CCC and TLU

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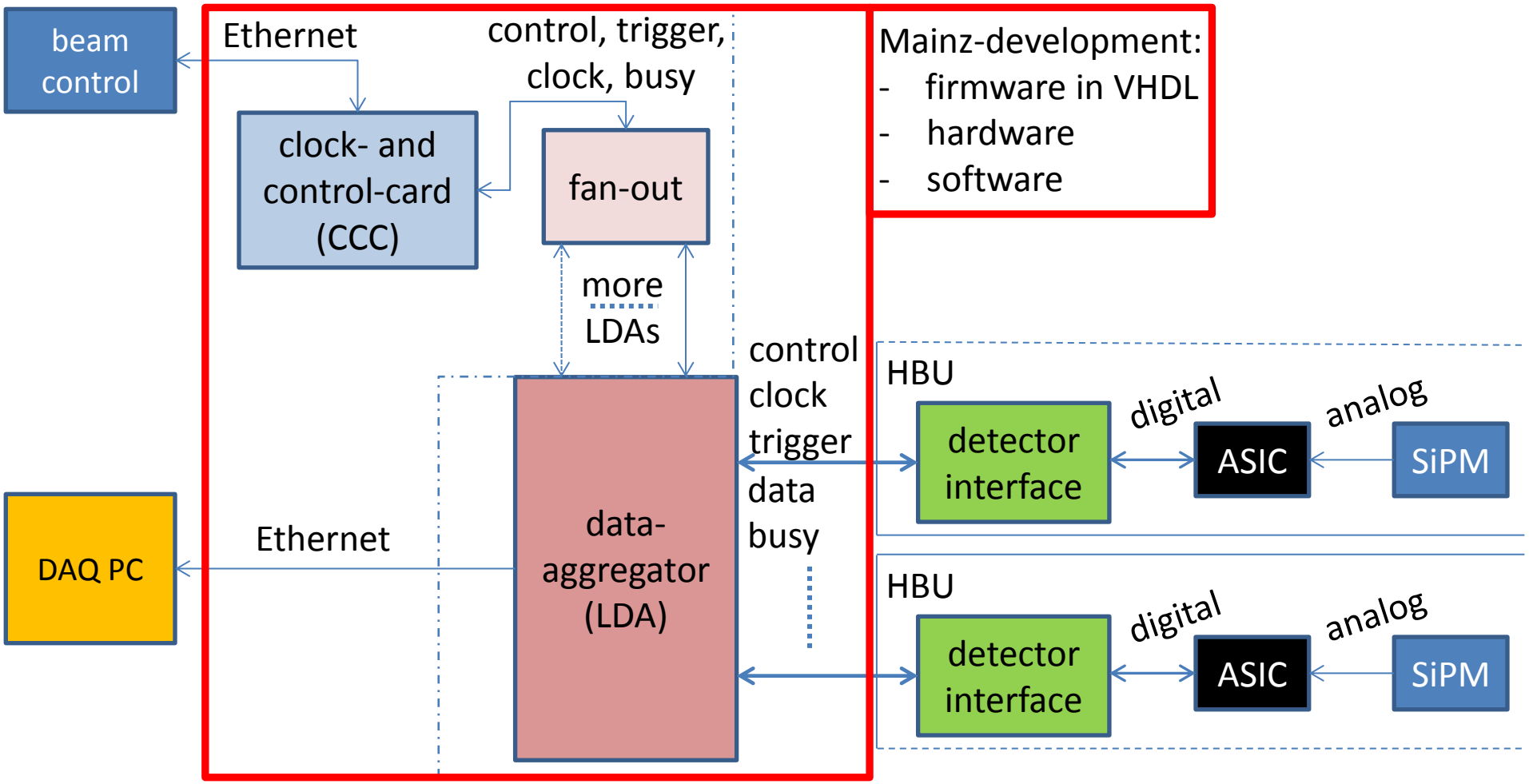
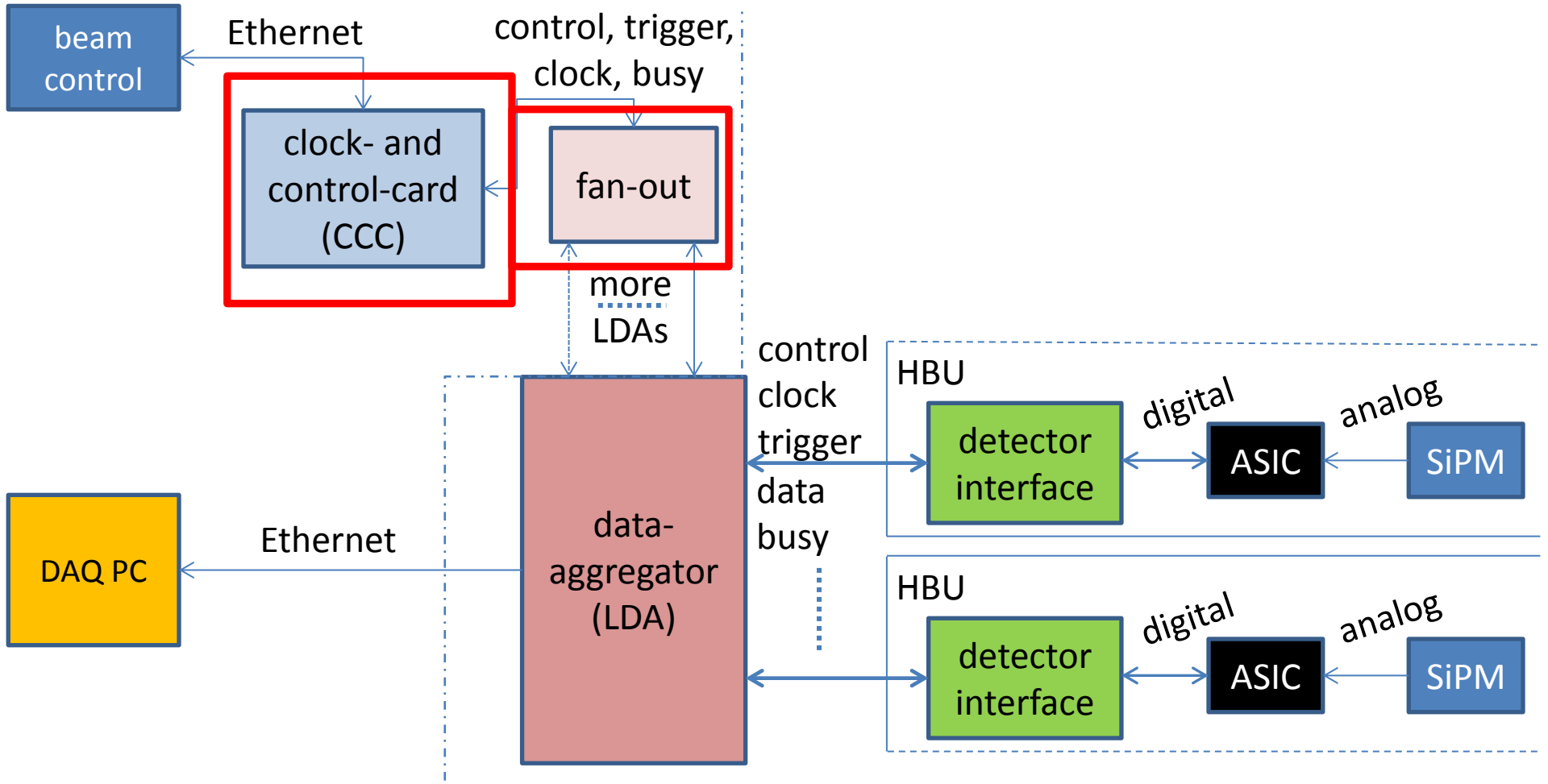
AIDA Meeting
Frascati, 11. April 2013

Read-out-chain



Read-out-chain



Clock and Control Card(CCC)

Requirements:

1. **High clock stability in the whole detector**

2. **Configuration interface over Ethernet**
   - manage different running modes
   - for feedback functions
   - for beam control

Status:

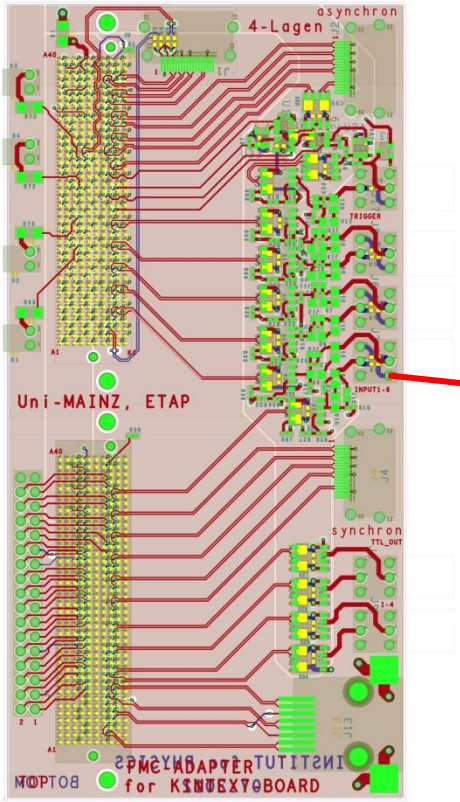
1. **Built and tested for a lab setup and used in test beams 2012**

2. **Next step: Upgrade for bigger test beams (almost finished)**

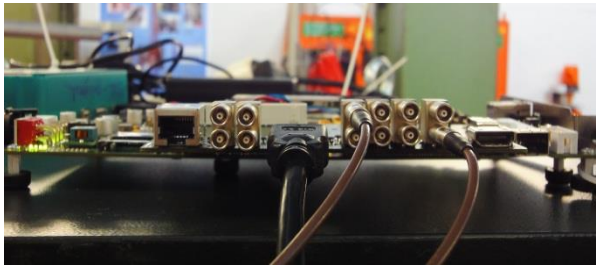
2012 Clock and Control Card

Mezzanine on an Kintex 7 Evaluation-Board:

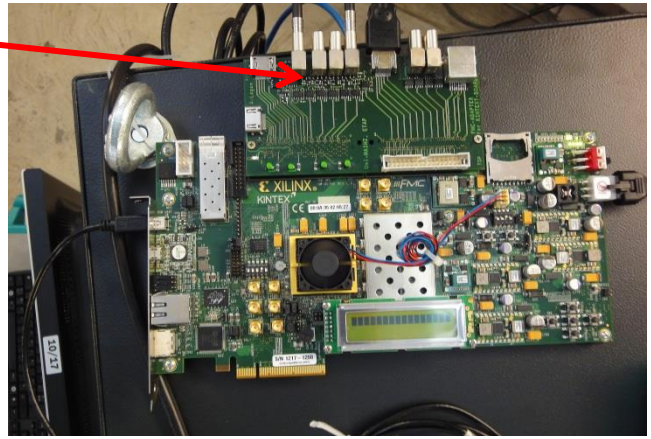
FPGA-controlled CCC board:



CCC at the testbeam (front):

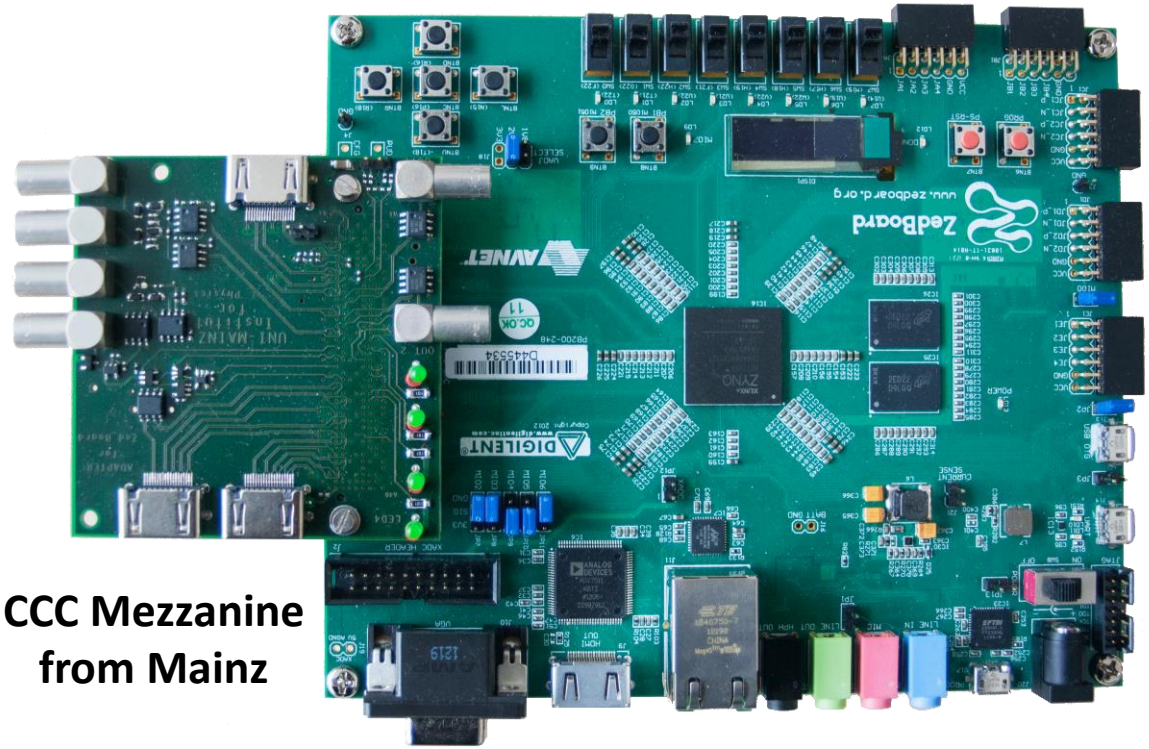


CCC at the testbeam (top):



New 2013 Clock and Control Card

First iteration with a Zynq-processor on a Zedboard for development:



CCC Mezzanine from Mainz

Zedboard:

- Evaluation Board from Digilent

Zynq:

- ARM9 dual core processor (Linux)

+

- FPGA

Clock and Control Card(CCC)

Final design for test beams:
6U-VME formfactor

front:

Ethernet

Micro-SD

USER

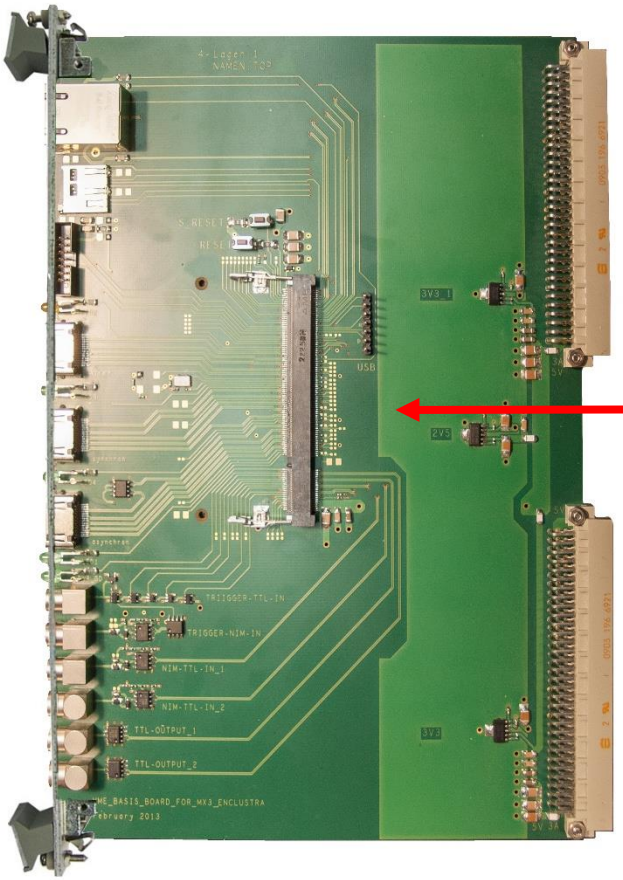
SYNC

ASYNC

TTL IN

TTL OUT

top:



Peculiarity of the Mars-Modul:

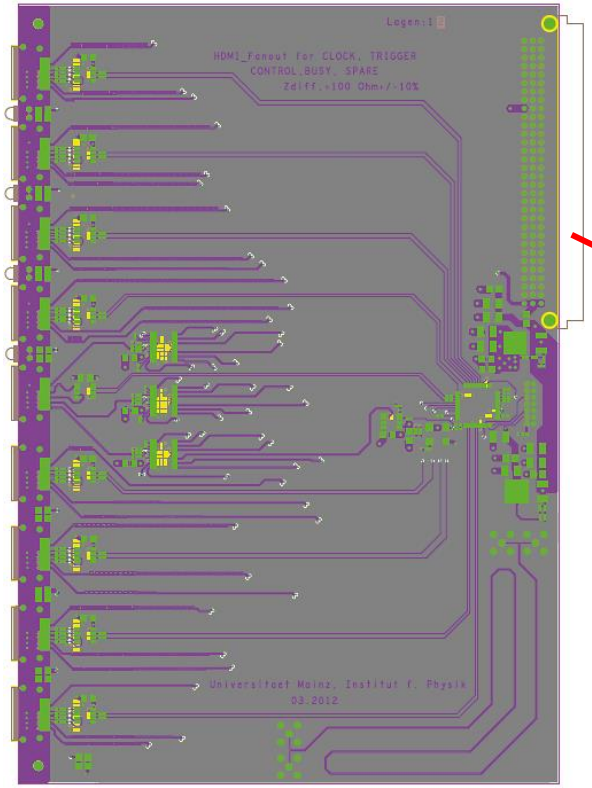
1. Zynq
   - ARM9 dual core
   - Linux + FPGA
2. 512MB NAND/RAM

Mars-ZX3 firm:Enclustra

CCC Fan-out same as in 2012

6U-VME Fan-out board:

Fan-out board layout:



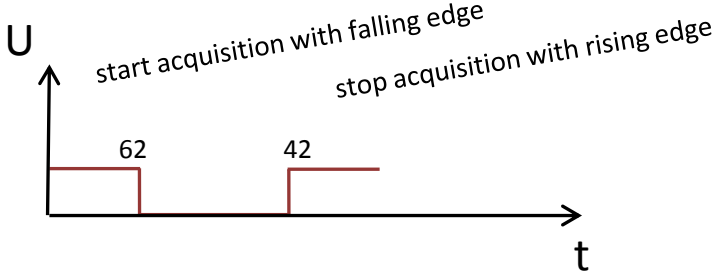
Fan-out board at the testbeam:

Running Modes

Four main modes and 13 commands:

signal:

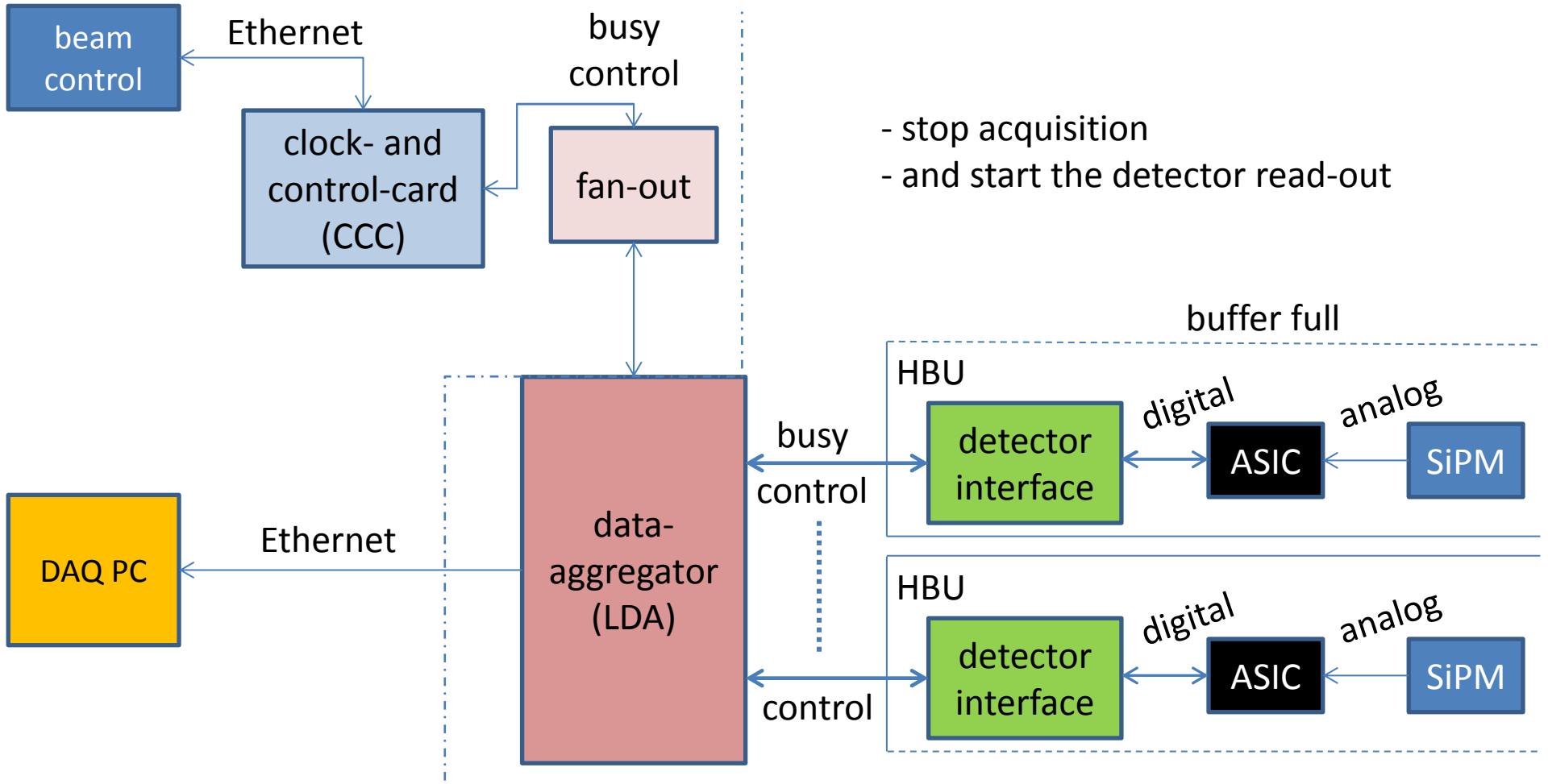
e.g. busy:



conditions:

ASIC buffer full

Read-out-chain



Running Modes

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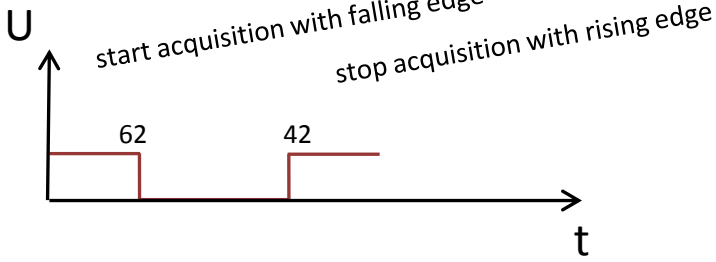

conditions:
ASIC buffer full

extended commands: (backward compatible)

- manual trigger
- listen on falling or rising edge
- status
- hard- and softreset
- and many more

CCC and TLU Configuration

Processing Instruction Configurator (piconf) (by Rouven Spreckels)

- Configures all devices
- Configuration procedures are automated
- Everything stored in one or multiple XML files
- Self-explanatory, predefined XML tags
- Interface independent:
  - implemented: TCP/IP

piconf example

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<piconf version="1.0.0">
        <!-- Only <pi> tags in this level are parsed and must only contain
             predefined tags. -->
        <pi>
                <conf>
                        <!-- Include some values. -->
                        <fpath>lda/some_values.xml</fpath>
                        <!-- Define another value. -->
                        <another_value>1</another_value>
                        <!-- piconf informs us if an endpoint rejected unknown
                             or invalid values. -->
                </conf>
                <!-- This <xpath> tag will be replaced by the <tcp> tags below,
                     since it is pointing to them. -->
                <xpath>../../some_devices/node()</xpath>
        </pi>
        <some_devices>
                <!-- Above <conf> tag will be sent to following devices. -->
                <tcp>
                        <host>lda1.physik.uni-mainz.de</host>
                        <service>3141</service>
                </tcp>
                <tcp>
                        <host>lda2.physik.uni-mainz.de</host>
                        <service>3141</service>
                </tcp>
        </some_devices>
</piconf>
```

CCC with a TLU

Two possibilities:

1. **Baseline: Integrate the current TLU VHDL code**
   Fallback: Integrate a hardware part for the Ethernet

2. **Baseline: Integrate a hardware part for the Ethernet**
   Fallback: Integrate an own TLU VHDL code

Both solutions depends on the timescale, less manpower until the May 2013 testbeam

Status of CCC

1. **One module physically exists**
2. **Hardware tested**
3. **Firmware almost done**

CCC should be ready to go for the test beam in May 2013

Thank you for your

attention!