Homework Assignment #1 (Due in 2 weeks)

- Exercises
  - Chapter 1 questions 5, 10, 16, 23, 25
    - Possible solutions 5, 10, 16, 23, 25 (in ISM)
  - Chapter 2 questions 4, 6, 15, 25, 50(Fig.2.52)
    - Possible solutions 4, 6, 15, 25, 50 (in ISM)
  - 10 points per question

HW#1 (Chapter 1)

- 1.5 A factor in the delay of a store-and-forward packet-switching system is how long it takes to store and forward a packet through a switch. If switching time is 10 μsec, is this likely to be a major factor in the response of a client-server system where the client is in New York and the server is in California? Assume the propagation speed in copper and fiber to be 2/3 the speed of light in vacuum.

- 1.10 What are two reasons for using layered protocols? What is one possible disadvantage of using layered protocols?

HW#1 (Chapter 1)

- 1.16 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?

- 1.23 An image is **1024** × **768** pixels with 3 bytes/pixel. Assume the image is uncompressed. How long does it take to transmit it over a 56-kbps modem channel? Over a 1-Mbps cable modem? Over a 10-Mbps Ethernet? Over 100-Mbps Ethernet? Over gigabit Ethernet?

- 1.25 List two advantages and two disadvantages of having international standards for network protocols.

HW#1 (Chapter 2)

- 2.4 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?
- 2.6 What are the advantages of fiber optics over copper as a transmission medium? Is there any downside of using fiber optics over copper
- 2.15 What is the minimum bandwidth needed to achieve a data rate of **B** bits/sec if the signal is transmitted using **NRZ**, **NRZI**, and Manchester encoding? Explain your answer.

HW#1 (Chapter 2)

- 2.25 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.

HW#1 (Chapter 2)

- 2.50 Using the spectral allocation shown in Fig. 2-52 and the information given in the text, how many Mbps does a cable system allocate to upstream and how many to downstream?

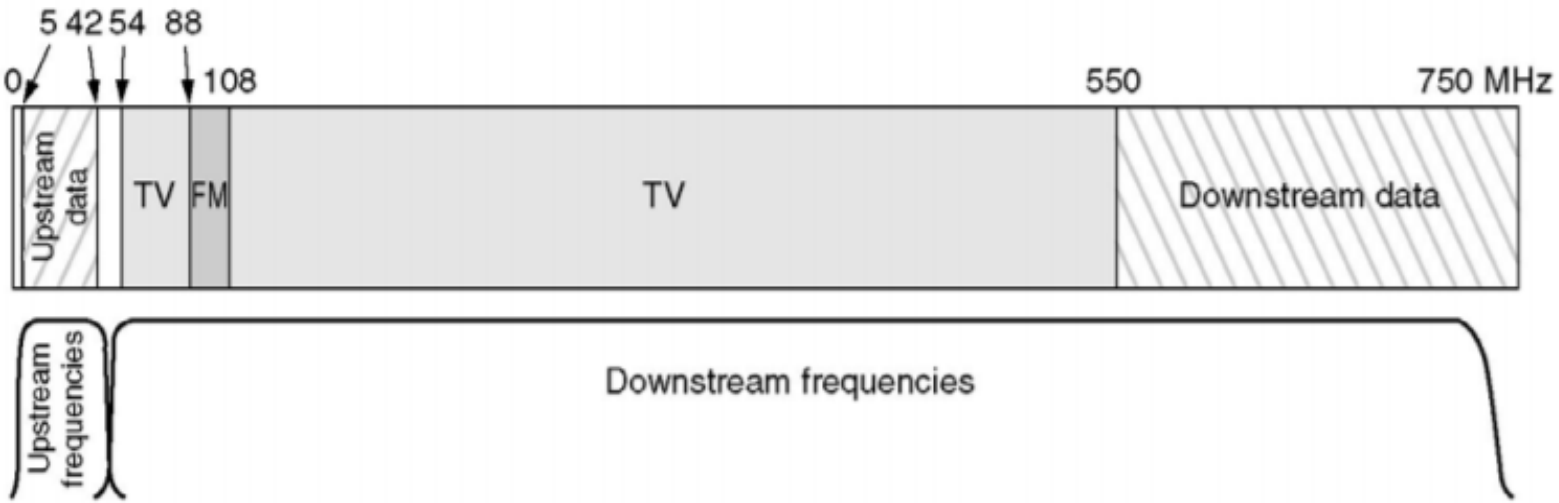

Figure 2-52. Frequency allocation in a typical cable TV system used for Internet access.