HW1

1. (10 points) What is the name of PDU at the network layer of the OSI reference model?

A. message

B. frame

C. packet

D. segment

C

2. (10 points) Connectionless Services is also called

A. virtual circuit service

B. acknowledged datagram service

C. client-server service

D. datagram service

D

3. (20 points) Which of the OSI layers handlers each of the following:

(a) Dividing the transmitted bit stream into frames.

(b) Determining which route through the subnet to use.

1. data link layer
2. network layer

4. (10 points) A system has an 7-layer protocol hierarchy. Applications generate messages of length 1000 bytes. At each of the layers, an 20 byte header is added. What fraction of the network bandwidth is filled with headers? (round to one decimal place)

140/1140 = 12.3%

5. (10 points) How long was a bit on the original 802.3 standard in meters? Use a transmission speed of 10 Mbps and assume the propagation speed in coax is 2/3 the speed of light in vacuum. (round to one decimal place)

1 \* 10 ^ -7 \* 3 \*10 ^ 8 \* 2 / 3 = 20m

6. (10 points) A client-server system uses a satellite network, with the satellite at a height of 40000 km. What is the best-case delay in response to a request? (round to one decimal place)

2 \* 4 \* 10 ^ 7 / (3 \* 10 ^ 8) = 0.3s

7. (20 points) An image is 1024 x 768 pixels with 3 bytes/pixel. Assume the image is uncompressed. (round to one decimal place)

(a) How long does it take to transmit it over a 56-kbps modem channel?

(b) How long does it take to transmit it over a 1-Mbps cable modem?

(c) How long does it take to transmit it over a 10-Mbps Ethernet?

(d) How long does it take to transmit it over 100-Mbps Ethernet?

image size = 1024 \* 768 \* 3 \* 8

1. image size / (56 \* 10 ^ 3) = 336.4
2. image size / (1 \* 10 ^ 6) = 18.9
3. image size / (1 \* 10 ^ 7) = 1.9
4. image size / (1 \* 10 ^ 8) = 0.2

8. (10 points) A collection of five routers is to be connected in a point-to-point subnet. Between each pair of routers, the designers may put a high-speed line, a medium-speed line, a low-speed line, or no line. If it takes 100ms of computer time to generate and inspect each topology, how long will it take to inspect all of them? (round to one decimal place)

=10 , topo = 4 ^ 10

Time = topo \* 100ms / 1000 = 104857.6s