VFAT2 control through GLIB

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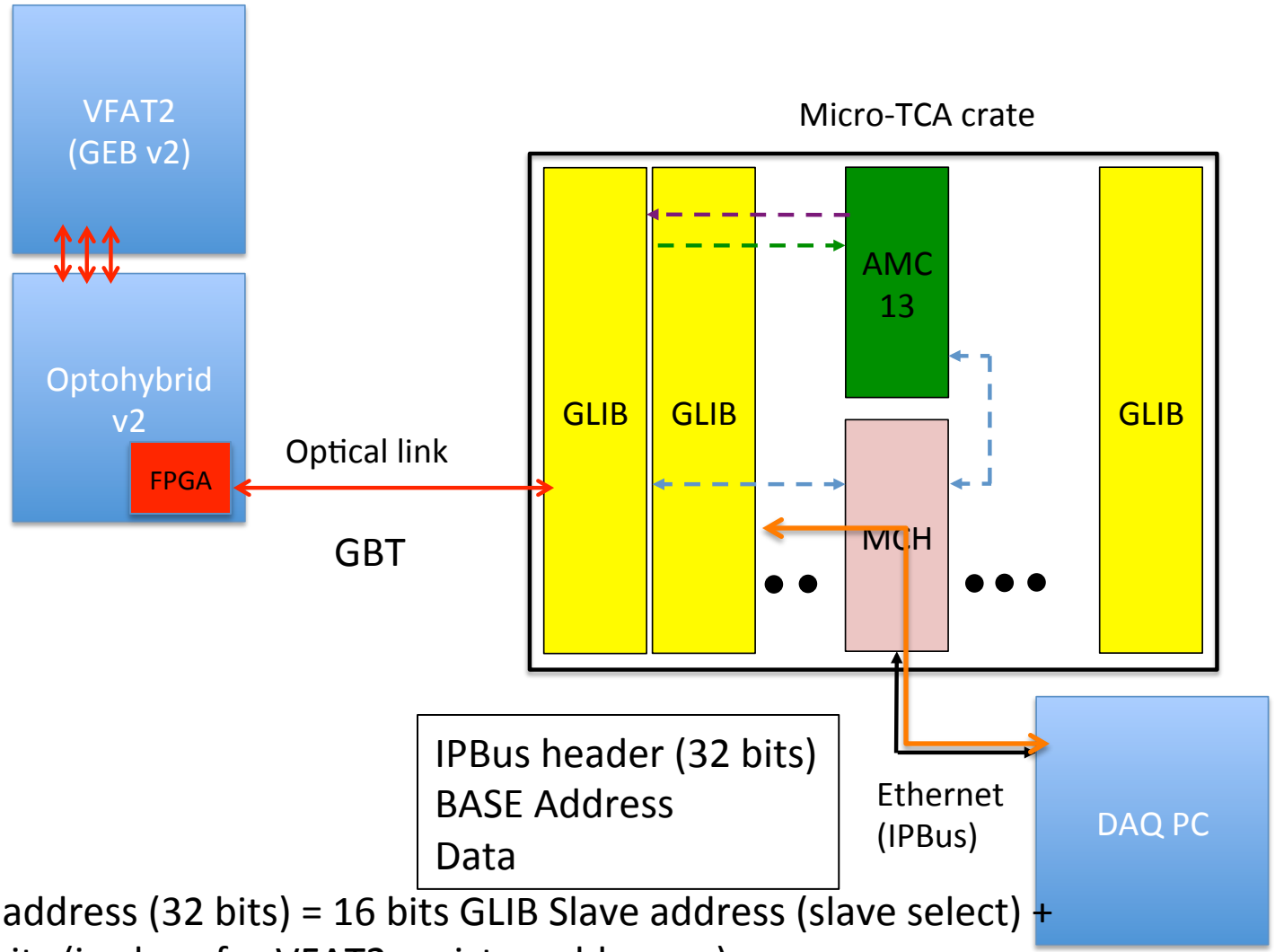
setup



BASE address (32 bits) = 16 bits GLIB Slave address (slave select) +
+ 16 bits (in slave for VFAT2 register addresses)

DAQ-GLIB protocol

- DAQ SW uses IPBus protocol over ethernet
- Each Ipbus transaction carries a 32-bit header that describes the transaction type (read/write)

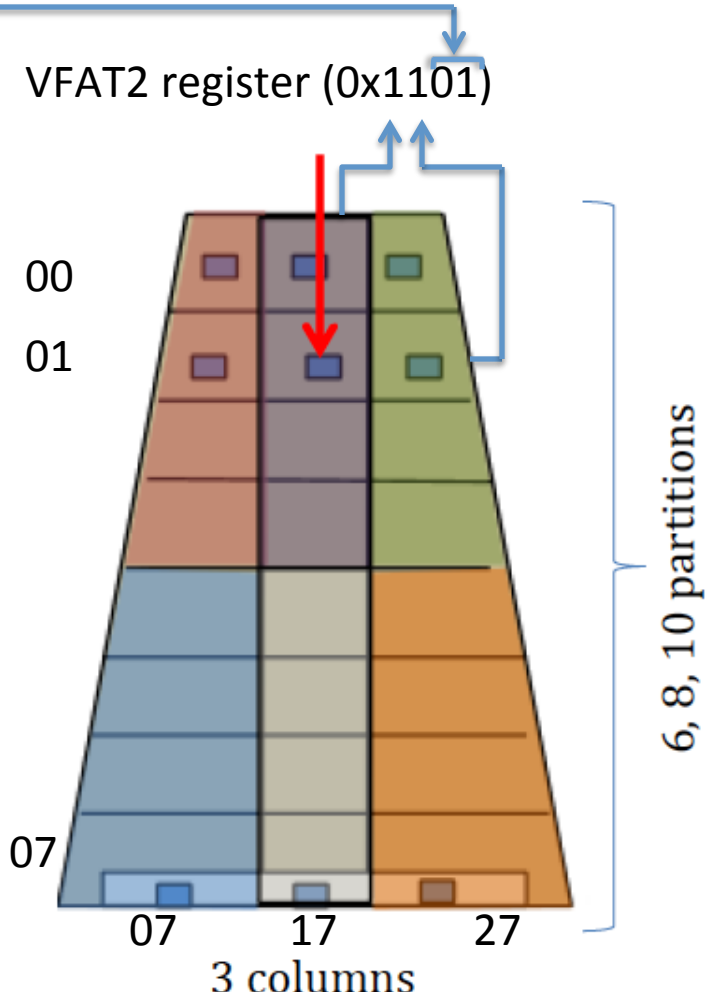
IPBus header
ADDRESS
DATA

- The GLIB has a range of USER IPbus slaves 0x40000000-0x7FFFFFFF
  - Each slave will correspond to one optical link (GBT or 8b/10b encoding)

GLIB mapping of VFAT2 registers

Example Cont.Reg<1>

- Column 2 bits (1 hex)
- Eta Partition 3 bits (1 hex)
- Register : 8 bits (2 hex)



➢ **Mapping in the GLIB:**

VFAT2_0_ContReg1 : Address = 0x40001101

µHAL

- C++ Hardware Access Library for the IPbus protocol
- We need to provide 2 .xml files
  - GLIB_IP.xml // File with IP of all the GLIBs
    - GLIB_0 : IP = 192.168.0.XYZ
  - GLIB_regs.xml // File with the mapping of the registers
    - VFAT2_0_ContReg1 : Address = 0x40000001
- Actually the SW developers do not need to know about the exact register address
  - Example:

```
<node id="REG" address="0x0001" permission="rw"/>
```

Then in the C code you use:

```
hw.getNode("REG").write(1);
```

Examples of functionalities: 1

- After PowerOn or hard reset, VFAT2 is in Sleep Mode
- You set VFAT2 in Run mode by writing 00000001 in VFAT2 Control_Register_0 that is mapped to GLIB register 0x4000AB01
- This is one IPBus transaction

- At the beginning of a run you want to set all VFAT2s of GE1/1 in Run mode
  - You send another command to the GLIB where the FW will take care of sending the request to the opto-hybrid FPGA which will send the I2C commands to all VFAT2s
- Such commands also important to be implemented for individual channels for debugging and testing

Examples of functionalities: 2

- S-curves
  - Histogram of hits when varying the injected charge for a given threshold (controlled by VT1 and VT2)
  - Process which requires many steps : only a few (8) channels per scan
    - Probably more efficient if GLIB firmware takes responsibility to send the commands to VFAT2s and store the data before sending them to DAQ PC

Conclusions

- VFAT2 control path defined
- Some functions well defined can already been implemented in the DAQ software
- We continue to establish other functionalities
- We need inputs from software and detector experts about what functionalities they want to be implemented
- Strong communication between hard/-firmware and software designers is needed to establish additional functionalities.