UNIVERSITI TEKNOLOGI MALAYSIA

SECP1513 – Section 07

Technology and Information System

ASSIGNMENT: Magazine on Application of 5G in Smart Campus, Industrial Talk 5 - Smart Campus (CommScope Malaysia) and Industrial Talk 6 - 5G, Wifi6 and Emerging Network Technologies (HUAWEI)

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DUE DATE: 11/12/2021

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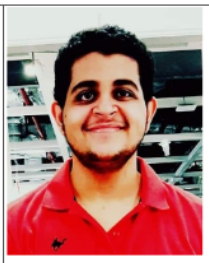
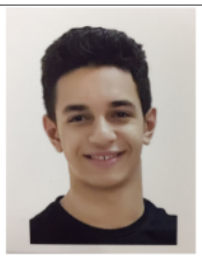
GROUP MEMBERS	 Arshad Parvez Dipto **(Group Leader)**	 Yousef Khaled	 Amar Hassan	 Maysara Mohamed	 Youssef Rames Mohamed
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Emerging Network Technologies and Smart Campus

Application of 5G in Smart Campus

Smart Campus: The Journey Starts Here (CommScope Malaysia)

5G, Wifi6 and Emerging Network Technologies (HUAWEI)

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Applications in the smart campus

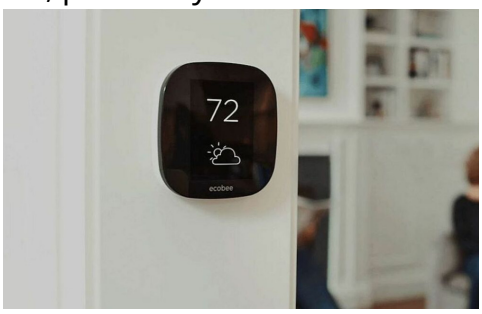
What is smart campus ?

The smart campus usually uses advanced tech and network infrastructure, it joins devices, people, and applications which allows us to, decisions improve security, and maximize resources. A successful campus is easy to get to and get visible and identifiable also edges of campus are very important and shouldn't be parking lots or large, there are a few examples such as Vape Detection, Window Sensors Occupancy Management.

so let's start with the first one wich is vape detection:

we can use it education for example Student vape detection in classrooms, locker rooms, bathrooms, or in hospitality such as Instant alerts for guest smoking and aping detection. Instantly prove for violation fees and eliminate lost revenue
or in health care Monitoring for hazardous substances and noise pollution per OSHA guidelines. Temperature monitoring for storage of lab results, vaccines, blood, ICU, pharmacy shelf life.

Vape detection



A smart thermostat is an app-enabled device that does more than managing your home's heating and cooling system. You can adjust your thermostat remotely anywhere your phone has a Wi-Fi or cellular connection. That way, you can manage your heat and AC whether you're at the grocery store, on vacation -- or just hanging out at home. Many models can also be controlled via Siri, Alexa, or Google Assistant voice commands.

Smart thermostats

Automated locks

Environment air monitoring

The main objective of environmental monitoring is to manage and minimize the impact an organization's activities have on an environment, either to ensure compliance with laws and regulations or to mitigate risks of harmful effects on the natural environment and protect the health of human beings.

Many smart locks offer a mobile app that allows you to lock and unlock doors with a simple icon tap

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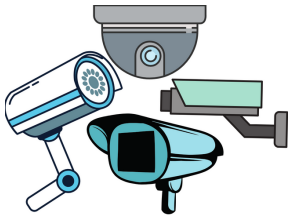
smart

smart campus

living learning security

There are many examples for smart living such as smart cards, in building IoT, smart lighting, smart parking transit, wayfinding, personal network.

Also, there are many examples for smart learning, first of all, Flexible Learning Spaces, Digital Portals, Virtual Labs, Distance Learning, Distance Learning, Library of the Future



The last smart frontier we have is smart security. We only got two examples for it, Sound Detection Motion Detection and CCTV and VMS Connected Entry Tracking Assets.

now the question is do we have a control when or where a campus security indicint may happend ?

This is why we need IoT Automation on campus. Safety information technology direction with the IoT control networks and information networks integration of IoT technology has been studied based on the actual situation of agricultural production.

Talking about the (CCTV) cameras known as closed-circuit television security monitor system one of its biggest advantages is to keep a watchful eye around or in your business.

First of all what is LED? its light-emitting diode produces light up to 90% more efficiently than incandescent light bulbs and the electrical current passes through a microchip which illuminates the tiny light sources we call LEDs and the result is visible light The first white LEDs were expensive and inefficient.

In the end, I would like to add that, all of these smart ways will strongly help the students to get an unforgettable experience of studying because the memory of this experience will be a mark on the person's life even good or bad this is why we need the smart living, learning, security in our campus to graduate a student who respects their campus for what they received, from this words I could say this simple equation which is smart living plus smart learning plus smart security equals to a great student experience.

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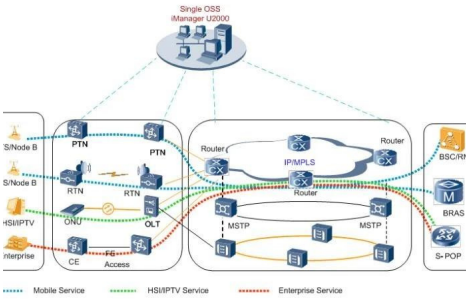
Unified network management



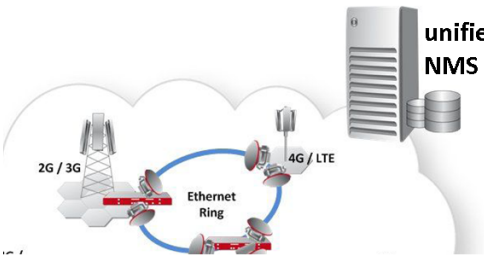
what is Unified network management?

A secure, healthy, and optimally functioning IT network serves as the backbone for any successful business. Managing modern-day network infrastructure is an increasingly complex task, largely due to the mix of new devices and applications. Along the same line, network management has become more important over the years, and is only expected to continue to grow; the market for network management is forecasted to be around $10.2 billion by the year 2023.

Network management functions are divided into four categories: performance management, configuration management, network security management, and fault management. The overarching goal of network management is to ensure that network resources are made available to users as effectively as possible and consumed as efficiently as possible.

- Performance management
- Configuration management
- Security and compliance management
- Fault management

Performance management



OpManager Plus provides proactive and reactive performance management techniques, helping you optimize your network performance and eliminate downtime thus offering a truly unified network performance management.

security management

Configuration management

Manage the configuration of your devices such as switches, routers, firewalls and other network devices by taking control of their entire life cycle of change management to guarantee a disaster-free network

Network security is an essential aspect of managing a network. Failing to comply with security standards can result in hefty fines and attract expensive lawsuits. OpManager Plus addresses your network security with features

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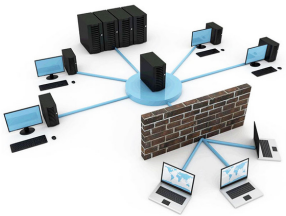
Network

Network infrastructure

Network Hardware



- Routers
- Switches
- LAN cards
- Wireless routers
- Cables

Network software

- Network operations and management
- Operating systems
- Firewall
- Network security applications

Network service

- T-1 Line
- DSL
- Satellite
- Wireless protocols
- IP addressing

What Does Network Infrastructure Mean?

Network infrastructure is the hardware and software resources of an entire network that enable network connectivity, communication, operations and management of an enterprise network. It provides the communication path and services between users, processes, applications, services and external networks/the internet.

It is critical to have a dependable IT infrastructure as well as qualified personnel, but neither is sufficient without a well-built network infrastructure. A network infrastructure facilitates connection and communication, both of which are critical to a company's success. Simply put, IT components such as hardware and software are useless without a solid network infrastructure. It is critical for organizational excellence to ensure that your network infrastructure is robust, secure, and clean.

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5G and Wi-Fi 6

What is 5G and Wi-Fi 6?

5G is the abbreviation for the 5th Generation of Mobile / Cellular Networks. While, Wi-Fi 6 is the 6th Generation of Wi-Fi technology. It is commonly referred to as “AX WiFi” or “802.11ax WiFi”, and is the successor to the 802.11ac WiFi standard. Both of these are set to replace their previous generations 4G and Wi-Fi 5. However, the use cases for both of these network technologies are different. They should not be compared to each other.

5G and Wi-Fi 6 will Co-exist

Both 5G and Wi-Fi coexist and collaborate more effectively to support various use cases. These technologies will work together to deliver uninterrupted wireless access.

5G will work as the standard for outdoor networks. This wide area network (WAN) may be utilized both indoors and outdoors, over great distances. For indoor networks, Wi-Fi 6 will continue to be the preferred access method.

Why 5G and Wi-Fi 6 over previous generations?

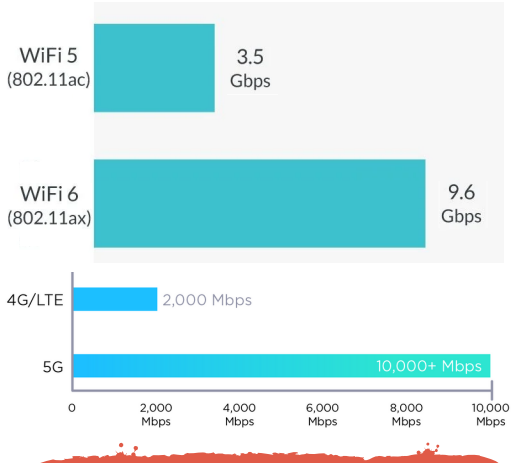
Consumers, mobile workers, and businesses will all benefit from upgrading to 5G and Wi-Fi 6. Thanks to the huge improvements data transmission speeds, bandwidth spectrum, coverage, reliability and capacity. They work as a platform for further technologies and applications. Some examples are:

- Virtual Reality and Augmented Reality
- Internet of Things (IOT)
- Self-Driving Cars etc.

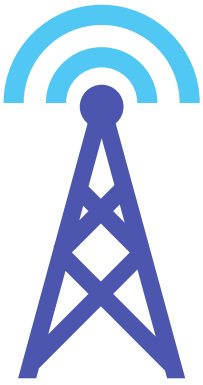
What improvements have been made?

Faster peak data speeds

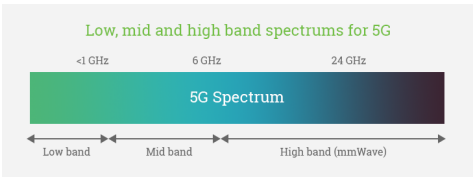
5G can reach up to 10 gigabits per second of data transmission speeds or more! While Wi-Fi 6 can reach up to 9.6 Gbps. Which are a huge improvement over previous generations as seen below.



Wide spectrum

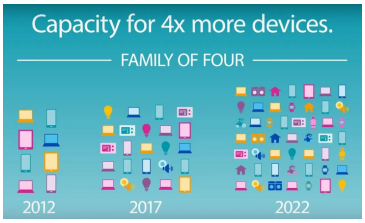


5G and Wi-Fi 6 both have really a wide spectrum. 5G uses 3 different bands. The low band, mid band and high band. While Wi-Fi 6 uses 2.4 GHz, 5 GHz and 6 GHz bands.



More capacity

Both 5G and Wi-Fi 6 can support way more devices compared to previous generations. For example, Wi-Fi 6 supports 4 times more.



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Network

Network technologies

5G

- Both indoor and outdoor usage
- Long range
- 10+ Gbps
- Wider spectrum
- Ultra low latency
- Higher Capacity
- Massive IOT

Wi-Fi 6

- Best for indoor usage
- Improved range for indoors
- 9.6 Gbps peak speed
- 4x more capacity
- Super low latency
- Wider channels
- Reduced Power Consumption

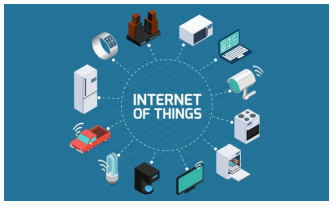
Generations

- Each generation is a step forward from the one before it.
- Represents changes and improvements
- Usually every 2-5 years apart from each other

What are the applications of 5G and Wi-Fi 6?

Huawei AirEngine Wi-Fi 6 series uses Huawei 5G-powered antennas and algorithm technologies to help organizations establish Wi-Fi 6 networks with no coverage holes, provide services with no waiting time, and achieve no packet loss. This enables numerous industries to transition to a fully wireless experience, including digital education, digital airports, omni-channel finance, smart healthcare, smart government, and smart manufacturing.

Another broad area for expansion using the improved 5G and Wi-Fi 6 is the Internet of Things (IoT). Every object, appliance, sensor, device and application will be connected to the Internet through the IOT. Data from millions of devices and sensors will be collected by IoT applications. For data collection, processing, transmission, control, and real-time analytics



Due to its flexibility, unused spectrum availability, and low-cost deployment solutions, 5G and Wi-Fi 6 are the most efficient candidate for Internet of Things. 5G and Wi-Fi 6 networks can help IoT in a variety of ways, including:

- Smart Home
- VR and AR
- Smart Cities

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