KPMG

Connectivity Of The Future:

5G The Gamechanger

December 2021

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Foreword

COVID-19 has fuelled an entire digital ecosystem where operating from anywhere has gained significant traction. The year 2021 and beyond marks a new era with accelerated transformation in almost every industry. Organisations have quickly adapted to the new ways of operating remotely and in a hybrid model. Mainstream use of AI, IoT, AR and VR technologies in sectors such as education, healthcare, consulting and retail has brought about a need for high-speed and high-bandwidth internet, which 5G has the potential to fulfil, creating a robust demand for it.

While 4G has been instrumental in driving the data revolution, 5G has the potential to transform every facet of digitalisation. Flexibility, speed and capacity are some of the strengths of the 5G cellular communication network. Additionally, 5G has created new business opportunities previously not imagined in areas such as smart factories and their automation, immersive experiences through AR/VR, cloud gaming, wireless broadband, healthcare and telemedicine. To drive this, the industry is witnessing significant collaborations between telecom service providers (TSPs), original equipment manufacturers, system integrators, device manufacturers and infrastructure providers to create a holistic 5G ecosystem in India.

Apart from bolstering B2C applications, 5G can enable businesses and individuals to operate machines and devices in real-time from anywhere in the world. This can potentially save millions of lives and optimise resources. 5G coupled with AI and automation can help enterprises tap into numerous opportunities and use-cases, those already existing, as well as those yet to emerge.

In recent times, the Government of India rolled out the Product-Linked Incentives (PLI) scheme, which has created an environment that fosters innovation, collaboration and the rigor needed to manufacture devices in India. Support is necessary now more than ever, as supply chains are being localised, 5G is emerging globally, and India is ripe with potential armed with a digitally driven population. Further, the recent reforms introduced by the government to ease the financial and operational hurdles cement the government's intention to create a robust telecom ecosystem that is geared to adopt 5G in the country.

Although there have been delays caused in the implementation of 5G in India due to regulatory uncertainties and issues related to affordability of spectrum, it is expected to be the gamechanger in the Indian telecom industry with support from the government and robust partnerships being formed locally and internationally. The innovation and progress made in 5G is expected to act as a catalyst in the overall growth of the TMT sector and expedite India's digital transformation.

KPMG in India is proud to present the report, '***Connectivity of the future: 5G The Gamechanger***' at the India Mobile Congress (IMC) 2021. The report provides insights into how the 5G environment is developing along with the readiness levels of different ecosystem players. It also delves into how a smooth transition to 5G can be made by addressing the issues that initially plagued the implementation of the latest cellular communication standard.

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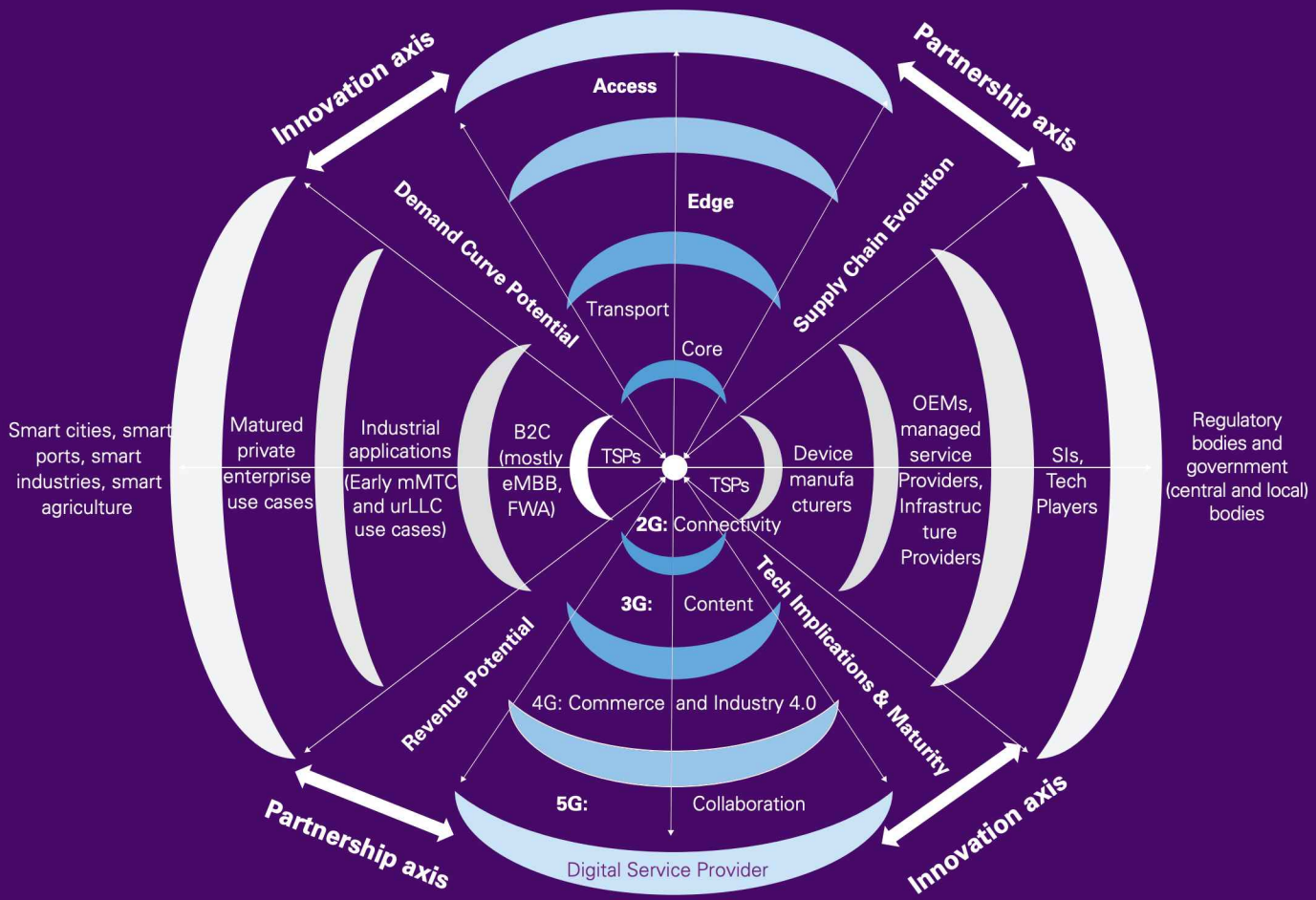
Executive summary

After achieving digital dominance by becoming the second largest telecom market[1] and having the second-largest internet user base, India is all set to accelerate the digital penetration in the country as it is getting ready to adopt 5G. With 5G opening the window of promising opportunities for ICT industry to move beyond just connectivity, in this report, we have presented our point of view on what 5G means to TSPs, device manufacturers, infrastructure providers, system integrators and technology players, and OEMs. The report also outlines major challenges and expectations from the ecosystem as it relates to each segment. By the end of 2030[2] there are expected to be 611.97 million 5G connections in India. With immediate promise of applications of fixed wireless access, 5G is expected to bring a significant transformation in the society by taking gigabit speed connectivity to small towns and villages. The industry is betting on enhanced mobile broadband (eMBB) applications to gain momentum in the initial phase of 5G launch with the real RoI to start justifying once massive machine type communication (mMTC) and ultra-reliable low latency communications (URLLC) use cases become main stream. Given the readiness of the industry, digital infrastructure and the existing challenges of adoption of some of the emerging technologies such as Industry 4.0, IOT, AI etc., KPMG in India estimates the URLLC use cases to gain maturity in four to five years' time from the launch of 5G in India. However, considering the immense automation demand from the industrial sectors which can be supported by the existing technologies such as 4G LTE, NB-IOT, the sector has started targeting the enterprise segment and has pivoted to cloud based virualised network architectures with capabilities such as network slicing and multi access edge computing (MEC) that allow TSPs to provide solutions beyond just voice and data. However, to realise the true potential of 5G beyond the eMBB use cases, the ICT industry must come together as an ecosystem and create unified digital solutions.

1. Fitch India Telecommunications Report, 2021
2. Fitch India Telecommunications Report, 2021

The evolution of the Indian ICT industry as it readies itself for 5G:



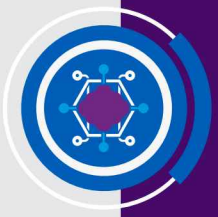
Source: KPMG in India analysis, 2021

As the above chart demonstrates, as the Industry has been transitioning from different generations of communication technology it has been pivoting from voice, to content to commerce and industrial applications. However, 5G is going to be characterised by a TSP becoming a digital services provider by collaborating with the entire ICT ecosystem to create mature private enterprise use cases where all components of networking including core, transport, edge and access will have to be strengthened on parameters like efficiency, performance, latency and customer experience.

Some of the key imperatives of achieving the above ideal state scenario include:

Telcos to become connected enterprises where front back and mid office are connected through cloud native architecture where the traditional OSS, BSS are transformed and made more nimble through newer technologies like containers, microservices, Kubernetes etc.

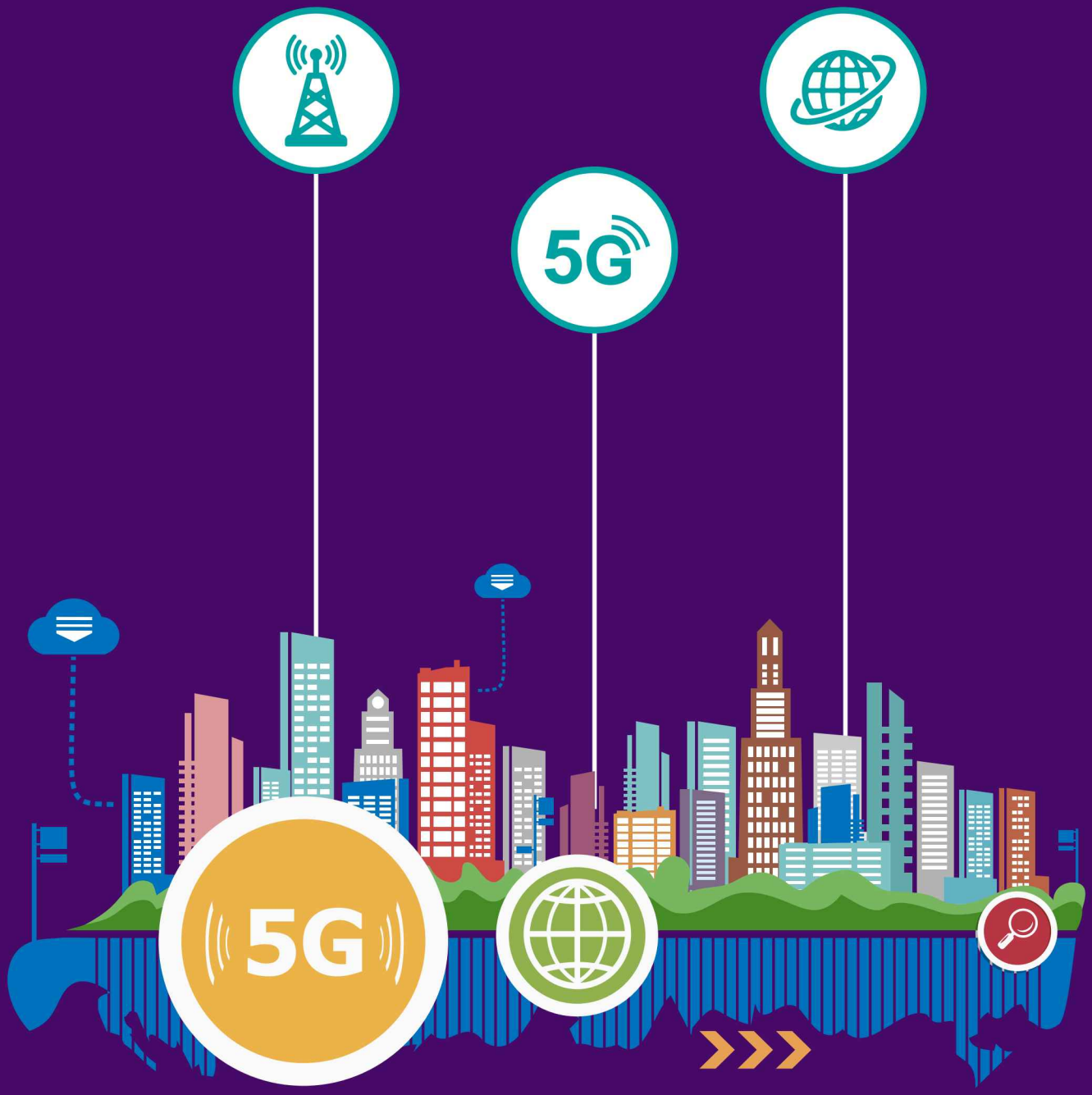
Build new 5G revenue streams: Leveraging the core (5GC or LTE) and edge capabilities to create use cases that solve industry, societal and governance problem statements through partnerships across the ICT ecosystem including OEMs, technology providers, device manufacturers etc, to speeden the time to innovate and go to market.



Telcos to adopt agile and DevOps methodologies to provide speed, agility, and scalability to its operations and make them more customer oriented.

Protect margins by reducing total cost of ownership (TCO): As the evolved use cases are being rolled out, the TSPs should leverage cloud native technologies to virtualise NFs that will allow reduction in network integration, maintenance and service cost thereby reducing the TCO and enhance customer experience.

Leverage digital to serve the customers better: To provide digital services to their customers, TSPs have to first become digital organisations with their core oriented towards customer centricity. By creating a unified one truth of the customer (leveraging data lakes, advanced analytics and AI), TSPs can predict customer behaviours and have an omni channel engagement and service model.



Key findings/segmental view

This report provides a segmental approach to understand the lay of the land and presents an overall picture of the 5G ecosystem. And is a culmination of various reports from KPMG in India insights, primary interviews with industry stakeholders and desk research. We have tried to summarise the segment's views on the opportunity in the 5G ecosystem; their key focus areas and challenges; readiness measures taken by the segment to augment its technological and business capabilities; and critical support that the segment needs from the ecosystem.

Segments → / Point of views ↓	TSPs	OEMs	Technology companies/System integrators	Device manufacturers	Infrastructure providers
Opportunities emanating from 5G	The ultralow latency and speed promised by 5G along with evolution of network capabilities such as network slicing, MEC, and convergence of connectivity and technology to allow TSPs to provide advanced technological solutions and open new revenue opportunities	33 per cent of the capex spend is estimated to be on transmission networks so the overall pie is huge to capture.	Technology players including System Integrators have a critical role in TSP transformation as they are pivoting towards 5G functionalities and as their OSS/BSS is undergoing an overhaul	Catapulting the 5G handset manufacturing capability to meet the massive 5G handset market that opens with the 5G launch in the country.	Opportunity to make the country's digital infrastructure 5G ready - vast and fast tower, fiber, and macro cell deployment with edge computing capabilities
		Enterprises and Industrial emerging as an independent customer segment as they embark on their digital initiatives		Enhanced demand of connectivity devices as B2B 5G deployment increases, paving way for new models and new devices	Opportunity to monetise infrastructure investments through 5G use cases
	Technologies such as FWA to help broaden the rural reach of TSPs	Favorable for managed services models for OEMs (tailwinds from geopolitics)	Playing the role of an orchestrator as TSPs forge different partnerships for 5G solutions bringing to the fore their design, integration, implementation, and certification expertise (Bringing outside-in perspective)	Entry in new markets such as tech wearables, IOT devices; VR/XR/AR provides a niche opportunity	Creation of edge clusters for intensifying demand from data centres
	Increased bandwidth with more frequency channels for higher data needs; and greater data transport efficiency to channelize cost savings				
Focus Areas	5G + Edge represents USD500 billion+ global opportunity and connectivity is just 11 per cent of that pie. So, forging partnerships to provide holistic technology solutions is key for TSP to move up the value chain	Shifting of supplier base from global to local	Creating solutions to assist TSPs in: • Digitise and run 5G operations • OSS and BSS modernisation • Enable platform led solutions for TSPs to take to market	Scaling up manufacturing facilities in India to provide cost efficient 5G devices in the country	Development of commercially viable 5G infrastructure including the backhaul and access
	Building a reliable, agile, programmable, scalable, and cost-efficient network through automation	Enhancing products for better ROI. Creating solutions and organisational capabilities to cater to new customer segments beyond the TSPs		Developing capabilities to function in both 5G NSA and SA environment	New business models with small cells and DAS ownership to be explored
	Creating ROI for B2C/B2B use-cases		Move towards outcome-based pricing environment	Addressing interoperability of the existing technology with the Indian standards (5Gi*)	
	Lowering capex cost per bit of transmission	Creating innovative use cases around eMBB, URLLC, and mMTC through strategic partnerships		Addressing component shortages	

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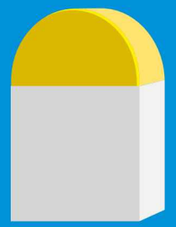
Readiness 	Initial focus is on network efficiency by tapping into partnerships with vendors across Open RAN; cloud and networking players; SI etc. Embracing an open horizontal hybrid cloud approach that allows Telcos to host telco and application workloads allowing multitenancy that will facilitate new solution hosting capabilities	Collaborating for inter-operable, inter-connected, and inter-dependent systems that no longer carry the risk of vendor lock-ins for TSPs (nascent stages)	Innovating open source led solutions that help TSPs through partnerships for creating future ready, scalable, and efficient networks	Boost manufacturing capacities under the PLI schemes for the three year period and then move towards R&D based asset/IP creation	• Access, data centre, transport, wholesale capacities to be enhanced multi-fold • Innovation in small cells, software defined components • Partnerships in open source 5G • Developing agile networking models • Engaged in skill enhancement • Public-private-partnerships still a WIP
	Working on enhancing B2C use cases focusing on commerce, connectivity, and content vortex	Still evolving verticalised private networking concepts, marketing, and launch strategies in India	Provide test beds in the form of COEs and IP factories to build cloud native, containerised, and virtualised network functions which are pre-integrated and pre-tested	Tap the hyperconnected, content driven, and commerce use cases (but needs an evolution for Indian device manufacturers)	Forging partnerships and access solutions to cater to both the B2B and B2C segment
	Preparing for the rural opportunity focusing on the opportunities presented by technologies such as fixed wireless access.		Technology companies are also playing the critical role of partnering with TSPs in developing indigenous 5G technologies. They have participated in the initial 5G testing and are proposing to be the one stop shop with platform led approach for TSPs in their 5G pursuits		
	URLLC could be the next step as SA architectures gain maturity	Roadmaps related to networking, policy and architecture on Open RAN, cloud RAN, cognitive sensing are still work-in-progress			Working along with various state governments to enhance the digital infrastructure across rural areas
Support needed 	Support in improving the financial health of the sector in the form of: • Rationalised spectrum pricing • Reduced levies and taxes • Minimum floor rates; overall liquidity • Better usage of USOF	Roadmap on PLI schemes to serve end-to-end cost effective 5G scenarios	Support needed from regulatory bodies to formulate and scale key assets and IPs	Harmonisation of standards to ensure global compatibility for devices	Critical support needed for faster implementation of digital infrastructure across the country
	Robust 5G policies including harmonisation of 5G standards and availability of contiguous bands; E band usage for backhauling of traffic	Private networking regulations	Collaboration with NASSCOM under 5G relevant themes required across MSMEs, SMBs, large enterprises, and city clusters across industries.	Clarity needed regarding the licensing of additional wireless bands for security and privacy concerns in the sub 6GHz space	Government's financial support in implementing infrastructure in areas generating insufficient RoIs for private sector (improving liquidity for infrastructure)
			• Formation of an industry partnership programme for harmonisation in India • Allowing a few 100 MHz of licensed spectrum to be used for low-power Industry 4.0 applications • Simplifying MVNO related regulations to encourage platformisation	Policy guidance needed from the government on Wi-Fi 6 and unlicensed bands for private networking to foray into the smart industry segment	RoW and other operational hurdles to be resolved to increase the ease of doing business.
		Road mapping on using satellite bands for backhauling of traffic- to ease out access issues			Need status of a REIT or InvIT to reduce the tax burden.

5Gi is a made in India standard created through a collaboration between multiple academic stakeholders and government entities and encouragement from International Telecommunications Union (ITU). 5Gi offers more range in the lower frequency bands as opposed to 5G.
Based on primary interviews and KPMG in India analysis, 2021

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01 Telecom Service Providers (TSP)

TSP: Opportunities emanating from 5G

5G in India is not just expected to augment the much-needed capacity for TSPs in the short term, but also improve reliability and latency for niche as well as broader use cases in the long term. TSPs expect to improve their top lines as well as contain costs by onboarding agile and open ecosystem of partners, suppliers, and vendors.

The ultralow latency for clustered synchronous communication; convergence of connectivity and technology for open networking will open up new revenue opportunities. On the other hand, increased bandwidth with more frequency channels for higher data needs; and greater data transport efficiency will channelise cost savings. Additionally, adoption of IoT, AI/ML, AR/VR, drones, and private networking technologies are expected to make 5G a go-to technology for any B2C and B2B/B2B2X setup.

The Indian smartphone buyers are already future-proofing their purchases with 5G ready smartphones as 5G gains momentum globally. This futureproofing of handsets will help operators tap the low-hanging B2C 5G use cases initially across AR/VR, OTT video streaming, gaming and others.

The coupling of 5G and edge computing can create significant incremental value for those in the ecosystem including TSPs, software providers, hardware providers and service providers. The value opportunity for a TSP is determinant on how can they maximise their position in the ecosystem by seizing maximum value, or share of revenue, by capturing the market share beyond connectivity.

2023 5G edge computing global opportunity across select sectors (USD billion)

	Connectivity	Software	Hardware	Services
Gaming	33.0	113.3	47.2	42.5
Industrial manufacturing	12.4	72.2	61.9	59.9
Connected Healthcare	6.8	5.0	9.5	24.0
Intelligent Transportation	2.2	6.1	6.8	9.2
Environmental Monitoring	0.8	0.5	2.0	1.9

Highest opportunity — Lowest opportunity

Source: 5G edge computing value opportunity, KPMG International, June 2020

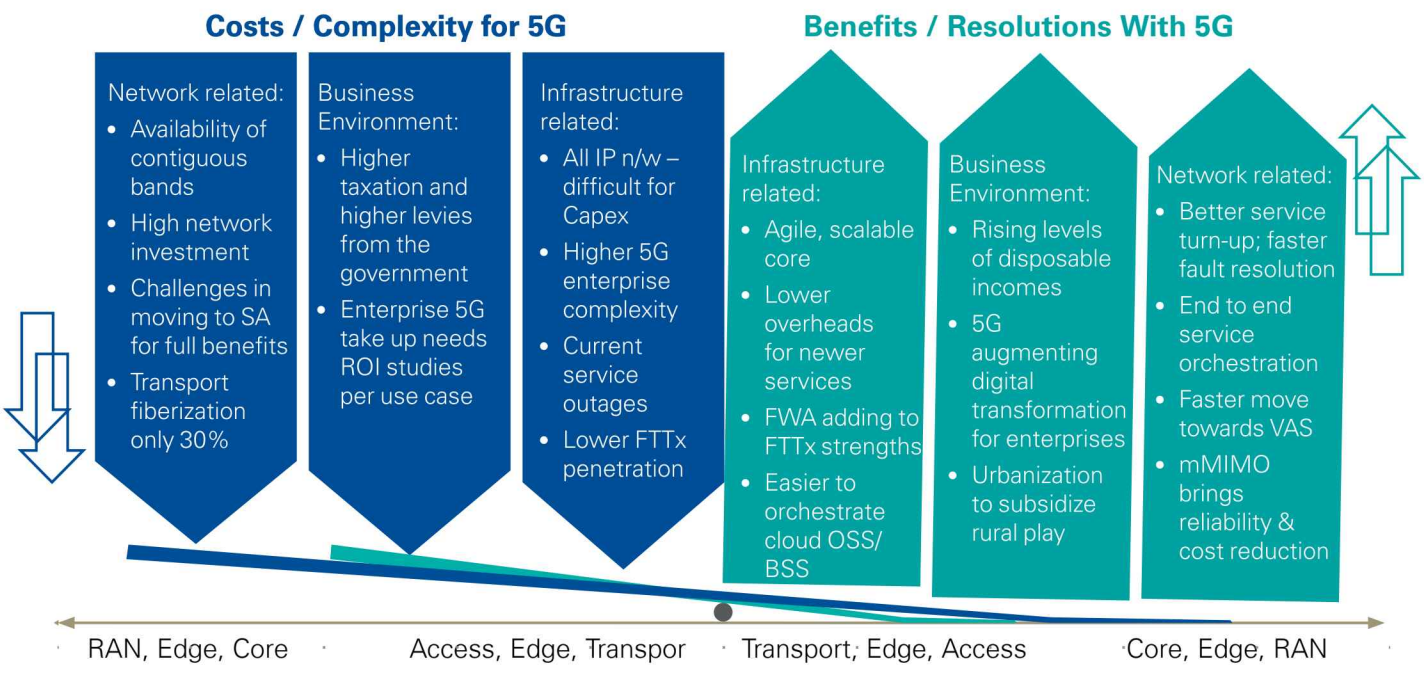
Based on a KPMG study, at a global level only 11 per cent of the 5G edge opportunity lies with the operators in terms of core connectivity. Thus, a move to a platform-oriented, software-driven, and services-led innovation and growth is the need of the hour for TSPs. Even though India is late to 5G auctions and implementations, TSPs have a huge opportunity with enterprise 5G to provide technology solutions to the enterprise's business challenges, thus transitioning into a digital services provider from the current status of being just a communication service provider.

Key focus areas for TSPs:

Operators in India are testing complementary strategies with 5G NSA and SA on the 700-megahertz (MHz), 3.5-gigahertz (GHz), and 26-GHz bands and considering there is a further six-month trial extension until May 2022, these strategies will only mature once the ecosystem around it has matured. Provided the 5Gi requirements are harmonised into the 3GPP standards, KPMG in India believes that such ecosystem maturity will still need a couple of years to prove the ROI. The commercial launch is now expected in late 2022 or early 2023 mostly in urban centres. The initial B2C applications such as cloud gaming, AR/VR, and other bandwidth intensive use cases that centre around FWA and eMBB may only be 20—40 per cent ARPU accretive, as per initial data from TSPs in China, South Korea, and Hong Kong. B2B and B2B2X applications are the real emerging opportunities for TSPs to reap the ROI of their 5G investments. TSPs are collaborating with technology ecosystem providers to create use cases in mission-critical environments such as utilities and oil & gas; industry 4.0 and industrial environments such as mining, transportation and logistics, and manufacturing, smart cities, drones-based surveillance, remote healthcare, remote education, smart agriculture, smart automotive, gaming, etc. Private 5G will be an innovation engine for enterprises and an enabler and accelerant for IoT, Industry 4.0, and edge computing —all supported by TSPs.

From an implementation perspective, the TSPs must set their eyes on the benefits of 5G in terms of opening new avenues of revenue, lowering the capex cost per bit while dealing with the initial costs and complexity associated with the lack of adequate infrastructure, capital intensive network augmentation, high spectrum reserve price etc. The government on its part, will have to take swift actions in augmenting the infrastructure, availability of contiguous spectrum and finding a solution to make 5G affordable, so that it emerges as a feasible option for the country, in a true sense.

Cost/benefit analysis for 5G levers in India



Source: KPMG in India analysis

Readiness:

To prepare itself for the imminent 5G launch, operators have taken nuanced approaches to partnering as 5G needs an ecosystem view than siloed ways of working.

Focus on network efficiency and upgrades:

TSPs are tapping into B2B and partnering with vendors across Open RAN, semi-conductor chip designers, system integrators, cloud and networking players, and wireless OEMs, to capture edge and cloud opportunities with open approaches to networking. Key investments are flowing into adoption of 5G NR over cloud and edge infrastructure with virtualised network functions that are automated through use of advanced technologies like AI and ML.

Focus on B2C and stabilising market shares:

TSPs have partnered with semi-conductor chip companies, operating systems and search engine giants to cement their position for the long haul in the B2C 5G ecosystem. The strategic investments from large tech players have also helped streamline the **'commerce, connectivity, and content'** vortex. Also, the device leasing strategy in the B2C segment will need to evolve for providing greater affordability. Finally, creation of a metaverse solving diverse set of customer needs could be an evolution path.

Focus on B2B use cases for practical real-world environment:

Some of the test beds are proponents of enterprise-TSP partnerships in creating opportunities for improving operational and business efficiencies across retail, sports, automotive, and other industries as well as horizontal themes such as smart cities, connected workforce and connected machines.

Focus on rural 5G:

Realising the rural potential, TSPs are building rural use cases along with OEMs in the areas of education, agriculture and healthcare. The partnership with platform technology companies helps build a network automation layer in a hybrid-cloud model — further enhancing network carriage under a software defined, network virtualised, end-to-end orchestrated and service automated, and containerised environment.