EEL4598/5718: Computer Communications

Homework 1

1.1

a. Describe the step-by-step procedure that is involved from the time you deposit a letter in a mailbox to the time the letter is delivered to its destination. What role do names, addresses, and mail codes (such as ZIP codes or postal codes) play? How might the letter be routed to its destination? To what extent can the process be automated?
b. Repeat part (a) for an e-mail message. At this point you may have to conjecture different approaches about what goes on inside the computer network.
c. Are the procedures in parts (a) and (b) connection-oriented or connectionless?

1.4

a. Suppose that the letter in problem 1 is sent by fax. Is this mode of communications connectionless or connection-oriented? real-time or non-real-time?
b. Repeat part (a) for a voice-mail message left at a given telephone.

1.16

Use your Web browser to access a search engine and retrieve the article "A Brief History of the Internet" by Leiner, Cerf, Clark, Kahn, Kleinrock, Lynch, Postel, Roberts, and Wolff. Answer the following questions:
a. Who was J. Licklider, and what was his "galactic network" concept?
b. Who coined the term *packet*?
c. What (who?) is an IMP?
d. Did the ARPANET use NCP or TCP/IP?
e. Was packet voice proposed as an early application for Internet?
f. How many networks did the initial IP address provide for?

1.19

Use your web browser to access a news website and play a news video clip. Speculate about how the information is being transported over the Internet. How does the quality of the audio and video compare to that of broadcast or cable television?

2.2

a. What universal set of communication services is provided by TCP/IP?
b. How is independence from underlying network technologies achieved?
c. What economies of scale result from (a) and (b)?

2.6

Which OSI layer is responsible for the following?
a. Determining the best path to route packets.
b. Providing end-to-end communications with reliable service.
c. Providing node-to-node communications with reliable service.

2.10

Give two features that the data link layer and transport layer have in common. Give two features in which they differ. Hint: Compare what can go wrong to the PDUs that are handled by these layers.

2.28

What is the difference between a physical address, a network address, and a domain name?

2.32

Suppose a machine is attached to several physical networks. Why does it need a different IP address for each attainment?

2.33

Suppose a computer is moved from one department to another. Does the physical address need to change? Does the IP address need to change? Does it make a difference if the computer is a laptop?

2.43

Which of the TCP/IP transport protocol (UDP or TCP) would you select for the following applications: packet voice, file transfers, remote login, multicast communication (i.e., multiple destinations).