**Nicholas Shari - CSE422 - Worksheet 11**

1. Do routers have IP addresses? If so, how many? Yes. 1 IP Address for each interface

2. Suppose an application generates chunks of 40 bytes of data every 20 msec, and each chunk gets encapsulated in a TCP segment and then an IP datagram. What percentage of each datagram will be overhead, and what percentage will be application data?

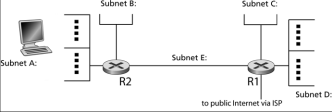
Header IP Data

| 20 | 20 | 40 |
| --- | --- | --- |

25% 25% 50%

\*\*\*See Chapter 4 - Slide 31

3. Consider the network shown below. Each of the subnets A-D contains at most 30 hosts; subnet E connects routers R1 and R2.

a. Assign network addresses to the five subnets shown above (that is, write the addresses you have assigned). Subnets/Hosts:

A: x.y.z..000/27 000/00000 x.y.z.0/27

B: x.y.z.001/27 -> 32 001/00000 x.y.z.32/27

C: x.y.z.010/27 ->64 010/00000 x.y.z.64/27

D: x.y.z.011/27 ->96 011/00000 x.y.z.96/27

E: x.y.z.100/27 ->128 100/00000 x.y.z.128/27

Reasoning:

1. 3 bits needed for subnet

b. Suppose that there are 17 hosts in A–D. Does your answer to Question a) change? If so why or why not?

No Change. Hosts are less than the current setup for 30 hosts.

c. What is the network prefix advertised by router R1 to the public Internet?

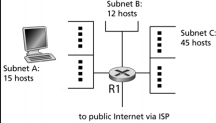
x.y.z..000/24

Why 24? The subnet mask is 24 bits longs.

4. IP addressing.

a. Consider an Internet address of the form 129.19.40.0/23. What does the /23 signify?

/23 is the subnet mask.



b. Consider the network shown above, consisting of a single router, R1, with three subnets A, B and C, with 15, 12, and 45 hosts respectively on these subnets. Assign an address range to the hosts in subnets A, B, and C so that only a single aggregated address needs to be advertised by R1 to the public Internet, and that the size of the advertised aggregated address range is minimized. In a sentence or two, explain how you arrived at your answer.

A = 15 4 bits

B = 12 4 bits

C = 45 6 bits

Set A = x.y.z.100 0000

Set B = x.y.z.100 0000

A = 0 or B = 1

x.y.z.128/25

If x.y.z.10**1** 0000

Then it is C.

Only the 7 bits are address range. x.y.z.128/25

6 bits for address, 2 for host. 8 bits total

5. Consider the scenario shown in the figure on Slide 55. Suppose that host 10.0.0.2 initiates a connection, using source port 5500 to a Web server listening at port 80 at 128.119.40.186.

a. Complete the NAT translation table for this TCP connection.

b. What are the source and destination IP addresses and port numbers on the IP datagram arriving to the WAN side of the router with interface address 138.76.29.7?

NAT Translation Table

| WAN Side addr | LAN side addr |
| --- | --- |
|  |  |
| 138.76.29.7, 5002 | 10.0.0.2, 5500 |
|  |  |

b.

Source: 128.119.40.186, 80

Destination 138.76.29.7 port 5002

6. How does the router at the destination end of a tunnel know that the IPv4 datagram contains an IPv6 datagram that it should extract from the IPv4 packet?

Since the ipv4 is addressed to the router at the destination of the end of tunnel

The datagram has an upper layer protocol of ipv4. (In the header)

This tells the router to handle is as IPv6 since there is an IPv6 datagram encapsulated in the IPv4 datagram.

7. Name three header fields in an IP datagram that can be “matched” in Open-Flow 1.0 generalized forwarding. What are three IP datagram header fields that *cannot* be “matched” in OpenFlow?

**Three Header Fields:**

1. IP Source Address
2. IP Destination Address
3. IP Protocol

**Three Datagrams Header Fields that cannot be matched:**

1. TTL (Time to Leave)
2. Fragmentation
3. Segmentation
4. Checksum
5. Offset
6. Datagram Length