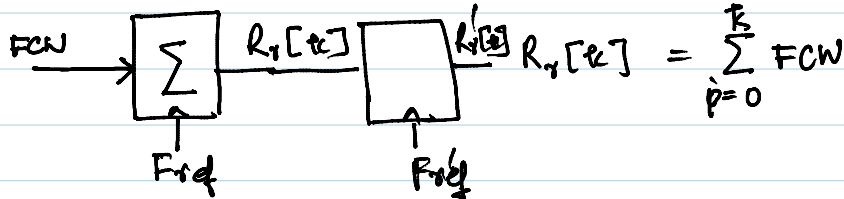


# All digital fractional-N PLL

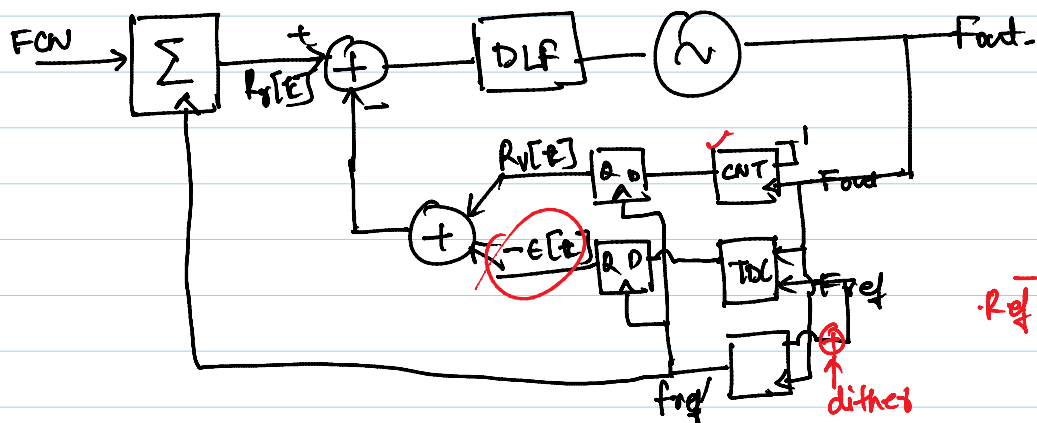
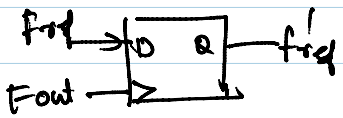
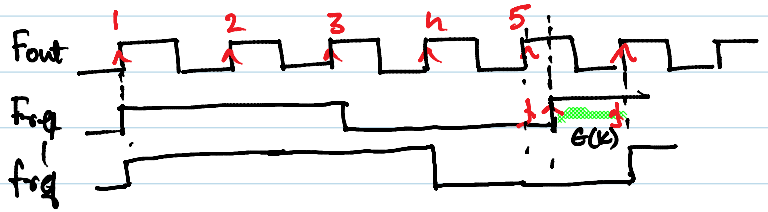
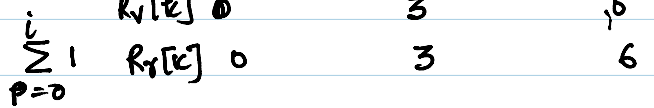
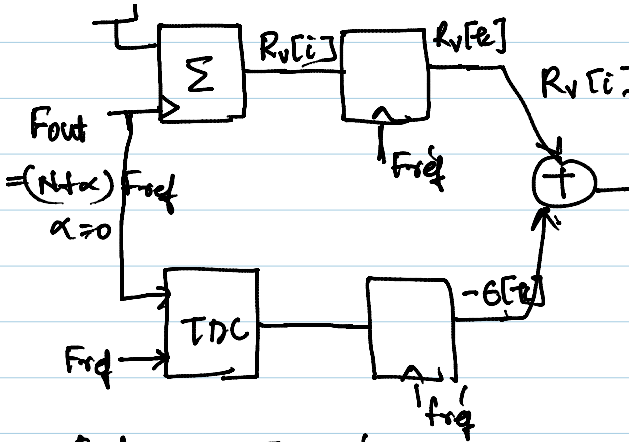
$$F_{out} = (N + \alpha) F_{ref}$$

$$T_{ref} = (N + \alpha) F_{out}$$

⇒ In 1 reference cycle, we count  $(N + \alpha)$  VCO cycles



$$FCW = N\alpha$$



$T_{vco} = 200ps$   
 $t_d = 10ps$  TDC unit delay

