Why You Need a P/DLL
DLL Simplified Linear Model

A Warning…
PLL Linear Model

Ref_clk (from crystal) → PFD → Loop Filter → VCO → Clk

Fb_clk → ÷N

PLL Linear Model cont’d
PLL Transfer Function

Phase Detectors

- Basic idea: create pulses with width $\alpha$ to phase difference
Another Warning

- Initial frequencies may be very different...
A Final Warning

- Look at control voltage waveforms:

Higher Order Loop filter