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NETWORK TECHONOLOGY

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5G, WIFI6 AND EMERGING NETWORK TECHNOLOGIES (HUAWEI)

EMERGING TECHNOLOGY ON NETWORK INFRASTRUCTURE (COMMSCOPE MALAYSIA)

APPLICATION OF 5G IN SMART CAMPUS

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SMART CAMPUS

A smart campus uses advanced network infrastructure and internet-connected devices to provide supportive and engaging experiences. It joins people, devices, and applications and allows universities to make insight-driven decisions to improve security and maximize resources.

Building a foundation for internet-connected services and ensuring room for future growth provides many advantages for universities. Working with a technology partner, such as your internet service provider, can help you identify immediate needs and plan future investments.

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SMART LIVING

SMART LEARNING

SMART SECURITY

1. Flexible learning space

Environment that is designed for flexibility and leisure for students such as dividing the classmates into small groups and sitting at low tables.

2. Digital portal

Websites developed for students as resources besides attending libraries and obtaining physical reference books.

3. Virtual lab

Virtual appearance based on a physical lab that is to eased the students as well as making it part of entertainment in the class.

4. Distance learning

Medium of study that does not require face-to-face interaction of students and instructors or known as virtual class.

5. Lecture capture

Instructors are able to view the classroom digitally. As such, attending Google Meet or any virtual video conferencing application for class.

REFLECTION

The smart campus has its advantages in various sections, that can cover living, learning, and security. Its creations can develop for a better learning experience, thus increasing individuals' productivity as smart campuses ensure the student's comfort and convenience. The uses of smart campuses have been increasing ever since the Covid-19 pandemic occurred, making students that usually on-campus had to virtually attend the classes.

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INDUSTRY TALK 5 :
EMERGING TECHNOLOGY NETWORK INFRASTRUCTURE

The arrival of the next WiFi generation, 802.11ax or renowned as WiFi 6 is just not promised about the incredible speed. The network consistency and reliability connection will be experienced by the user due to several significant changes and upgrade. High bandwidth and low latency are ensured to deliver the maximum throughput.

Everything about Wi-Fi 6

Wi-Fi 6 Further Improvements

Target Wake Time (TWT)

Devices is set to remain in sleep mode and only when wake for a particular period to access the data transmission. This shows how a significant impact in extend battery lifespan and its consumption.

Orthogonal frequency-division multiple access (OFDMA)

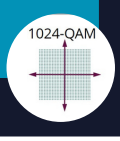
OFDMA enable multiple devices can be served simultaneously. It is like a carpool concept, data from every device are divided into subcarriers, bundled and transmitted in a single trip.

Basic Service Set Coloring (BSS Coloring)

Collision between nearest APs radio signal will lead to inferences that become less in transmission efficiency. BSS coloring is capable recognizes and connects the exact device with its AP or router even in a complicated network environment.

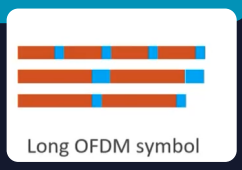
1024-QAM (Quadrature Amplitude Modulation)

The analog signal from the transmission must be converted into binary data. Signals actually divided into amplitude and quadrate. QAM has the same function as a translator. 1024-QAM allows 1024 possible transmission values with 10 bits per transmission



Long ODFM Symbol

this ensure outdoor network reliability that makes signal transmissions clear in large area wtihout any noise or lost due to reflection on bulidings



Multi-user MIMO (MU-MIMO)

Networks will have more distinct spatial stream with double streams available compared to Wifi 5 only has 4 streams. More devices connected at once and useful for high bandwidth transmission like smooth streaming 4K movies and using VR devices.

Multigigabit Technology

The risk of the wired network causing a performance bottleneck increased enough to spur the development of multigigabit technology, which allows you to achieve :

- A rapid increase in wifi speeds
- IoT devices/ smart building
- 10x increase in wired edge speed
- Cloud application and video streaming

Internet of Things (IoT)

Benefits of implementing IoT Solution

- Cost decrease
- Enhance customer experience
- Increase efficiency &productivity
- Increase business opportunities

Cloud Analytic

Cloud analytics is the process of storing and analyzing data in the cloud and using it to extract actionable business insights.

Domain Implementation Wi-Fi 6

Industrial IoT

The Wireless Broadband Alliance & Mettis Aerospace announced the world's first Wi-Fi 6 Industrial Enterprise and IoT trial. The use cases under this alliance include multi-stream live video monitoring, real-time energy monitoring, ultra-reliable low latency communications with sensors on critical systems, and augmented reality.

Sports and Entertainment

The WiFi 6 technology improves the efficiency of the spectrum, thereby enabling concurrent usage and increased bandwidth requirements. Since the venues may experience a sudden rise in voice traffic (carrier offload) on Wi-Fi networks, WiFi 6 can handle latency efficiently. WiFi 6 uses OFDMA, MU-MIMO for uplink & downlink which helps support the increasing demand for video content uploads/downloads from users in a hyper-dense environment.

Device Used Wi-Fi 6

Firewall

The firewall mainly plays an isolation role in the whole network. It separates and then connects the external network and the intranet users from the physical level. It combines software and hardware to first access the intranet from the external network.

Router and AP

Today's routers and APs have basically the same functions. It is a comprehensive device that integrates routing, switching, and WIFI functions. The role is data exchange processing, network link and IP distribution, wireless transceiver. At the same time, it also has a signal relay amplification function.

Reflection

The debut of Wi-Fi 6 is a life-changing experience since the internet will be dominant as it is an advance of improvement which is to ensure downlink and uplink happen in maximum efficiency. High bandwidth, low latency, and vast coverage area are significant to deliver an impressive performance. The upcoming IoT also makes Wi-Fi 6 a correct choice to overcome network congestion, thus conserving the client devices.

With the aid of automation, it is capable of dealing with complex situations for administrators to manage. On the other hand, network management also can be centralized to serve efficiently.

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INDUSTRY TALK 6:

5G, WI-FI 6 AND EMERGING NETWORK TECHNOLOGIES

WHAT IS WI-FI 6

Many do not realize that we already have Wi-Fi 6 for 3 years, some of us have probably used it before but never realized that they used it. In September 2019, the Wi-Fi Alliance initiated Wi-Fi 6 certification, indicating that Wi-Fi 6 is ready for mature commercial use. Wi-Fi 6 (802.11ax) with a new maximum rate of 9.6Gbps, faster than the last generation of Wi-Fi, W-Fi 5 (802.11ac) with the maximum rate of 1.73Gbps. Wi-Fi 6 supports Gigabit Broadband promotion such as 1Gbit/s to mobile phones/PCs and Fast Download/Cloud backup experience.

Wi-Fi 6 had increased sub-carriers thus increasing the efficiency to 95.7%, which is an improvement compared to last generation's 91.41% effective rate. Different coding mode also plays a huge part, Wi-Fi 6 uses 1024-QAM coding.

WHAT IS 5G?

5th Generation (5G) mobile network is the latest technological advancement in network communication, engineered to greatly increase the speed and responsiveness of wireless networks (Gillis). 5G is lower latency, enabling faster transmission of larger data streams, more reliable, enabling better transmission of data in extreme conditions, more flexible than wifi, supports a wider range of devices, sensors, and wearables.

5G will support more applications. The most important index can be shortened as 1, 10, 100 which means 1ms of E2E latency. 5G is capable of 10Gbps peak data rate and 1 million within 1 square kilometer.

COMPARISON

5G devices are low latency, by means 5G provides low time delay which is able to cause an effect as it faces physical changes over the system, such as action or request were made and received over the same devices.

The biggest change with Wifi 6 is Wifi 6 is blazing fast. The signal has been clocked at 1,000% faster than the average download speed in the United States. You'll be able to connect more devices and stream more data on every device at faster speeds with Wifi 6.

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Device Used 5G

Smart Home Devices

It combines all of the disparate apps into a single smart home app that can be controlled remotely by homeowners. Examples of smart home hubs include Amazon Echo, Google Home, Insteon Hub Pro, Samsung SmartThings and Wink Hub.

Wearable Devices

Wearable devices are products controlled by electronic components and software that can be incorporated into clothing or worn on the body like accessories. Nowadays, a variety of wearable devices, such as smart glasses and smartwatches, have been invented.

Domain Implementation (5G)

Business

- Augmented Reality : digital elements such as sound and visual in order to achieve an augmented version of physical reality.
- Virtual Reality : simulation of another world that is different from reality and mostly applies through games or training.
- Smart Grid : monitor power flows from the start, generating to consuming level, that is used for automation, communication and IT systems.

Industrial

- Smart Tourism through technology applications so tourists or any user is able to experience virtual escape or live-stream via 5G network.
- Advance 5G Industrial Park establishes more job opportunities as an impact of economic diversity through high-tech industrial development.

Domain Implementation (Wi-Fi 6)

- Implementation of IoT through Access Point (AP) which provides built-in Bluetooth connections for multiple functions such as RFID, Zigbee and UWB.
- These functions are able to serve widely for enterprise access management, Smart City control, precise location services and manufacturing facilities.
- In detail, as an example, RFID uses radio frequency identification for Touch ‘n Go RFID to pass highway toll.

REFLECTION

We concluded that the occurrence of 5G and Wi-Fi 6 will assist the path toward IR4.0, particularly for IoT, since Wi-Fi 6 will function as indoor connection for IoT, which smoothens the process of collecting, transferring, and processing bigger amounts of data and information. When the user is away from home, 5G will make it possible for him or her to obtain information or updates from the programme without any delay or latency. Wi-Fi 6 and 5G help to reduce the risk of harmful activities.

Car racing, for example, may be transformed completely through mimicry and virtually with the use of AR and VR over Wi-Fi 6 or even 5G. The high-speed performance of Wi-Fi 6 and 5G may provide a constant connection with quicker speed to any competition or even allow every user to enjoy new and sophisticated experiences such as multiplayer.