



UTM
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ASSIGNMENT 03

**ASSIGNMENT: MAGAZINE ON TECHNOLOGY AND INFORMATION SYSTEM, SMART
CAMPUS AND EMERGING TECHNOLOGIES**

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Smart Campus and Emerging Technologies

1. Application of 5G in Smart Campus
2. Smart Campus: The Journey Starts Here
(CommScope Malaysia)
3. 5G, WiFi-6 and Emerging Network
Technologies (HUAWEI)



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APPLICATION OF 5G ON SMART CAMPUS

INTRODUCTION

WHAT IS 5G ?

5G is the fifth era portable organization. It is a new worldwide remote norm after 1G, 2G, 3G, and 4G organizations. 5G empowers another sort of organization that is intended to associate basically everybody and everything together including machines, items, and gadgets.

5G remote innovation is intended to convey higher multi-Gbps top information speeds, ultra low inactivity, greater unwavering quality, gigantic organization limit, expanded accessibility, and a more uniform client experience to more clients. Better execution and further developed proficiency enable new client encounters and interfaces new enterprises

INTRODUCTION

WHAT IS SMART CAMPUS ?

"A physical or digital environment in where humans and technology-enabled systems interact to generate more immersive and automated experiences for university stakeholders," according to the organisation.

To support a smart campus concept, universities mix wired and wireless infrastructure and hardware. Administrators can fulfil smart campus plan goals by prioritising needs while balancing finances using the fundamental framework.

<https://www.coxblue.com/what-is-a-smart-campus>



EVOLUTION

BRINGING THE 5G IN THE SMART CAMPUS ?

Establishing experimental 5G operative functionalities on campus allows for faster prototyping of research-based technologies, especially when the environment is available to businesses, developers, and innovators, as it is on this campus. The ideas are tested in the immediate vicinity of the campus, with the most promising ones being scaled up to improve municipal government or provide services to smart city residents.



DETAIL >

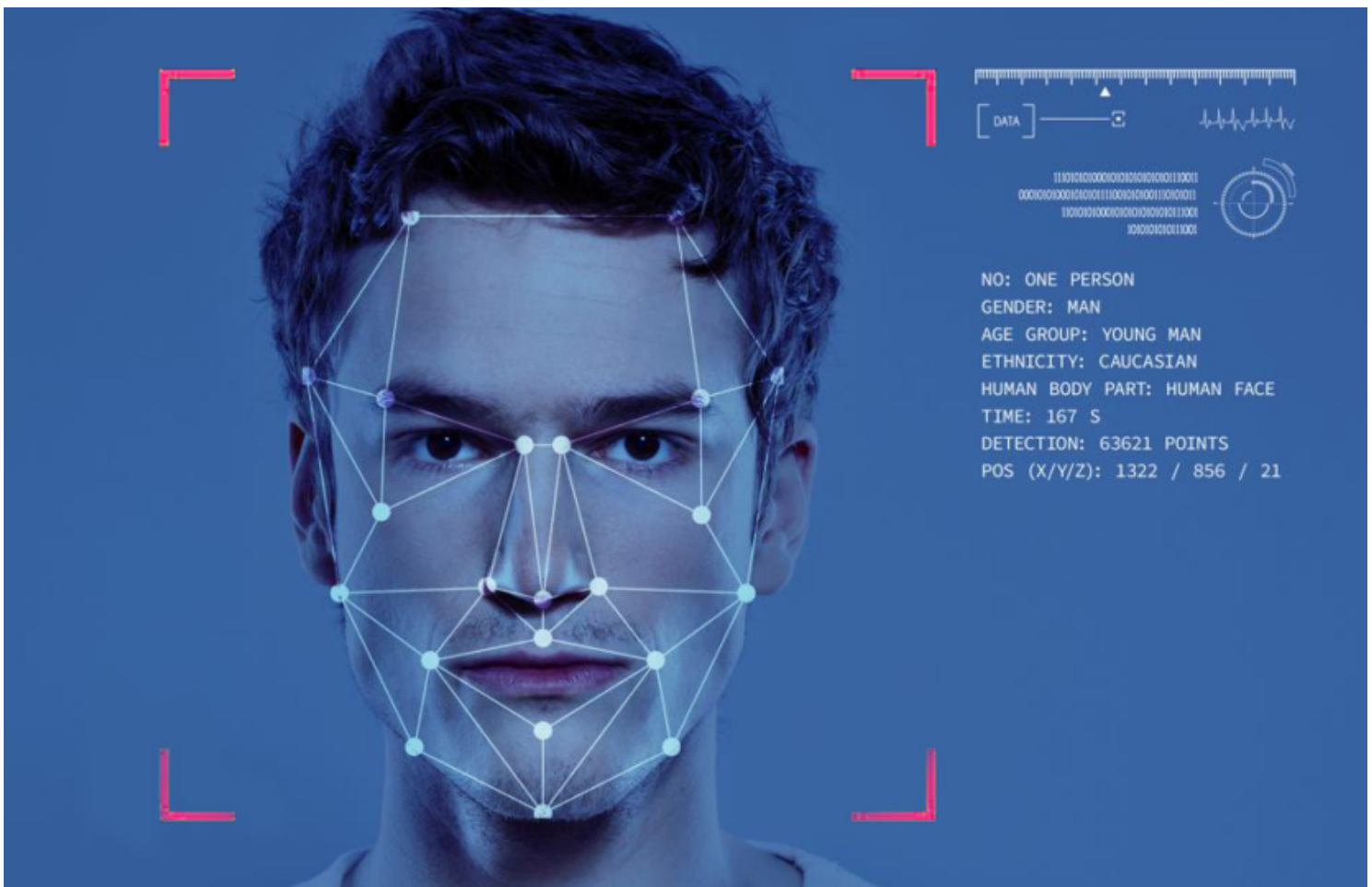
The key benefits of 5G are faster transmission speeds, lower latency and thus more capacity for distant execution, a larger number of connected devices, and the ability to construct virtual networks (network slicing), which allows for more tailored connectivity to specific demands.

Greater speed in transmissions

Transmission speeds can reach 15 or 20 Gbps. We can access data, programmes, and distant applications in a completely direct and without waiting manner if we have access to a faster speed. By increasing cloud usage, all devices (phones, computers, etc.) will rely less on internal memory and data accumulation, and it will be unnecessary to install a high number of processors on some items because processing can be done on the Cloud.

Lower latency

Latency is the time it takes for an action to occur once we provide a command on our device. The latency of 5G will be ten times lower than on 4G, allowing enabling real-time remote actions. It is possible to control the machinery of an industrial plant, control logistics or remote transport, surgical operations in which the doctor can intervene on a patient who is on the other side of the world with the help of precision instrumentation managed remotely, or complete control of remote transport systems, automated and without driver, thanks to this low latency and the increase of sensors..



Face verification is an alternative to using your campus card to verify your identity. Face recognition terminals can be used to not only promptly record students' attendance, but also to properly check the identities of in and out workers, ensuring campus security. Because of 5G communication, attendance data can be uploaded to the school administration platform in real-time, allowing both the school and the parents to keep track of their children's progress.

In addition, visitor permission registration, blacklisting, early warning, and dynamic control can all be configured at the face recognition terminal in order to limit the risk of off-campus workers disrupting the campus' usual order and increase security.

Improve the quality of examination

Face recognition technology can put an end to the problems of taking an exam for someone. Because the face recognition terminal has a witness comparison feature, it can automatically identify the examinee and ID card information, preventing the appearance of cheating and reducing instructor workload during supervision.

Optimize staffs attendance

Face recognition technology allows employees to simply swipe their faces in front of the face recognition terminals situated at each office's door. The attendance will be automatically updated to the system after the scanned facial information is matched with the one kept in the university system.

Improve learning engagement

Facial recognition software may be programmed to distinguish a wide range of emotions and nonverbal expressions. A lecturer can use this to gauge the mood of the class and decide which portions of his presentation are the most exciting and engaging, as well as where students' attention appears to be waning. In this approach, each individual face might act as a unique thumbprint that also communicates through spoken and nonverbal data.

5G APPLICATION: FACE RECOGNITION ON THE SMART CAMPUS

STUDENT REFLECTION

Based on the 5G applications, I learned that this technology can help students in the university in terms of their daily lives. It also promotes students to the uses of technology since our country is on the 4th Industrial Revolution.

Face recognition can help students to reduce the burden of bringing their card and maybe can help them pay for everything that they bought just by using their face. It also helps to reduce the theft case in the university as the students don't need to bring their wallets everywhere.

It also improves the system that can be used by the staff in terms of the attendance and many else. Lastly, I can say that this kind of technology is indeed very important to the improvement of the smart campus.

Industrial Talk

Smart Campus: The Journey Starts Here (CommScope Malaysia)



What is CommScope in network infrastructure and what are actually they do?

CommScope, Inc. is company that provide and design fiber optic cables and coaxial and any related products that are used by cable and satellite television provider and other, so that is why this company so popular in data networking , internet access, wireless communications and telephony.

Smart Campus as new thing in our generation

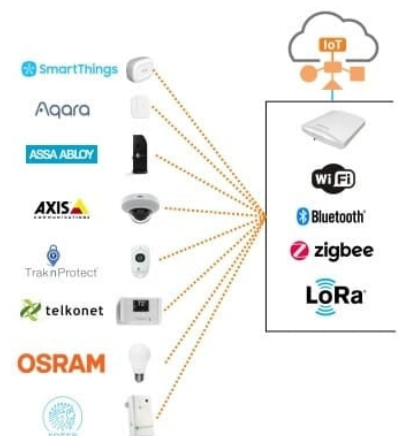
Nowadays, development of technologies are quite impressive due to facilities that we have and high speed connectivity to remote all the devices that be used especially in IoT. So, it is possible for any college to apply smart campus technologies to improve their study environment and make students there more comfortable.

There are three main things that related to smart campus infrastructure such as smart living, smart learning and smart safety. If we combine all three things that have been mentioned before, it is a complete structure for smart campus and it give students a great experience for them especially in study efficiency.

1. For smart living, each students must have smart ID cards that allow students to get an access in every places in college. Then, connectivity or in-building LTE must be focused on by responsible authority because students need it to do some research and work on their assignment.

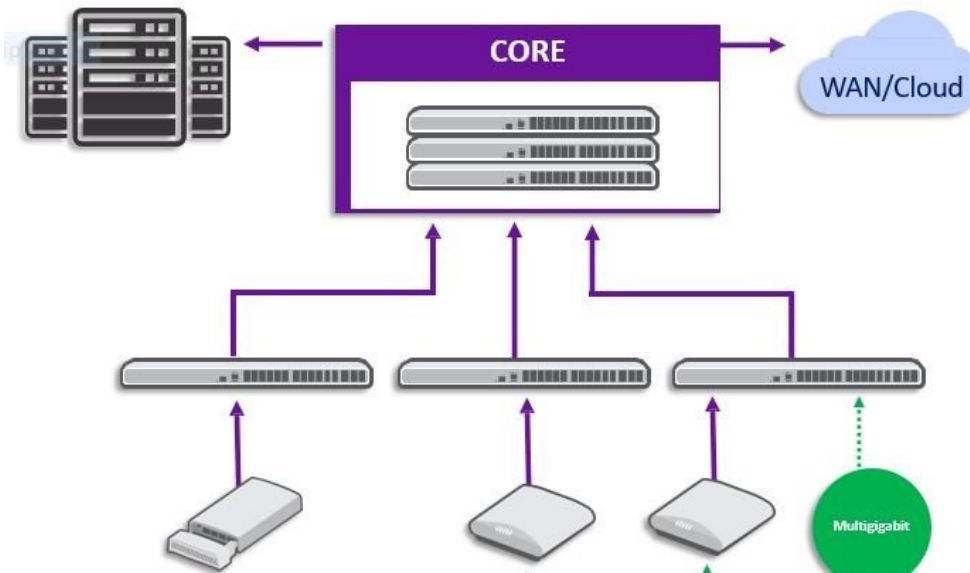
2. In smart learning, flexible learning space is one of important thing because it give both lecturers and students a convenient places in learning experience. It can be like having some IoT devices in there such as smart lamp, vape detection and others. Beside, digital is a vital system that must be applied in every college because it give a lot benefit in term of management and learning. It is related to cloud computing service and surely it is more convenient compared to the old way learning. This system also can be applied in library management to ease students to get some reference there.

3. Lastly, smart safety and security must be one of crucial things that must be focused on because the responsible authorities in college were assigned to secure the college communities' safety. So, they should install a lot of security devices in each college venue such as CCTV, motion detection, sound detection and connected entry. Then, it can be sure that their work will be easier to secure college environment and people in college will feel secure with the existence of these devices.



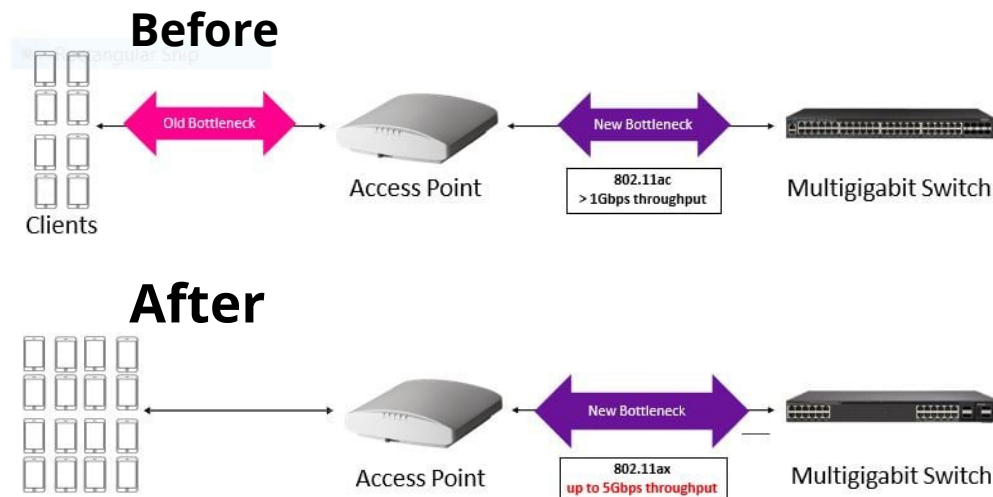
Example

Technology emerge has make a big impact on network infrastructure such as in Multigigabit Technology and Unified Network Management.



MULTIGIGABIT TECNOLOGY

The multigigabit technology has improve some part of exciting campus infrastructure. For example, the access limitation has increase from 1GbE to 2.5/5GbE when it convert to multigigabit technology. There are some product that have been upgrade like bottleneck from design 802.11n to 802.11ac. It is also got their latest version which is 802.11ax. This new design of bottleneck help more client to experience higher throughput . a



Unified Network Management

Before the unified network management was used, there are two main network management element which are WLAN controller and Network Management System. But, this technique has some disadvantage which is difficult for developer to handle too many access point in one time. Then, with unified network management system. Network controller now can handle all access points and switches in one time.

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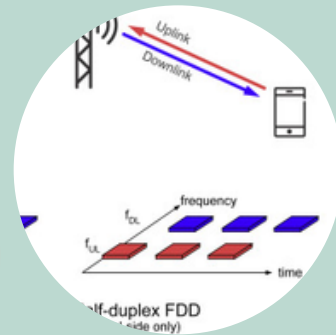
Reflection

From the talk that had been given by Commscope System Engineer Mr Goh Bih Der. We know that the emerging technology on network infrastructure has deal a big impact to the industry. Many people and sector has experience the benefit of the new technology. In the conclusion, we hope that the technology related to the network infrastructure can expand time by time to make sure we get maximum benefit from it.

WIFI 6 & 5G



HUAWEI



- In-Depth Analysis of HUAWEI Airengine WIFI6 Technologies First and foremost, it offers the best performance, with 16x16 MU-MIMO. Then there's the SMART ANTENNA, DYAMIC TURBO, and Joint Scheduling via MU-MIMO and OFDMA, which provide it the most stable experience. Third, it comes with the Most Comprehensive IoT Apps, which include two built-in slots for IoT modules, USB-based IoT expansion, and IoT chip compatibility. It also has the most secure features, such as a separate scanner radio, dual-signature boot, and hardware encryption.
- The distinction between 5G and WIFI 6 is that WIFI6 is geared more toward indoor ultra-high density and building/house applications. Home networks, supermarkets or malls, universities, classrooms, and stadiums are just a few examples. Outdoor wide coverage industries/cities, such as urban coverage, street or plaza, commercial street, highway, and scenic region, will benefit from 5G.



- the Wifi Alliance specified a new name for several wifi standards in October 2018, 802.11 ax was renamed wifi 6, which is a revolutionary technology. The factors affecting WIFI rate are first, the spatial stream which is from 4T4R to 8T8R. Second, the factor is sub-carrier quantity which the effective rate 91.41% to 95.7%. third, symbol duration from 256 QAM to 1024QAM. Last but not least, coding mode which is from 3.2US to 12.8US.
- Wifi 6 also improves full-house coverage. RF optimization on the wifi 6 chip, optimising TX power and sensitivity while maintaining the same quality. When connecting to regular wifi, a dedicated algorithm improves performance and provides omnidirectional coverage. a total of six STAs
- In addition, WIFI 6 has a new video service that includes multi-screen IPTV, online education, virtual reality, and esports. For multi-user disorder, a single lane without traffic signals competes with several lanes with traffic lights for WIFI6. The CCA power adjustment also changes from the same channel, allowing several users to transmit data on the same channel at the same time. Wifi 6 also supports better multi user Experience: More than 100 Terminals are connected, And the power consumption of terminals Reduced by 30 %.
- WIFI 6 differs from WIFI 5 in that it has a greater bandwidth and supports 1024 QAM, whereas WIFI 5 only supported 256 QAM. It also has four times the number of OFDM symbols (12.8 US from 3.2US). The number of terminals on a single AP is 1024, which is 4x the number of concurrent users, hence WIFI 6 has higher concurrency. WIFI 6 also has low latency, with a service delay of only 20 milliseconds and an average latency of only 50%. Last but not least, because the TWT mechanism is only 20MHz, it uses less power.



Reflection

From the industry talk, we can conclude that having 5G and WiFi-6 in this modernized era is important. For businesses to keep up with each other and thrive to stay on top, adapting these two technologies is a must. Workloads will be done more efficiently and consumers will also be satisfied. Industries that use 5G and WiFi-6 can reduce workforce too as Smart 5G technologies are there to be of help. Thus, in hopes of an advanced environment, having 5G and WiFi-6 is essential.

5G

The next generation of wireless technology systems.

The current generation is evolving really quick with advanced technology that everyone is trying to keep up with. 5G is one of it, being the next generation of wireless technology systems. Compared to the previous generations, 5G offers a faster speed. Imagine this, once 5G goes on the market, consumers can reach speeds that reach nearly 3025 Mbps. This means that things that took minutes to download using 4G will only take a matter of seconds with 5G. How amazing is that?

Other than that, what makes 5G so good? The three main advantages that 5G offers is that 5G devices has lower latency, more reliable, and more flexible than Wi-Fi. For instance, you could look at it this way. 4G can stand for a one or two lane highway while 5G stands for a 10 lane highway. This means that with the use of 5G, it can connect up to millions of devices at once and support more applications. 5G enables a faster and better data transmission rate.

5G will be adapted in cases mainly in Augmented Reality (AR) and Virtual Reality (VR). For example, it is essential to use 5G in VR because it provides high throughput for Retina Experience VR and low latency to avoid motion sickness. Consumers will have a better experience using it. Furthermore, industries that might find 5G as an essential are 5G Smart Manufacturing and 5G Smart Education.