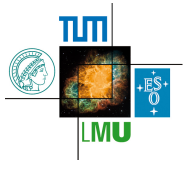
# DHE Firmwares and Beam Test Preparations

Dima Levit

Physik Department E18 - Technische Universität München

September 17th, 2015

supported by:
Maier-Leibnitz-Labor der TU und LMU München,
Cluster of Excellence: Origin and Structure of the Universe,
BMBF




# DHE Firmware Versions



1. Gated Mode Test Firmware
   - uses lemo card for receiving fast trigger signal
   - programmable sequencer generates trigger and veto signals synchronous with the frame sync
   - sequencer will be extended to cover 80 $\mu$s
   - functionality is ready
2. Switcher Control Firmware. Considered for beam test in November
   - uses SODIMM adapter card to control and configure switchers by FPGA on Hybrid 6
   - functionality is frozen
3. High Data Rate Test Firmware
   - uses external DDR3 memory as FIFO to sustain high data rate
   - changes in data processing logic required
   - sequencer. Same as in gated mode firmware?
   - in preparation
4. Final Firmware
   - handling of the overlapping triggers
   - no external trigger interfaces - trigger only from DHC
   - no UDP read-out

# High Data Rate Test Firmware

Technische Universität München

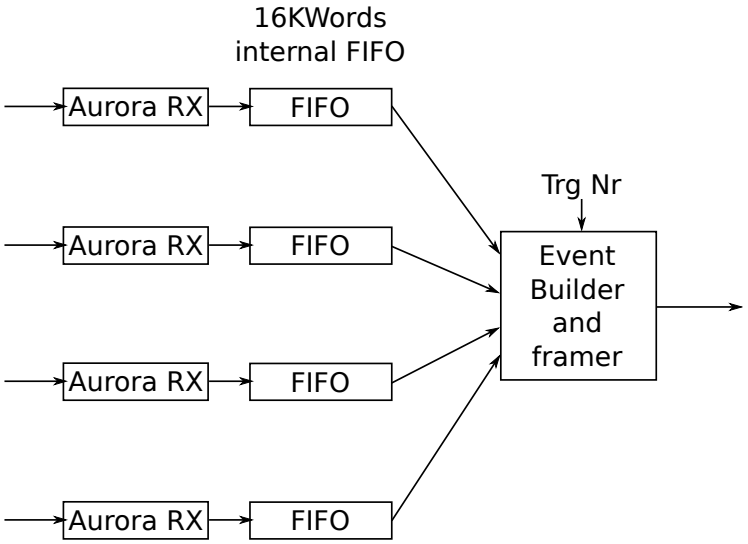



Figure : Current firmware

## Current Firmware

- trigger number assignment in event builder
- timeout required to find event borders
- tested up to the trigger rate of 6 kHz and 18 MB/s (Jan 2014, DESY)

## High Data Rate Firmware

- frames tagged with current trigger number before being written to external memory
- Start-Of-Event and End-Of-Event frames generated in event builder
- plan to re-use old state machines

# High Data Rate Test Firmware

Technische Universität München

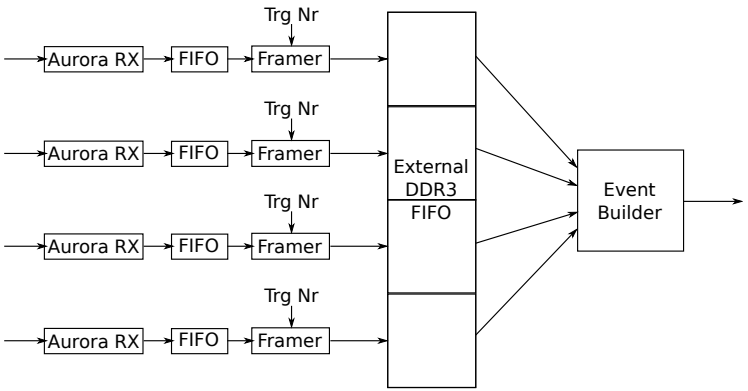



Figure : High data rate firmware

## Current Firmware

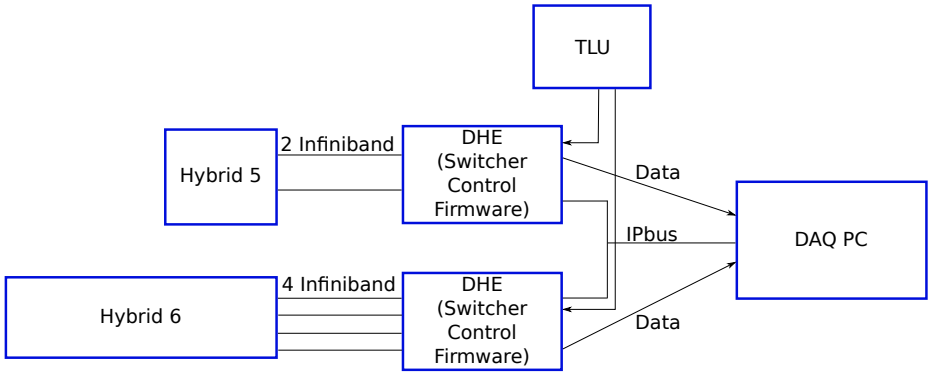
- trigger number assignment in event builder
- timeout required to find event borders
- tested up to the trigger rate of 6 kHz and 18 MB/s (Jan 2014, DESY)

## High Data Rate Firmware

- frames tagged with current trigger number before being written to external memory
- Start-Of-Event and End-Of-Event frames generated in event builder
- plan to re-use old state machines

# DHE at Beam Test

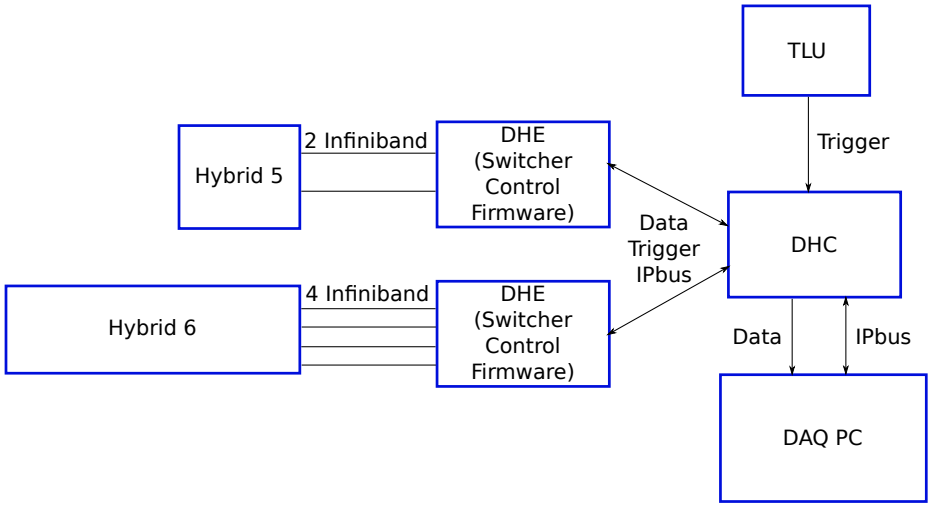





- Both DHEs use switcher control firmware
  - support for gated mode? use case?
- Independent TLU interfaces
  - 2 DHE-TLU cables required
- DAQ PC need 2 Ethernet cards to receive data
- Alternative: DHC performs sub-event building
  - one TLU link to DHC
  - one outgoing UDP link
  - DAQ software support for sub-event data formats
  - requires more effort from TUM and Bonn

# DHE at Beam Test






- Both DHEs use switcher control firmware
  - support for gated mode? use case?
- Independent TLU interfaces
  - 2 DHE-TLU cables required
- DAQ PC need 2 Ethernet cards to receive data
- Alternative: DHC performs sub-event building
  - one TLU link to DHC
  - one outgoing UDP link
  - DAQ software support for sub-event data formats
  - requires more effort from TUM and Bonn