

Your Name: _____

CptS/EE 455
Spring 2002
Midterm Exam #1
February 22, 2002

Write your name on your paper RIGHT NOW!

This is a **closed book, closed notes, closed neighbor** exam. Calculators are allowed. There are 8 questions. Answer **all** the questions in the space provided. This is a **50 minute** exam, 10:10 – 11:00. Exams will be collected promptly at 11:00.

1. (18 points) Basic Terms and Concepts

Explain the following terms in 3 or 4 sentences each:

a) Multiplexing – explain the concept. Give several examples of where multiplexing occurs in networks.

b) Network Core – explain the concept. Give examples of things that are part of the network core and things that are not.

c) Stateless protocol – your answer should include an example stateless protocol, but be sure to explain what is meant by stateless protocol, as well.

2. (10 points) Imagine that the world wide web hasn't been invented yet. You have been given the job of designing a core network that will support retrieval of documents from anywhere in the world to people's desktop computers.

a) Would you choose to build your network as a packet-switched network or a circuit-switched network? In three or 4 sentences, why? (Hint: consider resource utilization)

b) For best resource utilization in this application, your network will exploit (choose 1)

frequency-division multiplexing

time-division multiplexing

statistical multiplexing.

3. (16 points) Host A and Host B are connected by a network that has a bandwidth of 10 megabits/second. The hosts are separated by 3000 kilometers and the network propagation speed is 150,000 kilometers/second. Host A sends 10,000-bit packets to Host B at the rate of 500 packets/second. (Partial credit will be given only if calculations are shown)

a) What is the propagation delay between A and B?

b) What is the transmission time of a single packet?

c) If host A is the only host sending traffic on this link, would you expect the queuing delay to be larger or smaller than the maximum of your answers to part a and part b? Why?

d) What happens to your answer to part c if a third host attempts to send the same amount of traffic over the link. That is, the total load on the link is now 1,000 packets/second where each packet is 10,000 bits. Why? (Hint: Consider the traffic intensity on the link)

4. (10 points) Match each statement on the right with the system call on the left that makes it true:

System call	Property
1. bind	___ Tells the operating system whether this socket will be a TCP socket or a UDP socket
2. listen	___ Waits for data to be available for reading
3. connect	___ In a server, establishes the port number at which clients can contact the server
4. socket	___ Returns a new socket descriptor after a client contacts the server
5. accept	___ Cleans up completed per-client server processes in a forking TCP server
6. wait	___ Identifies the host address and port number of a server that a client wishes to communicate with
7. recv	___ Tells the operating system to allow connections to be made to the port associated with a socket

5. (12 points) Protocol layering

a) What is another name for the IP layer? Describe the service model of the IP layer.

b) What protocol layer sits directly above the IP layer? Name two protocols at this layer.

c) What protocol layer sits directly below the IP layer?

d) Name two application layer protocols other than HTTP.

6. (12 points) An HTTP request contains 3 parts, a) the headers, b) the request line, and c) the entity body.

a) In what order do these appear in the request?

b) How is the entity body separated from what comes before it?

c) Which HTTP header contains the length of the entity body?

7. (12 points) For each application state whether TCP or UDP would be a better transport protocol and why.

a) File transfer

b) e-mail

c) audio and video for holding a meeting involving two locations

d) Hostname lookups

8. (10 points) Miscellaneous short answer

a) What internet protocol allows my computer to find out the IP address corresponding to `www.cnn.com`?

b) The SMTP protocol allows sending only 7-bit ASCII text in e-mail messages. What is the name (or acronym) for the mail extensions that allow sending attachments such as photographs and formatted text using SMTP?

c) Name one of the two mail access protocols we talked about.

d) Name one of the two features that UDP adds to the service model provided by IP.

e) What UDP header field(s) support this feature?