

## THE 5G (5<sup>TH</sup> GENERATION) ADOPTION IN BUSINESS ORGANISATION

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### ABSTRACT

Here, we have tried to capture extensively the advantages accruable to business organizations as a result of the adoption of the fifth Generation Technology (5G). The world has witnessed the evolution of Generation Technology over the years. Ironically, in all the Generation Technology, the 5G Technology has proved to be more impactful to business organizations as well as the human existence as the 5G Technology. It is pertinent to note that in the applications of the Artificial Intelligence (AI), in surveillance, in automations, education, film making, communication, health care delivery, etc lapses and breakdowns associated with the use of 4G and other technologies before the advent of the 5G is completely eradicated. Scarce means and resources are conserved effectively as a result of the adoption of the 5G Technology. It is also pertinent to note that the 5G Technology has also got some challenges, some impediments which critics have leveraged to underscore the adoption of 5G Technology. These include religious bias, economic and socio-cultural factors. However, the advantages on the application and use of the 5G technology is much more than any disadvantage highlighted by critics. Adoption of 5G technology will reduce cost of doing business and thus increase profitability. The adoption of the 5G Technology by business organizations is more cost effective, it reduces time of doing business and it is our tomorrow. Our study therefore centres on the pertinent and imperative need to dissuade all fears and for every business organization that intends to thrive progressively to embrace the adoption of the 5G Technology.

***Keywords: Fifth Generation Technology (5G). 5G Adoption in Business Organization.***

### INTRODUCTION

Fifth-generation wireless (5G) is the latest iteration of cellular technology, engineered to greatly increase the speed and responsiveness of wireless networks. With 5G, data transmitted over wireless broadband connections can travel at multigigabit speeds, with potential peak speeds as high as 20 gigabits per second (Gbps) by some estimates. These speeds exceed wireline network speeds and offer latency of below 5 milliseconds (ms) or lower, which is useful for applications that require real-time feedback. 5G will enable a sharp increase in the amount of data transmitted over wireless systems due to more available bandwidth and advanced antenna technology. 5G networks and services will be deployed in stages over the next several years to accommodate the increasing reliance on mobile and internet-enabled devices. Overall, 5G is expected to generate a variety of new applications, uses and business cases as the technology is rolled out.

The Fifth Generation (5G) technology evolution has impacted not only modern businesses but human lives generally, globally in no small way. To this end, everyone and indeed every success-minded business organization must grapple with the challenges posed by 5G technology adoption to partake in the inherent benefits of this impressive phenomenon. The benefits are so massive that we have no choice but to accept and adopt it in our lives and businesses. 5G makes globalization more realistic and more interesting. With the Fifth- Generation technology, the ease of doing business is enhanced, time as a resource is optimized: businesses transactions are carried out at the click of the button, at the speed of light, physical presence is reduced, leading to reduction in business costs. Fifth Generation technology evolution therefore has improved the quality of life (Usmonov Botir Shukurillaevich, Radjabov Ozod Sattorovich and Rustamov Umedjon Amrillojonovich, 2019). Samala Durga Prasad Reddy (2019) opines that 5G has no limitations. Awesome, right? It is among the most

advanced technologies that would transform communication between humans, machines, and sensors to realize a connected, smarter, and safer world. (STL, 2022).

Despite being in 21st century characterized by inventions and technological advancements, we were still living in a "primitive world" prior to the advent of 3G networks. The introduction of 4G was an eye-opener to the opportunities that abound in high network speed. 5G technology therefore has come to fling wide open the door to a whole new world of game changing possibilities. As a matter of fact, what we have seen and know about 5G technology is just an iceberg of its real capabilities and benefits. 5G therefore is not fully in our grasp yet despite having considerably wide acceptance globally. However, the adoption of 5G technology is not without challenges. There are cultural, religious, economic, and social challenges that hamper 5G adoption. Little wonder Jabil and SIS International Research, according to Emmanuele Caballero (2023) had to conduct a survey to 193 telecommunications stakeholders responsible for strategy, planning, technology evaluation, development, operations, engineering, and product management where participants were directly involved in development, implementation, or adoption of 5G technologies at leading telecommunications companies. As a result of the foregoing concerns over the 5G adoption, we deem it necessary to carry out a study of this nature to enlighten organizational managers about the huge benefits accruable to effective adoption of the Fifth-Generation technology, especially in our clime.

### **Evolution of 5G**

5G is an advancement of 1G, 2G, 3G and 4G technologies. The 1st generation was launched for the voice services in early 1980's. All the systems were analog systems embedded. There were lots of limitations with the 1G technology. These limitations gave rise to the introduction of the 2G in 1990's which is mainly used for voice communication with additional features like e-mails and SMSs. This made life a bit easier as communication and interactions among organizational members became easier. With the 2G technology, emails and short message services (SMSs) became a veritable means of communication. 3G, launched in 2004, provided the core network speed needed to introduce the launching of smartphones. The basic features of the 3G network include wireless web base access, multimedia, email, as well as video conferencing. It also introduced relative speed in network. 4G, also referred to as the LTE, which came into being in early 2010, came with high data transfer rate that gave rise to mobile video which eased connectivity services that we can rely on. The 5G-Advanced evolution is a comprehensive integration of ICT technology, industrial field network technology, and data technology. 5G is therefore an advancement in network technology with very high speed, opening a world of new possibilities. 5G was launched in 2015, though we are yet to feel its full operation in our country now.

Priya Goyal and Avtar Singh Buttar (2015) postulate that the "challenge for the deployment of 5G wireless system will be to increase system capacity and quality of service within the limited frequency spectrum". There is no doubt that 5G has so far been able to meet this expectation. The challenge now is to sustain it at the long term. High overhead is needed to enhance its sustainability. It is therefore pertinent to introduce intelligent assistance such as AI, to improve the capabilities and quality of services at all levels. It can be argued that each generation of network came with improved spread, but 5G is also expected to enable emerging technologies such as autonomous vehicles and the Internet of Things (IoT) to finally become a reality for both businesses and consumers (Usmomov et al, 2019). Hence, 5G comes with something more than just network speed. To this end it affects businesses and life generally. Technology has been in phases of change from 1G,2G,3G,4G and now the 5G generation.

### **HOW DOES 5G WORK?**

Wireless networks are composed of cell sites divided into sectors that send data through radio waves.

Fourth generation (4G) Long-Term Evolution (LTE) wireless technology provides the foundation for 5G. Unlike 4G, which requires large, high-power cell towers to radiate signals over longer distances, 5G wireless signals are transmitted through large numbers of small cell stations located in places like light poles or building roofs. The use of multiple small cells is necessary because the millimeter wave (mmWave) spectrum-- the band of spectrum between 30 and 300 gigahertz (Ghz) that 5G relies on to generate high speeds -- can only travel over short distances and is subject to interference from weather and physical obstacles, like buildings or trees.

Previous generations of wireless technology have used lower-frequency bands of spectrum. To offset the challenges relating to distance and interference with mmWave, the wireless industry is also considering the use of a lower-frequency spectrum for 5G networks so network operators could use spectrum they already own to build out their new networks. The lower-frequency spectrum reaches greater distances but has lower speed and capacity than mm Wave.

The lower frequency wireless spectrum is made up of low- and midband frequencies. Low- band frequencies operate at around 600 to 700 megahertz (MHz), while midband frequencies operate at around 2.5 to 3.5 GHz. This is compared to high-band mmWave signals, which operate at approximately 24 to 39 GHz. MmWave signals can be easily blocked by objects such as trees, walls, and buildings -- meaning that, much of the time, mmWave can only cover about a city block within direct line of sight of a cell site or node. Different approaches have been tackled regarding how to get around this issue. A brute-force approach involves using multiple nodes around each block of a populated area so that a 5G-enabled device can use an Air interface -- switching from node to node while maintaining MM wave speeds. Another approach -- the more feasible one -- for creating a national 5G network is to use a combination of high-, medium- and low-band frequencies. MmWave may be used in densely populated areas, while low- and midband nodes may be used in less dense areas. The low-band frequencies can travel longer and through different objects. One low-band 5G node can stay connected to a 5G-enabled device for up to hundreds of square miles. This means that an implementation of all three bands will give blanketed coverage while providing the fastest speeds in the most highly trafficked areas.

### **BENEFITS OF 5G TECHNOLOGY**

Even though the downsides of 5G are clear when considering how easily mmWave can be blocked, or less clear considering radio frequency (RF) exposure limits, 5G still has plenty of worthy benefits, such as the following:

- \* Use of higher frequencies;
- \* High bandwidth;
- \* Enhanced mobile broadband;
- \* Lower latency of 5 ms;
- \* Higher data rates, which will enable new technology options over 5G networks, such as 4K streaming or near-real-time streaming of virtual reality (VR); and
- \* The potential to have a 5G mobile network made up of low-band, midband and mmWave frequencies.

The importance of 5G technology cannot be over emphasized. Live is good with 3G, better with 4G but great with 5G! Immeasurable opportunities abound with the Fifth-Generation technology. If fully deployed, the 5G technology will boost the AI technology. This is because 5G infrastructure uses 3GPP and mmWave which enhance reliability, better connectivity, higher speed, and stability of network required for AI operation. Studies have shown that 5G technology has technological, economic, and socio-cultural effects locally, regionally and globally. 5G technology is expected to contribute to an average annual GDP of over 80% in Sub-Saharan Africa and 53% in Europe by

2024-2034 (GSMA, 2018). Also, the global telecom digital BSS market is projected to reach USD 7416 million as early as 2025 if deployments proceed as expected (Nitin Abbey, 2022). Ericsson (2023) maintains that 5G is completely reshaping both our professional and personal lives by enabling new use cases like connective vehicles, augmented reality and enhanced video and gaming.

### **5G USE CASES**

5G use cases can range from business and enterprise use to more casual consumer use. Some examples of how 5G can be used include the following:

- \* streaming high-quality video;
- \* communication among devices in an internet of things (IoT) environment;
- \* more accurate location tracking;
- \* fixed wireless services;
- \* low-latency communication; and
- \* better ability for real-time analytics.

In addition to improvements in speed, capacity and latency, 5G offers network management features -- among them network slicing, which enables mobile operators to create multiple virtual networks within a single physical 5G network. This capability will enable wireless network connections to support specific uses or business cases and could be sold on an as-a-service basis. A self-driving car, for example, could require a network slice that offers extremely fast, low-latency connections so a vehicle could navigate in real time. A home appliance, however, could be connected via a lower-power, slower connection because high performance is not crucial. IoT could use secure, data-only connections.

### **SPECIFIC USES OF 5G TECHNOLOGY**

1. 5G aids the performance of AI especially in Automobiles, Security Gadgets etc with its high network speed.
2. In the entertainment industry, the use 5G technology makes it possible for people in the different parts of the world to perform in a movie without necessarily having to meet in one location.
3. In education, 5G technology can be of great importance to those doing online study programs. This will make it easy to interact with their tutors and class members, participate in classroom activities, carry out assignments, and do presentations and other academic activities without being physically present at the institution. Also, one could jointly present papers with colleagues in other parts of the globe without hitches.
4. With the 5G high network speed, we can use our smartphones to stream videos, and download audios in a blink of an eye. In short, 5G is notable for efficiency in terms of service quality, low latency, clarity in voice and audio calling as well as much better network speed.
5. In healthcare, remote treatment of ailments is possible. It also affords personalized treatment plans hence, better access to quality healthcare.
6. 5G technology is useful in automobile industry, where automated cars can be operated using AI technology. With 5G, automation in transportation will be enhanced.
7. In the manufacturing industry, automation can enable various components of the production process to communicate wirelessly, thereby cutting down on outages and malfunctions. Additionally, the integration of high-speed imaging in machines can improve quality assurance and data collected by automated machines can be used to proactively prevent faults and modify processes. In the healthcare sector, the automation of objects such as smart syringes, supply cabinets, and hospital beds may lead to more efficient management of resources and reduce the opportunities for errors in drug administration (GSMA, 2018).

### **ADVANTAGES OF 5G**

**1. Faster speeds**

5G operates more quickly on phones and other devices than 4G and 4G LTE. Users can download music, movies, and videos in seconds instead of minutes. The network's 20 Gbps speed enables businesses to utilize it for services like automation, improved web conferencing, and other things. A recent survey found that consumers who used 5G saved about 23 hours daily on downloading.

**2. Increased capability**

The capacity of 5G could be more than 100 times that of 4G. Performance is significantly enhanced since it helps the analysis switch between cellphones and Wi-Fi wireless solutions. In addition, it provides practical ways to access the internet.

**3. Promoting inventiveness**

Drones and sensors can all communicate with each other using 5G technology. It offers strategies to accelerate IoT adoption, enabling industries to increase productivity and do other things while 4G wireless networks are frequently crowded, which causes a variety of issues while obtaining critical data. 5G networks, on the other hand, allow consumers to bypass them due to faster speeds and more bandwidth.

**DISADVANTAGES OF 5G**

**1. Insufficient worldwide coverage**

The fact that 5G has a spotty worldwide reach and is currently only available in a few locations is its major drawback. The 5G network will primarily benefit cities; remote areas may not receive coverage for several years. The costs for installing tower stations are very high compared to other networks.

**2. A smaller broadcasting range**

Despite its fast speeds, 5G does not have the same range as 4G. Large structures and trees may also block the bandwidth of the 5Gbps, creating several problems. As a result, additional towers are required for coverage, which is both time-consuming and costly.

Rain can potentially disrupt 5G coverage, which requires other safeguards.

**3. Upload rate**

Mobile phone users may enjoy fast download rates thanks to 5G technology, and Upload rates are not much shorter than 100 Mbps compared to 4G. Furthermore, mobile phones need better battery technology for a 5G connection. Many phones' owners report that when using 5G, their handsets become hotter.

**4. Weakening of gadget batteries**

Phones that use a 5G connection will undergo significant power drain, reducing battery life significantly. As a result, producers must invest in innovative battery technology to prevent batteries from breakage and other issues.

**5. Cybersecurity-** The possibility of hacking is one of 5G's drawbacks. Hackers can steal the database because of the higher bandwidth. Additionally, it uses software that permits vulnerable attacks. The likelihood of an attack increases considerably as 5G connects more devices. As a result, businesses and organizations will need to spend more money on a security operations Centre to protect their infrastructure.

**6. Lack of encryption at the start of the connection procedure**

Because 5G lacks encryption, hackers may organize their assaults more accurately, which will significantly impact businesses. More bandwidths will put present security monitoring under pressure, and the network will need security measures to avoid cyber assaults. Consumer education is required to improve security effectively. On the other side, efforts are being made to increase security as the

initial deployment of 5G begins. Keeping all IT devices up to speed with security patches can aid in overcoming issues with the best outcomes.

### **CHALLENGES IN 5G ADOPTION**

Challenges are the inherent part of the new development; so, like all technologies, 5G also has big challenges to deal with. As we see in the past, i.e., development of radio technology, we find very fast growth. Starting from 1G to 5G, the journey is merely about 40 years old (Considering 1G in 1980s and 5G in 2020s). However, in this journey, the common challenges that we observed are lack of infrastructure, research methodology, and cost.

Still, there are dozens of countries using 2G and 3G technologies and don't know even about 4G, in such a condition, the most significant questions in everyone's mind are –

- \* How far will 5G be viable?
- \* Will it be the technology of some of the developed countries or developing countries will also benefit of this?

To understand these questions, the challenges of 5G are categorized into the following two headings –

- \* Technological Challenges
- \* Common Challenges

#### **Technological Challenges**

- \* Inter-cell Interference – This is one of the major technological issues that need to be solved. There is variations in size of traditional macro cells and concurrent small cells that will lead to interference.
- \* Efficient Medium Access Control – In a situation, where dense deployment of access points and user terminals are required, the user throughput will be low, latency will be high, and hotspots will not be competent to cellular technology to provide high throughput. It needs to be researched properly to optimize the technology.
- \* Traffic Management – In comparison to the traditional human to human traffic in cellular networks, a great number of Machine to Machine (M2M) devices in a cell may cause serious system challenges i.e. radio access network (RAN) challenges, which will cause overload and congestion.

#### **Common Challenges**

- \* Multiple Services – Unlike other radio signal services, 5G would have a huge task to offer services to heterogeneous networks, technologies, and devices operating in different geographic regions. So, the challenge is of standardization to provide dynamic, universal, user-centric, and data-rich wireless services to fulfil the high expectation of people.
- \* Infrastructure – Researchers are facing technological challenges of standardization and application of 5G services.
- \* Communication, Navigation, & Sensing – These services largely depend upon the availability of radio spectrum, through which signals are transmitted. Though 5G technology has strong computational power to process the huge volume of data coming from different and distinct sources, but it needs larger infrastructure support.
- \* Security and Privacy – This is one of the most important challenges that 5G needs to ensure the protection of personal data. 5G will have to define the uncertainties related to security threats including trust, privacy, cybersecurity, which are growing across the globe.
- \* Legislation of Cyberlaw – Cybercrime and other fraud may also increase with the high speed and

ubiquitous 5G technology. Therefore, legislation of Cyberlaw is also an imperative issue, which largely is governmental and political (national as well as international issue) in nature.

These challenges may however differ from society to society. Here in Nigeria, the foremost challenge was religious beliefs. It was rumored that the 5G technology is an "Anti-Christ" or "Satanic" instrument aimed at introducing the "mark of 666" by implanting chips in people's body which automatically condemns them to hell fire! Samala Durga Prasad Reddy (2019), contends that the adoption of the 5G technology will come with the following threats:

1. Since all the network operators and service providers would share a common core network infrastructure, compromise of a single operator will lead to the collapse of the entire network infrastructure, if not carefully guided against.
  2. Third parties can masquerade as legitimate users resulting in the theft of service and billing frauds can easily arise.
  3. Since 5G is a secure IP based solution it will be vulnerable to all the security threats as the current Internet world.
  4. On the lines of email-spam, the Spam over Internet telephony (SPIT), the new spam over VoIP may become serious and become serious threats.
  5. Spooling attacks can lead to misdirected communication and internet banking related to fraud.
  6. Eavesdropping and interception of private communications.
  7. Phishing attacks, stealing bank account details and other secured information, are more likely.
- Additionally, (Aparna Bhat, Vishwanath Gojanur and Rajeshwari Hegde 2017) believe that since 5G technology will require integration of various engineering standards and networks to make it work, it will be a challenge doing this as it is extremely difficult have a unified network structure.

## CONCLUSION

The fifth Generation Technology otherwise referred to as the 5G has come to stay. It is said that with 3G, life is good, with 4G, life is better, and with 5G, life is at its best. With the 5G Technology, cost of doing business is drastically reduced. Film/movies could be produced without all the actors and actresses being present physically at the same location at the same time. Workers can work from different locations with full input and accuracy. The Artificial Intelligence (AI) is more effective and can work with precision. People can attend classes and lectures without being there physically. The health care delivery has been given a boost as never seen before. The 5G saves cost and increases efficiency as well as the effectiveness of doing business. For any manager who wants the best for his business, the way to go is the 5G Technology. However, with the numerous advantages of this technology, some critics have also opined that other problems cut across religious, socio-cultural and technological. From the perspective of the critics, some religious organizations believe that the 5G network launched in 2015 marks the introduction of the Anti-Christ with the chip for the 666 mark. This, from the scientific point of view is largely untrue and this has further hindered people from embracing the 5G Technology especially in Nigeria where I live. This has serious consequences because the world seems to be leaving behind. Finally, whatever factors have been alleged as against the introduction and use of the 5G network is infinitesimal when compared to the humongous gains and benefits of this technology. This study encourages business organizations to embrace the adoption of the fifth Generation Technology which never of its kind has been seen before.

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These references discuss the adoption, opportunities, challenges, and implications of 5G technology in business organizations, particularly in the context of smart manufacturing, sustainable competitive advantage, IoT integration, and cybersecurity. They provide a comprehensive overview of the impact of 5G technology on various aspects of organizational operations and strategies.