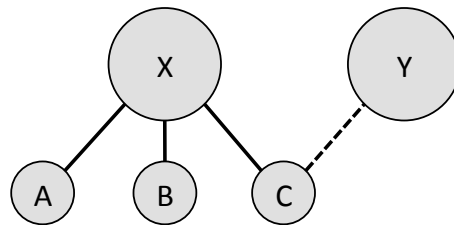


Homework 2

Due: October 17th, 2014, 11:59pm

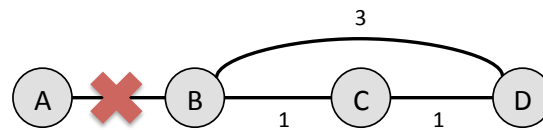
Question 1 - IP Prefixes



X, Y, A, B, C are ASes, with X and Y being transit ASes providing service to the others. X has allocated to it 143.112/16, and Y has allocated to it 222.10.192/18. Initially, the link YC does not exist. Assume that there are other client ASes connected to X and Y occupying the rest of their IP ranges.

- X allocates the first 1/8th of its address space to A, the second 1/8th of its address space to B, and the second 1/4th of its address space to C. What are the address ranges of A, B, and C, in CIDR notation?
- Assume that the ASes aggregate their prefixes as much as they can in their BGP announcements. Assuming that the link YC does not exist, what prefixe(s) does X announce?
- If we add the link YC, making C multi-homed, what prefixe(s) does X announce? What prefixe(s) does Y announce?
- Now if C removes the link XC, but keeps the same prefix as before, what prefixe(s) do X and Y announce? Why is it undesirable that IP address allocation be decoupled from the network topology?

Question 2 - Distance Vector Routing



Suppose A, B, and C are running a distance vector protocol, and the numbers denote the link costs. Let us consider only the routes to A, and that the routes have converged. A hunter then comes and shoots down the link between A and B¹ Use the syntax [$\langle \text{dest} \rangle, \langle \text{cost} \rangle, \langle \text{next hop} \rangle$] for update messages. (E.g., B receives msg [A, 2, C])

- List a sequence of updates that would cause a routing loop to be formed involving B, C, D. When would the loop be broken?
- Describe if and how (a) poison reverse, (b) path vector, and (c) DSDV would each prevent the loop from happening.
- What happens to an IP packet sent from a node connected to router D, destined to A, while the loop is in effect?

Question 3 - IP Forwarding

- List two disadvantages of IP fragmentation.
- Explain how MTU discovery works.
- What fields of an IP packet header can change during forwarding? (Ignore options, TOS, and NAT)

¹http://www.itnews.com.au/News/232831_us-hunters-shoot-down-google-fibre.aspx