HW I – CS 6390 , Spring 2012

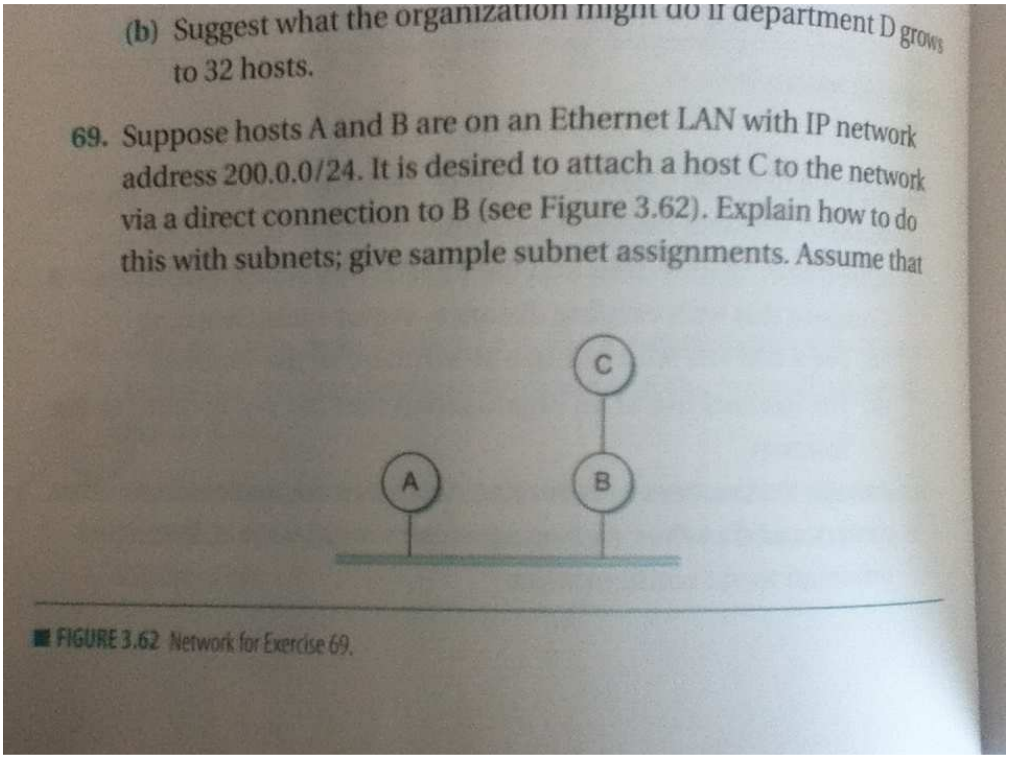
Seven questions, all count equally.

Question 1

What is the maximum bandwidth at which an IP host can send 576-byte packets without having the Ident field wrap around within 60 seconds? Suppose that IP‘s maximum segment lifetime (MSL) is sixty seconds; that is, delayed packets can arrive up to 60 seconds late but not later. What might happen if this bandwidth were exceeded?

Question 2

Exercise 70 in Chapter 3 of the book (which in turn depends on the figure of exercise 69). I attached pictures below of both exercises in case you don’t have the book



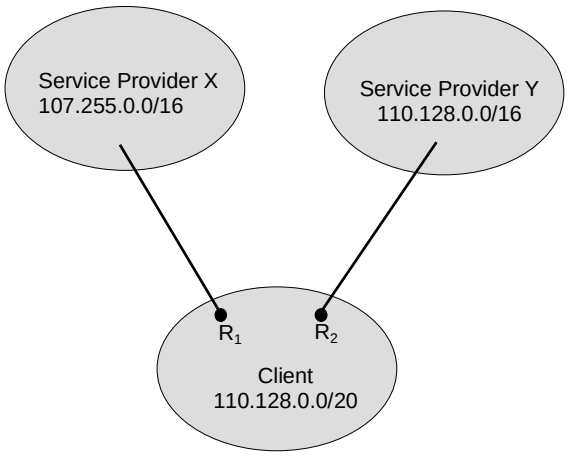
an additional network prefix is not available. What does this do to the size of the Ethernet LAN?

70. An alternative method for connecting host C in Exercise 69 is to use *proxy ARP* and routing: B agrees to route traffic to and from C and also answers ARP queries for C received over the Ethernet.
    (a) Give all packets sent, with physical addresses, as A uses ARP to locate and then send one packet to C.
    (b) Give B's routing table. What peculiarity must it contain?

71. Suppose two subnets share the same physical LAN; hosts on each subnet will see the other subnet's broadcast packets.
    (a) How will DHCP fare if two servers, one for each subnet, coexist on the shared LAN? What problems might [*do!*] arise?
    (b) Will ARP be affected by such sharing?

72. Table 3.20 is a routing table using CIDR. Address bytes are in

Question 3 (Inter-domain routing)



Consider the figure above. It contains two Internet service providers (X and Y) and a client. Thus, the client is ``multi-homed''.

(a) Assume that both routers R_1 and R_2 speak BGP, but no other router within the client speaks BGP.

i. What can the system administrators in the client do so that, with minimum human intervention (i.e. manual configuration of routers), traffic whose destination is outside of the client is sent along the path of R_1 and R_2?

ii. Which routers within the client will forward their IP traffic towards R_1, and which to R_2?

(b) Assume that within the service providers, only the border routers speak BGP. How will the other routers (that do not speak BGP) within the service provider learn how to forward IP traffic to the client's network?

(c) Assume that service provider Y is not aware that X also provides service to the client, and assume that Y wants to minimize the size of the routing tables in the core of the Internet. What routing information will Y advertise to its neighboring autonomous systems? Briefly explain why.

(d) In the case of (c) above, under what conditions will all the traffic from the Internet to the client follow the path via X? Briefly explain why.

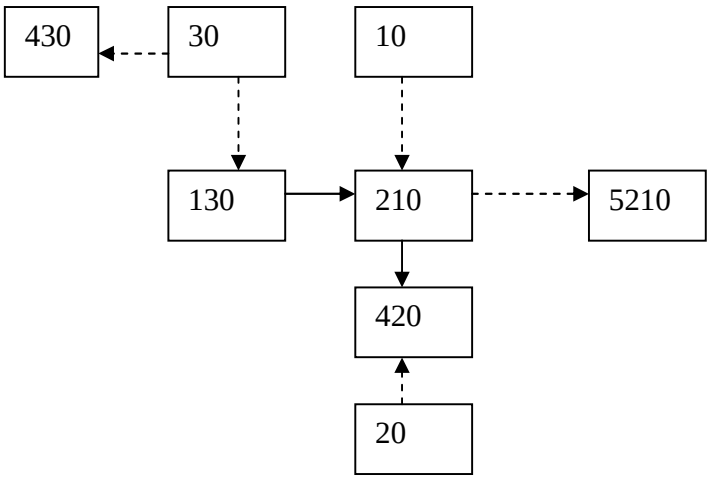
Question 4

Consider CIDR. Assume that routing domains (i.e. ASms) advertise address blocks (i.e. network numbers in CIDR) even though a subset of the addresses contained in the address block is not contained within the routing domain.

Show me a scenario in which packets are routed to the wrong domain because of this.

Question 5

Consider the dispute graph below:



Reverse-engineer the SPP instance that generated this dispute graph, i.e., see how much of the original SPP instance can be inferred from the above dispute graph. Argue how each component of your SPP instance

Question 6

In the proof that the absence of a dispute wheel implies the existence of a solution, we did not prove that each step in the construction of the spanning tree results in a sub-instance of the original SPP that has a solution (in particular, the solution is the partially built spanning tree). PROVE that indeed this subinstance has the partially built spanning tree as a solution at every step of the construction.

Question 7

In the hierarchical BGP approach (service providers, Guideline A, etc), show me an SPP instance that diverges, even though it satisfies guideline A, and satisfies the export policies, but however its provider-customer graph is not acyclic.