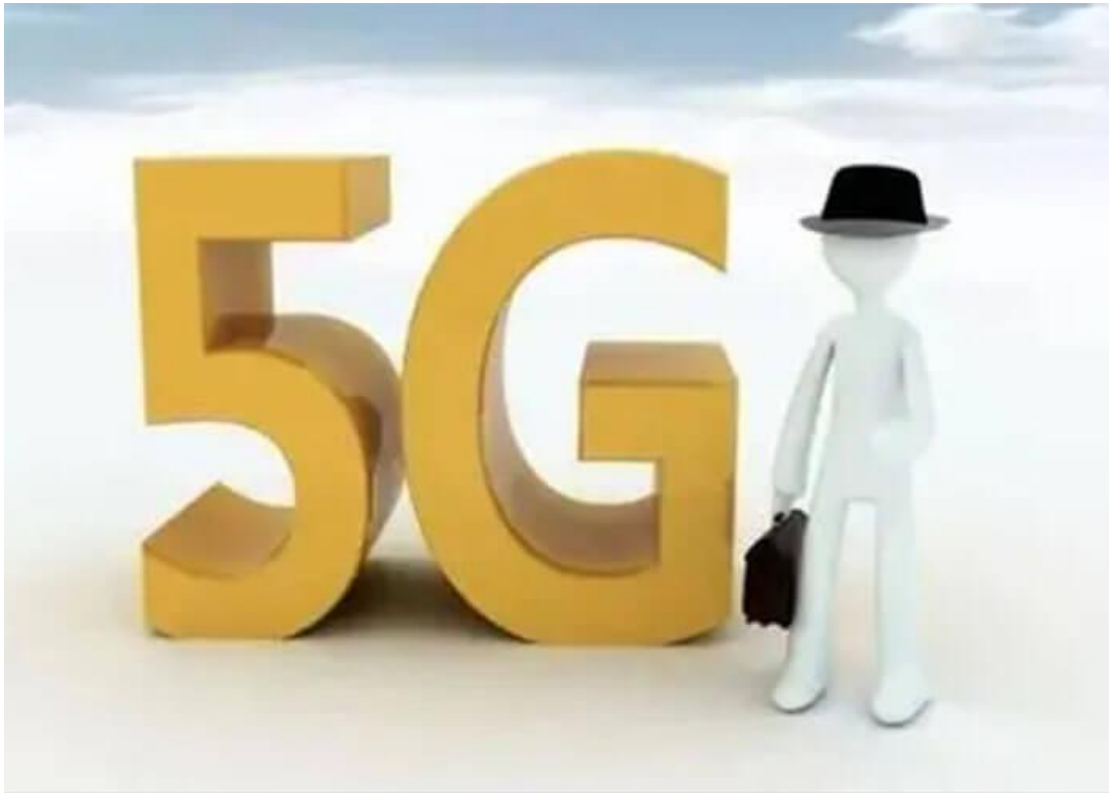




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6 Characteristics of 5G NR Technology



Today, we talk about the 5G NR technology and the [6 Characteristics of 5G NR Technology](#).

What is 5G NR technology?

The 5th generation mobile networks or 5th generation wireless systems, 5th-Generation, referred to as [5G](#) or 5G NR technology is the latest generation of cellular mobile communication technology, namely [4G](#) (LTE-A, WiMax), [3G](#) (Extension after UMTS, LTE) and 2G ([GSM](#)) systems. 5G NR technology has set a new standard for [wireless](#), opening up the spectrum above [6 GHz](#) that has been previously unusable by [cellular](#) services.

The performance goals of 5G NR technology are high data rates, reduced latency, energy savings, cost reduction, increased system capacity, and large-scale device connections.

What are the characteristics of 5G NR technology?

High-speed in Characteristics of 5G NR Technology

Compared with 4G, the first problem 5G has to solve is high speed. With the increase of network speed, the user experience and experience will be greatly improved. Only when the network faces VR/UHD services can it be unrestricted. Only services that require high network speed can be widely promoted and used. Therefore, the first feature of 5G defines the speed increase.

In fact, like every generation of communication technology, it is difficult to say exactly what the 5G speed is. On the one hand, the peak speed is different from the user's actual experience speed, and the speed will be different for different technologies in different periods.

For 5G base stations, the peak requirement is not less than 20Gb/s. Of course, this speed is the

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peak speed, not the experience of every user. With the use of new technologies, this speed still has room for improvement.

Such a speed means that users can download a high-definition movie every second, and may also support VR video. Such high speed provides opportunities and possibilities for future businesses that have high requirements for speed.

Ubiquitous Network in Characteristics of 5G NR Technology

With the development of services, network services need to be all-encompassing and widespread. Only in this way can we support richer services and can be used in complex scenarios.

The ubiquitous network has two meanings. One is extensive coverage and the other is deep coverage.

Extensive refers to the various places in our social life that require wide coverage. In the past, high mountains and valleys did not necessarily need network coverage because there were very few people living.

However, if 5G can be covered, a large number of sensors can be deployed to change the environment, air quality, and even landforms, earthquake monitoring, which is very valuable. 5G can provide networks for more of these applications.

In-depth refers to that in our lives, although there are already network deployments, we need to enter a higher-quality in-depth coverage. We already have a 4G network in our home today, but the quality of the bathroom in the home may not be very good. There is basically no signal in the underground parking garage, which is now in an acceptable state.

With the advent of 5G, toilets and underground parking garages with poor network quality can be widely covered by a good 5G network.

To a certain extent, the ubiquitous network is more important than high speed. Just building a very high-speed network with a small number of places does not guarantee the service and experience of 5G, and the ubiquitous network is a fundamental guarantee for the 5G experience. In the three 3GPP scenarios, ubiquitous networks are not mentioned, but the ubiquitous requirements are implicit in all scenarios.

Low power consumption in Characteristics of 5G NR Technology

To support large-scale [IoT](#) applications, 5G must have power consumption requirements. In recent years, wearable products have developed to a certain extent, but they have encountered many bottlenecks. The biggest bottleneck is the poor experience.

Take a smartwatch as an example. It needs to be charged every day, even in less than a day. All Internet of Things products requires communication and energy. Although communication can be achieved through a variety of means today, the supply of energy can only rely on batteries. If the communication process consumes a lot of energy, it will be difficult for IoT products to be widely accepted by users.

If the power consumption can be reduced and most IoT products can be charged once a week, or even once a month, the user experience can be greatly improved and the rapid popularization of IoT products can be promoted.

eMTC evolved based on the [LTE](#) protocol. In order to be more suitable for communication

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between things and for lower costs, the LTE protocol has been tailored and optimized.

eMTC is deployed based on a cellular network, and its user equipment can directly access the existing LTE network by supporting a 1.4MHz radio frequency and baseband bandwidth.

eMTC supports a maximum peak rate of 1 Mbps for uplink and downlink. [NB-IoT](#) is built on a cellular network and only consumes about 180kHz of bandwidth. It can be directly deployed on a GSM network, UMTS network, or LTE network to reduce deployment costs and achieve smooth upgrades.

NB-IoT can actually be deployed based on the GSM network and the UMTS network. It does not need to rebuild the network like the [core 5G NR technology](#). However, although it is deployed on the GSM and UMTS networks, it is still a rebuilt network. Its ability to greatly reduce power consumption is also to meet the needs of 5G for low-power IoT application scenarios. Like eMTC, it is an integral part of the 5G network system.

Low latency in Characteristics of 5G NR Technology

A new scenario of 5G is the highly reliable connection of unmanned driving and industrial automation. For information exchange between people, a delay of 140 milliseconds is acceptable, but if this delay is used for unmanned driving and industrial automation, it is unacceptable.

The minimum requirement of 5G for latency is 1 millisecond or even lower. This puts harsh demands on the network. And 5G is an inevitable requirement for applications in these new fields.

Driverless cars need to be interconnected between the central control center and the car, and the car should also be interconnected. In a high-speed operation, a brake needs to instantly send information to the car to respond. It takes about 100 milliseconds.

In time, the car will rush out tens of meters, which requires the shortest delay to send information to the car for braking and car control reactions.

This is especially true for drones. For example, if hundreds of unmanned aircraft fly in formation, a very small deviation will lead to collisions and accidents. This requires information to be transmitted to the flying unmanned aircraft in a very small time delay.

In the process of industrial automation, if the operation of a robotic arm is to be extremely refined to ensure the high quality and accuracy of the work, it also requires minimal time delay and the most timely response.

These features are not so demanding in traditional human-to-human communication or even human-machine communication, because the human response is relatively slow, and it does not require the high efficiency and refinement of machines.

Whether it is unmanned aircraft, unmanned vehicles, or industrial automation, they are all operating at high speeds. It is also necessary to ensure timely information transmission and timely response at high speeds, which places extremely high requirements on time delay.

To meet the requirements of low latency, various methods need to be found in the construction of [5G networks](#) to reduce latency. Technologies such as edge computing will also be adopted into the [5G network](#) architecture.

Internet of Everything in Characteristics of 5G NR Technology

In traditional communications, terminals are very limited. In the era of fixed telephones,

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telephones are defined by the crowd. In the mobile phone era, the number of terminals has exploded, and mobile phones are defined by personal applications. In the 5G era, terminals are not defined by people, because each person may have several, and each family may have several terminals.

In 2018, China's mobile terminal users have reached 1.4 billion, of which mobile phones are the main ones. The vision of the communications industry for 5G is that every square kilometer can support 1 million mobile terminals. In the future, the terminals connected to the network will not only be our mobile phones today but there will also be more weird products.

Every product in our lives may access the network through 5G. Our glasses, mobile phones, clothes, belts, and shoes may all be connected to the Internet and become smart products. Doors and windows, door locks, air purifiers, fresh air fans, humidifiers, air conditioners, refrigerators, and washing machines in the home may all enter the smart era. With 5G access to the network, our family becomes a smart home.

In social life, a large number of devices that were previously impossible to connect to the Internet will also work on the Internet, making them smarter. Public facilities such as cars, manhole covers, telephone poles, and trash cans used to be very difficult to manage, and it was also difficult to be intelligent. And 5G NR can make these devices become smart devices.

Refactoring safety in Characteristics of 5G NR Technology

The security issue does not seem to be a basic issue discussed by 3GPP, but it should also become one of the basic characteristics of 5G NR technology.

The traditional Internet has to solve the problem of information speed and barrier-free transmission. Freedom, openness, and sharing are the basic spirit of the Internet, but the intelligent Internet is established on the basis of 5G NR technology.

Smart Internet is not only to realize information transmission but also to establish a new mechanism and new system for society and life. The basic spirit of the intelligent Internet is safety, management, efficiency, and convenience. Security is the number one requirement of the smart Internet after 5G New radio. Assuming that 5G NR is built but the security system cannot be rebuilt, it will have huge destructive power.

If our unmanned driving system is easy to break, it will be as shown in the movie, the cars on the road are controlled by hackers, the intelligent health system is broken, the health information of a large number of users is leaked, the smart home is broken, and there is no safety at home. Assure. This situation shouldn't happen, and problems can't be solved by patching.

In the construction of 5G networks, security issues should be solved at the bottom level. From the beginning of network construction, security mechanisms should be added. Information should be encrypted and the network should not be open. Special security mechanisms should be established for special services. . The network is not completely neutral and fair.

For example. In terms of network guarantee, ordinary users may only have one system to ensure the smooth flow of their network, and users may face congestion. However, the intelligent transportation system requires multiple systems to ensure its safe operation and the quality of its network.

When the network is congested, the network of the intelligent transportation system must be

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unblocked. And this system is not accessible to general terminals for management and control.

Besides the 6 Characteristics of 5G NR Technology we mentioned, do you have any other Characteristics of 5G NR Technology? If you have, please share with us, thank you.

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