5G is transforming government service delivery

**EY Consulting LLC (Dubai)
and Nokia**
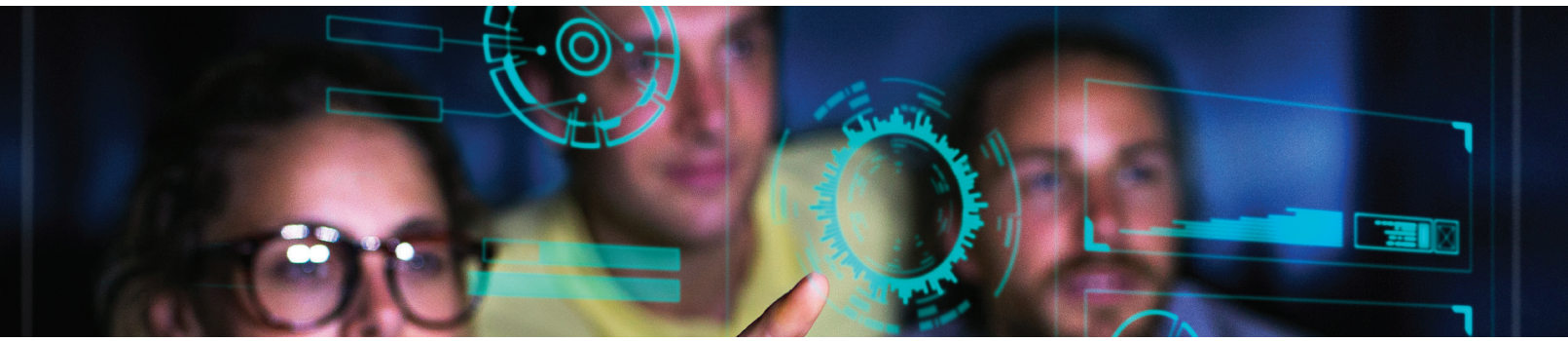
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Executive summary

Government and public service (GPS) organizations are expected to invest in 5G more than any new age emerging technologies in the next three years. Creating an enabling environment (e.g., cloud computing or edge computing) will be key for 5G adoption.

In our view, the radically enhanced connectivity that is being brought about through 5G and future versions of it will usher in a hyper-user experience-centric digital era, as governments will be able to significantly accelerate usage and adoption of technologies such as artificial intelligence (AI), virtual reality (VR), augmented reality (AR), and internet of things (IoT), etc.

Citizens want to engage with government through their channel of choice and at their convenience, and not at the convenience of governments. We therefore see an always "online" government being ushered in where humans-to-humans, humans-to-devices and devices-to-devices connectivity and communications will enable governments to deliver better, more meaningful and more efficient citizen and user experiences.

No matter the time of day, we see a future where all of us will be able to engage with governments to participate in policy making, obtaining information and services, in addition to using government portals as we do today assisted by AI-powered-human-replicas that will provide human-like service to citizens or users.

Initial government services leveraging 5G will be around smart city services. Current commercial deployment of 5G is using mid or high spectrum bands, which are best suited to cover city areas. Smart utility services are already in use such as smart lighting, smart waste collection, and smart parking. 5G is expected to bring together various services and introduce new functionalities, such as monitoring public infrastructure through drones. Providing high-speed connectivity in public places through 5G-enabled hotspots has always been an early consideration. Along with connectivity, 5G greatly improves mobility aspects. For instance, advancements in assisted driving paving the way for fully autonomous vehicles and remote control in future.

5G can enhance traffic management by optimizing traffic flow, automating traffic control and providing real-time public transport information.

The onset of the COVID-19 outbreak has put additional pressure on government service delivery, especially in health care. The immediate focus has been to accelerate 5G deployment in hospitals and quarantine centers. There have been instances when 5G-powered telemedicine and remote CT scanning were used to effectively overcome shortage of health workers. The COVID-19 outbreak has accelerated usage of 5G-based telemedicine consultations. In another instance, 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 used to remotely control a robot for conducting ultrasound test. Not only in health care, 5G's versatility is being used extensively for other services to tackle COVID-19. 5G-based infrared temperature measurement coupled with AI algorithm is helping to monitor citizens. 5G drones are being deployed for surveillance, dispersing crowds and delivering essentials in COVID-19 containment zones.

In the service environment, 5G has the potential to transform citizen engagement to a great extent by offering an immersive experience through the usage of AR, VR and mixed reality (MR). From using in-department AR VR-based digital signages to offering HD video calling for resolving customer queries, the possibilities are immense. On the education front, 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.

Governments and policy makers should consider the ongoing pandemic as a cue to fast-track 5G implementation plans. A clear policy roadmap needs to be articulated covering spectrum usage, infrastructure requirements, use-case trials and overcoming key challenges. It is time to adopt 5G with full gusto and realize the true benefits of this new technology.

Considering the current situation, GPS and communication service provider (CSP) organizations need to consider Now, Next and Beyond priorities.

Table: Now, Next and Beyond framework

Now	Next	Beyond

‣ Facilitate rollout of 5G services in areas greatly affected by COVID-19
‣ Focus on select health care use cases where 5G can benefit
‣ CSPs can speed-up 5G implementation plans and focus on key applications (e.g., video diagnostics for health care, or 5G coverage for hospitals)
	‣ Governments, CSPs, network vendors and other private players to collaborate and work in partnership to deploy 5G
	‣ Governments to adopt best-practice policy implementation covering infrastructure access, spectrum sharing and network sharing
	‣ CSPs and governments can explore co-investment in 5G
	‣ CSPs can prioritize 5G capex for government and health care
		‣ Enable 5G service delivery across the living environment
		  ‣ High-speed connectivity in public places
		  ‣ Traffic management
		  ‣ Safety and security
		  ‣ Autonomous driving
		  ‣ Smart utility services
		‣ Enhance service environment through 5G
		  ‣ Citizen engagement and e-services
		  ‣ In-department immersive signages
		  ‣ Customer service
		  ‣ Health care
		  ‣ Education
		‣ Network slicing and private networks for reliable, secure and dedicated connectivity to key verticals

Since 5G is a licensed technology, CSPs will play a key role in its deployment. However, the versatility of 5G is likely to open-up a number of deployment options across vertical industries. Central governments should consider allocating spectrum for 5G private networks. This will help to boost an innovation ecosystem through customized offerings catering to industry-specific needs. The role of 5G private networks will be crucial to support from a security and reliability perspective in defense and public safety.

Local governments and CSPs have a collaborative role to play in the deployment of 5G services for smart cities. Governments own the city infrastructure, while CSPs have access to 5G spectrum. A hybrid deployment model will be a win-win situation for all stakeholders concerned. Through partnerships, local governments can connect street and city assets to support CSP radio equipment installation. In turn, the CSP can commercialize 5G services to the city and its citizens. On the other hand, a predominantly public model will entail the government to own spectrum, backhaul and infrastructure. Cities will deploy and operate its own public 5G network. It will be able to resale extra capacity to CSPs following a neutral host model.

Ernst & Young Middle East (Dubai Branch) and Nokia have come together to develop this whitepaper. The paper focuses on identifying how 5G will transform government service delivery across the living, service and regulatory environments. It goes on to cover 5G deployment models in the GPS sector. In the end, the paper outlines key considerations for government organizations and CSPs to capitalize on the 5G opportunity in the GPS sector. I hope you find this report insightful and good to read.

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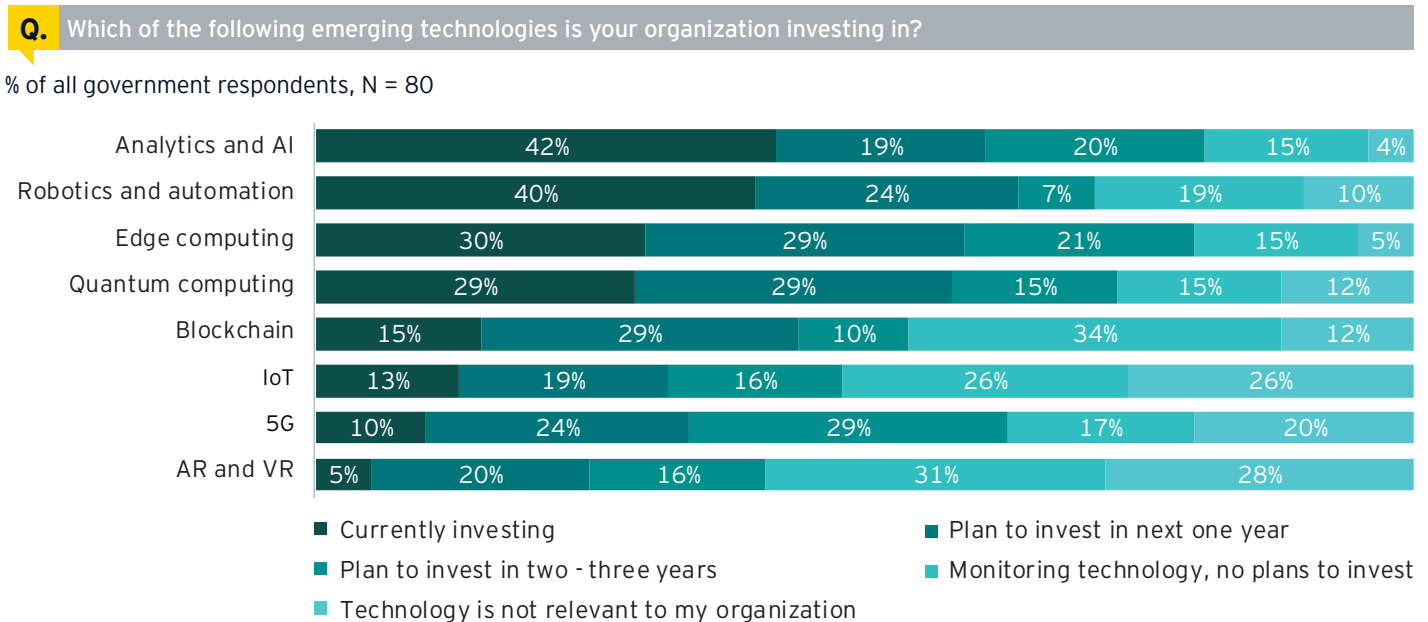# Contents

1

Impact of 5G on the GPS sector

1.1 Key technology investments in the GPS sector

Globally, GPS organizations are investing significantly in digital technologies to realize better results orientation, operational excellence and enhance customer experience. Analytics and AI, and robotics process automation (RPA) are witnessing the maximum traction. These technologies are helping to enhance productivity, optimize processes and improve efficiency. Through predictive and prescriptive analytics, handling of big data, and AI, governments are able to deliver on promises and achieve desired outcomes. In addition, digital is helping governments to better understand citizen needs, wants and expectations.

Comparatively, investment in 5G and IoT is much lower. However, in the next three years, 5G is expected to witness the largest investment among new age emerging technologies for government organizations, followed closely by edge computing. Digitization of government services is already mainstream, and it has significantly improved accessibility and availability. But the full potential of digital is yet to be realized. 5G has the ability to elevate customer experience to the next level by offering an intelligent, smarter and immersive experience.

Figure: Investment in emerging technologies

Q. Which of the following emerging technologies is your organization investing in?

% of all government respondents, N = 80

Technology	Currently investing	Plan to invest in next one year	Plan to invest in two - three years	Monitoring technology, no plans to invest	Technology is not relevant to my organization
Analytics and AI	42%	19%	20%	15%	4%
Robotics and automation	40%	24%	7%	19%	10%
Edge computing	30%	29%	21%	15%	5%
Quantum computing	29%	29%	15%	15%	12%
Blockchain	15%	29%	10%	34%	12%
IoT	13%	19%	16%	26%	26%
5G	10%	24%	29%	17%	20%
AR and VR	5%	20%	16%	31%	28%

■ Currently investing
■ Plan to invest in two - three years
■ Technology is not relevant to my organization
■ Plan to invest in next one year
■ Monitoring technology, no plans to invest

Source: Maximizing the 5G opportunity for enterprise, EY, February 2020

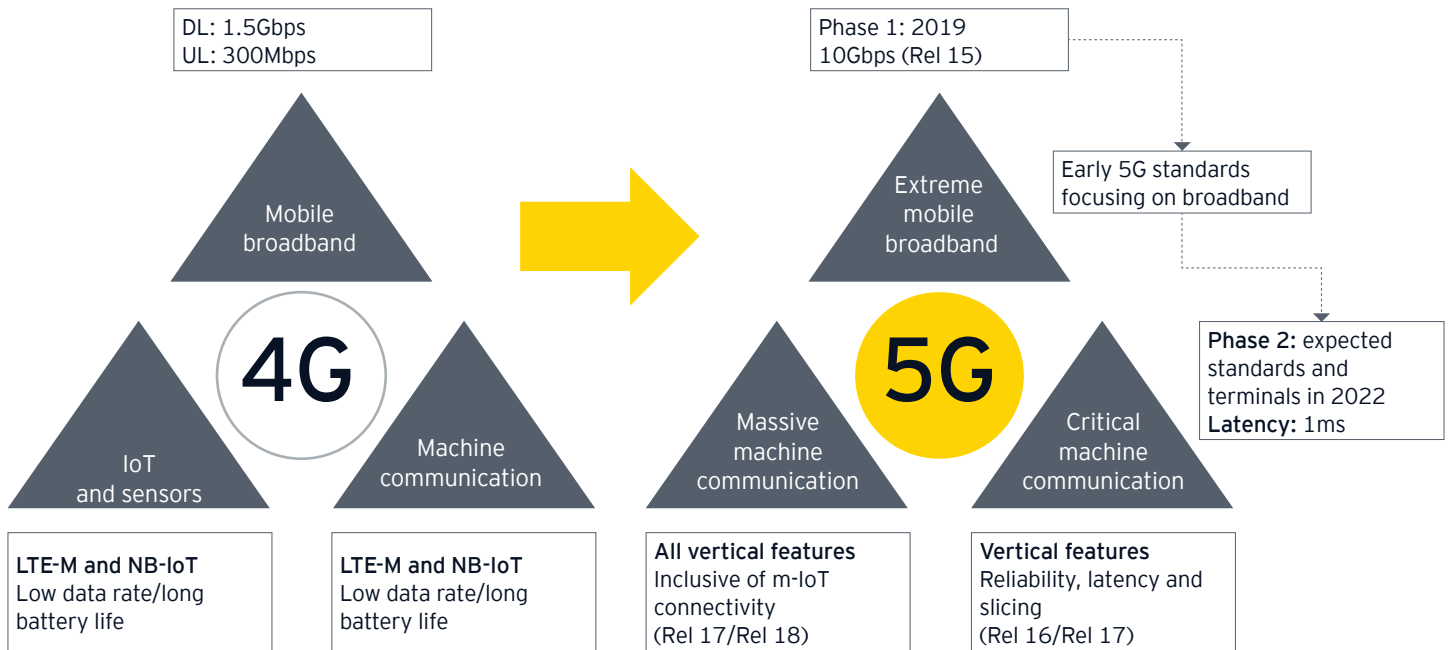## 1.2 Benefits and features of 5G

5G offers lightning fast speed, with 100 times faster speed than 4G, reaching maximum theoretical download speed of up to 10 Gbps. Currently, 4G latency is approximately 50 milliseconds (ms), while 5G should be able to provide 10 ms latency in general and 1 ms latency for the use cases which require extremely low latency. 5G overhauls network performance and efficiency significantly through its ability to support thousand times more mobile data volumes and connected devices per area as compared with 4G. Most importantly, 5G opens new use cases. 5G's primary value proposition is low latency, which enables critical communication coupled with support for massive IoT and offers significant high speed.

The first release of 5G commercial networks are focusing on delivering very high speed and capacity to address the ever-increasing needs of the consumer market. CSPs are using spectrum bands in the mid-frequency ranges. It allows CSPs to re-use the sites of their exiting wireless networks to easily deploy 5G. The high frequency spectrum bands are used for hot spots and fixed wireless access (FWA) deployments. Nevertheless, next releases of 5G network will progressively introduce the ultra-low latency, reliability and massive machine communications capabilities to the market.

Figure: 5G improves network performance in three key dimensions

DL: 1.5Gbps
UL: 300Mbps

Mobile broadband

4G

IoT and sensors

Machine communication

LTE-M and NB-IoT
Low data rate/long battery life

LTE-M and NB-IoT
Low data rate/long battery life

Phase 1: 2019
10Gbps (Rel 15)

Early 5G standards focusing on broadband

Extreme mobile broadband

5G

Massive machine communication

Critical machine communication

Phase 2: expected standards and terminals in 2022
Latency: 1ms

All vertical features
Inclusive of m-IoT connectivity
(Rel 17/Rel 18)

Vertical features
Reliability, latency and slicing
(Rel 16/Rel 17)

Source: Nokia

1.3   Spectrum is a critical resource to influence 5G rollout

The standard spectrum for the rollout of 5G in three categories of frequency bands, which when combined, will allow to fully benefit of 5G network performance.

▸ **High bands:** these bands are above 20 GHz and are also called millimeter wave. Given they are very large, they allow delivery of ultra-high speed or capacity up to 20 Gbps but will provide hot spot type of coverage. They are ideal for services requiring very high density of traffic that can be found in dense urban areas.

▸ **Mid bands:** these bands range from 1 GHz up to 6 GHz and are also called centimeter wave. They will allow to deliver very high speed or capacity up to 2 Gbps and will provide reasonably good coverage in the range of up to a few kilometers. They provide a good mix between support of high bandwidth services and cost-efficient coverage of a territory.

▸ **Low bands:** these bands are below 1 GHz and will deliver high speed or capacity up to 200 Mbps but will be able to provide very good coverage up to several kilometers. These bands are ideal for massive IoT communications to support the traffic generated by a large number of sensors, each generating low to mid traffic over a large territory.

So, depending on the type of services that government will want to roll out, central governments might have to start by releasing some bands vs others, or in the meantime leverage 4.9G technology which is already enabling lots of new digital services.

2 How can 5G transform government service delivery?

Digital transformation in the GPS sector is having a profound impact on service delivery. Already, emerging technologies such as AI, robotics, blockchain and IoT are being used to solve real-life issues and problems. It is leading to better services and living environment for citizens. The advent of 5G has simply catapulted digital service delivery to new levels. With 5G, the potential to transform the lives of citizens is immense.

2.1 Living environment

5G is expected to have a much bigger impact on the living environment, significantly enhancing the citizen experience. Currently, CSPs are using mid or high spectrum bands for deploying 5G services. It is best suited to cover city areas. Therefore, initial government services leveraging 5G will be around smart city services. Along with IoT, 5G is expected to play an integral role in smart cities. With the increase in smart city applications – both in volume and velocity – it may be difficult to manage the exponential growth in end points or sensors. 5G is expected to overcome this challenge through its ability to connect a large number of end points or sensors as part of its massive IoT functionality. Considering the huge impetus in developing smart cities, this is likely to emerge as a key use case for government service delivery.

Early 5G use cases have focused on offering enhanced mobile broadband in densely populated urban areas, complementing 4G and other alternative networks to provide connectivity and augment capacity. Governments can partner with CSPs to offer 5G hotspot services in public places. Citizens can access ultra-high definition (UHD) videos and content at a specific spot or on the move (e.g., buses and trains).

For local government authorities, traffic management is a key focus area. Through real-time dissemination of information and analysis, authorities can optimize traffic flow, control traffic lights and issue advisory to drivers. Moreover, providing real-time updates on public transport systems can help citizens to plan better and save crucial time.

Ensuring safety of citizens is on top of the list of all local governments and law enforcement agencies. 5G can enhance real-time video surveillance significantly, by enabling higher throughput wireless alternative to fixed connections. In addition, 5G supports higher resolution video and images, improving the quality of analysis. Transmission of large amount of real-time data and high-quality images will go a long way to prevent and respond to crimes.

Table: Key application areas of 5G in the GPS sector – living environment

Application areas	Use cases	5G improves	5G enables
High-speed connectivity in public places	‣ Provide high-speed broadband services in public places such as airports, sports stadiums, shopping malls, tourist hotspots ‣ Broadband access on high-speed trains through moving hotspots ‣ Pervasive UHD video	‣ Increase capacity of wireless networks ‣ Increase the capacity for connected devices per wireless access point ‣ Expand the capacity of the network to support large number of users in a concentrated area (e.g., stadium)	‣ Guarantee defined levels of connectivity performance ‣ Support control of robots and automated guided vehicles (AGVs) with low-latency response ‣ Fiber-speed like broadband access for latency critical immersive applications like telepresence
Traffic management or enforcement	‣ Optimize traffic flow by analyzing data from vehicles, advice drivers in real-time and control vehicles directly ‣ Monitor and penalize infringements ‣ Automated traffic control and autonomous car ‣ Provide real-time public transport information to citizens ‣ Remotely controlled drones	‣ Increases network capacity for large data types (e.g., high resolution images, >4K content) ‣ Increases network capacity for large number of continuous data flows ‣ 4K cameras on drones for road traffic incident analysis	‣ Provide low latency for feedback and control loops responding to real-time conditions ‣ Provide low latency for remote control ‣ Support many endpoint connections ‣ Cross road traffic monitoring and dynamic traffic light management

Source: IDC, Nokia, EY analysis

Autonomous driving	‣ Assisted driving ‣ Autonomous vehicles for city logistic, waste, urban cleanliness	‣ Enhance urban mobility through sensors and devices ‣ Improved assisted driving – static object discovery, HD map ‣ Software updates	‣ Fully autonomous driving + remote vehicle control ‣ High speed platooning (latency<10ms)
Machines remote control	‣ Remote robot arm control ‣ Remote inspection tools ‣ Remote hazardous area robots	‣ Remote controlled Drone ‣ Swarm of 4K mobile video drones	‣ Low latency control in case of densification of remote application
Smart utility services	‣ Monitor and control municipal services such as waste collection, street lighting, car parking ‣ Monitor the state of public infrastructure such as roads and bridges	‣ Increase the data capacity of sensor connectivity ‣ Provide connectivity for a large number of sensors	‣ Support a much larger number of endpoint connections ‣ Support real-time transmission and analysis of big data sets
Safety and security	‣ Security surveillance of public spaces, monitoring traffic to identify needs for improvement, air quality monitoring, premises hygiene monitoring ‣ Mobile video surveillance ‣ Real-time disaster alerts and emergency response ‣ VR glasses for search and rescue operation	‣ Increase capacity for connected devices per access point ‣ Increase capacity of network to carry large volumes of data ‣ Increase number of machines, cameras and quality (4k) ‣ On demand surveillance for special events	‣ Support a much larger number of endpoint connections ‣ Support real-time transmission and analysis of big data sets ‣ Connected autonomous vehicles and intelligent transportation networks ‣ Rescuers will also have AR glasses that connect directly to doctors, to help them give emergency treatment at the scene ‣ Real-time AR content overlay (e.g., face recognition in crowd, fire)
Port and/or airport management	‣ Support applications such as real-time monitoring and analysis of environmental data, control of traffic flows, and control of site equipment such as cranes ‣ In airports, 5G can support remote control of service equipment and vehicles, and AR-enhanced guidance for site service personnel	‣ Increase operational efficiency ‣ Expands the range of services that port facilities can offer to carriers of freight and passengers	‣ Real-time management and control of port and/or airport operations
Immersive theme parks and/or tourist hotspots	‣ Intelligent cameras connected to 5G network ‣ VR and MR rides – rides will be installed with compact cameras with wireless communication modules ‣ Provide immersive experience at tourist spots to highlight specific characteristics and/or persona	‣ Provide more thrilling and exciting experience ‣ Ensuring safety of visitors with intelligent CCTVs	‣ Differentiated experience for citizens ‣ Experience a realistic and exciting experience without having to go through the rides

2.2   Service environment

Governments offer numerous services – passports, driving licenses, national IDs, business licenses, etc., that are directly controlled and delivered by them. These primarily fall under the purview of the service environment. In the last decade or so, increased digitization has fundamentally changed how government services are rendered. For instance, accessibility of services has increased manifold through online portals and mobile apps.

Adoption of 5G is expected to help governments offer a better service experience for citizens. The use of immersive technologies is touted to be the next big frontier of customer experience. VR, AR and MR are sensitive to network performance. 5G will offer larger capacity, lower latency, and a more uniform experience for various immersive technologies. To elevate customer interaction, if all government online forms and applications can be accessed through AR-devices, then citizens can benefit from a more intuitive and visually enriching experience. Even in-department signages can be radically transformed through a combination of AR, VR and MR. The level of customer interaction and engagement will surely be enhanced.

Another area where immersive technology can play a key part is in customer service. Imagine a world where citizens are interacting with government customer service agents through AR-enabled devices. The customer service representative will appear in the citizen's space and allow for a face-to-face interaction. Or simply, a government service representative resolving citizens' queries through a HD video chat. A lot of scenarios will emerge that are futuristic. However, there is no doubt about the limitless possibilities of 5G in enhancing customer experience.

In health care, 5G has the potential to make the maximum impact on the lives of citizens. A smart ambulance 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 and ensure emergency care within the golden hour. Even transfer of large data files within the hospital can be much faster using 5G and multi-access edge computing (MEC) networks. 5G can open new use cases such as remote surgery, where specialist doctors can perform tele-mentored surgery in remote areas. It will enable care to be delivered virtually from anywhere and anytime. Overall, the adoption of 5G in government hospitals will help to connect various applications, people, devices, robots and processes to enable a holistic digital experience for patients.

The onset of the COVID-19 crisis has put the spotlight on health care systems and infrastructure. 5G is already improving select medical activities to help in the treatment and control the pandemic. For example, 5G is enhancing efficiency of medical personnel through remote diagnosis. COVID-19 is transitioning health care delivery online. 5G is expected to make the online experience much better and become the backbone of key technologies such as telehealth and telemedicine. On the ground, 5G-enabled mobile trolleys are helping to minimize number of contacts between medical staff and patients. Eventually, 5G will open several opportunities around automating health care processes. Already, 360-degree cameras connected to 5G networks are being deployed to stream data in real-time from ICUs. It will help doctors in different locations to ensure the right treatment.

Table: Key application areas of 5G in the GPS sector – service environment

Application areas	Use cases	5G improves	5G enables
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 – with accessibility aids such as sound, language translations, visual and graphic instructions	‣ Policy, legal, regulatory documents and frameworks – to be transformed into "living" documents that can interact with citizens and officials through AR-enabled devices	‣ Citizens to view through AR what planned public works projects will look like – highways, water and energy facilities, public parks, new transit lines and stations, etc. ‣ Interact with the augmented project
In-department immersive signages	‣ Digital signages to convey information ‣ Immersive signage booths incorporating AR, VR, MR	‣ Display higher quality content ‣ Stream and transmit high-quality video ‣ Immersive interactive experience	‣ Update signage content in real time ‣ Offer a superior self-service experience for citizens ‣ Make access to information more fun and compelling
Customer service	‣ Immersive (AR, VR, MR) customer interface replacing physical visits ‣ HD video calling for resolving customer queries	‣ Lively and intuitive customer interface replicating physical environment ‣ HD video calling offers more clarity and resolves any latency issues	‣ Better citizen engagement
Health care	‣ 5G powered digital hospitals ‣ Smart ambulance ‣ Quick transmission of large image files ‣ Expanding telemedicine and remote consultation ‣ Reliable, real-time remote monitoring ‣ Increased usage of AI ‣ Remote surgery	‣ High-speed 5G network to quickly and reliably transport huge data files of medical imagery ‣ Health care systems to enable mobile networks to handle telemedicine appointments for greater reach ‣ IoT devices to help government health care providers to monitor patients and gather data to improve personalized and preventive care ‣ 5G enables real-time rapid learning; health care organizations can use AI tools to provide the best care possible	‣ 5G-enabled telemedicine to help patients get treated sooner and have access to specialists otherwise not available ‣ 5G to improve both access to care and the quality of care ‣ 5G to enable remote monitoring for more patients through lower latency and higher capacity ‣ Remote (robotic) control surgery (haptic feedbacks) ‣ Moving ambulance remote diagnostic and tele medicine using AR and VR goggles
Education	‣ Smart classrooms (e.g., IoT-enabled attendance) ‣ 3D holographic telepresence ‣ Immersive lessons and trainings with AR and VR ‣ Greater assistance for students with special needs ‣ Flexible learning	‣ Immersive content requires higher bandwidth, which can be seamlessly provided through 5G ‣ Using holographic telepresence supported by 5G, a teacher can be virtually beamed to a classroom in a remote location	‣ Learning will be more fun and engaging ‣ More interactive imparting of education

Source: World Economic Forum, AT&T, Getting Smart, EY analysis

2.3 Regulatory environment

The regulatory environment is facing a tectonic shift in the digital era. In a hyper-connected world, traditional regulatory boundaries are getting blurred. A siloed approach will not work for emerging digital technologies such as 5G and AI. Increasingly, sector regulators have to cooperate with other sector regulators to define a common overarching roadmap for the success of new technologies. 5G encompasses a wide range of industries and involves close coordination between different government departments. Without coordinated standards and policies, the true benefits of 5G will not see the light of day. Consensus on policy matters, common standards development and achieving end-user objectives should be the key priority for sector regulators.

South Korea's 5G policy is the most mature and evolved, with clear roadmap, significant investments (joint government and private), development plan for vertical industries and use cases, and pronounced tax incentives for 5G rollout. Successful implementation of the initial 5G strategy has led the Government to formulate a "5G+" plan. The Ministry of Science and ICT, and nine other related ministries jointly developed the 5G strategy. It aims to create a US$26b ecosystem for 5G-related services and industries in South Korea by 2023.[1]

5G policies in majority of the countries focus on common parameters — making 5G spectrum available, support for 5G infrastructure rollout, fostering cooperation and dialogue between various stakeholders, and identification of new use cases. All national 5G policies focus on developing a sustainable 5G ecosystem. There is strong political commitment for 5G and this translates to varying degrees, into institutional mechanisms and collaboration platforms with industry. Governments are making significant investments in 5G in conjunction with private enterprises.

Table: 5G policy in select countries

Countries	Overview	Details
South Korea	**5G+ strategy** ‣ Foster 15 5G-based "strategic industries" to create 600,000 jobs and export US$73b worth of goods and services by 2026. ‣ There will be a push for "big projects" by 2025, which will be implemented in two stages. The first stage will focus on developing "killer services" by area while the second stage will promote their diffusion. ‣ The government will build a "5G+ Innovation Center" in Sangam, Seoul and Pangyo by 2021. ‣ To promote investment in 5G services and industries, the government plans to ease regulations on 5G businesses.	**The 15 industries consist of:** ‣ Five core services: immersive content, smart factory, autonomous vehicles, smart city and digital health care ‣ 10 core industries: next-generation smartphones, network equipment, information security, edge computing, vehicle-to-everything (V2X) communication, robots, drones, intelligent CCTV, wearable devices, and VR and AR headsets
The UK	**Priority areas for government policy on 5G** ‣ Make it easier and cheaper to deploy mobile infrastructure ‣ Supporting infrastructure models that promote competition and investment in network densification and extension ‣ Stimulating demand and new use cases through the 5G Testbeds and Trials Programme ‣ Securing a diverse set of innovative 5G services through spectrum policy **5G Testbeds and Trials Programme** ‣ It is led by the Department for Digital Culture Media and Sport (DCMS) to support 5G trial projects across a range of sectors to identify opportunities for 5G, develop business models and improve understanding of potential deployment challenges.	‣ Primary investment of £160m for 5G for the "Testbeds and Trials Programme" including £10m for testing the security of 5G networks and £5m to test 5G applications and deployments on roads ‣ Creating the National 5G Innovation Network to trial and demonstrate 5G applications. The first phase was to invest up to £16m in a 5G testing facility (the 5G UK project) ‣ £35m to improve internet connectivity on trains (a combination of mobile and fiber broadband)

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[1]   "Korean Gov't Determined to Foster Core 5G Services and Industries," Business Korea press release, April 2019

The UAE

UAE Vision 2021
- In line with the vision of the UAE 2021, the Telecommunications Regulatory Authority (TRA) aims to be the main driver in launching the 5G mobile commercial service in the country

5G Steering Committee
- The TRA has established steering committee to drive 5G in the UAE which has three committees − including all stakeholders (operators, manufacturers, academia and users) working under its supervision. The three committee are for spectrum, verticals and network.

The verticals committee focuses on:
- Use cases
- IoT, incubation hubs
- V2X
- Academia studies and researches

The Kingdom of Saudi Arabia

- The Government is keen to establish the KSA as a world leader in 5G services and has made a major financial commitment to support the rollout of 5G.
- The National 5G Task Force was set up in early 2018 to bring together government, operators, equipment vendors and potential user groups.
- The Task Force is led by a Steering Committee that sets the general strategy directions and oversees progress. It unites all stakeholders with an interest in 5G.
- Specialized work is carried out in three subcommittees that deal, respectively, with "5G Spectrum," "5G development" and "5G verticals."

- The KSA is leading 5G development through setting the standard, research and development (R&D), network infrastructure technology, building the industry chain and engaging in focused use-case scenarios.

Germany

5G strategy for Germany − launched by the German Federal Government in July 2017, describes political goals and fields of action across the following:
- Step up network rollout (especially fiber optic cable)
- Make available 5G frequencies
- Promote cooperation between telecoms and user industries
- Support 5G research
- Initiate 5G for cities and municipalities

- Host 5G Dialogue Forum and all sectors to identify potentials and specify requirements
- Develop tailormade 5G applications for regions
- Support project planning with the help of industry partners
- Cities, municipalities and counties should have necessary awareness, expertise and financial means to build 5G-hubs

France

Four priority areas for the success of 5G
- Free-up and allocate radio frequencies
- Foster the development of new use cases
- Support 5G infrastructure rollouts
- Ensure transparency and dialogue on rollouts and the public's exposure

- Support the development of new applications in sectors that have been identified as priorities
- To facilitate the creation of consortia for conducting pilot projects, the Government plans to rely on the National Council for Industry

Source: Business Korea; Counterpoint; Mobile World Live; "Briefing paper," House of Commons Library, February 2019; "FTIR," Department for Digital, Culture, Media & Sport, July 2018; "5G strategy for Germany," The German Federal Government, September 2017; "5G_An ambitious roadmap for France," The Govt. of France and Arcep, July 2018; TRA

3

5G deployment models

5G being a licensed spectrum technology, its primary deployment model will be through CSPs. Given the much more widespread usage of 5G across vertical industries, central governments might want to allocate some of the 5G spectrum for private wireless networks – supporting critical applications such as defense, public safety, utilities or railways which have very specific constraints in terms of communication reliability.

State and local governments that will need 5G services to deploy their smart city services might also have an expanded and more active role in the deployment of 5G on their territory.

On one hand, CSPs own the spectrum, but might face difficulties

in deploying 5G in the highest bands, the ones that offer the best speed and capacity, as:

‣ Given the small coverage of cells, it requires a strong densification of 5G antennas, which means having access to street assets to provide a good city coverage.

‣ Deployment of these antennas is costly, and they need to define proper return-on-investment, before investing.

On the other hand, local governments need 5G connectivity to power their smart city services and they own many street assets or city real estate.

Table: 5G deployment models in cities

	Commercial model	Hybrid model	Hybrid model Public model
Spectrum and radio access	CSP-owned	CSP-owned	City-owned
Backhaul and infrastructure	CSP-owned	CSP-owned	City-owned
Citizen services	Telco service provider	Telco service provider	Telco service provider
City services	Telco service provider	Telco service provider	City
Economic model	Private	Private + wholesale public-private partnership (PPP) friendly	Neutral host PPP friendly

Source: Nokia

Figure: Salient features of various 5G deployment models

Commercial

This was seen in previous generations (2G or 3G or 4G) where the CSP has full responsibility to deploy and commercialize the 5G network services.

Hybrid

The municipality will connect its street and city assets in to facilitate the deployment of the CSP radio equipment. The city will commercialize backhaul service to CSP and CSP will commercialize the 5G services to the city and its consumer and business customers.

Public

The city will deploy and operate its own public 5G network (often relying on a wholesale operator under PPP model). It will use this network to power its own services but will also be able to resell extra capacity to CSP following a neutral host model, where several CSPs will use the same network.

Source: Nokia

Role of private networks in 5G deployment

5G is opening numerous new business models for key stakeholders such as governments and enterprises apart from CSPs. Leading industry conglomerates are planning to deploy captive 5G private networks to capitalize on new Industry 4.0 opportunities – automation, large number of connected devices and sensors, and usage of immersive VR and AR technologies. Setting up a private 5G network offers several benefits. Firstly, private 5G networks are expected to augment performance and quality of corporate network connections. It is easier to deploy

5G network within an enterprise campus that has access to power and backhaul network, than at public locations. It essentially overcomes some of the limitations of Wi-Fi and wired Ethernet by offering low-latency support for real-time performance requirements for applications such as robotic motion control. A private 5G network provides greater control over security and allows sensitive and proprietary data to stay local. Overall, critical communications and industrial IoT segments are expected to drive the deployment of public 5G networks, primarily due to the need of wide area and ubiquitous coverage requirements of nationwide public safety networks, enterprise buildings, public venues, factories and warehouses.

Table: Select 5G private network use cases

Emergency services, government departments, civil contingency and critical national infrastructure	Need to upgrade their legacy networks with new, secure systems, with better data and video capability, that function even when public networks are not operational
Town and city networks	To support smart city initiatives with their multitude of applications and users, and high security requirements
Utilities	Need to upgrade highly secure national scale control systems and networks to create smart electric, gas and water grids
Ports, airports and other transport hubs	Expansive campus networks covering indoor and outdoor locations, high numbers of densely packed users or connected things and a very high security requirement
Large enterprise campus networks, and conference centers	Require capacity and density to support large number of people and IT systems across campus networks and indoors

Source: GSA (the Global Mobile Suppliers Association)

4 Key considerations

1

Governments should consider establishing specific innovation labs to explore how the power of 5G can be leveraged to create a virtual always-on government model for the access and delivery of services.

2

Governments should, other than spectrum auctions, consider nonconventional options for rolling out 5G, as this could potentially accelerate its deployment and deliver more value in the long run.

3

Both CSPs and governments have complementary assets and converging interest to help deploy 5G in cities. They must choose the appropriate model to facilitate the rollout of 5G.

4

Governments should take a proactive approach to develop new 5G use cases that has the potential to significantly improve the quality of life and enhance citizen experiences.

5

Government and other stakeholders should actively explore partnering and collaboration options that will bring into play everyone's strengths and enable the development of innovative and unique business models. It will facilitate and accelerate the deployment of 5G networks.

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