

# COMP2190 – Semester 1 2020/2021

## Tutorial 5

### Problems

1. Consider a datagram network using 32-bit host addresses. Suppose a router has four links, numbered 0 through 3, and packets are to be forwarded to the link interfaces as follows:

Destination Address Range	Link Interface
11100000 00000000 00000000 00000000 through 11100000 00111111 11111111 11111111	0
11100000 01000000 00000000 00000000 through 11100000 01000000 11111111 11111111	1
11100000 01000001 00000000 00000000 through 11100001 01111111 11111111 11111111	2
otherwise	3

- a. Provide a forwarding table that has five entries, uses longest prefix matching, and forwards packets to the correct link interfaces.
- b. Describe how your forwarding table determines the appropriate link interface for datagrams with destination addresses:

11001000 10010001 01010001 01010101  
11100001 01000000 11000011 00111100  
11100001 10000000 00010001 01110111

2. Consider the network shown in Fig. 1. Suppose that the addresses for the home network come from the 192.168.1.0/24 block.

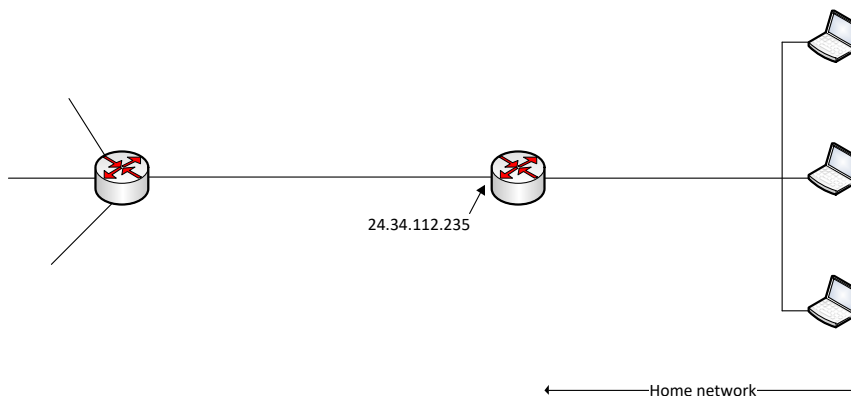


Figure 1: Network for NAT problem

- a. Assign addresses to all interfaces in the home network.
  - b. Suppose each host has two ongoing TCP connections, all to port 80 at host 128.119.40.86. Provide the six corresponding entries in the NAT translation table.
3. Consider the topology shown in Fig. 2. Denote the subnets without hosts as networks A, B, and C.

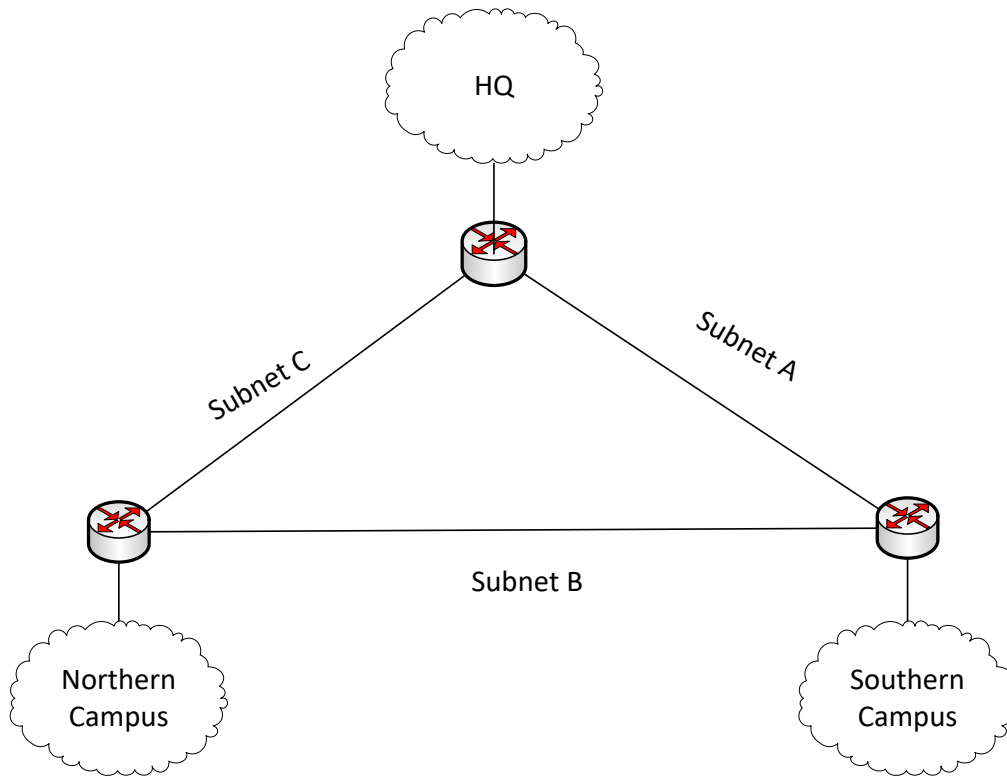


Figure 2: Network Topology for P3

- a. Assign network addresses to each of these six subnets, with the following constraints: All addresses must be allocated from 214.97.252.0/22; the headquarters should have enough addresses to support 120 interfaces; and the southern campus should have enough addresses to support 250 interfaces; and the northern campus should have enough addresses to support 120 interfaces. Of course, subnets A, B, and C should each be able to support two interfaces. For each subnet, the assignment should take the form a.b.c.d/x.
  - b. Using the answer to part (a) provide the forwarding tables (using longest prefix matching for each of the three routers).
4. Consider sending a 2400-byte datagram into a link that has an MTU of 700 bytes. Suppose the original datagram is stamped with the identification number 422. How many fragments are generated? What are the values in the various fields in the IP datagram(s) generated related to fragmentation?

## Acknowledgment

All problems on this tutorial sheet come from “Computer Networking: A Top-Down Approach,” 6/E by J. F. Kurose and K. W. Ross