Contribution ID: **9**

Type: **Poster**

A Software Package for the full GBT Chipset Lifecycle

Tuesday 23 September 2014 16:51 (1 minute)

This work presents the software environment surrounding the GBT chipset, addressing the requirements of GBTX, GBLD and GBT-SCA. The GBTX is a high speed bidirectional ASIC, implementing radiation hard optical links for high-energy physics experiments. Having more than 300 8-bit configuration registers, it poses challenges addressed by a wide variety of software components. This software keeps track of each GBT device by storing data from the testing and characterisation phase. This paper focuses on tools available to the designers and users, enabling them to create and test configurations and ensure a good quality tracking of their devices.

Summary

This paper introduces the software environment created to support all steps in the life cycle of the GBT chipset from internal characterisation and radiation testing to customization performed by the end-users. It depicts how interconnecting all software components leads to added values for the users.

A web tool is provided to support users in creating custom-tailored configurations. It is the main user interface to the GBT and guides through the configuration process of the GBTX ASIC, GBLD and GBT-SCA. Using a web-based technology represents a most flexible solution that allows implementing immediate changes in case of upcoming requirements. The paper shows how users are supported in choosing the desired configuration values and how those are programmed into the GBT components.

The described public configuration interface is connected to a CERN database dedicated to GBT. This storage system interacts as a link between all systems associated with testing, characterization, qualification and usage of the GBT. For every single GBT device, the database contains data collected in those stages of the GBT life cycle. This innovative interconnection will represent a very useful solution to provide a real Quality Assurance policy to the full GBT chipset production and will allow the support teams to conduct analysis immediately and quickly identify the source of problems if required.

This paper details as well the methods used to perform the radiation tests. It gives insights into innovative approaches applied to test successfully a complex device such as the GBTx ASIC. A specific protocol had been created that allows the exchange of control signals and data packages between the testing FPGA and the software. The testing software is accompanied by several components that proved to be valuable in testing a system as complex as the GBT chipset; one of those elements is a GBTX software emulator that allows simulation of conditions that are hard or impossible to reproduce on demand in the laboratory. Further innovative approaches are shown, like the development of a 'LiveViewer'that allows analysing Radiation Test runs in detail almost immediately; this solution proposes a real time and concurrent monitoring of a Bit Error Rate analysis, together with identification, localisation and statistics of transmission errors, monitoring of SEUs on configuration registers, loss of locks of CDRs and PLLs, etc. Its functionality is based on a tailored storage system recording all test data. Detailing all those components and functions might provide incentives for the successful verification and support of similarly sophisticated electronics environments.

Author: FEGER, Sebastian Stefan (CERN)

Co-authors: PORRET, David (CERN); WYLLIE, Ken (CERN); BARROS MARIN, Manoel (CERN); RODRIGUES SIMOES MOREIRA, Paulo (CERN); VICENTE LEITAO, Pedro (CERN); Mrs BARON, Sophie (CERN)

Presenter: FEGER, Sebastian Stefan (CERN)

Session Classification: First Poster Session

Track Classification: Production