

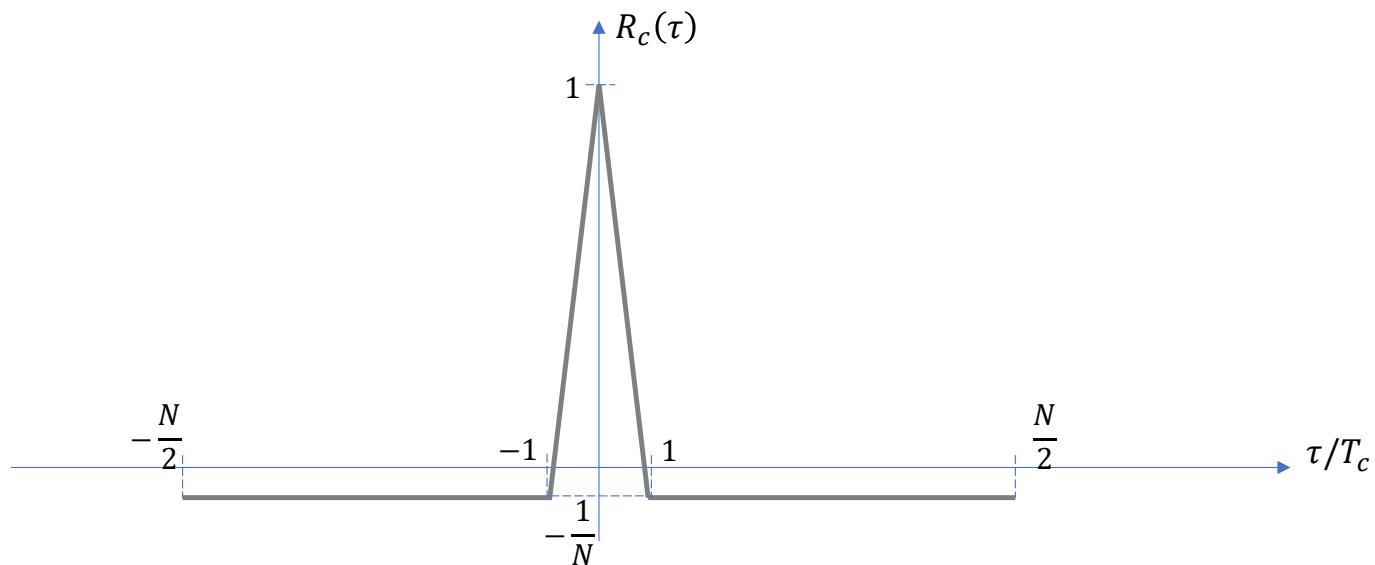
# Channel estimation via maximum-length sequences

EE161: Digital Communication Systems  
San José State University



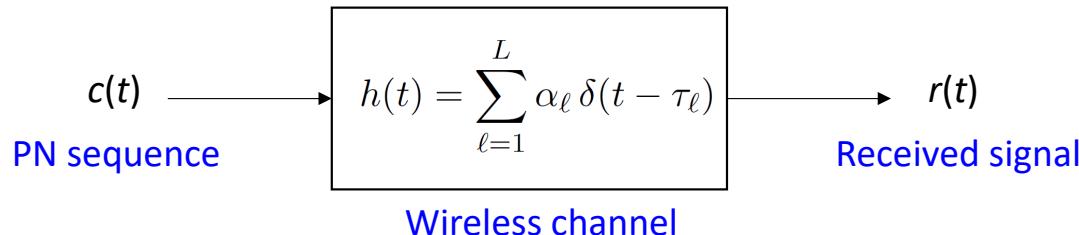
## Maximum-length (or pseudo-noise, PN) sequence

- A **PN** sequence is a BPSK rectangular-pulse sequence  $c(t)$  of length  $T = NT_c$  with good (“peaky”) autocorrelation:



See lecture note [16\\_1\\_note\\_PNsequence.pdf](#) and section 15.4 of the textbook

## Channel estimation using a PN sequence



(Cross-) Correlation between input  $c(t)$  and output  $r(t)$ :

$$R_{cr}(\tau) = h(\tau) \star R_c(\tau) = \sum_{\ell=1}^L \alpha_\ell R_c(t - \tau_\ell)$$

The receiver uses  $c(t)$  to compute the correlation with the received signal and uses peak detection to estimate the channel

## Example: Estimation of a two-path channel

