

Technology Information System Emerging Network Technologies

SECP1513 | 11 December 2021

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The background image features a hand reaching out from the right side towards a digital globe on the left. The globe is composed of a wireframe mesh and is surrounded by a network of glowing white nodes connected by thin lines. The overall color scheme is blue and white, with a blurred cityscape in the background.

**APPLICATION OF 5G IN
SMART CAMPUS**

**EMERGING TECHNOLOGY
ON NETWORK
INFRASTRUCTURE**

[29 Nov. 2021]

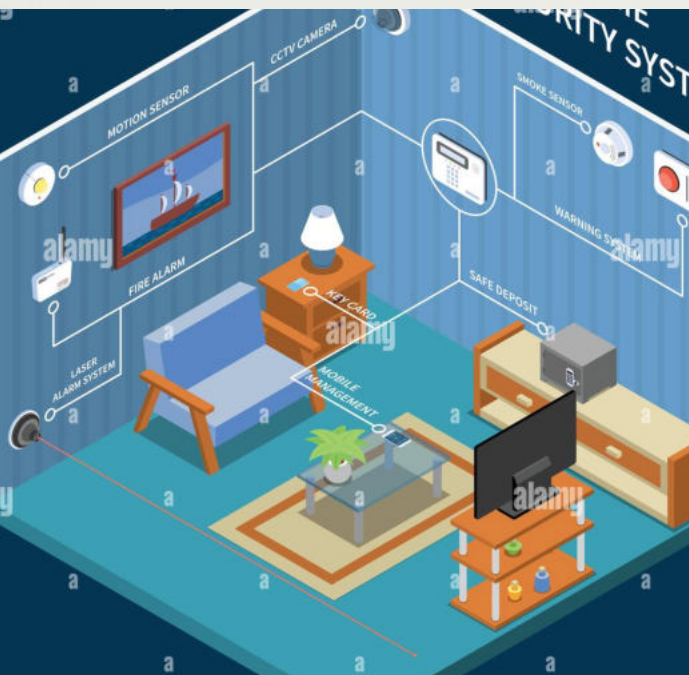
CommScope Malaysia

**5G, WIFI6 AND
EMERGING NETWORK
TECHNOLOGIES**

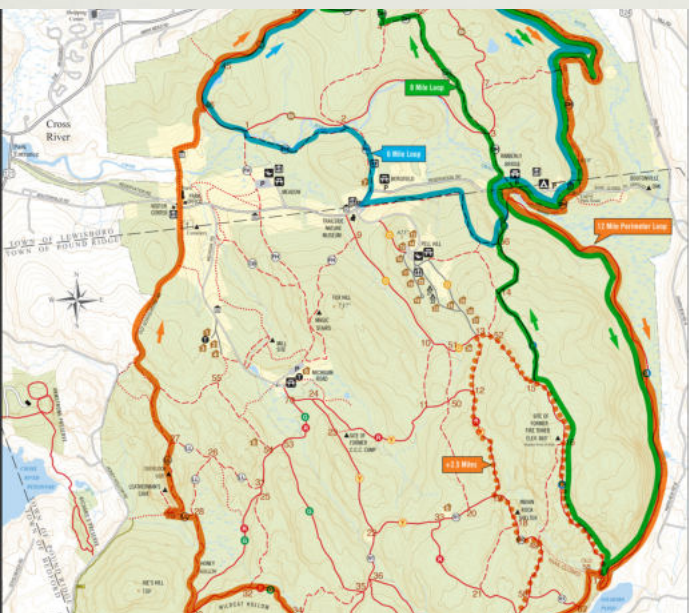
[2 Dec. 2021] HUAWEI



Facial recognition & video retrieval



Fire extinguishing linkage



Perimeter linkage

APPLICATION OF 5G IN SMART CAMPUS

COMPREHENSIVE SECURITY PROTECTION

Comprehensive security protection:
System Linkage, Visualized Command and No Security Blind Spot

Facial recognition & video retrieval:

- Distribution of blacklisted persons
- Restrictions on entering the area
- Video analysis

Fire extinguishing linkage:

- Intelligent advance warning
- System linkage, one-click processing when an event occurs
- Intelligent post analysis

Perimeter linkage:

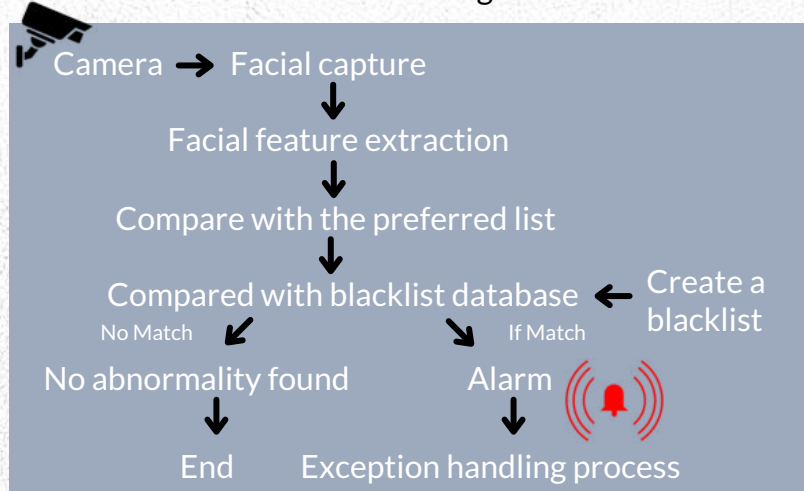
- Video to assist in case handling
- System link processing

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COMPREHENSIVE SECURITY PROTECTION

➔ Facial recognition & video retrieval

Access control based on face recognition and video cloud



Reflection

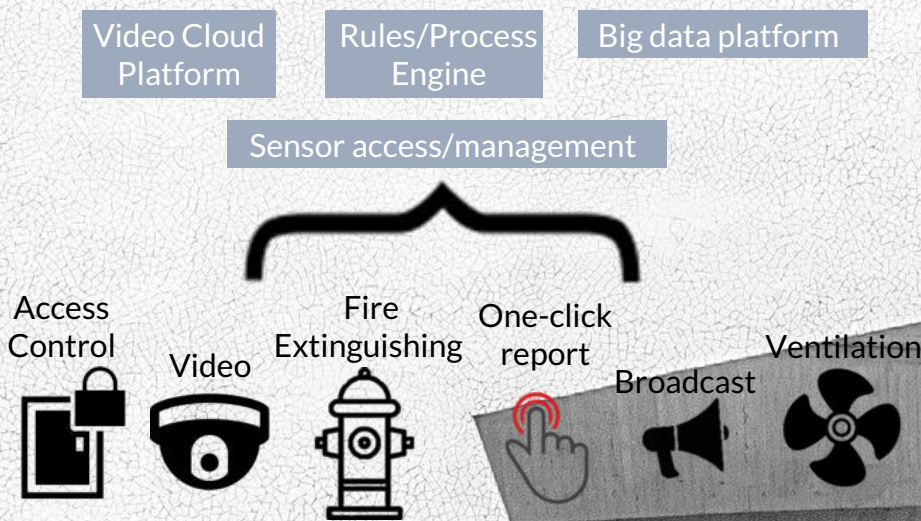
Comprehensive security protection is a battle plan that guides an organization, ensuring that the data and network is guarded from potential security threats.

With comprehensive security protection, I discover that it's harder for hacker to access the system and stole any data from it. Beside, it is easier to detect if any kidnapping cases happen. Moreover, it also help to prevent fire uncontrollable and cause less damage.

In fact, comprehensive security protection also convenient people and save time from physically record down any data. All data can be read straightly from the database.

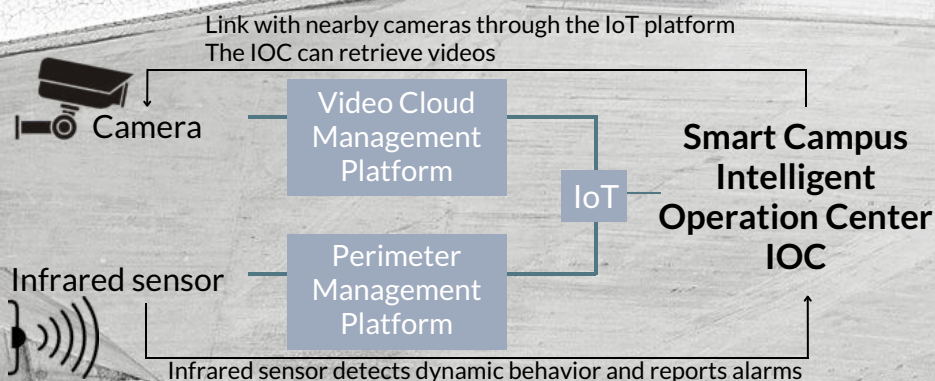
➔ Fire Extinguishing Linkage

Smart Campus Intelligent Operation Center IOC



➔ Perimeter linkage

Perimeter detection and video analysis reduce the false alarm rate of the perimeter system from 99% to 10%



EMERGING TECHNOLOGY ON NETWORK INFRASTRUCTURE

The workshop was given by: Mr Goh Bih Der (CommScope Malaysia)

There are many things to be discussed about network infrastructure especially when the technology is emerging. I understand that nowadays it is hard to see someone without using the Internet; it has just become an essential part of daily life. Everything includes a network, from education till industry.

The term "network" refers to a system that allows people to communicate and engage with one another. However, things are likely to change as a result of emerging technologies, which will have a significant impact on network infrastructure. Given that the globe is being forced to use the Internet more than ever before, don't you think the network infrastructure would be different?

Every month, billions of IoT devices are deployed simply to provide new devices and solutions to aid in higher asset utilisation, cheaper energy costs, improved guest services, and improved security and safety.

Firstly, let's set aside traditional LAN/WLAN network management by the developing technology. There will no longer be two separate network parts such as a WLAN controller and a network management system; instead, the next developing technology will feature a single unified network management system that will be all-encompassing.

When we look at the evolution of the network from 1970, when they were using wired devices, to today, when we are utilising IoT devices, we can see that there is a significant difference between the two network technologies, and we are improving faster than before.

On the Internet of Things, or IoT, there are numerous developing prospects. Let's have a look at some IoT forecasts. By 2025, it is predicted that 50 billion new devices will be connected. The smart building market will be worth \$108 billion. The home automation market is growing at a rate of \$25 billion per year. By 2025, the smart hotel sector will be worth \$12 billion. There are numerous advantages to deploying IoT technology, including cost savings, improved customer experience, increased efficiency and production, and enhanced company opportunities.

Just in the previous 24 months since COVID-19, we've seen a shift in employee remote working, cloud and mobile computing, digital transformation acceleration, corporate resilience, high-speed broadband access, along with many other remote technologies. Let's talk about network infrastructure now.



It's sometimes too difficult for humans to operate standard network systems, as 42% of network professionals spend too much time troubleshooting and 38% of network professionals are unable to detect network performance concerns proactively. As a result of the IOT system's development, the world will be ready for smart cities, smart colleges, smart homes, smart learning, and many other things.



Reflection

In the workshop 5 that was given by Mr Goh Bih Der, we got taught the basic concepts of networks and the new technologies that are arriving in it. Discussing the new classifications in the smart home, smart cities and the smart colleges that is involved in the new college systems was really inspirational. We've seen improvements to 5G and Wi-Fi 6, as well as artificial intelligence AI and augmented reality. How all of these technologies are relatively new and assisting in the development of new network infrastructure. In short we can learn from this workshop is that network infrastructure can significantly improve world technology. Simple network enhancements are transforming the world into a greater place.

5G, WI-FI 6, & EMERGING NETWORK TECHNOLOGIES

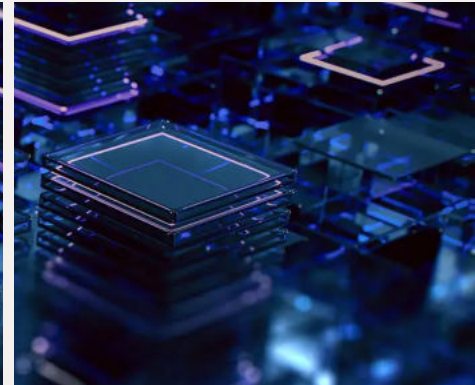
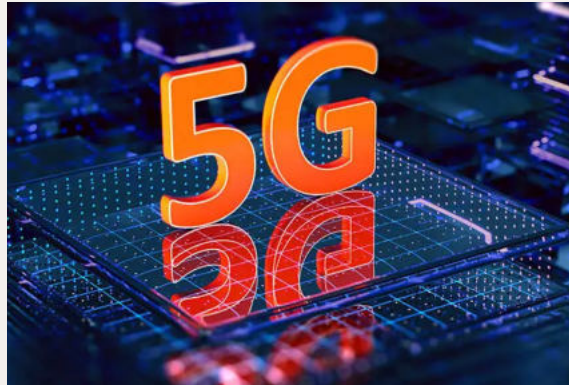
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What is 5G?

The fifth generation of wireless technology systems is known as 5G. It delivers speeds that are comparable to those given via fiber-optic connections and are faster than any previous generation. Due to higher accessible bandwidth and advanced antenna technology, 5G will enable a significant increase in the volume of data delivered across wireless systems.

5G has shown real-world speeds of 700-3025 Mbps in early tests. If downloading a video or other files takes minutes on 4G, it will just take seconds on 5G!

As a result, 5G is significantly superior to and faster than any broadband cellular network we've ever used.



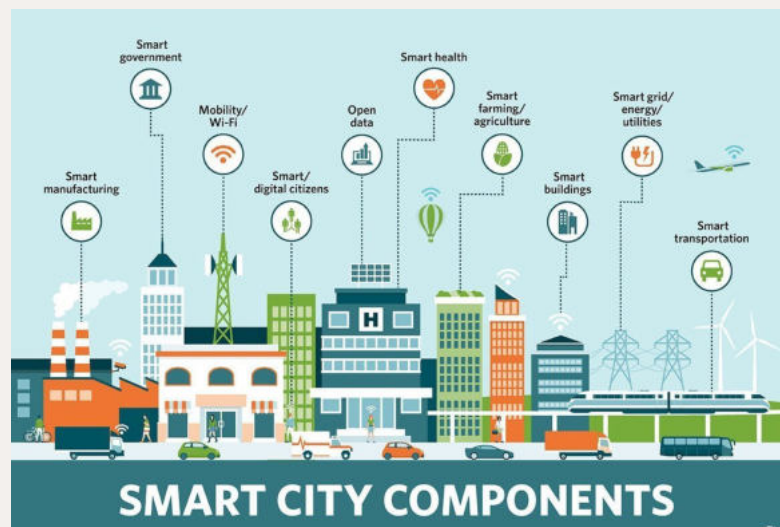
Why 5G are able to change the world?

With the existence of 5G, it will change or impact on various field such as communication, business, education, or even society. Then how can 5G have such impact on these fields? This is because once 5G become widespread, the devices that support 5G are lower latency and more reliable which can enable users to experienced faster transmission of larger data streams and a better data transmission in extreme conditions. Moreover, 5G are more flexible than Wi-Fi and can support a wider range of devices, sensors and wearables.

How can 5G can change the world?

With the advancing technologies, we need the broadband cellular network that can support these applications such as streaming high-quality video, public safety, Virtual Reality (VR), IoT, autonomous driving, logistics and shipping, smart cities and others. Hence, 5G will offer more opportunities for new device manufactures and applications developers and even create new job opportunities.

As low latency is the most significant feature for 5G, this make 5G more capable to develop Internet of Things (IoT) in another broad area. The example that can be easily related to all of us is smart home. For device connectivity and application monitoring, the smart home idea will rely on 5G networks. Smart appliances that can be configured and accessed from remote locations will use the 5G wireless network, while closed circuit cameras will give high-quality real-time footage for security purposes.



Wi-Fi 6



Wi-Fi 6 Supports Better Multi-user Experience

Larger Capacity

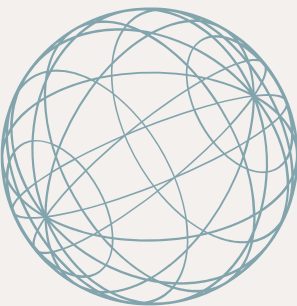
OFDMA multi-user technology allows several devices to connect to the router without overwhelming it or significantly slowing it down, resulting in a four-fold increase in capacity over Wi-Fi 5.

Lower Latency

Users get a smooth connectivity experience with faster response times thanks to OFDMA multi-user technology, even when connecting via numerous devices. This aids in the reduction of delay.

30% Lower Power Consumption

Gadgets with on-demand wake-up capabilities consume 30 percent less power. While Wi-Fi 6 interacts with many devices, on-demand wakeup is activated, which saves power when the devices are not in use. Wi-Fi 5 routers, on the other hand, could only communicate with one device at a time. This implies it uses battery power even when the devices aren't in use all of the time.



Did you know that Wi-Fi 6 has been verified for more than 3 years since 2017? Wi-Fi 6 is the next generation standard in Wi-Fi technology which is also known as AX Wi-Fi or 802.11ax Wi-Fi. It was build to improve on current 802,11ac Wi-Fi (Wi-Fi 5). Broadcom and Qualcomm are the first companies who release Wi-Fi 6 series chips which covering enterprise, home and devices sceneries in August 2017. But only in September 2019, Wi-Fi 6 was certified to be used in commercial phase.

Difference between Wi-Fi 6 and Wi-Fi 5

Wi-Fi 6 Advantages	Improvements	Wi-Fi 5	Benefits
Bandwidth improved by 2.8 times	802.11ax for 2.4 GHz	The 2.4 GHz frequency band does not support 802.11ac	2.4G performance improvement
	1024QAM	Only 256QAM	Peak performance improved by 25%
	4 x longer OFDM symbols (12.8 us)	3.2 us	Peak performance improved by 5.2%
	The ratio of subcarriers carrying carriers increases by 95.7%	91.4%	Peak performance improved by 4.3%
Coverage range improvement, Increased by 40%	Dual carrier modulation (DCM)	None	The receive SNR increases by 3 dB
	OFDMA (Smaller BW RU)	None	Theoretically, the receive SNR increases by a maximum of 9 dB
Network capacity and efficiency improvement A maximum of 128 users are supported	OFDMA	OFDM	Multi-user small-packet performance and delay improvement
	Spatial Reuse	None	Multiple APs share spectrum resources, improving spectral efficiency
	UL MU-MIMO	Only DL MU-MIMO	Uplink multi-user concurrency, improving network capacity
	Preamble punc starting	None	Improved spectrum utilization under interference
The power consumption of STAs is reduced by 30%	Target Wake Time (TWT)	None	The power consumption is reduced when the STA (Station) is in sleep mode

Retrieved from Industrial talk 6

Wi-Fi 6 New Video Service : Multi-screen IPTV, Online Education, VR, eSports

For online education purpose, Wi-Fi 6 provides high-density environment as well as faster throughput and wider coverage. Some of Wi-Fi 6's new features make it a top performer on school and college and university campuses. Students and teachers will be able to enjoy always-on connectivity with very little network congestion due to OFDMA, downlink and uplink MU-MIMO, Target Wake Time (TWT), and BSS coloration.

As for eSports, Wi-Fi 6 is much more stable than prior network standards. Wi-Fi 6 can handle multiple devices that connected in same network better than Wi-Fi 5. In comparison to prior network standards, Wi-Fi 6 improves connectivity between the router and gaming device in ideal start conditions.



Reflection

We may learn from this discussion that 5G and Wi-Fi 6 were created to enable today's modern technology, such as smart farming, smart homes, logistics and shipping, and online education. These programmes were developed and refined to satisfy the needs of today's people, who are increasingly reliant on the internet and technology. As a result, the medium that connects applications and users, namely the broadband cellular network, must be upgraded in conjunction with the applications in order to provide users with the optimum performance and experience.

With the introduction of 5G and Wi-Fi 6, we are on our way to a fully technology-based society that includes either the public nor private sectors. With 5G and Wi-Fi 6, we can genuinely create a seamless world with increased bandwidth and reduced latency. With a faster and better network, we can improve human-to-human and human-to-technology connectivity. We can be certain that 5G and Wi-Fi 6 will make our lives easier as a result of this discussion.

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