



NETWORKED INFRASTRUCTURE FOUNDATIONS

PORTFOLIO FINAL VERSION

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References:	Error! Bookmark not defined.
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Week 1:

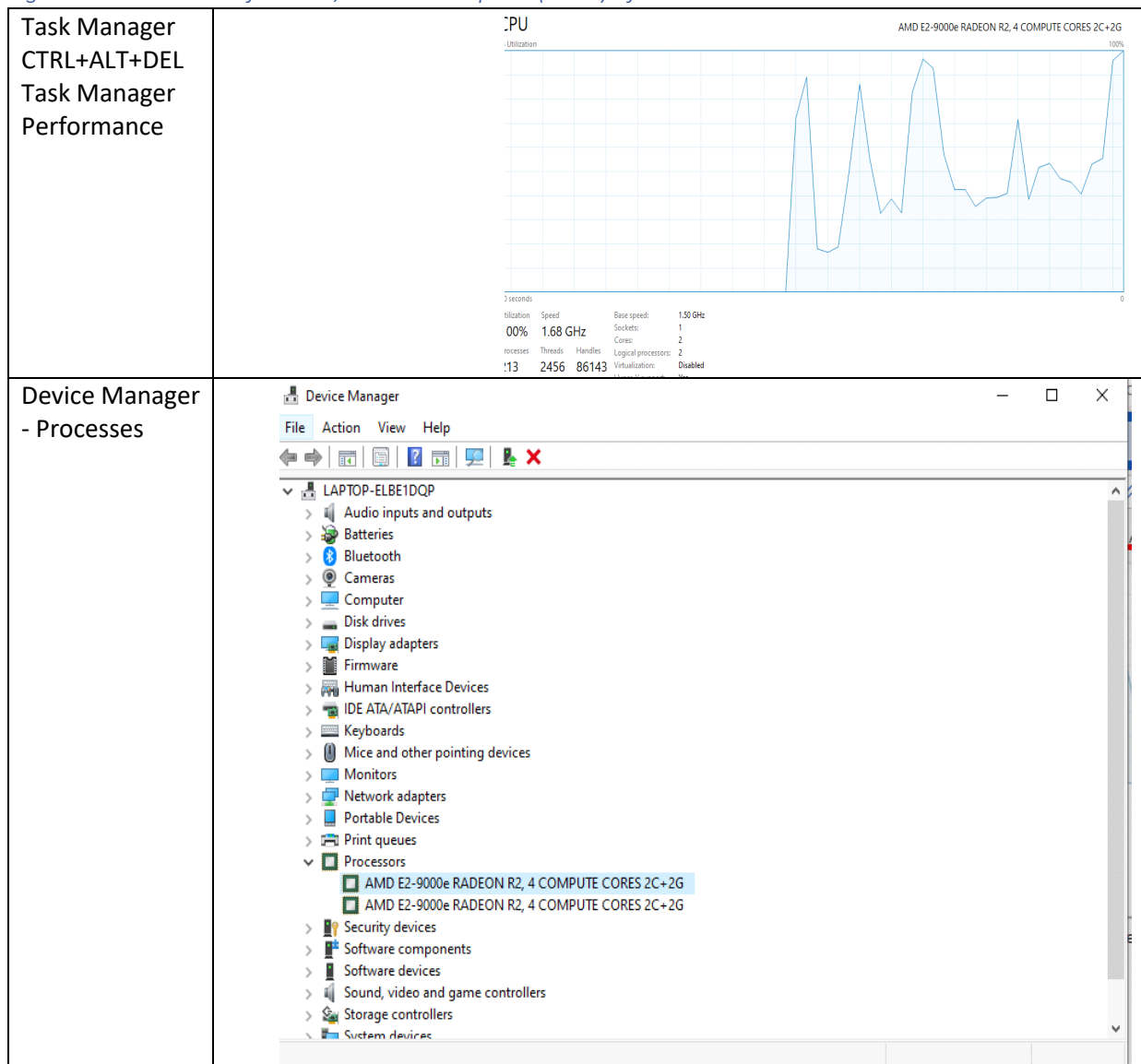
Week 1 Summary

During week 1 tutorial I was able to identify where to locate the manufacturer, model and speed (in HZ) of the CPU.

The purpose of this was to identify the speed of the central processing unit. This will ensure the PC or laptop has the necessary processing capabilities to meet individual requirements.

The second command that was covered in Week 1 tutorial was how to locate the ISP and internet speed. Further summarisation will occur on this matter during week 2.

Figure 1: Locate manufacturer, model and speed (in HZ) of CPU



Control Panel - Systems and Security	See details in Windows Security Device specifications HP Laptop 14-cm0xxx Device name LAPTOP-ELBE1DQP Processor AMD E2-9000e RADEON R2, 4 COMPUTE CORES 2C +2G 1.50 GHz Installed RAM 4.00 GB (3.88 GB usable) Device ID 1719E98D-1782-41E0-A9D7-6425CDC3EE23 Product ID 00325-92433-99643-AAOEM System type 64-bit operating system, x64-based processor Pen and touch No pen or touch input is available for this display
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Week 1 Reflection

The area that I have least understood during week 1 was the conversion of Decimal, Binary and Hexadecimal equations.

There are numerous online resources and calculators that provide information on how to complete these equations however the one I found most beneficial was 3 Ways to Convert Binary to Hexadecimal <https://www.wikihow.com/Convert-Binary-to-Hexadecimal>

The completion of Central Queensland University Australia Practice - Binary, Hex and Decimal <https://moodle.cqu.edu.au/mod/quiz/view.php?id=1450603> allowed me further practice .

Q1. What is the difference between bits and Bytes?

Binary digits stored on a computer are called bits and a bit holds either a 0 or a 1. A 0 means that there is an absence of voltage or light etc and a 1 means that there is no absence. A bit is the smaller unit and 8 bits are equivalent to a byte.

Q2. What is the difference between decimal, binary and hexadecimal number systems? (Hint: ask your local lecturer or search on Wikipedia). Perform some practice conversions between the number systems.

Decimal systems are the basic system used day to day and is a base 10 number system. Binary systems only use 0 and 1 and is a base 2 number system.

The Hexadecimal system is a base of 16 and utilises numbers from 0-9 and then utilises the alphabet A-F to represent 10-15.

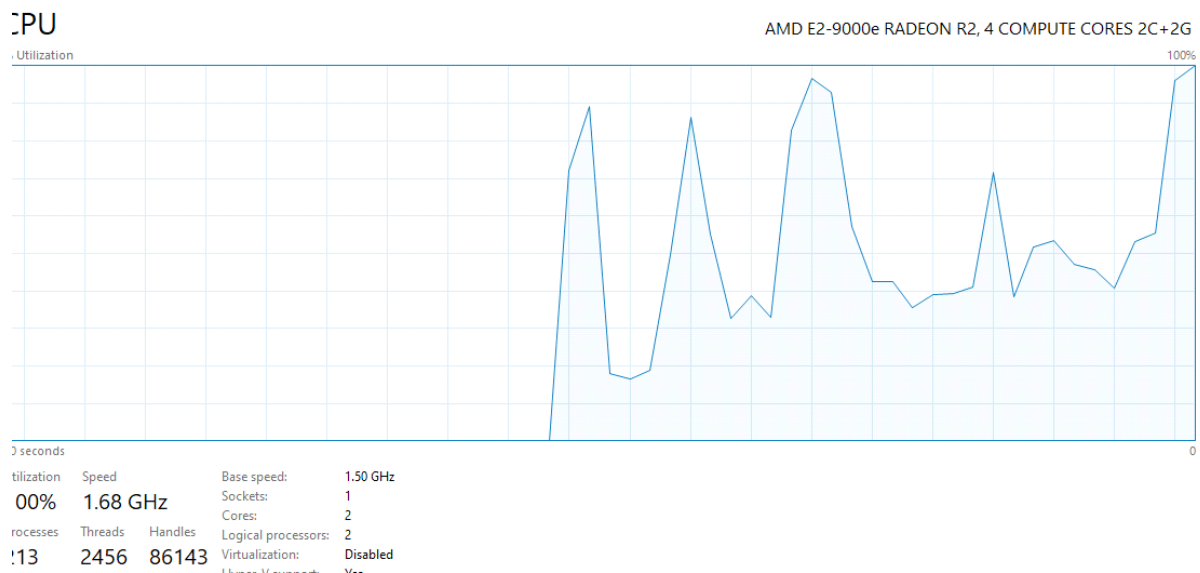
Q3. Remind yourself of the definition of common prefixes in computer. That is, kilo, mega, giga and tera, as well as milli, micro and nano. Perform conversions between them, e.g. convert 12,345,678 Bytes to MB, convert 0.04567 s to ms.

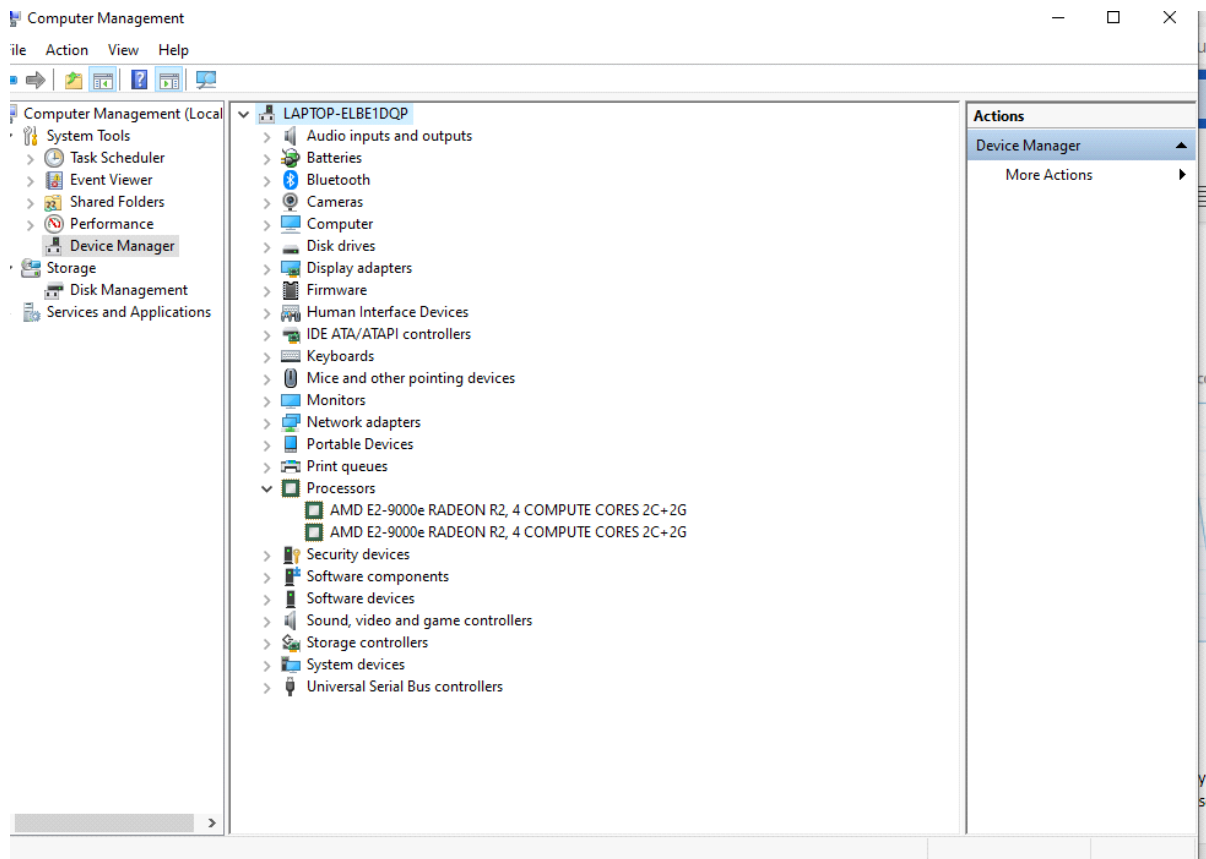
12,345,678 Bytes = 12.345,678 MB

Sometimes a kilo can be 1000 or 1024 due to the binary system which is the power of 2

Q4. Identify the manufacturer, model and speed (in Hz) of your computer's CPU. Does the CPU have multiple cores? If so, how many?

AMD 1.5GHZ 2 x Core





Q5. Consider you have to store 10 TB of data. Search online to find approximate costs if you were to use: a. Hard disk drives b. Solid state drives c. Online storage with Dropbox (or similar) d. Also discuss the advantages and disadvantages of each of the three storage approaches.

- (a) A hard drive can cost from around \$499 (Seagate Back-up Plus Hub Desktop Hard Drive (10TB)

<https://www.jbhifi.com.au/products/seagate-backup-plus-hub-desktop-hard-drive-10tb>

- (b) A SSD (Sold State Drive) can cost around \$1999 for 10 TB

https://www.amazon.com.au/Sabrent-Internal-Maximum-Performance-SB-RKTQ4-4TB/dp/B08F76V39T/ref=asc_df_B08D28X4HW/?tag=googleshopdsk-22&linkCode=df0&hvadid=341792317172&hvpos=&hvnetw=g&hvrnd=16770873647266344055&hvpone=&hvptwo=&hvmmt=&hvdev=c&hvdvcmcl=&hvllocint=&hvllocphy=9068965&hvtargid=pla-933984988783&th=1

- (c) Online storage can equate to around \$30 per month (iCloud storage plans and pricing)

The advantages of hard disk drive are that it is cheaper compared to the SSD. They are slower to process than SSD and not so reliable.

SSD are expensive to high disc drive and have high speed and more reliable. Hard disc there may be an opportunity to recover data, but this is harder with a SSD.

Online storage security concerns with third parties may access to your data. The speed of the online storage will depend on the internet speed and bandwidth. An advantage is that it is accessible from any location.

6. Identify the Internet connection used at home (or your business). For example, NBN, ADSL or other technology. What is the speed? Who is the ISP? Discuss your findings next week.

Glass House Mountains is connected to the NBN

SSID: TelstraE5E719

Protocol: Wi-Fi 4 (802.11n)

Security type: WPA2-Personal

Network band: 2.4 GHz

Network channel: 12

Link speed (Receive/Transmit): 72/72 (Mbps)

IPv6 address: 2001:8003:71f8:a500:28e1:80d6:5c93:8f86

Link-local IPv6 address: fe80::28e1:80d6:5c93:8f86%19

IPv6 DNS servers: 2001:8003:71f8:a500::1

IPv4 address: 192.168.0.106

IPv4 DNS servers: 192.168.0.1

DNS suffix search list: modem

Manufacturer: Realtek Semiconductor Corp.

Description: Realtek RTL8821CE 802.11ac PCIe Adapter #2

Driver version: 2024.0.10.220

Physical address (MAC): 28-3A-4D-83-90-F1

Q7. [Optional] Use Task Manager (or similar software on a Mac or Linux computer) to see the current performance (e.g. CPU, memory, disk) and processes of your computer. Identify the processes that use the most memory and CPU. How do you stop a program or process using the Task Manager.

At the time of undertaking this task, Microsoft Edge was using the highest CPU but very low power usage.

Task Manager									
File Options View									
Processes Performance App history Startup Users Details Services									
Name	Status	75% CPU	84% Memory	6% Disk	0% Network	3% GPU	GPU engine	Power usage	Power usage t...
Apps (6)									
> Microsoft Edge (20)		8.3%	619.3 MB	0.1 MB/s	0 Mbps	0%		Low	Very low
> Snipping Tool		1.1%	2.2 MB	0 MB/s	0 Mbps	0%		Very low	Very low
> Task Manager		24.6%	29.6 MB	1.4 MB/s	0 Mbps	0%		Moderate	Low
> TextPad (32 bit)		0.6%	1.8 MB	0 MB/s	0 Mbps	0%		Very low	Very low
> Windows Command Processor ...		0%	0.1 MB	0 MB/s	0 Mbps	0%		Very low	Very low
> Windows Explorer		8.4%	28.3 MB	0.1 MB/s	0 Mbps	0%		Low	Very low
Background processes (95)									
AMD External Events Client Mo...		0.4%	0.6 MB	0 MB/s	0 Mbps	0%		Very low	Very low
> AMD External Events Service M...		0%	0.1 MB	0 MB/s	0 Mbps	0%		Very low	Very low
Application Frame Host		0%	3.7 MB	0 MB/s	0 Mbps	0%		Very low	Very low
Bonjour Service		0%	1.0 MB	0 MB/s	0 Mbps	0%		Very low	Very low
COM Surrogate		0%	0.6 MB	0 MB/s	0 Mbps	0%		Very low	Very low
COM Surrogate		0%	1.3 MB	0 MB/s	0 Mbps	0%		Very low	Very low
CommRecovery		0%	4.1 MB	0 MB/s	0 Mbps	0%		Very low	Very low
CTF Loader		0.7%	6.3 MB	0 MB/s	0 Mbps	0%		Very low	Very low
CxAudioSvc		0%	6.8 MB	0 MB/s	0 Mbps	0%		Very low	Very low
Elan Service		0%	0.1 MB	0 MB/s	0 Mbps	0%		Very low	Very low
ETD Control Center		0%	1.3 MB	0 MB/s	0 Mbps	0%		Very low	Very low
Fewer details									
								End task	

Week 2:

Week 2 Summary

During week 2 we covered architecture and communication between networks.

The main tools and commands that we have used during this week was locating other computers on a network or via the internet via a network command.

Using ipconfig to view information about the computers network also ipconfig/all that provides more thorough information about the personal computer and any other computers on the network.

Week 2 Reflection

During Week 2 I was able to gauge a further understanding of different networking hardware and the different types of networks including the differences between a switch and a router and how this hardware assists in the connection of networks.

As the weeks progress, my understanding is coming easier as the terminology becomes ingrained, however I have no doubt that I will continue to revisit the lectures/PowerPoints and text books over the period of the subject as required.

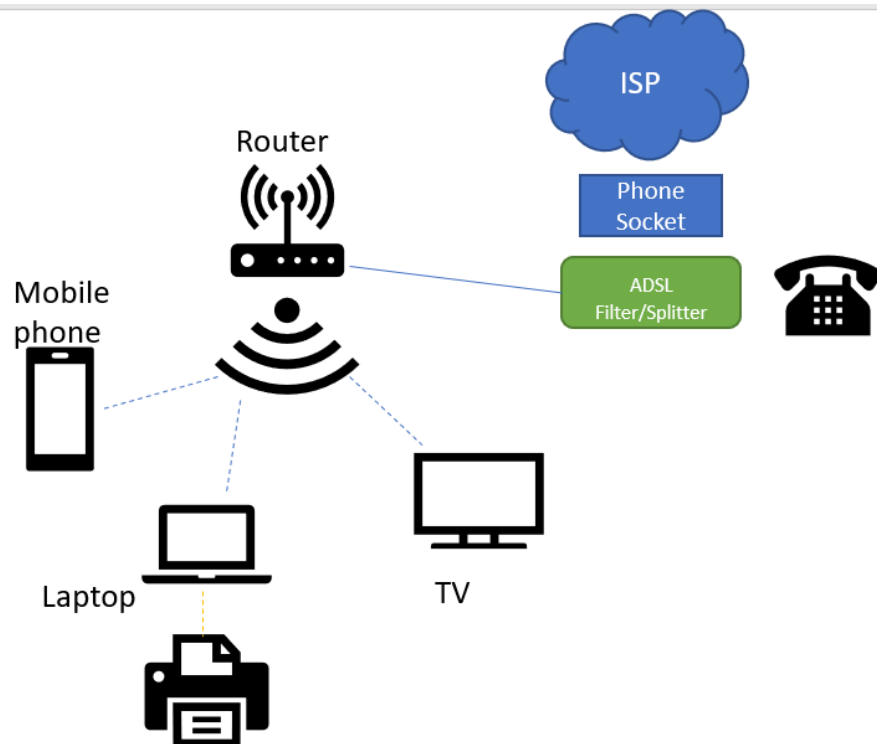
Q1. Discuss and compare your finding on your home internet connection.

Glass House Mountains uses NBN as the providing of our home internet service. NBN is purported to be faster than ADSL; however, as Glass House Mountains is a long way from the exchange the speeds are not as fast as other areas.

It is also noted that our home internet connection is provided by the Set Service Identifier E5E719 with a Network Protocol 802.11n which is not the fastest speed available.

The Internet Protocol version 6 is the most recent version of the Internet Protocol (IP)

Q2. Draw a diagram of a network you use often.



Q3. Use ipconfig to view information about your computer's network configuration.

Value of IP address: IPv6 Address. 2001:8003:71f8:a500:28e1:80d6:5c93:8f8

Default Gateway: Default Gateway fe80::1213:31ff:fee5:e718%19 192.168.0.1

Physical address: Physical Address. : 28-3A-4D-83-90-F1

As I am a distant student I do not have access to other computers and it is not on a network.

Q4. Use a Ping to test connectivity to another computer

As a distant student I do not have capability to test other computers; however, replicated the Tutorial ping test and have tried it though myer.com.au for an example.

C:\Users\urban>ping www.myer.com.au

Pinging www.myer.com.au [13.224.179.26] with 32 bytes of data:

Reply from 13.224.179.26: bytes=32 time=530ms TTL=244

Reply from 13.224.179.26: bytes=32 time=20ms TTL=244

Reply from 13.224.179.26: bytes=32 time=20ms TTL=244

Reply from 13.224.179.26: bytes=32 time=20ms TTL=244

Ping statistics for 13.224.179.26:

Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),

Approximate round trip times in milli-seconds:

Minimum = 20ms, Maximum = 530ms, Average = 147ms

Q5. Speed test

A speed test conducted on 18 March 2021 provided the following results.

It is quite clear that the upload speed is much slower than the download speed for our home computer.

Figure 1 shows the results of the speed test results for our residence and Figure 2 shows the results of my workplace. It is noted that the workplace is located in an urban environment whereas I live in rural residential; however, the results are quite severe in their differences.

Fig 1

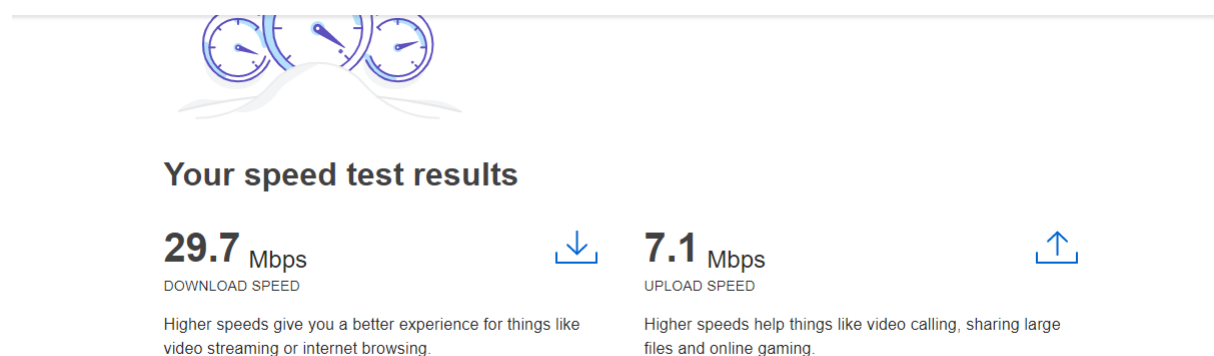


Fig 2



Your speed test results

94.5 Mbps
DOWNLOAD SPEED

Higher speeds give you a better experience for things like video streaming or internet browsing.



94.4 Mbps
UPLOAD SPEED



Higher speeds help things like video calling, sharing large files and online gaming.

Week 3:

Week 3 Summary

During week 3 we focussed predominately on the differences between hubs, switches and routers. Further The 7-layer OSI (Open Systems Interconnection) framework was further investigated.

Week 3 also covered the use of PING to measure time to get a message from one computer to another. As I do not have access to another lab network LAN I again utilised the website Myer.com.au to provide this outcome.

We also covered the use of Traceroute (or tracert) to identify the path between two computers in a network. Again, as I was unable to utilise a live network, the use of Myer.com.au was used as the receiving network computer.

Screenshots capturing my use of these commands will be provided under Week 3, specific questions.

Week 3 Reflection

Again the 7-layer Open Systems Interconnection model is an area that is slowly becoming a little easier to comprehend. As the weeks continue and again the terminology becomes more ingrained, I have no doubt that this framework will become will become second nature and the layers more obvious.

I had difficulty in comprehending use of switch links between different clients for data transmission. Further research was completed to strengthen my understanding.

Week 3 Specific Questions

Q1. Use ping to measure the time it takes for a message to get from your computer to another computer. What does RTT mean? Repeat the ping but using an option to send 6 messages. Repeat the ping again but using an option to set a specific message size and then check the different RTT's.

To get a message from my computer to the other computer it took 21ms. The round-trip time (RTT) is the length of time it took from the date packet to be sent and the time it took for the acknowledgement to be received.

```
Command Prompt
Microsoft Windows [Version 10.0.17134.112]
(c) 2018 Microsoft Corporation. All rights reserved.

C:\Users\kerripaulsen>ping www.myer.com.au

Pinging www.myer.com.au [13.224.179.54] with 32 bytes of data:
Reply from 13.224.179.54: bytes=32 time=21ms TTL=240
Reply from 13.224.179.54: bytes=32 time=21ms TTL=240
Reply from 13.224.179.54: bytes=32 time=21ms TTL=240
Reply from 13.224.179.54: bytes=32 time=21ms TTL=240

Ping statistics for 13.224.179.54:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 21ms, Maximum = 21ms, Average = 21ms

C:\Users\kerripaulsen>
```

Repeat the ping using an option to send 6 messages

```
C:\Users\kerripaulsen>ping -n 6 myer.com.au

Pinging myer.com.au [13.224.179.36] with 32 bytes of data:
Reply from 13.224.179.36: bytes=32 time=21ms TTL=240
Reply from 13.224.179.36: bytes=32 time=21ms TTL=240
Reply from 13.224.179.36: bytes=32 time=21ms TTL=240
Reply from 13.224.179.36: bytes=32 time=21ms TTL=240
Reply from 13.224.179.36: bytes=32 time=21ms TTL=240
Reply from 13.224.179.36: bytes=32 time=21ms TTL=240

Ping statistics for 13.224.179.36:
    Packets: Sent = 6, Received = 6, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 21ms, Maximum = 21ms, Average = 21ms
```

Again, the RTT (round trip time was 21ms)

Repeat the ping using an option to set a specific message size

```
C:\Users\kerripaulsen>ping -l 64 myer.com.au

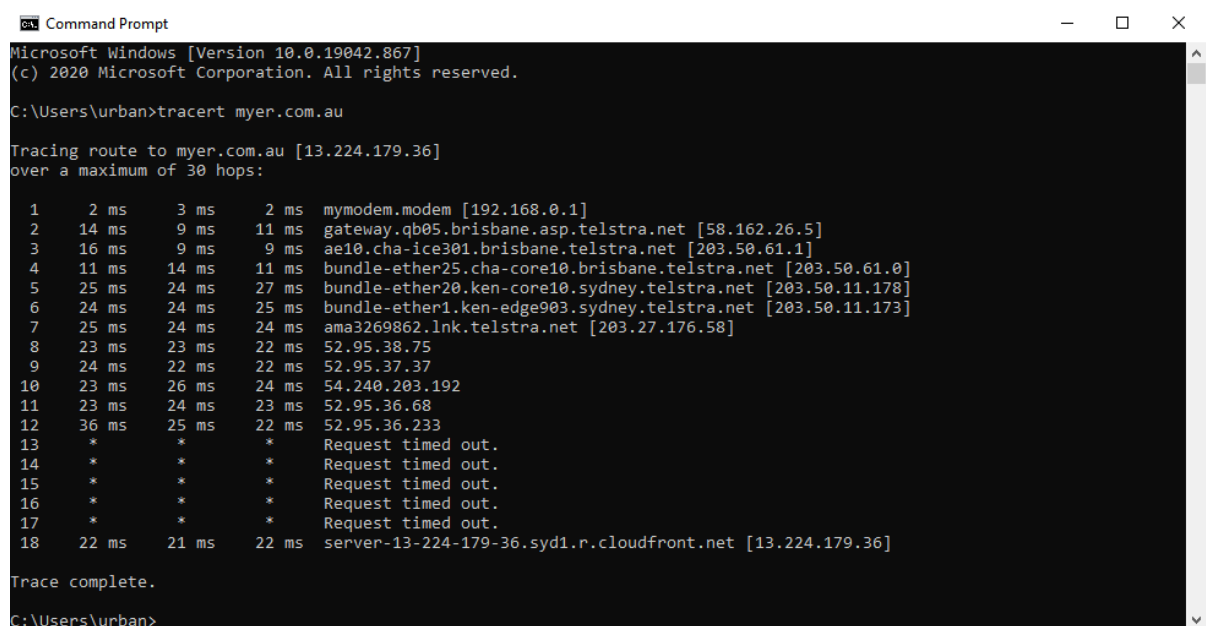
Pinging myer.com.au [13.224.179.26] with 64 bytes of data:
Reply from 13.224.179.26: bytes=64 time=25ms TTL=240
Reply from 13.224.179.26: bytes=64 time=24ms TTL=240
Reply from 13.224.179.26: bytes=64 time=24ms TTL=240
Reply from 13.224.179.26: bytes=64 time=24ms TTL=240

Ping statistics for 13.224.179.26:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 24ms, Maximum = 25ms, Average = 24ms
```

In this scenario the RTT was higher than previous due to the large bytes of data.

Q2. Use tracert to identify the path between two computers in a network.

The path between my home computer and the myer.com.au website via Tracert provided the following output in the first trace however timed out.,



```
Microsoft Windows [Version 10.0.19042.867]
(c) 2020 Microsoft Corporation. All rights reserved.

C:\Users\urban>tracert myer.com.au

Tracing route to myer.com.au [13.224.179.36]
over a maximum of 30 hops:

  0  2 ms   3 ms   2 ms  mymodem.modem [192.168.0.1]
  1  14 ms   9 ms  11 ms  gateway.qb05.brisbane.asp.telstra.net [58.162.26.5]
  2  16 ms   9 ms   9 ms  ae10.cha-ice301.brisbane.telstra.net [203.50.61.1]
  3  11 ms  14 ms  11 ms  bundle-ether25.cha-core10.brisbane.telstra.net [203.50.61.0]
  4  25 ms  24 ms  27 ms  bundle-ether20.ken-core10.sydney.telstra.net [203.50.11.178]
  5  24 ms  24 ms  25 ms  bundle-ether1.ken-edge903.sydney.telstra.net [203.50.11.173]
  6  25 ms  24 ms  24 ms  ama3269862.lnk.telstra.net [203.27.176.58]
  7  23 ms  23 ms  22 ms  52.95.38.75
  8  24 ms  22 ms  22 ms  52.95.37.37
  9  23 ms  26 ms  24 ms  54.240.203.192
 10  23 ms  24 ms  23 ms  52.95.36.68
 11  36 ms  25 ms  22 ms  52.95.36.233
 12  *      *      *      Request timed out.
 13  *      *      *      Request timed out.
 14  *      *      *      Request timed out.
 15  *      *      *      Request timed out.
 16  *      *      *      Request timed out.
 17  22 ms  21 ms  22 ms  server-13-224-179-36.syd1.r.cloudfront.net [13.224.179.36]

Trace complete.

C:\Users\urban>
```

Q3. For a switch table, explain how a port of the switch can be assigned/linked to different clients for data transmission.

In a basic scenario several computers can be linked to a switch via a port. The port then assigns an IP address and based on the IP of the switch and the port number of the linked computer MAC.

The following scenario has been created to provide an example of my understanding.

When a device is attached a port at the switch, the switch reads the Mac Address of the device. When a packet is sent to from the host machine it arrives at the switch and the switch reads the frame to locate the destination Mac address. The switch then forwards the frame to the port where the Mac address was found. The switching table is then updated.

If there were 4 devices connected to the switch as follows:

MAC address	Port #
04-01-2F-01-01-6F	1
04-01-2F-01-01-7A	2
04-01-2F-01-01-9Z	3
04-01-2F-01-01-3U	4

Device 04-01-2F-01-01-3U has expired. There has been no network traffic for the device or MAC address for a period. Ultimately Port 1 will be available to the next device that connects. If a packet is received for 04-01-2F-01-01-3U, it will be sent to all other connected devices as was undelivered and the switch will forward to other devices.

If a new device was connected to Port 4 04-01-2F-01-01-9B – the switching table would be updated to reflect the new device and if 04-01-2F-01-01-3U was connected to spare Port 5, the switching table would be updated to reflect. The table would look as follows:

MAC address	Port #
	1
04-01-2F-01-01-7A	2
04-01-2F-01-01-9Z	3
04-01-2F-01-01-9B	4
04-01-2F-01-01-3U	5

Q4. Explore the options in a WIFI access point.

For the virtual device TP Link TL-WR842ND V1 – Firmwire Version 111121 the following results have been identified.

SSID: The SSID or Service Set Identifier is the unique identifier for a network. This allows wireless connection to a specific network (generally a WLAN – wireless local area network) so it is easily identified. The SSID for the device is TP-LINK_842088

A SSID can be hidden but all it does is hide the network name not the actual network. Malicious persons can activity seek hidden SSID networks as there is an incorrect belief that hiding the SSID provides security against cyber-attacks.

This virtual device allows for multiple access points so long as the SSID Broadcast is selected.

This virtual Wi-Fi router provides a 11bgn mixed mode which allows both ad hoc mode (connections are wireless links) and infrastructure mode which allows hardware to be directly attached to the router.

A repeater will assist with the WIFI coverage. Having the router in an area that is not blocked by multiple walls or other structures may impede the WIFI signal.

Encryption on WIFI is required. All modern routers should have built-in encryption options. This will scramble the signal so only authorised devices are able to understand the data being transmitted. The virtual router provides automatic or TKIP (Temporal Key Integrity Protocol) or AES (Advanced Encryption Standard) encryption.

Q5. Scenario

ABC currently has 8 workstations with 100Mbps switch operating in half-duplex mode. This effectively means that each of the workstations needs to wait to send or receive information. The 100Mbps will be available to only one workstation at a time.

The wireless access point (WAP) 802.11ac also provides a total of 125Mbps per workstation; however, this will be halved to send and receive so a total of 62.50 Mbps is available to each workstation.

The WAP is providing a reduced speed as full duplex with all workstations connected significantly reduces the speed provided.

It would also depend on what the network is being used for. For example, small documents will use less bandwidth than downloading large media files.

Another situation to consider is the Wi-Fi strength and the location of the WAP. This also may also cause interference with the delivery of the network speed.

If ABC company has 8 workstations and is using a switch operating in half duplex mode – the overall speed is higher for the users – however there is a period of downtime as each user is waiting for their “turn”.

The WAP is overall slower in the provision of bandwidth, but all users will be able to work simultaneously.

Overall, I would advise ABC company to remain using the Network Switch.

Week4:

Week 4 Summary

During week 4 we focussed on physical network topologies and the different types such as physical bus, physical star and physical ring.

The tutorial also covered the difference between the broadband and baseband networks.

Week 4 Reflection

Upon reflecting on week 4, I have considered that I comprehend physical and tangible learnings such as topologies quicker than I comprehend network concepts such as pulses and binary.

The video on week 4 specifically around 2.4ghz and 5ghz WIFI was interesting as I would have assumed 5ghz would be more appropriate in all scenarios, however this is not the case.

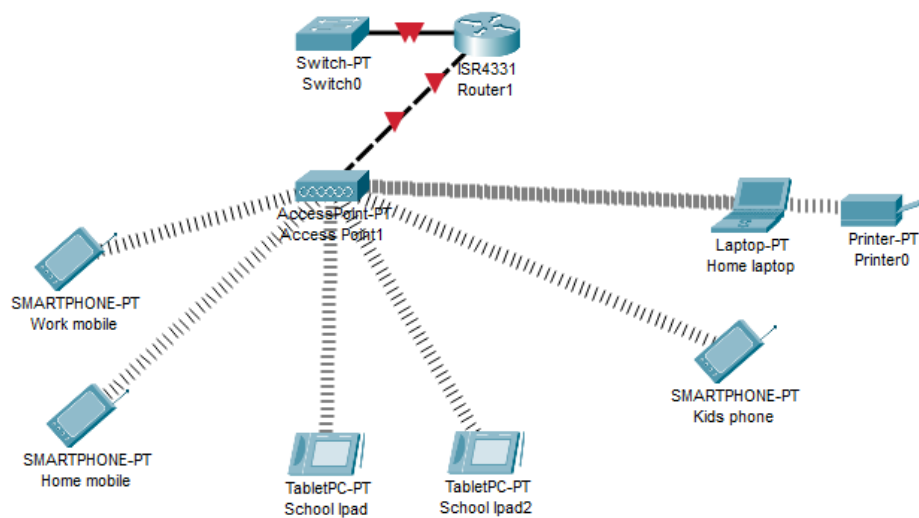
Week 4 Specific Questions

1. Reviewing the diagram you drew in the Week 2 Tutorial Activity: “Draw a diagram of a network you often use (e.g. your home network, office network or university lab). Consider how to use Cisco Packet Tracer to draw interconnecting devices, computer devices (e.g. laptop, PC, servers) and types of connections between devices (e.g. cables or wireless). Label devices with meaningful names.” • Which network topologies did you use in this diagram? • Discuss the difference between physical and logical topologies.

Figure 1 has been designed on a physical star topology. This is the actual design of the home internet connection.

The logical topology is the data transfer between the switch, the router and the end user items such as the mobile phones and iPad. As our family does not use wired connection, the whole design has been based on wireless connections.

Figure 1

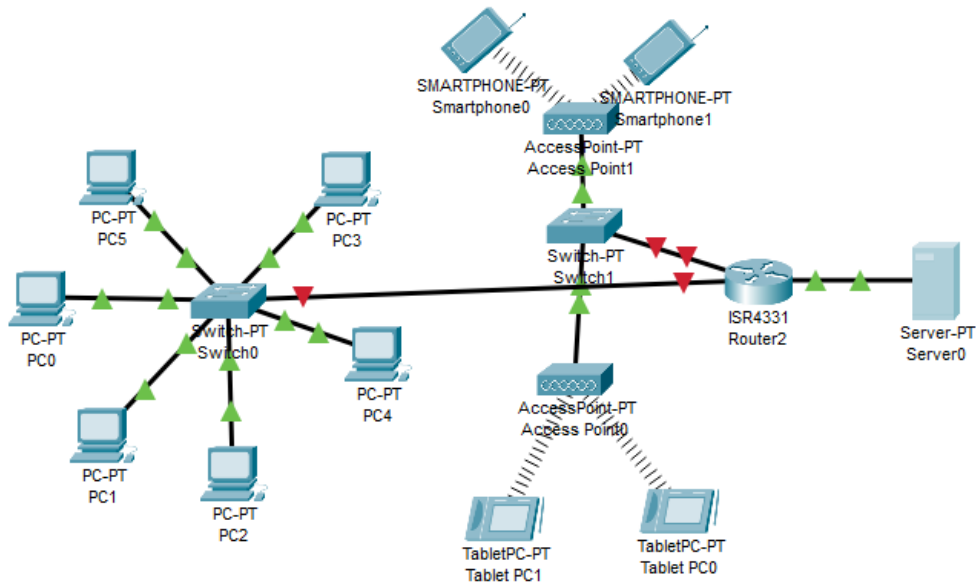


2. Assume you are working in a start-up technology company. This company uses a mix of six workstations in a wired LAN and two wireless LANs enabled laptops/wireless tablets/smart phones connected via two access points. Both APs connect to one switch. All wired workstations connect to another switch. • Using an extended star topology, draw the network diagram. • Discuss the advantages and disadvantages of a star topology.

Figure 2 below indicates the network diagram that would show the physical extended star network topology that may meet the needs of the start-up tech company.

The downside of using this particular physical topology is that if there is a fault with the hub or switch the whole network will fail.

Figure 2



3. Consider the following two Ethernet switches. Identify the standards they support, as well as the number of ports, speed and network media.

- TP-Link TL-SF1005D: <https://www.tp-link.com/au/home-networking/sohoswitch/tl-sf1005d/> (hint: the datasheet is also available on the Support page)
- FS S3900-24T4S: <https://www.fs.com/au/products/72944.html>

SL-SF1005D V15

The SL-SF1005D ethernet switch supports IEEE 802.3, IEEE 802.3u and IEEE 802.3x standards. This switch provided 5 x 10/100mbps ethernet ports providing up to 1GPBS switching capacity.

FS S3900-24T4S:

The FS S3900-24T4S ethernet switch supports IEEE 802.3x, IEEE 802.1D, IEEE 802.1w, IEEE 802.1s standards. This switch provides 24 x 10/100 ports as well as 4 x 10G SFP ports for stacking.

4. Use network protocol analyser (such as Wireshark) to capture a ping between two computers. Select one captured frame.

- Find the values of the Ethernet Destination field, Ethernet Source field and Ethernet Type field.
- View the data portion of the frame. How many bytes of data is in the frame? What is the data (in hexadecimal) in an ICMP message? Hint: do you see any pattern in the hex values?

Using Wireshark I pinged the Myer website www.myer.com.au the frames captured are as follows:

The value of the ethernet destination field is 2001:8003:71f8:a500:1

The value of the ethernet source field is 2001:8003:71f8:a500:7544:9c8c:2a8b:e1c5

The value of the ethernet type field is Ethernet II.

There are 32 bytes of data in the data frame and the hexadecimal value is as displayed below:

✓ Data (32 bytes)
Data: 6162636465666768696a6b6c6d6e6f7071727374757677616263646566676869
[Length: 32]

5. In a physical bus topology, why do the ends of the cable have to be terminated?

If the ends of the cable are not terminated, there is the risk of signal bounce. This basically means that the signal will continue travelling up and down the cable causing a “echo like” effect.

Week5:

Week 5 Summary

Week 5 covered network media. Gaining an understanding of the types of network media such as cables.

Twisted-pair cables which come in two types unshielded and shielded which are one or more pairs of insulated strands twisted around each other(copper cable)

Coaxial Cable – which was the cable of choice prior to the 1990s (copper cable)

Fibre optics – most companies now use Fibre Optics as the choice of cables.

Week 5 Reflection





In the OSI model the network media belongs in the Physical Layer. I noted that as my house was built prior to 1990 it still has coaxial cable points throughout. With twisted pair Cables the more twists in the cable the less chance of Electronic Magnetic Interference or Radio Interference

1. Watch the following videos (can be found in Week 5 in the unit website):













- How to make an Ethernet CAT5e cable o<https://www.youtube.com/watch?v=Uw8FSXx4dnU>
- How Fibre Optics Works for Network Communications
ohttps://www.youtube.com/watch?v=0MwMkBET_5I
o<https://www.youtube.com/watch?v=o5t6evogJbg>
- Find made CAT5e/CAT6 cables for sale online, check the prices.

As Office Works provides all the necessary equipment, I have selected this retailer as the base line for the costing for CAT5e and CAT6 cables.

CAT 5 CABLES



	<p>Keji 5m RJ45 Cat 5e Patch Cable Blue</p> <p>Rating: ☆☆☆☆☆ (0 customer reviews)</p> <p>Product Code: COC505BU</p> <p>Enter your postcode to see accurate store and delivery availability. Set postcode</p>	<p>\$14.88</p> <p>Quantity <input type="text" value="1"/></p> <p>Add to Cart</p> <p>Add to My List</p> <p>Add to Compare</p>
	<p>5m RJ45 Cat 5e Patch Cable White</p> <p>Rating: ☆☆☆☆☆ (0 customer reviews)</p> <p>Product Code: COC505WH</p> <p>Enter your postcode to see accurate store and delivery availability. Set postcode</p>	<p>\$14.88</p> <p>Quantity <input type="text" value="1"/></p> <p>Add to Cart</p> <p>Add to My List</p> <p>Add to Compare</p>
	<p>CAT 5e Cable 2m Twin Pack Blue</p> <p>Rating: ☆☆☆☆☆ (0 customer reviews)</p> <p>Product Code: COC502BB</p> <p>Enter your postcode to see accurate store and delivery availability. Set postcode</p>	<p>\$17.40</p> <p>Bulk Buy Price</p> <p>5+ \$15.70</p> <p>Quantity <input type="text" value="1"/></p> <p>Add to Cart</p> <p>Add to My List</p> <p>Add to Compare</p>
	<p>CAT 5e Cable 2m Twin Pack White</p> <p>Rating: ☆☆☆☆☆ (0 customer reviews)</p> <p>Product Code: COC502WW</p> <p>Enter your postcode to see accurate store and delivery availability. Set postcode</p>	<p>\$17.40</p> <p>Bulk Buy Price</p> <p>5+ \$15.70</p> <p>Quantity <input type="text" value="1"/></p>

CAT 6 CABLES

 <p>\$4.48 Comsol RJ45 Cat 6 Patch Cable 1m White</p> <p>Add to Cart</p> <p>Add to My List</p> <p>Add to Compare</p>	 <p>\$5.88 Comsol RJ45 Cat 6 Patch Cable 1m Blue</p> <p>Add to Cart</p> <p>Add to My List</p> <p>Add to Compare</p>	 <p>\$5.98 Comsol Cat 6 Ethernet Cable 50cm Black</p> <p>Add to Cart</p> <p>Add to My List</p> <p>Add to Compare</p>	 <p>\$5.98 Comsol Cat 6 Ethernet Cable 50cm Yellow</p> <p>Add to Cart</p> <p>Add to My List</p> <p>Add to Compare</p>
 <p>\$5.98 Comsol Cat 6 Ethernet Cable 50cm Blue</p> <p>Add to Cart</p> <p>Add to My List</p> <p>Add to Compare</p>	 <p>\$6.48 Comsol RJ45 Cat 6 Patch Cable 2m White</p> <p>Add to Cart</p> <p>Add to My List</p> <p>Add to Compare</p>	 <p>\$6.98 Comsol RJ45 Cat 6 Patch Cable 1m Black</p> <p>Add to Cart</p> <p>Add to My List</p> <p>Add to Compare</p>	 <p>\$6.98 Comsol RJ45 Cat 6 Patch Cable 1m Orange</p> <p>Add to Cart</p> <p>Add to My List</p> <p>Add to Compare</p>
 <p>\$6.98 Comsol Cat 6 Ethernet Cable 1m Blue</p> <p>Add to Cart</p>	 <p>\$6.98 Comsol RJ45 Cat 6 Patch Cable 1m Yellow</p> <p>Add to Cart</p>	 <p>\$6.98 Comsol RJ45 Cat 6 Patch Cable 1m Red</p> <p>Add to Cart</p>	 <p>\$6.98 Comsol RJ45 Cat 6 Patch Cable 1m Purple</p> <p>Add to Cart</p>

- Select different cables (UTP/STP), RJ45 connectors and needed tools in an online store if you want to make a CAT5e/CAT6 by yourself.

HOME > PRODUCTS > CABLES & CONNECTORS > WIRE & CABLE ROLLS > COMPUTER DATA & SENSOR CABLE > CAT 6 SOLID CORE UTP NETWORK CABLE - SOLD PER

Cat 6 Solid Core UTP Network Cable - Sold per metre

CAT.NO: **WB2030**

Solid core Cat6 UTP cable for computer networking applications up to 1000Mbps.

ADD TO WISHLIST
 NOTIFY ME WHEN ON SPECIAL


DESCRIPTION


SPECIFICATIONS

DOWNLOADS

ARTICLES

Solid core Cat6 UTP cable for computer networking applications up to 1000Mbps.





HOME > PRODUCTS > CABLES & CONNECTORS > COMMUNICATION & NETWORK CONNECTORS > RJ-45/RJ-11/RJ-12 CONNECTORS > 8P/8C SCREENED RJ45 PLUG TO SUIT STRANDED CABLE - 10PK




8P/8C Screened RJ45 Plug to Suit Stranded cable - 10Pk

CAT.NO: **PP1437**

PLG RJ45 8P/8C (STRND CABLE) SCRND PK10...

ADD TO WISHLIST
 NOTIFY ME WHEN ON SPECIAL

\$14.95

Bulk Pricing:

1-4	\$14.95
5-19	\$13.35
20+	\$11.70

In Stock

1

ADD TO CART

DESCRIPTION

SPECIFICATIONS

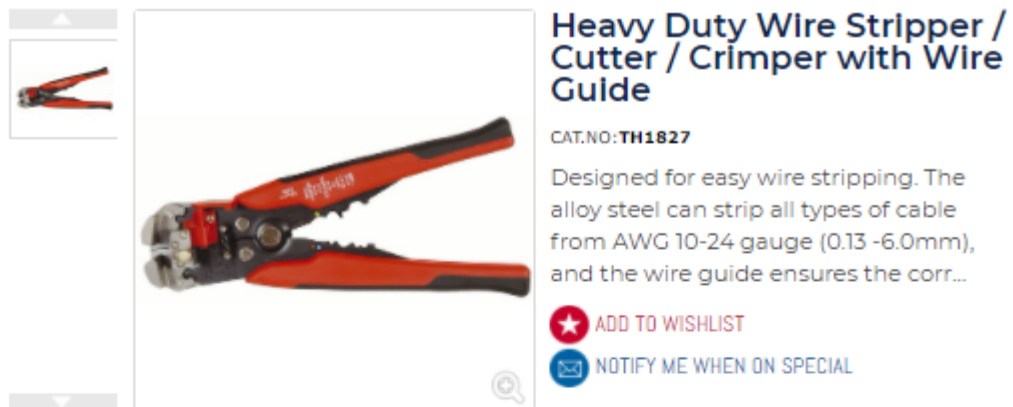
DOWNLOADS

ARTICLES

Packet of 10 PLG RJ45 8P/8C (STRND CABLE).


zip | From \$10 a week [learn more](#)

or 5 fortnightly payments of **\$2.99** with **hummy** [more info](#)



DESCRIPTION

SPECIFICATIONS

ARTICLES

Designed for easy wire stripping. The alloy steel can strip all types of cable from AWG 10-24 gauge (0.13 -6.0mm), and the wire guide ensures the correct length is stripped time and time again. It incorporates a precision cutting blade for easy wire cutting. It also features quality crimping jaws.

- * For insulated terminals (1.5 - 6mm)
- * For non-insulated terminals (1.5 - 6mm)
- * For auto ignition terminals (7-8mm)
- * This is the best all round wire tool we've seen for a long time,
- * Spring return

2. Download and use an Android/Apple WIFI analyser on your mobile phone or tablet (e.g. Farproc WIFI Analyzer for Android). Use the WIFI analyser to:

- Identify the SSID of your current WIFI network.
- Identify how many other APs are within range of your phone.
- Find the approximate signal strength of your current AP.
- Explore other information shown by the WIFI analyser.

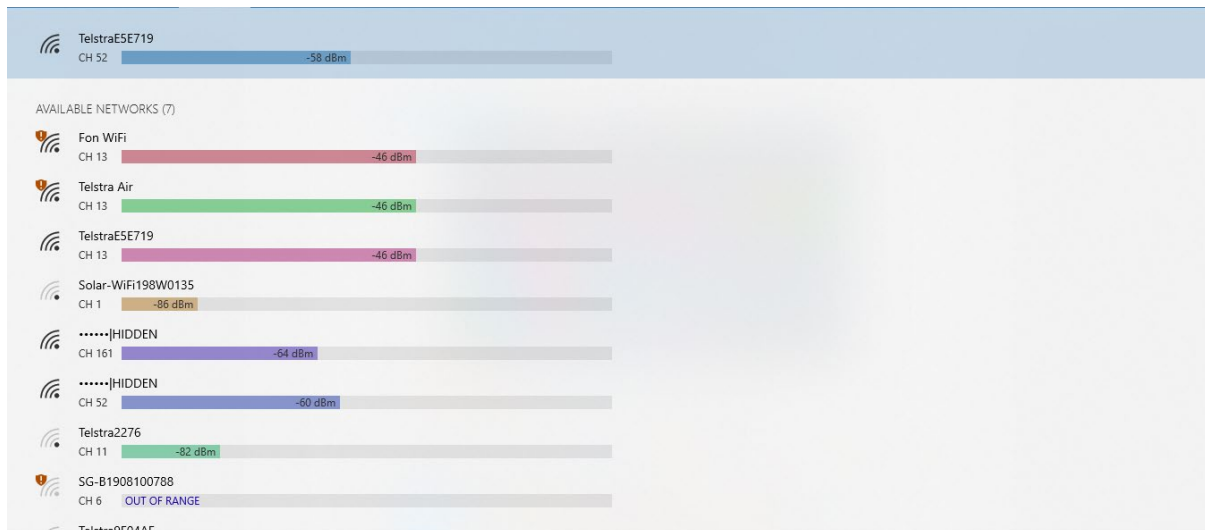
Using a WIFI analyser app (<http://matthafner.com>) provided via the Microsoft Office Store, I was able to identify the following:

(1) The Basic Service Set Identifier for my WIFI is

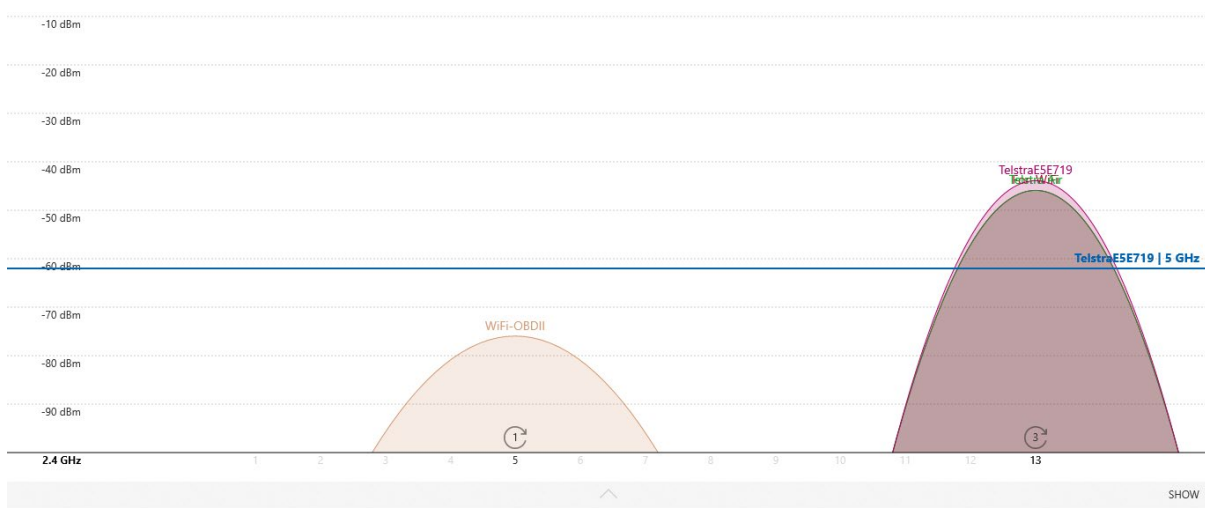
DEVICE INFO

BSSID 12:13:31:E5:E7:21

(2) There are an additional 7 AP within range of my laptop



(3) Strength the WIFI analyser has identified that the WIFI strength is 65 dBm .



It is interesting to note the additional information that is available. I noted that the private IP address is different from the public IP address. That the WIFI is on channel 52 and that we are on IEEE 802.11ac which is commonly known as WIFI 5. Given the lack of internet signal at our property it I would have assumed that the WIFI was an older model.

NETWORK DETAILS

SSID	TelstraE5E719
Channel	52
Frequency	5.260 GHz (5.250-5.270) *
Bandwidth	20 MHz *
Protocol	802.11ac

DEVICE INFO

BSSID	12:13:31:E5:E7:21
-------	-------------------

IP DETAILS

Private IPv6	2001:8003:71f8:a500:28e1:80d6:5c93:8f86
Public IPv6	2001:8003:71f8:a500:e86f:2d52:18b7:e015

SECURITY

Authentication	RSNA-PSK (WPA2)
Encryption	AES-CCMP

INFRASTRUCTURE

Kind	Infrastructure network
Connectivity	Internet access
Interface	IEEE 802.11 wireless network interface

Q3. Find three WIFI APs/routers for sale online, and compare them based on price, standards supported, frequency bands, maximum data rates.



\$498.00

**NETGEAR Nighthawk XR1000
WiFi 6 Gaming Router**

Add to Cart



\$379.00

**NETGEAR Nighthawk AX4200
AX5 5-Stream WiFi 6 Router**

Add to Cart



\$228.00

**D-Link AX1800 Mesh Gigabit
WiFi 6 Router**

Add to Cart

Name	Price	Standards	Frequency Bands	Maximum Data Rates
Netgear Nighthawk XR1000 WIFI 6 Gaming router	\$498.00	ADSL and ADSL2	2.4GHz and 5 GHz	4800 Mbps
Netgear Nighthawk AX4200 AX5 – 5	\$379.00	ADSL and ADSL2	2.4GHz and 5 GHz	3600Mbps

Stream WIFI 6 Router				
D-Link AX1800 Mesh Gigabit WIFI 6 Router	\$228.00	N/A Router only**	2.4GHz and 5 GHz	1800Mbps

**it is interesting that although this presents the same as the other models it does not provide the same capabilities and unknowing purchasers may not receive the connection they are expecting.

Week 6:

Week 6 Summary

Week 6 covered Network Protocols, specifically the purpose of a network protocol and the layers in the TCP/IP Architecture (Transmission Control Protocol and Internet Protocol).

Week 6 Reflection

Although weeks 1-5 have covered the 7 OSI layers, I am still learning how each one of these layers works in a networking environment and how they assist the end-to-end process.

Q.1. Draw the TCP/IP layered architecture with the name of each layer. Discuss how the TCP/IP layered architecture is different from the OSI model (see Week 2, chapter 7).

OSI model	TCP/IP Model
Application Layer Presentation Layer Session Layer	Application Layer
Transport Layer	Transport Layer
Network Layer	Network Layer
Data-Link Layer Physical Layer	Network Access

The OSI model is a reference model, and the TCP IP is an implementation model. TCP layer segments the information to put a sequence number.

TCP IP only has 4 layers and OSI models have 7 layers. The TCP/IP combines the application, presentation and session into one layer called Application.

The Network access incorporates the network, datalink and physical layer from the OSI model.

2. Discuss the TCP/IP protocols in each layer of the TCP/IP model with a partner. For each layer, write the names of at least two protocols on your diagram above. • Suppose you start a web browser with the home page configured as <https://www.cqu.edu.au>. What protocols are most likely being used in each layer of the TCP/IP architecture?

Unfortunately, as this is a remote learning subject, was unable to discuss with a partner. I have included my understanding of at least two protocols for each layer.

TCP/IP Model	Protocols
Application Layer	HTTP (Hypertext Transfer Protocol) DHCP (Dynamic Host Configuration Protocol) DNS (Domain Name System)
Transport Layer	TCP (Transmission Control Protocol) UDP (User Datagram Protocol)
Network Layer	ICMP (Internet control message protocol) IPsec (Internet protocol security)
Network access	Ethernet WAN Technologies (Wide Area Network Technologies)

www.cqu.edu.au protocols

In the application layer we generate the request for the http protocol

The next layer being the transport layer - the data being [cqu.edu.au](https://www.cqu.edu.au) will be passed to the TCP header as segment.

The segment will then be passed to the next layer being the network layer which provides the IP header. The segment then becomes a packet.

The packet will be passed to the Network access layer and will add a header and a trailer to become a frame.

This frame is then delivered to the network to bits or signals and transmit it through the network media.

3. Use the command “ipconfig /all” to find information about your computer NIC, addresses and network, including: • What is your IPv4 address? • What is your NIC MAC address? • What is the address of the default gateway? • What is the default gateway used for? • What is the address of one of your DNS servers? • What is the DNS server used for? If you are using a Mac or Linux computer (not Windows), then instead of “ipconfig /all” you can try the command “ifconfig.”

IPv4 Address: IPv4 Address. : 192.168.0.106(Preferred)

NIC MAC Address: E4-E7-49-9B-4B-71

Default Gateway: fe80::1213:31ff:fee5:e718%19

What is the default gateway use for? The default gateway is used to send packets to other networks outside of a Local Area Network. If a default gateway is not identified the computer can only communicate with computers on the same network.

Address of DNS Server: DNS Servers : 2001:8003:71f8:a500::1
192.168.0.1

What is DNS server used for? The DNS Server provides an easy to remember hostname (such as www.myer.com.au) rather than trying to remember the IP address of the network they are trying to reach.

Microsoft Windows [Version 10.0.19042.928]

(c) Microsoft Corporation. All rights reserved.

C:\WINDOWS\system32>ipconfig/all

Windows IP Configuration

Host Name : LAPTOP-ELBE1DQP

Primary Dns Suffix :

Node Type : Hybrid

IP Routing Enabled. : No

WINS Proxy Enabled. : No

DNS Suffix Search List. : modem

Ethernet adapter Ethernet 2:

Media State : Media disconnected

Connection-specific DNS Suffix . :

Description : Realtek PCIe GbE Family Controller #2

Physical Address. : E4-E7-49-9B-4B-71

DHCP Enabled. : Yes

Autoconfiguration Enabled : Yes

Wireless LAN adapter Local Area Connection* 1:

Media State : Media disconnected

Connection-specific DNS Suffix . :

Description : Microsoft Wi-Fi Direct Virtual Adapter #5

Physical Address. : 2A-3A-4D-83-90-F1

DHCP Enabled. : Yes

Autoconfiguration Enabled : Yes

Wireless LAN adapter Local Area Connection* 6:

Media State : Media disconnected
Connection-specific DNS Suffix . :
Description : Microsoft Wi-Fi Direct Virtual Adapter #6
Physical Address. : AA-3A-4D-83-90-F1
DHCP Enabled. : Yes
Autoconfiguration Enabled : Yes

Wireless LAN adapter Wi-Fi 2:

Connection-specific DNS Suffix . : modem
Description : Realtek RTL8821CE 802.11ac PCIe Adapter #2
Physical Address. : 28-3A-4D-83-90-F1
DHCP Enabled. : Yes
Autoconfiguration Enabled : Yes
IPv6 Address. : 2001:8003:71f8:a500:28e1:80d6:5c93:8f86(Preferred)
Temporary IPv6 Address. : 2001:8003:71f8:a500:a802:861e:5b15:2afb(Preferred)
Link-local IPv6 Address : fe80::28e1:80d6:5c93:8f86%19(Preferred)
IPv4 Address. : 192.168.0.106(Preferred)
Subnet Mask : 255.255.255.0
Lease Obtained. : Saturday, 24 April 2021 4:05:52 PM
Lease Expires : Saturday, 24 April 2021 5:35:52 PM
Default Gateway : fe80::1213:31ff:fee5:e718%19
192.168.0.1
DHCP Server : 192.168.0.1
DHCPv6 IAID : 237517389
DHCPv6 Client DUID. : 00-01-00-01-23-9F-83-64-E4-E7-49-9B-4B-71
DNS Servers : 2001:8003:71f8:a500::1
192.168.0.1

NetBIOS over Tcpip. : Enabled

Connection-specific DNS Suffix Search List:

modem

C:\WINDOWS\system32>

4. Find the IP addresses of the default gateway, DHCP, DNS by using the command “ipconfig /all”, then explain what gateway, DHCP and DNS are (your understandings) with your partner.

As referenced above, as I am completing this as an online student, I am unable to discuss my findings with a partner. However, have included my understandings below.

Default gateway: fe80::1213:31ff:fee5:e718%19

The default gateway is address on my computer IP address settings that indicating the address of the router. This allows the router to forward the packets to other networks.

The network gateway operates in the networking layer of the TCP/IP model.

DHCP Server : 192.168.0.1

When I start up my computer, as the client I send out a request to the DHCP server. The server then assigns an IP address for a set period of time. In this instance the IP address 192.168.0.1 lease was obtained on Saturday, 24 April 2021 12:14:40 PM and will expire on Saturday, 24 April 2021 2:05:56 PM.

DNS: DNS Servers : 2001:8003:71f8:a500::1
192.168.0.1

The domain name server keeps a list of the computer names rather than their IP addresses. This stops people having to remember IP addresses and just must remember a domain name.

5. Use ping and arp in a Command Prompt to perform the following:

Display the current ARP table using the command “arp -a”

Microsoft Windows [Version 10.0.19042.928]

(c) Microsoft Corporation. All rights reserved.

C:\Users\urban>arp -a

Interface: 192.168.0.106 --- 0x13

Internet Address	Physical Address	Type
192.168.0.1	10-13-31-e5-e7-18	dynamic

224.0.0.22	01-00-5e-00-00-16	static
224.0.0.251	01-00-5e-00-00-fb	static
224.0.0.252	01-00-5e-00-00-fc	static
239.255.255.250	01-00-5e-7f-ff-fa	static
255.255.255.255	ff-ff-ff-ff-ff-ff	static

C:\Users\urban>

What information is stored in the ARP table?

The table contains the IP address, MAC address as well as type.

Why do you think the current entries exist?

The current entries exist as the source computer (my computer) is seeking to obtain information from the Target computer (being the IP provider)

Ping another computer whose IP address is not currently in the ARP table. If you are in the CQU lab, then identify another student or computer to ping. For online students, you may try to delete the current table using “arp -d” and then ping another computer in your network, e.g., your default gateway or DNS server.

I pinged the DNS server of my network being 192.168.0.1 and the results are as follows:

C:\Users\urban>ping 192.168.0.1

Pinging 192.168.0.1 with 32 bytes of data:

Reply from 192.168.0.1: bytes=32 time=2ms TTL=64

Reply from 192.168.0.1: bytes=32 time=2ms TTL=64

Reply from 192.168.0.1: bytes=32 time=3ms TTL=64

Reply from 192.168.0.1: bytes=32 time=2ms TTL=64

Ping statistics for 192.168.0.1:

Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),

Approximate round trip times in milli-seconds:

Minimum = 2ms, Maximum = 3ms, Average = 2ms

C:\Users\urban>

- **Discuss how ARP works.**

When a source computer (such as my home computer) does not have the destination, MAC address it sends out an ARP broadcast via the internetwork layer of the TCP/IP. The computer uses ARP to retrieve the MAC address of the router on its default gateway.

Week 7:

Week 7 Summary

Week 7 covered Network Protocols IPV4 and IPV6 as well as the OSI reference model and TCP/IP architecture.

Week 7 Reflection

Upon reflection with week 7 I am aware that I am still not confident with binary equations. The differences between IPv4 and IPv6 are becoming clearer.

I did note the differences between the tutorial IP address for google and the one shown on my tracert. I also note that my tracert did not show the default gateway as the first packet rather it showed the IPv6 address.

Questions:

Q.1 Review the practice (Quiz) of Number System to be familiar with binary math.

(completed)

Q. 2. Use the command "ipconfig" in Windows Command Prompt to find IPv4 address of your currently used Ethernet adapter.

The IPv4 address of my current adapter is 192.168.0.106

(1) convert your IPV4 address from decimal to binary

11000000.10101000.00000000.01101010

(2) Identify the class your IPV4 address belongs to.

My IPV4 belongs to Class C which is designed for small networks.

(3) what is a private IP address? Why do we need private IP addresses?

Due to the number of devices the list of public IP addresses is almost exhausted. Private IP addresses can be used by LAN to assign to internal hosts. Private IP addresses cannot directly access the internet and must do so via process of Network Address Translation (NAT).

(4) In this class identified in 2.2, what is the range of IPv4 address is reserved as the private IP address?

The range of private addresses for IPv4 are 192.168.0 to 192.168.255

Q.3 Subnetting

(1) Find out the subnet mask associated with your IPv4 address.

The subnet mask associated with my IPv4 address is 255.255.255.0

(2) Which part of your IPv4 address is the network ID, and which part is the host ID?

192.168.0 is my network ID and 106 is the host ID.

(3) Discuss what is subnetting and what it is used for.

A subnet is a subdivision of a network. In large network the main IP address will receive the data packet and the router will then forward the data packet to the subnet IP address. This ultimately improves speed and network performance.

Q.4 Use tracert to find the path from your computer to a web server e.g., google.com: from the output

```
C:\WINDOWS\system32>tracert www.google.com

Tracing route to www.google.com [2404:6800:4006:80a::2004]
over a maximum of 30 hops:
  0  0 ms   0 ms   0 ms  2001:8003:70d5:c700::1
  1  8 ms   7 ms   9 ms  2001:8003:0:bdf:f0:7:5:0
  2  22 ms  11 ms   9 ms  ae10.cha-ice301.brisbane.telstra.net [2001:8000:0:2060:124:128:0:2]
  3  *      *      10 ms bundle-ether25.cha-core10.brisbane.telstra.net [2001:8000:0:2060:124:128:0:1]
  4  *      *      *      Request timed out.
  5  *      *      *      Request timed out.
  6  21 ms  21 ms  22 ms  2001:4860:1:1::4d4
  7  23 ms  23 ms  22 ms  2404:6800:8067::1
  8  22 ms  21 ms  21 ms  2001:4860:0:1::1880
  9  *      *      *      Request timed out.
 10  23 ms  23 ms  22 ms  syd15s06-in-x04.1e100.net [2404:6800:4006:80a::2004]

Trace complete.
```

(1) identify the server IP address

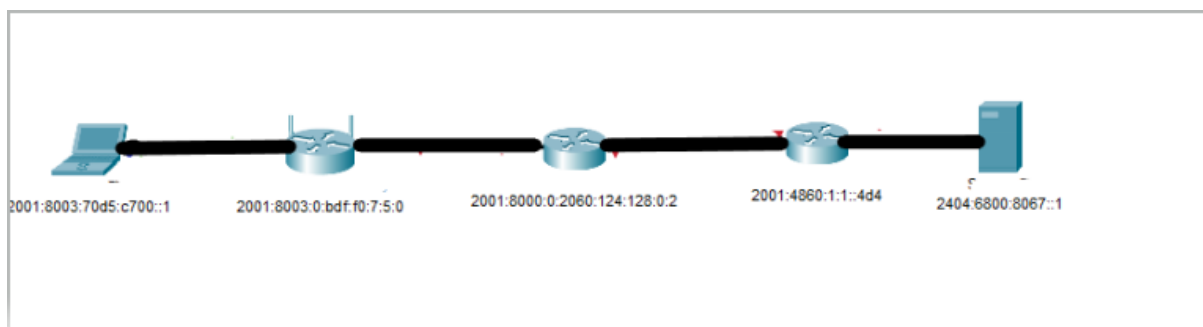
The server IP address for google.com is 2404:6800:4006:80a::2004

(2) Identify the IP address of the gateway in your network

The default gateway for my network is as follows:

2001:8003:70d5:c700::1

(3) draw a diagram to show the path



(4) what other information does tracer give you about the path?

Tracer provides information from my gateway through the IPS and then the packets as they arrive at the IP address and then back again through the network.

It also provides information on how long the reply took. This will be helpful if designing a network to identify areas where the packets are not being delivered correctly.

Q.5 IPv6

(1) How IPv6 can address the limitations of IPv4

IPv6 replaces IPv4 32bit address with a 128-bit address. This allows for more than enough unique IP address for every device on earth.

There are currently insufficient IPv4 IP addresses available to meet the ever-expanding need.

As IPv4 is an aging system, there are constant requirements for upgrades and workarounds to meet security requirements.

By using IPv6 over IPv4 tunnelling a server running a IPv6 application is able to be received by a host running IPv4.

(2) Discuss the enhancements in IPv6

Apart from providing more unique IP addresses, IPv6 eliminates the need for Network Address Translation (NAT).

IPv6 can self-configure the IP addresses thereby remove the need for DHCP.

IPv6 offers more support for mobile technology.

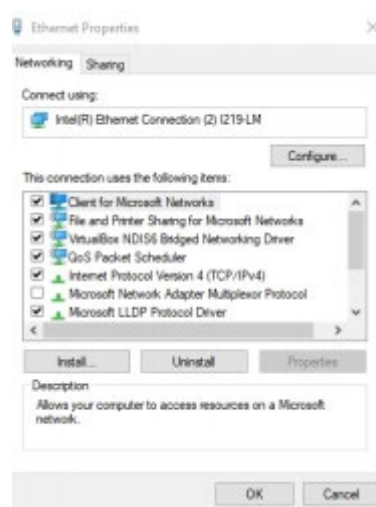
Although NAT is workable in the current form, it interferes with IPSec. Having each device on the network with its own unique IP will enhance performance.

(3) How to achieve to make IPv4 and IPv6 coexist

In order to make IPv4 and IPv6 coexist older hardware can be upgraded with updated firmware and new operating systems will automatically be configured to IPv6.

Unfortunately, the ISP carriers do not see any value proposition in a dual stack system that would eliminate the need for NAT.

Q.6 Identify each layer of the TCP/IP architecture (five layers) in the Ethernet Properties dialog box.



Application Layer	Client for Microsoft Networks
-------------------	-------------------------------

Transport Layer	
Network Layer	Internet Protocol Version 4 (TCP/IPv4); QoS Packet Scheduler File and printer sharing for Microsoft networks.
Data Layer	Microsoft LLDP protocol driver; Virtual Box NDIS 6 Bridged Network Driver,
Physical Layer	Connection using Intel (R) Ethernet connection

Week 8:

Week 8 Summary

Week 8 covered advanced features and operations of network switches, routing properties and routing protocols.

Week 8 Reflection

Having reflection on virtual machines, I am still understanding this concept, however this week provided more clarification. The switching table is a little clearer however the concept of a virtual machine is still something that I am coming to terms with.

Q.1 Review Question 3 of Tutorial 3 in Week 3, then investigate the following scenario: Your laptop (00-14-22-01-23-45) links to a switch, which connects to a router (00-04-DC53-3D-4F) and another PC (00-40-96-5D-42-22). The initial switching table is as follows:

MAC	Port
00-04-DC-53-3D-4F	3
00-14-22-01-23-45	5
00-40-96-5D-42-22	1

After the following events occur:

- The entry for 00-40-96-5D-42-22 expired.
- Reconnect your laptop(00-14-22-01-23-45) to Port 2;
- A new virtualised machine (00-38-6B-00-28-0C) is created in your laptop.

Show the switching table that you'd expect to see at the end of these events by completing the table below.

MAC	Port
	1
	5
00-04-DC-53-3D-4F	3
00-14-22-01-23-45 00-38-6B-00-28-0C	2

Q.2 Viewing the routing tables by using the command “route print”, then discuss five different columns.

```
=====
IPv4 Route Table
=====
Active Routes:
Network Destination        Netmask          Gateway          Interface        Metric
0.0.0.0                    0.0.0.0          192.168.0.1      192.168.0.106    35
127.0.0.0                  255.0.0.0        On-link          127.0.0.1        331
127.0.0.1                  255.255.255.255  On-link          127.0.0.1        331
127.255.255.255            255.255.255.255  On-link          127.0.0.1        331
192.168.0.0                255.255.255.0    On-link          192.168.0.106    291
192.168.0.106              255.255.255.255  On-link          192.168.0.106    291
192.168.0.255              255.255.255.255  On-link          192.168.0.106    291
224.0.0.0                  240.0.0.0        On-link          127.0.0.1        331
224.0.0.0                  240.0.0.0        On-link          192.168.0.106    291
255.255.255.255            255.255.255.255  On-link          127.0.0.1        331
255.255.255.255            255.255.255.255  On-link          192.168.0.106    291
=====
```

- Network Destination

The network destination will show the network number compared to the destination address. In the first row it starts at 0.0.0.0 therefore showing the default route.

- Netmask

The netmask divides the IP address into subnets and available hosts.

- Gateway

The gateway is my personal IP address. This has been confirmed by again running ipconfig/all.

- Interface

The interface column again shows the MAC address that the packet should be sent through to reach the gateway. In this instance it shows my IPv4 address.

- Metric

If the routing table shows many entries that can reach the destination, the one with the smallest metric will be chosen.

Compare the information provided by ipconfig (ipconfig /all) to the information stored in the routing table.

The information stored in the routing table shows the Default gateway, DHCP Servers, Subnet Mask.

It does not show 224.0.0.0 which I understand is a multi-cast address and is reserved -for well-known multi-cast addresses.

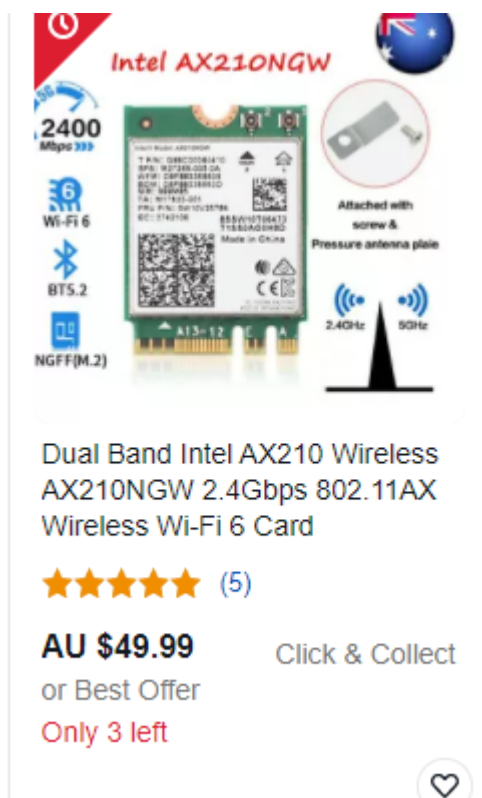
Q3. Wi-Fi Assume you plan to provide a free Wi-Fi service in your coffee shop. List and discuss what wireless settings can help you to build an efficient and secure WLAN for your business.

There would need to be two separate networks. A reduction in bandwidth for the public WIFI would be beneficial as this would ensure limited cost to the shop. The strength of the wi-fi should be considered to ensure that passers-by are not just using the WIFI signal, and it is only beneficial for your shop.

MAC Filtering could be considered if the shop becomes aware of devices using more data than would be considered acceptable use.

The other network should have a separate SSID that would require authentication such as a username and password. Another option would be to encrypt with WPA2 protocol.

Q4. NIC Search three different types of network interface card based on different bus types on the internet:



Transfer rate: 867mbps

Bus Size: PCI Express x4, PC Card Type IV, Mini PCI, PCI Express



Mouse over image to zoom



AU Dual Band Wireless 9260AC Intel 9260NGW 1.73Gbps Bluetooth 5 WiFi Wireless Card

★★★★★ 5 product ratings

Condition: Brand New

Quantity: More than 10 available / **164 sold**

Price: **AU \$26.99**
or 4 payments of AU \$6.75 with Afterpay


Best Offer:

100% buyer satisfaction Click & Collect 164 sold


[Buy It Now](#)
[Add to cart](#)
[Make Offer](#)
[Add to Watchlist](#)

Transfer rate: 867mbps

Bus Size: PCI Express x4, PC Card Type IV, Mini PCI, PCI Express



Mouse over image to zoom



AU INTEL 8492MT 1000 MT Gigabit Dual Port Network Serve Adapter PCI Network Card

Condition: Brand New

Quantity: 9 available / **205 sold**


Price: **AU \$33.99**
or 4 payments of AU \$8.50 with Afterpay

Best Offer:

100% buyer satisfaction Click & Collect 205 sold

Collection: Click & Collect - Select store at checkout.

Postage: **FAST 'N FREE**
On or before **Fri, 14 May**, to 4000
Item location: Padstow, NSW, Australia
Posts to: Worldwide [See exclusions](#)

Payments: 

afterpay 4 payments of AU \$8.50 | [Learn more](#)

Ad: **Lenovo** 20% off* Lenovo storewide with code PLENV20. *T&Cs apply.

Returns: Free 30-day returns | [See details](#)

Transfer rate: 10000Mbps/16bps

Wired: Ethernet (RJ-45)

2.4G/5G Dual Band 600Mbps LAN Wireless PC PCI Express WiFi Adapter Network Card

Condition: Brand New
Quantity: 1 (10 available)

Price: **AU \$21.58**
or 4 payments of AU \$5.40 with Afterpay

Buy It Now
Add to cart
[Add to Watchlist](#)

Free postage 30-day returns Longtime member

Postage: FREE Economy SpeedPAK from China/Hong Kong/Taiwan | [See details](#)
International shipment of items may be subject to customs processing and additional charges.
Item location: Guangzhou, China
Posts to: Australia, Americas, Europe, Asia, New Zealand | [See exclusions](#)

Delivery: Estimated between **Wed. 26 May** and **Thu. 8 Jul.** | [See details](#)
Please allow additional time if international delivery is subject to customs processing.

Payments: [PayPal](#) [VISA](#) [MasterCard](#) [American Express](#) [Discover](#)
[afterpay](#) 4 payments of AU \$5.40 | [Learn more](#)

Returns: 30-day buyer pays return postage | [See details](#)

Transfer rate: 600Mbps

Wireless: PCI-E X1 / X4 / X8 / X16

The common use of each type of NIC is as follows:

The network interface card transmit signals and delivers data packets. The NIC is configured dependent on the type of network cables required. For example, the majority of computers will be attached to RJ-45 ports.

Then, discuss the following advanced features of NICs

- Shared adapter/system memory

If the NIC has RAM Buffering it means it includes memory that provides temporary storage for network data that may arrive at the NIC faster than it can be sent out.

- Onboard co-processors

This allows the NIC to have its own Central Processing Unit this stops the data from using the computer CPU.

- Remotely power on a PC by accessing NIC through network.

Advanced Configuration Power Management Interface (ACPI) allows an administrator to power a computer remotely by accessing the NIC through the network.

Week 9:

Week 9 Summary

Week 9 covered off for me one of the most important aspects of a Network, being its security. A network is only as good as the information that is kept and having lack network security will lead to lack of trust in the network as well as vulnerabilities to cyber-attacks.

Week 9 Reflection

Having worked local and State government for my whole working career, I am comfortable with and adhere to network security policies including acceptable use of IT policies.

Further I realised that my passwords would be easily identified, and I have immediately utilised a password locker. It is also quite concerning how many cyber-attacks occur that the general public is not aware of.

CQUniversity Policies can be searched for and downloaded via: <https://www.cqu.edu.au/policy>. If the direct links given below do not work, then search for the policy by name

Q.1 The CQUniversity Information and Communications Technology Passwords Procedure (pdf) defines how user accounts and passwords should be managed within the university.

a). Read the procedure (that is, section 3).

Completed

b). Consider the following items in the procedure (they are individual dot points in section 3.1) and discuss the reasons for the procedure (e.g. what security benefits it brings), as well as the drawbacks of the procedure (e.g. potential for attacks and/or inconvenience it may cause):

- Password expiry

Having an expiration of 180 days for passwords will ensure that at the end of 180 days staff passwords will expire. This is not applicable to students or staff with elevated privileges. The security benefits of this is to ensure that staff information and access is kept uncompromised. The

drawback of same is that staff will have to remember unique passwords every 6 months. This may lead to handwritten notes to keep the passwords or alternatively have these located in a non-secure location.

- Prevention of weak/common passwords

Having a set of procedures that prohibit the use of weak or common passwords, will ensure that CQU staff access is not compromised. I would suggest that Universities could be the target of a cyber-attack for reasons such as grading, test results or even DDOS to allow more time for students to complete their assignments.

Again, more complex passwords rely heavily of the password owner to remember the password and human nature dictates that people will immediately go for the easiest option.

- Account locking

After 5 incorrect consecutive password attempts the account will be locked. The policy does not indicate what happens when the account is locked, however I would assume an error message would occur perhaps advising that the account has been locked for 30 minutes and to contact the relevant IT area for assistance.

c.) Discuss the password protection requirements in section 3.8. Have you ever violated these requirements? Do you think other students or staff may have? Are they practical?

I can say personally that I have used the “Remember password” feature available on application and it did not occur to me that this was not appropriate.

On other students and staff, it would be inevitable that information sharing would occur. It would depend on the integrity of the parties involved.

Further the chances of passwords being written down electronically or manually is also inevitable as again human nature dictates that the easiest option is the one that they will gravitate towards.

2. The CQUniversity Information Assets Security Classification Policy (pdf) lists a set of classification levels for the aspects of Confidentiality, Integrity and Availability (see the table of page 2 of the policy).

- Read the classification levels (that is, the table on page 2).

Completed

- List at least five (5) different information assets for CQUniversity.
- For each asset, select an appropriate classification.
- For each asset, identify an appropriate control.

Security Aspect	Classification	Information Type and Controls	
		Information	Controls
Confidentiality	Highly Protected	Information assets that require a substantial degree of protection as their compromise could cause serious damage to the University, the State, Government, commercial entities or members of the public.	Strict access controls e.g. strong encryption routines with long keys; biometric authentication; safes Electronic media must be destroyed or sanitised.
	Protected	Information assets whose compromise could cause damage to the University, the State, Government, commercial entities or members of the public. This level of classification also includes cabinet-in-confidence/sensitive cabinet.	Strict access controls e.g. strong encryption routines with long keys; biometric authentication; safes Electronic media must be destroyed or sanitised.
	Confidential (X-in-confidence)	Information assets whose compromise could cause limited damage to the University, the State, Government, commercial entities or members of the public. Examples include legal-in-confidence, commercial-in-confidence, and staff-in-confidence.	Strong access controls e.g. standard encryption routines and keys; multifactor authentication; locked filing cabinets.
	Unclassified	Information assets that do not need special security controls or require a classification level. These are not in the public domain, but do not otherwise need to be classified. These information assets require approval from the information owner to be released to the public.	Routine access controls as per Cybersecurity Policies.
	Public	Information assets which have been authorised by the owner for public access and circulation, such as agency publications or on web sites.	No specific requirement.

3. The CQUniversity Information and Communications Technology Acceptable Use Policy and Procedure ([pdf](#)) allows for bring-your-own-device (BYOD), that is, using personal ICT devices on the university network.

- Read the procedure for Using personal ICT devices (that is, sections 4.28 to 4.33).

Completed

- What are the benefits of an organisation allowing BYOD?

There is a reduction in asset expenditure for the organisation as well as general upkeep and wear and tear.

- What are the security challenges of employees/students using personal devices (as opposed to using university owned devices)?

There is a risk of malware or trojans on the individual devices as they are not subject to the security review of assets owned by the University.

There is also the risk that students/staff who are no longer studying or employed by CQU have retained information on their personal devices that may breach the Asset Security Policy.

- Are there technical ways for CQUniversity to enforce the procedure, that is, make sure it is followed?

The policy clearly states that the University may monitor use of the ICT facilities connected to ICT devices. The information may be collected and archived and will be subject to law enforcement or other legally binding access requirements.

Week 10:

Week 10 Summary

Week 10 covered Wide Area Networking and Cloud Computing. Specially the methods used to connect to Wide Area Networks, and major areas of cloud computing.

Week 10 Reflection

The difference between internetworks and Wide Area Networks has become more apparent and makes more sense as the distance between the networks will obviously pose a great challenge to the end user.

The increased cost of service providers or service carriers when using a Wide Area Network needs to be fully weighed up prior to final costings being completed for any network infrastructure.

Q1. Explore the features and specification of the following router that can be used to build a WAN network. HPE FlexNetwork HSR6800 Router Series

<https://h20195.www2.hpe.com/v2/gethtml.aspx?docname=c04111425>

Look for information such as:

- The WAN technologies supported. For example, does it support Gigabit Ethernet, ATM or Optical Carriers (e.g. fibre)?

The Standard features listed on the website indicate that the device does support Gigabyte Ethernet (10Gbe) and ATM ports and supports Fibre and Copper Interface models.

- How many packets per second (pps) can the router forward?

The router indicates under the key-features that it is capable of services of up to 420Mpps (Mega Packet per second) forwarding and

- How many bytes per second (bps) can the Switch process?

The switch can process 2Tpbs. To reach the final equation I converted Terabytes to Gigabytes, then Gigabytes to Megabytes and Megabytes to Bytes which came to 2000000000000 bps.

- Does the router support IPv4, IPv6 or both?

The product overview indicates that the product supports both IPv4 and IPv6.

- Does the router support MPLS? X.25? ATM?

The specifications of the router show that it supports MPLS. The Router does not indicate that it does not support X.25 however ATM is supported

- What are the physical dimensions of model JG363B of the router (size, weight)?

The technical specifications of the router show the following:

43.6x48x22cm with a total weight of 22.75kg

2. Consider the AARNET network which connects universities in Australia, and to education networks overseas (see the maps in the following page).

- What network media technologies do you think are used within the majority of the AARNET network in Australia? E.g. twisted pair, coaxial cable, fibre, wireless, satellite.

It would appear that AARNET uses fibre optic as the majority of the network media technologies throughout Australia. I am unable to find any evidence that Satellite technology is not used.

- If you were transferring a 100GB file from Brisbane to Darwin using AARNET, approximately how long would it take?

The AARNET Australian Network Map indicates that the transfer speed is 10gbps. With this transfer rate it would take 80 seconds to transfer the information from Brisbane to Darwin.

- Using AARNET International connections, what is the fastest path from Sydney to the west coast of the US? Which cities does the path go via, or is it direct? Which cities in the US does the link terminate (i.e. the landing point)?

The fastest path from Sydney to the east coast of the US will be Sydney to Seattle via Honolulu. The bandwidth for this connection is 100Gbps which provides the fastest transfer speed. The landing point for this connection is Seattle. The connection for this particular scenario will end in Seattle with other network infrastructure to provide the service from the landing point to other providers.

3. Find an example for each of the following three main categories of cloud computing:

- Software as a service

Currently I have Microsoft home office account for 365. I pay monthly subscription to use this service. This is a prime example of software as a service.

- Platform as a service

As opposed to SAAS, PAAS provides a platform for development of software rather than the end product such as Microsoft Home Office. There is the ability to collaborate with other developers using cloud powered development environments.

- Infrastructure as a service

There are an increasing number of Infrastructure as a service provider on the market such as Amazon Web Services, Microsoft Azure and Google Cloud.

Week 11:

Week 11 Summary

Week 11 covered the necessary tools to identify and monitor information such as service start and stops, locating errors and identifying performance issues.

Network documentation is an intrinsic part of providing a service. Without the documentation the network switch ports are not identified and when a workstation is moved, the ability to trace this information can be lost.

Having a strong set of standard operating procedures to ensure that the network administration elicits the appropriate information from the client to assist with network concerns is a priority.

Without this, the ability to provide a valid service is compromised.

Week 11 Reflection

Week 11 was a very interesting and timely learning journey. I am literally having problems with the operating system with my work laptop and require our IT department to look at it. Saying that I was excited to be able to have the skills to review the performance of the laptop myself to identify where the processing concerns lay.

Q.1 Use Task Manager in Windows (or equivalent software in MacOS, e.g. Activity Monitor) to view the applications/processes currently running. Identify those that are consuming the most resources (e.g. CPU, memory, disk, network).

At the time question was completed the following was noted on the Task Manager.

As indicated the applications running were Task Manager and Microsoft Edge.

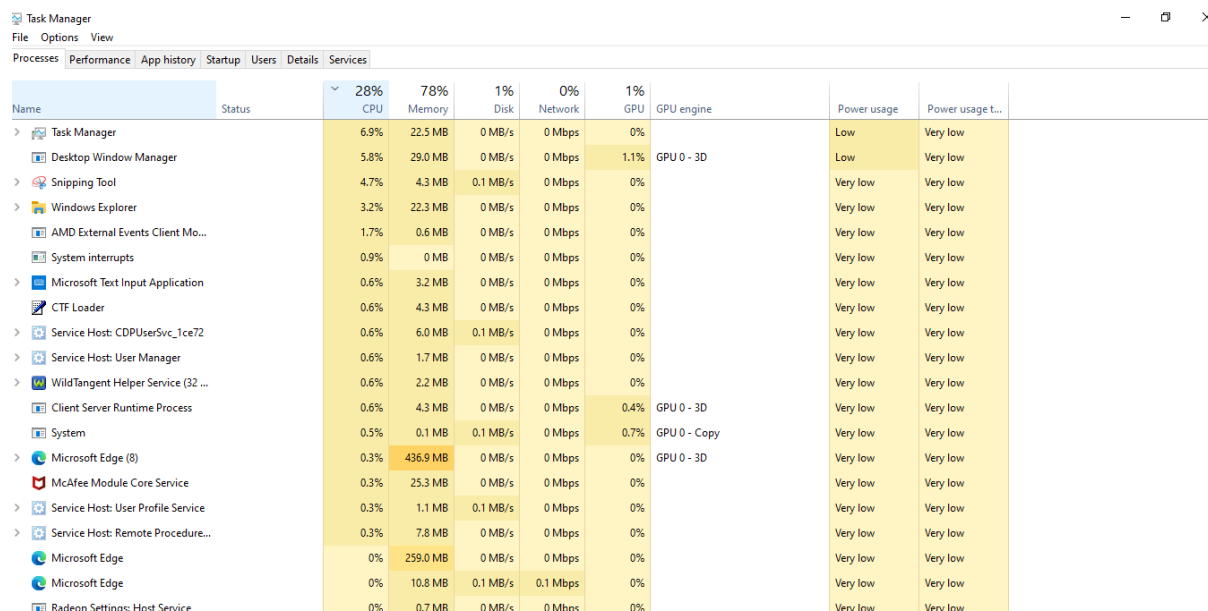
Task manager was consuming the most CPU

Microsoft Edge was consuming the most memory

McAfee was using the most disk space , but this quickly resolved

Microsoft Edge was using the most Network.

This will all be due to the current operating of the system, being solely Networked Infrastructure Foundation online tutorials and lectures. I have the actual videos running separately on my iPad to be able to test theories as they are tabled by Dr Lin.



Name	Status	28% CPU	78% Memory	1% Disk	0% Network	1% GPU	GPU engine	Power usage	Power usage t...
Task Manager		6.9%	22.5 MB	0 MB/s	0 Mbps	0%		Low	Very low
Desktop Window Manager		5.8%	29.0 MB	0 MB/s	0 Mbps	1.1%	GPU 0 - 3D	Low	Very low
Snipping Tool		4.7%	4.3 MB	0.1 MB/s	0 Mbps	0%		Very low	Very low
Windows Explorer		3.2%	22.3 MB	0 MB/s	0 Mbps	0%		Very low	Very low
AMD External Events Client Mo...		1.7%	0.6 MB	0 MB/s	0 Mbps	0%		Very low	Very low
System interrupts		0.9%	0 MB	0 MB/s	0 Mbps	0%		Very low	Very low
Microsoft Text Input Application		0.6%	3.2 MB	0 MB/s	0 Mbps	0%		Very low	Very low
CTF Loader		0.6%	4.3 MB	0 MB/s	0 Mbps	0%		Very low	Very low
Service Host: CDPUserSvc_1ce72		0.6%	6.0 MB	0.1 MB/s	0 Mbps	0%		Very low	Very low
Service Host: User Manager		0.6%	1.7 MB	0 MB/s	0 Mbps	0%		Very low	Very low
WildTangent Helper Service (32 ...		0.6%	2.2 MB	0 MB/s	0 Mbps	0%		Very low	Very low
Client Server Runtime Process		0.6%	4.3 MB	0 MB/s	0 Mbps	0.4%	GPU 0 - 3D	Very low	Very low
System		0.5%	0.1 MB	0.1 MB/s	0 Mbps	0.7%	GPU 0 - Copy	Very low	Very low
Microsoft Edge (8)		0.3%	436.9 MB	0 MB/s	0 Mbps	0%	GPU 0 - 3D	Very low	Very low
McAfee Module Core Service		0.3%	25.3 MB	0 MB/s	0 Mbps	0%		Very low	Very low
Service Host: User Profile Service		0.3%	1.1 MB	0.1 MB/s	0 Mbps	0%		Very low	Very low
Service Host: Remote Procedure...		0.3%	7.8 MB	0 MB/s	0 Mbps	0%		Very low	Very low
Microsoft Edge		0%	259.0 MB	0 MB/s	0 Mbps	0%		Very low	Very low
Microsoft Edge		0%	10.8 MB	0.1 MB/s	0.1 Mbps	0%		Very low	Very low
Radeon Settings: Host Service		0%	0.7 MB	0 MB/s	0 Mbps	0%		Very low	Very low

Q2. Start viewing the system performance (e.g. Performance tab in Task Manager) and observe how the CPU and memory usage changes when you play a video (e.g. Youtube) in your web browser (e.g. Chrome, Firefox or Safari).

Processes Performance App history Startup Users Details Services									
Name	Status	64% CPU	76% Memory	1% Disk	0% Network	5% GPU	GPU engine	Power usage	Power usage t...
Microsoft Edge (9)		21.3%	441.2 MB	0.1 MB/s	0 Mbps	3.5%	GPU 0 - 3D	Moderate	Low
Task Manager		12.0%	22.5 MB	0 MB/s	0 Mbps	0%		Low	Low
Windows Audio Device Graph Is...		8.2%	15.1 MB	0 MB/s	0 Mbps	0%		Low	Very low
Desktop Window Manager		7.4%	39.5 MB	0 MB/s	0 Mbps	1.2%	GPU 0 - 3D	Low	Very low
Client Server Runtime Process		3.7%	4.3 MB	0 MB/s	0 Mbps	0.6%	GPU 0 - 3D	Very low	Very low
System		2.9%	0.1 MB	0.1 MB/s	0.1 Mbps	0%		Very low	Very low
System interrupts		2.7%	0 MB	0 MB/s	0 Mbps	0%		Very low	Very low
Windows Explorer		1.6%	25.8 MB	0 MB/s	0 Mbps	0%		Very low	Very low
Microsoft Edge		0.8%	1.9 MB	0 MB/s	0 Mbps	0%		Very low	Very low
AMD External Events Client Mo...		0.8%	0.6 MB	0 MB/s	0 Mbps	0%		Very low	Very low
Microsoft Edge		0.8%	234.7 MB	0 MB/s	0 Mbps	0%		Very low	Very low
HP Message Service (32 bit)		0.8%	0.1 MB	0 MB/s	0 Mbps	0%		Very low	Very low
Snipping Tool		0.4%	2.4 MB	0.1 MB/s	0 Mbps	0%		Very low	Very low
Radeon Software: Host Applicat...		0.4%	5.5 MB	0 MB/s	0 Mbps	0%		Very low	Very low
WildTangent Helper Service (32 ...		0.4%	2.1 MB	0 MB/s	0 Mbps	0%		Very low	Very low
McAfee Module Core Service		0%	25.6 MB	0 MB/s	0 Mbps	0%		Very low	Very low
Service Host: Remote Procedure...		0%	7.6 MB	0 MB/s	0 Mbps	0%		Very low	Very low
Service Host: Diagnostic Policy ...		0%	19.9 MB	0 MB/s	0 Mbps	0%		Very low	Very low
McAfee CSP Service Host		0%	4.1 MB	0.1 MB/s	0 Mbps	0%		Very low	Very low
CTF Loader		0%	5.5 MB	0 MB/s	0 Mbps	0%		Very low	Very low

Whilst running a youtube video the CPU increased significantly however the memory did not change.

Q3. Use and explore Performance Monitor in Windows. Try adding some new counters (hint: right click and select “Add Counters...”) and change the colour of their line (hint: right click and select “Properties”).

Some counters may be:

a. TCPv4 -> segments/sec

Fig 1. Original counter for TCPv4

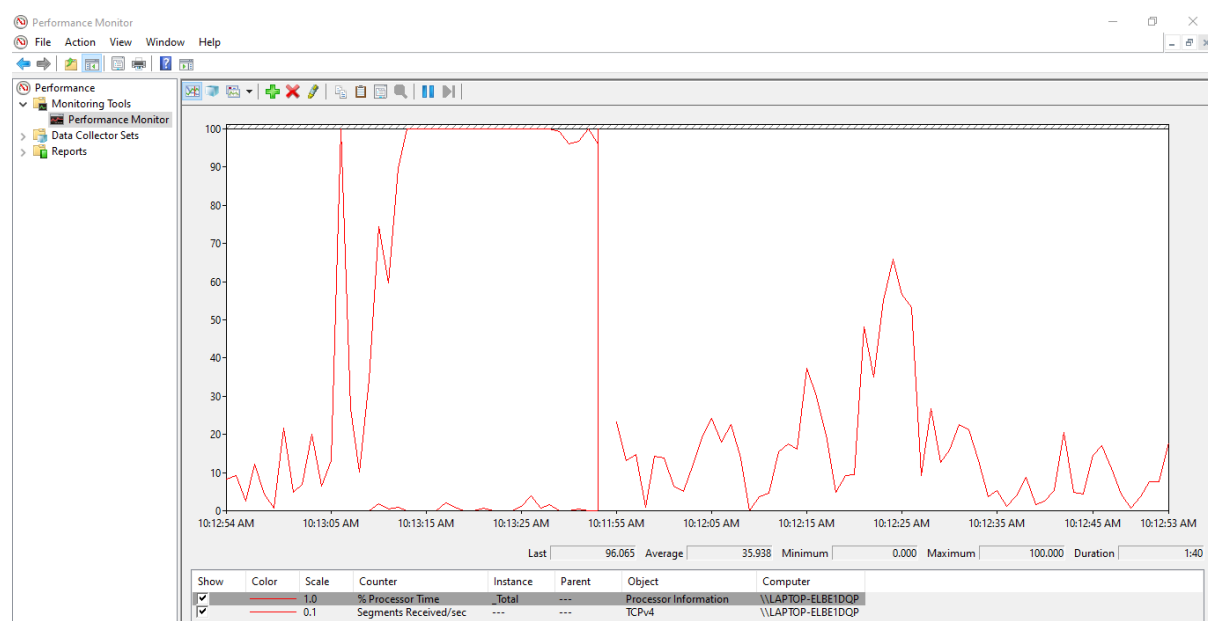
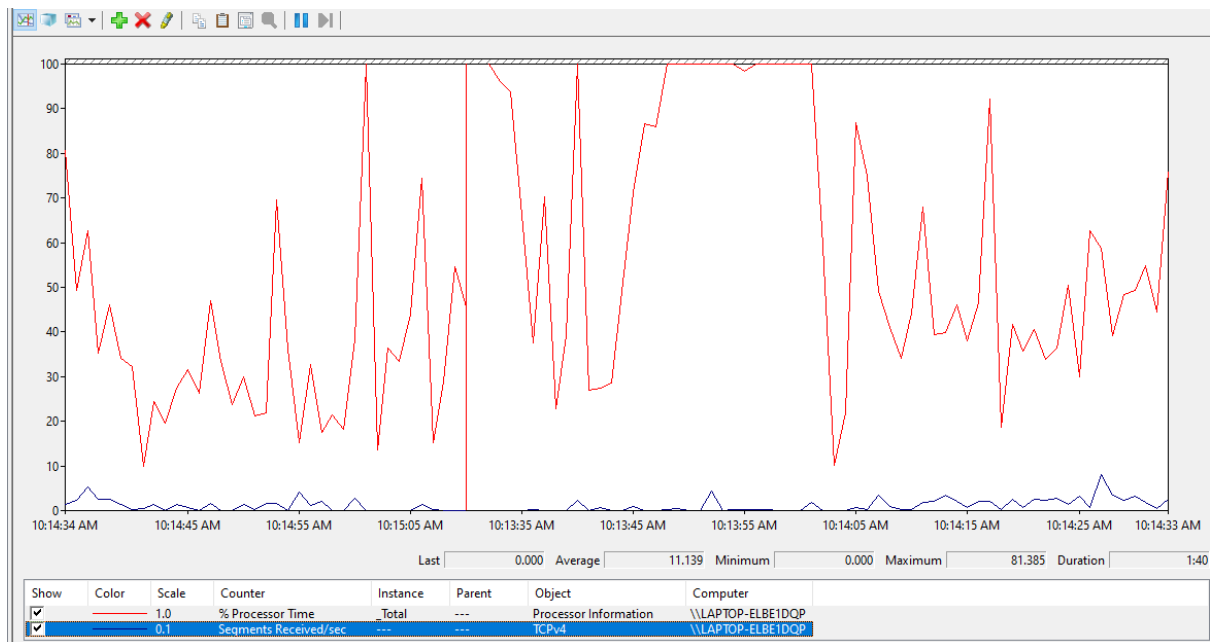


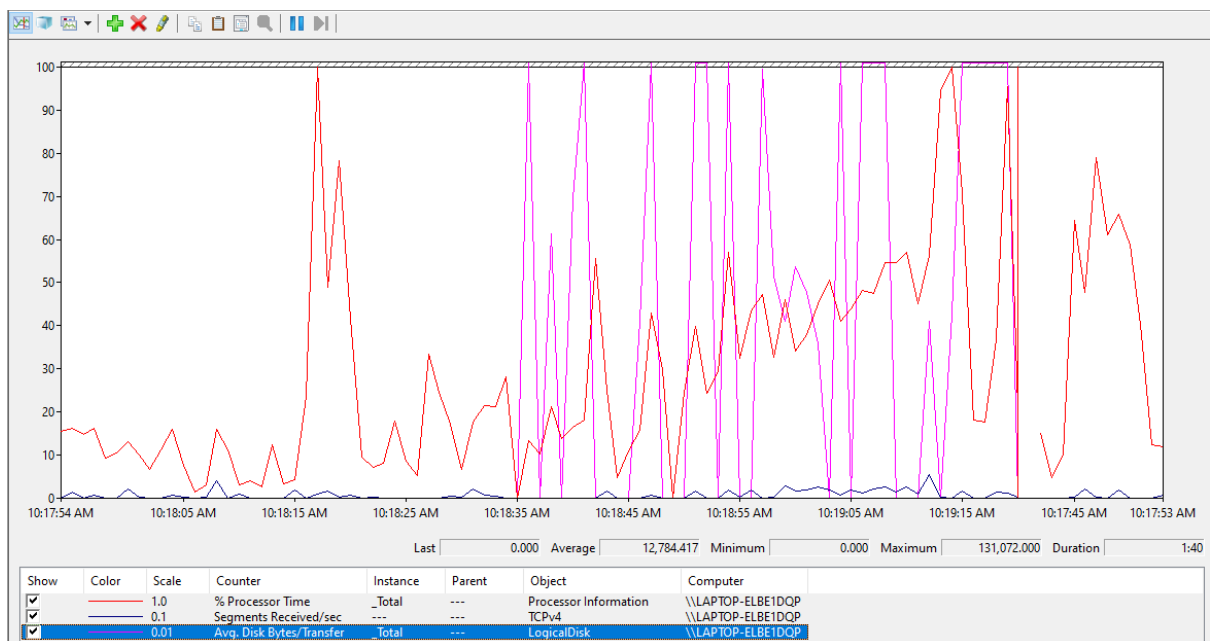
Fig 2. Change in colour of counter for TCPv4

The colour how now been changed to blue

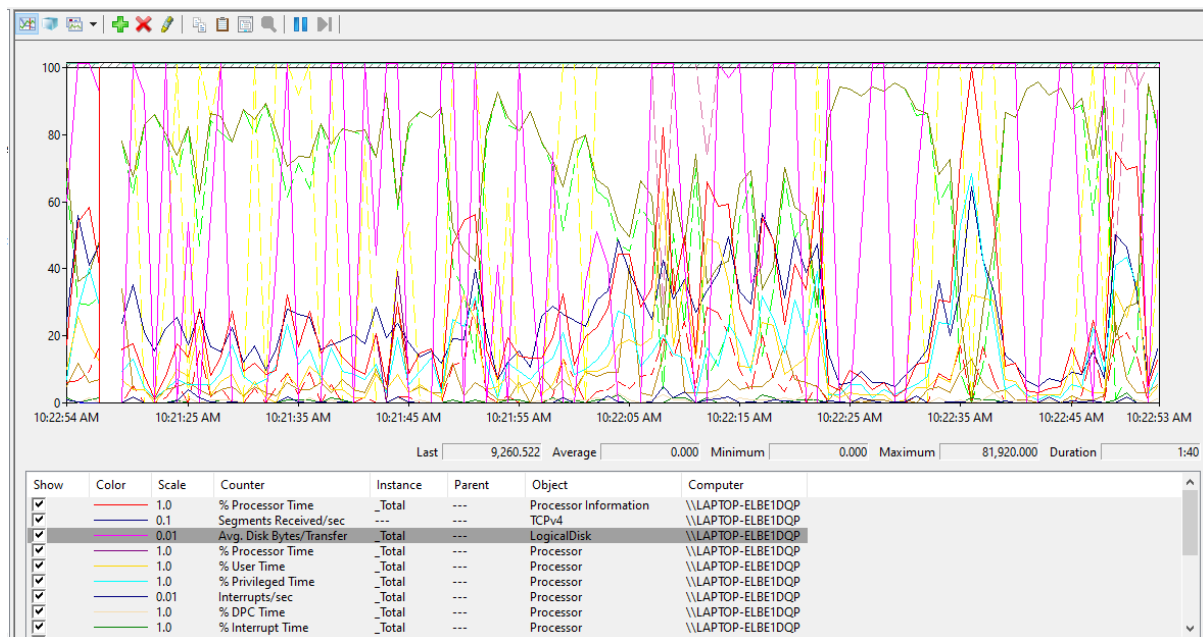


b. Disk Bytes/Transfer

The Disk Byte Transfer is displayed with the colour changed to pink



c. Processor



Adding all this additional information has made the graph unreadable. I would be removing numerous counters to ensure that the information was easily accessible.

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