Phase Interpolator Basics

- Key idea:
  - Add together 2 (or more) signals with different phase
  - Get 1 output with phase in between the 2 inputs
“Inverter”-Based PI

Practical Issue #1
• 360 degree programming range?
  • Can’t really interpolate between clk and clk_b
• Solution:

Lower Power PI
• CML-based (Maneatis) PI decouples DR from signal path

Practical Issue #2
• How much power will a 6-bit inverter-based phase interpolator take?
  • How about a 7-bit, 8-bit, etc.? 

Practical Issue #3
• CML-based PI good for power, but still usually want to use inverter-based ring
  • Need to map ring Vc into CML Vc...
  • A hack, but works OK (with enough programmability)

Practical Issue #4
• Typical PI phase vs. control code:
“Fully Balanced” Design

• Embed MUX into interpolation stage
  • (Similar to double-balanced Gilbert quad)

Another Approach: Injection Locking

Injection Locking cont'd