Chapter 2

2. A noiseless 4-kHz channel is sampled every 1 msec. What is the maximum data rate?

根据Nyquist定律：

假设采样的sample为 bits，则

∴

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?

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根据Shannon定律：

根据Nyquist定律：

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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?

Circuit-switched network:

Packet-switched network:

∴ 当 ，即 时，packet network有更低的延时

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?

总数据量:

传输时长:

传输延迟:

总延时:

∴当 时，总延迟最小