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A High Bandwidth and versatile Advanced MC Board

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We developed a new AMC board based on AMC.0, named as Trigger Receiver Board (TRB). TRB is a high bandwidth data-stream processor, using one Xilinx Artix-7 FPGA. This FPGA has 16 MGTs running up to 6.4Gbps, making TRB capable to handle total bandwidth up to 100 Gbps. Also there are LVDS I/Os routed to a FMC connector for commercial extend board and two micro connectors for MicroZED. One on-board 4Gb DDR3 chip running at 800MT/s is the main memory of microblaze-based embedded system, as well as the data buffer of logical part

Summary

Nowadays many particle and nuclear physics experiments are planning to use the micro-TCA or the ATCA standards for their Trigger and Data Acquisition (TDAQ) system. In most of these experiments the first stages of the TDAQ system are based on FPGA-based hardware architecture to select events of interest and suppress background to an acceptable level for the DAQ system. Future projects or experiment upgrades always require larger data throughput, larger number of high speed (optical) Input/Output and much more sophisticated trigger algorithms with longer latency. The micro-TCA and the ATCA standards, with their FPGA-based boards, respond to those requirements. These experiments are also built to run over many years, even up to a couple of decades. Maintenance of the electronics may become an issue and it is therefore of interest to limit the use of many different custom-made electronics boards. Since a couple of years, several evaluation platforms or "generic"micro-TCA boards (AMC) have been introduced. In this contribution we will present a new AMC board based on AMC.0, named as Trigger Receiver Board (TRB).
TRB has 10 optical links on the front panel (2 QSFPs and 2 SFPs) which can receive data from front-end electronics system up to 60 Gbps. There are 5 optical links and 9 LVDS differential pairs communicating with the MCH and redundant MCH through backplane, building up the DAQ and slow control path as well as getting system clock.
It has one on-board 4 Gb DDR3 chip running at 800 MT/s as the main memory for microblaze-based embedded system and data buffer for the logical part, there are two micro connectors to connect a MicroZED board as a co-processor to enhance the data processing ability. In order to further increase the flexibility, TRB has an FMC connector to interface with commercial FMC cards. In addition, TRB has 2 HDMI connectors for remote debugging and external electrical trigger.
In this contribution we will report the first performance results obtained with this prototype and possible applications in particle physics experiments.

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