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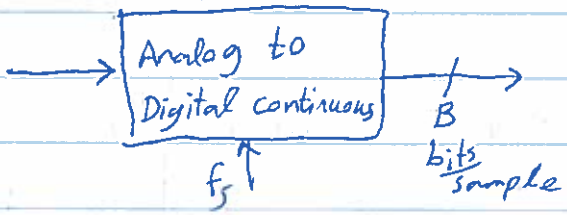
Notes by Mr. Houshang Salimian

Continuous_Time
Analog Signals
systems

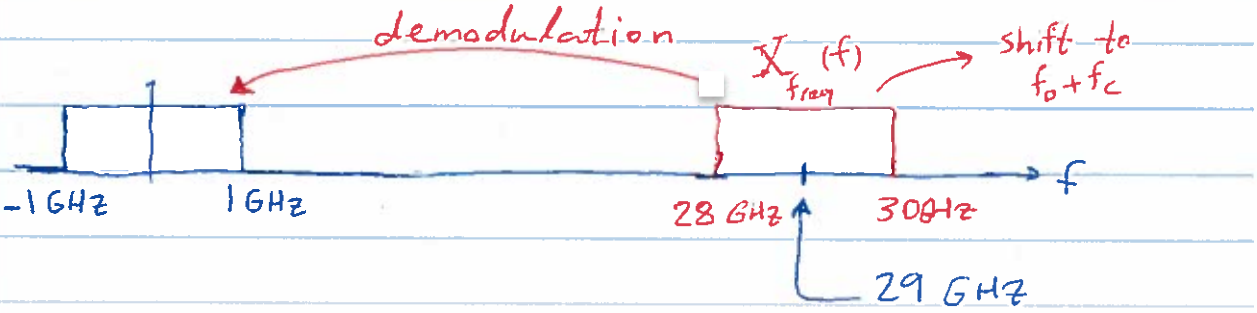
Discrete_Time
Digital signals
systems

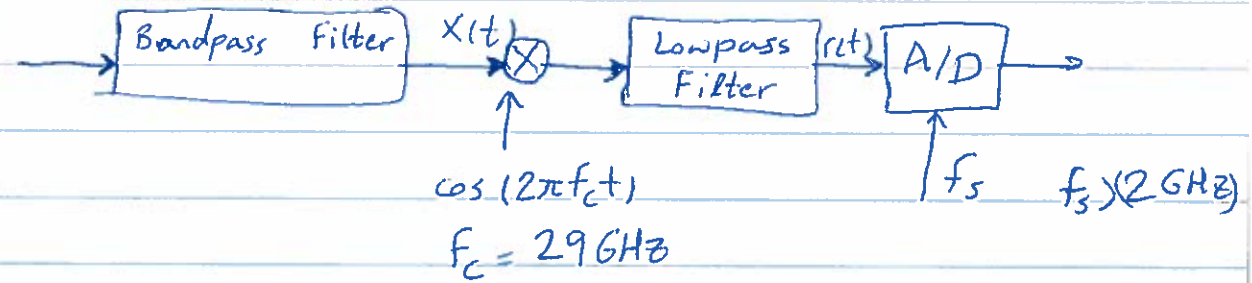
$f_s > 2 f_{max}$

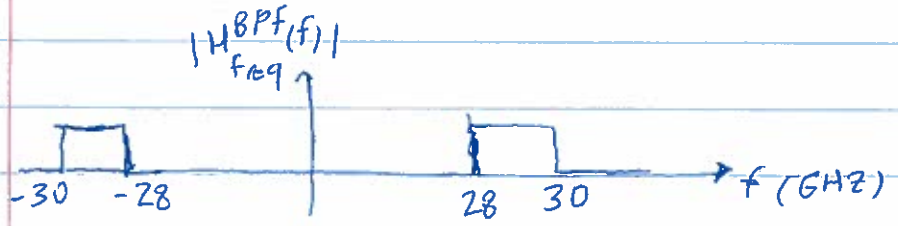


5G New Radio 28-30 GHz

- Demodulate using analog/RF circuits down to 0 Hz.







$$\cos(2\pi f_0 t)\cos(2\pi f_c t) = \left(\frac{1}{2}e^{-j2\pi f_0 t} + \frac{1}{2}e^{j2\pi f_0 t}\right)\left(\frac{1}{2}e^{-j2\pi f_c t} + \frac{1}{2}e^{j2\pi f_c t}\right)$$

$$= \frac{1}{4}e^{-j2\pi(f_0+f_c)t} + \frac{1}{4}e^{j2\pi(f_c-f_0)t} + \frac{1}{4}e^{j2\pi(f_0-f_c)t} + \frac{1}{4}e^{j2\pi(f_0+f_c)t}$$

$$= \frac{1}{2}\cos(2\pi(f_0 - f_c)t) + \frac{1}{2}\cos(2\pi(f_0 + f_c)t)$$

$\delta(t)$ → $\int_{-\infty}^{t}(\cdot)\,dt$ → $h(t)$

$$h(t) = \begin{cases} 0 & \text{if } t<0 \\ ? & \text{if } t=0 \\ 1 & \text{if } t>0 \end{cases} = u(t)$$