CS 4270: Internet Lab

Midterm exam

October 13, 2010

Duration: 50 minutes

Name: _____

GT-ID: _____

Part	Maximum	Obtained
1	25	
2	25	
3	25	
4	25	

Final grade:

Problem 1 (25 points)

Someone claims that they can measure “the number of connected & active hosts in the Internet.” They do so with the ping utility, “pinging” every IPv4 address a few times during a time period of say 2 hours. How would you explain to this person that their measurements may be seriously broken? Mention at least two different reasons that can cause underestimation (i.e., to measure fewer hosts than the correct number) and at least one reason that can cause overestimation.

Answer

Problem 2 (25 points)

Usually, the first thing we learn at school about the count-to-infinity problem in distance-vector protocols is that it can be resolved using the “split horizon” technique. In the Cisco implementation of RIP however (as you saw in Lab-4), routers attempt to avoid the count-to-infinity problem using two more features. Identify those two features and explain how they help to avoid “count-to-infinity”.

Answer

Problem 3 (25 points)

An Autonomous System X has three BGP-speaking routers A, B and C. There is a fourth internal router D that does not speak BGP. The routers in X run a link-state IGP protocol.

Consider a destination prefix P1.
a) Router A receives two routes towards P1. The first route has Local-Preference=200 and AS-Path={Y, W, U, Z}. The second route has Local-Preference=150 and AS-Path={W, Z}.
b) Router C receives one route to P1 with AS-Path={Y,W,Z}.
c) The IGP cost from D to A is 10, and from D to C 20.

Identify the preferred route to P1 at each of the four routers in X. Explain your answer assuming that the routers in X use the standard BGP route selection criteria that we discussed in class.

Answer

Problem 4 (25 points)

Suppose that the destination address length is 5 bits. You are given the following forwarding table. The longest-matching prefix lookups are performed using a T-CAM, as described in class. Show the internal organization of the T-CAM, and the stored values in each T-CAM entry, considering the following hints:
1) Each T-CAM cell has one input line (a bit of the packet destination address), one output line (Match vs No-Match) and it can store one of *three* values (0, 1, *).
2) The output lines of several T-CAM cells can be connected together to produce a single output. That aggregate output is 1 only if *all* the connected output lines are 1; otherwise it is 0.
3) You are also given a *priority encoder* with 4 inputs and a 2-bit output. You can assume that the input 0^{th} input line corresponds to the *lowest* priority, and the 3^{rd} input line corresponds to the *highest* priority.
4) The next-hop entries are stored in a *RAM* with 2-bit addresses.

Prefix	Next-hop
*	A
01*	C
0101*	B
10011	D

Answer