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Design of an AdvancedTCA board Management Controller Solution

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The AdvancedTCA (ATCA) standard has been selected as the hardware platform for the upgrade of the back-end electronic of the CMS and ATLAS experiments of the Large Hadron Collider (LHC). In this context, the electronics systems for experiments group for experiments at CERN is running a project to evaluate, specify, design and support xTCA equipment. As part of this project, an Intelligent Platform Management Controller (IPMC) for ATCA blades, based on a commercial solution, has been designed to be used on existing ATCA blades. This poster reports on the status of this project presenting the hardware and software developments.

Summary

Originally developed for the telecommunication industry, the AdvancedTCA standard has been selected as a platform for the phase II upgrades of the ATLAS and CMS back-end electronics at CERN. In this framework, the CERN EP-ESE group launched in 2011 the xTCA evaluation project whose aim is to perform technical evaluation of equipment, provide support for the selected components across experiments as well as design and support standardized hardware controllers.

The AdvancedTCA standard, defined by the PCI Industrial Computer Manufacturer Group (PICMG), outlines a modular architecture by describing physical, electrical and functional specification. It offers a wide range of hardware management features to monitor (temperatures, voltages, current, etc.) and control (fan speed, power management, etc.) the system as well as ensure its proper operation (modules compatibility, current requirement, e-keying, etc.). These actions are performed by specific controller modules which are interconnected via an Intelligent Platform Management Interface (IPMI) bus: Module Management Controller (MMC) for AMCs, Intelligent Platform Management Controller (IPMC) for ATCA boards and Carrier IPMC for ATCA carrier as well as Shelf Manager for ATCA shelves and MicroTCA Carrier Hubs. In the frame of the CERN xTCA evaluation project, a commercial Intelligent Platform Management Controller (IPMC) solution from Pigeon Point was evaluated in 2015. Following this evaluation, a mezzanine card was designed to be used on existing AdvancedTCA blades compliant with a specific form factor (VLP DIMM-DDR3). The reduced dimensions of this form factor created challenges for the board layout and resulted in a very dense PCB. A first prototype of this IPMC has been recently received and is being tested. In parallel, the PCB layout is being improved and simplified in order to reduce cost and improve reliability. The testing phase is divided in three parts: the hardware with the validation of the power and the interfaces available on the connector, the firmware including the test of the modified FPGA design and the software for the embedded microcontroller. In the meanwhile, we are evaluating different ways to allow users to customize the IPMC to their specific ATCA blades with minimum effort (power sequences, sensors, e-keying, etc.). This poster introduces the progress made on this project with a focus on the difficulties faced during the prototype design and with a report on the test status and development roadmap.

Author: MENDEZ, Julian Maxime (CERN)

Co-authors: VASEY, Francois (CERN); JOOS, Markus (CERN); HAAS, Stefan Ludwig (CERN); MICO, Sylvain (CERN); BOBILLIER, Vincent (CERN)

Presenter: MENDEZ, Julian Maxime (CERN)

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