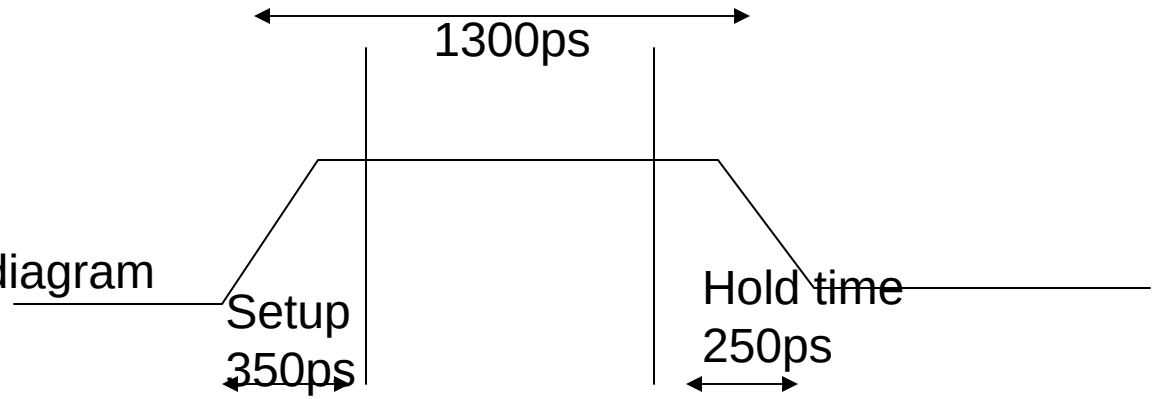
# HBD FEM Progress

- The Cypress clock fan-out chip is obsolete. We also have trouble with D0 Cal L1 Trigger we build.
  - It is clear to us, jitter on the clock play major roles in the high speed serial data.
  - The original clock tree of the HBD FEM is
    - LVDS -> Stratix FPGA (PLL) -> TTL clock fanout -> ADC
  - The new clock tree is
    - PECL -> PECL fanout -> PECL receiver + Stratix -> ADC
    - Brought in additional clock phase bit.

Clock Jitter

Data timing diagram




We receive the ADC data in Stratix. The ADC data running at 720 MHz

The ADC provide 360 MHZ clock, input clock is 60 MHz

Stratix phase lock loop (PLL) double the clock to 720 MHz. It use 720 MHZ clock to clock in the serial data into 12 bits word. The PLL smooth out the short term jitter on the clock.

Jitter budget

ADC has 8 output. The layout path length difference is 100ps

The Stratix PPL jitter budget is 100 -200 ps.

The clock jitter from GTM is

< 100ps random jitter

~ 450ps total jitter

It is unclear to me that how much GTM jitter will translate to ADC jitter.

The new design remove the contribution from transport the clock from GTM to the ADC

# What else happened

- We have a phone conference with Texas Instrument engineers (Japan, India, Dallas, NJ, NY) to discuss the jitter issues on the ADC.
  - The ADC will be officially released by August next month. The datasheet will be released at that time.
  - They will send us 14 ADC samples from the production lot
  - We discuss varies jitter issues
  - They suggest us to back terminated the ADC LVDS data lines ( layout changes) and use 6ma current setting on the LVDS output
    - Better rise time and receiver pulse shape at Stratix end.
    - Also avoid refection that cause problem on the ADC end.

# Outlooks

- Clock modification is done.
- Adding terminator resistors to the layout.
- Layout should go out early next week.
- Clock fanout boards is almost ready.
- Our old money contract term is expired.
  - New money is somewhere between BNL/Columbia
  - Ed O’Brien is extending the old contract.
    - The assembly order can not be processed till either old contract extension or new money shows up.