# Fixed-phase mesochronous CDC

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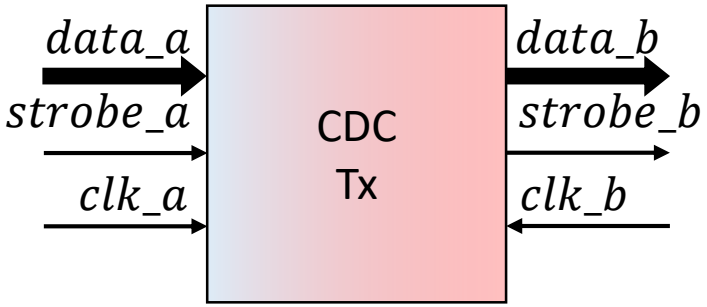
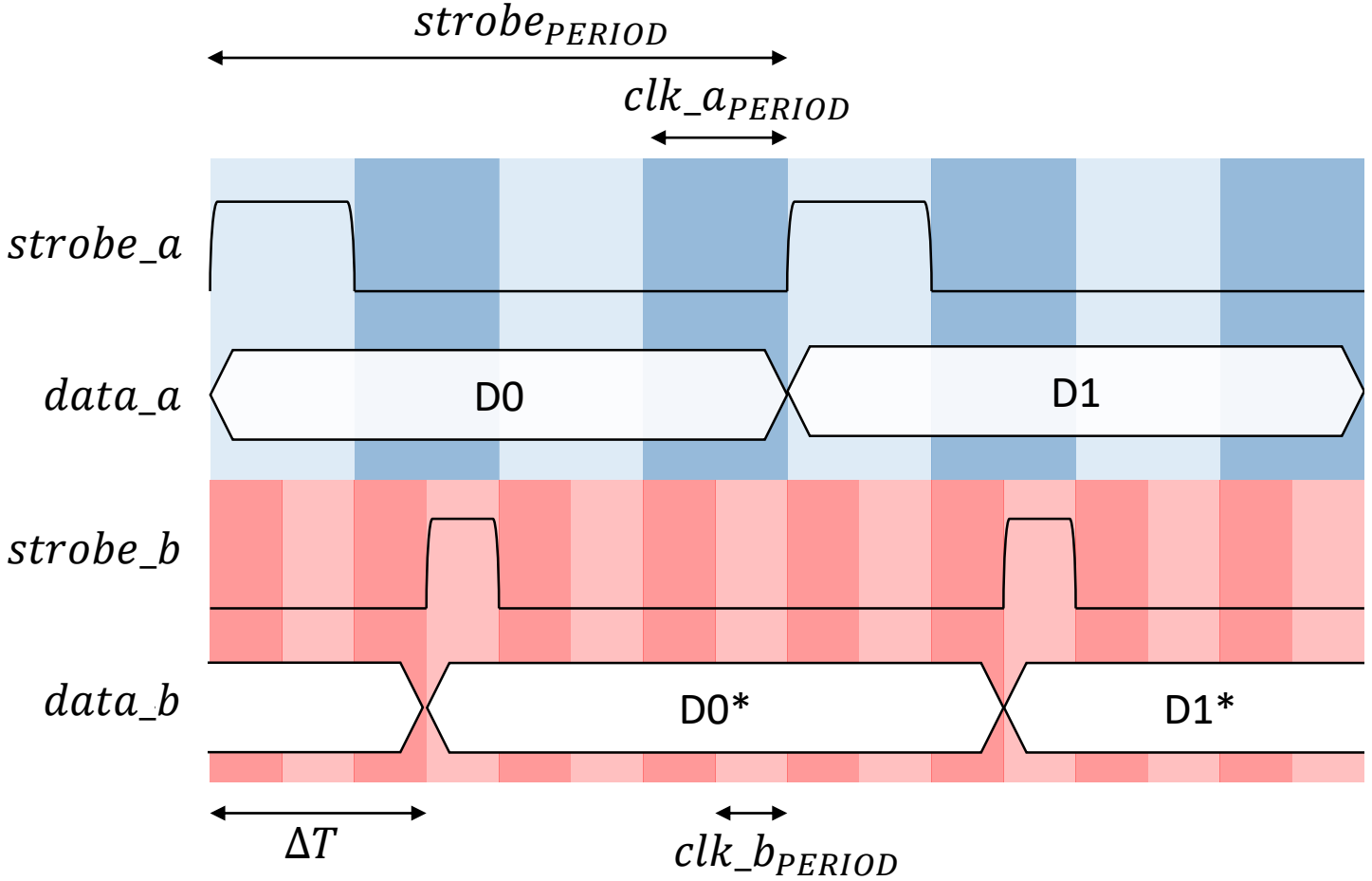
# cdc_tx (downlink)

- Requirements:
  - (1) Dn = Dn* (n=0,1,2,3,…)
  - (2) $\Delta T$ does not changes with resets



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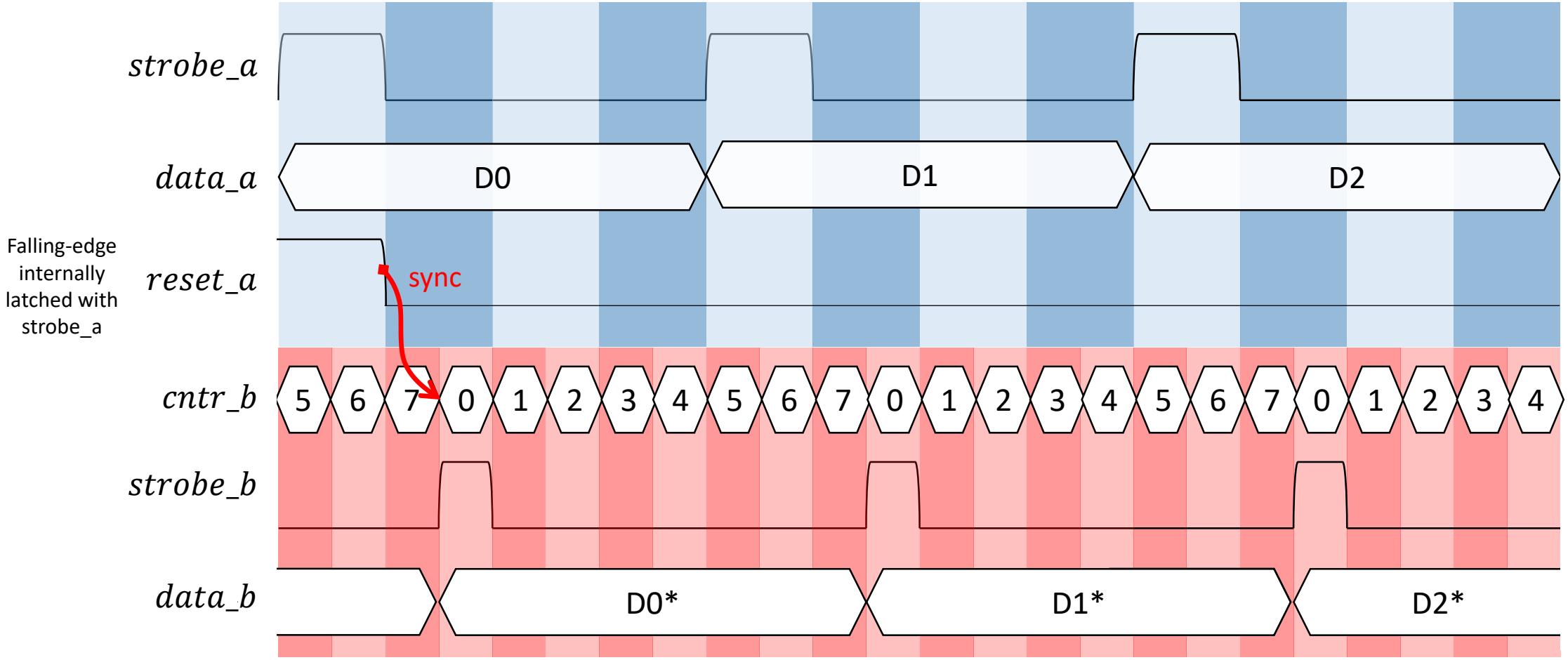
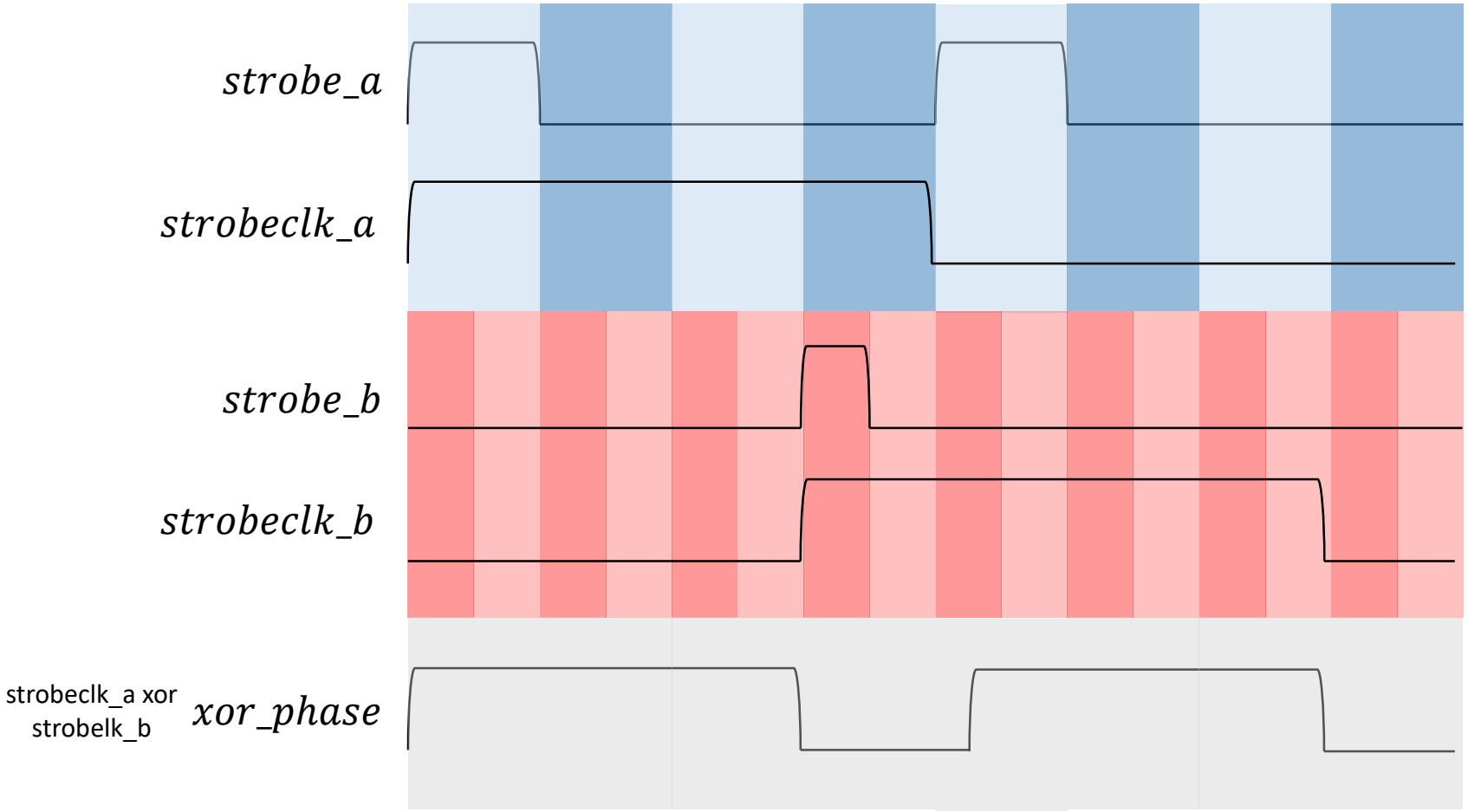


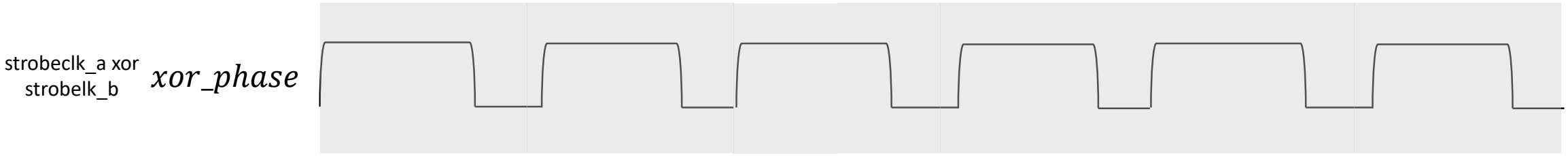
# cdc_tx (downlink)

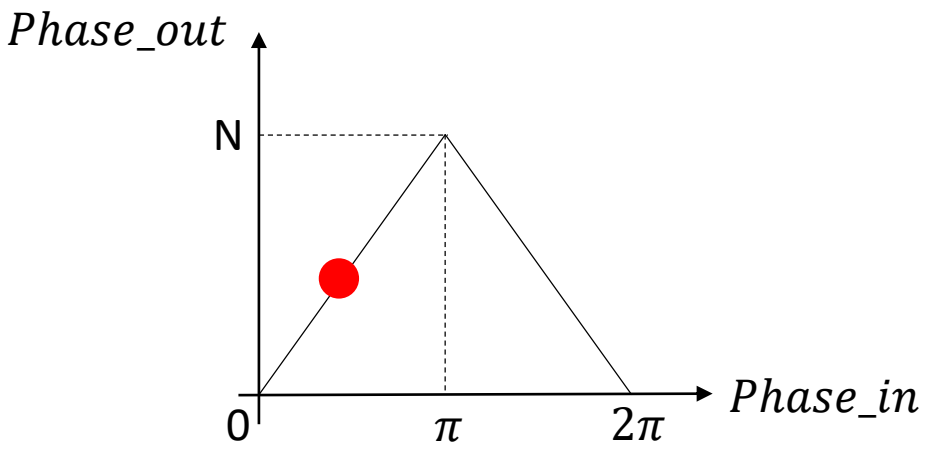
- Requirements:
  - (2) $\Delta T$ does not changes with resets: measure phase between strobe_a - strobe_b



# cdc_tx (downlink)

- Requirements:
  - (2) $\Delta T$ does not changes with resets: measure phase between strobe_a - strobe_b
    - Sampling xor_phase and accumulating xor with an asynchronous clock leads to a phase measurement (0-N)




ALGORITHM

- Capture phase for first reset: phase0
- For further resets:
  - If phase > phase0+clk_b_period/2
    - Retard strobe
  - If phase < phase0-clk_b_period/2
    - Advance strobe

# cdc_tx (downlink)

- Summary
  - This technique ensures reliable data-transfer (appropriate max_delay constraint is recommended)
  - It does not require fine phase-shifting capability which is very inconvenient for designs featuring hundreds of links in a single FPGA
  - It can ensure fixed-phase operation (‘memory’ required)
  - Extensively verified in simulation for different cases

# cdc_rx (uplink)

- Slightly different scheme (simplified) supporting also fixed-phase operation
  - Why different?
    - strobe_b is an input (fixed to 1 for 40MHz)