

Makeup Homework

This homework's score replaces the worst of other homework scores.

Problem 1:

A company wants to use a remote back-up for disaster preparedness of all of their data. Because of past experience, it investigates the use of a single T3 line, as this is considered sufficient for the networking needs of a medium-sized company with about 1000 computers.

Once a month, the company will prepare a complete backup of around 100 TB data and each other day, a delta backup of 100GB each. The company is fine with backups being delayed.

Price out the following options:

- Use one or more rented T3 lines between the data center and the remote backup site.
- Pay licensing fees for deduplication based compression software. The software can compress the complete backup by a factor of 100 and the delta values by a factor of 50.

Problem 2:

We are using a link with bandwidth 3 Mb/sec and want to transmit at a data rate of 10 Mb/sec. What is the minimum signal-to-noise ratio (in decibel) that will make this possible?

Problem 3:

In Analog-to-Digital Conversion, we can use delta modulation. Assume that we use three bits (instead of just one as in the slides) to encode the delta values. What is a possible range for the delta values? Assume the following sequence of values:

20 20 15 10 7 5 5 5 5 10 15 20 20 20

Give a possible approximate delta encoding and show the reconstructed values. (This problem has more than one valid solution.)

Problem 4:

Using the Hamming code implemented in class (and possibly the software distributed to the class), explain what happens if the message [0, 1, 0, 0, 0, 1, 1, 1, 0, 1, 1, 1, 0, 0, 1] is received. What is the decoded message?