COMPUTER NETWORK - First Homework

1. An engineer who has a receiver for catching TV signals decides to watch TRT1:

    a. How many bits/sec can be sent if four level digital signals are used? Assume that channel is completely noiseless.

    b. If the signal-to-noise ratio is 20 dB, what is the maximum achievable data rate?

(TRT1; Satellite: Galaxy 19. Frequency: 11961 MHz. Polarization: V. S/R: 22000)

2. Comparison of ADSL and cable:

    a. Define these two types of connection with detailed explanation.

    b. Give an example of a case that ADSL connection is better than cable connection. In that situation, list problems occurred when the cable is used for the connection.

    c. Give an example of a case that cable connection is better than ADSL. In that situation, list problems occurred when ADSL is used for the connection.

    d. Please imagine that you are the manager of a company which provides internet service. Define user sets and decide which user has permission to use ADSL, cable or both. Please give a detailed explanation about user sets and their permissions of internet usage.

3. NS3 network simulation task:

    a. Please, setup NS3.

    b. Simulate a network which has 10 nodes.

    c. 4 Nodes at two endpoints will be connected by using WIFI. Other nodes in the network will be connected by cable.

    d. Please calculate the connection speed between two endpoints according to given values. (Values are expected to be given by you)

4. Error Correction:

    a. Assume that you are expected to build a connection on the noisy channel. You need to send and receive critical data on that channel. How do you know which bits are changed? What is error rate? How do you manage it? Is there any way to calculate error possibility of each bit?

    b. A 16-bit Hamming code whose hexadecimal value is 0xF6B0 arrives at the receiver. What was the original value in hexadecimal? Assume that not more than 2 bit is in error

    c. Assume n-bit block arrives at a receiver and error risk rate on the channel is k% possibility (that is k percent of n bit might be faulty). Calculate how many bits are risky, how many bits are needed as check bit and what should the length of codeword be? Explain and give 3 example.