Student Name : _____Jden Goh_____

Group : _____SCS4_____

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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 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 laboratory PC:

MAC Address : A4-BB-6D-61-D7-7D
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> } : this range of IP addresses is called a loopback address. It allows a device to send and receive its own data packets, thus directing network traffic back to itself.
{ 172.21, <any> } : This range of IP address is reserved for use within private network, and are not routable over the public internet.

EXERCISE 1E: DYNAMIC HOST CONFIGURATION PROTOCOL (DHCP)

Determine the following for your laboratory PC:

DHCP Enabled : Yes
DHCP Server : 155.69.3.8
Network/Subnet Mask : 255.255.240.0

What is your IP address(from Ipconfig) : 10.96.178.56

What is the reported IP address from website (try https://whatismyipaddress.com/): 155.69.190.63

Who is the owner of the IP address reported by the website? : NTU

EXERCISE 1F: PORT NUMBERS

Determine the well-known ports for the following services:

TELNET	: 23
Simple Mail Transfer Protocol (SMTP)	: 25
Quote of the Day Protocol	: 17
Domain Name Service (DNS)	: 53
Hyper-Text Transfer Protocol (HTTP)	: 80

EXERCISE 1G: DOMAIN NAMES

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

1. Choose a domain name, and check the availability of the domain name using a domain name checker, such as https://www.sgnic.sg/

2. Choose a domain registrar to register the domain

3. Create your account and provide necessary personal particulars and pay for the registration fees

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 : 155.69.3.8

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	: hwl1-va10
Primary WINS server	: 155.69.5.154
Secondary WINS server	: 155.69.5.54

EXERCISE 1K: DEFAULT GATEWAY

IP address of default gateway : 10.96.191.254

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

Physical MAC address of default gateway : 00-00-0c-9f-f0-f0

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. Ping operation sends out a ping request to the PC, and the PC responded. This successful exchange of ping packets will update the ARP table on my PC to have the IP-to-mac address mapping of my neighbour's PC.

Physical address of neighbour's PC : a4-bb-6d-5f-c9-ee

EXERCISE 1N: TRACE ROUTE - *TRACERT* COMMAND

How many routers are separating your laboratory PC and the local DNS servers?

```
 1   <1 ms   <1 ms   <1 ms  10.96.191.253
 2   <1 ms   <1 ms   <1 ms  172.30.146.5
 3    1 ms   <1 ms   <1 ms  172.30.146.194
 4   <1 ms   <1 ms   <1 ms  172.30.2.189
 5   <1 ms   <1 ms   <1 ms  ntp.ntu.edu.sg [155.69.3.8]
```

There is a total of 4 intermediate routers.

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

No. Arp only show addresses on the same subnet, devices out of the subnet is only reachable through a gateway and not at MAC layer. Hence , the DNS server's MAC address will not appear and not saved to the ARP cache table.