

Homework 2: L2 and L3

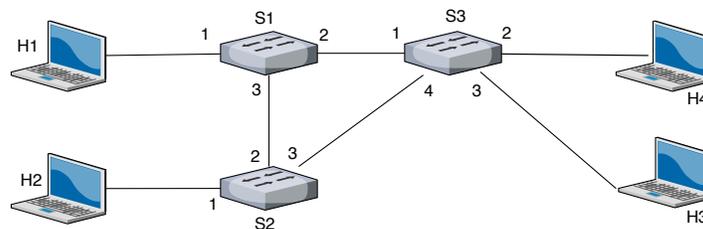
Due: 11:59 PM, Oct 18, 2018

Contents

1	Spanning Tree	1
2	IP Routing	1
3	Spanning Tree Protocol	2

1 Spanning Tree

Consider the network below. The three switches run the spanning tree protocol.



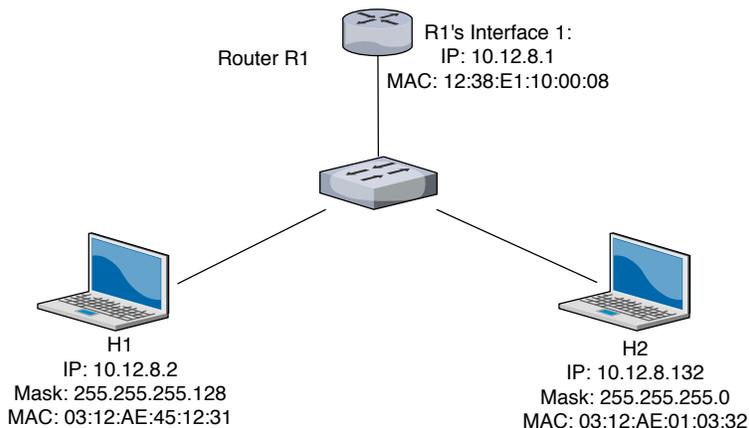
1. For each switch port, write its final state after the STP converges. Denote each port by its switch and port number (e.g., S1.1, S2.3, etc), and choose between three states: Root Port, Designated Port, or Discarding Port.
2. Now assume every link is a 10Gbps link, and that switches are can switch at full bandwidth between all its ports (i.e., switches are not the bottlenecks). H1 wants to send to H4, and H2 wants to send to H3. Assuming that flows share links fairly, what is the bandwidth that each pair of nodes gets?
3. Is there a way to renumber the switches in this network to improve the bandwidth in this case? How?

2 IP Routing

1. List two advantages of a distance vector protocol over a link state protocol.
2. List two advantages of a link state protocol over a distance vector protocol.

3 Spanning Tree Protocol

For the topology below, consider what happens when H1 sends a packet P to H2. All H1 knows beforehand are the IP addresses of H2 and of R1 (which is its default gateway). Before each transmission, assume all caches are empty (ARP caches, learning switch tables). The box below the router is a learning Ethernet switch.



1. If H1's network mask is 255.255.255.128, list the following values. Assume that H2 has not responded to P, but assume all ARP queries and responses necessary for the communication have been made.
 - (a) H1's entry(ies) in its ARP table (IP and MAC):
 - (b) Packet P destination IP address:
 - (c) Packet P Ethernet destination MAC address:
 - (d) The switch's entry(ies) in the MAC learning table (MAC and Port):

2. Now assume H1's network mask is set to 255.255.255.0, and that all tables and caches have been cleared. Again, H1 sends an IP packet to H2, and H2 has not responded to this IP packet. What are the answers to the same questions:
 - (a) H1's entry(ies) in its ARP table (IP and MAC):
 - (b) Packet P destination IP address:
 - (c) Packet P Ethernet destination MAC address:
 - (d) The switch's entry(ies) in the MAC learning table (MAC and Port):

3. Given the MAC addresses, what (if anything) can you say about H1, H2, and H3?

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/brown/fall2018/csci1680>.