Evaluation of the extension of the MicroTCA.4 board connectivity to the rear side of crates.

U. Mavric, M. Fenner, J. Branlard, H. Schlarb, DESY
K. Czuba, WUT-ISE
D. Makowski, A. Mielczarek, P. Perek, F. Makowski, TUL-DMCS

Abstract

The contribution summarizes recent activities in the extension of the MicroTCA.4 connectivity to the rear side of standard MicroTCA.4 crates. The need for such an extension started as a need for a cleaner and more isolated environment from digital areas present in the front side of the crate. Local oscillator generation, clock generation and their distribution were moved into a MicroTCA.4 crate and they could benefit from the standard MicroTCA.4 board management layer and connectivity. For this reason an RTM backplane manager which sits in the rear side of the management carrier hub was used as a bridge from the front side to the rear. The backplane manager provides power, management layer and PCIs connectivity to the rear. Special emphasis was put on the layout of the digital signals in the rear MicroRF backplane in order to avoid the possibility of pollution of high sensitivity signals. Finally an example of practical usage of the new extension is presented.

MicroRF Backplane Concept

3 x eRTM (3 x 6HP)
12 x eRTM (12 x 6HP)
MCH-RTM-PM RTM-PM/RTM-PM

Purpose
- The MicroRF Backplane extends the connectivity of RTMs and introduces eRTMs (extended RTMs).
- The RTMs, LOs, REFs and Pilots are not distributed over the backplane.
- It allows to make a better use of the available space in the crate.

Features
- Use the standard MicroTCA.4 board management to the rear.
- Each RTM can be powered by rear power supplies.
- It allows usage of external generator, signal generation etc.
- Improves isolation between digital PICMG, AMC backplane and RF domain.

Monitoring, Histories, Events, Control, ...

On-Board RF Temperature
- The Peltiers regulate the temperature of the board.
- The regulation efficiency is 0.05 deg per hour.

On-Board Rel. Humidity
- The PGB is used against humidity changes.
- An in-board humidity sensor shows rel. humidity changes in the crate.

RF Power Monitoring
- LO, RF power is legged.

PCI-interfaces
- The tested areas of the PCI are legged.

DC Power
- DC power consumption of various sub-elements is legged.
- The picture shows the power consumption of the Peltier cooler.

System Integration

- The LO, CLK generation module is recognized as one of the devices in the PCI tree.
- The RTM power is managed by the front MCH.
- The AMC backplane is managed by the front MCH.
- DOOCS Interface
- On the application level we can control the LO, CLK generation, monitor the RF power, monitor various temperatures, control the Peltier cooler etc.

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