

Homework 2: IP

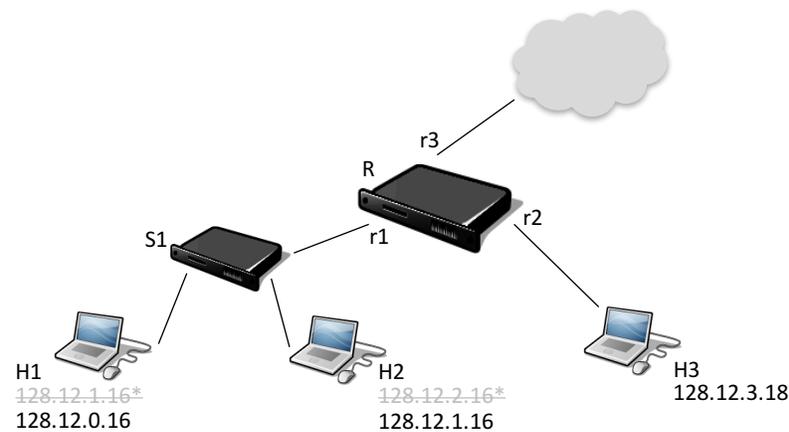
Due: 11:59 PM, Oct 19, 2017

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1 IP Forwarding

Answer the following questions based on the diagram below. S is a switch, and R is a router, and r1, r2, and r3 are network interfaces on the router. Suppose the hosts all know the IP addresses of the other hosts.



*There was an error in the original version of the assignment

1. You are configuring this network manually. H1 and H2 are in the same subnet, and H3 is in a different subnet. What are the most specific subnet masks for H1, H2, and H3, to make this happen?
2. Now you have to choose the IP addresses for the router interfaces. Assuming that you give to each one the smallest possible address in their respective subnets, what IP addresses do you give to r1 and r2? Note in any subnet, you cannot use the first and valid address, (e.g., 0 and 255 for a /24), because these are the network and the broadcast addresses, respectively.
3. H1 wants to send IP packets to H2. What ARP request does H1 broadcast before doing so? Why?

4. H1 wants to sent IP packets to H3. What ARP request does H1 broadcast before doing so? Why?
5. You leave for a moment and your friend comes, and manages to mess up with H1's network configuration. When you come back, you notice that a traceroute from H1 to H2 is going through the router, while a traceroute from H2 to H1 does not. Everything else behaves as before. You then notice that your friend changed the netmask for H1. What change would explain this behavior?
6. The MAC addresses of H1, H2, and H3 are, respectively, 04:12:01:00:01:01, 0a:be:12:00:01:01, 04:12:01:23:4e:12. Given this, what can you say about H1 and H2, and about H1 and H3?
7. The router is part of a routing protocol, and wants to advertise to the rest of the world that they can reach the subnets to which H1, H2, and H3 belong. If it only advertises one prefix, what is it?

2 Routing

A router has the following routing table:

Network	Interface	Next Hop
10.1.4.0/24	s1	directly connected
10.1.6.0/24	e0	10.1.1.2
10.1.6.64/28	e1	10.1.2.2
10.1.6.64/29	s0	10.1.3.3
10.1.6.64/27	s1	10.1.4.4

What will the router do with a packet addressed to:

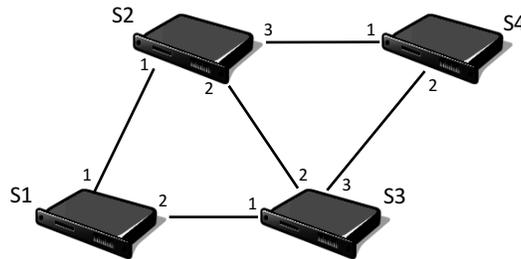
1. 10.1.6.65 ?
2. 10.1.6.75 ?
3. 10.1.6.93 ?
4. 10.0.6.66 ?

3 More routing

1. Give one advantage of distance vector routing over link state routing.
2. Give one advantage of link state routing over distance vector routing.
3. Why is path vector routing immune to count to infinity problems?

4 Spanning Tree

You foolishly connected your four switches according to the figure below, and forgot to enable the spanning tree protocol.



1. What happens when a host decides to send a packet on this network?
2. After you recover from the above incident, you decide to turn on STP on the switches. What is the final state of the network once the protocol 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.

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<https://piazza.com/brown/fall2017/cs168>.