CHAPTER 3

Underlying Technologies

Exercises

1. We know that D = T × V, where D is the distance, T is the time, and V is the velocity or speed. In other words, T = D / V. We insert the corresponding values to find the time needed for a bit to travel the cable.

   T = D / V = (2500 meters) / (200,000,000 meters/second) = 0.0000125 s = **12.5** μs

3. Assume that the minimum frame size is 65 bytes or 520 bits. We have L = T × R, where L is the length of the frame, T is the time, and the R is the data rate. We can say T = L / R. The time can be calculated as

   T = L / R = (520 bits) / (10,000,000) bits/second = 0.000052 s = 52 μs

5. The padding needs to make the size of the data section 46 bytes. If the data received from the upper layer is 42 bytes, we need 46 – 42 = **4** bytes of padding.

7.

   a. **Similarities:**
   Each station has an equal right to the medium.
   Each station senses the medium.

   b. **Differences:**
   CSMA/CD: A station can send if it senses no signal on the line.
   CSMA/CA: A station needs to inform other stations that it needs the medium for a specific amount of time.

   CSMA/CD: A collision can occur.
   CSMA/CA: Collisions are avoided.

8. See Table 3.E8.

Table 3.E8 *Exercise 8*

Fields	*IEEE 802.3*	*IEEE 802.11*
Destination address	**6**	
Source address	**6**	
Address 1		**6**
Address 2		**6**
Address 3		**6**
Address 4		**6**
FC		**2**
D/ID		**2**
SC		**2**
PDU length	**2**	
Data and padding	**1500**	
Frame body		**2312**
FCS (CRC)	**4**	**4**