



The Impact Of 5g On The Evolution Of Automation And Industry Digitization

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ABSTRACT

The mobile phone industry is developing and preparing to implement fifth-generation (5G) networks. It's getting easier to replace 5G networks, a key driver of growth in IoT and other smart automation applications. Advances in intelligent automation require lightning-fast and low-latency connectivity through 5G - Internet of Things (IoT), artificial intelligence (AI), driverless cars, digital reality, block chain and future breakthroughs we can't even imagine. 5G won't just be a generational advance; opens up a new world of possibilities for any tech business. The purpose of this article is to examine and discuss how 5G can assist or facilitate smart automation in different industries. This article examines development of several generations of mobile networks, highlights the importance of 5G's revolutionary network, examines its key technologies, determines its trends and challenges, discusses its use in different manufacturing industries and discusses its role in shaping it. The era of endless connectivity, smart automation and digitization of work are emphasized.

Keywords

5G · 5G networks · Cellular wireless networks · Mobile communications · Internet of Things (IoT) · Internet of medical things (IoMT) · Industrial Internet of Thing · Wi-Fi 6 · Enhanced mobile broadband (e MBB)

Introduction

Targeted theories about the link between 5G and COVID-19 have circulated online, arguing that elites around the world are using 5G to spread the disease. Needless to say, there is no evidence to support the theory that 5G networks cause or contribute to the spread of COVID-19. The purpose of this study is to conduct data analysis and explore the impact of the revolutionary 5G network technology on the digitalization of the economy and the development of smart automation. Impact 5G networks are in the early stages of adoption. Based on the business applications presented in this article, experts will understand the business potential of 5G, 5G address issues, drivers of change, barriers to entry, and key areas of concern regarding the use of 5G technology for their organizations. Authenticity/Value this article examines the important role. Different industries including the Internet of Things, Automotion Industry and Smart Cars, Manufacturing ,Smart Cities, healthcare. He discussed how important 5G is for digitizing the growing economy and solving the many challenges that different industries will face in this rapidly changing environment. Finally, the article explains the important role 5G will play in providing the right platform to support the widespread use of basic communication services and enable the digitization and automation of the economy, copying practices and methods for Business 4.0. Research Constraints While the journey to 5G networks has begun, little has been reported about how manufacturers understand the benefits for businesses from this new urine technology. Lack of reporting leads to incomplete data, the implications of which are often questionable

and not particularly thoroughly studied. Only a few articles have been published in peer-reviewed scientific journals or case studies about the advantages and limitations of companies using 5G technology. This article is an important part of early research in the field of consultant definition and commitment.

Evolution of Cellular Wireless Networks

Since the first 1G system was launched in 1981, cellular wireless networks have come a long way with the emergence of a new generation of cellular networks every 10 years (Pathak 2013; Mishra 2018). In the last 30 years, the mobile industry has transformed society through 4 to 5 generations of technological innovation and change, such as 1G, 2G, 3G, and 4G network technology (Figure 1). 1G gives us a cell phone for big business. 2G provides global interoperability and reliable mobile and open SMS messaging. 3G provides us with high-speed data transfer capabilities to download data from the internet. 4G has increased data capacity and speed and brought online platforms and high-speed internet services to large audiences. With 5G technology, unmatched data capacity, unlimited volume, and unlimited data transmission, it will be the most powerful mobile phone

The following sections describe each generation of mobile phones in more detail.

1G Analog Cellular Network The first commercial automated 1G cellular network was established in 1979 by NTT in Japan and by Bell Labs in the United States in 1984. The 1G network is based on an analog protocol at 2.4 Kbps (1 kilobit = 1000 bits) and is designed for voice. 1G supports the use of multiple mobile phones and the ability to transfer calls

from one site to another as the user moves mentally while searching. 1G has many disadvantages such as low capacity, unreliable transfer rate of and weak audio. The first phones based on analog technology were huge. Voice calls echo in radio towers, making these calls vulnerable to unwanted strangers .2G Digital Networks Introduced in the early 1990s, second-generation (2G) wireless networks are based on digital standards rather than analog. 2G digital networks enabled fast phone-to-network signal and led to the emergence of prepaid mobile phones. In addition, 2G, which started as SMS messaging, can be made in GSM networks and finally in all digital networks. Other benefits of 2G digital networks include less battery consumption, clearer voice, and less noise. Digital encryption provides privacy and security for data and voice calls.

3G - High-Speed Data Networks Third-generation (3G) wireless networks introduced in 1998 provide high-speed data transfer capabilities for downloading data from the internet and sending video at 2 Mbps (1Mbit = 1000 bit). 3G technology uses a network of base stations to connect signals, providing a stable connection for a long time.

The maximum download speed is 7.2 Mbps and the upload speed is 2 Mbps. In the mid-2000s, the enhanced 3G cellular communication protocol (also known as 3.5G, 3G+, or turbo 3G) began to be used in the High-Speed Packet Access (HSPA) family. 3G+ provides more data transfer and capacity in Universal Mobile Telecommunications System (UMTS) based networks (Mishra 2018).

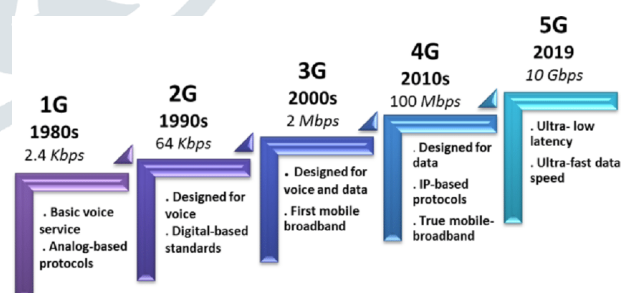
4G - The Evolution of Mobile Broadband The fourth generation (4G) wireless network was commercialized by Verizon in the US in 2011,

promising 10 times faster than the current 3G technology. Standard 4G has a download speed of about 14 Mbps and can reach 150 Mbps. 4G networks are based on IP (Internet Protocol). It even uses IP for audio files. It sends and receives information in packets using standard communication methods.

Using this packet standard, 4G allows data to travel across multiple networks without interference or degradation. 4G network technology is an extension of 3G technology with greater bandwidth and the ability to stream audio/video with services. 4G provides more data capacity and speed than 3G systems at a 100 Mbps data transfer rate. 4G systems essentially make a change in favour of an all-IP network design for data. 4G allows users to browse the web and stream high-definition videos on mobile devices.

4G networks allow users to download gigabytes of data in minutes or even seconds. These technologies transform smartphones into modern computers

Fig.1 The evolution of mobile communications



5G – Innovate over many Fifth Generation Service (5G) networks at speeds of 1–10 Gbps (1 Gbit = 1000 Mbit), this 4G Long Term Evolution (LTE) represents the mainstream level of telecommunications soon. 5G systems are expected to be available at the end of 2019. 5G technology provides unmatched data capabilities and unlimited data transmission in new mobile operations. Other features of 5G networks include enhanced mobile

broadband, dynamic low latency, wide bandwidth, device-centric mobility, simultaneous redundancy, and reliable device-to-video connectivity .

Key features of 5G network

5G network provides lower cost, lower battery consumption, and lower latency than 4G wireless network. This is because 5G uses higher bandwidth ultra-wideband (UWB) networks at lower power levels. With a bandwidth of 4000 Mbps, it is four hundred times faster than 4G wireless networks. The 5G communications network can provide hundreds of millions of connections, large-scale communications systems, and massive mobile networks. In addition, 5G provides 1-millisecond ultra-low latency, 90% energy efficiency, 99.9% ultra-reliability, 10 Gbps peak data transfer rate, and 10 TB mobile data

The following sections describe the main features of 5G networks.

A. 5G networking standard

5G networking technical standard is divided into two main parts:

1. The first group of Non-Standalone (NSA) 5G networks is based on the NSA, which is the basis of business, used at the end of 2019. . . The NSA model uses existing 4G LTE infrastructure for aircraft control and traffic guidance.

2. Standalone (SA) 5G Standalone (SA) adopts a new core architecture. It shifts the control plane to the 5G core and makes a significant change in the way the network works.

SA will be released in 2020 - it will support simpler connections and subcarrier encoding. It is designed to be more efficient than 4GLTE and NSA and will reduce costs for operators

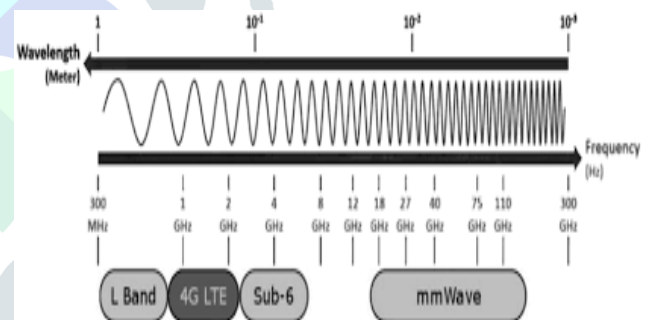
and increase performance for users (Cero et al., 2017).

b. Extended Network Spectrum

According to Cisco's 2017 research, the use of wireless networks will grow growth rate of 47% through 2021. The speed will increase from 10 Gbps and give 5G is an evolving standard that combines more spectrum and provides consumers with more bandwidth and higher speeds. By connecting to 5G networks, customers can benefit from a variety of spectrums.

The most widely used 5G technology is mm wave. Operators will also use the new spectrum on existing sub-6GHz WiFi , sub-1GHz low band, and 4G LTE bands, as shown in **Figure 2**. Band-width

Fig.2 Networking Spectrum bands



5G network technology also relies on different parameters. A wireless network consists of cellular base stations divided into sectors that transmit data over radio waves. Fourth-generation (4G) long-term transmission (LTE) wireless technology requires high-power, large mobile phones to spread the signal over long distances.

On the other hand, 5G wireless signals will be transmitted from many small stations in places such as lampposts or roofs. Because 5G is based on the mm Wave spectrum between 30 and 300 GHz, it needs to use a lot of small

space as it is short-patchable and affected by weather and engine.

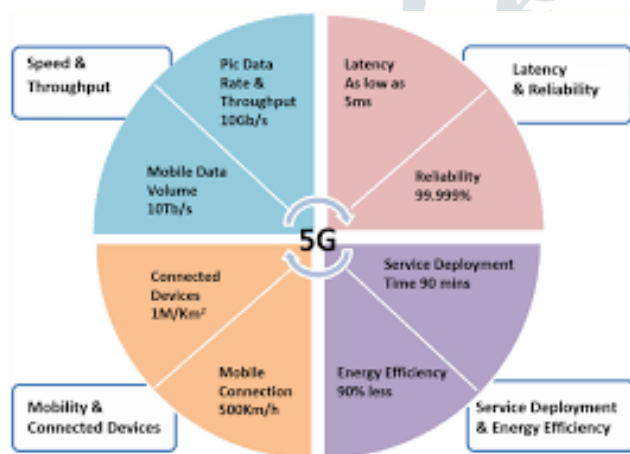
C. New Technology Innovations

5G uses some key innovations that increase the spectrum used to send and receive more data compared to today's 4G LTE networks. This technology provides customers with more bandwidth and higher speeds.

Shown in Figure 3 and described below

- A. The mm wave has frequencies from 17 to 110 GHz and high bandwidth for high-speed data transmission. It is a short-term technology to be used in crowded areas. It is also the latest 5G technology.

Fig.3 5G Networks Capabilities



B. Below 6 GHz Most future 5G networks will likely operate on WiFi like mid band frequencies between 3 and 6 GHz. It will cover the medium spectrum and is good for a small base station for indoor use or a more powerful outdoor station.

C. Low Band Operates at very low frequencies below 800 MHz, covering long distances.

Both technologies are designed to provide similar services with the core mission of delivering gigabit-plus to end users.

Wi-Fi 6, like all other Wi-Fi technologies, operates on unlicensed bands that do not require a license. In the case of licensed frequency bands, a company pays a license fee for the right to transmit on the selected channel in each region's frequency band. The license ensures that wireless carriers do not interfere with transmission. Unlicensed technology has no problem affecting interference.

It also provides bone support.

D. Beamforming This important technology enables beamformers (routers) to send signals to user devices, creating better, faster, and more reliable wireless communication. Beamforming is an important technology for overcoming the spectral range and limitations of high-frequency waveforms.

E. When unlicensed technologies such as Wi-Fi are used, end-user intervention can be prevented. Additionally, the radio environment may change over time .

5G is a carrier-based cellular technology. 5G operators get special licenses for certain blocks in certain areas through competition. They can build their unique networks to meet specific needs, capabilities, and business goals.

Transmit and receive large MIMO data using multiple antennas at the base station to serve multiple end users. This technology makes communication more advanced. Can be combined with beam forming.

D. Special Features of 5G Networks

5G networks have enhanced support for machine-to-machine communication aiming at lower cost, lower battery consumption, and lower latency.

So interference shouldn't be a problem. 5G and cellular are superior to Wi-Fi and Wi-Fi6 in many ways.

5G uses higher bandwidth ultra-wideband (UWB) networks at lower power levels. With a bandwidth of 4000 Mbps, it is 400 times faster than modern 4G wireless networks (Figure 3). 5G communications can provide millions of connections, large-scale communications, and mobile applications. In addition, 5G provides low latency of 1 ms and is 90% more efficient, 99.

9% ultra-reliability, 10 Gbps maximum data transfer rate and 10 Tb mobile data.

E. Impact on Download and Stream Times

Download speed is measured as the amount of data (such as web pages, images, apps, or videos) transferred from the Internet to your computer or smartphone. They are measured in "bits per second" (bps), where "bits" are 1 or 0 in binary. But we usually measure speed in "megabits per second" (Mbps), where 1 megabit equals one million bits.

Higher download speeds can improve streaming and make content on the Internet load faster with less lag. (Ken's Tech Tips 2018). Nowadays, Voice over IP (such as calls via Skype or Whats App), online video applications (For example, Netflix and YouTube) . When content isn't downloading fast enough, we experience stuttering (also known as "buffering") during gameplay. Actual download speed will depend on several factors, including location (whether you are indoors or outdoors), distance from nearby mobile phones, and network connection level. 5G network download times for web pages, emails, photos, and music are as close as possible .

Another advantage of 5G networks is lower latency. Also known as "latency" or "ping", the delay is the first delay before the server at the other end begins to respond. Only after the server responds will the download continue. This is an important concept that impacts the end user's smartphone experience. High-latency connections can cause web pages to load slowly.

It affects the experience of apps that require real-time connectivity, such as phone calls, video calls, and gaming apps. The main benefits of 5G are reduced latency, increased capacity, and faster downloads. The human response time is 200-300 milliseconds. 5G will reduce this to 1 millisecond or less. It's almost time.

F. Wi-Fi 6 and 5G Networks

Wi-Fi 6 is the latest wireless LAN technology developed in conjunction with 5G and is expected to be available at the same time as 5G. Both technologies are designed to provide similar services with the core mission of delivering gigabit-plus to end users. Wi-Fi 6, like all other Wi-Fi technologies, operates on unlicensed bands that do not require a license. In the case of licensed frequency bands, a company pays a license fee for the right to transmit on the selected channel in each region's frequency band. The license ensures that wireless carriers do not interfere with transmission. Unlicensed technology has no problem affecting interference. So interference shouldn't be a problem. 5G and cellular are superior to Wi-Fi and Wi-Fi6 in many ways.

Authentication - Employee circulation is transparent. It is also easy to connect to the mobile phone; Just turn on the mobile phone, while Wi-Fi usually needs to choose the

available SSID and provide a security key. expects both technologies to be used by end customers in the future, bringing them closer to the best network. For example, the mobile phone market could support both technologies from 2020 (Mathias 2019).

3 Business Services of Intelligent Automation and 5G Networks

Manufacturing is turning to digitization for many reasons, including increased revenue from better customer service, increased demand, beating competitors, reducing costs through productivity and efficiency, and improved safety and security. Reducing the risk.

A recent study identified the key challenges and needs of digital marketing. These requirements include:

- Provides ultra-reliable, durable, and instant connectivity to millions of devices.
- Lower price with longer battery life.
- Asset Tracking

Throughout an asset transaction.

- Perform telemedicine procedures.
- Enhance the shopping experience with AR/VR.
- Apply AI to improve multi-site or business-wide

. Offering a high-speed, reliable, and secure broadband experience,

5G will become an important technology that supports the digital development of the economy. It will provide the network and platform to support digitization and automation for Industry 4.0.

It will support the large-scale deployment of smart IoT and widespread use of critical communication services (GSMA 2017).

In summary, 5G networks enable service providers to create virtual networks according to the needs of applications such as:

- Mobile broadband communications, infotainment, and Internet
- Machine-to-machine (Massive IoT) retail, shopping, manufacturing
- Reliable Low-latency automotive, medicine, smart city
- Critical communication
- Business, energy, etc.

A for Internet of Things (IoT) Definition of Internet of Things

"Internet of Things" (IoT) is the Internet of other networks and Extensions connected with different sensors and devices (or "things"). The idea is based on the general rule that "everything that can be connected will connect".

This includes car engines, airplane engines, oil rigs, washing machines, coffee makers, cell phones, wear, and more. The Internet of Things can also provide higher levels of computing and analytics capabilities for individual products. IoT is a rapidly growing technology and more and more businesses are willing to adopt it to improve their operations. Smart terminals, mobile broadband, and cloud computing provide broad connectivity, changing the way we perceive the world around us (Attaran 2017b)

B. IoT Architecture and Principles of Operation

Figure 4 shows the main architectural layer of the IoT architecture.

The features of each of these layers are discussed below

1. Wireless Sensor Actuator and Network Layer – This layer consists of sensors, RFID tags, and network connections. They create the "stuff" of IoT systems and collect data in real-time. The sensor converts data from the outside world into data for analysis. Actuators affect physical reality; they can turn off the light and adjust the temperature of the room.

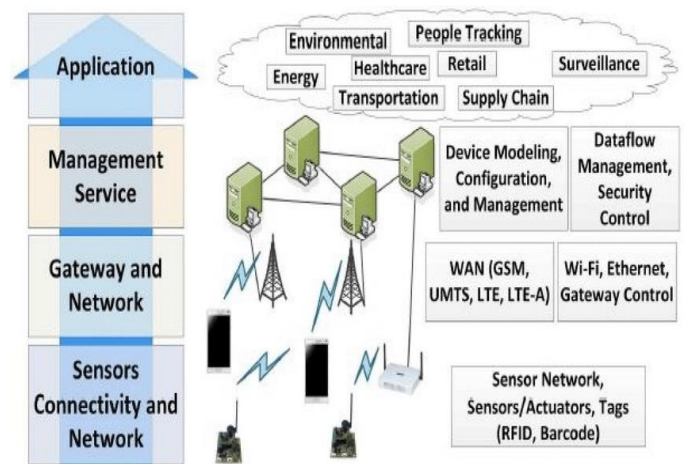
Sensors and actuators encompass and tune everything needed in the physical world to gain the insights needed for further analysis.

2. Internet Escape and Data Collection System This provides both digitization and data collection. The rest of the internet works via Wi-Fi, networking, signal processors, microcontrollers, and conferences including LAN (Local Area Network), WAN (Wide Area Network), and more. The role of the gate is to move on to the next layer by sending data from the sensor, link, and other layers.

The data acquisition system (DAS) connects to the sensor network and collects the output. This stage processes the big data collected in the previous stage and compresses it to one size for further analysis.

3. Edge IT-Management Services This process is responsible for data mining, text mining, IoT device analysis, and information analysis (flow analysis, data analysis).

Fig.4 IOT Architecture Layers



and property management. This phase provides the preparation of data with analysis and prioritization before being exported to a data center or cloud for further analysis. Edge IT systems are close to sensors and actuators and form a cabinet.

4. Data center and clouds The main processes of data analysis, management, and storage will take place in data center or clouds.

Deepening can be done at this stage with subsequent changes in response to feedback.

The following sections examine how 5G networks can improve the process of various layers of the IoT architecture.

C. Mainstream Adoption

IoT is an emerging technology. Over the last few years, IoT-enabled devices have gotten wider, deeper, and cheaper. Sensors and tags are cheaper. Readers and sensors use less power, get smarter, run faster, run longer, and control interference. This means better performance, the ability to use sensors and tags with more information, and easier integration into existing systems without reprogramming. According to several recent studies, IoT adoption is expected to increase in the next 10 years. According to Cisco estimates, there are 11 billion devices

connected to the internet in 2013, 15 billion in 2014, 25 billion in 2016, and more than 50 billion in 2020 - connecting seven "everything" in the world (Evans 2011). DBS Research Group has determined that IoT technology will be adopted massively in Asia in the next 5-10 years (DBS Asian Insights 2018). According to research, IoT achieved 14% global consumer adoption in 2017. With increasing penetration, the IoT adoption rate will reach 18-20% by the end of 2019. IoT technology adoption by consumers worldwide will reach 100% by 2030 (DBS Asian Insights 2018).

D. The Next Stage of Internet of Things Evolution

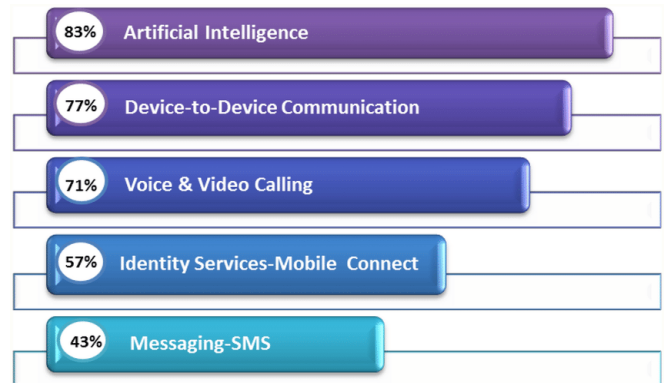
In the last few years, technologies such as Augmented Reality (AR), Industrial Internet of Thing , Edge Computing, and Low Power Wide Space (LPWA) have become available and are the next stage of IoT evolution. In the next few years, more and more devices will connect to the internet and the application of IoT will grow exponentially (Attaran 2017b). In addition, IoT technology is the driving force behind our Industry 4.0 revolution. In Industry 4.0, business processes and related systems are smarter and more modular.

E. The Impact of 5G on the Internet of Things

The 2017 CEO Survey on Potential Uses of 5G revealed five different services that can support and grow as 5G networks expand the business. It is highlighted in Figure 1.5. IoT ranked second on the list, with 77 percent of respondents believing that 5G has broad support for IoT use cases. Gartner conducted another study in 2018 to understand the growing demand for 5G and its adoption plans. The results showed that 65 percent of organizations plan to deploy 5G networks by

2020, specifically for IoT and video communications. They identified the quality of work as the main driver of their decisions

Fig.5 A Ceo Survey Of Possible 5g Applications



Solutions IoT technology currently faces challenges such as multi-node connections and security issues. To meet the diverse applications and needs of different industries, IoT needs to raise performance standards for security, reliability, wireless coverage, ultra-low latency, and broad connectivity. 5G can improve the process of various levels of IoT architecture (Figure 2). 5G could contribute to the future of the Internet of Things by connecting billions of smart devices to interact independently and share information. 5G is seen as an important technology that will play an important role in the continued success and spread of IoT. 5G will introduce new radio technology (RATs), and smart antennas, and use more frequencies when replacing or rebuilding the network. 5G-enabled IoT will help connect many of these IoT devices and will also help meet business needs for wireless services. Fifth-generation (5G) mobile networks will fill the gap in front of IoT. To meet the growing needs of IoT, Long Term Evolution (LTE) and 5G technologies must provide new connectivity for future IoT applications. To meet IoT requirements, 5G mobile phones must guarantee good support for large-scale devices and new services, such

as mobile broadband (eMBB), mainframe communications, critical communications, and the development of network operations. 5G offers end users intelligibility, low latency, fast data transfer, multi-use support of materials, energy efficiency.

The existing 4G and 4G LTE networks cannot support mobile communications over the Internet of Things. 5G can also provide a solution to this problem and provide the fastest data network, less reliability, and better communication compared to the current 4G LTE network technology. The speed provided by 5G will bring innovations. Next-generation 5G will manage hundreds of millions of connections and deliver 10Gbps transfer speeds with ultra-low latency of 1 millisecond. It also reduces service inequalities between urban and rural areas by providing more reliable services in rural areas (Li et al., 2018). While it is the continuation of 5G, 4G, and 4G LTE networks, it has a brand new network and features like virtualization which is more than high-speed data. Network functions virtualization provides the ability to split the physical system into multiple virtual networks where devices can be configured to form multiple networks. This capability will instantly power 5G-enabled IoT applications, increase speed and coverage, and to meet the needs of the application. Virtualization will also enhance the Radio Access Network.

A more detailed description of the performance is as follows:

1. Data Rate is an important parameter for wireless communication network fabrication (Saha et al.

2016). The 5G core network will support both the highest data rates (the maximum data a

user can reach) and the minimum guaranteed user data rates (minimum data (Oughton and Frias 2017)). High data is essential in most projects based on IoT applications. 5G networks support a minimum data rate of 10 Gbps and a guaranteed minimum user data rate of 100 Mbps (5G Forum 2016).

2. Mobile IoT applications have very different mobility needs (relative speed between receivers and transmitters) in 5G networks. Many IoT applications require easy portability, high-speed computing, and advanced connectivity. These requirements may prove very difficult for 5G networks to provide mobility requirements for all types of devices and services (Le et al., 2015).

3. Latency is end-user perceived and is often expressed as end-to-end (E2E) latency. 5G networks will achieve "zero latency" expressed in millisecond E2E latency through significant infrastructure improvements and new technologies. The IoT application determines the level of latency required.

4. Link density is the number of devices connected and/or accessible to an area, eg.

For example, 1 million connections per square meter (Le et al., 2015; NGMN Alliance, 2017). Connectivity on 5G networks is not limited to mobile devices. 5G networks can meet connection and traffic speeds for various functions based on the IoT application set (Amaral et al., 2016). 2016; NGMN Union 2017).

5. Reliability is measured by the maximum packet loss the application process can tolerate. For some IoT applications, such as driverless cars, 5G should provide 99.999% or better reliability. Likewise, trust is an important aspect of monitoring, management,

and control activities. Trust will bring many challenges in the future. High-speed trains are just one example of this challenge.

6. Position Accuracy is defined as maximum fault tolerance by the IoT application form. Authentication is important both in surveillance-based activities such as remote camera monitoring and in control activities such as driving (Blanco et al., 2017). 5G network technologies should be accurate in the field of outdoor equipment, with an accuracy of less than 10 m to 1 m in 80% of patients and better than 1 m for indoor deployment (Elay-obi et al., 2016).

7. Payment Service The 5G core network should be able to form a network according to the user's needs. It should provide connectivity anytime, anywhere with a minimum user data rate of 1 Gbps (Hossain 2013). Almost all project-based IoT applications require very high service levels—99.999% availability (NGMN Alliance 2017).

8. Spectrum efficiency is defined as all data from all users in a unit of spectrum services in a cell or unit area. The minimum peak spectral efficiency is 30 bps/Hz for downlink and 15 bps/Hz for uplink (Liu and Jiang 2016). To achieve good network sustainability, IoT-enabled 5G networks must have 3-5 times.

H. End User's Willingness to Pay for 5G-enabled IoT

In the summer of 2017, Gartner surveyed to measure end-users willingness to pay more for a 5G network technology (Gartner 2017). The majority (57%) of respondents believe that 5G-enabled networks will play an important role in IoT organizations, and their goal is to use 5G to drive IoT communications. Video is the next most popular use, chosen by 53% of

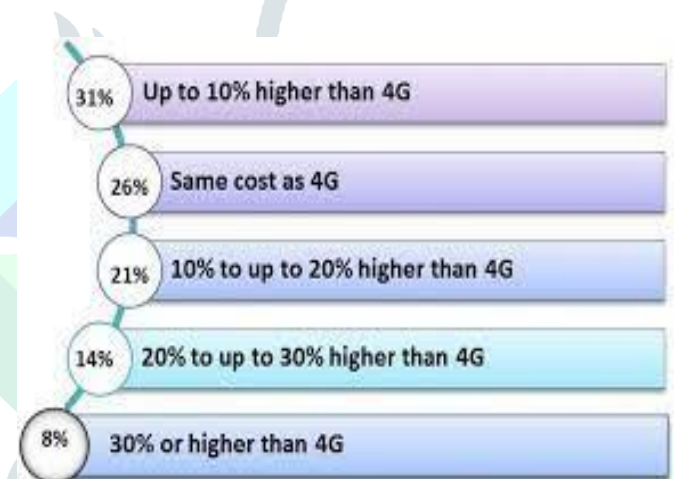
respondents. The study also identified the willingness of research organizations to pay for 5G networks. 57% of surveyed organizations are willing to pay the same or even 10% more for 4G (Figure 6).

5 5G for the Automobile Industry and Smart Cars

A. Rethinking Transportation

Henry Ford rolled his first Model T off the assembly line in 1908, using replaceable parts. This made the production process more efficient - car prices fell and sales increased. In 1918, about 7 percent of American households owned a car. how many cars are nearby

Fig 6 Willingness of organization to pay for 5G



and customers. The economic impact of 5G on businesses will account for approximately 20% of the total global 5G economic impact by 2035 (Condon, 2017). According to the World Economic Forum, the digital transformation of the automotive industry will create \$67 billion in value for the economy between 2015 and 2025. In addition, this transformation will generate \$3.1 trillion in social benefits, including the development of energy-efficient vehicles. and also the transportation industry (World Economic Forum 2015).

7 5G in Healthcare

A. Transforming the Marketing Industry

Allied Market Research estimates that 3.7 million connected healthcare devices are used to support healthcare decisions.

According to his forecasts, the global IoT healthcare market will reach \$136.8 billion by 2021 (Market Watch 2016). The use of IoT in the healthcare industry is unlimited. This concept is called the Internet of Medical Things or "IoMT". It is a collection of Wi-Fi medical equipment.

B 5G Benefits for Healthcare

5G Networks and Services Provide Mobile Health Platforms such as Networking and Intelligence

Production Category Industrial Control and Automation

Planning and Design Monitoring and Monitoring

Production Use Cases

Robotics and Smart Factory Industrial Automation and Control Product Monitoring in the End-to-End Value Chain

Remote from Robotics and Smart Factory Work environment.

Application for recording and monitoring of data, connectivity, so doctors and Nurses can complete patient care anytime, anywhere. 5G technology allows patients to communicate their symptoms and condition using portable devices. With faster speeds and higher bandwidth, 5G-enhanced mobile broadband can help doctors access patient information for care and diagnostics.

5G networks enable factory robots to be more efficient and wireless by communicating their

tasks and locations. Drones can fly over fields and use sensors on the ground to sort, collect, feed, and water crops.

A recent study by Ericsson identified several ways in which the healthcare industry can capture the value of 5G network technology (Ericsson, 2018). These are listed as follows:

- Efficiently store large amounts of patient information.
- Real-time mobile presentation of rich medical information.
- Required capabilities have been enhanced.
- Improve patient information security and better data retention - years.

- Ability to accurately manage telemedicine equipment without delay

- The ability to combine augmented reality and virtual reality to improve education for students.

A recent study has identified several ways the electricity and power industry can capture the value of 5G network technology (Ericsson, 2018). These are summarized as follows:

- Improve the integration of new technologies into existing systems.

- Improved capture and processing of batch files.

- Streamline the automation of distribution, operations, and energy use.

- Enable connection and monitoring of remote sites such as wind farms.

- Improve business management and automation systems.

- Improved application collection and data management.

- Improved use of shared power supplies.
- Advanced sensor integration in microgrids and distributed generation.

B. 5G Smart Cities

And 5G is a key element in enabling better networks in our technological world. For example, smart cities integrate ICT and 5G network solutions into security to manage different functions of the city. These projects include but are not limited to, schools, libraries, transportation, hospitals, power stations, water connections, waste management, police, and other community services. A method must be found to process the various layers of data covering traffic, personal exchange, movement of people, changes in effort, job security, and all important aspects of today's business world.

5G technology can facilitate this integration. 5G technology can facilitate this integration. The revenue from smart cities is incredible. For example, smart water technology can save \$12 billion a year. Sensors fitted to individual vehicles can be connected to overall systems to help manage traffic throughout the city.

smartphones, scanners, laptops, and manufacturers.

It needs to be replaced or replaced, which means additional training and cost for the business. Business infrastructure needs to be updated to take advantage of 5G connectivity. Existing equipment should be updated or replaced with new equipment that supports 5G technology.

9 Summary and Conclusions

A. Summary

5G networks and services will be deployed in stages over the next few years, providing a platform from which new digital services and business models can evolve.

5G will mark a revolution in the future of communications, bringing high-performance connections to billions of devices. It will enable machines to communicate in an IoT environment that can maintain near-end services. With IoT use cases increasing as more and more devices are connected, 5G networks will support the rapid growth of IoT and bring huge benefits to businesses and consumers. 5G networks will revolutionize transportation and reliably connect patients and doctors around the world for better health. As the digital revolution transforms the user

This article examines the critical role of 5G in the success of different industries, including the Internet of Things, automotive and smart cars, manufacturing and smart factories, smart plans, smart cities, and healthcare. He discussed how 5G is essential for the digitization of the growing economy and solves many challenges facing different industries in a rapidly changing environment. Finally, the article explains the important role 5G will play in providing the right platform to support the widespread use of basic communication services and enable the digitization and automation of the economy, copying practices, and methods for Business 4.0.

10 Future Scope

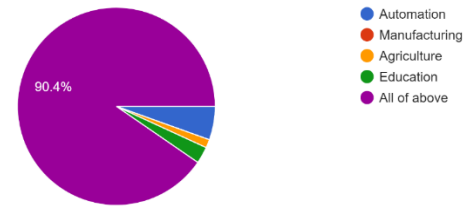
While the 5G network will take some time to complete and deploy, and 5G will continue to evolve as the company moves into the next phase. After its launch in 2020, it is expected to become widespread

rapidly and cover more than a third of the world's population within 5 years.

The impact of the rise of electric power on the transportation industry, society, and the automobile industry. 5G will play an important role in making electric cars and co-driven a reality.

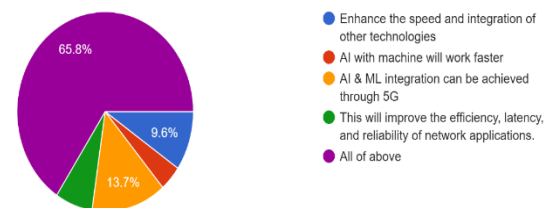
5. What do you think in which sector 5G will be most useful?

what do you in which sector 5G will be most useful ?
73 responses



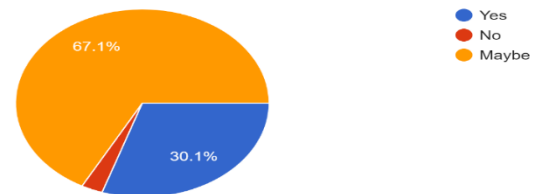
6. What is the impact of artificial intelligence with 5G do you think?

what is the impact of artificial intelligence with 5G do you think ?
73 responses



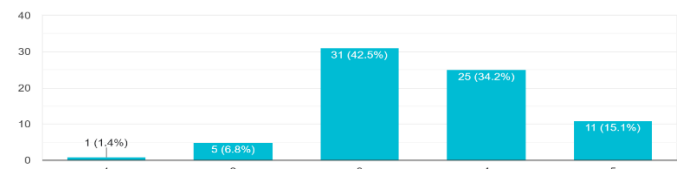
7. Do you think 5G will boost digital economy?

Do you think 5G will boost digital economy ?
73 responses



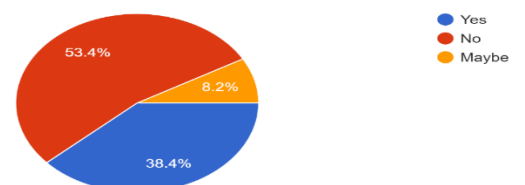
8. Do you feel safe using while these types of networks (e.g., 4G,5G)?

Do you feel safe using while these types of networks (eg 4G,5G) ?
73 responses



9. Does your device support 5G network?

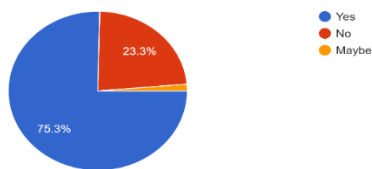
Does your device supports 5G network ?
73 responses



Survey Results

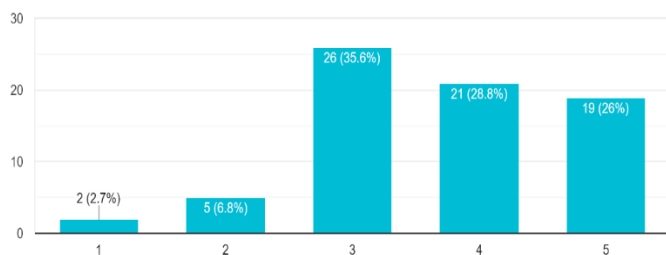
1. Have you heard about 5G?

Have you heard about 5G ?
73 responses



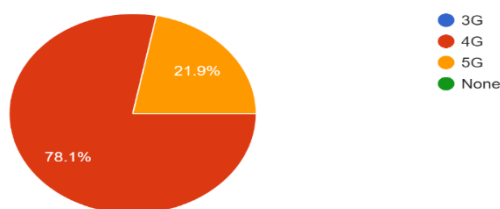
2. What do you think 5G is beneficial for automation industry?

what do you think how much 5G is beneficial for automation industry ?
73 responses



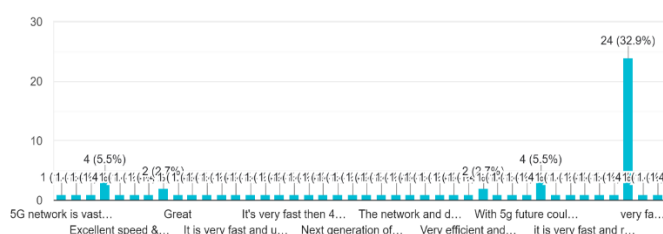
3. What type of network you are using?

what type of network you are using ?
73 responses



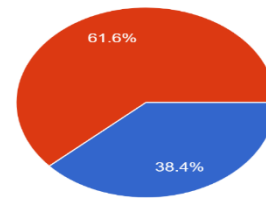
4. What are your thoughts about 5G?

what are your thoughts about 5G ?
73 responses



10. Have you used the 5G network till now?

Have you used the 5G network till now ?
73 responses



● Yes
● No

Descriptive Statistics

1. Have you heard about 5G?

Have you heard about 5G?	
Mean	1.260274
Standard Error	0.055268
Median	1
Mode	1
Standard Deviation	0.472211
Sample Variance	0.222983
Kurtosis	1.274181
Skewness	1.515818
Range	2
Minimum	1
Maximum	3
Sum	92
Count	73

Mean	7.780821918
Standard Error	0.048753782
Median	8
Mode	8
Standard Deviation	0.416552496
Sample Variance	0.173515982
Kurtosis	-0.081171238
Skewness	-1.386295352
Range	1
Minimum	7
Maximum	8
Sum	568
Count	73

2. What do you think 5G is beneficial for automation industry?

What do you think 5G is beneficial for automation industry?	
Mean	3.694444444
Standard Error	0.121349495
Median	4
Mode	3
Standard Deviation	1.029684608
Sample Variance	1.060250391
Kurtosis	-0.297436749
Skewness	-0.384045209
Range	4
Minimum	1
Maximum	5
Sum	266
Count	72

4. What are your thoughts about 5G?

What are your thoughts about 5G?	
Mean	5.95890411
Standard Error	0.081459191
Median	6
Mode	6
Standard Deviation	0.695987631
Sample Variance	0.484398782
Kurtosis	11.72015565
Skewness	1.071846715
Range	5
Minimum	4
Maximum	9
Sum	435
Count	73

3. What type of network you are using?

What type of network you are using?

5. What do you think in which sector 5G will be most useful?

What do you think in which sector 5G will be most useful?	
Mean	2.369863014
Standard Error	0.107742239
Median	3
Mode	3
Standard Deviation	0.920550097
Sample Variance	0.847412481
Kurtosis	-1.337405575
Skewness	-0.812664004
Range	2
Minimum	1
Maximum	3
Sum	173
Count	73

Standard Deviation	0.48961825
Sample Variance	0.23972603
Kurtosis	-1.8112561
Skewness	-0.4890272
Range	1
Minimum	1
Maximum	2
Sum	118
Count	73

6. What is the impact of artificial intelligence with 5G do you think?

What is the impact of artificial intelligence with 5G do you think?	
Mean	3.547945205
Standard Error	0.103296311
Median	3
Mode	3
Standard Deviation	0.882564066
Sample Variance	0.77891933
Kurtosis	-0.053940952
Skewness	-0.087238392
Range	4
Minimum	1
Maximum	5
Sum	259
Count	73

Do you feel safe using while these types of networks (e.g., 4G,5G)?	
Mean	1.69863014
Standard Error	0.07216201
Median	2
Mode	2
Standard Deviation	0.6165525
Sample Variance	0.38013699
Kurtosis	-0.6009341
Skewness	0.28901396
Range	2
Minimum	1
Maximum	3
Sum	124
Count	73

7. Do you think 5G will boost digital economy?

Do you think 5G will boost digital economy?	
Mean	1.61643836
Standard Error	0.05730548
Median	2
Mode	2

Does your device support 5G network?	
Mean	3.694444444
Standard Error	0.121349495
Median	4
Mode	3
Standard Deviation	1.029684608
Sample Variance	1.060250391
Kurtosis	-0.297436749
Skewness	-0.384045209
Range	4
Minimum	1
Maximum	5
Sum	266
Count	72

8. Do you feel safe using while these types of networks (e.g., 4G,5G)?

9. Does your device support 5G network?

10. Have you used the 5G network till now?

Have you used the 5G network till now?	
Mean	1.260274
Standard Error	0.055268
Median	1
Mode	1
Standard Deviation	0.472211
Sample Variance	0.222983

Kurtosis	1.274181
Skewness	1.515818
Range	2
Minimum	1
Maximum	3
Sum	92
Count	73

