

Homework 2: IP

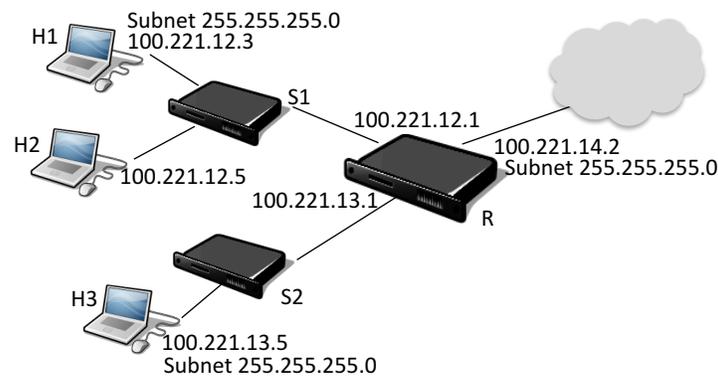
Due: 11:59 PM, Oct 20, 2016

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1 IP Forwarding

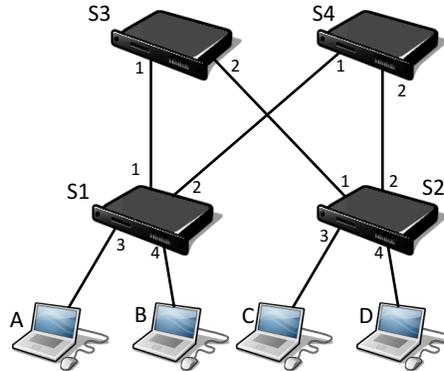
Consider this diagram and answer the following questions:



1. Why does the router R have three IP addresses?
2. If H2 has only one entry in its routing table, what is the prefix and the IP of the next hop for this entry?
3. When a packet is sent from H2 to H3 (assume H2 knows H3's IP address), what is the layer 2 MAC address put in the frame sent by H2? (You can say 'the MAC address of interface X on Y')
4. How does H2 obtain this MAC address? (What protocol does it use, and what is the argument in the protocol message sent by H2?)
5. When a packet is sent from H2 to H1 (assume H2 knows H1's IP address), what is the layer 2 MAC address in the frame sent by H2? Why?
6. If you configure H1's network mask to be 255.255.254.0, does this change the set of nodes it can reach? Why or why not?

2 Spanning Tree

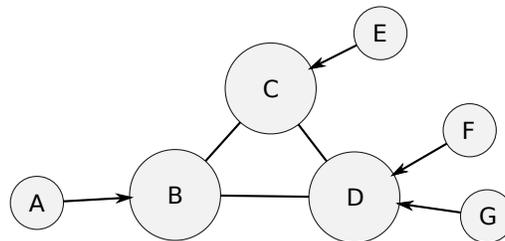
Consider the following network:



1. If this is a standard Ethernet network, why do we need the Spanning Tree Protocol on this topology?
2. What is the final state of the network once the STP converges? (For each switch port, mention whether it is in one of the three states: root port, designated port, or discarding port). Assume that ties are broken based on the numeric switch id.

3 BGP

In the figure below, the circles represent ASes, arrows point from customer to providers, and lines connect peer ASes. Assume that the ASes follow the Gao-Rexford model.



1. List all AS-level announcements that B receives to reach G. Is the set of announcements different from the set of all possible paths? Why?
2. If B and D decide to not peer anymore, A will stop being able to talk to G and F. Why?
3. What changes would B and D have to do to the way they relate to other ASes (assuming they still don't want to talk to each other), so that the broken routes get re-established? (hint: this will involve money). Why?
4. List two problems that could arise if BGP were to use a distance vector protocol instead of a path vector protocol.

Please let us know if you find any mistakes, inconsistencies, or confusing language in this or any other CS168 document by filling out the anonymous feedback form:

<https://piazza.com/class/isqj37mfnyz26r?cid=6>.