KOTO CDT Module
Status Report

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New CDT - Block Diagram – 8/27/2016

• 1:16 Fan Out Card for LIVE, 125MHz Clock, L1A.
• Service all 16 ADCs in the Crate
• 6U VME Double Width

Minor changes to the Old MT Board:
• Same FPGA
• Same TLK chips

The Changes are:
• 4 TLK Chips
• 16 x RJ45 to ADCs
• 2 x RJ45 to Master
• Clock Jitter Cleaner
New CDT Module Features 8/27/2016

• 1 to 16 Fan-Out Module for 125MHz Clock, LIVE, L1A;

• Replaces the Fan-Out Crate with Modules placed in the ADC Crates;

• Jitter Cleaner: better signal integrity;

• Fully Compatible with Existing and Future (ATCA based) L2 System;

• Doesn’t Require any Change in L2 Firmware or Hardware.
New CDT - Block Diagram

Schematic Finished:
http://edg.uchicago.edu/~bogdan/KOTO_Crate_Distribution_Module/schematics.html
New CDT – Layout: 6U-Double Width

- 2 x Optical Links
- 2 x RJ45:
  - 3-In, 1-Out
  - 1-In, 3-Out
- 16 x RJ45 Fan-out
  To 16 ADC Boards
  Each RJ45: 1-In, 3-Out

LED
JTAG

Layout Finished
Combinations of System and Local Clocks are possible; Clock applied to all FPGA sides will allow future firmware developments.
Before each L1A, Cluster Bits from CsI ADCs are collected by the Crate’s new CDT, via the existing CAT6 cables. All Cluster Bits are gathered into one single CDT, where the Cluster Numbers are calculated, and sent to MASTER. L1A Decision is made inside Master.

CLUSTER Trigger Function is Separate from the Fan Out
CLUSTER Trigger with the new CDT Module 10/13/2016

Trigger Veto Latency: 60-80 clocks
Trigger Veto Down Time: ~20 clocks (0.28% of 35K/spill L1R)

LVDS-625Mbps:
Cluster Bits from CsI ADCs

O/L 2Gbps
New Trigger Module
12 x Optical Links
6U – Double Width

Top Trigger Veto

1 x 32 Fan Out Board

1 Cable
L1 125MHz LIVE

LVDS-625Mbps:
20bits / 4 clocks
320bits / 20 clocks

MASTER
How Cluster Trigger Works

- A Shorter Pre-L1A pulse is sent to ADCs, 300 clocks before the actual L1A pulse;
- ADCs calculate the Cluster Bits (one bit per channel);
- Cluster Bits are sent from ADCs to CDTs via RJ45-LVDS Output;
- All Cluster Bits are collected into Top Trigger Veto Module (TTV);
- TTV sends Cluster Numbers to Master, along with a Trigger Veto (TV) pulse;
- Master uses Cluster Numbers to issue L1A.

If two Pre-L1A pulses come within 20 clocks, the 2nd one is ignored and the corresponding L1A pulse is generated without Trigger Veto. No Data is discarded.
KOTO CDT Module

• Questions
• Comments
• Conclusions