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CERN-IPMC Solution for AdvancedTCA Blades

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The AdvancedTCA standard has been selected as one hardware platform for the upgrades of the back-end electronics of the CMS and ATLAS experiments of the Large Hadron Collider. In this context, the CERN EP-ESE group has designed and produced an IPMC mezzanine card for the management of AdvancedTCA blades. This paper presents the CERN-IPMC hardware and the software environment to be used for its customization and describes a test pad that can also be used as a development kit. Finally, it also introduces the foreseen conditions for distributing the module.

Summary

Originally developed for the telecommunication industry, the AdvancedTCA standard has been selected as one of the platforms for the upgrades of the ATLAS and CMS back-end electronics at CERN. In this context, 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 as well as design and support standardized system components.

The AdvancedTCA standard, defined by the PCI Industrial Computer Manufacturer Group (PICMG), outlines a modular architecture by defining physical, electrical and functional specifications. 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 (interoperability, 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 carriers 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 and future AdvancedTCA blades compliant with a specific form factor (VLP DIMM-DDR3) already proposed by LAPP for the ATLAS experiment.

A first batch of IPMCs was successfully produced in spring 2017 and is ready to be distributed. In parallel, a complete software environment and documentation were set up to ease the customization of the CERN-IPMC: implementation of sensors, customization of the FRU information, etc. To fully validate the controller, a small tester board was designed to carry out automatic tests. It provides connectivity to all of the interfaces available on the mezzanine card: IPMB buses, one I2C line dedicated to sensor monitoring and another for the power management. Additionally, all of the GPIO pins are connected to a CPLD in order to which allows monitoring them through an USB connection. Finally, the JTAG master and the UART interfaces managed by the IPMC are directly routed to connectors. Finally, this automatic tester can also be used as a development kit for early users.

This paper provides a description of the CERN-IPMC with all supported features as well as a presentation of the test pad used for production. It also outlines the foreseen conditions for distributing the IPMCs to interested users.

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