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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 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 : 30-D0-42-E9-16-62

Manufacturer : Dell Inc.

EXERCISE 1D: IP ADDRESSES

NTU IP address range (NOT your PC IP address) : { 155.69, <any> }

Determine the special uses of the following IP addresses:

{ 127, <any> } :

The IP address of the local computer (ie. localhost). This IP address allows the machine to connect to and communicate with itself. Therefore, localhost is used to establish an IP connection to the same device used by the end-user.

It is also called as the Internal host loopback address. It should never appear outside a host.

{ 172.21, <any> } :

Private Internal Network

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) : 172.21.144.33 (
 What is the reported IP address from website (try <https://whatismyipaddress.com/>):
 155.69.175.9

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?

SGNIC is committed to providing Internet registry and information services of the Internet Domain Name System (DNS) infrastructure in Singapore and to foster the integrity and growth of .SG domain names.

In order to register a domain name under .sg, one can register through SGNIC under the Domain Registration section. The one who are registering need to have a Singapore address and provide Singpass or NIRC to any of the registrars accredited by SGNIC. Next, he can check if the domain is available, if yes, he can proceed to purchase and register it.

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 (ntp.ntu.edu.sg) & 155.69.3.9 (dns-sdc-01.ntu.edu.sg)

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 : hwl3-vb010
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, when I ping my neighbour's IP address 172.21.146.172, ARP request is performed and the mapping of physical address is saved into the ARP cahce table.

Physical address of neighbour's PC : 30-d0-42-e9-15-24

EXERCISE 1N: TRACE ROUTE - TRACERT COMMAND

How many routers are separating your laboratory PC and the local DNS servers?
3 routers (172.21.151.254, 172.30.143.194 and 172.30.2.189) are separating 155.69.3.8 (ntp.ntu.edu.sg) or 155.69.3.9 (dns-sdc-01.ntu.edu.sg).

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

No, No ARP Entries Found. The devices that is outside of the local subnet are only reachable through a gateway, but not directly at the MAC layer. Therefore, MAC address us not saved into the ARP Cache Table.