

Homework

1. “Fast” Ethernet operates 10x faster (100Mbps) than regular ethernet. Explain why the following changes were made. (a) Encoding changed to 4B/5B. (b) CAT-5 cable has more twists.
2. If a binary signal is sent over a 3-kHz channel whose signal-to-noise ratio is 20dB, what is the maximum achievable data rate?
3. What are the advantages of fiber optics over copper as a transmission medium? Is there any downside of using fiber optics over copper?
4. Is the Nyquist theorem true for high-quality single-mode optical fiber or only for copper wire?
5. What is the minimum bandwidth needed to achieve a data rate of B bits/sec if the signal is transmitted using NRZ and Manchester encoding? Explain your answer.

6. Is an oil pipeline a simplex system, a half-duplex system, a full-duplex system, or none of the above? What about a river or a walkie-talkie-style communication?
7. A modem constellation diagram similar to Fig. 2-23 has data points at the following coordinates: $(1,1)$, $(1,-1)$, $(-1,1)$, $(-1,-1)$. How many bps can a modem with these parameters achieve at 1200 symbols/sec?
8. What is the difference, if any, between the demodulator part of a modem and the coder part of codec? (After all, both convert analog signals to digital ones.)
9. What is the available user bandwidth in an OC-12c connection?
10. Suppose that A, B, and C are simultaneously transmitting 0 bits, using a CDMA system with the chip sequences of Fig. 2-28(a). What is the resulting chip sequence?