

Name: KEY

Sec. 4

1. How many bits are required to store video+audio stream of 3 seconds using N73 Nokia?  
 For the video assume: 3 Mega-pixels/frame, 15 frames/sec, 3 colors, 8 bits/color/pixel.  
 For the sound assume 16 bits/sample of sound using 22k sample/second.

$$\text{Video: } 3 \text{ M} \frac{\text{pixels}}{\text{frame}} * 15 \frac{\text{frame}}{\text{sec}} * 3 \frac{\text{color}}{\text{pixel}} * 8 \frac{\text{bits}}{\text{color} \cdot \text{pixel}} * 3 \text{ sec.}$$

$$= 3 \text{ M} * 15 * 3 * 8 * 3 \text{ bits} = 3240 \text{ M bits}$$

$$\text{Audio: } 16 \frac{\text{bits}}{\text{sample}} * 22 \text{ K} \frac{\text{sample}}{\text{sec}} * 3 \text{ sec}$$

$$= 16 * 22 \text{ K} * 3 \text{ bits} = 1056 \text{ K bits}$$

$$\text{Video + Audio} = 3240 \text{ M} + 1056 \text{ K} = 3241.056 \text{ Mbits}$$

$$= 3.241056 \text{ G bits}$$

2. Consider the following sequences of 1's and 0's: 1 0 1 1 0 1

Sketch the wave form using the following methods of representing symbols 1 and 0 (line coding):

(a) On-off signaling (NRZ). Also known as unipolar

(b) Manchester Coding: A high to low transition represents 1 and a low to high transition represents zero.

Which one of the two line codes has zero DC?

Manchester

Which one of the two line codes required minimum bandwidth?

unipolar

