CH.5

Amplitude modulation

* Modulation is required to to change the frequency of the transmited signal so that we can build an anttena with practical physical length
* from electromagnetic theory the physical length for efficient anttena that results in efficient electromagentic radiation is given by

$$L = \frac{\lambda}{4}$$

for example If we want to transmit a signal whose frequency is f = 4kHz, then the physical length of the anttena is

$$L = \frac{\lambda}{4} = \frac{c}{4f} = \frac{3 \times 10^8}{4 \times 4 \times 10^3} = \frac{300}{16} \text{ km}$$

which is impractical length

* In order to reduce the physical length of the antenna we use modulation to increase the frequency of the transmitted signal

5.1 Amplitude modulation

Suppressed Carrier

* The general equation for the Carrier is give by

$$\phi(t) = a(t)\cos\theta(t)$$

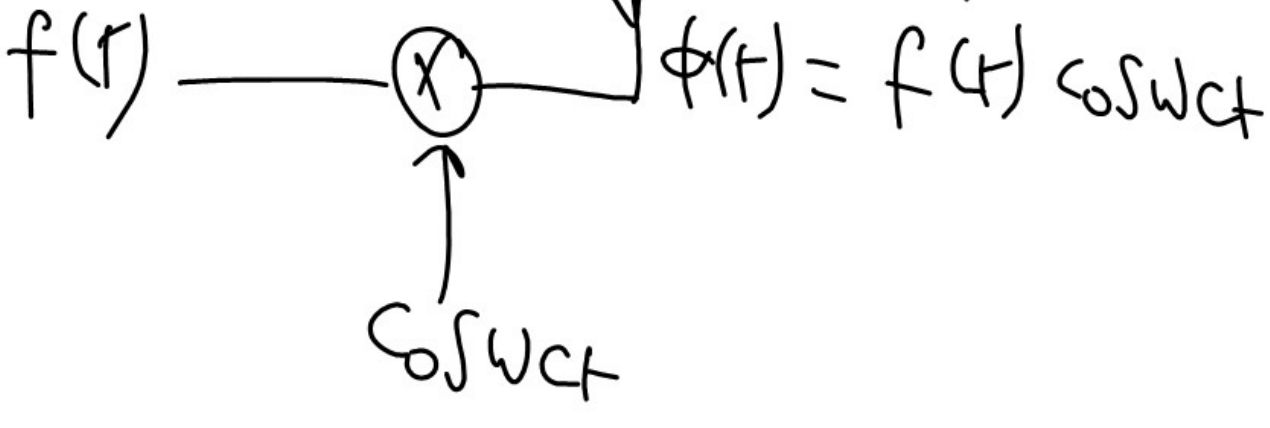
* If we made the amplitude of the carrier to vary according our information signal, then, we have amplitude modulation
* The amplitude of the carrier is given by $a(t)$
* To make amplitude modulation, we simply take the information signal $f(t)$ and multiply by the carrier as illustrated mathematically by

$$\phi(t) = f(t)\cos(\omega_c t + \theta_0)$$

assume $\theta_0 = 0$

$\theta(t)$

* The amplitude modulation can be illustrated by the following block diagram



* We can analy the amplitude modulation both in time and in frequency as shown