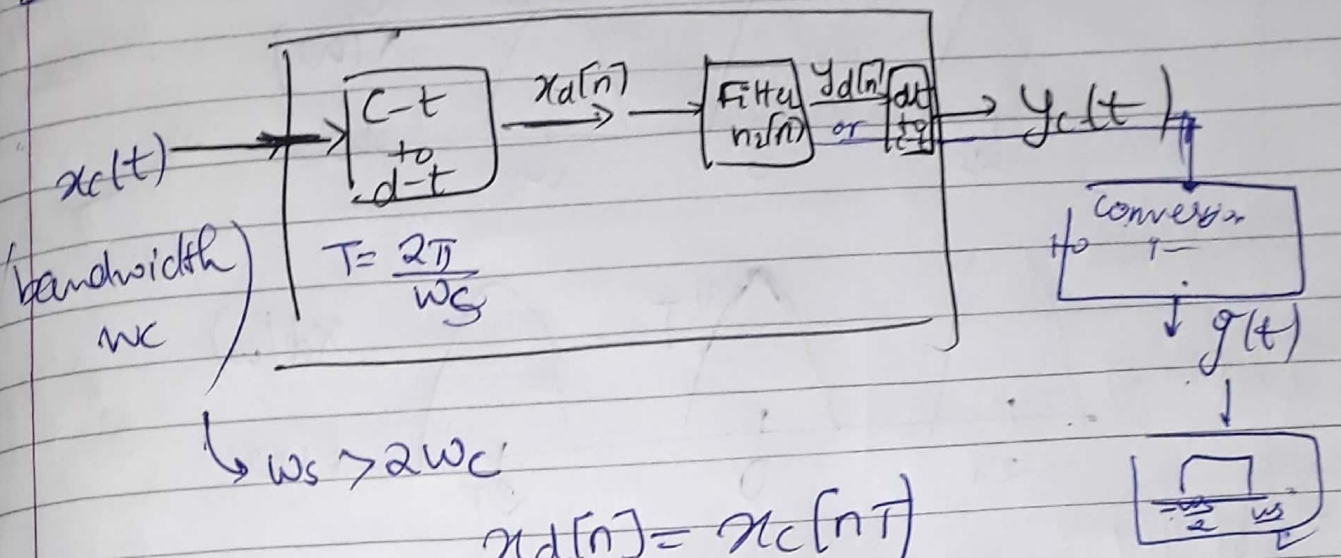
Discrete time processing of cont. time signals



$\hookrightarrow w_s > 2w_c$

$$x_d[n] = x_c[nT]$$

$$\tilde{x}(t) = x(t) \times \left(\sum_n \delta(t-nT)\right)$$

$$= \sum x(nT)\,\delta(t-nT)$$

$x_p \rightarrow \sum x_c(nT)\,\delta(t-nT)$

$x_d[n]$

$$X_d = \sum_{n=-\infty}^{\infty} x_d e^{-j\Omega n}$$

$x_c[nT]$

$$\hookrightarrow \tilde{X}(\omega) = \frac{1}{T}\sum_{k=-\infty}^{\infty} X(\omega - k\omega_s)$$

$$X(\omega) = \int \tilde{x}(t)\, e^{j\omega t}\, dt = \sum x_c(nT)\, e^{j\omega nT}$$

$\delta(t-nT) \rightarrow e^{j\omega nT}$

periodic replication with period w_s in C-T

$$\tilde{X}(\omega) = \sum x_c(nT) e^{j\omega nT}$$

$$X_d(\Omega) = \tilde{X}\left(\frac{j\Omega}{T}\right)$$

$$X_d(\omega) = \sum x_d[n] e^{-j\omega n} \quad \| \quad X_d(\omega) \sum x_c(nT) e^{j\omega n}$$

$\omega \rightarrow \omega t$

$$x_d(\omega t) \Rightarrow \tilde{X}(\omega)$$