Data Communications Laboratory
Switches, MAC addresses and ARP

Your Name:

Your Student ID:

Documentation Task 1.

State what features you can see on the switches (ports, power switches, etc) and what you know of their functions.

Features that I can see are:
Ethernet Ports: that allow for wired network connections using Ethernet cables
Gigabit SFP ports:
Power switches: Turns the switch on or off
USB ports: a mechanism used to connect peripheral devices to computers
Console ports:
Uplink ports
Patch Panel

Documentation Task 2.

What IP address has been assigned to each computer? What other IP address appear to be in use on this network?

What switch port is each computer connected to?

PO4 192.168.1.4 CONNECTED TO SWITCH PORT 3
PO5 192.168.1.5 CONNECTED TO SWITCH PORT 5
PO6 192.168.1.6 CONNECTED TO SWITCH PORT 1

Documentation Task 3.

Document what software you used to check whether your network was working and what the results were.

Software used was ping

```
C:\Users\Student>ping 192.168.1.6

Pinging 192.168.1.6 with 32 bytes of data:
Reply from 192.168.1.6: bytes=32 time=1ms TTL=128
Reply from 192.168.1.6: bytes=32 time=17ms TTL=128
Reply from 192.168.1.6: bytes=32 time=1ms TTL=128
Reply from 192.168.1.6: bytes=32 time=1ms TTL=128

Ping statistics for 192.168.1.6:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 17ms, Average = 5ms

C:\Users\Student>ping 192.168.1.5

Pinging 192.168.1.5 with 32 bytes of data:
Reply from 192.168.1.5: bytes=32 time=1ms TTL=128
Reply from 192.168.1.5: bytes=32 time<1ms TTL=128
Reply from 192.168.1.5: bytes=32 time<1ms TTL=128
Reply from 192.168.1.5: bytes=32 time=1ms TTL=128

Ping statistics for 192.168.1.5:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms
```

Documentation Task 4.

Include in your documentation what you consider to be the useful information from *ipconfig /all* for your PCs Ethernet connection. Consider the fact there are multiple interfaces on your PC and we are only interested in some of them.

Description: Name/model of the network adapter (helps identify the hardware in use).

Physical Address (MAC): Unique hardware ID

DHCP Enabled: Shows whether IP is assigned automatically or manually.

IPv4 Address: The actual IP address assigned to your PC

Subnet Mask: Defines the network portion of the IP.

Default Gateway: The router or device that forwards traffic out of your network.

DHCP Server: The router that assigned the IP address.

DNS Servers: IP addresses of servers your PC queries to resolve domain names

Documentation Task 5.

Let's have a look at the ARP table held by the laptops. Get a command window running (if you do not already have one). In the window type arp –a and press Enter.

What devices have an entry in the ARP table? Record this in your documentation.

Could you see the physical address of the other laptop(s) and the switch in your network? If not ping the other computer(s) and try arp –a again. Try all the IP addresses you found in use in your network. Are entries for them now in the table? Add the results to your documentation if necessary. Do any IP addresses share the same MAC address?

The devices that have an entry in the ARP tables is computer 5 (192.168.1.5) and computer 6 (192.168.1.6) .

We can get the physical MAC address of the other laptops

None of the ip addresses share the same MAC address

```
C:\Users\Student>arp -a

Interface: 192.168.1.4 --- 0x2
  Internet Address        Physical Address       Type
  192.168.1.5             08-00-27-5c-f8-04      dynamic
  192.168.1.6             08-00-27-15-4a-12      dynamic
  192.168.1.255           ff-ff-ff-ff-ff-ff      static
  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\Student>
```

Documentation Task 6.
1. Does the arp table now contain an entry for each IP you pinged?
2. What are the hexadecimal values for the source and destination addresses in the first Ethernet frame in your capture containing an ARP request message?
3. Can you identify the arp messages corresponding to the all the entries in the arp table? List the two MAC addresses found in each pair of messages
4. Compare hexadecimal source and destination addresses to the information given in the source and destination fields of the main Wireshark packet summary window. Are they different? If so, what is the information telling you?
5. What else can you observe about the functioning of ARP from this capture?

1)) Yes they do

2)) in packet number 20

20	33.510927	PcsCompu_15:4a:12	Broadcast	ARP	60 Who has 192.168.1.4? Tell 192.168.1.6
21	33.510943	PcsCompu_20:84:98	PcsCompu_15:4a:12	ARP	42 192.168.1.4 is at 08:00:27:20:84:98
22	33.512028	PcsCompu_15:4a:12	PcsCompu_20:84:98	0x0800	74 IPv4
23	33.512125	PcsCompu_20:84:98	PcsCompu_15:4a:12	0x0800	74 IPv4
24	34.076013	Cisco_46:d1:83	Spanning-tree-(for-…	STP	60 RST. Root = 32768/1/54:8a:ba:46:d1:80
25	34.539517	PcsCompu_15:4a:12	PcsCompu_20:84:98	0x0800	74 IPv4
26	34.539564	PcsCompu_20:84:98	PcsCompu_15:4a:12	0x0800	74 IPv4
27	35.261501	Cisco_46:d1:83	CDP/VTP/DTP/PAgP/UD…	DTP	60 Dynamic Trunk Protocol
28	35.552019	PcsCompu_15:4a:12	PcsCompu_20:84:98	0x0800	74 IPv4
29	35.552067	PcsCompu_20:84:98	PcsCompu_15:4a:12	0x0800	74 IPv4
30	36.079432	Cisco_46:d1:83	Spanning-tree-(for-…	STP	60 RST. Root = 32768/1/54:8a:ba:46:d1:80
31	36.568137	PcsCompu_15:4a:12	PcsCompu_20:84:98	0x0800	74 IPv4

```
> Frame 20: 60 bytes on wire (480 bits), 60 bytes captured (480 bits) on interface \Device\NPF_{036F5C0F-5937-4BB2-
✓ Ethernet II, Src: PcsCompu_15:4a:12 (08:00:27:15:4a:12), Dst: Broadcast (ff:ff:ff:ff:ff:ff)
    ✓ Destination: Broadcast (ff:ff:ff:ff:ff:ff)
         Address: Broadcast (ff:ff:ff:ff:ff:ff)
```

The source address is 08:00:27:15:4a:12
The destination address is ff:ff:ff:ff:ff:ff

3))
Yes I can

Packet number 128 states who has 192.168.1.5? Tell 192.168.1.4

```
Target MAC address: PcsCompu_5c:f8:04 (08:00:27:5c:f8:04)
    129 101.949840     PcsCompu_5c:f8:04     PcsCompu_20:84:98     ARP     60 192.168.1.5 is at
```

Packet number 71 states Who has 192.168.1.6? Tell 192.168.1.4

```
Target MAC address: PcsCompu_15:4a:12 (08:00:27:15:4a:12)
     72 87.964622     PcsCompu_15:4a:12     PcsCompu_20:84:98     ARP     60 192.168.1.6 is at
```

4)) When I am getting pinged I can't get the destination address, however when I ping I can get the destination address of the IP

```
Windows IP Configuration

   Host Name . . . . . . . . . . . . : DESKTOP-V5J1L07
   Primary Dns Suffix  . . . . . . . :
   Node Type . . . . . . . . . . . . : Hybrid
   IP Routing Enabled. . . . . . . . : No
   WINS Proxy Enabled. . . . . . . . : No

Ethernet adapter Ethernet 4:

   Connection-specific DNS Suffix  . :
   Description . . . . . . . . . . . : Intel(R) PRO/1000 MT Desktop Adapter #2
   Physical Address. . . . . . . . . : 08-00-27-20-84-98
   DHCP Enabled. . . . . . . . . . . : No
   Autoconfiguration Enabled . . . . : Yes
   Link-local IPv6 Address . . . . . : fe80::5814:6452:3412:1350%2(Preferred)
   IPv4 Address. . . . . . . . . . . : 192.168.1.4(Preferred)
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Default Gateway . . . . . . . . . :
   DHCPv6 IAID . . . . . . . . . . . : 235405351
   DHCPv6 Client DUID. . . . . . . . : 00-01-00-01-2F-AD-F6-60-08-00-27-E0-F9-D9
   DNS Servers . . . . . . . . . . . : fec0:0:0:ffff::1%1
                                       fec0:0:0:ffff::2%1
                                       fec0:0:0:ffff::3%1
   NetBIOS over Tcpip. . . . . . . . : Enabled
```

5) I see that the pcs I ask for also ask me for pcs mac

Documentation Task 7.

Record the interesting and useful information from using the ***show running-config*** command

- Last configuration date UTC Sat Jan 1 2000
- Host name is Thursday
- Model name of the switch 1 provision ws-cs2960x-24tf-1
- Crypto pki certificate chain TP-self-signed-3125203328, gave itself its own authentication certificate
- Shows all the 26 Internet interfaces
- Shows two 10 gigabit interfaces

Documentation Task 8.

Check that the entries in the switch's MAC table have the correct MAC addresses for your laptops and the correct port numbers (ie the ones you have plugged the cables into) and record your observations.

Note that the switch's MAC address table doesn't include IP numbers. Why do you think this is?

Documentation Task 9.

Notice anything interesting in the Wireshark capture or the Packet Tracer Simulation on the machine that wasn't involved in the ping?

How do you think the switch is filling its MAC table?