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## Future of 5G Wireless System

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### ABSTRACT

The fifth generation of cellular technology is known as 5G.It is the most recent advancement in cellular technology.5G wireless technology offers multiple Gbps peak data rates, ultra-low latency, enhanced dependability, huge network capacity, increased availability, and a better user experience to a larger number of users.Not only does 5G have the capacity to support millions of devices at ultrafast speeds, but it also has the potential to transform people's lives all around the world.

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Keywords:Huge bandwidth, Low latency, High density

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### 1. Main text

In the previous fifteen years, mobile and wireless networks have grown tremendously.The generations of wireless telecom connectivity are 1G, 2G, 3G, and 4G, where G stands for generation and the number represents the generation number.5G is the most recent generation, while 1G has become obsolete.GSM, UMTS, LTE, and NR are cellular technologies that enable 2G, 3G, 4G, and 5G, respectively

#### 1.1 Introduction

The fifth-generation mobile network is referred to as 5G. After 1G, 2G, 3G, and 4G networks, it is a new global wireless standard. 5G allows for the creation of a new type of network that connects nearly everyone and everything, including machines, objects, and gadgets.

#### 1.2 Main text

1G:

1G networks were the first wireless telecom network system, and they began in the 1980s.The purpose of 1G networks was to offer users with basic voice calling capabilities.It has now been devalued.

2G:

2G is the following generation after 1G.The first 2G networks appeared in the 1990s.When cell phones transitioned from 1G to 2G, it was the first major upgrade.The analog to digital transition has occurred in cell phones.Voice calls, text messages, and limited mobile data services were all possible on these networks.GPRS is a second-generation upgrade that is commonly referred to as 2.5G since it prepared the door for 3G data services, which used the same network nodes as GPRS.2.75G is a radio segment improvement of GPRS that includes faster data speeds for global evolution network updates..

3G:

The third generation of wireless mobile telecommunications technology is known as 3G.It's a step higher from 2G, 2.5G, and 2.75G.It provides faster data

transport as well as improved voice quality.

This network is built on a set of mobile device and mobile telecommunications standards.

4G:

The fourth generation of mobile networks is known as 4G. It will be released in late 2009. It is made possible by a technology known as LTE (Long Term Evolution). Wireless customers can stream high-definition video and audio at 4G download speeds.

5G:

In the previous fifteen years, mobile and wireless networks have grown tremendously.

## Result

Mobile and wireless networks have made tremendous growth in the last fifteen years. 1G, 2G, 3G, 4G are the generations of wireless telecom connectivity where G stands for generation and the number denotes the generation number. 5G is the latest generation where as 1G is now obsolete. The cellular technologies GSM, UMTS, LTE, and NR enable 2G, 3G, 4G and 5G respectively.

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## 2. Uses of 5G

### 2.1 How does 5G work

5G is similar to 4G, however it uses higher radio frequencies that are less crowded. This enables it to transport more data at a much faster rate. Millimeter waves are the higher frequency bands (mmwaves). Regulators have opened them available for licensing after they were previously unlicensed. Because the necessary equipment was both unavailable and expensive, they had mostly gone unnoticed by the general population

#### 2.1.1 5G id driving global growth:

- \$13.1 Trillion dollars of global economic output
- \$22.8 Million new jobs created
- \$265B global 5G CAPEX and R&D annually over the next 15 years

We discovered that 5G's full economic impact will likely be realized across the globe by 2035, supporting a wide range of businesses and potentially enabling up to \$13.1 trillion in products and services, according to a groundbreaking 5G Economy study. This is a far more significant influence than earlier network generations. The new 5G network's development requirements are also extending beyond traditional mobile networking companies to industries like the automotive industry. According to the report, the 5G value chain (which includes OEMs, operators, content creators, app developers, and consumers) may support up to 22.8 million employment, which is more than one job for every person in Beijing. Many emergent and new applications will continue to be defined in the future. Only time will tell how significant the "5G effect" on the economy will be.

#### 2.1.2 5G Change Everything:

It will also provide a number of remote applications, with experiments with the NHS to remotely monitor critical changes in a patient's health already underway. LG and Doosan have also used this remote functionality to control an excavator on another continent.

Artificial intelligence and holographic technologies are also being tried with 5G, and the world's first 5G television is in the works. Other uses for the new networks in the entertainment industry include providing coverage at festivals and sporting events.

Transportation will be transformed as well, with improvements in linked cars and the introduction of self-driving vehicles (you can find out more about 5G and transport below).

Other innovative applications of the technology include the building of super smart factories that promise increased safety, more efficient manufacturing methods, and cost savings for both producers and customers (you can find out more about 5G and smart factories below).

These are just a few instances of how 5G could transform everything from everyday life to transportation, entertainment, and business and manufacturing.

#### 2.1.2 5G Network:

5G technology can 'slice' a physical network into several virtual networks. Operators will be able to supply the appropriate network slice based on how it is being used, allowing them to better manage their networks. This means that, depending on the importance of the task, an operator will be able to choose varying slice capacities. Simpler devices might be segregated from more complex and demanding applications, such as managing driverless vehicles, while a single user streaming a video would use a different slice of a corporation.



**Fig 1: -5G Network**

### **2.1.25G Help in Transport:**

There will undoubtedly be aerospace applications, such as improved data sharing between owners, managing ancillary systems on aircraft, bolstering safety and maintenance operations, processing data streams in near real time, and, of course, providing improved in-flight entertainment and WiFi service to passengers, while also gathering information about passengers to improve customer experience.

However, with the evolution of the connected and driverless car, 5G might be a true game-changer in the automotive industry. The connected automobile, which is not to be confused with self-driving cars, is one that has Internet connection and, in many cases, a wireless local area network. The linked car has been in use for a while, with electronic systems in place to assist driving via ABS and power steering, regulate functions such as windscreen wipers and lighting, and handle entertainment and communications systems. Advanced driver aid technologies, such as adaptive cruise control or parking assistance, GPS telematics, vehicle monitoring, and hands-free phoning, have all become more prevalent in recent years.

All of these systems must be able to interact in real time, and today's high-end automobiles currently exchange thousands of messages through roughly 70 electronic control units. Airbag deployment, for example, is significantly more vital than the air conditioning in a vehicle at the time of an accident, hence these networks have varied transmission speeds based on the criticality of the data. Fig. 2: 5G transport



**Fig 2: -Transport of 5G**

### **2.2 5G and Smart Factories:**

According to a white paper issued by HMS Labs, 5G will revolutionize factory floor production operations. It is expected that the technology would lead to safer, more efficient, and flexible manufacturing systems.

This new smart factory model will allow for more automation, which should not only save costs but also enhance product quality by removing the possibility of human error. These smart factories will also be able to provide flexibility when it comes to personalised products, allowing them to satisfy demand swiftly, efficiently, and cost-effectively. All of this, according to the white paper, will be made possible by 5G's stability, scalability, and performance.

Wireless technology and machine-to-machine connectivity will enable 5G to automate logistics, material handling, and factory automation. Everything from material supplies through production and warehousing to the delivery of final products could be controlled and monitored remotely, thanks to this connection and the improved automation provided by 5G. "The only area not suitable for 5G within industrial production is motion control with sub-millisecond cycle time needs," according to HMS' white paper, "the only area not suitable for 5G within industrial production is motion control with sub-millisecond cycle time requirements." 5G Smart Factories (Figure 3)



**Figure3:5GSmart Factories**

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### 3. Conclusion

We will use 13 times more data in 2025 than we do now, according to the regulator Ofcom. There are already 7 billion internet-connected gadgets on the planet, with an expected 21 billion by 2025. Many of these new devices will power and monitor our homes, city infrastructure, transportation, and other areas; this network is referred to as the Internet of Things. It is being hailed as one of the next big digital revaluations, and because of the importance of staying connected to key equipment that regulate our safety and security, improvements in network reaction times or latency will be essential.

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