CMSC 417-0201 Computer Networks **Spring 2002**

Mid-Term Exam

Closed book and notes; In class *Thursday, April 04*

⊕ *Do not forget to write your name on the first page. Initial each subsequent page.*
⊕ *Be* **neat** *and* **precise**. **I will not grade answers I cannot read.**
⊕ *You should draw simple figures if you think it will make your answers clearer.*
⊕ *Good luck and remember, brevity is the soul of wit*

- All problems are mandatory
- I cannot stress this point enough: **Be precise**. If you have written something incorrect along with the correct answer, you should **not** expect to get all the points. I will grade based upon what you **wrote**, not what you **meant**.
- Maximum possible points: 50.

Name: _____

Problem	Points
1	
2	
3	
4	
5	
Total	

1. Routing

   (a) What is the difference between *routing* and *forwarding*? (2 points)

   (b) How is the *counting to infinity* problem mitigated in distance vector routing? (3 points)

   (c) Why is flooding in link state routing different than sending data over a multicast tree? Describe a flooding protocol for link state routing. (5 points)

2. IP, TCP

(a) Show with an example why *subnetting* is useful. (3 points)

(b) What is *CIDR*? Why is it used in the Internet? (3 points)

(c) What is *slow start*? Why and when is it used? (4 points)

3. IP details

(a) Consider the IP network shown in Figure 1 with two hosts and two routers. The link level MTUs are as given in the figure. The TCP layer MSS (maximum segment size) at host A is configured to be 1500 bytes (i.e. TCP will send a 1500 bytes in a single "segment" to IP if the TCP has at least 1500 bytes to send). The IP at each node layer is properly configured, i.e. each IP implementation can send the link MTU sized datagrams (obviously modulo link-level headers). Assume (1) no

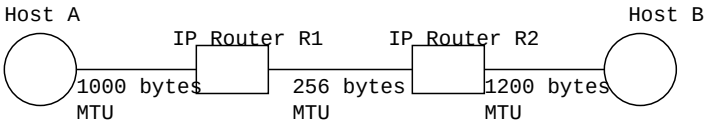

Figure 1: IP network (link MTUs shown in figure)

data loss; (2) each layer (application, TCP, IP) *always* sends the maximum sized packet/segment it can send; and (3) all the link-layer headers are 10 bytes in length.

Assume an application at host A sends a single 1200 byte TCP message. Fill in the IP datagrams fields the resultant set of IP packets that are sent from host A to host B. You only need to list packets that will be sent on the link between A and router R1. Hint: Both the IP and TCP headers are 20 bytes each. (3 points)

Src	Dst	IP Id	Flags (DF,MF only)	IP Len

(b) Why is NAT less robust than plain IP forwarding? (3 points)

(c) Describe two uses of IP-in-IP encapsulation. (4 points)

4. Multicast Forwarding

(a) Precisely describe how forwarding is implemented in *Reverse Path Broadcast*. (3 points)

(b) Show with an example how the idea of *parent routers* is used in RPB. (3 points)

(c) How does an IP router decide to start, stop, and restart forwarding a multicast session onto a local network? Describe the steps executed by each entity involved in the process. (4 points)

5. Domain Name System and HTTP

(a) What is a DNS *zone*? Why and how are they used? (3 points)

(b) What is an authoritative answer for a DNS query? Describe a class of queries that *always* result in an authoritative answer. (2 points)

(c) Give two reasons HTTP/1.0 is an inefficient protocol. (5 points)