JÜLICH
FORSCHUNGSZENTRUM
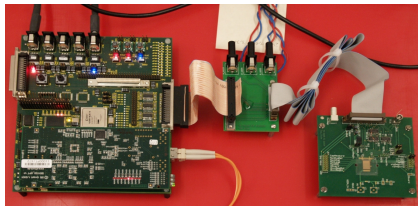
MRFoE
Upgrade of the Jülich Digital Readout System for the ToPix 3

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Upgrade of the Jülich Digital Readout System for the ToPix3

For the readout of the ToPix 3 the hardwareplatform of the digital readout system is upgraded in order to improve online data processing capabilities (e.g. more memory...)

- The modular MRF-software allows to adapt quickly the software to new hardware → No new development necessary
- The current readout board can be improved with different connectors and more memory
  → development takes time and resources
  OR work with a commercial FPGA board

Xilinx Virtex-6 FPGA ML605 Evaluation Kit

Advantages

- No development time for hardware
- No development costs for hardware
- Good documentation, protocol implementations and examples available
- All necessary interfaces and sufficient memory is available

Xilinx Virtex-6 FPGA ML605 Evaluation Kit

- Virtex6
- 160+68 bit interface
- comes with 512MB DDR3
- Tri Speed ethernet MAC
- SFP tranceiver connector
- FMC Connectors
- CompactFlash Slot

Connection

- Existing readout board: SYS1100
- New readout board: Gigabit ethernet
- → needs communication protocol

Data Protocol

Ethernet frame as a basis for custom protocol

- Advantages
  - Simple protocol
  - Little overhead
  - Standard hardware can be used → Price
  - FPGA Core to handle ethernet frames available
- Disadvantages
  - No package control / acknowlegment
  - No fragmentation
- → will be implemented by custom part of our protocol

Ethernet-Frame: Min. 64, Max. 1518 Byte (mit VLAN-Tag: Max. 1522 Byte)
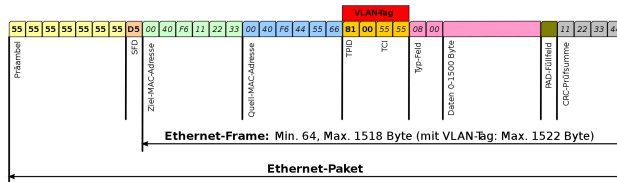
Ethernet-Paket

MRFoE - MVD Readout Framework over Ethernet

Protocol embedded in the payload of ethernet frame
Datagramm Draft

- ID
- Command
- Address
- Length
- Data[i]

Data channel and message channel are foreseen

Summary - Outlook

- Board is there and ready for operation
- First loopback example for ethernet-frames is running

Next steps

- Implementing the ethernet protocol into the MRF
- Implementing the MRFoE protocol into the MRF
- Get the ToPix2 running
- Get the ToPix3 running
- $\rightarrow$ Can be used for other components e.g. Strips, Straws,...

Dankeschön

Thank you
for your Attention