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1. What is the relation between period and frequency?

Frequency is how many cycles of an oscillation occur per second and is measured in cycles per second or hertz. Period of a wave is the amount of time it takes a wave to vibrate one full cycle. These two terms are inversely proportional to each other: f=1/T and T=1/f.

1. Distinguish between baseband transmission and broadband transmission?

Baseband Transmission is sending digital signal over a channel without changing the digital signal to analog signal. It requires the low-pass channel with two cases a wide bandwidth and a narrow bandwidth.

Broadband transmission means changing the digital signal to analog signal for transmission. It allows to use a Bandpass channel.

1. A line has a signal-to-noise ratio of 1000 and a bandwidth of 4000 KHz. What is the maximum data rate supported by this line?

Capacity = Bandwidth \* log2(1 + SNR)

= 4000 \* log2(1 + 1000) = 39800

1. A signal with 200 milliwatts power pass through 10 devices, each with an average noise of 2 microwatts. what is the SNR? what is SNR in dB?

+Average signal power: 200 milliW = 0.2 W

+Average noise power: 2 microW = 0.00002 w

SNR = average signal power / average noise power = 0.2 / 0.00002 = 10000

SNRdb = 10 log10(SNR) = 10 log(10000) = 10 \* 4 = 40

1. We have a channel with 4 KHz bandwidth. If we want to send data at 100 kbps, what is the minimum SNR in dB? What is the SNR?

Capacity = Bandwidth log(1+SNR)

100\*103 = 4\*103 log2 (1+SNR)

log2 (1+SNR) = 25

1 + SNR = 225

SNR = 225 – 1 = 33 554 431

SNRdb = 10 log10(33554431) = 75db