CENG 3331 Intro to Telecommunication and networks- Homework 3

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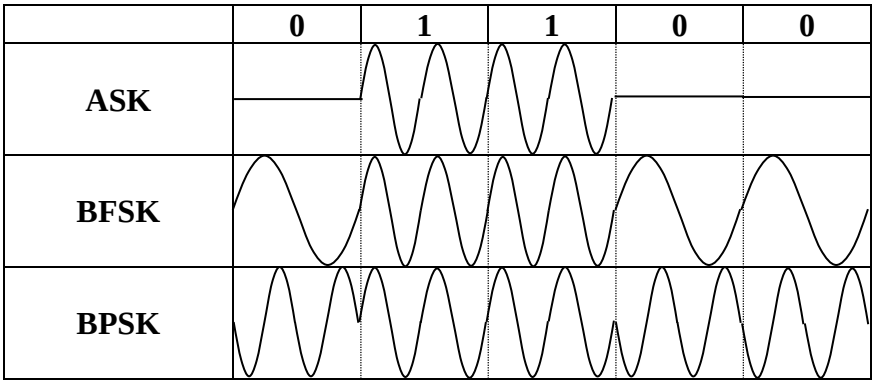
Problem 1:

QAM is a modulation technique that is a combination of Amplitude Shift Keying and Phase-Shift Keying. It is a digital-to-analog technique that combines ASK and PSK into a single channel, which makes it more effective.

Problem 2:

Scrambling techniques substitute long strings of 1's or 0's which can cause difficulty in clocking, and this is done with either Bipolar with 8-zeros substitution(B8ZS) or High-density bipolar 3-zeros(HDB3). B8ZS replaces 8 consecutive 0's with 00VB0VB, which is a string that contains 2 code violations. It also implements the bipolar line encoding rule. HDB3 replaces 4 consecutive 0's with 000V or B00V, depending on the number of nonzero pulses after the last substitution. If it is even, B00V is used, and if it is odd, 000V is used.

Problem 3:



Problem 4: $(\frac{S}{N})_{dB} = 6.02n + 1.76$

$(\frac{S}{N})_{dB} = 6.02n + 1.76 = 6.02(10) + 1.76 = 61.96$ dB

Problem 5: SNR = 6.02n + 1.76 # of levels = 2^n bps = f_s * N

A. SNR = 6.02n + 1.76 → 30 = 6.02n + 1.76 → n = 4.69 = 5

# of levels = 2^5 = 32 levels

B. bps = f_s * N = 7000 * 5 = 35000 bps

Problem 6: $f_a = | n * f_s - f |$ $f_s >= f_N$

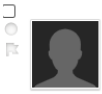
$f_s >= f_N$ → 50 Hz >= 10 Hz ✓ 50 Hz >= 30 Hz ✓ 50 Hz >= 65 Hz ✘

50 Hz >= 105 Hz ✘

$f_a = | n * f_s - f | = | 2 * 50 - 65 | = | 100 - 65 | = 35$ Hz <= 50 Hz ✓

$f_a = | n * f_s - f | = | 3 * 50 - 105 | = | 150 - 105 | = 45$ Hz <= 50 Hz ✓

Problem 7:



Michael Lankford Just now

RE: Parallel Computing vs. Distributed Computing

1. Traditional computing relies on data centers to store information that a business needs. These data centers are bad when it comes to software and hardware, needing constant updates and repairs, but they are the most secure.

2. Parallel computing is different to distributed computing because instead of using multiple machines that share information over a network, it uses only one machine to complete tasks. This is done by utilizing multiple processors to share the information by a bus to distribute calculations and have them performed at the same time. This ensures good performance because the computer only has to send information to itself, and it is extremely reliable due to there being multiple processors so if one fails the others continue to work.

3. We use CPUs with more cores to increase computer performance because the more cores a computer has the more processors and the more computing it is able to do. It also reduces power consumption for the computer so that's another plus.

4. Distributed computing uses multiple computers which communicate with each other over a network to complete tasks. This ensures scalability of the number of computers in the network and also ensures efficiency with the task loads being shared over the entire network.

5. Distributed computing is best for scalability because when you need to add more processors you just connect a new computer to the network versus upgrading every CPU for all the computers with parallel computing or making a massive server upgrade with traditional computing. The main downside, however, with distributed computing is that, like traditional computing, if the network goes down then the computers won't be able to communicate with each other and this stops all tasks from being completed.