

Some Thoughts on FELIX Development Within EPIC

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Setup

- we expect to obtain 1 FELIX 155 from ATLAS
 - caveat: the board needs to stay at **BNL**
- what we need at BNL, hardware
 - find a suitable lab where the board will be housed
 - suitable (massive) PC
 - needs to be remotely accessible via e.g. ssh
 - **FELIX installed in this PC and connected to JTAG**
- software and firmware
 - Vivado licenses?
 - we started this discussion last week at the DAQ Mtg
 - current board's source firmware, PC software, manuals, guidance...
 - there's an entire ATLAS group of people and a mailing list ⇒ need to start participating
 - NB, I'm on it but so are others...

Setup II

- the lab location is also expected to be able to house our various RDO prototypes
 - e.g. AC-LGAD Readout Chain hardware is currently being setup at BNL too and we expect to connect it to the FELIX in a “few” months
 - this location decision should come soon...
- the FELIX PC should be reachable remotely via ssh
 - we can timeshare access to the FELIX board from different developers around the globe
 - note that different RDOs from different groups can be (and should be) connected to different input fibers of the FELIX
 - this makes switching between different RDO developments simply a matter of downloading different firmware using the JTAG interface
 - also, nobody wants to sit in a noisy lab for no reason (and I see no reason majority of the time)

Peopleware roles

- EPIC should form a group of experts (users?) of the FELIX boards
 - we can't rely on CERN (or ATLAS), obviously
 - we have our own hardware specifics (e.g. interface to the accelerator, timing, ASICs, etc)
 - we have our own software/firmware streaming specifics
- I suggest we form a group within EPIC with the following “roles”
 - someone responsible for the hardware setup at BNL
 - installs, maintains, powers on/off PC, updates PC software, etc.etc.
 - can be a tech?
 - firmware role
 - responsible for the FELIX FPGA firmware and integration of various needs
 - e.g. specific ASIC data formats, interfaces to RDOs, etc.
 - PC software role
 - responsible for the libraries and documentation on how to access and “talk to” the FELIX board from the PC
 - device drivers, documentation, code libraries
 - overall head/manager
 - maintains coherence and external interfaces to
 - accelerator, streaming, Run Control, etc.

Summary

- we should set up the FLX-155 in a lab and make it ready for remote access
- **and we start exploring** (in my preferred order):
 - IpGBT interface to the RDO
 - e.g. how to execute simple commands on the host PC to R/W IpGBT registers
 - how to initiate I2C commands from IpGBT to ASIC
 - how to modify FELIX firmware to get rid of ASIC's "IDLE WORD"s
 - etc.etc.
 - streaming interface over PCIe
 - e.g. how is this done? how to capture streaming data from the ASIC (eventually)?
 - non-IpGBT interface to RDO in conjunction with e.g. calorimetry (Norbert et al)