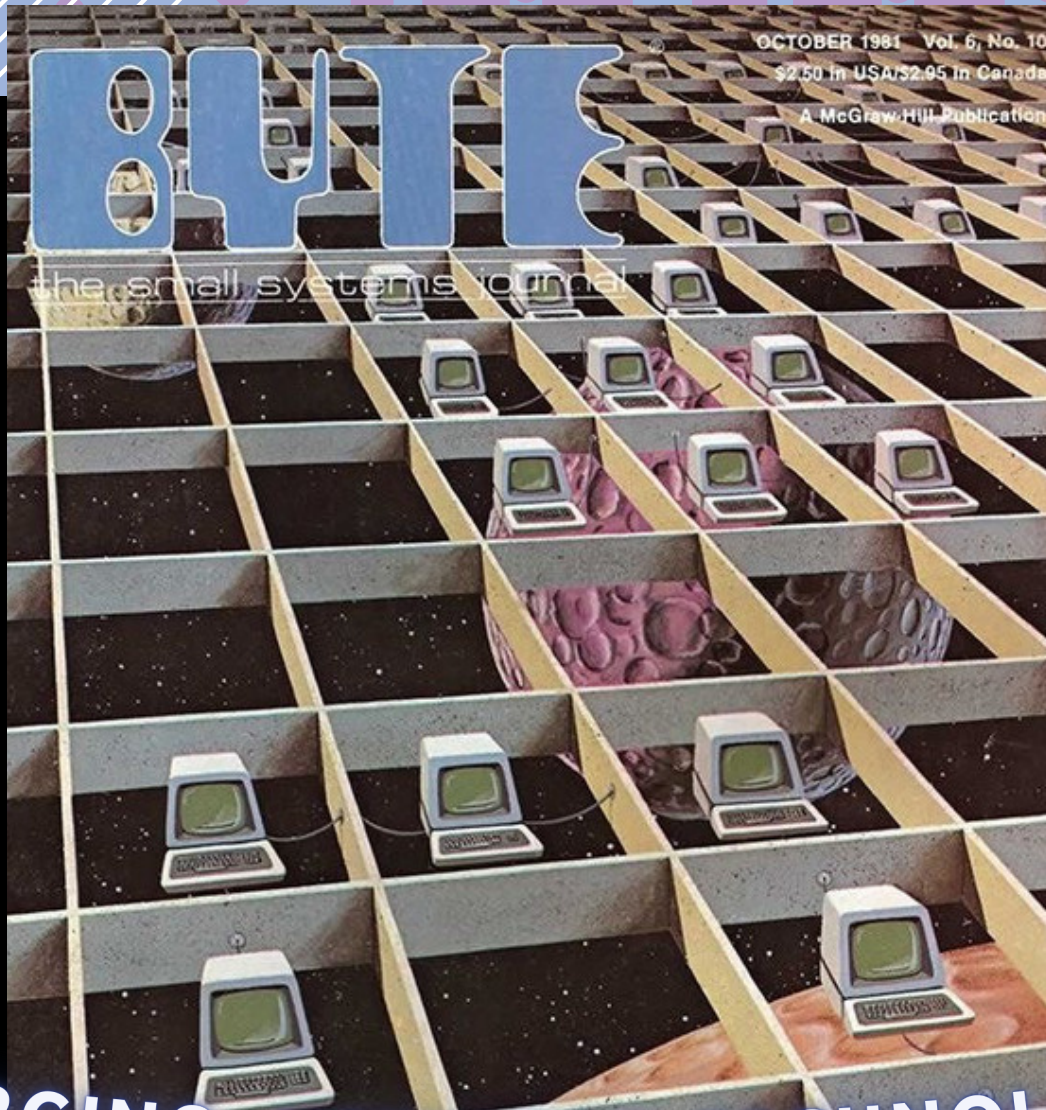


# Technology Information System



## EMERGING NETWORK TECHNOLOGY



### GROUP MEMBERS

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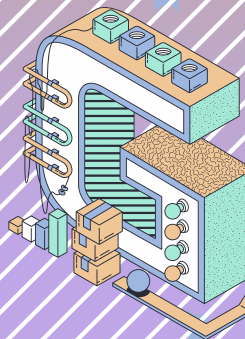
### Topics:

- Application of 5G in Smart Campus
- Industrial Talk 5: Emerging Technology on Network Infrastructure (Commscope Malaysia)
- Industrial Talk 6: 5G, WiFi6, and Emerging Network Technologies (HUAWEI)



# WHAT'S A SMART CAMPUS?

Before we get into the topic, it is very crucial to know what is this Smart Campus all about. Is it a kind of campus that is where every brilliant person, mental giant, mastermind, Einstein-like people study at? Apparently, it is half true but let us clear up some misunderstanding here. The actual definition of this **Smart Campus** is it uses advanced network infrastructure like smart sensors and internet-connected devices to provide engaging experiences where actuators can collaborate to receive information and interaction with machines, tools and users. Moreover, It joins people, devices, and applications and allows universities to make insight-driven decisions to improve security and maximize resources.



# APPLICATION OF 5G IN SMART CAMPUS

**THE STUDENTS OF THE FUTURE WILL DEMAND THE LEARNING SUPPORT THAT IS APPROPRIATE FOR THEIR SITUATION OR CONTEXT. NOTHING MORE, NOTHING LESS.**

QUOTE BY MARCUS SPECHT

In order to promote the innovation of educational applications for the future, 5G technology plays a huge role which enables users to gain same learning experiences from being present attending the real classrooms even in different time zone and locations with the aid of IoT and advanced VR technology.

There is one application of 5G technology that can be applied to the field of education in smart campus, which is the Virtual Reality and Augmented Reality (VR&AR) teaching method. This is because due to the high and large capacity of bandwidth & low rate latency of 5G. It allows VR&AR teaching materials to be put on the cloud. Why putting it in the cloud? This is because the rendering, displaying visual and control of the AR application can be deploy on the cloud-based system by using the cloud's computing power.

Before 5G, there is an issue about low latency of VR&AR teaching. But when the 5G technology slowly emerging, the VR&AR audio-visual streaming can be transmitted through 5G network in real time when encoded efficiently.





## APPLICATION OF 5G IN SMART CAMPUS

To meet the needs of the low latency of VR/AR teaching, the deployment of rendering functions on MEC architectures near the customer's side can be used to effectively solve the problems within the former architecture; especially those caused by the limitations of the network's transmission rate and the delay in the cloud's services. Furthermore, the application of a VR&AR cloud application, virtual lab experiment, virtual innovative class and other VR&AR related classes can be conducted through it. This is where we make transformation of real existing things into virtual things via VR&AR and learners can observe, interact, digitalize and understand these virtual knowledge with them systematically in a virtual space.

## REFLECTION ON THE 5G IN SMART CAMPUS

From the example of 5G application mentioned, we can compute the comparison between the traditional methods of education and the VR & AR teaching. The VR & AR teaching method is three-dimensional (3D) where it enhances student's classroom experience from its previous two dimensions (2D) teaching method. The VR & AR content can make learners visualize intangible and indefinable things which makes it easier for learners to improve their understanding and cognition. Other than that, the enhancement of VR&AR teaching method will increase the participation of learners through deep learning experiences & lead them to proactively interact in the teaching process.

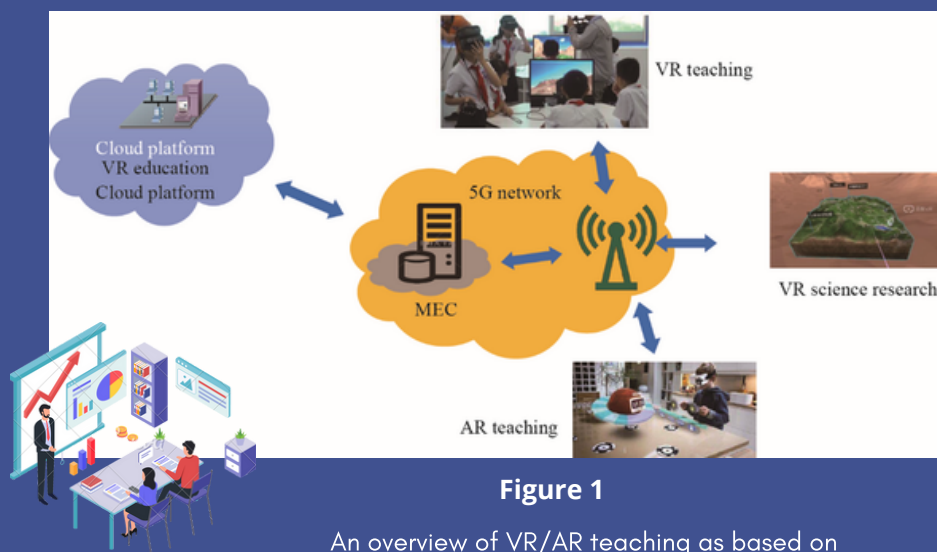
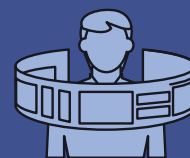


Figure 1

An overview of VR/AR teaching as based on 5G technology is shown in Figure 1..



Furthermore, active-interactive learning allows students in the class to pause at any time or repeat any of the steps without excessive interruptions or overstress on teachers. In addition, by leveraging VR&AR methods, teaching content can be designed into very attractive games which makes learning interesting and entertaining for students. Here comes the important aspects in learning process, the virtual experiments can be done in virtual environments through VR&AR technologies. It can reduce the risks from experiments in chemistry, physics, electronics, and other disciplines. Lastly, the VR & AR teaching method enable teachers and students from different regions to gather in the same virtual classroom, where the balancing of the equality of educational resources can be done.

# Emerging Technology on Network Infrastructure (Commscope Malaysia)

## INDUSTRIAL TALK 5 :



## Wi-Fi 6 DEVICES

PlayStation 5, Microsoft Surface Laptop Go, HP Spectre x 360, iPhone 12

The WIFI 6 chipset supports the 6GHz band with the goal of doubling the Wi-Fi speeds while cutting latency in half. It is not just about speed as it is also equip to relieve network congestion, reduce power consumption and also provide greater client capacity.



Mr Goh Bih Der the system engineer from COMMSCOPE was the speaker for the industrial talk 5 with the main title of

## INFRASTRUCTURE DESCRIPTION

Emerging Technology on Network infrastructure. He began by talking about the impact of the pandemic to the IT world and how it's changing the existing network infrastructure. Some examples of these changes are remote working environment for employees, acceleration of digital transformation, remote management of IT infrastructure and many more. The information of the moving components of the networking infrastructure was made clear by linking our daily Wi-Fi devices through wireless protocol to connect to the access point. Also not forgetting IoT devices which might have their own IoT protocol. The access point then will have a cable to connect to the switches which has the power to connect all of the equipment needed by user. The switches is then connected to the core switch via cable(uplink). This is where internet connection is achieved. This leads to a spirited discussion about what exactly is a Smart Campus was had which helps in explaining the In's and Out's of a Smart Campus which cultivate an environment of Smart Living, Smart Learning and Smart Safety to achieve a greater student experience. This will ultimately place the real life physical infrastructure on its network infrastructure which will be using IoT connections to link objects, buildings, vehicles and even people. Some example of changes made are Wi-Fi provider being much more accessible, smart lining system installed on the streets, installing a sensory system and many more. Mr Goh also explained in detail about what COMMSCOPE is working on and presented a networking portfolio. Overall the talk was extremely informative and gave us a rare insights on the technological advancement made in the industry.

## COMMSCOPE DEVICES

COMMSCOPE manufactured many devices that will help in the cause of implementing and maintaining the network infrastructure such as, **switches, indoor and outdoor wireless access point**

COMMSCOPE is also a world first certified WIFI 6 vendor (RUCKUS R750)

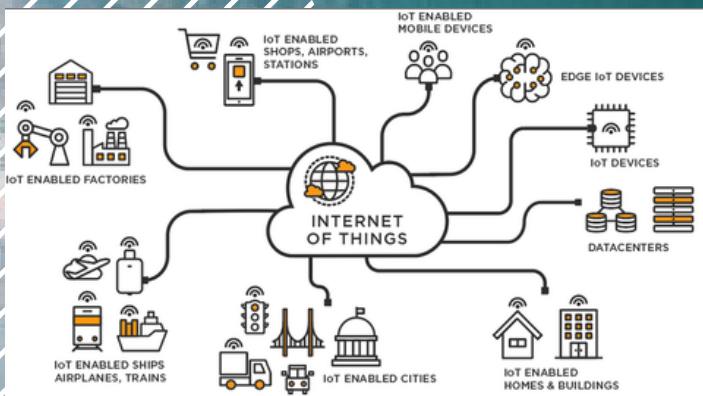




# Reflection

## EMERGING TECHNOLOGY ON NETWORK INFRASTRUCTURE

Conclusively, there are many important new technologies that emerges especially towards network infrastructure. Covid-19 pandemic has impacted the IT field immensely. Majority of industries nationwide has gone digital causing rapid acceleration towards digital transformation. Newly emerging technologies such as WIFI 6 has contributed greatly towards the evolvement of network infrastructure. With better network capacity and efficiency, it has solved many problems that we are facing with our current wifi technology. Furthermore, the evolution of network also allows us to utilize IoT (Internet of Things) technology more efficiently. With the existence of IoT Access Network, it is much easier for us to achieve "Smart Campus". By achieving this status, it is more guaranteed that students can have a smart living and a smart learning environment. This proves that these new emerging technologies not only makes our lives better but also contributes immensely towards the nation's education system.



# Example of Domain

29 NOV 2021

# COMMSCOPE®

## COMMSCOPE

## EMERGING TECHNOLOGY ON NETWORK INFRASTRUCTURE

CommScope is one of the dominant company in Malaysia that focuses on empowering new technologies towards network infrastructure. CommScope is responsible in providing world's advanced networks by designing, manufacturing and supporting the network infrastructure and also its software intelligence to enable digital society. For example, CommScope has introduced RUCKUS Network that simplifies IT in our lifestyle. Some of the solutions offered by RUCKUS includes Wifi 6, IoT technology and Converged Access. It also offers hardware infrastructures such as ethernet switches and access points. With these new technologies, people all over the world can enjoy an efficient network infrastructure.





# 5G AND WI-FI 6 DESCRIPTION

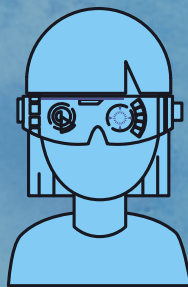
In industry talk 6, Mr Nicholas Yong from Huawei Enterprise Business Group discussed about 5G and Wi-Fi 6. Huawei is an emerging network technology which is a leading provider of ICT infrastructure and smart devices. 5G is the fifth generation of wireless technology system. It provides speeds faster than any previous generation, comparable to those delivered through fiber-optic cables. 5G will be transformative for industries with the reason 5G devices are lower latency, enabling faster and better transmission of larger data streams, more reliable, more flexible than wi-fi and can support a wider range of devices. Users may experience enhanced mobile broadband, massive machine type communications, ultra-reliable and low-latency communications when 5G are applicable. 5G also foster new opportunities and benefits. W-Fi 6 is the next generation of wi-fi with some improvements such as speed limit. It has been verified for more than 3 years. 802.11ax is actually named Wi-Fi 6. This refers to a revolutionary new technology. Wi-Fi 6 has large bandwidth, low latency, IoT-oriented energy saving and it is anti-interference. Users prefer Wi-Fi 6 because it supports the evolution of home value-added services such as multi-screen IPTV and e-sports acceleration, improves coverage for full-house and supports better multi-user experience.

2ND DEC 2021



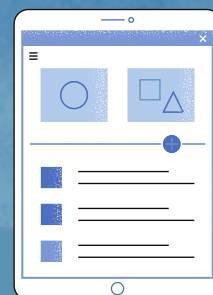
## 5G DEVICE

One of the popular device which use 5G is Virtual Reality (VR). VR needs 5G to provide high throughput for retina experience VR. The 5G used in VR also caused low latency to avoid motion sickness like dizziness and fainting. With this features, users will enjoy using the VR.



## Wi-Fi 6 DEVICE

We can access Wi-Fi 6 using our phones and laptops. But not all models will support Wi-Fi 6. Some models such as Samsung start incorporating support for Wi-Fi 6 and other models are soon to follow the suit.





# Reflection

## 5G AND WI-FI 6

Through the talk, we have gained so many insights especially about 5G and Wi-Fi 6. 5G is actually the evolvement from 4G technology. 5G have higher bandwidth and lower latency which causes the speed to become more faster. These features will enable us to use wider range of application that can be supported by 5G such as Virtual Reality, Automation in vehicle and many more. Furthermore, 5G also foster new opportunities and benefits in many sectors including industries, education, tourism and much more other. The rapid development on today's internet connectivity has results in the evolvement of Wi-Fi. The latest generation of Wi-Fi is Wi-Fi 6. Wi-Fi 6 core technologies consists of large bandwidth, high concurrency, low latency and low power consumption. This technology actually already available on the market. Lastly, we hope that in the future, the Wi-Fi or any internet connectivity will cover every part of our country especially in the rural area, because nowadays internet connectivity has become one of the necessity as everything is conducted through online.

# 5G

## Example of domain

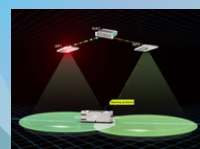


### 5G AND WI-FI 6

Huawei is one of the company in Malaysia that provides WiFi-6 technology. Huawei AirEngine Wi-Fi-6 Technologies At-A-Glance is one of the domain that have been highlighted by Mr Nicholas Yong during the talk. This technology have the **highest performance** which is 16x16 MU-MIMO. Moreover, it also gives user the **most stable experience** with Smart Antenna, Dynamic Turbo, Loseless Roaming and also SmartRadio. Furthermore, Huawei AirEngine is the **most comprehensive IoT apps** because there are two built in slots for IoT module, IoT expansion through USB port and lastly it is also IoT chip ready. Last but not least, this technology is the **most secure** as it has independent radio for scanning, hardware encryption and also dual-signature boot.



Dynamic Turbo



Loseless Roaming



Smart Antenna

