Student Name : Lee Juin

Group : A52

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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) : **Physical Layer** **&** **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-CB-17**

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> } : **Loopback addresses**

{ 172.21, <any> } : **Used in private network. IP address assigned by**

**entreprise organization to an internal host which is unreachable from the 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 : **255.255.248.0**

What is your IP address (from Ipconfig) : **172.21.144.254**

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

**155.69.176.9**

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. **Check the availability of the domain name intented to register by visiting** [**www.sgnic.sg**](http://www.sgnic.sg) **to enquire whether the domain name is already existing.**
2. **If the domain name is available, visit any one of the accredited registrars under SGNIC to register for the domain name. The list of accredited registrars is in this link:** [**https://www.sgnic.sg/domain-registration/list-of-registrars**](https://www.sgnic.sg/domain-registration/list-of-registrars)
3. **Payment to be made to the registrar directly.**

**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 : **13.107.238.59**

IP address of domain name 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 : **hwl1-va13**

Primary WINS server : **155.69.5.154**

Secondary WINS server : **155.69.5.54**

**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. Both lab PCs are on the same subnet. When a ping request to the second lab PC is made, first lab PC checks whether the destination IP is on the same network. If it is, the first lab PC will consult the ARP table to check whether the destination IP’s MAC address is already located in the table. If not, the first lab PC will broadcast an ARP request, by which the second lab PC will respond to with its MAC address. The first lab PC will then store the MAC address of the second lab PC into the ARP table.**

Physical address of neighbour's PC : **a4-bb-6d-5f-c3-b9**

**Exercise 1N: TRACE ROUTE - *TRACERT* COMMAND**

How many routers are separating your laboratory PC and the local DNS servers? **2**

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

**No. ARP entries are only for addresses on the same subnet. The DNS server is only reachable by gateway and not directly via MAC address as DNS servers are on different subnets. So, the computer will not attempt to resolve the addressing using ARP. Hence, it does not appear in the ARP table.**