Computer Networks—CS 461

MIDTERM EXAM April 5, 2001

1. Explain why the Ethernet has a minimum packet size of 64 bytes. Give an example illustrating how a smaller packet size could be a problem. [**5 points**]

2. Describe what information a router needs to determine if a given IP datagram can be directly delivered on one of its interfaces. Be precise. [**5 points**]

3. The following is a routing table using CIDR. Address bytes are in hexadecimal. The notation "/12" in C4.50.0.0/12 denotes a netmask with 12 leading 1-bits, ie FF.F0.0.0. Note that the last three entries cover every address and thus serve in lieu of a default route.

net/masklength	nexthop
C4.50.0.0/12	A
C4.5E.10.0/20	B
C4.60.0.0/12	C
C4.68.0.0/14	D
80.0.0.0/1	E
40.0.0.0/2	F
00.0.0.0/2	G

State to what next hop the following will be delivered. [**12 points**]

(a) C4.5E.13.87

(b) C4.5E.22.09

(c) C3.41.80.02

(d) 5E.43.91.12

(e) C4.6D.31.2E

(f) C4.6B.31.2E

4. TCP has a 32-bit sequence number and a 16-bit advertised window. Assuming a 100ms RTT and a 120s maximum segment lifetime [**8 points**]:

   (a) Identify the two problems that occur as link bandwidth increases.

   (b) At what bandwidths do each of these two problems become an issue?

   (c) Describe how the Internet has addressed these two issues.

5. Consider the TCP congestion control algorithm [**10 points**]:

   (a) Why do connections often experience multiple packet losses during slow start, and how bad are these losses in the worst case?

   (b) Describe how fast retransmit works and explain why it is not effective when there are multiple packet losses during an RTT.

6. In TCP Vegas, the calculation of *ActualRate* is done by dividing the amount of data transmitted in one RTT by the length of the RTT. Explain how this can lead to unfair treatment of different TCP connections. [**5 points**]

7. Describe the fundamental conflict between tolerating burstiness and controlling network congestion. [**5 points**]