Student Name : Toh Kok Soon

Group : SCSI

Date : 27/08/2025

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-D6-81
Manufacturer : DELL Inc

EXERCISE 1D: IP ADDRESSES

NTU IP address range (**NOT** your PC IP address) : 155.69.1.0 – 159.69.1.255

Determine the special uses of the following IP addresses:

{ 127, <any> } : Loopback address
{ 172.21, <any> } : Reserved for private medium to large-size networks such as universities and businesses

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) : 10.96.183.213
What is the reported IP address from website (try https://whatismyipaddress.com/) : 155.69.197.24

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	: 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 licensed registrar
2) Check domain availability
3) Prepare documents such as NRIC
4) Register domain
5) Configure the domain

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

Determine the followings:

Local DNS servers for your laboratory PC	:	155.69.3.7 155.69.3.8 155.69.3.9
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	:	104.16.4.14

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	:	hw1-r1-v28
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?

Physical address of neighbour's PC : a4-bb-6d-5f-ca-df

My PC needs the mac address of my neighbours PC to send a packet and test the response and since it's in the same LAN, the devices were able to directly talk to one another

EXERCISE 1N: TRACE ROUTE - *TRACERT* COMMAND

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

```
C:\Users\tohk0042>tracert 155.69.3.7

Tracing route to dns-sdc-02.ntu.edu.sg [155.69.3.7]
over a maximum of 30 hops:

  1    <1 ms    <1 ms    <1 ms  10.96.191.252
  2    <1 ms    <1 ms    <1 ms  172.30.146.194
  3    <1 ms    <1 ms    <1 ms  172.30.2.189
  4    <1 ms     1 ms     1 ms  dns-sdc-02.ntu.edu.sg [155.69.3.7]

Trace complete.
```

3 routers (10.96.191.252 [Default Gateway] -> 172.30.146.194 -> 172.30.2.189 -> 155.69.3.9 [local DNS server])

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

No because there are multiple routers in between the local DNS server and the PC, the PC does not directly connect to the local DNS server, the ARP command on the lab PC only knows the MAC address of the next router in the chain. The packet sent is then handled by the routers down the chain until it reaches the destination.