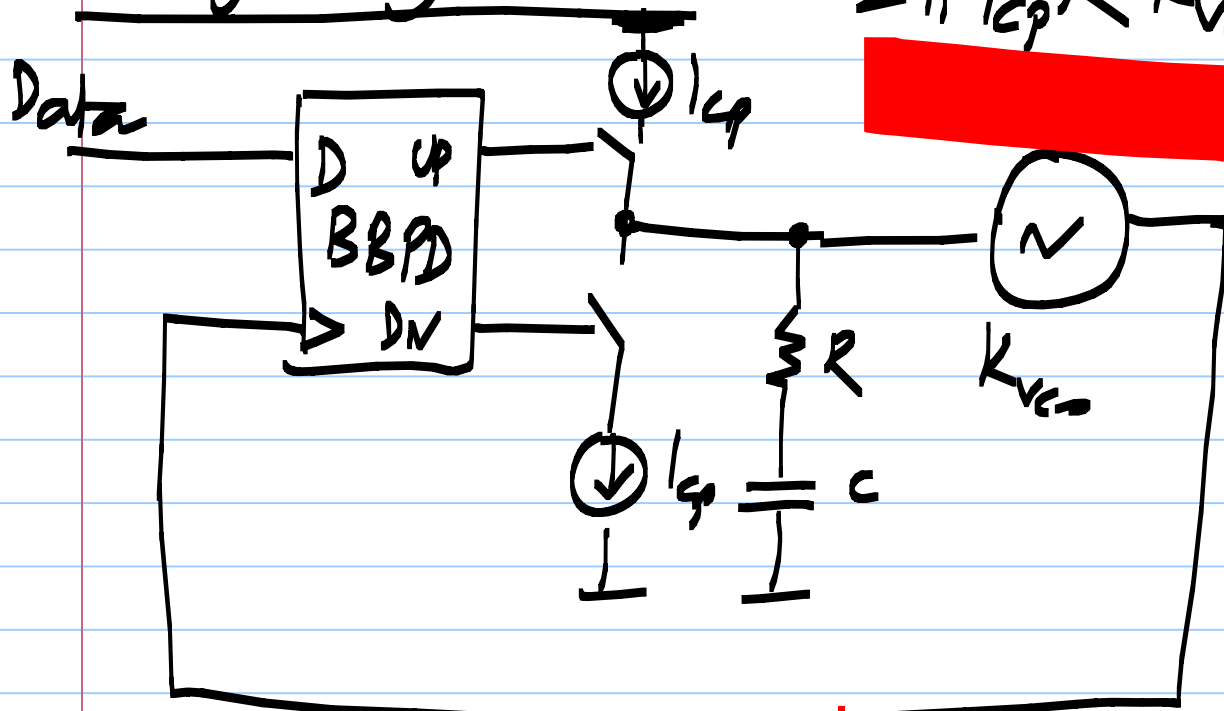


Bang-bang jitter

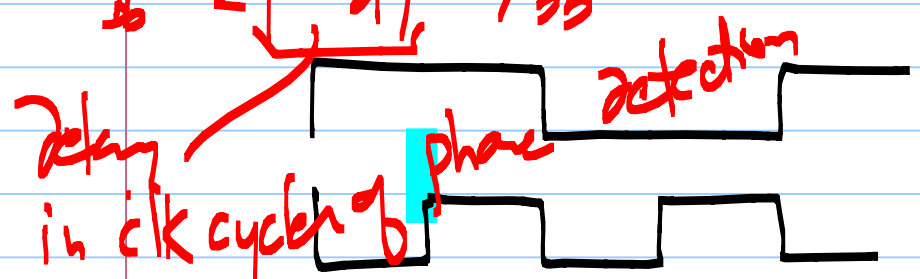
$$I_{cp} R \cdot K_{vco} = f_{bb} \text{ (freq. jump)}$$

$$2\pi I_{cp} R K_{vco} T_s = 2\pi f_{bb} T_s = \phi_{bb}$$

(phase shift in 1 period)

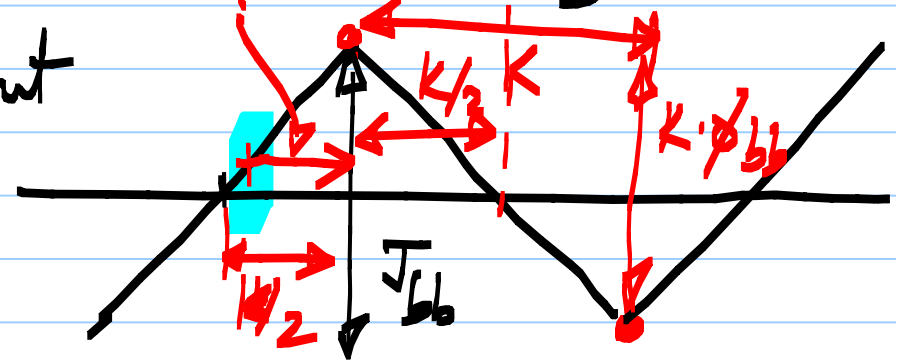


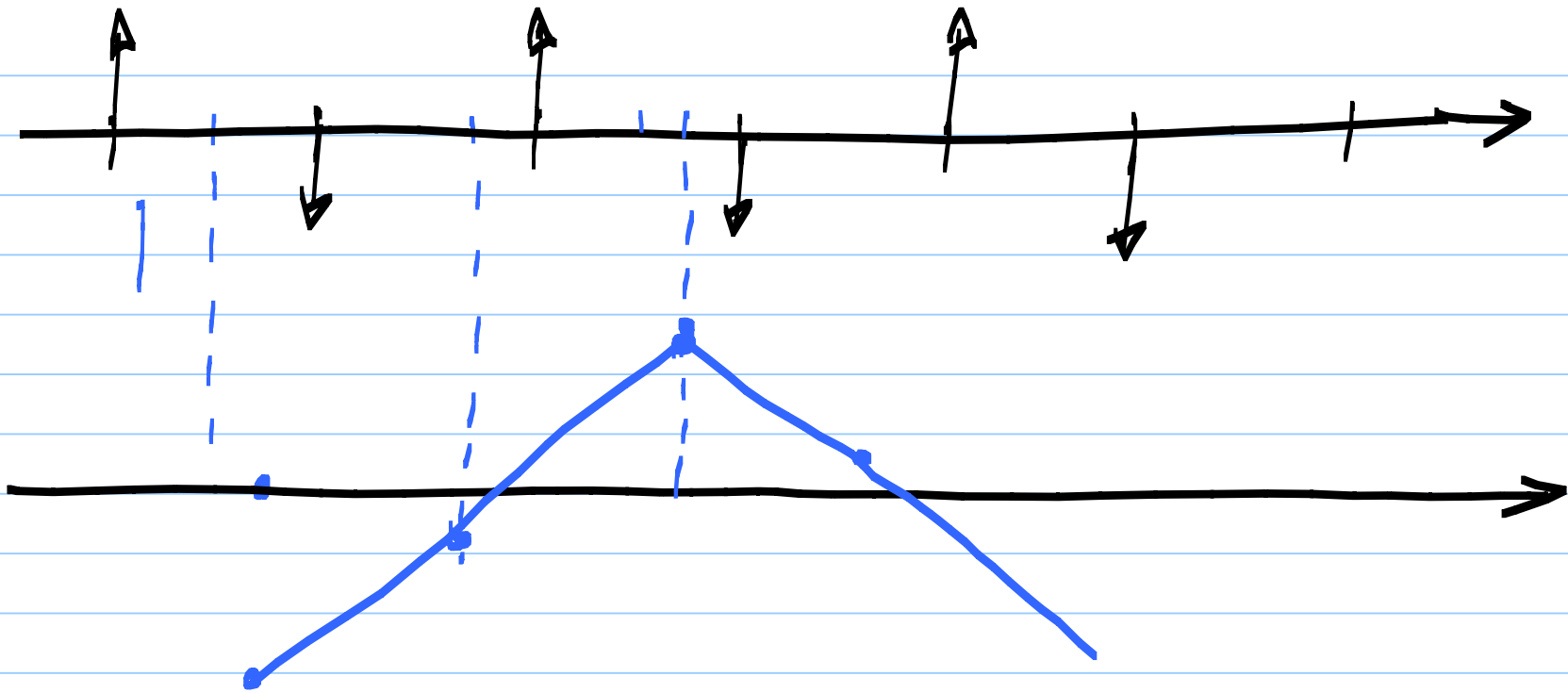
$$J_b = 2 [N_d] \cdot \phi_{bb} \quad N_d > 1/2$$

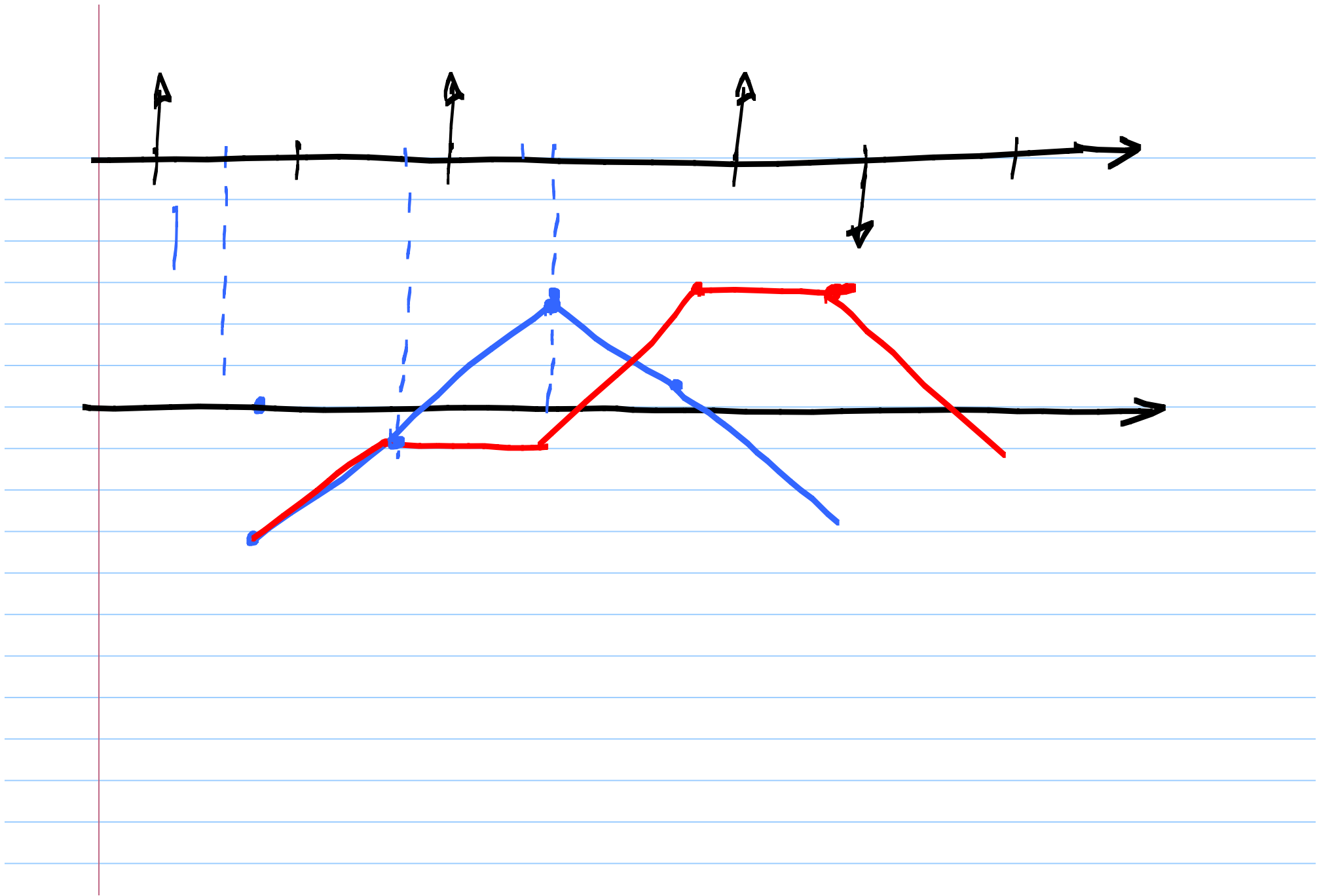


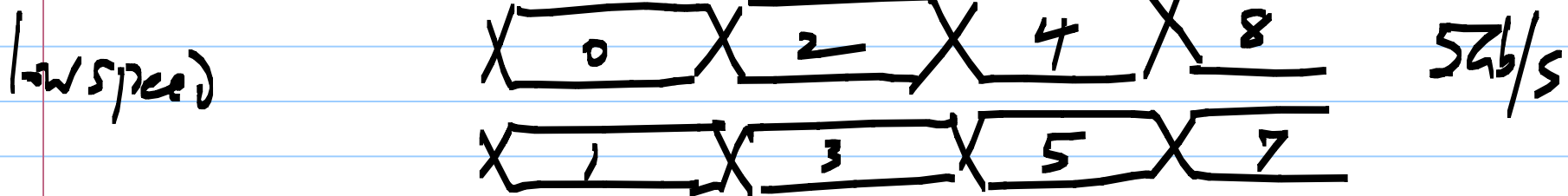
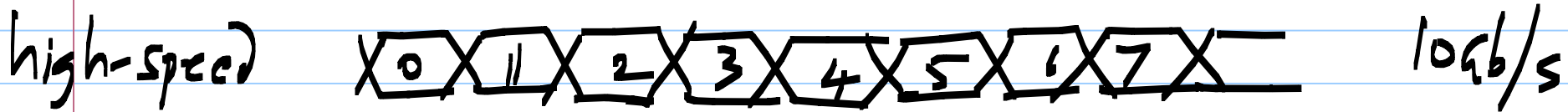
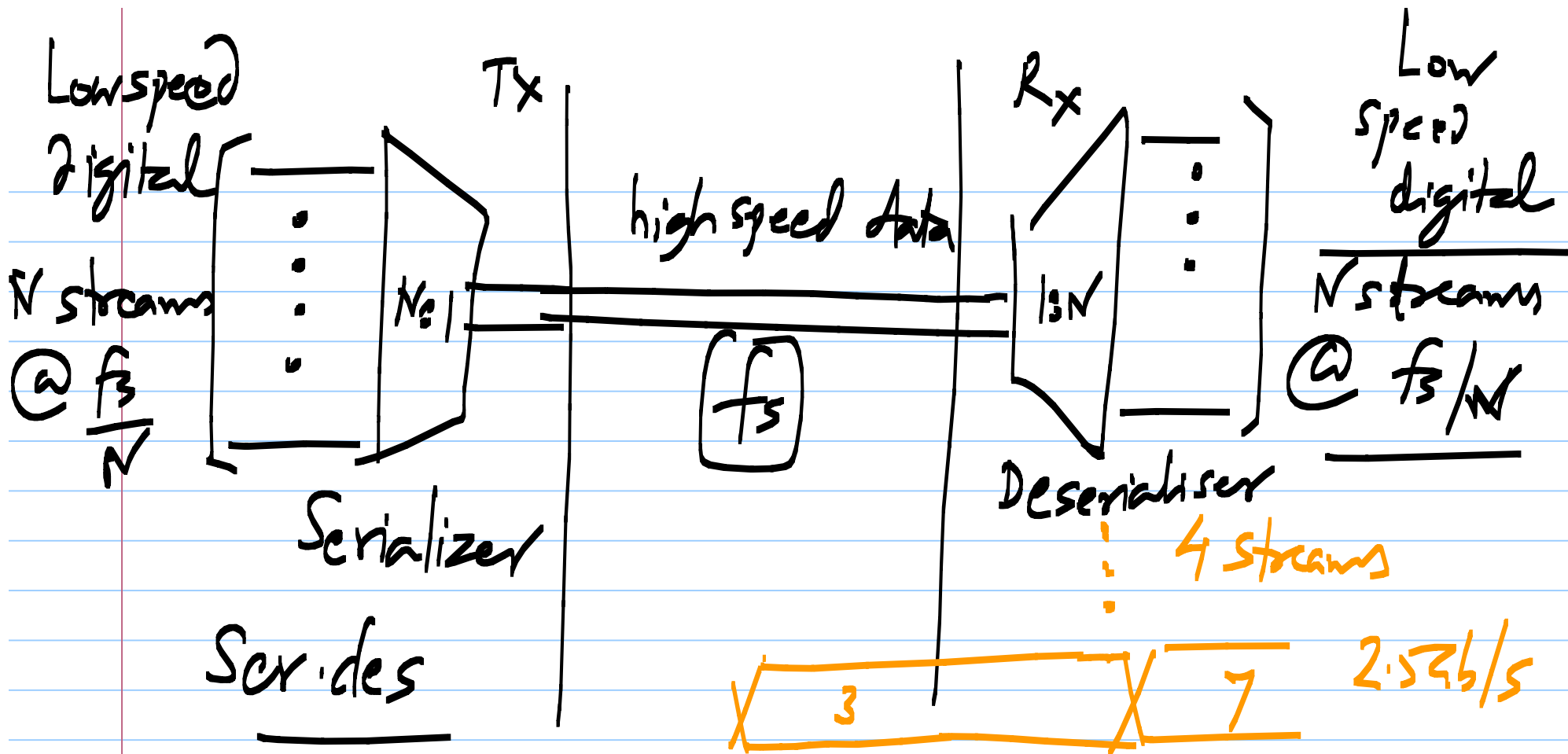
phase detection latency ($> 1/2$)

Alternating data









~~M0 M1 M2 M3 M4 Mn~~

