PPM (Pulse Position Modulation)

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Generating the PDM Signal

- the message signal $m(t)$
- the PPM signal $s(t)$
- the standard pulse of interest $g(t)$

The Pulse Duration Modulation (PDM)

- use the samples of the message signal
- to vary the duration of the individual pulses $g(t)$
- the modulating signal $m(t)$ may vary the time of occurrence of
  - the leading edge
  - the trailing edge
  - both edges of the pulse $g(t)$

Generating the PPM Signal

- the message signal $m(t)$
- the PPM signal $s(t)$
- the standard pulse of interest $g(t)$

The Pulse Position Modulation (PPM)

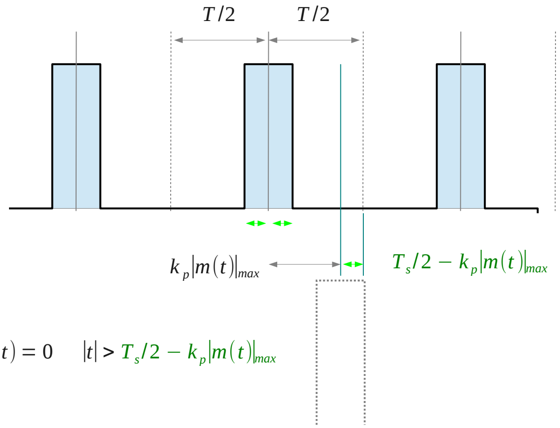
- use the samples of the message signal
- to vary the position of the individual pulses $g(t)$
- relative to its unmodulated time of occurrence
- can reduce the power compared to PDM by subtracting the unused power

The Periodic Pulse Carrier

- the message signal $m(t)$
- the PPM signal $s(t)$
- the standard pulse of interest $g(t)$
- the periodic pulse carrier : $\sum_{n=-\infty}^{\infty} g([t - nT_s])$
- the sampled values at time nT_s: $m(nT_s)$
- the sensitivity factor : k_p
- the shifted pulse carrier : $s(t) = \sum_{n=-\infty}^{\infty} g([t - nT_s] - k_p m(nT_s))$

Noverlapping Condition

- the shifted pulse carrier : $s(t) = \sum_{n=-\infty}^{\infty} g([t - nT_s] - k_p m(nT_s))$



$g(t) = 0 \quad |t| > T_s/2 - k_p|m(t)|_{max}$

PPM Signal

- the message signal $m(t)$
- the PPM signal $s(t)$
- the standard pulse of interest $g(t)$

PPM Signal

$$s(t) = \sum_{n=-\infty}^{\infty} g\left([t - nT_s] - k_p m(nT_s)\right)$$

$$g(t) = 0, \qquad |\, t \,| > \frac{T_s}{2} - k_p |m(t)|_{max}$$

$$k_p |m(t)|_{max} < \frac{T_s}{2}$$

Reference

[1] S. Haykin, M Moher, "Introduction to Analog and Digital Communications", 2ed