

EMERGING NETWORK TECHNOLOGIES

TECHNOLOGY INFORMATION SYSTEM A SNEAK PEEK



BY GROUP3

Aina Najwa Binti Mohd Rozi A21EC0010
Loke Rui Kee A20ET0329
Muhammad Azamuddin Nasution Bin Raduan A21EC0069
Nur Aisyah Fatimah Binti Mohamed Rozi A21EC0107
Sofia Anak Henry A21EC0133

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CommScope Malaysia

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APPLICATION OF 5G IN SMART CAMPUSES

5G is the 5th generation mobile network. It is a next generation global wireless standard after 1G, 2G, 3G, and 4G networks. It enables a new kind of network that is designed such that virtually everyone and everything together including machines, objects, and devices are connected with each other. 5G technology is supposed to deliver a greater peak data speed, reliability, network capacity, availability, and uniformity in terms of the user experience among users by significantly reducing latency, allowing for a consistent, high speed performance. Being augmented in terms of performance and efficiency, this allows for new user experiences and industries to be empowered and connected.

5G is set to benefit campuses in a lot of areas, mainly through the augmentation of teaching methods and the mass deployment of IoT technology.

5G is set to elevate the quality of teaching methods by powering new, immersive technologies such as Augmented Reality (AR) and Virtual Reality (VR). There is a large evidence that VR is a powerful teaching tools that can be utilized in many disciplines. One example would be in the field of medicine where medical students are trying to learn how to conduct surgery on digital patients. We see this, for example in Fisk University, located in Tennessee, United States where T-mobile has been working with the University to launch the first ever 5G powered VR Human Cadaver Lab which is a new model of learning that combines 5G-powered, VR technology with the in-person classroom experience that enable medical students to explore the complete skeletal and muscle structures in the human organ systems while maintaining the in-person engagement with their classmates and instructors. This technology has proven itself to be very revolutionary as in the past, the cadaver is not being purchased due to its high cost and maintenance, thus increasing the university's dependence to other universities. But with a Virtual Cadaver Lab, the University can offer an advanced learning experience that's affordable and easy to maintain as virtual cadavers don't degrade when compared to their real life counterparts.

Besides that, 5G technology will also imply mass deployment of IoT technologies to improve services on campuses. In the future, 5G connected autonomous buses and delivery vehicles will be centrally managed, reporting their location and arrival time to users in real time. IoT embedded sensors can now record and transfer real time data such as ridership and traffic patterns, and also road conditions so that on campus transportation services can now adjust with the students ridership patterns during different times of the day. Road conditions can also be continuously evaluated, allowing in campus bus services to provide the safest route for the students. IoT-powered smart parking solutions can now be implemented as a result of its low latency and high performance of 5G. Users can now be informed about the real time availability of parking spaces at different times of the day and be informed of different times where the traffic is appropriate to use a car in the campus.

REFLECTION

In short, 5G is set to impact campuses in a myriad of ways. Being a disruptive technology, it has proved itself to cause revolutionary strides in many different areas, from the augmentation of pedagogical methods all the way to the mass deployment of IoT technology. Therefore, it can be said that 5G is crucial in the betterment of our public universities and it is within our best interest to utilize it to its utmost potential.

THE EMERGING OF NETWORK INFRASTRUCTURE



"Machines and Numbers"

The Domain Name System (DNS) translates domain names (for example, www.url.com) to Internet Protocol (IP) addresses (strings of numbers). Humans, as we all know, identify objects through their names, but computers do not. It is identified numerically. Thus, you can conduct a computer search by simply entering in the domain name. Consider Youtube. You can access the web browser by typing the IP address, but dealing with numbers is difficult for humans and requires a great deal of memorization. Rather of that, you can simply write the domain name (youtube.com) and DNS will resolve the IP address to 20.51.154.170. And if the operating system is unable to locate the IP address, it will send a signal to the Internet Service Provider (ISP), and if the ISP is unable to locate it, it will send it to the domain's root server. The root server will assist it in locating the IP address by transmitting it directly to the Top-Level Domain (TLD). Each TLD serves a specific purpose. For instance,

- .com -for commercial which is an open entity and any person or organization can register
- .edu -for education purposes such as schools and universities
- .gov -limited to only governmental entities as well as governmental agencies
- .net -for network purposes anyone can register but mostly use by smaller website

"Beyond the amelioration connection to the internet"

Reflection

This COVID-14 epidemic exemplifies both the necessity of technology and its advancement. Everything has increasingly become digital, and the internet has risen to become the world's most valuable commodity. However, improved internet connectivity requires a strong network infrastructure. It became evident to me during this debate that a stronger network architecture is required for speedy internet connectivity. For instance, everyone is currently upgrading to the wifi6 router due to its increased internet speed and coverage. And now I'm aware that large enterprises employ routers that are markedly different from those used at home. The technological transformation is accelerating, and we already know that every piece of equipment aspires to be an Internet of Things gadget that we can all operate via our cellphones. Xiaomi is a well-known manufacturer of Internet of Things (IoT) devices. All IoT technology has a number of advantages over traditional equipment, including increased flexibility, cost savings, and the ability to be more secure. The primary disadvantage is that it must be connected to the internet and have excellent Wi-Fi. As a result, if the power is cut off or the Wi-Fi connection is lost, the equipment is also impacted. However, the issue had been fixed. For example, the door lock, the user can only enter the door with their facelift ID, however if the Wi-Fi connection is lost, the user can still use the physical key. As a result, deploying IoT devices had no impact. Hereby, I encourage everyone to begin appreciating and fully utilizing technology, as it has the ability to give numerous benefits. I also hoped that everyone would contribute to our country becoming a high-tech nation, comparable to Japan and the United State



Detail >

Dive into the infrastructure

The network infrastructure generally is consisting of the **wireless edge, access, core & data center**. Wireless communication has transformed from traditional phone to **converged communications device**, from WiFi access point to **converged access point**. The trend in the industry right now on the Internet of Things (IoT) devices, smart buildings, and cloud applications have increased the **core traffic** tremendously.

Therefore, **multigigabit technology** has risen as a refresh to the existing infrastructure. Instead of client-access point bottleneck, it has now shifted to an access point-Multigigabit Switch bottleneck. Moreover, **Unified Network Management** has enabled an all-in-one strategy that allows access points and switches to connect to the network controller directly

Devices

With the advancement in network structures and management, it is now possible to monitor everything in one dashboard. For instance, **SmartZone 6.0 Dashboard** has enabled people to view access points and switch information in one sitting.

The rise of **IoT devices** has also made smart environment possible. In education sector, smart campus is one of the application of several IoT devices deployed in one setting. With great network and data infrastructure combined with artificial intelligence, more wonders is expected to be seen in the near future

5G, WIFI 6 AND EMERGING NETWORK TECHNOLOGIES

HuaWei

Huawei, a global leader in information and communication technology infrastructure and smart products based in Shenzhen, Guangdong, China, was founded by Ren Zhengfei in 1987. Originally, the company manufactured telephone exchange switches before expanding into telecommunications networks. Huawei employs over 197,000 individuals and serves more than three billion people in over 170 countries and regions. Huawei's objective is to provide digital to every person, house, and business so that the world can be fully linked and intelligent. To that end, Huawei will promote ubiquitous connectivity and equal network access to lay the groundwork for the intelligent world, provide the ultimate computing power to deliver ubiquitous cloud and intelligence, build powerful digital platforms to help all industries and organisations become more agile, efficient, and dynamic, and redefine user experience with AI, providing consumers with more personalised and intelligent experiences across all scenarios, involving fitness and health, office, home, entertainment and travel. Huawei's technology is an important component of the next-generation wireless technology, 5G, which is currently in development, which is why it keeps making headlines.



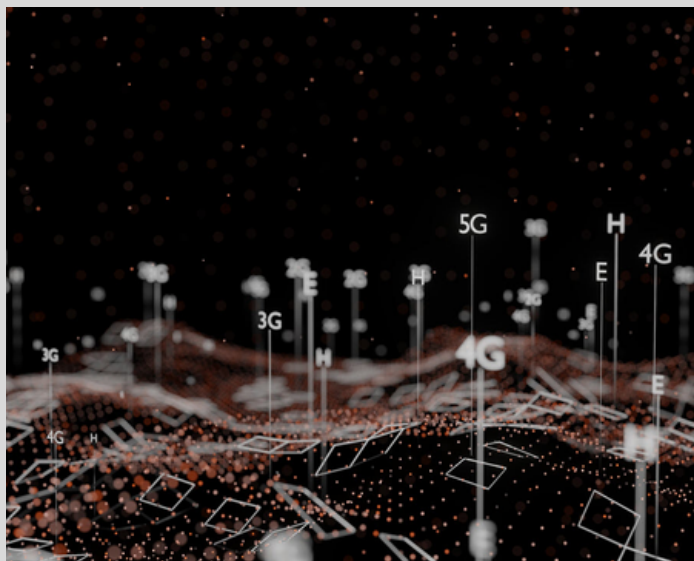
"The journey to an intelligent world has already begun."

Eric Xu,
Deputy Chairman of the Board, Rotating CEO, Huawei

5G

"5G isn't just another tech innovation, it's the platform that makes other innovations possible."

Hans Vestberg,
Chairman and CEO, Verizon



The fifth generation wireless technology is known as 5G. It can outperform 4G LTE networks in terms of speed, latency, and capacity.

- Speed - With speeds at least 5-10 times faster than 4G, 5G is substantially quicker than previous generations of wireless technology. This means that large files like videos may be transferred in seconds rather than minutes, allowing you to stream video on the move without buffering.
- Low latency - 5G is more responsive than 4G because the delay between commanding a device to execute an activity and that action being completed is shorter. 5G allows data to be broadcast and received with nearly no latency, allowing it to support a wide range of time-sensitive services and applications, as well as boosting online gaming experiences and, in the future, driverless vehicles
- Greater capacity - 5G has more capacity, allowing thousands of devices in a small area to connect at the same time. This is becoming more significant as everything in our life gets connected to the so-called internet of things, such as automobiles, clothing, and buildings.

1G, 2G, 3G, and 4G all led to 5G, which is intended to provide greater connectivity than ever before. It has been built with the capability of enabling next-generation user experiences, empowering new deployment models, and delivering new services. 5G will take the mobile ecosystem to new heights with its high speeds, superior reliability, and low latency. 5G will affect every industry, allowing for safer transportation, remote healthcare, precision agriculture, and digitised logistics, among other things. As its network will change our daily lives, 5G has been one of the most important topics. 5G will enable the Internet of Things' automation and business transformation, as well as services such as Virtual Reality and Augmented Reality.



Wi-Fi 6

The speed of Wi-Fi is about to increase. That's fantastic news, as we know that faster internet is always in demand, especially as we use our laptops and phones to access more bandwidth-intensive programmes, games, and videos. However, Wi-Fi 6, the next generation of Wi-Fi, provides more than just a speed bump. It will have a more nuanced impact, and we will likely see its benefits grow over time. This isn't so much a one-time speed boost as it is a long-term improvement to ensure that our speeds don't come to a halt a few years down the road.

What is Wi-Fi 6 ?

Wi-Fi 6 is the next generation of WiFi. It'll still link you to the internet, but with a slew of new technologies to help it do so more quickly. Wi-Fi 6, commonly referred to as "AX WiFi" or "802.11ax WiFi", is a successor to the present 802.11ac WiFi standard. Wi-Fi 6 was created in response to the increasing number of gadgets on the planet. A Wi-Fi 6 router may be the finest WiFi router for you if you have a VR device, many smart home gadgets, or simply a big number of devices in your home. Wi-Fi 6 combines both 1024-QAM to offer a signal with more data for improved efficiency and a 160 MHz Channel to offer a larger channel for quicker WiFi. Stutter-free VR or stunningly vivid 4K and even 8K streaming are available. Wi-Fi 6 also employs 8x8 uplink/downlink, MU-MIMO, OFDMA, and BSS Color to provide up to four times the capacity and handle more devices. Come home to a nearly flawless smart home experience, or host house parties with a network designed to handle all of your guests' devices.

Huawei AirEngine Wi-Fi 6

When compared to Wi-Fi 5, Wi-Fi 6 (802.11 ax) offers four times the network capacity and user concurrency. Only Huawei AirEngine Wi-Fi 6 uses Smart Antenna and algorithm technologies to reduce network latency from 30 to 10 milliseconds, removing dizziness from Virtual Reality (VR) and Augmented Reality (AR) experiences, enabling wireless 4K High Definition (HD) conferences, and ensuring zero packet loss during Automated Guided Vehicle (AGV) roaming. Huawei AirEngine Wi-Fi 6 helps businesses across industries speed their digital transformation.

What is a domain name ?

A domain name is an address that represents your website. We can use the domain name to find resources or send emails. Domain Name System (DNS) is a distributed database used in TCP and IP applications. It also completes resolution between IP addresses and domain names.

Do you want to know how's the structure of the domain name? Here is a simple explanation;

- * www: This is the Third-Level domain (world wide web)
- * Huawei: This refers to Second-Level Domain. Normally, this domain is the name of the website
- * .com: This is the generic Top-Level Domain (gTLD) . There are examples of gTLD :
 - .com = Commercial businesses.
 - .org = Organizations
 - .net = Network organizations.
 - .gov = Government agencies.
 - .mil = Military.
 - .edu= Educational facilities, like universities

Devices

With the advancement of technology, most of the newly released smartphones are equipped with 5G facility. This facility can make it easier for us when doing tasks that require speed and strong internet coverage such as online meetings. Furthermore, we can use technology to enjoy the virtual world by simply using devices like VR. We can feel the world with a real feeling like meeting an idol or enjoying a virtual vacation without having to spend money moreover, we can suggest the use of such devices with good intentions especially in this time of pandemic for example, we can use vr to feel learning in the classroom that feels real even learning from home.



Reflection

We get to know more about Huawei's technology developments. Consumers may not have heard of the brand Huawei five years ago. In terms of market share, it is presently the third largest smartphone manufacturer. Its expansion has been both impressive and phenomenal. Huawei's annual sales revenue more than doubled to USD 75 billion with more than half of that coming from outside China from 2012 to 2016. Its unwavering commitment to R&D investment and spending, engaging corporate branding and marketing campaigns, and effective pricing strategy targeting the right consumer segment are some of its key success factors. These are all important takeaways for brands looking to succeed on a global scale. Huawei's foothold in the South Asian, Indian, and North American markets, however, remains limited, restricting its ability to maintain a sustainable second-place position after Samsung. Huawei must make bold, daring, and unusual moves if it wants to become the world's leader in the information and communications technology sector.

Other than that, for public spaces with a lot of devices, WiFi 6 has a lot of advantages, but smaller households with fewer devices or houses without WiFi 6-enabled gadgets might not notice much of a difference. However, having a WiFi 6-enabled router has a number of other benefits, like greater battery life, faster speeds, lower latency, and fewer dropped calls. Many of our older devices won't be able to handle the highest speeds offered by WiFi 6, but thanks to the bandwidth optimization of this new technology, a WiFi 6-enabled router will give our existing devices a speed boost.