ZynqMP-based board-management mezzanines for Serenity ATCA-blades

Tuesday, 21 September 2021 17:50 (2 minutes)

In the context of the CMS Phase-2 tracker back-end processing system, two mezzanines based on the Zynq Ultrascale+ Multi-Processor System-on-Chip (MPSoC) device have been developed to serve as centralized slow control and board management solution for the Serenity-family ATCA blades.

In this talk, we present the current revision of both Serenity baseboards and the developments on the MPSoC mezzanines to execute the Intelligent Platform Management Controller (IPMC) software in the real-time capable processors of the MPSoC. In coordination with the Shelf Manager, once full-power is enabled, a CentOS-based Linux distribution is executed in the application processors of the MPSoC.

Summary (500 words)

In the context of the CMS Phase-2 tracker back-end processing system, two mezzanines based on the Zynq Ultrascale+ Multi-Processor System-on-Chip (MPSoC) device have been developed to serve as centralized slow control and board management solution for the Serenity-family ATCA blades.

The Serenity family consists of two ATCA-sized boards designed to explore alternative configurations. Serenity-A is designed around a single Virtex US+ FPGA with up to 128 high-speed transceivers, each with a line rate of up to 25 Gb/s. 120 high-speed lanes are connected to Samtec Firefly optical transceivers; four are used for the DAQ path, one is used for the CMS timing and clock distribution (TCDS), and the remaining links for slow-control and management tasks provided by the MPSoC mezzanine in the "FMC+" format.

Serenity-Z contains two sites that utilize Samtec z-ray interposer technology mounting removable FPGA-based daughter cards. Each site is connected to 18 Samtec Firefly optical transceiver sites. All of them can take the form of x4 or x12 (16 Gb/s or 25 Gb/s) depending on the daughter card used. The choice of slow-control and board management is as well flexible between the combination of a com-express (CMX) Computer-on-Module (CoM), a DIMM-based IPMC, or an integrated MPSoC mezzanine in the "CMX-Extended" format.

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Primary authors: MEHNER, Torben (KIT - Karlsruhe Institute of Technology (DE)); ARDILA, Luis (KIT-IPE); BALZER, Matthias Norbert (KIT - Karlsruhe Institute of Technology (DE)); SANDER, Oliver (KIT - Karlsruhe Institute of Technology (DE)); TCHERNIAKHOVSKI, Denis (Karlsruhe Institute óf Technology); Mr SCHLEICHER, Michael (KIT - Karlsruhe Institute of Technology (DE)); FEDI, Giacomo (Imperial College (GB)); GIMAS, George (Imperial College (GB)); ILES, Gregory Michiel (Imperial College (GB)); PESARESI, Mark (Imperial College); PARKER, Duncan (Imperial College (GB)); ROSE, Andrew William (Imperial College (GB)); Dr SCHUH, Thomas (Rutherford Appleton Laboratory (GB))

Presenters: MEHNER, Torben (KIT - Karlsruhe Institute of Technology (DE)); ARDILA, Luis (KIT-IPE)

Session Classification: Posters Systems, Planning, Installation, Commissioning and Running Experience

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