

《计算机网络》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.(Bandwidth vs. Maximum data rate) A noiseless 8-kHz channel is sampled every 1 msec. What is the maximum data rate?

3. (Maximum data rate theorem) 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. (Maximum data rate theorem) What signal-to-noise ratio is needed to put a T1 carrier with data rate 1.544Mbps on a 100-kHz line?

7. (Channel capacity requirement) 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. (Modulation) 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. (ADSL principle) 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. (FDM principle) 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.

4-14. (Manchester encoding) Sketch the Manchester encoding on a classic Ethernet for the bit stream 0001110101.

26. (PCM principle) Why has the PCM sampling time been set at 125 μ sec?

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. (delay: circuit switching vs. packet switching) 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. (delay of packet switching) 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 $x \gg p + h$. The bit rate of the lines is b bps and the propagation delay is negligible.

What value of p minimizes the total delay?