WBS 6.1.3
Pixel Communication & Services

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SLAC
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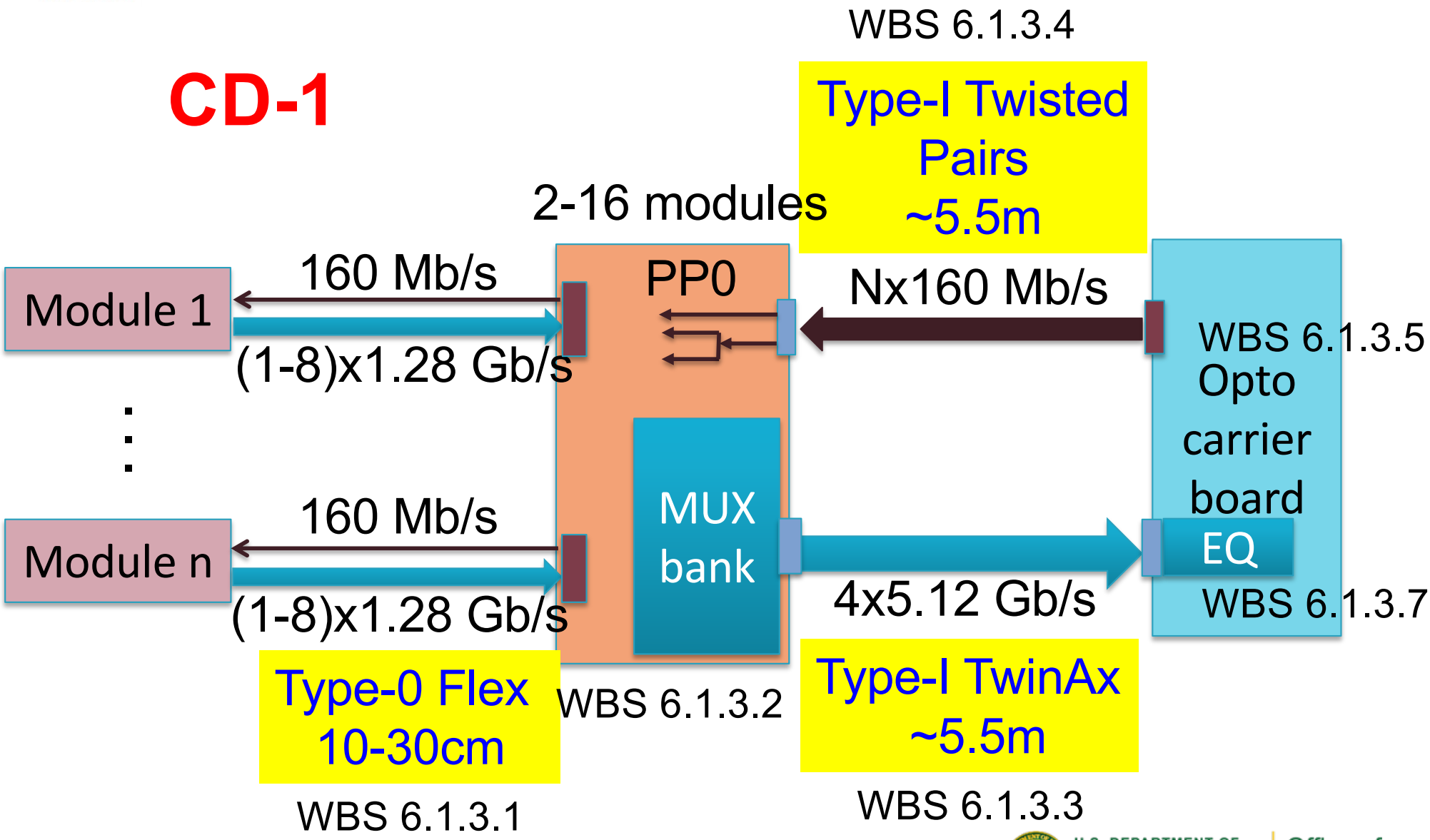
Outline

- Deliverable Overview
- Data Transmission Task Force
- Status of each Deliverable
- Summary

Deliverable Overview

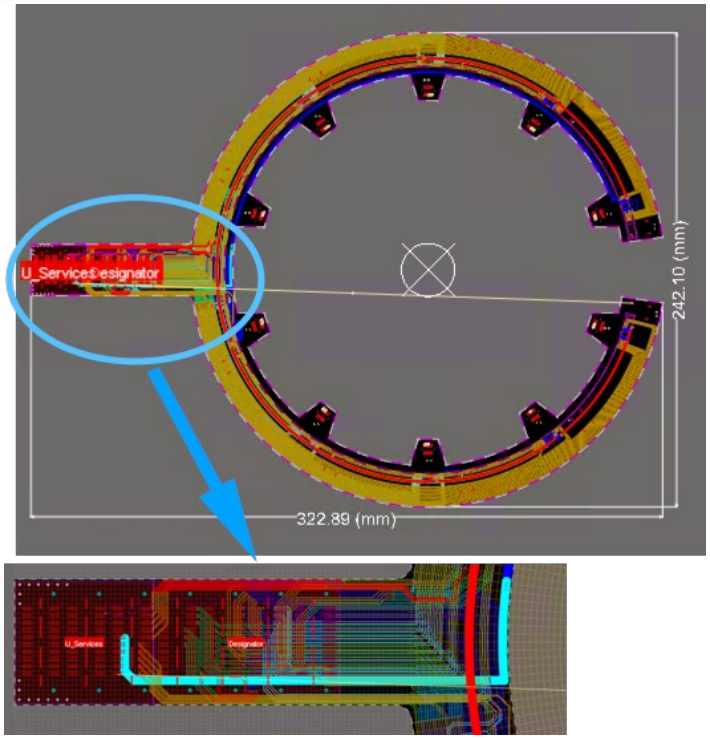


Data Transmission Task Force

- Aggregator ASIC for aggregating 4 x 1.28 Gb/s into 5.12 Gb/s probably will take 2-3 years to develop
- Time scale incompatible with ITK-Pixel schedule
- Data Transmission Task Force formed to investigate various solutions
  - Sending 1.28 Gb/s data to opto-box is currently a favorite solution
    - Significant increase in material inside detector volume
  - Task Force will recommend a solution soon

WBS 6.1.3.1: Flex

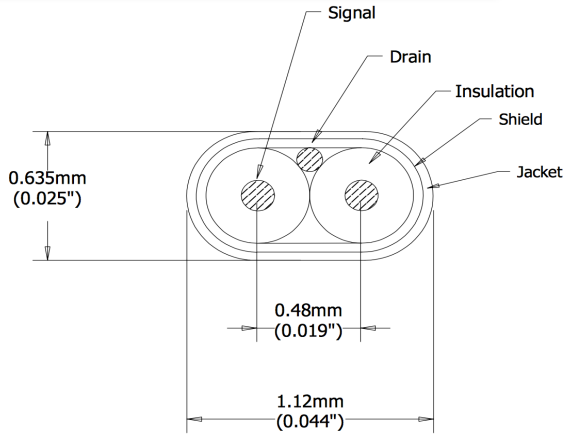
- Institution: Oklahoma State
- Prototype flex was designed
  - Need to ~120 differential pairs in 14 mm
- Difficult to manufacture
  - Large physical size
  - High trace density
  - Small feature size
  - Many layers



- Large reduction in data lines count from new RD53b encoding scheme
- Working with Cirexx and others to develop new design

WBS 6.1.3.2,3: PP0/TwinAx

- Institution: SLAC
- 6.1.3.2: Patch Panel 0 (PP0)
- 6.1.3.3: TwinAx
- WBS now merged
- Radiation-hard co-axial cables for data transmission from PP0 to opto carrier boards
  - AWG34 Cu wire and LDPE dielectric, 100 Ω
- Major design effort spent assuming aggregator AISC at PP0



WBS 6.1.3.4: Type-I bundle

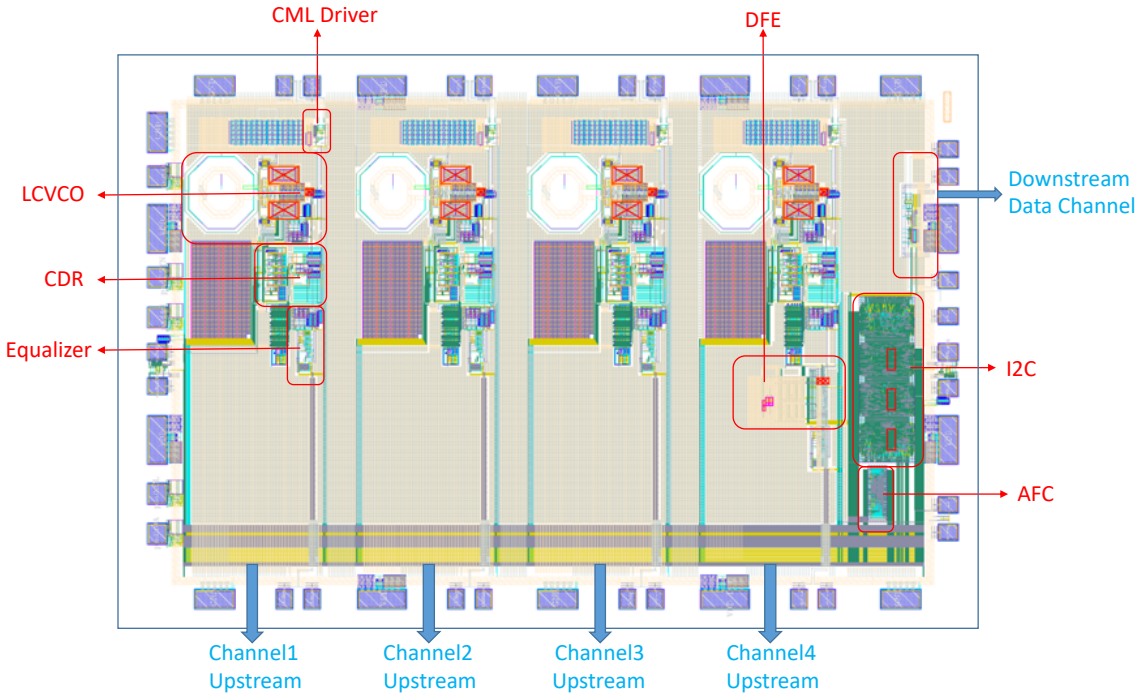
- Institution: UC Santa Cruz
- Type-I bundle: CMD/CLK, DCS, LV/HV
- Mechanical assembly tests of LEMO PP1 connector with very small-gauge (HV) and large-gauge (LV) cables to PP0
  - Tests of splicing options for LV cables (3- or 4-to-1 splice at PP1)
  - Tests of crimping options for solid-core small-gauge HV cables
- Fabricate prototype cable bundles
- Developing firmware for cable bundle crosstalk tests

WBS 6.1.3.6: Serial Power Supply

- Institution: Oklahoma State
- Prototype designed and fabricated
- Software is being developed
- Produced stable current at various load resistances
- Functions well as a constant current source
- Prototype will be used in upcoming system test/demonstrator
- Joint market survey by ATLAS/CMS for a serial power supply
- Will wind down custom development

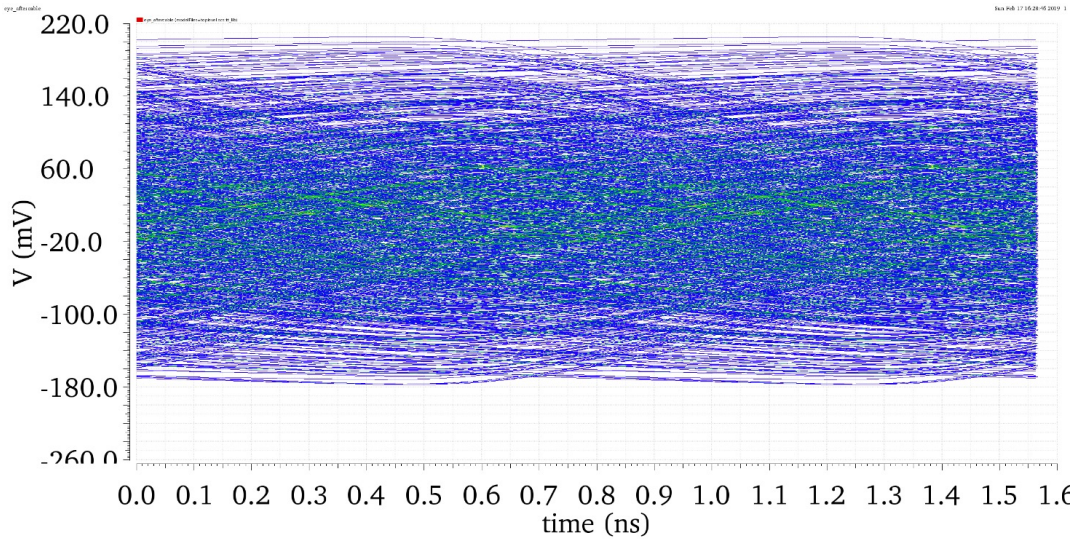
WBS 6.1.3.7: Equalizer

- Institution: Southern Methodist U.
- Prototype submitted in December 2018
- To be delivered in March
- PCB to test the ASIC being prepared

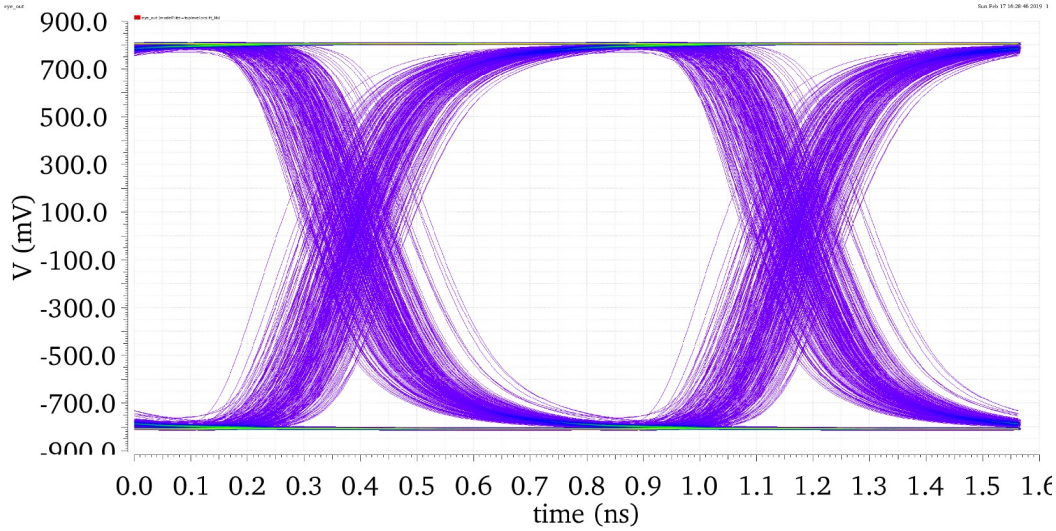


WBS 6.1.3.7: Equalizer

- Investigating possibility of receiving data from RD53 at PP0/PP1 in simulation



15 m of 34 AWG TwinAx



After equalizer

Summary

- Major progress on all deliverables
- Significant effort spent assuming aggregator ASIC at PP0 and 5 Gb/s data electrical transmission to PP0
- Data Transmission Task Force probably will recommend 1.28 Gb/s electrical transmission to PP0
- Need to update RLS at the completion of Task Force