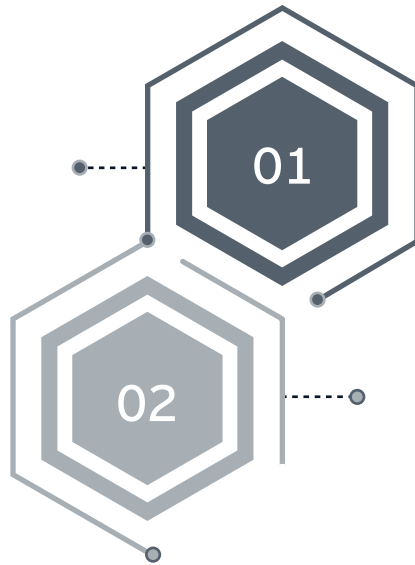
To successfully evaluate the applicability of 5G/private networks to their operations and leverage the technology, companies will need to evaluate:

- ▶ Identify sector use cases/services – sector-specific service/use case evaluation, investment thesis, coupled with regulatory, legal/risk, organization, and business model rethink
- ▶ Finalize network architecture choices – evolution of new technology, which includes fit for purpose 5G reference architecture and new partnerships aimed at future proofing clients’ business and technology requirements
- ▶ Outcome driven transformation – setting-up, orchestrating or managing of 5G cloud network for scalability, cost, security, resilience, and new service creation and delivery

As an initial hypothesis based on internal analysis and identification of use-cases, some sectors appear to have a significant upside with 5G deployments. These include – mining, transportation and logistics (including ports), manufacturing, oil and gas, retail and healthcare.

> 5G infrastructure bottlenecks may hamper rollout

Currently, tower fiberization in India is low at approximately 35%. Deployment of 5G will require a lot of fibre to support a robust backhaul network. Connecting telecom towers to fiber network is one of the primary challenges of launching 5G in India along with seamless infrastructure deployments. Right-of-Way (RoW) continues to be a challenge despite uniform RoW rules across all the States. In addition, densification of network in cities is likely to elevate capex levels significantly.



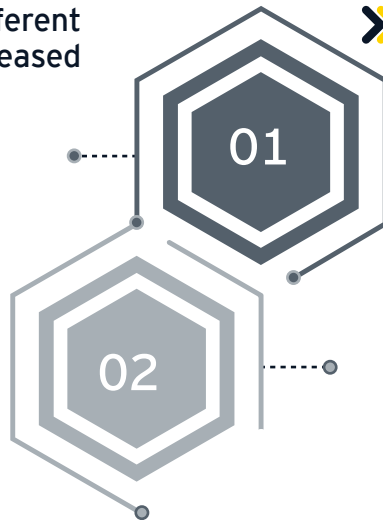
> India needs to adopt innovative means of 5G infrastructure deployment

- ▶ India has been a pioneer in passive infrastructure sharing. Now, with 5G, there is a greater need for sharing active infrastructure to minimize cost.
- ▶ Telcos may look at creating net-cos or network companies for rolling out 5G by segregating their networks from operations, pooling their active networks together, to create more efficient operations. The net-co will be able to provide capacities to operators on a non-discretionary basis. Creation of a single 5G network will enable wholesale access for all operators in the market like a Virtual Network Operator (VNO)/ Mobile Virtual Network Operator (MVNO). This will ensure most efficient use of spectrum as it will be controlled by a single company, with differences only in the quantum to be consumed and slots to be taken. Network sharing has the potential to reduce cost of 5G rollout by approximately 40% - small cells and 5G macro network rollout, core upgrades and 5G spectrum.



➤ **5G requires altogether different network architecture, increased virtualization and cloud adoption for telcos**

For 5G, a service-oriented network architecture is required. Network architecture is the fundamental difference between 5G and other previous generations. For 3G and 4G, change was predominantly on the radio site. 5G not only requires changes in the radio but at the transport and the core as well. Network virtualization is a primary enabler of 5G - network function virtualization, software defined networking, distributed cloud and network slicing.

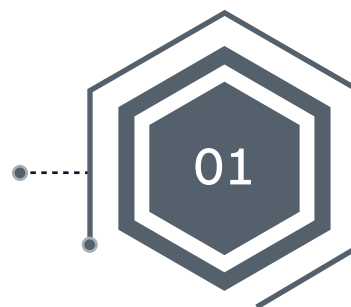


➤ **Telcos are already gearing up for 5G launch by focusing on virtualized and 5G-ready Radio Access Network (RAN)**

- ▶ Telcos are preparing for upcoming 5G launch through deployment of 5G-ready RAN to augment network capacity and capabilities. Telcos are rolling-out virtualized and Open RAN-based networks to support 5G services.
- ▶ India telcos are investing in network cloud to support new emerging technologies such as 5G and edge computing.

➤ **India is expected to be a leading manufacturing hub for 5G equipment**

- ▶ In February 2021, the Union Cabinet has approved the Production Linked Incentive (PLI) Scheme for Telecom and Networking Products.
- ▶ This would help to position India as a leading 5G gear manufacturing hub and boost network gear exports. The generous incentives are likely to help companies to manufacture 5G gear cost-effectively.
- ▶ 5G should help India to leverage its geopolitical advantage and be the preferred choice for manufacturing network products.
- ▶ A head-start in 5G will enable India to become an export hub for the 5G device ecosystem including handsets, IoT sensors, etc.



- ▶ In February 2022, the Government of India launched a design-led manufacturing scheme as part of PLI. It will further help to position India as a hub for 5G equipment manufacturing and exports.



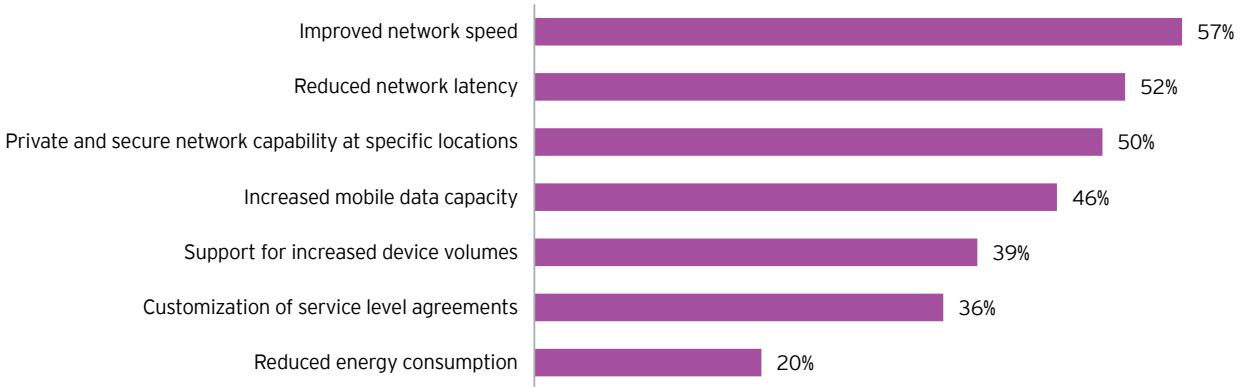
04

5G priorities and challenges in India

Enhanced speed lead as perceived 5G benefits for Indian enterprises. Interestingly, reduced network latency features as a top benefit, which is encouraging.

Enterprise perception of 5G technology benefits

% of all respondents in India (N = 56)

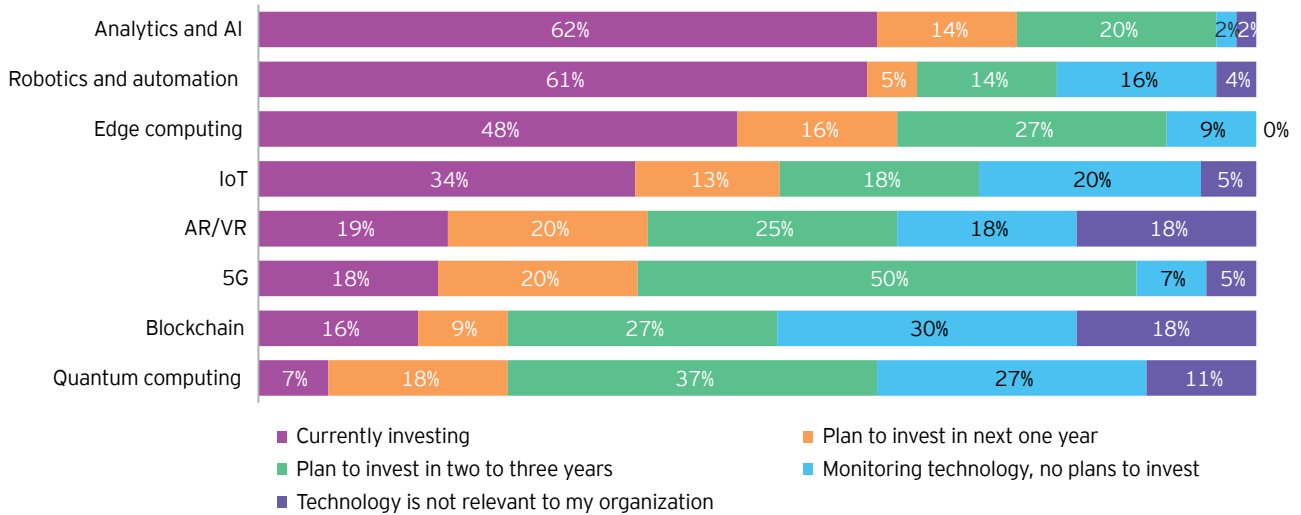


Source: Reimagining Industry Futures, EY 5G enterprise survey, 2022

Currently, analytics and AI, and robotic process automation (RPA), and IoT are witnessing significant investments. However, in the next three years, Indian enterprises (70% of respondents) are expected to make the highest investment in 5G among new age emerging technologies.

Investment in emerging technologies

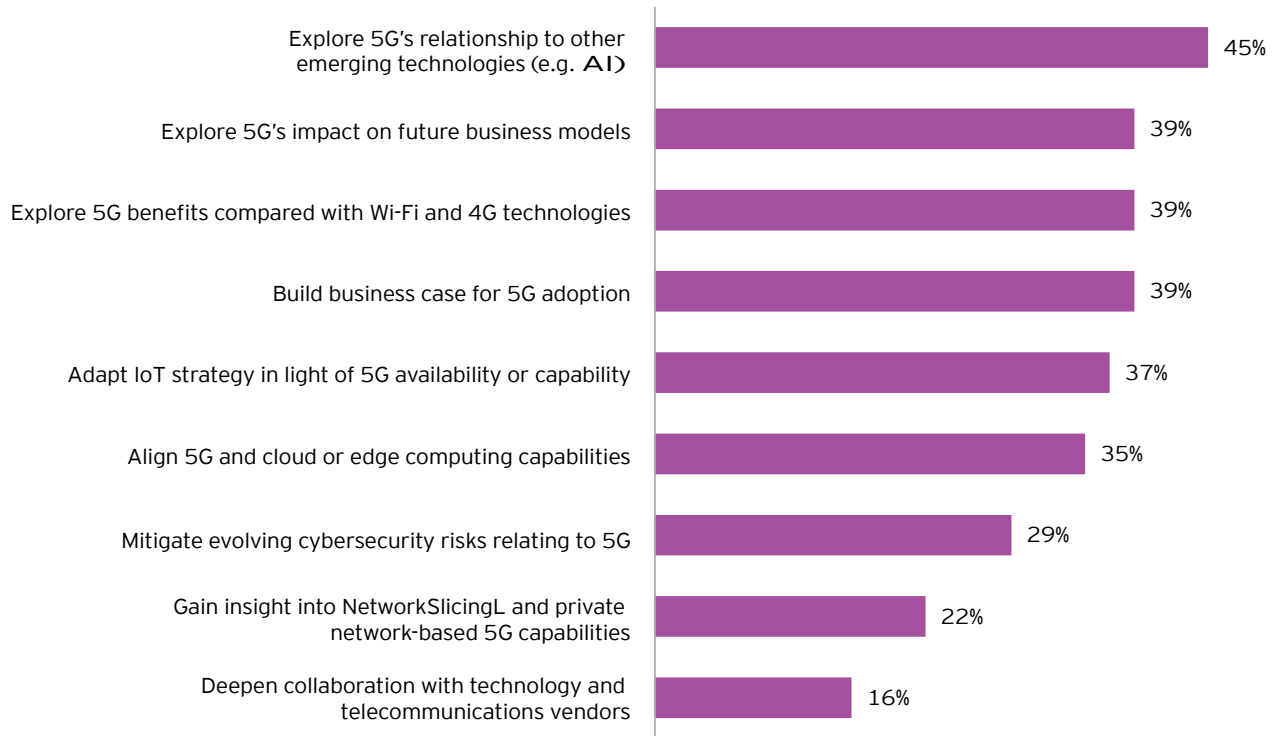
% of all respondents in India (N = 56)



5G has the potential to unleash limitless possibilities and drive innovation. Businesses can start leveraging 5G to transform business operations, disrupt competition and outpace rivals, and even unleash innovation. Exploring 5G's relationship with other emerging technologies is the top priority among Indian companies when it comes to 5G. It highlights that 5G priorities underline the need for a holistic approach to emerging technology adoption.

Most important 5G priorities for Indian enterprises

% of respondents, N = 49 (Indian enterprises currently investing or planning to invest in 5G)

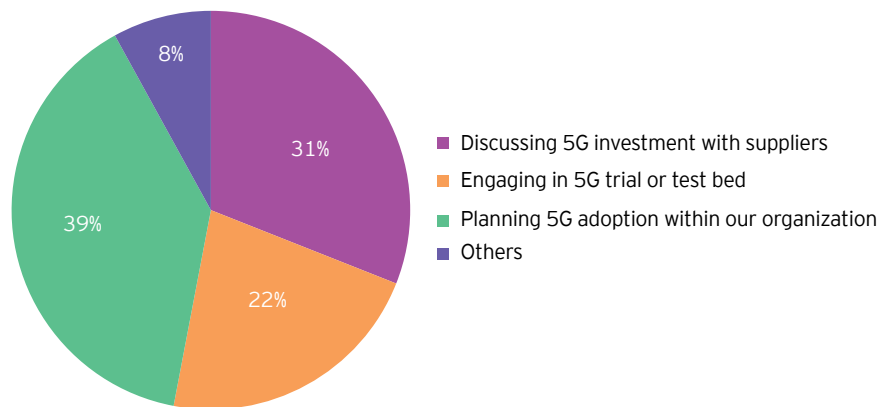


Source: Reimagining Industry Futures, EY 5G enterprise survey, 2022

India enterprise 5G adoption maturity

Q. What is the current state of your organization's 5G investment plans?

% of enterprises currently investing or planning to invest in 5G in India (N = 49)



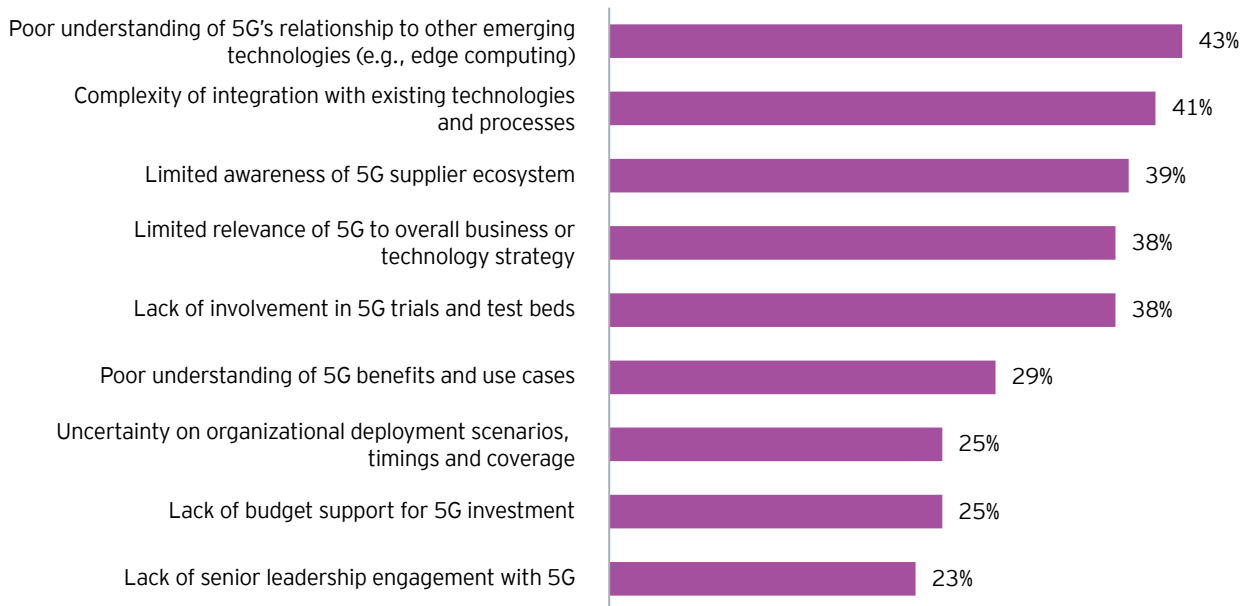
Source: Reimagining Industry Futures, EY 5G enterprise survey, 2022

Poor understanding of 5G's relationship to other emerging technologies is a rising pain point for Indian enterprises. At the same time, enterprises are grappling with how 5G can seamlessly integrate with other emerging technologies. Considering that the 5G ecosystem is yet to develop in India, lack of involvement in 5G trials and test beds is cited as a key internal challenge.

Internal challenges around 5G

Q. Which are the most critical internal challenges informing your organization's view of 5G?

% of all respondents in India (N = 56)



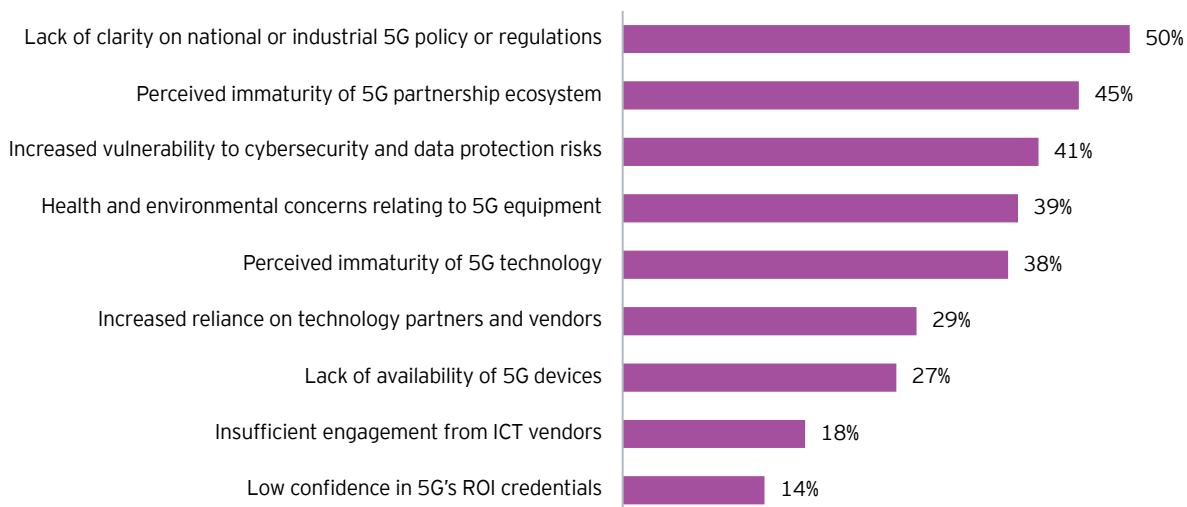
Source: Reimagining Industry Futures, EY 5G enterprise survey, 2022

Indian enterprises are most sensitive to limited clarity on 5G policy and regulations, cited by half of the respondents. Cyber-attacks worldwide, and so in India, is on the rise. In 2020, cyber-attacks increased 300% y-o-y to record 1,158,208 incidents in India⁹. With 5G's support for massive number of end points and use case evolution, the risks of cyber-attacks and data breaches is paramount for enterprises in India.

External challenges around 5G

Q. Which are the most critical external challenges informing your organization's view of 5G?

% of all respondents in India (N = 56)



Source: Reimagining Industry Futures, EY 5G enterprise survey, 2022

⁹ "Almost 300% rise in cyberattacks in India in 2020, govt tells Parliament," Hindustan Times, March 2021.

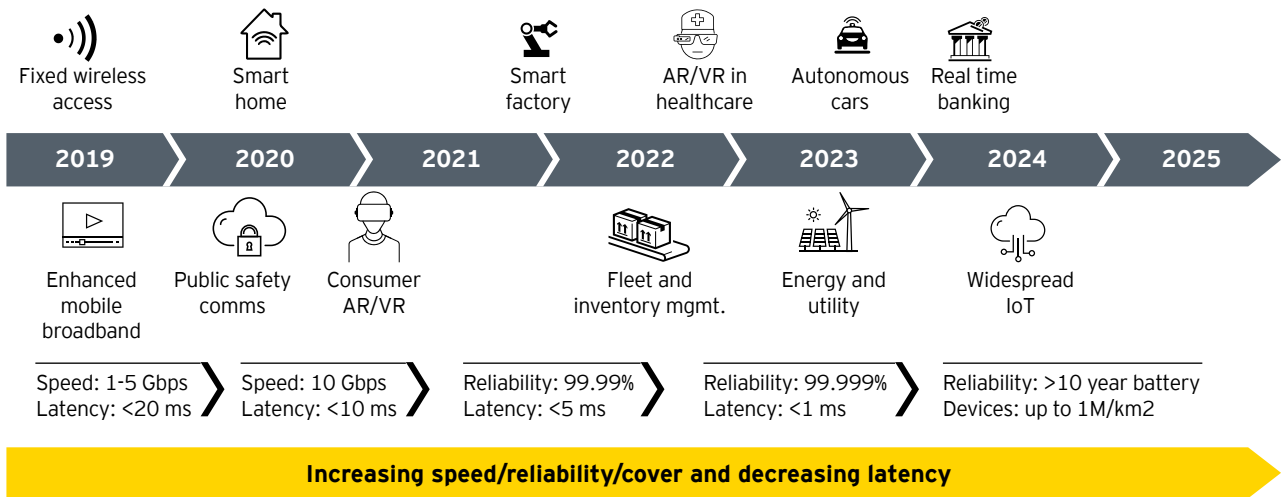


05

Cross-industry
collaboration key
to unlocking value of 5G

Evolving 5G applications have huge impact across industries. New use cases and applications are crucial for realizing business model innovation. 5G networks are expected to transform a host of industries in India delivering new forms of immersive gaming, AR/VR content, tele-medicine and remote healthcare, smart manufacturing and industrial automation, and smart infrastructure.

Maturity of use cases across industry sectors enabled by evolving 5G features



Source: Nokia



5.1. Advanced Manufacturing

The manufacturing industry is facing more stringent demand from a diverse customer base globally while managing increasingly complex product portfolios. This drives the need for running flexible production, to accommodate rapid changes to the production environment. On this, 5G is an enormous breakthrough on this sector, allowing them to lower manual labour, speed up automation, produce at lower costs, and leapfrog to Industry 4.0 eventually. Broadly speaking,

there are two ways 5G benefits the manufacturing industry: improving industry access to connectivity and unlocking applications that have not previously existed. A new set of use cases will make a tangible difference to a manufacturer’s business model. Example of use cases include collaborative robots requiring ultra-low latency for safe human-robot collaboration, AR/VR and remote operations through digital twins, are also anticipated to drive 5G investments.

5G-enabled manufacturing use cases and benefits

Functional areas	Use case	Benefits
Automation and control	Cell automation: devices in an assembly line and control units communicate wirelessly	Flexible and highly efficient production
	Process automation: a high number of low maintenance sensors and actuators communicate wirelessly with control units	Increased efficiency, flexibility, lower inventory
	Remote assistance and robot control: remote control of robot to fulfil operations such as measurements and digging	Increased product/process quality, health and safety
	Industrial robots: collaborative robots interacting with each other and other machinery	Real-time response to requests and changes; enable greater customization
Maintenance	Augmented reality (AR): live direct or indirect view of a physical environment for training and maintenance	Increased efficiency, worker satisfaction and safety
Tracking	Logistics tracking: track flow of goods from raw material to delivery	Increased efficiency (saving on cost and time)
Autonomous factory transport	Autonomous vehicles to transfer goods in a factory without needing to pre-define routes	Increased safety and efficiency, increased productivity

Source: EY analysis*

In India, the manufacturing sector accounts for approximately 15% of the GDP, underlining its importance to the country's growth story. With increasing digitization and advancement in technologies, the sector is in the middle of a transformation. 5G is expected to accelerate adoption of Industry 4.0 across the manufacturing ecosystem in India. According to the United Nations Industrial Development Organization (UNIDO), India ranks favourably in the development and application of Advanced Digital Production (ADP) technologies. It is the only lower middle-income country to feature in the list of leading economies along with Australia, Canada, Italy, Singapore and Spain. India may not appear among the top 10 frontrunners, but Indian companies are increasingly patenting new innovations in ADP technologies and embedding these technologies in smart machines. The advent of 5G is expected to significantly improve productivity, bring in greater efficiency in processes, save cost and optimize labour utilization.

The Confederation of Indian Industry (CII) has launched a Smart Manufacturing Platform in collaboration with leading industry players, education and research institutions, international organizations, and government agencies. So far, the platform has documented 61 Industry 4.0 case studies across eight technologies and services in India. Some of the sectors include automobiles and ancillaries, industrial engineering, capital goods, consumer durables and automotive¹¹. 5G will act as a great enabler to boost implementation of Industry 4.0 applications across industries in India.

The government of India, through its flagship programs "Make in India" and "Aatmanirbhar Bharat", aims to catapult India as a leading manufacturing destination. The Smart Advanced Manufacturing and Rapid Transformation Hub (SAMARTH) Udyog Bharat 4.0 is

an Industry 4.0 initiative of the Department of Heavy Industry, Ministry of Heavy Industry & Public Enterprises, under its scheme on 'Enhancement of Competitiveness in Indian Capital Goods Sector'. The initiative aims to bring together key stakeholders in the manufacturing ecosystem and help spread awareness on Industry 4.0. Under this program, five Common Engineering Facility Center (CEFC) have been set-up across the country.¹² These centers can be an ideal avenue to showcase how 5G can transform manufacturing in India and lead to a digital revolution.

In India, the engineering/advanced manufacturing segment offers the largest opportunity for 5G/IoT. Companies in this segment are most likely to use 5G connected equipment to drive greater efficiencies and optimize productivity. In the cement segment, 5G/IoT can be used to connect mining equipment in limestone quarries.

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The advanced manufacturing segment offers the largest opportunity for 5G/IoT in India. With capex cycle going up, this segment should witness a lot of vibrancy and make the most of 5G connected equipment.



Neel Goyal

Partner, Consulting,
Advanced
Manufacturing Sector,
Ernst & Young LLP

¹¹ "CII smart manufacturing platform," CII website, <http://www.ciismart.in/Home.aspx>, accessed 22 September 2022.

¹² "SAMARTH Udyog Bharat 4.0," SAMARTH Udyog website, <https://www.samarthudyog-i40.in/>, accessed 22 September 2022.



5.2. Life sciences and healthcare

The outbreak of the COVID-19 pandemic accelerated digitization in health care industry and 5G played a pivotal role in enabling this transformation. For instance, 5G-powered telemedicine and remote CT scanning were used to effectively overcome shortage of health workers. 5G-cloud enabled robots were deployed to facilitate round-the-clock contactless procedures such as remote nursing, vital parameter measurement and medication delivery. 5G network was also used to remotely control a robot for conducting ultrasound test. In addition, 5G-based telemedicine consultations significantly increased.

The potential of 5G in healthcare is immediately realized in home-based care and connected hospital devices, as 5G facilitates real-time data transfer. In the longer term, 5G will transform the healthcare sector even more profoundly than remote diagnostics and consultations. 5G will be the breeding ground for technologies like AR/VR in the healthcare environment, and will allow the widespread deployment of AI, which will transform current manual processes into smartly automated workflows. With the new release of 5G standard, 5G will be able to empower robotic surgery procedure, customized medication, wearable healthcare, instantaneous patient data analysis, and substantially more in the future.

5G-enabled health care use cases and benefits

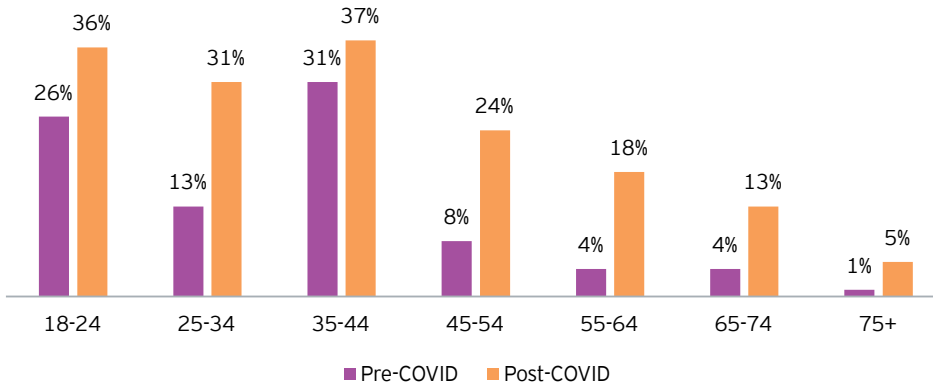
Functional areas	Use case	Benefits
Remote monitoring	Remote monitoring of health data through wireless devices	5G to enable remote monitoring for more patients through lower latency and higher capacity
Remote consultation and guidance	Remote diagnosis and consultation	5G-enabled telemedicine to help patients get treated sooner and have access to specialists otherwise not available; 5G to improve access to care and the quality of care
	Smart ambulance	Rescue personnel can transmit preliminary examination results to the hospital in real time. Hospital experts may provide remote guidance to carry out preliminary treatment
Digital hospitals	Faster data transmission	5G network to quickly and reliably transport huge data files of medical images
	Immersive teaching and training	With the use of VR/AR equipment, doctors can undertake immersive and interactive training; 5G enables real-time rapid learning
	Increased usage of AI	Health care organizations can use AI tools to provide the best care possible
Remote surgery	Wireless tele-surgery	Allow specialists to join a local surgeon remotely, or allow for surgery to take place for those patients in remote or dangerous locations
	Remote robotic ultrasound	Medical experts remotely control the robot to carry out ultrasonic inspection services. Only the nurse is required to set up equipment and instruments
Pharma manufacturing	High-speed connectivity, AR/VR maintenance, remote monitoring	

Source: EY analysis*

In India, digitalization of health care service delivery has been an ongoing theme. Leading hospital chains launched their teleconsultation/telemedicine services and warmed-up to the idea of innovative digital platforms. The onset of COVID-19 simply fast-tracked its adoption,

as earlier there were no strong motivation. Now, with 5G coming in the picture, teleconsultation/telemedicine is expected to be significantly benefited. 5G offers the flexibility to doctors to consult and treat patients through high-speed (UHD, 4K, 8K) video. In addition, medical experts can access relevant data in real time.

Willingness to book telehealth visits (by age group) in India



Source: Healthcare goes mobile: Evolution of teleconsultation and e-pharmacy in new Normal, EY, September 2020

The true impact of any new technology will be gauged through its influence on rural areas. 5G is likely to address some of the basic challenges due to lack of optimum infrastructure for healthcare. With 5G, rural areas are likely to benefit from improved connectivity and high data throughput. 5G has the potential to open-up remote patient monitoring and diagnosis opportunities in health care in the rural areas. With low doctor density and dismal doctor-patient ratio, the potential for teleconsultation is much more in rural areas in India. Currently, bandwidth limitations prevent using high quality video consultation. Remote diagnosis centers enabled by 5G will lead to a more decentralized patient treatment using technology and relieve some of the pressures from urban healthcare facilities.

5G is slated to enable innovative health care application and services in India. The possibilities are immense and 5G is expected to have a profound impact on the lives of citizens. For emergency medical situations, a patient's survival often depends on the timely and quality of care received during the golden hour. A smart ambulance

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5G is expected to redefine how hospitals cater to customers. OPDs will change. With 5G's ability to support higher bandwidth and connect multitude of devices, the ICU will come down to the house. 5G can take connected healthcare to a different level supporting remote diagnostics and procedures. However, the industry needs to take the lead in 5G in India. It is important for various stakeholders to showcase how 5G can make the life of patient/doctor better.



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¹³ "Indian Pharmaceutical Industry," IBEF, <https://www.ibef.org/industry/pharmaceutical-india.aspx>, accessed 22 September 2022.

equipped with latest medical instruments, including HD video camera and portable MRI scanners, can help to transfer real-time data to the hospital. This will help to reduce the door-to-needle time (approximately 25 mins) and ensure emergency care within the golden hour. On the other hand, seamless transfer of large data and image files will improve efficiencies and enable real-time diagnosis. 5G is expected to play a key part in connecting various applications, people, devices, robots and processes to enable a holistic digital experience for patients.

The pharmaceutical sector in India ranks 3rd worldwide in terms of production by volume and 14th by value. Currently, there are over 3,000 drug companies with 10,500 manufacturing units in India.¹³ 5G/IoT technology can be a key enabler of digital transformation in the manufacturing facilities. Most of the pharma manufacturing plants are in remote areas and require robust connectivity. There is also a need to remotely monitor plant operations. IoT-based solutions can address some of these requirements. With 5G's support for higher bandwidth, it will be possible to implement newer use cases. For example, using AR/VR for maintenance activities.



5.3. Media & Entertainment

5G is hailed as a new wave of media technology, which promotes the evolution of traditional media form to the so-called new media. 5G is set to unleash another wave of innovation and potentially disrupt the existing value chain as video consumption and even production increasingly become more mobile. Taking advantage of 5G strengths, ultra-high definition video, cloud gaming, AR/VR are some of the earliest scenarios where people

can experience the 5G network. The emergence of 5G will act as a catalyst for mobile gaming growth due to the improved latency and data speed. Meanwhile, we have witnessed the use of 5G for the distribution of live high-definition broadcast in big events, and will increasingly see it innovating in the domain of the next generation stadium experience through in-stadium AR.

5G-enabled M&E use cases and benefits

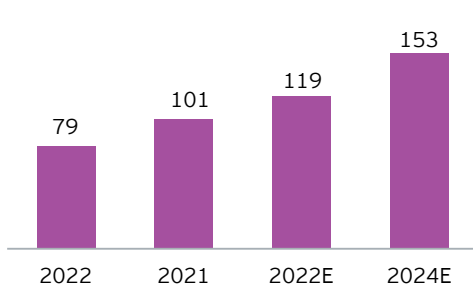
Functional areas	Use case	Benefits
AR/VR content	AR	Teleports users to an eSports stadium or music festival/concert
	VR	Virtual social space allows multiple users to engage in diverse activities and create contents in a virtual space; Watch live games in VR through 360-degree cameras; diverse VR content related to idol stars, sports games and movies
UHD/4K/8K content	8K TV	Offer an enhanced and superior TV viewing experience through direct transmission of 4K/8K video and content
Ad	AR/VR	Enhanced augmented experience while buying products online; immersive ads
Gaming	Cloud gaming	Offload processing to the cloud instead of relying on powerful consoles; gamers can play immersive online games on mobile or even TV
	Immersive gaming	VR and AR versions of popular games; haptic-charged, sensory-overloaded home entertainment experience
In-stadium immersive experience	AR	Larger than life images of players in stadiums;
	3D volumetric video	Capture specific moments over 3D video that looks as if players are dancing right next to the customer
Broadcasting	New distribution technologies as a media infrastructure substitute	Live broadcast service that hosts multiple live-feed videos at once. Viewers can choose the broadcast angle they want to view from, including personalized views
Content production	Immersive media studio	Developing next generation content and driving innovation using technology; serve as a partner to other immersive content creators; offers co-creation space for 5G-enabled application development

Source: EY analysis*

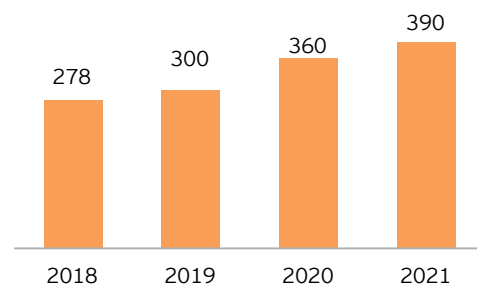
The Indian M&E sector is transitioning from passive consumption to participative consumption fueled by popularity of immersive technologies such as AR and VR, networked gaming and interactive game shows. 5G is expected to accelerate this trend and completely transform the consumer experience. The superior speed and reduced network latency will help to overcome some of the current challenges with immersive content in India.

Already, companies are making significant investments in acquiring AR, VR and gaming capabilities. The online gaming segment in India is on an upswing led by accelerated growth in the number of gamers due to rising smartphone adoption, availability of high speed and cost-effective data, and localized and engaging gaming formats.

India online gaming segment revenue (INRb)



Online gamers in India (million)



Source: "Tuning into consumer: Indian M&E rebounds with a customer-centric approach," EY-FICCI, March 2022.

The introduction of 5G will open-up new gaming experience for consumers such as cloud gaming as is the case globally. The ability of cloud gaming to offer a seamless experience and enhanced graphics will be dependent on the availability of high-speed network. It offers a significant opportunity in India for premium games beyond the current console and PC audience. Integration of AR/VR with 5G is expected to enable enhanced cloud-based and immersive gaming with enhanced features and graphics.

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5G is expected to have huge impact on operations of Media & Entertainment companies. It may remove the requirement of OB vans from sports stadiums for example, which will lead to huge savings in production cost. In addition, there will be growth of immersive studios for producing content specifically for 5G. Currently, owing to network bandwidth issues, watching content or gaming through AR/VR is a challenge. 5G is going to change all that and open-up immersive world of gaming and content.



Raghav Anand

Segment Leader Digital Media - Emerging Markets,
Ernst & Young LLP

On the operations front, 5G is expected to have huge impact. Currently, outside broadcasting (OB) vans are an essential part of live broadcasting. However, they are costly and use up resources. 5G-based live broadcasting may altogether remove the requirement of an OB van as well as need for wired cabling. This will lead to substantial savings in production cost. On the other hand, specialized studios focusing on creating immersive content for 5G will be the norm. 5G will also help to outsource content as different formats can come from diverse areas. Overall, 5G is expected to usher in significant cost reduction and open-up innovative service delivery.



5.4. Automotive

5G is envisioned to enable two aspects in the automotive industry - connected and automated cars and in-car entertainment. With the inclusion of specifications around cellular Vehicle-to-Everything (C-V2X) in Rel-16, 5G will accelerate the realization of this enabling connectivity technology, which is designed to connect vehicles-to-vehicles, roadside infrastructure, road users, and cloud services, to improve transportation experience and quality of life.

In India, connected car is already a reality and has become a key requirement of the Indian car owner. The auto industry has been proactive in building the connected car ecosystem. Now, connectivity is a standard feature in most cars, having moved from an optional add-on. Primary connected car use cases include on-demand infotainment, navigation, vehicle diagnostics, and enhanced safety and security features. Some of the drivers of the connected car market in India are provision of connected features in economy vehicles by OEMs and increasing vehicle legislation and compliances. In addition, proliferation of connected car platforms is contributing to the growth of the market¹⁴.

5G-enabled automotive use cases and benefits

Functional areas	Use case	Benefits
Infotainment	UHD or 4K video; Immersive content and applications	New opportunities for the provision of in-car entertainment and information services
Navigation	HD maps; hyper precise location services	Automated HD maps for autonomous vehicles using high-resolution satellite imagery; create a real-time 3D visualization of an intersection, along with real-time kinematic
Autonomous vehicles	Vehicle-to-everything communications	Autonomous vehicles for city logistic, waste, urban cleanliness; Fully autonomous driving + remote vehicle control; enhance urban mobility through sensors and devices
	Driver assistance - 'see through' the front vehicle, in-dash junction cameras (for HGV's for example)	Improved car and road safety; enhanced driving experience
	Platooning	Improved safety and efficiency; increased capacity of roads
Port and/or airport management	Real-time monitoring and analysis of environmental data, control of traffic flows, and remote control of service equipment and vehicles	Real-time management and control of port and/or airport operations; increase operational efficiency

Source: EY analysis*

The advent of 5G is expected to significantly enhance connected car features and usher in the age of autonomous vehicles (AV). For instance, C-V2X overcomes some of the limitations of Advanced Driver Assistance Systems (ADAS) that is used today. According to a study conducted by the International 5G Automotive Association in February 2019, 68% of accidents can be avoided by using 5G. However, there are several challenges for AVs to take off in India. In 2019, India had 151,113 people killed in 480,652 road accidents, which is the highest in the world¹⁵. In addition, most of the roads in India are congested and in general there is lack of adherence to traffic rules. All these raise safety concerns and does not make AVs conducive for India. In addition, there are no policy impetus for the introduction of AVs in India. It is only a matter of time that the benefits of AVs are realized.

Although the AV market in India is at a very nascent stage, the promise for the future is huge. The key value proposition of 5G - very high speed, low latency and support for numerous sensors - is likely to spur the AV market and bring in enhanced mobility-as-a-service. To achieve the transformative benefits of 5G, it is imperative to lay the groundwork now. Building the AV ecosystem will be key to realize long-term success.

“The need for ubiquitous connectivity and mobility among consumers is propelling new forms of innovation and collaboration between various stakeholders including auto OEMs, telcos, technology players and component manufactures. OEMs are investing money and have formulated telematics strategy. With 5G, the connected car ecosystem will get a boost through innovative use cases.



Vinay Raghunath

India Automotive Sector Leader,
Ernst & Young LLP

¹⁴ The car is connected now! But are we safe, EY, August 2020.

¹⁵ "India had most deaths in road accidents in 2019," The Hindustan Times press release, October 2020.



5.5. Smart infrastructure

5G is expected to have a profound impact on the government and public services (GPS) sector and accelerate digital transformation. At the same time, 5G is all set to enhance government service delivery and significantly improve the lives of people. Given that 70% of the world's population is projected to live in cities by 2050 according to The World Bank, 5G's transformative influence will be primarily urban centric. 5G has a key role to play in smart cities along with IoT. For instance, 5G significantly enhances safety and security by supporting high throughput real-time video surveillance. Access to

better resolution images and faster transmission will help to prevent crimes. In addition, AR/VR glasses is likely to make search and rescue operation efficient. 5G's ability to support a large number of sensors, and real-time dissemination of information and analysis make it suitable for several smart city functionalities, ranging from smart utility services to automated traffic management.

5G-enabled smart infrastructure use cases and benefits

Functional areas	Use case	Benefits
Safety and security	Security surveillance of public spaces	High definition mobile video surveillance; real-time AR content overlay (e.g., face recognition in crowd, fire)
	Emergency response	VR glasses for search and rescue operation - rescuers will also have AR glasses that connect directly to doctors, to help them give emergency treatment at the scene
Smart utility services	Monitor and control municipal services such as waste collection, street lighting, car parking	Support a much larger number of endpoint connections; provide connectivity for many sensors; support real-time transmission and analysis of big data sets
Traffic management and enforcement	Optimize traffic flow by analysing data from vehicles, advice drivers in real-time and control vehicles directly	UHD or 4K cameras on drones for road traffic incident analysis
Citizen engagement and e-services	Government forms and application to be accessed, viewed and completed through AR devices – smartphones, smart glasses, in-office displays and readers	Policy, legal, regulatory documents and frameworks – to be transformed into “living” documents that can interact with citizens and officials through AR-enabled devices
High-speed connectivity in public places	Provide high-speed broadband services in public places such as airports, sports stadiums, shopping malls, tourist hotspots	Pervasive UHD video; increased capacity of wireless networks; expand the capacity of the network to support large number of users in a concentrated area (e.g., stadium)
Immersive theme parks and tourist hotspots	Provide immersive experience at tourist spots to highlight specific characteristics and/or persona	Differentiated experience for citizens

Source: EY analysis; 5G is transforming government service delivery, EY-Nokia, September 2020; IDC



06

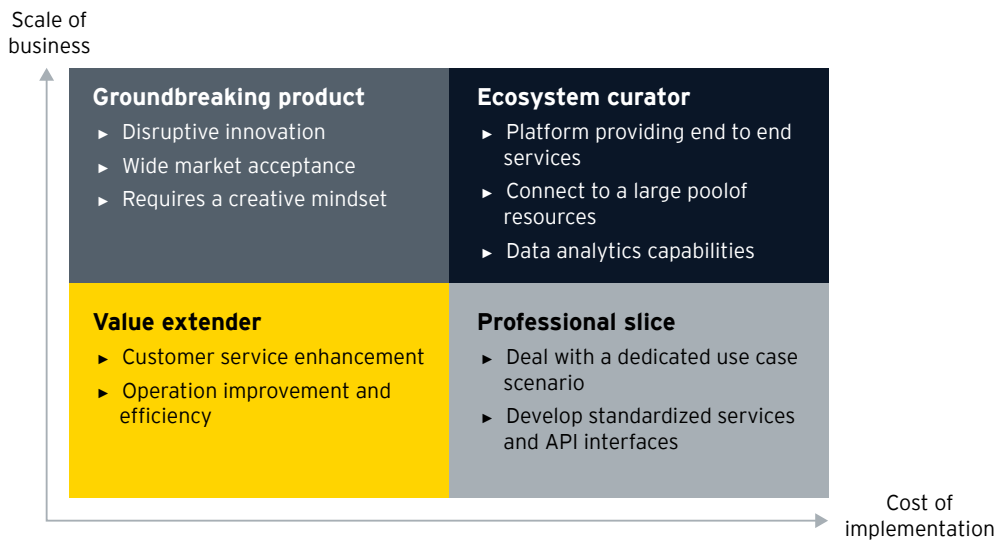
5G business model innovation and key enablers

5G not only offers new possibilities for the industries, this will give rise to completely new concepts for connected assets and contextualized services, offering a new wave of innovation for businesses. Service providers will also be able to tap new business models with the data generated owing to the new mobile standard and the innovations it produces. Business leaders are upbeat on 5G's transformational potential and envisage 5G to play a key role in their digital transformation strategies.

5G business models

As 5G becomes more mature, more enterprises will explore the technology to increase long-term competitive advantage and sustained revenue growth. In the coming years, we envisage many different business models to arise in the 5G enterprise space. We divide them into four major categories that vary on the scale of business and cost of implementation.

Potential 5G business models in the enterprise space



Source: EY analysis*

Ecosystem curator

5G will likely drive a new wave of applications and devices that should spur the emergence of the multi-tenant and on-demand platforms. In a platform model, businesses build an ecosystem connecting consumers with suppliers of 5G-enabled IoT products or services through a cloud-based IT infrastructure. Platform business will reap the benefits of huge data traffic generated, which then allows them to develop deep customer insights to customize additional services and expand into new lines of businesses.

For instance, a large health system could aggregate multiple 5G healthcare services by third parties to become a platform provider. Harnessing 5G's high speed and low latency, the platform can offer value-added services such as care management and health coaching. The scale of platforms would enable providers

to manage and monetize the different services and control the relationship with customers. On this, large IoT manufacturers may have an advantage in creating their own platforms as well as opening it to other smaller suppliers.

Enterprises embracing this model must have open platform capabilities through APIs. The interfaces must be standardized to enable easy consumption for other enterprise customers. By plugging into the platform, ecosystem partners can collaborate easily to manage services across multiple clouds and billions of devices. To facilitate this, they have to develop strong cloud IT infrastructure either internally or acquire from third party cloud providers.

Groundbreaking products

Many businesses such as product manufacturers have been rushing to introduce new disruptive products in a short time that can gain huge acceptance by the mass market. These products are usually either groundbreaking at a premium or ones come with strong features but at a very reasonable price point. These businesses are able to develop new service models and achieve scale by reducing the cost of production through process optimization or subsidizing with other value-added services.

The promise of 5G offers a golden opportunity to drive technological innovation. Businesses may exploit the low latency of 5G and guaranteed quality of service apart from attaching huge value to high-speed connectivity to find completely new use cases that deliver life-changing experience, in a way like the introduction of touchscreen smartphones in the last decade. To develop a super product, enterprises must have strong vision about the

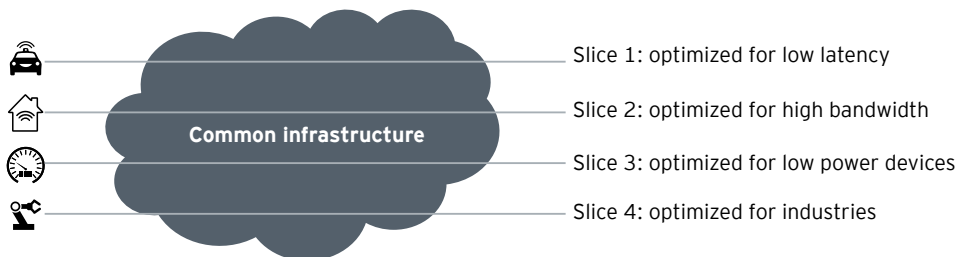
future, be creative and highly innovative in order to succeed.

One possible example of groundbreaking concept could happen in the arena of autonomous driving. Companies may leverage 5G network together with cellular vehicle-to-everything (C-V2X) communications to transform roads, improve traffic flow and reduce accidents. Passengers will have access to better infotainment systems too. Successful implementation of this concept could mean huge impact to society.

Professional slice

Network slicing is one of the powerful and potentially lucrative new capabilities of 5G, especially in the business arena. 5G network slicing can deliver a highly reliable network that enables flexible creation of new services across industries. Network slicing delivers flexibility of network resources to cater to different customer requirements.

Title



Source: EY analysis*

Some enterprises may take on a specialist role to offer dedicated service to a particular sub-segment in their sector, assisting those companies or SMEs to quickly get aboard the 5G bandwagon. To achieve this, they will leverage network slicing to set apart a virtual network for a specific use case scenario. The network characteristics can in turn manifest as service level agreements (SLAs) and points of definable control that enterprises can in turn monetize as service providers. This covers everything from uplink and downlink throughputs to geographic areas covered to number of devices covered

within the slice. The focused investment in developing a dedicated 5G service scenario will usually incur a higher cost of implementation.

As an example, a media company may open-up its network to create a standard slice for high definition VR solution based on 5G and edge computing. This enables other companies in the sector to offer new services such as immersive media, cloud gaming, etc. Such network slice may control and manage QoS including access, bandwidth and quota, as well as supporting low latency requirements, that can be charged on a monthly cost basis.

Successfully monetizing 5G must be accomplished with a disaggregated flexible architecture and open interfaces. 5G network slicing enables secure, robust, developer-friendly access to expose network services and capabilities. This means that enterprises can use the open APIs to create their own network services on-demand.

Value extender

Connected products in the in-service lifecycle provides an opportunity to build new business models for the sector, some of which are beginning to be explored. In this model, businesses harness 5G to offer valued enhancement on their existing products or services. With a slim investment, this provides a light step for enterprises to take on 5G, as they can offer products as a service and provide remote maintenance to monitor IoT products after they have been delivered to the customer. Alternatively, enterprises may also exploit 5G to automate and improve their process in a way to achieve greater operational efficiency during their production.

For instance, capitalizing on the massive Machine Type Communications (mMTC) and Ultra Reliable Low Latency Communications (URLLC) capabilities of 5G, connected devices and assets empower businesses to extract machine usage-specific insights for predictive maintenance; and allow manufacturers to remotely upgrade products via software without replacing the product itself.

These service-based business models can enhance customer experience as well as improving operational efficiency. Consequently, this would bring enterprises closer to the end users as they have more access to usage data.

Leveraging private 5G to speed up innovation

Enterprises looking at 5G today have a few advantages. Unlike previous mobile generations, 5G is coming at a time when open source and automation will make it relatively easier and cheaper to install and run their own networks within the confines of factories and warehouses. It thus offers a wide scope of private 5G networking to enterprises.

Private industrial 5G has drawn significant attention from manufacturing companies in Europe as they look at the Industrial 4.0, smart factory, industrial IoT as the future of manufacturing. According to the Global Mobile Suppliers Association (GSA), there are 156 private mobile network deployments being deployed all around the world as of October 2020. More industrial companies, airlines and carmakers are tapping 5G deployment in their plants using own privately held spectrum to guarantee both coverage and performance in terms of latency, bandwidth and reliability.

Business model innovation is logical when cellular network technologies for new business applications are concerned. Enterprises considering private 5G or hybrid network should determine their preferences as well as capabilities when it comes to spectrum ownership, network assets ownerships and network operations. Decision on the former will link with any use cases that have strong dependencies to unlicensed, shared, or licensed spectrum. These preferences could vary between industries and would depend on the projected split between public and private network traffic.

The edge will be the bridge

While 5G is a key enabler for innovation, it is not a silver bullet. There is a whole set of attendant technology that has to be considered and incorporated in a successful 5G strategy such as those mentioned above. As it relates to realizing the revenue opportunity associated with differentiated enterprise services, 5G and edge computing go hand-in-hand.

By extending the compute, storage and additional functionality generally associated with a centralized data center out to the edge of the network, the latency benefits of 5G and thus real-time applications can be truly realized. Though 5G will reduce latency in data transmission, edge computing will deliver even faster transmission, thereby maximizing its use.

Edge computing has been particularly transformational for the autonomous vehicle industry. With limited storage on vehicle computers, edge computing will be an efficient way for automakers to access and process diverse sets of data. This will be important both before and after the mass rollout of 5G. Edge computing is moving from concept to early-stage deployments as new use cases demand a more decentralized approach to computing and networking than a traditional, fully cloud-based model.

Building up cloud capabilities is crucial

Distributing 5G network infrastructure and cloud computing functionality are seen as part and parcel of delivering on the promise of 5G for enterprise which moves beyond enhanced mobile broadband to also include massive machine-type communication (IoT) and ultra-reliable, low latency communications.

5G and cloud computing together have the power and potential to help businesses turbocharge their growth and level up their game in the hyper-competitive market. The 5G network advances the data retrieval speed and proliferates the cloud's storage space for big data to slash the analytical issues. Organizations can assimilate, manage, and get valuable insights into the data collected by the various sources via the cloud.

5G when coupled with cloud computing is capable of propelling the operational efficiency of every company by setting a base for innovation. The pivotal role of 5G technology along with cloud in bringing revolutionary changes in business models like remote working as the new workplace reality and realizing the importance of exquisite customer experience is quite evident.

Having said that, businesses looking to implement successful 5G business model innovation require a holistic cloud strategy to build or acquire a strong cloud infrastructure with enhanced security. The infrastructure does not only meet the demand for massive storage and enormous computing power but should enable them to manage services across multiple cloud and edge devices under a centralized management system. The cloud needs to become pervasive, extending from regional facilities right out to the enterprise edge.

Address the skills gap to facilitate 5G innovation

In the early stage, enterprises can deploy 5G by leveraging managed services and expertise from suppliers. As the technology matures, enterprises at all levels will need to increase the skillsets of their own staff while demanding new skills of their providers in order to raise employee participation in the innovation process. They need to adapt to new ways of finding and retaining highly skilled STEM professionals. 5G will substantially increase the demand for a range of key skill areas in the business arena.

First of all, it will become increasingly difficult for companies to specify the details of the technologies behind solutions in the 5G era. Instead, enterprises will need to understand the technology and how it can be used to solve business problems. They have to find 'specialized persons' with required skills on how 5G can be applied to the company, on its operation, products/ services, etc.

Secondly, business process experts are under strong demands as they can help enterprises to refine proliferating new use cases. As smart cities and other more compelling use cases evolve, these will put a tremendous pressure on already scarce resources.

5G will produce a larger drain on compute resources and thus require far-reaching cloud, privacy and security capabilities. Securing the high-speed 5G network will be the key to adoption as the technology becomes pervasive. With billions of connected devices, security and privacy issues at the edge will be paramount.

At the same time, enterprises will demand for specialized competences in radio technologies, big data analytics, mobile apps and platform programming to take advantage of the capability of 5G and IoT. Skills in software development, systems integration and professional services are essential for delivering large IT projects if enterprises are looking to deploy 5G private networks. Enterprises either need to acquire these skills or be willing to forge strong partnerships with specialists.

Employees must also make adjustment on their mindset and working style to cope with the pace of innovation development. Both front-line and back-office employees will need to transform orderly toward automation, networking, intelligence and digitalization. They will be able to migrate from the heavy workload in the past (such as over-the counter operations and data analytics) to engage in more efficient and creative marketing, customer service and technological innovation.

Redefine the cybersecurity strategy

In a world of interconnected networks, devices, and applications, every activity is a potential attack vector. This vulnerability is only heightened by the distributed and virtualized nature of 5G networks and its highly desirable attributes. As businesses pursue the innovation, therefore, they must place equivalent—if not greater—focus on the security of those connections, devices, and applications. To build 5G on top of a weak cybersecurity foundation is to build on sand, directly harming the safety of network users.

5G networks create a greatly expanded, multidimensional cyberattack vulnerability. This new network “ecosystem of ecosystems” requires a similarly redefined cyber strategy. Speedy implementation is important but developing a new cyber-awareness culture is paramount. The cost of missing a proactive 5G cybersecurity opportunity will be much greater than the cost of cyber diligence up front. The attack on 5G networks illustrates the high cost of such incursions, and it pales in comparison to an attack that would result in human injury or loss of life. Businesses need to establish the conditions by which risk-informed cybersecurity investment up front is smart business for all 5G participants.

The potential impact of increasing privacy protections should not be underestimated as it can alter the cost-benefit evaluation of collecting potentially personal data. To increase the efficiency of data analytics and cybersecurity measures, companies should educate their employees and especially IT engineers to understand business, its language and needs.



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