GET Project
Meeting at IRFU
Feb 5, 2009

Minutes

G. Wittwer, E. Pollaco, B. Raine, F. Druillole, P. Baron, J. Pibernat, JL Pedroza, E. Delagne, L. Nalpas, S. Anvar, F. Chateau

I AsAd technical specification

AsAd (**As**ic-**Ad**c) board is the part of GET situated between the detector (TPC) and the digital electronics which relates with data acquisition and control processes. The draft version of the technical specification is written, the 1.0 version will be available before the next meeting (10-13 march Caen).

I.1 Main functionalities

- To provide AGET (**A**SIC for **G**eneral **E**lectronics for **T**PCs) with all conditions required to make it operate properly.
- To perform the digital conversion of the analogue signals issued by the TPC and sampled by AGET
- To perform the digital conversion of the trigger sum given by AGET
- To perform the transfer of these data to **CoBo** (**CO**ncentration **Bo**ard)
- To manage its operating controls (self monitoring, calibration and test operation etc…)
- To deal with the slow control software system for all controls and status
- AsAd provides supplies and all voltage/current sources required by all the components included in the card. It manages the ON/OFF supplies and checks the voltages/currents levels.
- To be identified in the whole GET systems, AsAd provides ID number, Serial and release numbers, type of detector connected on the system.
- The temperature of the module is measured at the hottest.
- AsAd manages clock signals for AGET read-write, test and calibration, slow control, analogue to digital conversion, even if CoBo is not connected on the system.
- Protection against sparks from the detectors is managed by the **task ZAP**
- At last, since all the slow control commands and status communicate with Cobo, AsAd manage its own local slow control interface

I.2 AGET

Particular polarisation: the dividers (resistors) are inside the ASIC, but the common mode for the differential output buffer is external and can be adjusted.
There is only one power supply (3.3v-GND) for analogue and digital supply. Decoupling RC filter on each IC supply input.

I.3 Analogue to digital conversion

Conversion done by ADS6422 (TI), must be tested by MSU (T&H, S&H), and CENBG(outputs, slow control). Voltages references inside the ADC
The output data format must be validated by MSU and CENBG to optimise the local data processing in CoBo (mainly the order of transmission)
Full scale output of the ADC (12 bits) +1v. (Dynamic range for AGET analogue output -1,+1v). Insertion of a buffer on the ADC output for protection in case of short cut on the output cable.
Readout of the trigger $\sum$ during the write SCA on AGET.
Dead time less than 1ms require certainly buffering in CoBo.

I.4 Data output interface

Differential lines ,LPVECL levels, distance ≈ 3 m between AsAd and CoBo. Power consummation to check , using of LVDS levels for slow signals.
Connector SAMTEC QSE-DP-EM series and cables EQDP. The availability and performance of cables 2-3 meters in length must be checked. (CENBG).
The total length of all the connectors should not exceed 148 mm for CoBo.

I.5 Test and calibration

The CENBG suggests to use a 14 bit DAC (AD9707, Analog Devices). The calibration capacitor for the AGET input must be defined (value and precision)

I.6 Slow control

One generic SPI slow control between AsAd and CoBo, device selection and SPI adapdation done by AsAd. SPI clock fixed at 12.5 MHz for slow control.
Hit channel readout done by the Dout line of the slow control. In this case SPI clock fixed at 25 MHz.

I.6 Monitoring

Proposition from CENBG is to use an ADT7519 (AD) for temperature, voltage and current check.

I.7 Supply

3.3 v voltage regulator low dropout, ON/OFF via CoBo

1.8 ZAP

ZAP can be hosted on AsAd, the question on using of protection diodes is open, decision during the next meeting.
An other possibility is to connect ZAP directly on the output of the detector and to use a connector and a cable (or flex PCB) for the AsAd connection: even a high density AsAd card can be used on a large detector (ie, 5 mm PADs or more).

1.9 Others points

Question about the trigger and the bit pattern (level 3 trigger). A document must be written (who ?).
The maximum dead time is 1 ms. To avoid excessive tardiness, a buffer to host the events in Cobo could be useful if the number of hits is important or for trigger and store the radioactivity after ion implantation in the detector.
. A discussion between physicists and engineers seems to be necessary to define with a good “precision” how many pads could be lighted (worst case).

II Firmware

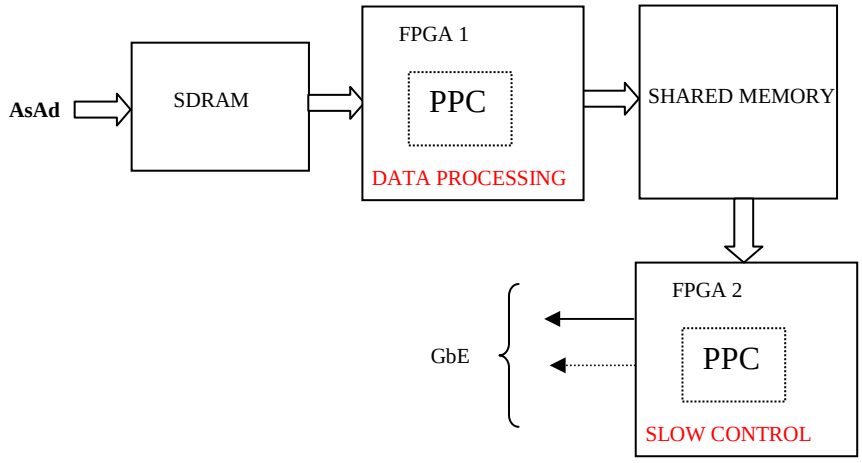
Discussion on the time stamp and the events integrity. Gilles presents slides on the Data rate (to file in the wiki):

- ≈ 7.5 Gbit/s (1 event ≈ 7.5 Mbit/1 ms) 10 CoBo → 70 Gbit/s , must be reduced (factor 10 to 20).
- Frederic Druillole presents slides on "the GET frontier" (to file in the wiki)
- Cobo must reduce the data flow, use of a Gigabit link from CoBo to storage (500 Mbit/s).
- A document must be written, specifically to describe the scenario usage on different TPCs (physicists)
- Suggestion to use the ENX register server (GANIL) Have a look at : http://enx.in2p3.fr/

III Phone meeting with MSU and Daresbury

A. Bickley, B. Lynch, N. Usher, B. Lynch, P. Coleman-Smith, R. Lemmon

Discussion about CoBo and InBo. Saclay suggest connecting the CoBo outputs directly on PCs though 1 or 2 Gbit Ethernet links.
What kind of architecture for CoBo ? 1 or 2 FPGAs with an embedded processor?
Gilles's suggestion :



The firmware of the test bench for AsAd and AGET will be similar to CoBo firmware (VHDL code), so, proposition that MSU develop the firmware of the test bench.

IV Work package

Must be refined.
Actual WP:
AGET : 09/09 global test with T2K test bench
AsAd: bench test AsAd + AGET → with CoBo firmware and Gbit/Eth link for software
CoBo : reuse of the test bench AsAd.
MUTANT/BEM
Run Control
Slow control

need to write a paper on the throughput and on the global aspect GET (hard + soft) for the next meeting (Caen)

V Conclusion

AsAd technical specification written begin of march, 2009. (Jerome and Jean-Louis)
Skeleton of the agenda for the Caen meeting (Lolly)
Register server ENX usage for the embedded part.
Topology of an event for a given TPC (physicists, Caen, march 10-13)