Internet Protocol

Exercise 1: What is the difference between IP and "The Internet"? Does a network using IP have to be on the Internet? Does someone using the Internet have to use IP?

- IP is a protocal
- "The Internet" is a network
- you can have private n/w using IP
- to use Internet. you must use IP

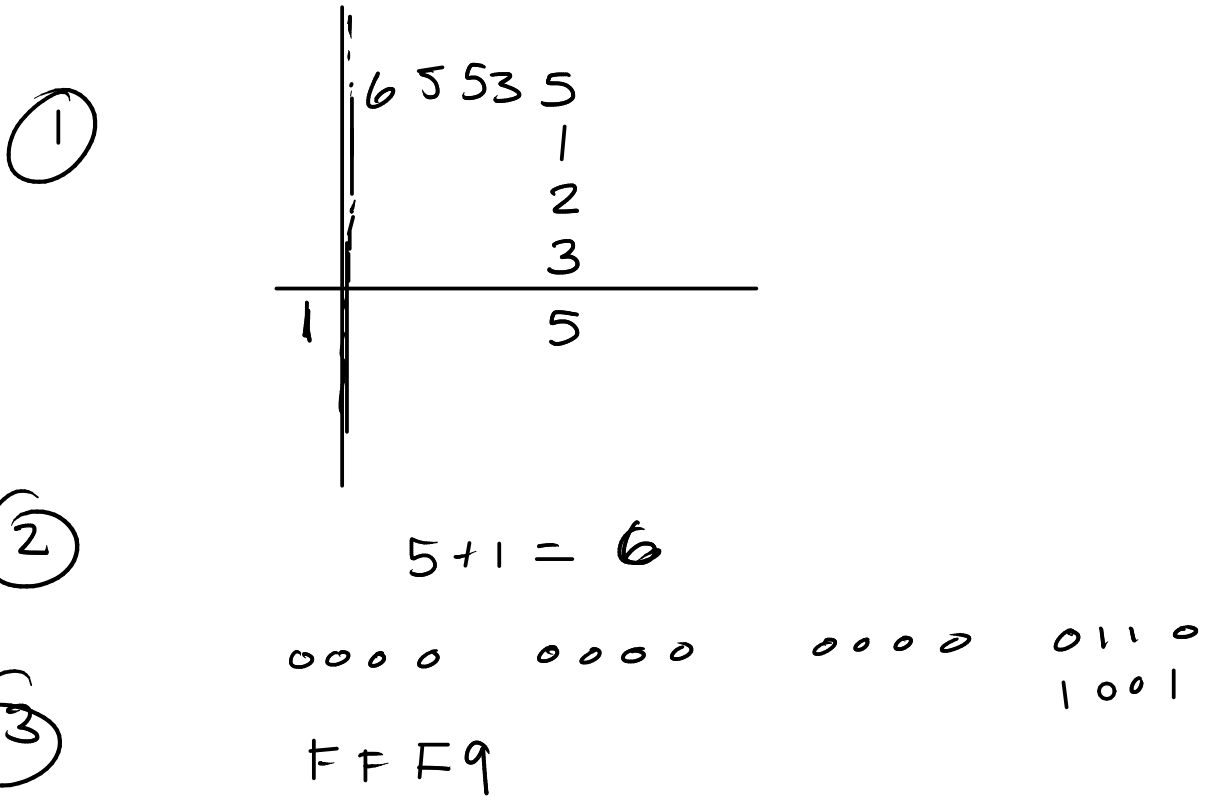
Exercise 2: What is the value of the first byte of an IP packet that uses the shortest possible header? If first byte is 0x46, what is the length of the Options field in bytes?

IPv4

4 5
↗ ↑
IPv4 5 X 32 bit words = 20 bytes.

4 6
↑ 6-5 = 1 options word = 4 bytes.

Exercise 3: A protocol header contains four 16-bit fields with decimal values 65535, 1, 2, and 3 that are to included in an IPv4 checksum. What is the value of the header checksum?



Exercise 4: What is the netmask in binary for a /24 network? What is it in decimal? How can the netmask be used to determine if one IP address is on the same network as another? Is the address 192.168.2.200 in the 192.168.2.0/25 network?

/24 = 11111111 11111111 11111111 00000000

255 . 255 . 255 . 0

1) AND IP address w/ netmask

2) Compare to network address

192.168.2.200

192.168.2.0 /25

& & & 0

255.255.255.128

Not in S

AND: 192.168.2.1

not same as 192.168.2.0

Exercise 5: Who "owns" the 24.80.0.0/13 network?

You searched for: **24.80.0.0/13**

Networks	
SHAW-COMM (NET-24-80-0-0-1)	24.80.0.0 - 24.87.255.255
NET24 (NET-24-0-0-0-0)	24.0.0.0 - 24.255.255.255

Exercise 6: Does the header checksum change each time a packet is forwarded? Why?

Yes. TTL field is decremented (maybe also fragmented).

Exercise 7: For the routing table above, what port ("Interface") would be used by packets with the following destination IP addresses: 127.0.0.255? 192.168.1.1? 192.168.2.1? 204.191.10.32?

client — server

host — router

IP

router:

Destination	Gateway	Subnet Mask	Metric	Interface
192.168.1.0	*	255.255.255.0	0	br0 (LAN)
204.191.0.0	*	255.255.0.0	0	vlan1 (WAN)
127.0.0.0	*	255.0.0.0	0	lo
default	204.191.1.1	0.0.0.0	0	vlan1 (WAN)

127.0.0.255 → lo (loopback) port

192.168.1.1 → br0 port

192.168.2.1 → vlan1 port (default)

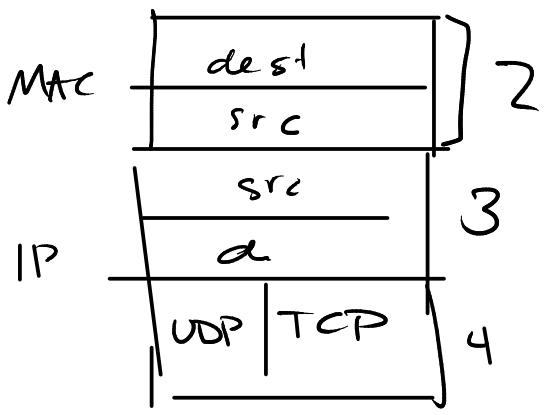
204.191.10.32 → vlan1 port

Layer

Exercise 8: What pairs of values are stored in an ARP cache? What addresses from a received packet need to be examined to validate an ARP cache entry?

→ IP address + Ethernet address

src IP address } validate/refresh
src MAC address } ARP cache

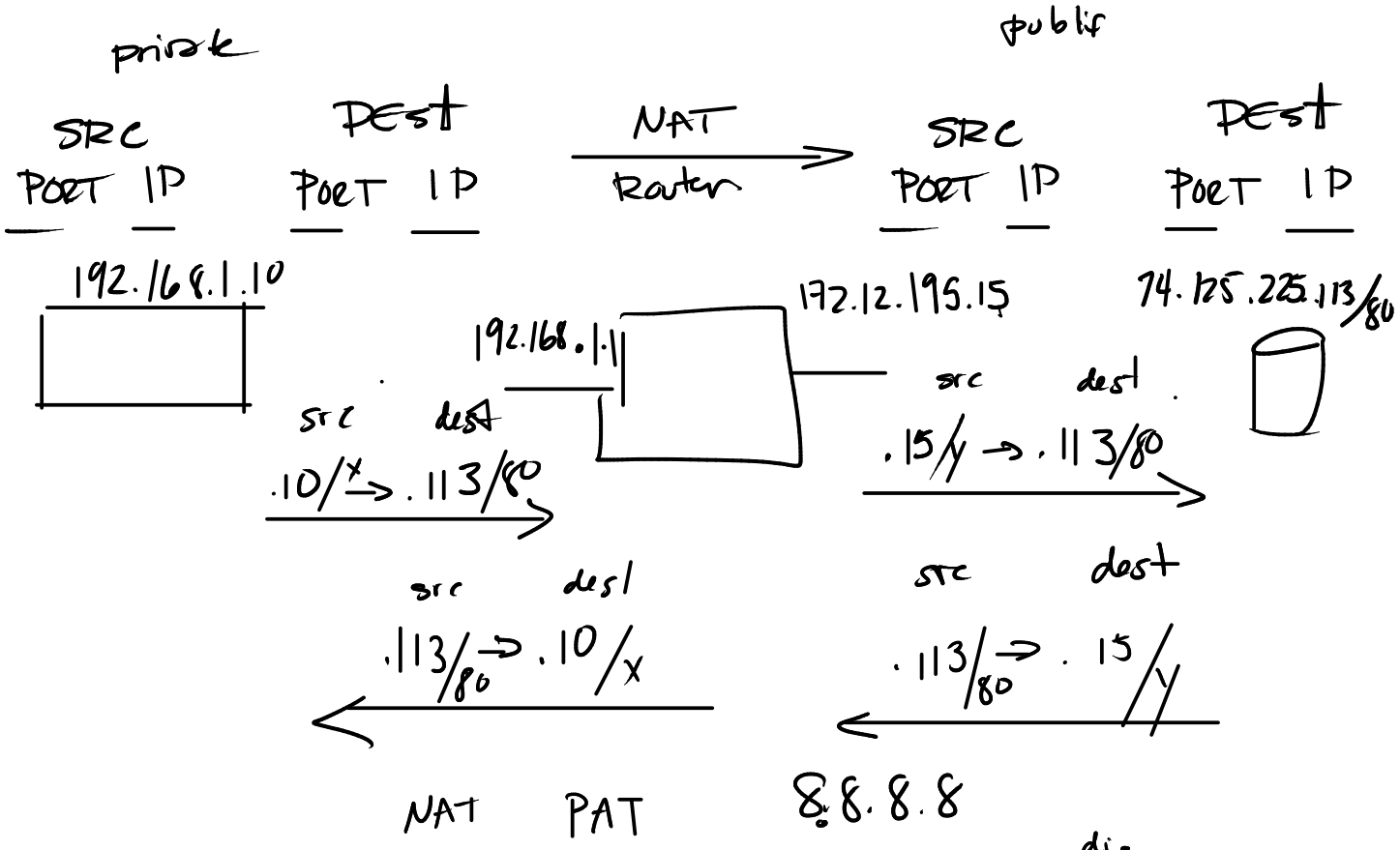


Exercise 9: When a host boots up, what must it send out first, an ARP request or a DHCP request?

ARP → IP → MAC

DHCP → our IP, netmask, g/w, DNS server.

Exercise 10: A host with a (private) address 192.168.1.10 is behind a NAT router with an (public) address of 172.12.192.15. The host sends a packet to a host at address 74.125.225.113 requesting a web page. Show the source/destination address pairs of the request and response packets on the private and public sides of the router.



- dig
- nslookup.

Exercise 11: Can a host's DNS server be configured using a host name? Why or why not? Assuming a host has an empty DNS cache, what queries would it generate to look up the IP address of the host mx.bcit.ca?

- DNS Server must be cfg'ed as IP address since no DNS server available yet.

type	sent to	asking for
NS	.	.ca
NS	.ca	.bcit.ca
NS	.bcit.ca	mx.bcit.ca
A	ns.bcit.ca	address →