Learn about 5G network, future mobile platform

In essence, the 5G network is still developed based on 4G platform but at a higher level. 5G network will support LAS-CDMA (Large Area Synchronized Code Division Multiple Access), UWB (Ultra Wideband), Network-LMDS (Local Multipoint Distribution Service), IPv6 and BDMA (Beam Division Multiple Access).

It is expected that about 50 billion devices will be able to network in 2020 and the problem of finding a new mobile technology platform capable of connecting all the devices. Since 3G became popular, it contributed many benefits to daily life. In addition to making communication more seamless, it also offers a variety of business entertainment and application services such as traffic monitoring, online service support such as watching entertainment videos and voice messages. , videoconferencing, high speed internet service .

1. US $ 600 million will be invested in 5G technology by 2018

Not stopping there, in some developed countries have introduced 4G LTE network technology with much higher speed than 3G network. The 4G network still supports similar services as 3G but has download speeds of up to **100 Mbps** . In addition, the 4G broadband network supports QoS (*Quality of Service*), quality broadband access (*Wireless roadband access*), MMS multimedia messaging applications (*Multimedia Messaging Service*), high-definition online (*HDTV*), DVB (*Digital Video Broadcasting*) and other broadband services.

Expected in the next two years, the 4.5G technology network is deployed to provide users with ultra HD resolution videos, holographic 3D technology. Similarly when converting from 3G to 4G, 4.5G technology has faster speed, lower latency and superior features than current 4G technology. It will also open an opportunity to exploit new revenue for mobile operators as mobile broadband becomes more and more powerful and efficient.

In another aspect, many countries in the world have not officially upgraded 4G technology. However, with the strong development of network-capable devices (*IoT - Internet of Things*) and the growth in the number of future mobile devices have posed problems about finding a platform New mobile technology can meet this demand. It is expected that by 2020 there will be about 50 billion devices capable of networking. This is also a premise for the development of the next 5G technology network.

5G technology platform

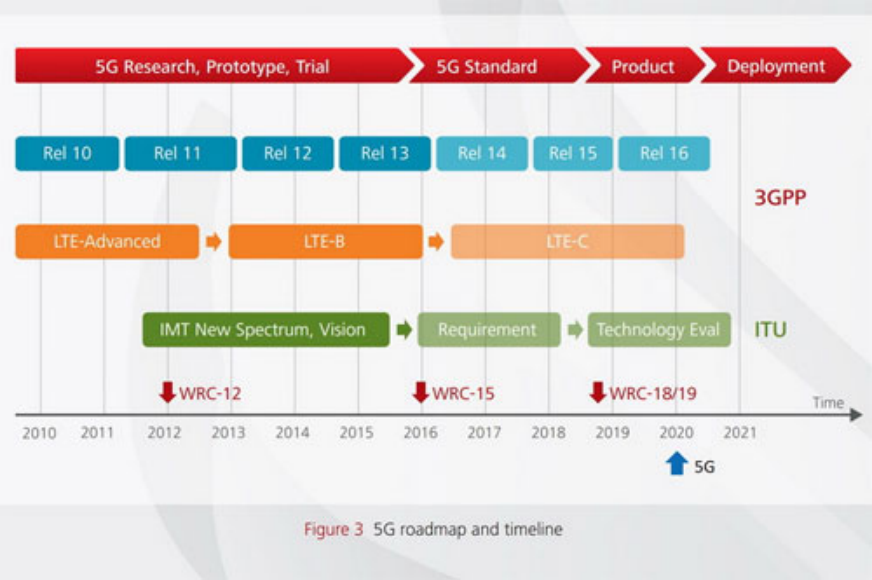

Figure 3 5G roadmap and timeline

The fifth generation mobile Intertnet network is expected to be the perfect World Wide Wireless Web (*wwww*) platform to connect anywhere on the earth. A truly wireless connection world, where we can access the Internet through and without barriers, space and time limits. In essence, the 5G network is still developed based on 4G platform but at a higher level. 5G network will support LAS-CDMA (*Large Area Synchronized Code Division Multiple Access*), UWB (*Ultra Wideband*), Network-LMDS (*Local Multipoint Distribution Service*), IPv6 and BDMA (*Beam Division Multiple Access*).

With a wide variety of platforms, users can connect multiple devices simultaneously over the wireless network and easily switch back and forth without any problems. These devices can use different mobile networks such as **2.5G, 3G, 4G** or **5G, Wi-Fi, WPAN** or any other access technology to appear in the future.

As mentioned above, the IoT era (*Internet of Things*) is gradually affecting people's lives. Devices like smart watches, health monitors, sensors on cars, smart glasses, and sensors monitoring 24/7 . are devices that require compatibility. High impact via the Internet to stay connected continuously, seamlessly and transmit a large amount of data.

Note that the 5G network is still in development stage so there are many suggestions and arguments about the route and how it works. However, certainly one thing is that unlike the previous wireless communication standards, this new generation of networks has to address more technology-related challenges. If 4G focuses on improving connectivity and speed, then 5G will include all that and add the very important factor of intelligence.

Standard of 5G network

The 5G systems in accordance with the IMT-2020 specifications are expected to enhance the capabilities of devices and networks, in close collaboration with applications that are intended to be released in the near future. The following 8 parameters are the main capabilities of IMT-2020 5G:

AbilityDescription Target 5 Usage context Peak data rate Maximum data rate can be achieved. 20 Gbit / s eMBB User data rate Data rate can be achieved throughout the coverage area. 1 Gbit / s eMBB Wireless network latency contributes to packet travel time. 1 ms URLLC Mobility Maximum speed for handover and QoS requests. 500 km / h eMBB / URLLC Connection density Total number of devices per unit area. 10^6 / km^2 MMTC Energy efficiency Data is sent / received per unit of energy consumption (by device or network). Equivalent to 4G eMBB Universal Performance Throughput per unit of wireless bandwidth and per network cell

(network cell). 3–4x 4G eMBB Total traffic Total traffic across the coverage area. 1000 (Mbit / s) / m ^{2} eMBB

Note that, for 5G NR, according to 3GPP specifications when using spectrum under 6GHz, the performance will be closer to 4G.

5G challenges encountered

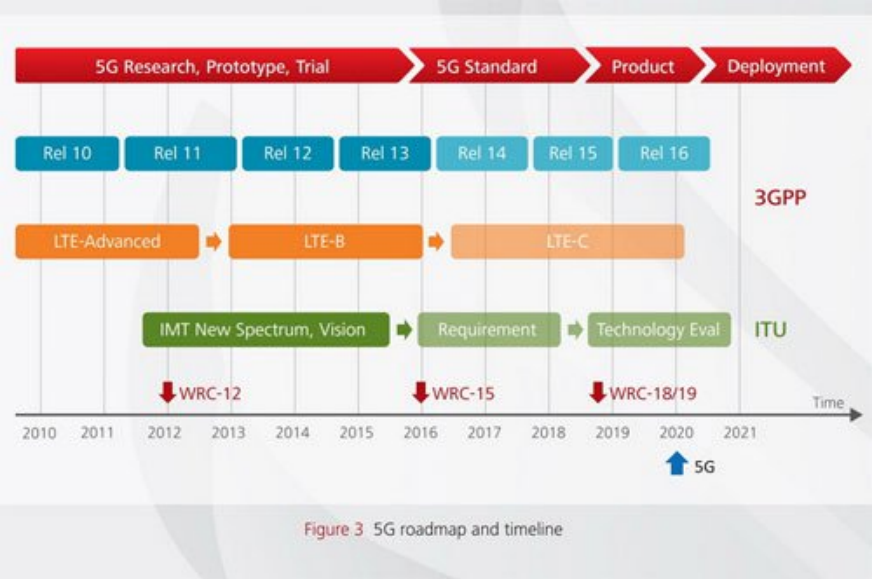

Figure 3 5G roadmap and timeline

The benefits provided by 5G network are huge. However, there are still some issues that need to be resolved before 5G technology can become a reality. It's bandwidth availability and technological challenges, such as how to create network architectures that can increase the amount of higher data traffic and data transfer rates. necessary to accommodate more users on the network.

According to statistics, from now to 2020, the number of smart devices will increase rapidly, with more than **50 billion** devices connected to the mobile network. With such rapid growth, it also means that the amount of data to be shared is **1,000 times** higher and the transmission speed is **10** to **100** times faster than the current network speed. In addition, supporting a wide range of devices, services and applications using different bands is also a challenge waiting for 5G.

Future mobile networks may become the main ' *Internet* ' network that not only connects people to people but also between people and machines and equipment. Therefore they need to meet important factors about QoS (*Quality of Service*), security and reliability. To become a reality, 5G technology needs to be able to meet the transmission rate of about **10 Gb / s** , similar to a new fiber network that can handle multimedia content and virtual communication with resolution Super sharp award.

To support virtual reality applications and super-resolution video, the data transfer rate must be at least **1 Gb / s** or higher. In addition, the mobile cloud service requires very high access speeds of up to **10 Gb / s** . In addition to the extremely large bandwidth, similar to the existing fiber network, the response time and latency of 5G network must always be extremely low with a unit of less than or equal to 1 mms (*milliseconds*) to be able to Achieving the requirement to support real-time mobile devices, applications and communication devices between each other.

The 5G network also supports different radio access technologies, so to ensure smooth service, the time between switches should not exceed **10 mms** .

With more than 50 billion IoT devices will appear on the market by 2020, corresponding to the number of users who will connect to the mobile network and also means billions or even hundreds of billions of applications are activated. and always in *always-on* , it is clear that current bandwidth will not be able to respond.

The future of 5G technology

As expected, 5G network technology may be launched in 2020, but so far observers have not seen any official projects to develop international 5G networks launched outside of some projects. Individual projects are researched by technology corporations. Typically, Samsung has just cooperated with New York University to find its own way. Huawei said it invested about $ 600 million for research and development (*R&D*) of 5G technology by 2018 when participating in a number of EU 5G technology research projects and coordinating to build the Center. Creative 5G (*5G Innovation Center - 5GIC*) in the UK to build a unified standard system for 5G network on a global scale.

5G technology is still in research and scientists are still looking for the most appropriate solution. According to Osseiran, senior researcher at Ericsson and the coordinator of the METIS project, established by universities, cooperating with European financial companies to find the best solutions for 5G network. METIS said it is still considering different technologies, including new data coding and modulation techniques, better intervention management, *multi-hop* communication networks, and even design designs. advanced data transmission. Osseiran is most powerful that the specificity of the 5G network is to use a combination of various systems and Samsung's millimeter wave technology is only a small part of it.