Task T - CMS at LHC

Global Calorimeter Trigger
Muon Crate Auxiliary Input/Output Card

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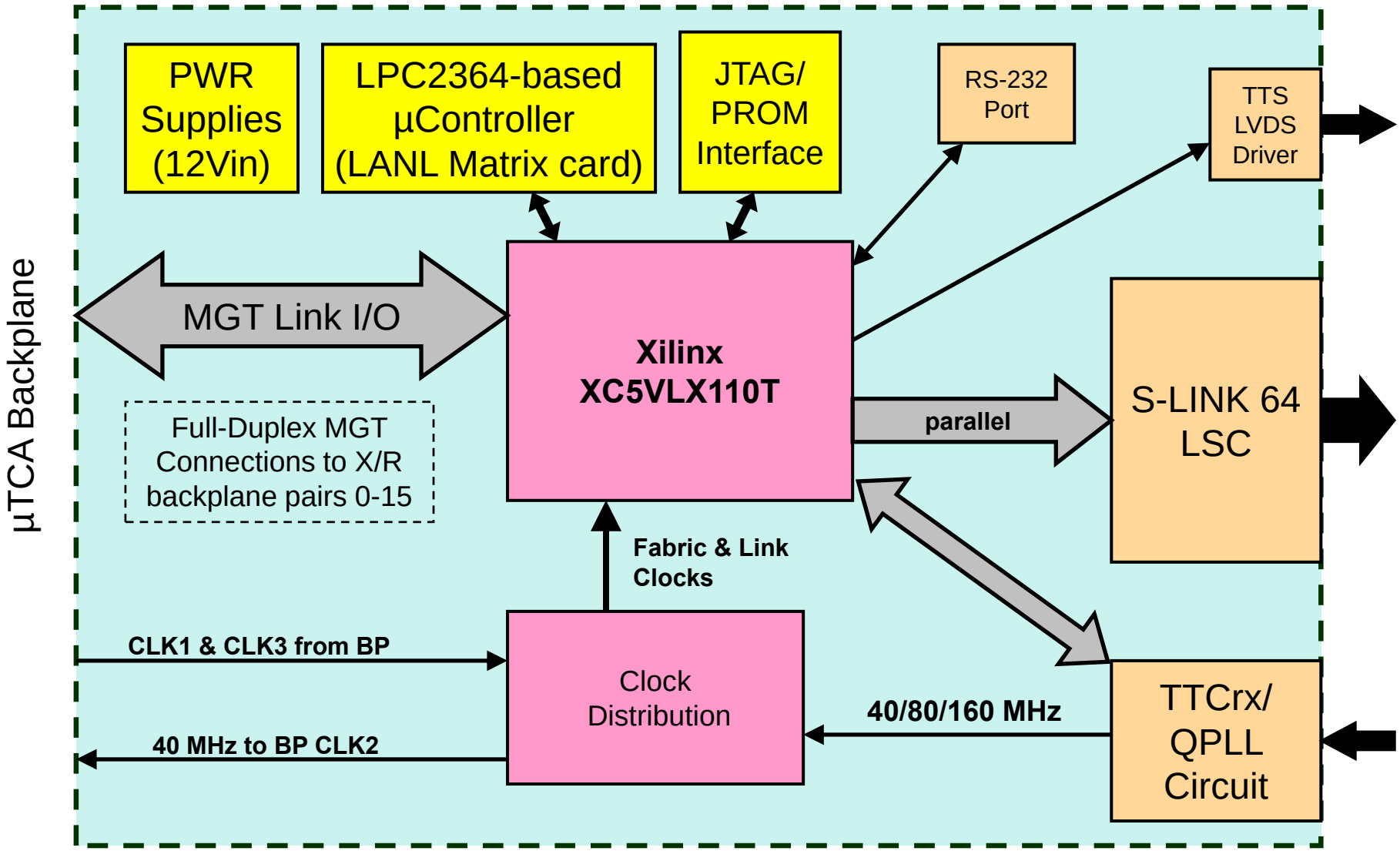
November 19, 2008

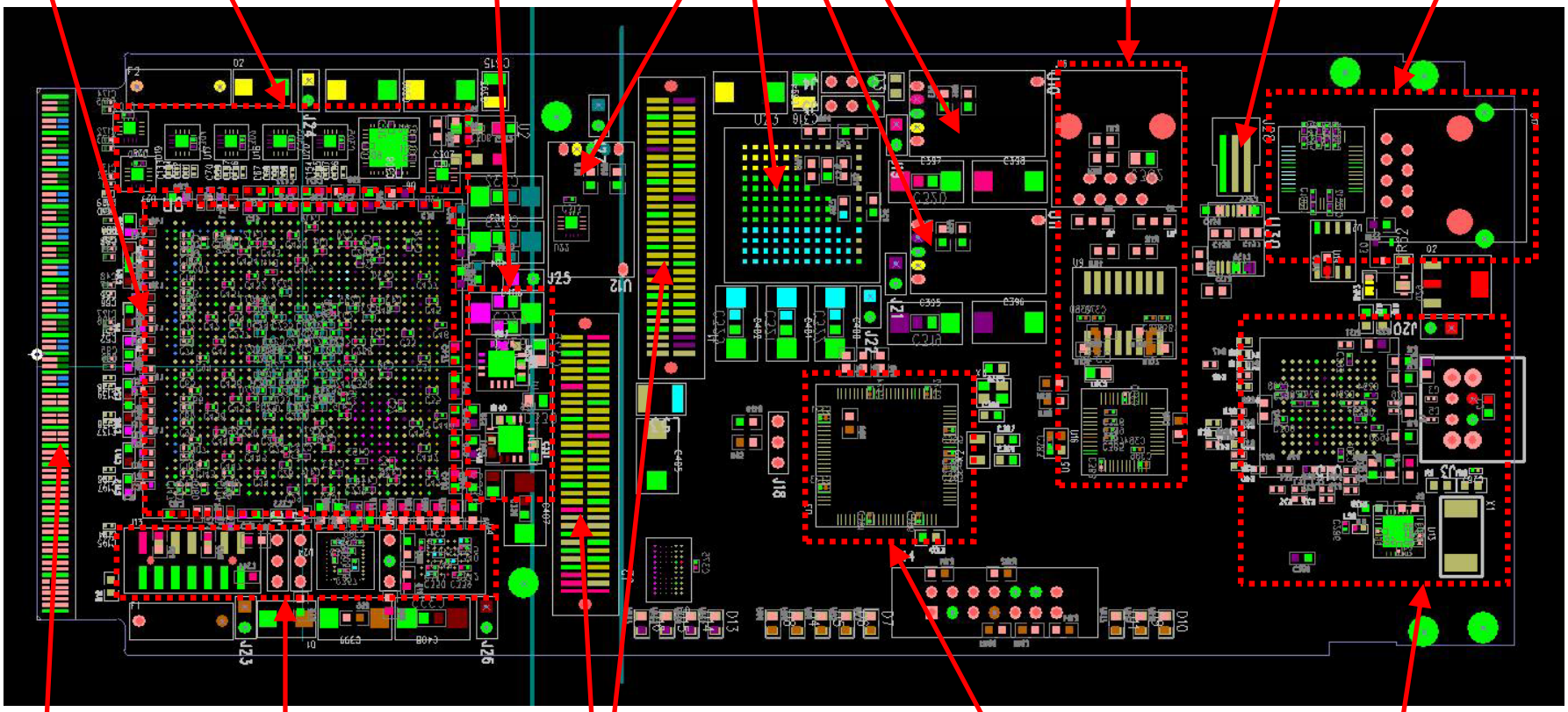
Aux Card Overview

- Provides TTC, TTS, and S-Link 64 Connectivity to a µTCA crate
- Single Width, Full Height AMC Module (180.6mm × 73.5mm × 28.95+ mm)
- Uses LANL Matrix Card as a reference design:
  - Xilinx XC5VLX110T FPGA
  - Philips LPC2364-based µController ckt for µTCA interface
  - FPGA JTAG Circuit
- 16 Rocket I/O bidirectional connections to µTCA backplane
- Provides TTC 40 MHz ref for crate via backplane

Block Diagram

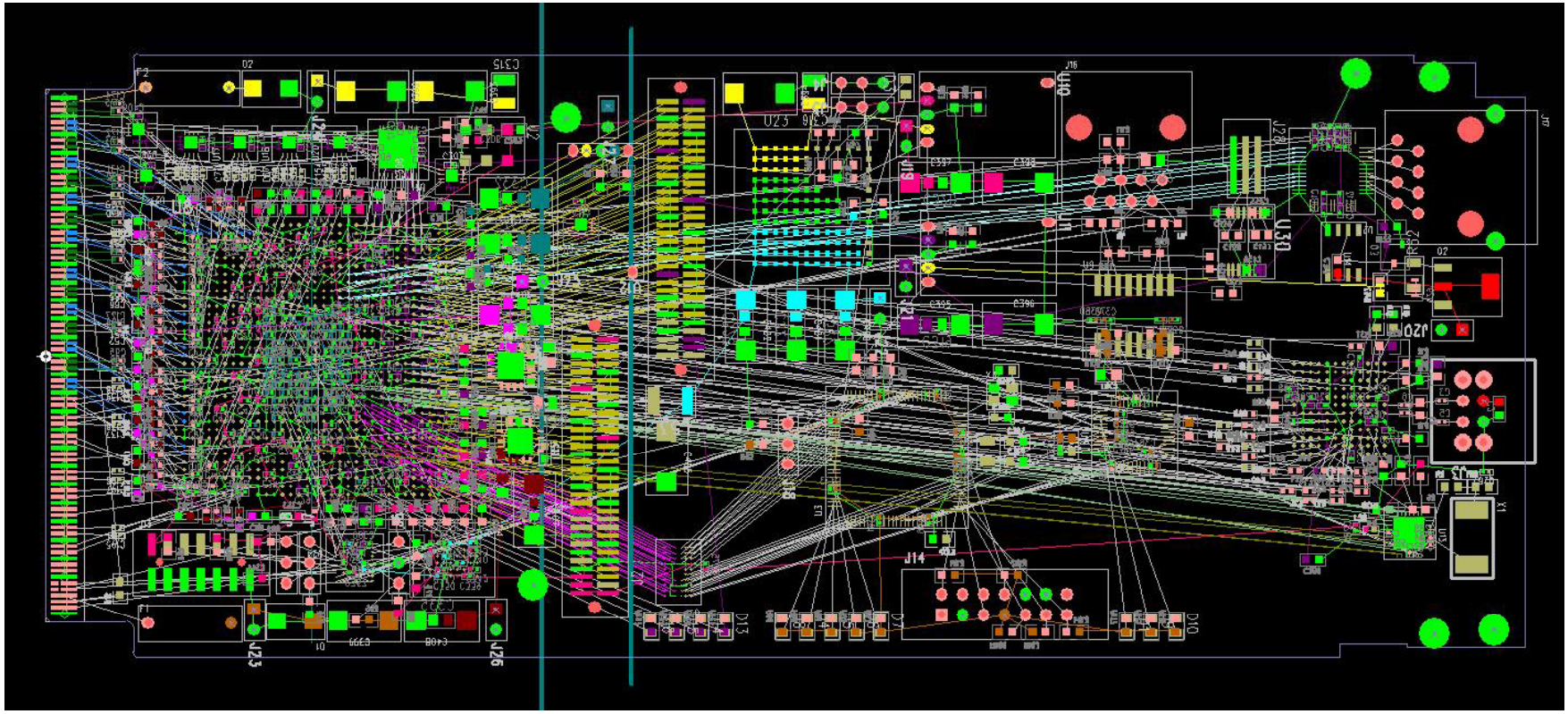


Aux Card Snapshot



Aux Card Connections

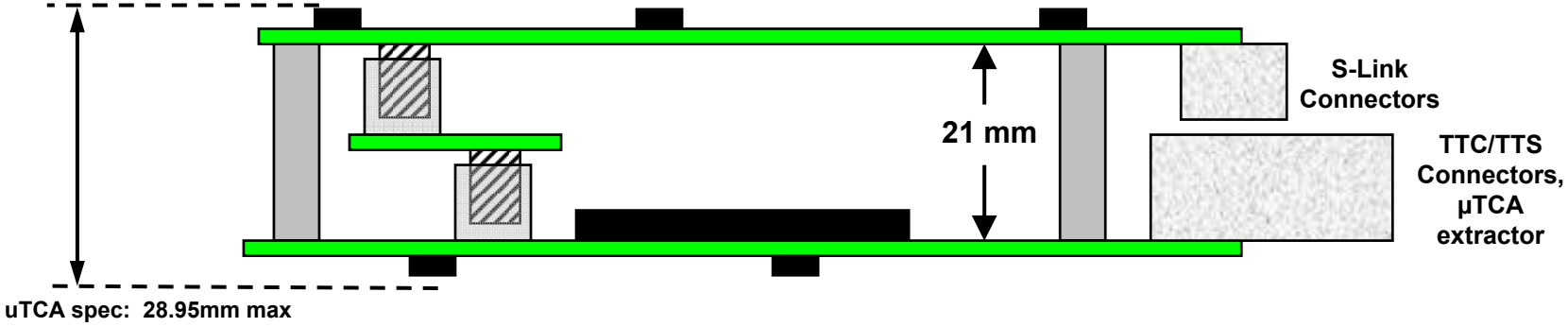
- **Post-Placement, FPGA I/O Pins reassigned for optimal parallel signal flow**
- **MGT Links to µTCA Connector optimized for signal length/flow**



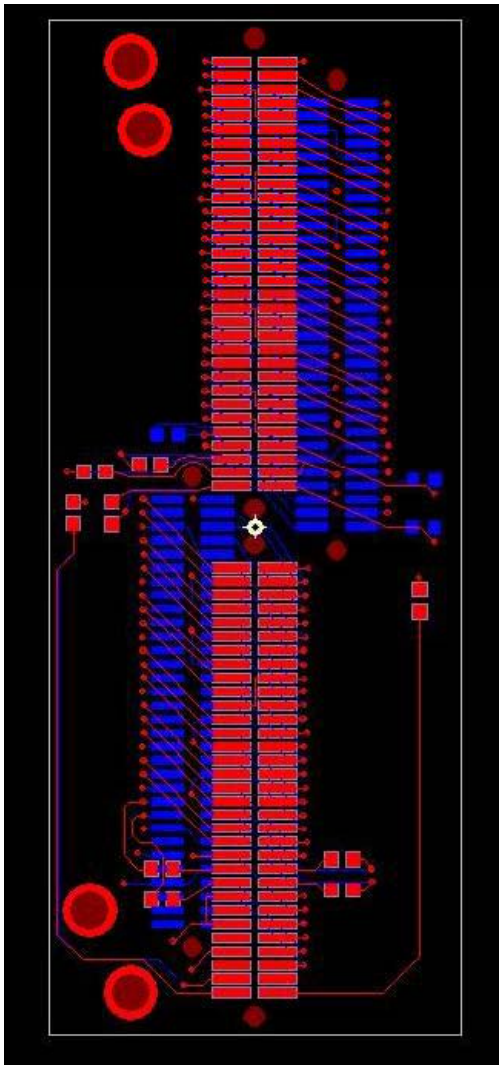
S-LINK 64 / Aux Stackup

Adapter Card:

- Moves PMC connector positions on Aux Card so that they do not interfere with card guides in µTCA crate
- Raises S-LINK 64 Card high enough to allow S-LINK connectors to clear TTC/TTS connectors on Aux card
- Result is slightly taller than 28.95 mm max in AMC spec—means slot to left in µTCA may need to be empty



S-LINK 64 Adapter Board



- **Blue** pads—bottom side—mating connectors to Aux Card
- Red pads—top side—mating connectors to S-LINK 64 LSC card
- 4-Layer Board with surface 50Ω traces
- Top/Bottom connector displacement such that trace lengths are equal
- Useful for probing/debug (w/ top side connector removed)

PCB Design Info

- Mentor Graphics DxDesigner/PADS-Layout
- 12 Layer Board—6 signal (incl. top & bottom), 6 planes
- Laminate/Prepreg: Nelco N4000-13 (recommended by Xilinx for Rocket I/O apps)
- 50Ω S.E. / 100Ω differential pair traces
- 5 mil tracks on surface, 4 mil internal
- Projected Via Usage:
  - Smallest have .45mm pad w/ .2mm drill
  - Blind spanning layers 1-6 & 7-12, through vias 1-12
- Anticipate mixture of hand + auto-routing

PCB Design Info, cont'd

- Current Status: Aux Card placement complete, routing to begin
- Expect to have assembled units in Q1 2009
- Have 5 sets of TTC components currently on hand
- Bypass LPC2364 initially for power on/off ctl, use firmware from Matrix card as it becomes available
- Use JTAG CPLD programming from Matrix card