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Date : 31 January 2023

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-CC-F6
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> } : An IP address that is assigned by an enterprise organization to an internal host. These IP addresses are used in private networks, which are not available, or reachable, from the Internet.
{ 172.21, <any> } : Private Internet Connection - IP addresses in the private space are not assigned to any specific organization, including your ISP (Internet Service Provider), and everyone is allowed to use these IP addresses. However, IP packets addressed from a private range cannot be sent through the public Internet.

EXERCISE 1E: DYNAMIC HOST CONFIGURATION PROTOCOL (DHCP)

Determine the following for your laboratory PC:

DHCP Enabled : Yes
DHCP Server : 155.69.3.9
Network/Subnet Mask : 255.255.248.0

What is your IP address(from Ipconfig) : 172.21.145.58
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 (default), 465 (deprecated), 587 (modern)
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? You can register your '.sg' domain name with any of the registrars accredited by SGNIC by paying them. You will need to choose a Second Level Domain (SLD). Which can be the organization name, and a Third Level Domain (TLD), which in this case is '.sg'. The combination SLD + TLD should be unique.

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 : 155.69.254.5, 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-vb17
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. I see my neighbor's PC listed and it an be reached from my computer because we are in the same sub-network. The network is a hierarchial structure and we can reach the networks in the same sub-net directly.

Physical address of neighbour's PC : a4-bb-6d-5f-c3-c0

EXERCISE 1N: TRACE ROUTE - *TRACERT* COMMAND

How many routers are separating your laboratory PC and the local DNS servers? 4 hops each for 155.69.3.8 and 155.69.3.9

Run ***arp*** command again. Can you find the MAC address of the DNS servers? Why? No. I cannot find the MAC address of the DNS servers since they are not in the same sub-net as my PC. It takes 4 hops to reach the DNS servers from my PC, meaning they are not directly connected to the same sub-net, and that is why we cannot see them using the arp command.