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Group : FDDP1

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Location (On/Off campus) when you did the experiment: Software Lab 2, Seat 15

LAB 1: UNDERSTANDING NETWORKING WITH INTERNET TECHNOLOGIES

EXERCISE 1A: COMMUNICATION ARCHITECTURES

Classify the following installed communication modules into their appropriate layers in the TCP/IP architecture(ie protocol stack in figure 1.1):

Internet Protocol (IP) : Network Layer
Network controller card
(eg. Realtek PCIe GBE Family Controller) : Data Link Layer

EXERCISE 1B: ADDRESSING

Classify the use of the following addresses into their appropriate layers in the TCP/IP architecture(protocol stack in figure 1.1):

Port number : Transport Layer
IP address : Network Layer
MAC address : Data Link Layer

EXERCISE 1C: PHYSICAL/MAC/ETHERNET ADDRESSES

Determine the MAC address of your PC:

MAC Address : 00-4E-01-BD-AC-8F
Manufacturer : Dell Inc.

EXERCISE 1D: IP ADDRESSES

NTU IP address range(**NOT** your PC IP address) : 155.69.0.0 - 155.69.255.255

Determine the special uses of the following IP addresses:

{ 127, <any> } : Local Loopback Address is used to let a system send a message to itself to make sure that TCP/IP stack is installed correctly on the machine. This allows for a reliable method of testing Ethernet.
{ 172.21, <any> } : IP Address Space for Private Network

EXERCISE 1E: DYNAMIC HOST CONFIGURATION PROTOCOL (DHCP)

Determine the following for your laboratory PC:

DHCP Enabled : Yes
DHCP Server : 155.69.3.8
IP Address : 172.21.151.141/21
Network/Subnet Mask : 255.255.248.0

What is your IP address(from Ipconfig) : 172.21.151.141
What is the reported IP address from website(try https://www.apnic.net/) : 155.69.175.9

Who is the owner of the IP address reported by the website? Nanyang Technological University

EXERCISE 1F: PORT NUMBERS

Determine the well-known ports for the following services:

TELNET : Port 23
Simple Mail Transfer Protocol (SMTP) : Port 25/587/2525/465
Domain Name Service (DNS) : Port 53
Hyper-Text Transfer Protocol (HTTP) : Port 80
Hyper-Text Transfer Protocol Secure (HTTPS) : Port 443

EXERCISE 1G: DOMAIN NAMES

How do you register/buy a domain name under .sg, e.g. myweb.per.sg?

1. Find a domain name register
2. Search for your domain name
3. Finalize your domain name choice
4. Choose a domain name suffix, such as .sg
5. Purchase the domain name
6. Add domain ip protection

EXERCISE 1H: DOMAIN NAMES/IP ADDRESSES TRANSLATION - DOMAIN NAME SYSTEM (DNS)

Determine the followings:

Local DNS servers for your laboratory PC : 155.69.3.8, 155.69.3.9

Authoritative DNS servers for ntu.edu.sg : DNSTEX.NTU.EDU.SG (155.69.254.5)
DNSTEX1.NTU.EDU.SG (155.69.254.230)

IP address of domain name www.ntu.edu.sg : 155.69.7.173

What is the command to show the entries in the DNS cache? ipconfig /displaydns
What is the command to clear the entries in the DNS cache? ipconfig /flushdns

EXERCISE 1J: PROPRIETARY MICROSOFT WINS

Determine the followings for your laboratory PC:

NetBIOS/Host name : swl2-r2-v015
Primary WINS server : 155.69.5.54
Secondary WINS server : 155.69.5.154

EXERCISE 1K: DEFAULT GATEWAY

IP address of default gateway : 172.21.151.254

EXERCISE 1L: IP ADDRESS/PHYSICAL ADDRESS TRANSLATION - ADDRESS RESOLUTION PROTOCOL (ARP)

Physical MAC address of default gateway : 00-08-e3-ff-fc-a0

EXERCISE 1M: NETWORK REACHABILITY - *PING* COMMAND

ping your neighbour's PC and run ***arp*** command again. Do you see your neighbour's PC listed? Why? Yes, when I ping my neighbour's PC, an ARP request is being generated and broadcasted all over the network to find the device having the destination IP address. When the device having the destination IP address receives the ARP request, it updates it's own ARP cache and generates an ARP reply containing it's own MAC address. My device will receive the ARP reply and update it's ARP cache. Thus, we can see my neighbour's PC listed.

Physical address of neighbour's PC : 00-4e-01-bd-ca-29

EXERCISE 1N: TRACE ROUTE - *TRACERT* COMMAND

How many routers are separating your laboratory PC and the local DNS servers (insert the output in your answer)? 3 Routers Separating in Total

```
1   <1 ms    <1ms   <1ms  172.21.151.254
2    1 ms    <1 ms  <1 ms  172.30.143.194
3    1 ms    <1 ms  <1 ms  172.30.2.189
4   <1 ms    <1 ms   <1 ms  ndc-dns-dhcp-01.ntu.edu.sg [155.69.3.8]
```

Run ***arp*** command again. Can you find the MAC address of the DNS servers? Why?

No, I am unable to find the MAC address of the DNS servers. When the tracert command is being run, the DNS servers are separated by 3 routers which seperates the PC. Thus, we are not able to see the MAC address of the DNS servers as the DNS servers are not within our local network. We will only be able to see the MAC addresses of the devices within our local network on the default gateway.