Computer Network

Homework #5 for Chapter 7

19102100 Choi Jiwoo

Chapter 7

1. Please, look at the Figure 7.3 and answer the following questions. Suppose I am using the service whose BER requirement is 10-4.

텍스트, 도표, 라인, 그래프이(가) 표시된 사진

자동 생성된 설명

1. Now SNR = 10 decible. What will be your modulation technique?
   1. BPSK should be used.
2. Now SNR = 30 decible and QAM256(8Mbps) is used. Since I moved far from AP, SNR dropped from 30 to 20 decible. What will be your modulation technique?
   1. To satisfy the BER requirements, we need to use QAM16 technique.
3. Now SNR = 15 decible(assume that it is middle points between 10 and 20). What is the allowable BER if at least 4Mbps is required for my service?
   1. To support minimum speed of 4Mbps, We’d better use QAM16. In this case, the allowable BER is at around .

2. Solve below problems;

텍스트, 도표, 평면도, 스크린샷이(가) 표시된 사진

자동 생성된 설명

#7-2. Consider sender 2 in Figure 7.6 . What is the sender’s output to the channel (before it is added to the signal from sender 1), Zi, m

Z = [1, -1, 1, 1, 1, -1, 1, 1] for d1 and [1, -1, 1, 1, 1, -1, 1,1] for d0

#7-3. Suppose that the receiver in Figure 7.6 wanted to receive the data being sent by sender 2. Show (by calculation) that the receiver is indeed able to recover sender 2’s data from the aggregate channel signal by using sender 2’s code

1. D1 of receiver 2 : Z = [0, 2, 0, 2, 0, 0, 2, 2] \* C[1, -1, 1, 1, 1, -1, 1, 1] = (0+2+0+2+0+0+2+2)/8 = 1
2. D2 of feceiver 2 : Z = [2, 0, 2, 0, 2, 2, 0, 0 ] \* C[1,-1,1,1,1,-1,1,1] = (2+0+2+0+2+2+0+0)/8 = 1

#7-4. For the two-sender, two-receiver example, give an example of two CDMA codes containing 1 and -1 values that do not allow the two receivers to extract the original transmitted bits from the two CDMA senders

1) CDMA codes of Sender 1 : [1,1,1,1,−1,−1,−1,−1]

2) CDMA codes of Sender 2 : [1,−1,1,−1,1,−1,1,−1]

3. Please give 2 reasons why CSMA/CD can’t be used in Wireless LAN.

* When CSMA/CD protocol allows collision, it is needed for the protocol to identify the collision clearly. However, it is difficult to sense collision in wireless environments because the strength of the signal decreases and reflected while propagating. Thus, the collision detected becomes unreliable.
* In wireless environments, there might be physical obstacles such as mountains or buildings – hidden terminal problem. Due to these obstacles, it becomes harder for sender nodes to detect the transmission from each other. Consequently, two signals have probability of collide in receiving node. In CSMA/CD protocol, each sender checks if the nodes is empty or not. However, like the case of wireless transmission, if it’s difficult to know if the nodes are empty or not, the protocol will not work fine.

4. What is the reason why CSMA/CA allows collision.

In CSMA/CA, it checks if the receiver node is empty by sending RTS message. In this case, the RTS message packet might be collided if another sender trying to check if it can send data. However, since the size of the RTS message is quite small, it is not significant in waste of resources. Consequently, there will be no collision in dataframe packet.