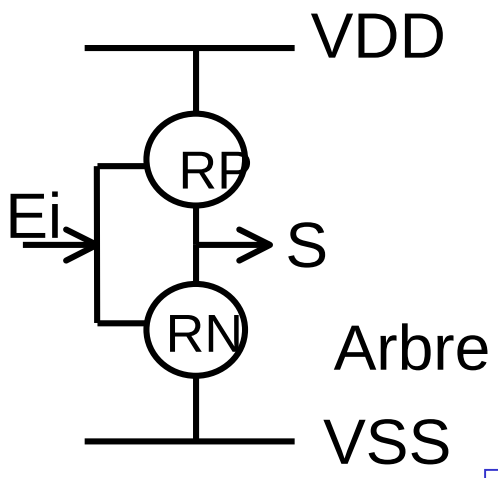
Contraintes de Stabilité

Analyse Temporelle

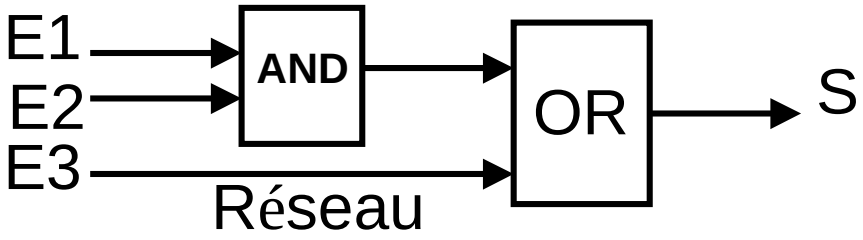
MASTER ACSI M2

Habib MEHREZ

Arbres et réseaux combinatoires



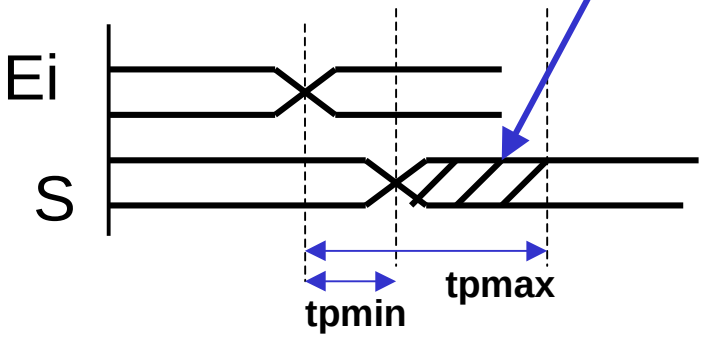
$Tp_{min}(Ei \rightarrow S)$, $Tp_{max}(Ei \rightarrow S)$



Tpmin~Tpmax

Instabilité

Tpmin<>Tpmax

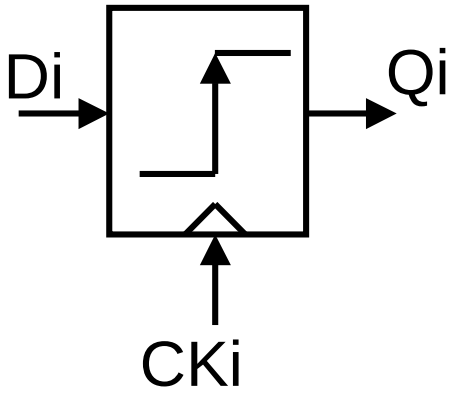


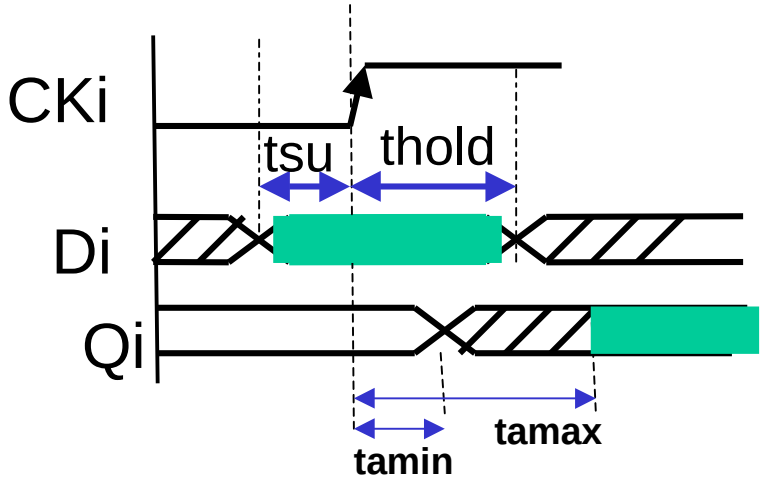
Cas général

Tpmin(Ei→Sj)=Min($\sum$ tpmin_chemins)

Tpmaw(Ei→Sj)=Max $\sum$ tpmax_chemins)

Portes séquentielles





Tsu: Setup time (temps de pré-établissement) tsu(Di/CKi)

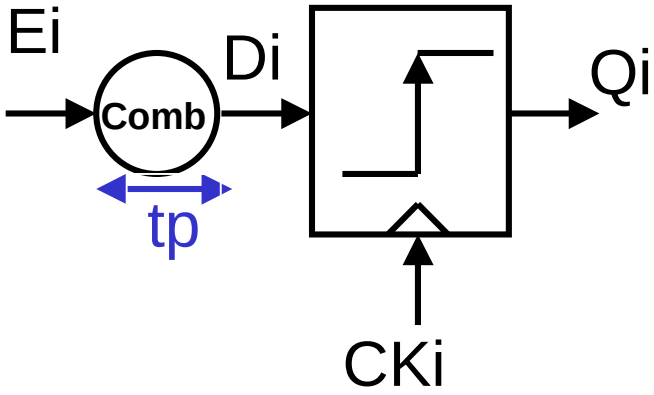
Th: Hold time (temps de maintien) th(Di/CKi)

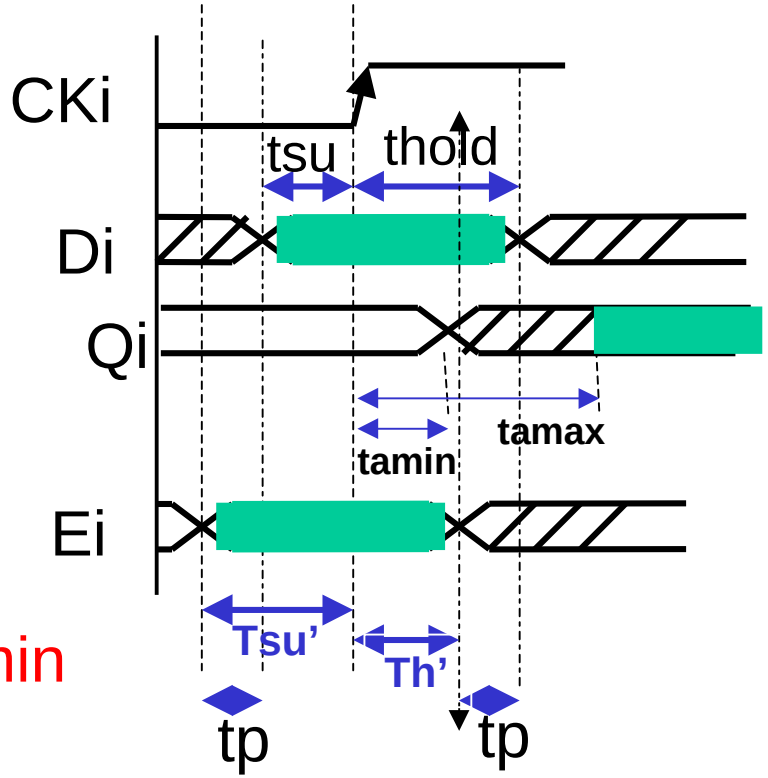
Ta: Access time (temps d'accès) ta_min(CKi→Qi)

Ta: Access time (temps d'accès) ta_max(CKi→Qi)

En pratique ta_min(CKi→Qi)=ta_max(CKi→Qi)

Contraintes temporelles: Retard sur les données

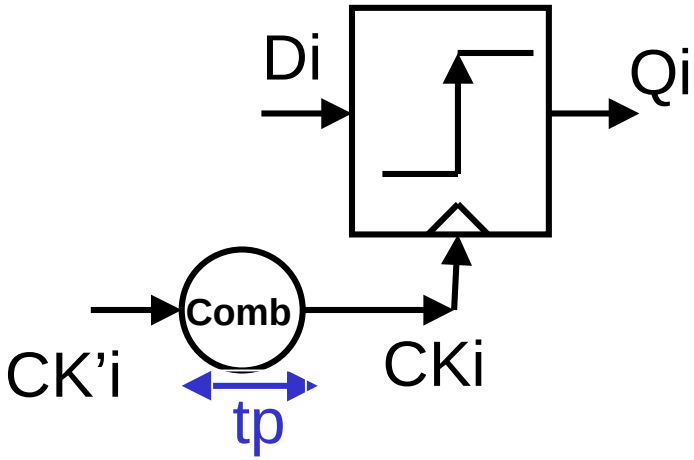


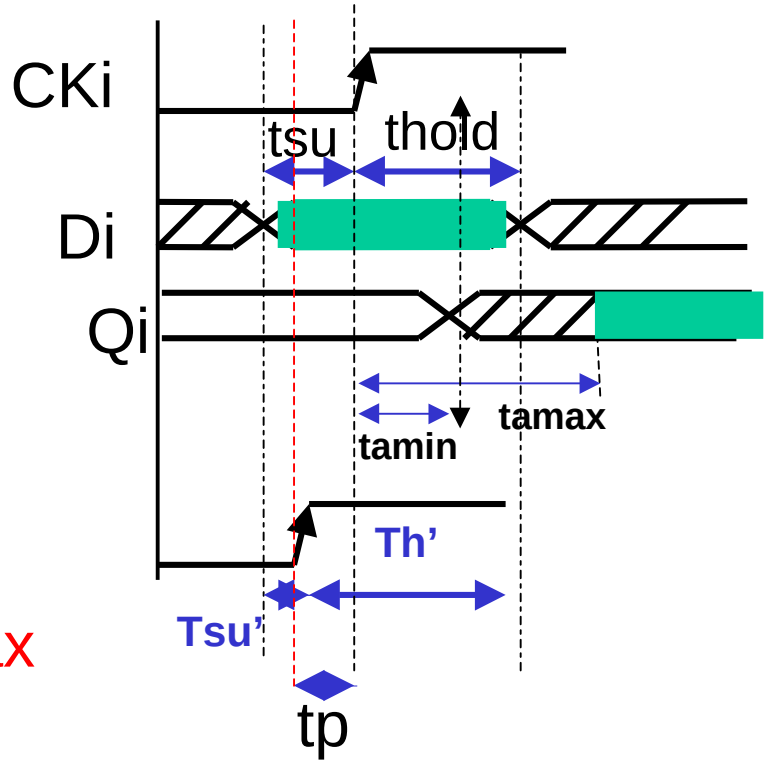


Tsu' > tsu+tpmax > tsu+tpmin

Th' > th-tpmin > th-tpmax

Contraintes temporelles: Retard sur l'horloge

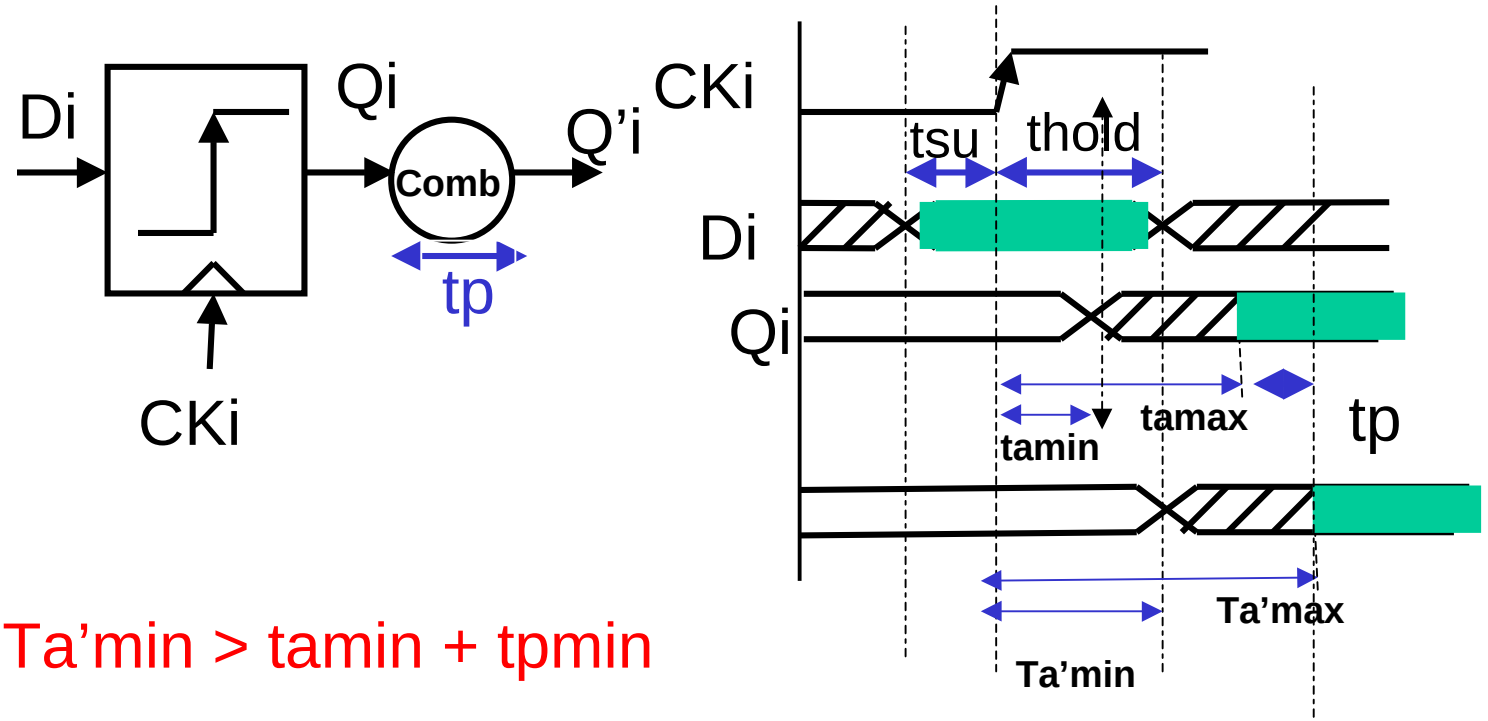




Tsu' > tsu-tpmin > tsu-tpmax

Th' > th+tpmax > th+tpmin

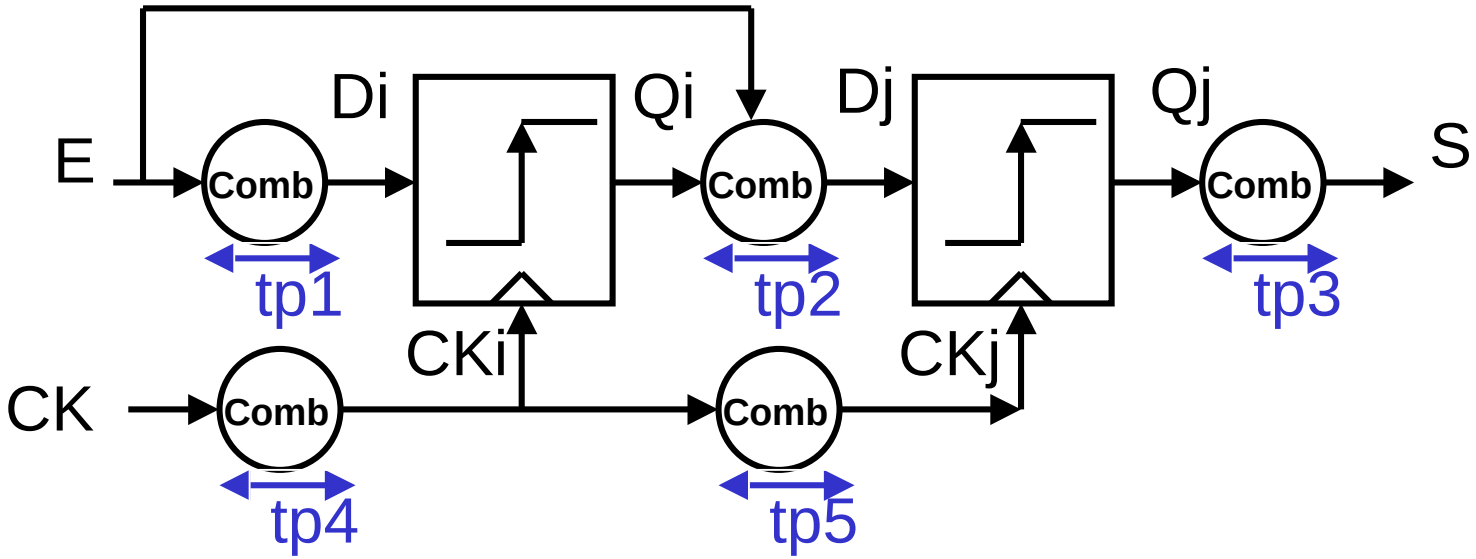
Contraintes temporelles: Retard sur l'horloge



Ta'min > tamin + tpmin

Ta'max > tamax+tpmax

Contraintes temporelles: Cas général



Définir pour chaque:

Entrée E, tsu(E/CK) et tH(E/CK) ?

Sortie S, ta_min(CK→S) et ta_max(CK→S) ?

Contraintes temporelles: Cas général

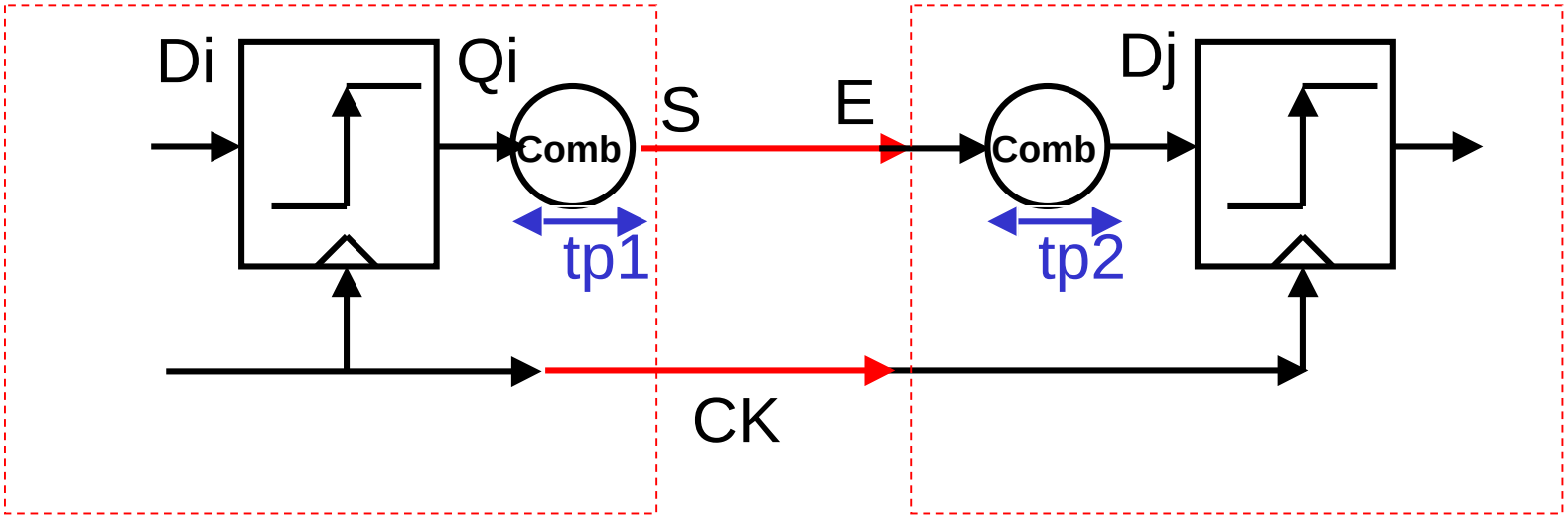
$$Tsu(E/CK)=Max\_chemins\_i \{tsu(Di/Cki) + tp\_max(E\text{-->}Di) - tp\_min(CK\text{-->}Cki)\}$$

$$Th(E/CK)=Max\_chemins\_i \{th(Di/Cki) - tp\_min(E\text{-->}Di) + tp\_max(CK\text{-->}Cki)\}$$

$$Ta\_max(CK\text{-->}S)=Max\_chemins\_i \{ta\_max(Cki\text{-->}Qi) + tp\_max(Qi\text{-->}S) + tp\_max(CK\text{-->}Cki)\}$$

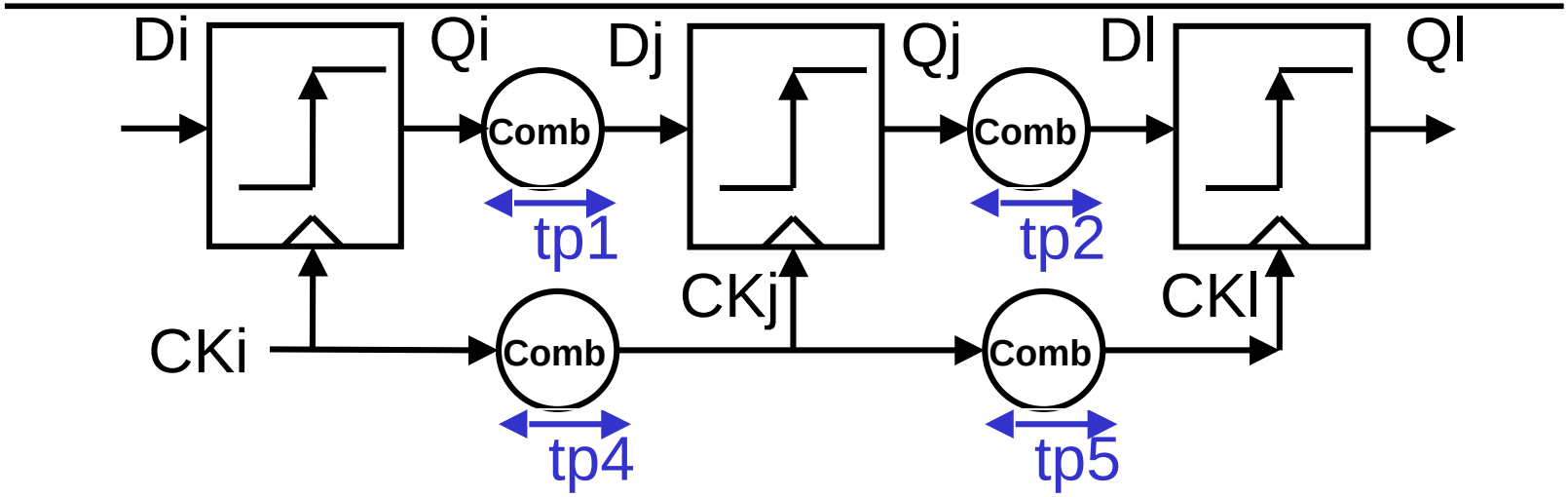
$$Ta\_min(CK\text{-->}S)=Min\_chemins\_i \{ta\_min(Cki\text{-->}Qi) + tp\_min(Qi\text{-->}S) + tp\_min(CK\text{-->}Cki)\}$$

Contraintes temporelles: Cas général



Tcycle > ta_max(CK-->S) + tsu(E/CK)

Contraintes temporelles: Temps de cycle, Cas général



Chaîne longue------>Temps de cycle

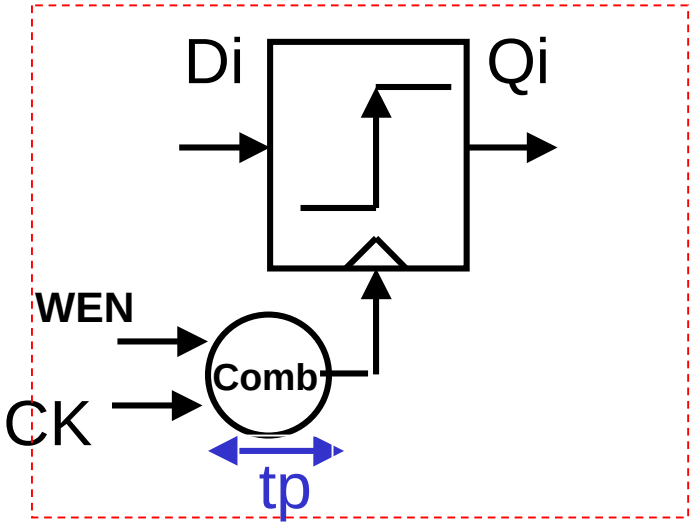
$\forall$ Ij , Tcycle > ta_max(Cki-->Qi) +tp_max(qi-->Dj) + tsu(Dj/CKj) + tp_max_CKij

Chaîne Courte couple j et l

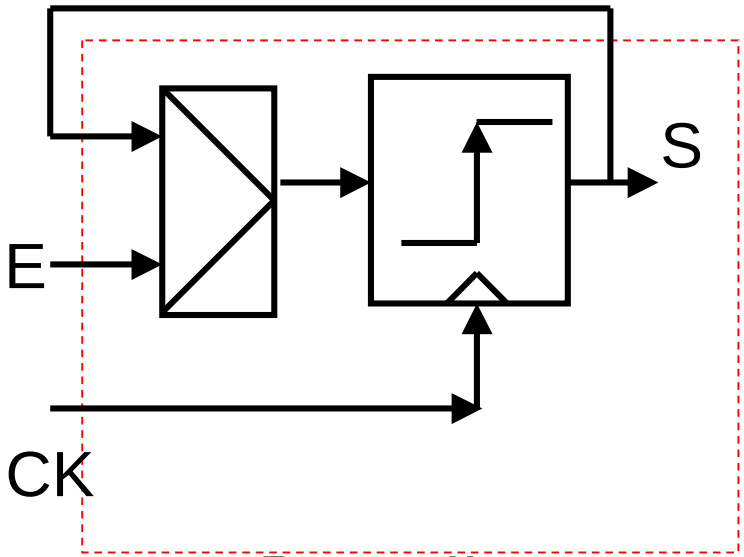
ta_min(Ckj-->Qj) +tp_min(qj-->Dl)> th(Dl/CKl) + tp_max_CKij

Contraintes temporelles: Ecriture conditionnelle dans les registres

2 Solutions:



Mauvaise!!

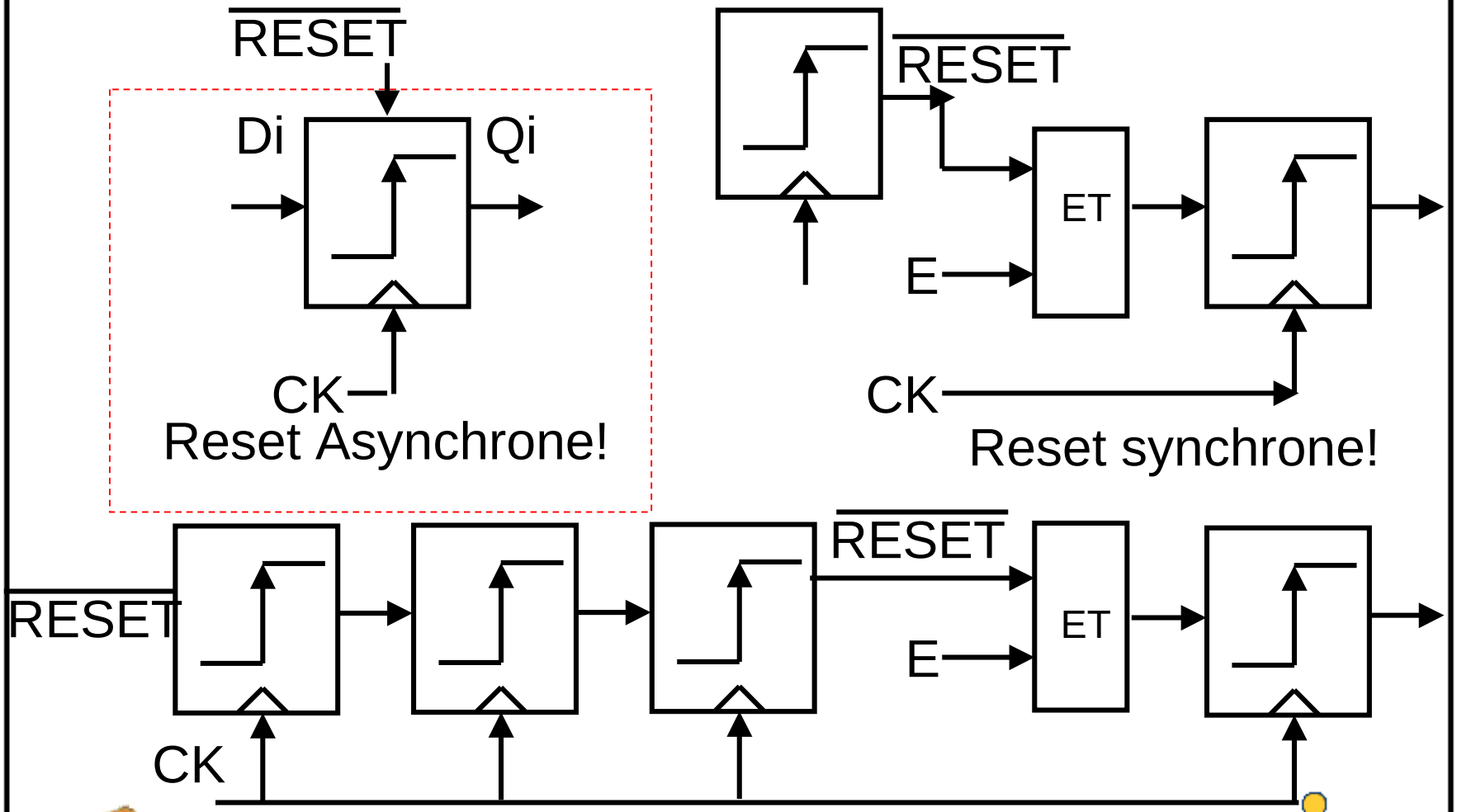


Bonne!!

Tp ---> Skew sur l 'horloge

Contraintes sur WEN

Contraintes temporelles: Initialisation, Signal RESET



Contraintes temporelles: Signaux de commande

Priorité TEST > RESET > WEN