Infosys®
Navigate your next

5G – EMPOWERING
THE NEXT WAVE
OF DIGITAL
TRANSFORMATION

5G

5G

Contents

5G technology is much more than about connecting people – it is spearheading transformation across industries. Led by developed markets in North America, South Korea, China, Western Europe, and Australia, over 443 telecom operators across 133 countries and several enterprises are investing in 5G and driving innovation.[1] 5G-powered digitization is expected to bring about an economic impact of $30 trillion over the next decade.[2]

5G-powered digitization promises to accelerate connectivity-led transformation in an increasingly hyperconnected world, ushering in a new range of possibilities for both individuals and enterprises. 5G provides superfast data rates, massive traffic capacity and ultra-low latency than any existing wireless technology. The potential of 5G facilitates the realization of many innovative use cases that can make technology increasingly purposeful. Several telecom players are part of the race to own a major share of the 5G-led enterprise digitization journey.

Over the next few years, activities across 5G infrastructure and connectivity, IT and platforms, and application and services will trigger innovative solutions, from basic building blocks to complex autonomous industrial applications. In addition to technology development, several new ecosystem partnerships are springing up to solve business challenges and create new experiences. Here are a few examples across industries –

- Verizon and Mastercard recently announced a partnership to introduce 5G in the global payments industry[3]

- Dish and AWS entered a strategic collaboration to reinvent 5G connectivity and innovation[4]

- Lufthansa is among the first few companies in Germany utilizing 5G private networks for aircraft maintenance.[5]

The scope of 5G is virtually unlimited, and its impact will grow over the years depending on the maturity of markets in each domain.

The transformative approach of 5G is pushing for an open standards, disaggregated and cloud and edge-based approach for building networks. In addition to 3GPP-led standardization, new initiatives such as ORAN alliance, Facebook-led Telecom Infra Project, TM Forum Open APIs bolster the more open approach for 5G. New players who can disrupt the way networks have been built, including hyperscaler-led initiatives, are

also in the fray. There are also significant developments in the chip and device ecosystem. As a result, 5G devices are no longer just smartphones but include CPEs, dongles, modules, robots, routers, laptops, TVs and even vending machines. Over 873 new 5G devices have been launched as of June 2021.[6]
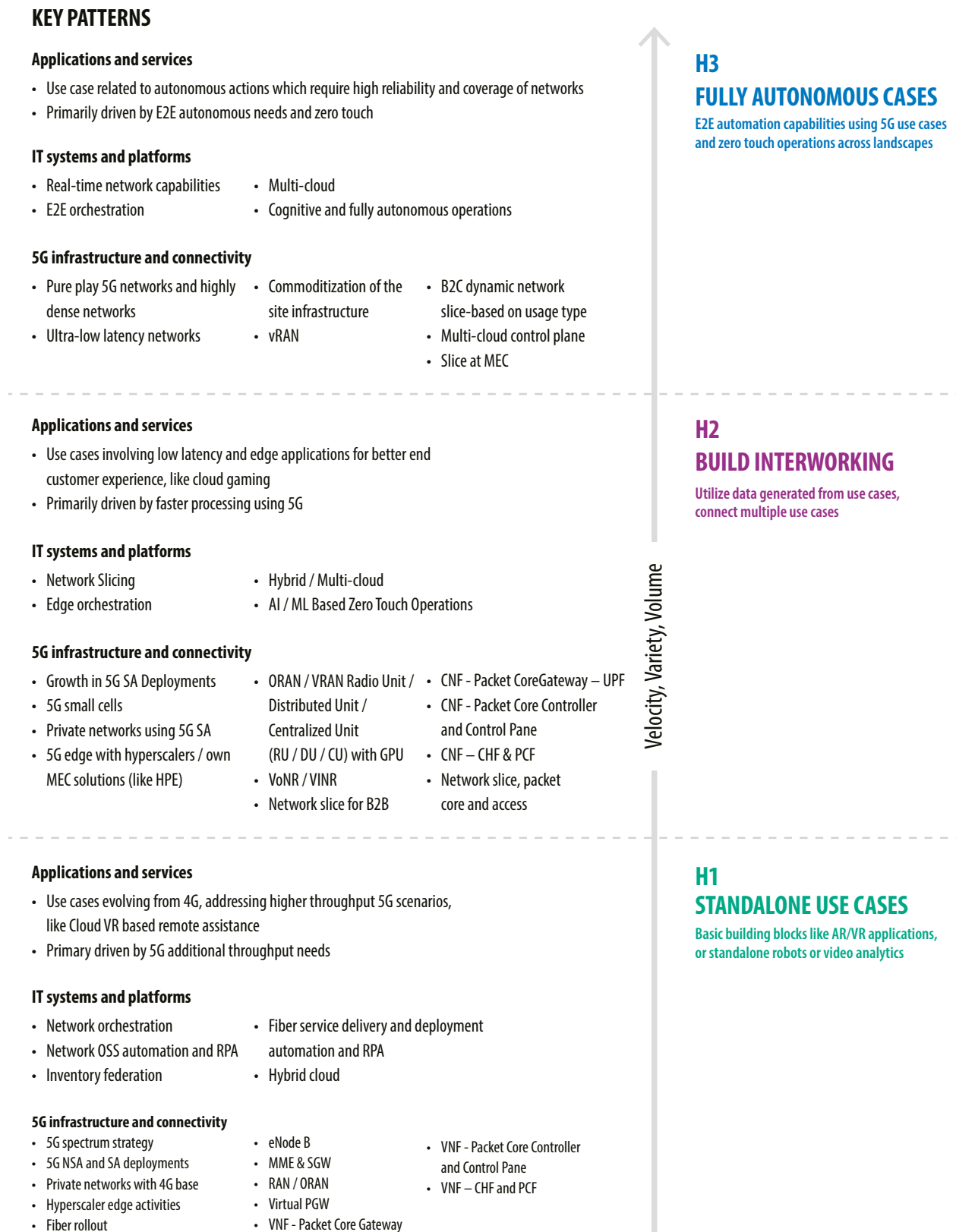
Diverse industries will benefit from exciting 5G based applications such as autonomous vehicles, telemedicine, smart factories, immersive retail and entertainment experiences. Suffice to say that any use case which demands rich data experience, automation, hyper-fast data analytics and low latency is an ideal candidate for 5G. According to the latest GSA report on 5G, 71% of enterprises believe that 5G networks will have a big impact.[7]

With this kind of multi-purpose usability, it becomes vital to consider standard evolution, OEM equipment maturity, technology cost and affordability, device compatibility and market readiness when charting a 5G blueprint. Enterprises should align their 5G roadmap to technology evolution and plan the sequence of use cases to harness the best value.

What do the three horizons have in-store for enterprises?

At Infosys, we tracked 5G evolution from 2018 onwards across three horizons, H1, H2 and H3. While differences at a regional level can surface, the overall evolution trajectory remains the same. H1 addresses basic building blocks like AR/VR applications, standalone robots or video analytics, and H2 emphasizes the interworking of independent use cases. Finally, H3 aims for end-to-end autonomy, the next level of evolution.

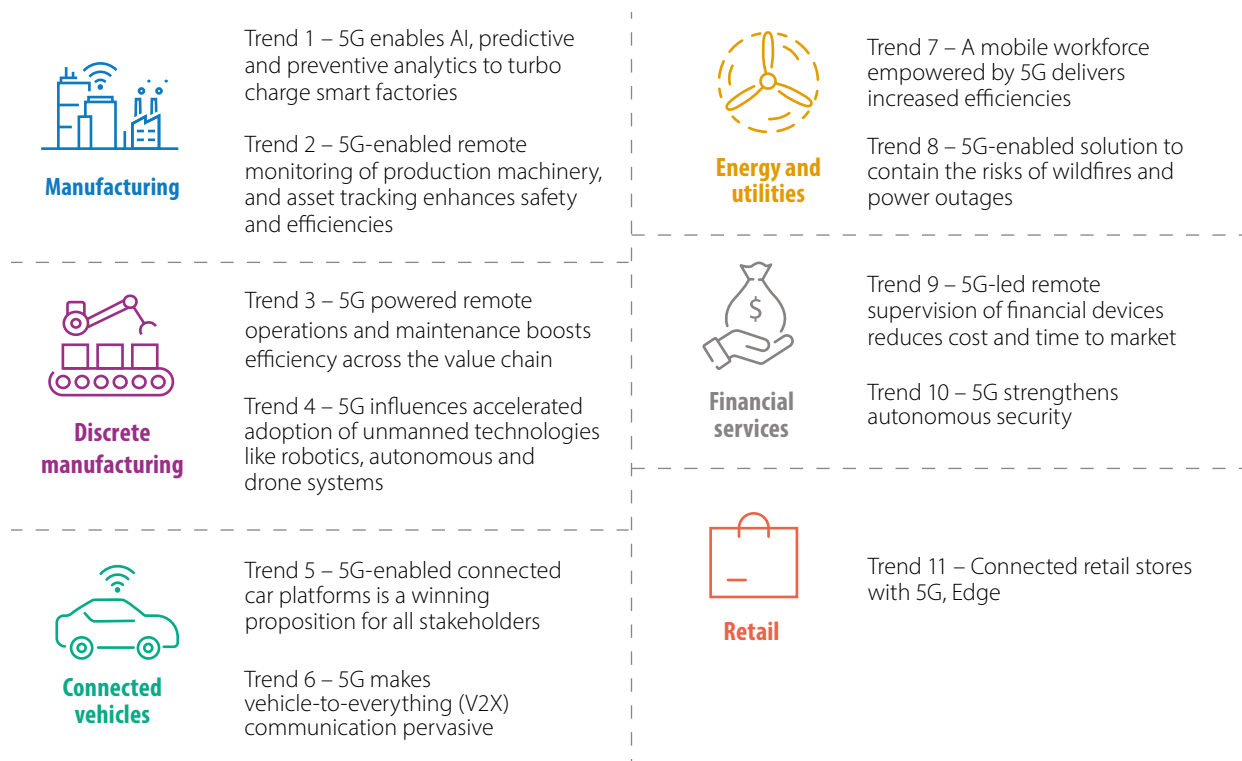## Figure 1. Adapting to market dynamics: the three horizons

KEY PATTERNS

H3
FULLY AUTONOMOUS CASES
E2E automation capabilities using 5G use cases and zero touch operations across landscapes

Applications and services
- Use case related to autonomous actions which require high reliability and coverage of networks
- Primarily driven by E2E autonomous needs and zero touch

IT systems and platforms
- Real-time network capabilities
- E2E orchestration
- Multi-cloud
- Cognitive and fully autonomous operations

5G infrastructure and connectivity
- Pure play 5G networks and highly dense networks
- Ultra-low latency networks
- Commoditization of the site infrastructure
- vRAN
- B2C dynamic network slice-based on usage type
- Multi-cloud control plane
- Slice at MEC

H2
BUILD INTERWORKING
Utilize data generated from use cases, connect multiple use cases

Applications and services
- Use cases involving low latency and edge applications for better end customer experience, like cloud gaming
- Primarily driven by faster processing using 5G

IT systems and platforms
- Network Slicing
- Edge orchestration
- Hybrid / Multi-cloud
- AI / ML Based Zero Touch Operations

5G infrastructure and connectivity
- Growth in 5G SA Deployments
- 5G small cells
- Private networks using 5G SA
- 5G edge with hyperscalers / own MEC solutions (like HPE)
- ORAN / VRAN Radio Unit / Distributed Unit / Centralized Unit (RU / DU / CU) with GPU
- VoNR / VINR
- Network slice for B2B
- CNF - Packet CoreGateway – UPF
- CNF - Packet Core Controller and Control Pane
- CNF – CHF & PCF
- Network slice, packet core and access

H1
STANDALONE USE CASES
Basic building blocks like AR/VR applications, or standalone robots or video analytics

Applications and services
- Use cases evolving from 4G, addressing higher throughput 5G scenarios, like Cloud VR based remote assistance
- Primary driven by 5G additional throughput needs

IT systems and platforms
- Network orchestration
- Network OSS automation and RPA
- Inventory federation
- Fiber service delivery and deployment automation and RPA
- Hybrid cloud

5G infrastructure and connectivity
- 5G spectrum strategy
- 5G NSA and SA deployments
- Private networks with 4G base
- Hyperscaler edge activities
- Fiber rollout
- eNode B
- MME & SGW
- RAN / ORAN
- Virtual PGW
- VNF - Packet Core Gateway
- VNF - Packet Core Controller and Control Pane
- VNF – CHF and PCF

Velocity, Variety, Volume

Source: Infosys

External Document © 2021 Infosys Limited

H3's progress will rely on the maturity of 5G networks and solutions, the associated device ecosystem, and other aspects related to sustainability and security. Unless the technology is robust enough to be used autonomously, H3 will take time to mature. Differences in maturity across different markets will arise based on aspects like spectrum availability and regulations.

Let us explore the key trends across key industries:

- Manufacturing
- Discrete manufacturing
- Connected vehicles
- Energy and utilities
- Financial services
- Retail

Figure 2. Key 5G trends across industries

Manufacturing

Trend 1 – 5G enables AI, predictive and preventive analytics to turbo charge smart factories

Trend 2 – 5G-enabled remote monitoring of production machinery, and asset tracking enhances safety and efficiencies

Discrete manufacturing

Trend 3 – 5G powered remote operations and maintenance boosts efficiency across the value chain

Trend 4 – 5G influences accelerated adoption of unmanned technologies like robotics, autonomous and drone systems

Connected vehicles

Trend 5 – 5G-enabled connected car platforms is a winning proposition for all stakeholders

Trend 6 – 5G makes vehicle-to-everything (V2X) communication pervasive

Energy and utilities

Trend 7 – A mobile workforce empowered by 5G delivers increased efficiencies

Trend 8 – 5G-enabled solution to contain the risks of wildfires and power outages

Financial services

Trend 9 – 5G-led remote supervision of financial devices reduces cost and time to market

Trend 10 – 5G strengthens autonomous security

Retail

Trend 11 – Connected retail stores with 5G, Edge

Source: Infosys

Manufacturing: Smart factories and more

5G technology has empowered the manufacturing domain to build smart factories and reap the benefits of advanced technologies such as automation, artificial intelligence (AI), augmented reality (AR) for troubleshooting, and the Internet of Things (IoT). In H1, 5G plays a key role in a smart factory—a highly digitized and connected environment where robots, machines and devices run operations autonomously with minimal human intervention.

In H2, 5G helps optimize production. By capturing real-time data on machines, inventory and production, manufacturers can analyze production patterns in more detail to identify the proper sequencing of factory activities and maximize flow, facilitating smooth production cycles and reduced waste. In addition, predictive and preventive maintenance capabilities will allow companies to monitor equipment status and schedule maintenance when needed closely.

Finally, H3 will witness the use of AR for troubleshooting and beyond. Collaborative robotics and automated guided vehicles will become a reality in a fully autonomous factory. A recent Infosys Knowledge Institute study confirmed that manufacturers would exploit 5G's mass machine communication capabilities and low latency connectivity to enable smart factories.

Trend 1: 5G enables AI, predictive and preventive analytics to turbocharge smart factories

An important benefit of the smart factory is its ability to automate repetitive, labor–intensive, and potentially dangerous tasks. AI coupled with preventive and predictive analytics can prevent unplanned downtimes, which can be a major impediment to maximizing productivity for manufacturers. Further,

advanced analytics can help forecast demand for spare parts that can create the parts on-demand along with additive manufacturing. This will then simultaneously reduce the waste of spare parts and the cost to store them significantly while also lowering carbon emissions by decreasing transportation of spare parts and waste generation.[8] These outcomes are achieved only when the vast quantities of data generated from sensors and interfaces are transmitted and processed in real-time, which 5G networks make possible. Analytics engines need to work with real-time data to be effective. 5G eliminates the low network bandwidth hurdle that has historically prevented analytics applications from delivering accurate results. According to a recent Forbes report, this trend will minimize human error and the risk of accidents and give people more opportunities to take on complex roles.[9] The manufacturing sectors possess near-term revenue potential, so capitalizing on this trend will be key to realizing the growth. Companies must take a long-term and more strategic view of the problems 5G can solve and the overall gains that it can deliver.

> A major food and agri-business company transformed its coffee business through 5G. In partnership with Infosys, they implemented a smart factory model that enabled higher quality control by controlling the moisture levels in its coffee products. Infosys helped the client deliver a proof of concept using sensors that decreased the variance in moisture levels from 9%. 5G connectivity relayed the sensor data to a dashboard that triggered changes in the next stage of the process.

Trend 2: 5G-enabled remote monitoring of production machinery, and asset tracking enhances safety and efficiencies

5G implementation allows for remote monitoring and controlling of production assets, a trend that will be even more notable in a post-COVID world. Operators can track operations in real-time through software systems remotely. This means they can

easily locate and manage assets, gain actionable insights in real-time, and configure the machinery to optimize safety, efficiency, and quality. With 5G, live streaming and remote monitoring will be more seamless, accurate and secure, enabling operators to instantly broaden their application and troubleshoot problems.[10,11] Enterprises should expand the potential of 5G by liaising with connectivity operators to establish private 5G networks in their production facilities.[12] The private network will help the gradual and seamless implementation of robotics and automated tasks in their facilities, significantly reducing 5G network rollout expenses. Production lines must consider pilot 5G programs to assess the feasibility and profitability for themselves.

> A leading German automotive company enabled a private 5G network to remotely monitor and track its assets and production machinery. This Infosys client used a high-performance, wireless 5G network to digitize its factory floor with selective assembly facilities IoT-enabled. With high-resolution cameras transmitting high-quality videos in real-time and driverless transport systems coupled with sensors relaying critical parameters to the factory personnel present at remote locations, Infosys effectively managed quality assessment, monitoring operations and tracking assets. We also laid the groundwork for the latest software and applications to make this 5G transformation fruitful.

Discrete manufacturing: IT-OT intelligent integration

The discrete manufacturing industry is incubating advanced technologies like IoT, robotics, autonomous systems as part of Industry 4.0 initiatives. Digital engineering, led by IT-OT integration, automation and AI, drives accessibility, flexibility, controllability and is easy to implement across the value chain. This improves efficiencies in the supply chain, logistics, collaborative robotic work environment, quality control and remote monitoring. Wireless communication led by 5G is vital to connect and provide data between technological components. Aspects like interoperability, interconnectivity, response time, interface scheme, encryption schema, spectrum and network transmission impact the system performance. An Infosys Knowledge Institute study report reinforces the significant role that 5G can play.

Here are key trends in the journey from H1 to H3:

In H1, 5G adoption will increase chiefly driven by the need for low latency, real-time processing, digital infrastructure, seamless intra and inter-enterprise communication.

In H2, real-time data acquisition and analysis through 5G networks will lead to dynamic scheduling, remote maintenance, augmented and virtual reality (VR),

collaborative robot-assisted workflows, machine vision-based quality assessments, digital twins and smart warehousing.

In H3, 5G will help automate and autonomize operations. It will integrate the manufacturing shop floor with upstream supply chain organization and downstream customer organization through smooth data flow enterprise-wide and with horizontal and vertical integration.

Trend 3: 5G powered remote operations and maintenance boosts efficiency across the value chain

Remote operations and maintenance are becoming important enablers to enhance remote operability, sustainability and monitoring in real-time for enhancing efficiency across the value chain. The Round-Trip Time (RTT) - a network request from initiation to destination for a given workflow must be minimal, underlining the need for a 5G cloud network, which addresses lower latency and seamless connectivity requirements. Cloud computing and AI on edge for data-intensive processes such as inventory consumption, critical to quality (CTQ) assessment, and

online process inspections mandate 5G technology as the digital foundation layer for efficient connectivity. The need for an intelligent alert system from connected IoT devices with operation and enterprise layers necessitates highly stable network connectivity for overall system performance. 5G will provide a seamless and secure communication channel between OT and IT for data ingestion, analytics and reporting. The demand for multiple communication layers with multi subsystem configuration in discrete manufacturing will utilize network slicing with 5G technology. Industry 4.0 and 5G initiatives enable remote shared services that connect central processing and operation teams with production, machines, processes and maintenance workflows in real-time.

> Infosys collaborates with clients to design and develop unmanned and remotely operable platform solutions across the value chain. Inbound logistics, for example, can be remotely operated for efficient and autonomous material movement. The fault tree data for equipment is managed with a cloud-based, AI-enabled diagnostics solution. High-end operational analytics are carried out for equipment operation and maintenance data to improve their utilization. These platforms are enabled with VR, AR to carry out contactless remote maintenance as an immersive experience.

Trend 4: 5G influences accelerated adoption of unmanned technologies like robotics, autonomous and drone systems

Manufacturers are accelerating the adoption of unmanned solutions to achieve higher efficiencies in the supply chain, logistics, surveillance and monitoring.

Unmanned movement of material in manufacturing demands intelligent navigation systems and remote monitoring with secured communication. 5G's lower

latency and high data transfer rate affirm its utility in autonomous mobility. Constant remote monitoring and situational awareness activate real-time responses for safer navigation on the shop floor. Furthermore, 5G enables faster data transmission by capturing images, sending the data for processing on edge with an AI layer for controlling as per the business layer. Track and trace will be used more often as real-time movement tracing and action will be possible with 5G.

Smart warehouse operations today use unmanned aerial vehicles (drones) for video capture of inbound inventory. Drone systems help with vision-based inspection for mission-critical systems. Autonomous mobility platforms improve the supply chain efficiency of both inbound and outbound logistics. Industry 4.0 solution integration expects autonomous guided vehicles to optimize infrastructure and connect autonomous technologies with the supplier ecosystem for scheduled intelligent delivery systems (JIT), enhancing overall efficiency. Collaborative robotics systems improvise productivity and overall equipment efficiency.

These unmanned technologies will create flexible manufacturing floors through infrastructure transition with integrated unmanned mobility solutions and digital platforms across the value chain.

> A leader in electric mobility services developed autonomous vehicles and robotic platforms to amplify human potential and enhance human safety and security. For this Infosys client, the advanced work was achieved in a 3D environment by utilizing next-generation platforms built on AI, machine and deep learning.

Connected vehicles: Internet of mobility

Connectivity, device and edge infrastructure will be instrumental in transforming the connected vehicle industry. 5G-led connectivity layer will play an important role in this journey. In H1, the vehicle connects to the cloud and provides important alerts to the enterprise on vehicle location and key parameters to track, monitor and assess the health and safety of the vehicle. The vehicle connects to smartphones and wearables to provide real-time information. The vehicle acts as a WiFi hotspot, which helps it navigate smoothly in confined and controlled environments like smart campuses.

In H2, the vehicle communicates with the network with additional bandwidth and higher performance. This enables more data available remotely to provide assisted driving. The vehicle is semiautonomous and guided. The performance of autonomous navigation in confined and controlled environments improves further.

In H3, 5G will enable fully autonomous vehicles in controlled and natural environments like densely populated areas. It will enable a complete cellular vehicle to environment (V2X) communication,

including Vehicle to Vehicle (V2V), Vehicle to Pedestrian (V2P) and Vehicle to Infrastructure (V2I). In addition, the vehicle will possess next-generation features of diagnostics and prognostics that result in increased safety and sustainability.

Trend 5: 5G-enabled connected car platforms is a winning proposition for all stakeholders

Vehicles interacting with the cloud in real-time via 5G provide important alerts to the enterprise about location, operational parameters and emergency alerts. This data can be used by various stakeholders of the ecosystem like vehicle owners, dealers, insurance providers, traffic regulators and others to enhance the system efficiency, reduce the cost of operations, improve overall safety and enhance sustainability. Operational parameters help assess driver patterns and the vehicle's performance. The vehicle OEM can utilize this information to improve the current vehicle variants' performance and design

better vehicles in the future. The health and condition of the vehicle can be assessed in real-time, reducing the operational and maintenance costs of the vehicle. The data can be used for multiple purposes, including managing warranty claims and OEM costs, tracking the driver and owner behavior to assess insurance requests and claims. At the same time, local authorities can utilize the vehicle's movement data to monitor and streamline traffic. Fuel consumption data can be monitored to assess environmental impact and sustainability. The ecosystem can utilize the performance and additional bandwidth provided by 5G.

Many automotive majors have either already rolled out 5G-enabled services or plan to do so. For example, Audi, BMW, Ford, and Tesla are deploying cellular vehicle-to-everything (C-V2X) technology to improve connectivity and safety. 5G's low latency will enhance the reliability of C-V2X and enable better cellular connectivity to traffic signals, school zone beacons, and emergency vehicles. 5G will help **Skoda** implement the wrong way driver warning system through an application called Traffication. **BMW** is the first European automaker to use 5G on the road. It allows the company to integrate an

array of semiautonomous driving systems that require guaranteed, low latency network coverage to function as intended. Finally, **Mercedes-Benz**, together with telecommunications company Telefónica Deutschland and network supplier **Ericsson**, is establishing the world's first 5G mobile network for automobile production in its "Factory 56" in Sindelfingen."

A Japanese automotive OEM leader built advanced infotainment and a connected car platform in partnership with Infosys. The solution components are a cloud platform for services, 5G for communication, a customer care call center and third-party services that include music, weather forecasts and maps. In addition, the display unit has an operating system, firmware, infotainment apps, service APIs, a voice assistant and the head unit hardware.

Trend 6: 5G makes vehicle-to-everything (V2X) communication pervasive

The impact of advanced technologies on the connected vehicle industry has made communication, information and control an everyday aspect. 5G-enabled telematics control units (TCUs) help V2X communication smoothly lay the infrastructure for automated driving and elevates automotive safety, reliability and user experience.

5G-enabled V2X helps enhance situational awareness between vehicles, accommodating both routine and urgent traffic situations. Cross-intersection warnings, emergency vehicle notifications, and blind spot warnings can help prevent accidents. As a result, road detours, lane changes, traffic flow and traffic accidents can be better managed. Pedestrians will benefit from the safety enhancements through V2X on their mobile phones, driving through a new cellular V2X (C-V2X) protocol defined as part of the 5G network standard.

V2X Communication	Description	Benefit
Vehicle to Vehicle	Direct communication with other cars	Vehicles can share current position, critical traffic alerts in the event of accidents
Vehicle to Infrastructure	Communication between vehicles and road infrastructure	Vehicles and traffic lights can communicate in a smart network to avoid traffic jams
Vehicle to Devices	Communication between the vehicle and any electronic device	Vehicles can detect cyclists or pedestrians with smartphones or smartwatches
Vehicle to Home	Communication between the vehicle and the owner's smart home	The smart home knows when the vehicle will reach the house and turns on heating and lights

Source: Infosys

A North American provider of transportation services to schools across various districts launched a next-generation fleet management solution. The solution built in partnership with Infosys improved customer experience, optimized routes, reduced driver labor and provided deep insights into driving behavior.

Energy and utilities: Improving operational efficiency

The deep penetration of distributed energy resources, electric vehicles, and storage is disrupting energy and utility companies. Digital strategies can equip these firms to handle the changes better and still be customer-centric. 5G wireless transmission can further accelerate digital strategies. It can make fully automated and reliable smart grids a reality by transmitting high-quality data collected from millions of edge devices at high speeds and analyzing the data for efficient operations. Enterprises must rely on 5G capabilities to tackle key issues like monitoring and controlling millions of edge devices, improving the health and safety of employees, facilitating remote maintenance and repair and reducing costs of asset management. 5G is envisioned as a global technology standard for various future use cases like fast and reliable self-healing networks, automated operations, and advanced grid analytics in the energy and utilities domain. A study from the Infosys Knowledge Institute adds that enterprises intend to harness 5G's capabilities in digital oil fields, analytics-driven optimization of oil well location and production and security.

Trend 7: A mobile workforce empowered by 5G delivers increased efficiencies

The utilities industry is asset-intensive and invests significant time and money in managing and maintaining them. Today, asset management is handled by thousands of field technicians manually inspecting the sites spread across vast geographical regions. Challenges such as increasing the productivity and efficiency of the workforce, decentralizing operations and dealing with an aging workforce also plague the utilities industry. These challenges trigger digital workforce solutions by enabling the field technician remotely through AR/VR/MR capabilities. The onsite field technician equipped with a VR headset can stream a high-definition video of the equipment, seek expert guidance remotely and fix the issue in a single truck roll.

A major energy company in the Netherlands needed a solution for remote maintenance. Infosys collaborated with the company to develop an AR/VR solution to facilitate remote troubleshooting and maintenance of underground equipment. At the same time, this solution enabled easier access to experts and was timely in the current pandemic situation.

Trend 8: 5G-enabled solution to contain the risks of wildfires and power outages

Vegetation management is a top priority for utilities and is the most important lever to mitigate risks of wildfires and power outages. A complete view of the current and forecasted vegetation states is critical for an effective workflow to mitigate these risks. Currently, these inspections are performed manually using helicopters/UAV/drones. The inspection data captured is then inspected offline. During the inspection of these captured images, if any issues are detected, the drone or helicopter must be redeployed to get additional information. Unfortunately, by this time, it may be too late to handle the issue. With 5G, many high-definition images and videos can be captured in real-time and transmitted at a very high speed. The AI and deep learning-based solution helps isolate vegetation from the power lines and compute safe clearance distance from the vegetation. If any issues are detected, the drones can zoom in to capture high-definition images of the impacted area for further analysis.

A drone operator needed an automated solution to detect vegetation growth near the power line vicinity. Working with Infosys, they developed a drone-based image capture automated solution using sophisticated technologies. The solution eliminated manual efforts and significantly reduced costs and efforts.

Financial services: Strengthening control and security

5G brings in the necessary ingredients - faster speed, low latency, increased device density and tighter security, for the next digital transformation phase in financial services. In addition, it enhances customer experience, allows remote access of branches and connects use cases from different banks. For example, 5G enables "pop-up" branches or mini branches that host less staff while providing a full suite of functionality, including ATMs. Further, financial infrastructure can be set up quickly at disaster zones in emergencies or in remote locations that lack connectivity.

An Infosys Knowledge Institute study shows that 5G use cases in financial services have evolved from creating AR/VR applications or video analytics to those that involve edge computing for better and more secure banking experiences. Edge computing brings network nodes closer to customers enhancing security in real-time. Banks can look beyond biometrics and combine facial recognition with customer's physical characteristics to enhance real-time verification.

The next horizon of 5G will include applying autonomous actions that require high reliability and coverage of the network. This will be driven primarily by end-to-end autonomous needs and zero-touch. In addition, banks can utilize data generated from use cases and connect multiple use cases to deliver better outcomes.

TREND 9: 5G-led remote supervision of financial devices reduces cost and time to market

Testing at-the-site devices is challenging, especially for ATMs or points of sale, as it is expensive to ship them offshore to test.

Due to the lack of bandwidth, testing also becomes monotonous and repetitive over time. The unavailability of remote testing leads to a large onsite testing team resulting in higher costs. It is also difficult to provide continuous software upgrades

24/7. The lack of elimination, automation or shift-left increases the time to market for products, services and technology.

Automation and 5G enable this. With higher speed, lower latency, and edge computing, 5G enhances the testing experience by improving connectivity and the robotic arm's level of interaction. While this is still in the nascent stage, its applicability could help test remotely and quickly:

- Card presentation (swipe, inset of tap-to-pay) at POS
- Non-card actions such as configuration and void
- Touch screen and keypad entry
- Image processing through dynamic OCR

5G-enabled remote testing helps lower operating costs and the time to market. This could potentially bring in a 30% to 60% improvement in productivity and reduce the cost of quality by over 60%. In addition, it allows for 24/7 testing of continuous infrastructure software upgrades and enables end-to-end automation.

> A North American payment processor built a robotics-based test automation solution to test POS terminals, ATMs, teller machines and mobile applications. The platform for this Infosys client was integrated with client-specific and third-party tools to automate end-to-end. This solution is applicable through 5G adoption and reduces the cost of additional connectivity infrastructure. Further, 5G provides greater flexibility to robotic arm interactions with devices and is currently in the initial stages of implementation.

TREND 10: 5G strengthens autonomous security

Testing is not only limited to devices — mobile applications developed for customers and employees need to be tested in ways that simulate user interactions. 5G, when combined with quantum cryptography, can help test and secure mobile

banking applications and the data within. For example, to boost its mobile application's security with 5G quantum cryptography technology, South Korea's DGB Daegu Bank partnered with SK Telecom. The mobile app enables customers with a Samsung Galaxy A-Quantum handset to use the quantum random number generator (QRNG) to generate random numbers for one-time passwords during banking transactions.

When blended with spatial computing-enabled visualizations, 5G can enhance VR features. For example, Banco Santander allows customers to virtually visit its Santander work café at the bank's office using VR and edge computing technologies. VR or AR provided on 5G enhances a bank's infrastructure and better equips AI to perform real-time analytics on customer data. Banks can then offer new products and services to customers, improve the experience and provide more choices. Increased device density also allows real-time data flow allowing hyper-personalization and predict customer preferences better.

Low latency through 5G also allows insurance providers to use drones more effectively — insurers can precisely review property locations and evaluate property damages for quicker and real-time insurance processing.

> An Australian financial institution sought Infosys' expertise to build a robotic arm intervention to automate application peripheral testing. Modeled on the Infosys Long Arm solution, this solution helped reduce the cost of quality by 66% per cycle with an annual savings of AUD260,000. In addition, 5G enhanced the functionality of the robotic arm through better connectivity and increased response rate.

Retail: Building connected stores

5G empowers exciting technologies such as AR and VR and interactive digital walls in the retail sector. At the same time, for consumer goods companies, it delivers efficient and intelligent supply chains and enhances visibility and tracking in the logistics sector.

A study by the Infosys Knowledge Institute shows that the always-on network has important implications for this sector that is constantly looking to improve the consumer experience. Ultra-low-latency connectivity and ultra-reliability will be the most pertinent attributes of 5G for this sector. In addition, using AI and ML technologies in conjunction with 5G will be key to building use cases to bring in new revenue streams and customers.

Trend 11: Connected retail stores with 5G, Edge

Building smart stores and creating interactive user experiences using 5G and edge computing are priorities for retailers. Edge devices such as sensors and cameras in stores can help understand product interactions and movements in the store. Insights garnered from the analysis of consumer behavior can aid in building personalized consumer experiences. Analysis of interactions between customer representatives and consumers can provide additional ammunition to improve customer service further.

Ultra-low latency and large bandwidth provided by 5G-powered real-time analytics would help store executives assist customers in their purchases. 5G-powered edge platforms can also help in optimizing store operations and inventory management. Insights on consumer demands and expectations, reliable connectivity, and effective store management would be pivotal in creating highly profitable retail stores that provide the best customer experiences.

A large US retailer enhanced its in-store experience. Infosys as its partner, banked on 5G, edge capabilities and the retail storefront analytics platform to make this happen. Handsfree shopping provided a safe shopping experience in COVID-19 times. At the same time, real-time store statistics and insights on purchase patterns led to effective inventory management. As a result, the firm increased its in-store conversion rate by understanding its customers better and elevating their experience.

References

1. 5G Ecosystem Report, July 2021, GSA

2. Ericsson estimates USD 31 trillion 5G consumer market by 2030, November 2020, Ericsson

3. Verizon Business and Mastercard Partner to Bring 5G to the Global Payments Industry, July 2021, News Center

4. DISH and AWS Form Strategic Collaboration to Reinvent 5G Connectivity and Innovation, April 2021, Amazon

5. Premiere for 5G networks in aircraft maintenance, February 2020, Lufthansa Technik

6. 5G Device Ecosystem Report, July 2021, GSA

7. LTE to 5G Report, July 2021, GSA

8. IHS 5G Economic Impact Study 2019, Qualcomm

9. How The Right Automation Road Map Helps Overcome Human Error, November 2018, Forbes

10. 5G and the promise of futureproof factories, March 2021, Ericsson

11. Challenges Associated with Implementing 5G in Manufacturing, June 2020, MDPI

12. Why private 5G networks are on the rise, February 2021, HPE

Contributors

Anunay Kumar	**Krishnananda Shenoy**
Anurag Pan	**Nikhil Rajendra**
Arunkumar Ranganathan	**Rachana Hasyagar**
Balaji T	**Rajagopal KS**
Dr. Ravi Kumar G. V. V	**Rakhi Mullick**
Dr. Manish Kumar	**Ramachandran Sundararajan**
Dr. Satish Balantrapu	**Ramesh Kalyana Sundaram**
Dr. Sreekanta Guptha BP	**Sanjeev Kumar**
Gnanapriya C	**Sharan Bathija Pradeep**
Govindadas H Pai	**Shashank Mathur**
Hariharan B	**Sreekanth S.S.**
Jinu Koshy	**Ullas Krishnan**
Kavoori Srinivas Indeevar	**Vishwanath Taware**

Producer

Ramesh N

Infosys Knowledge Institute
ramesh_n03@infosys.com

About Infosys Knowledge Institute

The Infosys Knowledge Institute helps industry leaders develop a deeper understanding of business and technology trends through compelling thought leadership. Our researchers and subject matter experts provide a fact base that aids decision-making on critical business and technology issues.

To view our research, visit Infosys Knowledge Institute at infosys.com/IKI.

Infosys

Navigate your next

For more information, contact askus@infosys.com

Stay Connected