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CS 4270: Internet Lab

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Final exam

April 27, 2007

Duration: 50 minutes

Name: \_\_\_\_\_

Part	Maximum	Obtained
I	20	
II	20	
III	20	
IV	20	
V	20	

Final grade:

Problem 1 (20 points)

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Suppose that the following network of bridges uses the Spanning Tree Protocol. Show the resulting spanning tree. Also, create a table that shows the *Root Port*, the *Designated Ports*, and the *Blocked Ports* for each bridge. A lower bridge ID has higher priority, and ports are ranked lexicographically (i.e., port A has higher priority than port B, and so on).

Problem 2-A (10 points) \_\_\_\_\_

Describe how *Path MTU Discovery* works. 3-4 short sentences should be enough to describe the key points of the method.

Problem 2-B (10 points) \_\_\_\_\_

How can an application programmer set the maximum size of the TCP advertised window at the receiver? How large would you set that maximum window size (in bytes) if you knew that the connection's Round-Trip Time is 100msec and the capacity of the corresponding network path is 100Mbps. What's the problem with setting the advertised window size to the maximum possible value?

Problem 3-A (10 points) \_\_\_\_\_

TCP's congestion control mechanisms detect congestion from packet losses. What's the problem with this approach? Can you think of another way to detect congestion, without explicit feedback from the routers? How would you adjust the *congestion window* TCP variable upon the first sign of congestion?

Problem 3-B (10 points) \_\_\_\_\_

Describe three clearly distinct ways that the SNMP protocol is used. Which SNMP message is used in each case? One short sentence for each application is enough.

Problem 4-A (10 points) \_\_\_\_\_

Describe the NAT traversal technique for UDP packets called STUN. Use an example with two users, say Mary and Bob, that want to communicate but they are both behind NATs in private networks. Suppose that Mary's private address is 10.0.1.1, and her NAT translates the source address of her outgoing packets to the public address 1.1.1.1 with source port number 10. Bob's private address is also 10.0.1.1 and his NAT translates the source address of his outgoing packets to the public address 2.2.2.2 with source port number 20. Present a diagram that shows all packet exchanges that are necessary for the NAT traversal.

Problem 4-B (10 points) \_\_\_\_\_

When is it necessary to use a DHCP relay agent? How does a DHCP relay agent modify DHCP packets or their IP header?

### Problem 5 (20 points)

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We discussed in class how Akamai uses DNS to direct an HTTP request to a server that is both close to the client and that is not heavily loaded. Enumerate and describe the main steps of this method.