TDM EX

two signals are to be transmitted using PAM, TDM. The first signal has a bandwidth of 8kHz, the second signal has a bandwidth of 10kHz. The two signals are sampled equally, then passed through a LPF before transmission.

a) what is the minimum clock frequency of the PAM system

b) what is the minimum cut off frequency of the LPF, that is used before transmission

c) what would be the minimum bandwidth if these two signals were frequency multiplexed using normal AM technique and SSB technique.

Solution

a) $f_N = n f_s$ (maximum frequency)
$= 2(2)(10kHz) = 40kHz$

b) The B.W of LPF should be greater than or equal to the B.W. of the TDM signal

$B.W = \frac{f_N}{2} = \frac{40kHz}{2} = 20kHz$

c) If the above mentioned signals were transmitted using frequency division multiplexing and AM, the the BW is

$BW = 2f_{m_1} + 2f_{m_2}$
$= 2(8) + 2(10) = 36kHz$

If SSB modulation is used, then

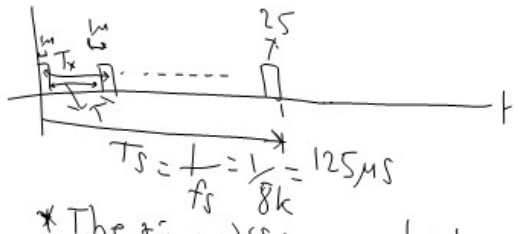
$BW = f_{m_1} + f_{m_2} = 8 + 10 = 18kHz$

From this example we can see that the BW for TDM System is Similar to SSB

Ex 2

Twenty four voice signals are sampled uniformly at a rate of 8kHz/s. These are TDM the Sent over a common Communication Channel. The multiplexing operation includes provision for synchronization by adding an extra pulse of sufficient amplitud. If all pulses have a duration of 1μs each determine the distance between adjacent pulses

Solution



* The time distance between adjacent pulses is given by

$T_x = \frac{T_s}{N} = \frac{125\mu s}{25} = 5\mu s$

$T' = 5 - 1 = 4\mu s$

pulse width and pulse position modulation

* These two kinds of pulse modulations are best illustrated by the following diagram