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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 : Transort lLayer
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-E9-15-B7
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> } : the loopback address range, which is used for communication within the same device.
{ 172.21, <any> } : private address range that is used for internal communication within a network. Private IP addresses are not routed on the internet and are used to conserve the number of public IP addresses.

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) : 172.21.144.239
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 desired domain name using a domain name checker on the official website of the Singapore Network Information Centre (SGNIC), http://www.sgnic.sg/
2. Choose a domain name registrar that is accredited by SGNIC. In this case, myweb.per.sg
3. Provide the necessary personal and contact information and pay the registration fee.
4. Wait for the registrar to process the registration, which can take up to 2 business day

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

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-vb008
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 (using command arp -a)

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?

because the ping operation caused a request to be sent to my neighbor's PC, and the ARP cache was updated with the IP-to-MAC mapping for that device.

Physical address of neighbour's PC : **30-d0-42-e9-15-7a**

EXERCISE 1N: TRACE ROUTE - *TRACERT* COMMAND

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

1 <1ms <1ms <1ms 172.21.151.254
2 <1ms <1ms <1ms 172.30.143.194
3 1ms <1ms <1ms 172.30.2.189
4 <1ms <1ms <1ms ndc-dns-dhcp-01.ntu.edu.sg [155.69.3.8]
So, 4 intermediate routers. As the packets travel from my laboratory PC to the first hop (172.21.151.254), then to the second hop (172.30.143.194), then to the third hop (172.30.2.189), and finally to the local DNS servers (ndc-dns-dhcp-01.ntu.edu.sg, IP address 155.69.3.8).

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

No I cannot, because my DNS server is not directly connected to my device, the arp -a command only provides information about the devices that are directly connected to my device.