《计算机网络》作业-2022年

**第一章作业：（英文版教材第一章 2，3，9，10,11,16,17,18,30）**

2. The performance of a client-server system is strongly influenced by two major network characteristics: the bandwidth of the network (that is, how many bits/sec it can transport) and the latency (that is, how many seconds it takes for the first bit to get from the client to the server). Give an example of a network that exhibits high bandwidth but also high latency. Then give an example of one that has both low bandwidth and low latency.

3. Besides bandwidth and latency, what other parameter is needed to give a good characterization of the quality of service offered by a network used for (i) digitized voice traffic? (ii) video traffic? (iii) financial transaction traffic?

9. A disadvantage of a broadcast subnet is the capacity wasted when multiple hosts attempt to access the channel at the same time. As a simplistic example, suppose that time is divided into discrete slots, with each of the n hosts attempting to use the channel with probability p during each slot. What fraction of the slots will be wasted due to collisions?

10. What are two reasons for using layered protocols? What is one possible disadvantage of using layered protocols?

11. What is the principle difference between connectionless communication and connection-oriented communication? Give one example of a protocol that uses

1) connectionless communication 2)connection-oriented communication.

16. Which of the OSI layers and TCP/IP layers handles each of the following:

1) Dividing the transmitted bit stream into frames

2) Determining which route through the subnet to use.

17. If the unit exchanged at the data link level is called a frame and the unit exchanged at the network level is called a packet, do frames encapsulate packets or do packets encapsulate frames? Explain your answer.

18. A system has an n-layer protocol hierarchy. Applications generate messages of length M bytes. At each of the layers, an h-byte header is added. What fraction of the network bandwidth is filled with headers?

30. Suppose there is a change in the service (set of operations) provided by layer k. How does this impact services at layers k-1 and k+1?

**第二次作业：（英文版教材第二章 2, 3, 4, 7, 8, 21, 24, 25, 26, 28, 36, 37, 教材第四章14）**

2. A noiseless 8-kHz channel is sampled every 1 msec. What is the maximum data rate?

3. If a binary signal is sent over a 3-kHz channel whose signal-to-noise ratio is 20 dB, what is the maximum achievable data rate?

4. What signal-to-noise ratio is needed to put a T1 carrier with data rate 1.544Mbps on a 100-kHz line?

7. It is desired to send a sequence of computer screen images over an optical fiber. The screen is 1920 × 1200 pixels, each pixel being 24 bits. There are 50 screen images per second. How much bandwidth is needed?

8. Is the Nyquist theorem true for high-quality single-mode optical fiber or only for copper wire?

21. A modem constellation diagram similar to Fig. 2-23 has data points at (0, 1) and (0, 2). Does the modem use phase modulation or amplitude modulation?

24. An ADSL system using DMT allocates 3/4 of the available data channels to the down-stream link. It uses QAM-64 modulation on each channel. What is the capacity of the downstream link?

25. Ten signals, each requiring 4000 Hz, are multiplexed onto a single channel using FDM. What is the minimum bandwidth required for the multiplexed channel? Assume that the guard bands are 400 Hz wide.

第4章14题Sketch the Manchester encoding on a classic Ethernet for the bit stream 0001110101.

26. Why has the PCM sampling time been set at 125 μsec?

28. Compare the maximum data rate of a noiseless 4-kHz channel using

(a) Analog encoding (e.g., QPSK) with 2 bits per sample.

(b) The T1 PCM system.

36, Compare the delay in sending an ***x-bit*** message over a ***k-hop*** path in a circuit-switched network and in a (lightly loaded) packet-switched network. The circuit setup time is ***s*** sec, the propagation delay is ***d*** sec per hop, the packet size is ***p*** bits, and the data rate is ***b*** bps. Under what conditions does the packet network have a lower delay? Also, explain the conditions under which a packet-switched network is preferable to a circuit switched network.

37. Suppose that ***x*** bits of user data are to be transmitted over a ***k-hop*** path in a packet switched network as a series of packets, each containing ***p*** data bits and ***h*** header bits,

with *x >> p + h*. The bit rate of the lines is ***b*** bps and the propagation delay is negligible.

What value of ***p*** minimizes the total delay?