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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  
IP address : Network  
MAC address : Data Link

### **EXERCISE 1C: PHYSICAL/MAC/ETHERNET ADDRESSES**

Determine the MAC address of your laboratory PC:

MAC Address : 00:4E:01:BD:C0:D7  
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> } : localhost  
{ 172.21, <any> } : private ip address

### **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) : 172.21.149.77

What is the reported IP address from website (try <https://whatismyipaddress.com/>) : 155.69.179.9

Who is the owner of the IP address reported by the website? AS9419 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?  
Find a domain name registrar which sells .sg as .sg is local TLD and might not available at all registrars. The registrar should be accredited by SGNIC. We can register and buy such a domain name from the registrar.

### **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 : 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 : swl2-r2-v011  
Primary WINS server : 155.69.5.54  
Secondary WINS server : 155.69.5.154

### **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. The ping with the neighbour's PC got a positive reachability result. Once it was reached by ping, the neighbour's address got recorded and cached.

Physical address of neighbour's PC : 00:4E:01:BD:B0:76

### **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 (default gateway), 172.30.143.194 and 172.30.2.189

Run **arp** command again. Can you find the MAC address of the DNS servers? Why?  
No, no ARP entries are found. This is because the DNS servers are separated by many (3) routers and they outside of the network.