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REDNET Overview

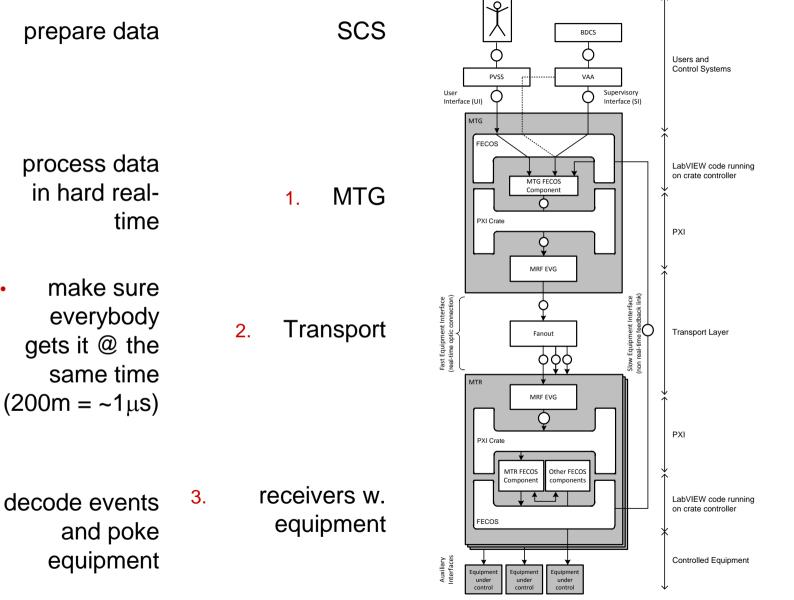
Rok Stefanic (<u>rok.stefanic@cosylab.com</u>)

Outline

What does REDNET provide to the users

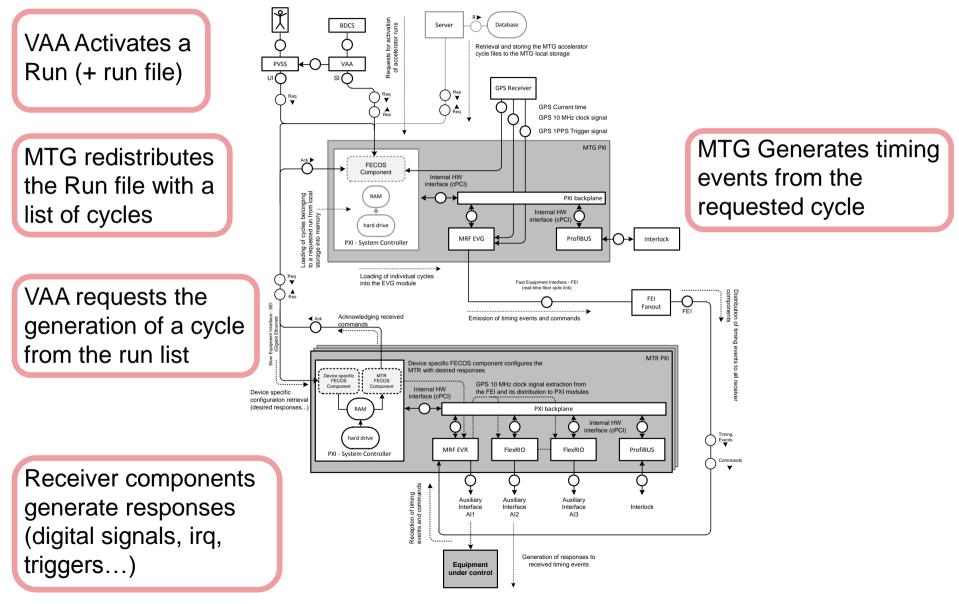
- How it looks like
- How it works (MTG & MTR)
- Responses controlling the devices
- What we have done in CWO2
 - Refine the requirements
 - Architecture and design
 - Mock-up demo of the system
- What follows in future CWOs
 - Detailed FPGA and LV architecture
 - Implementation of the system

What does **REDNET** provide to the users How it looks like



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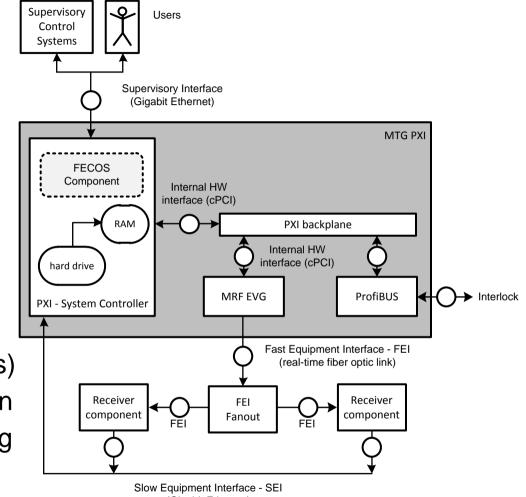
What does REDNET provide to the users How it works



What does REDNET provide to the users MTG

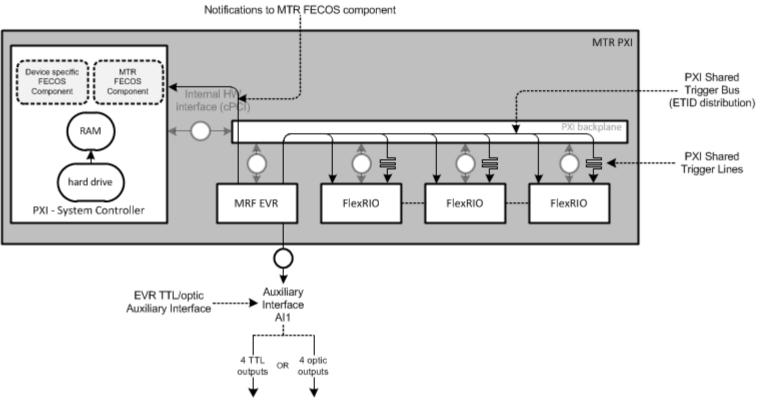
- PXI crate
- Controller
- LV RT
- MRF EVG

- 5 Execution slot tables (priorities)
- 1µs granularity of event emission
- Emission of asynchronous timing events
- 10 Hz heartbeat timing event (time grid)
- GPS time and clock distribution



⁽Gigabit Ethernet)

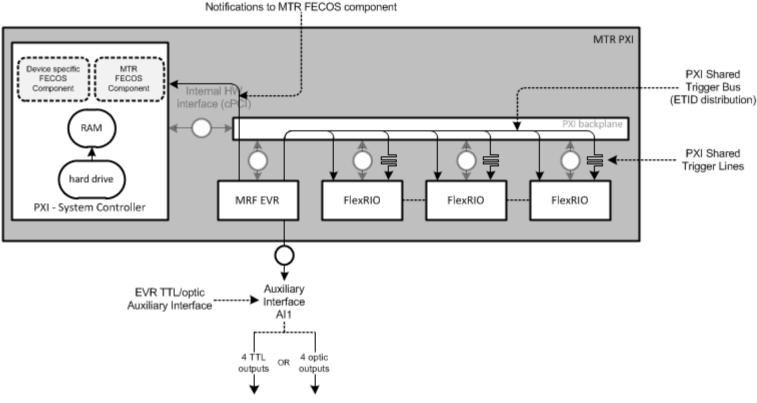
What does REDNET provide to the users MTR – controlling the devices



- PXI crate
- Controller
- LV RT
- MRF EVR
- Other PXI modules

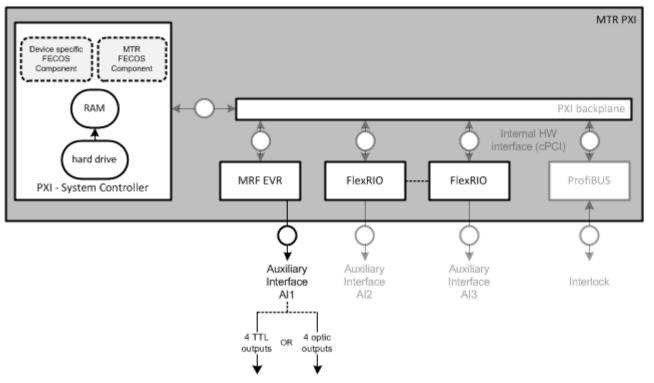
- Digital/optical signals on the MRF EVR outputs
- Re-distribution of timing events to PXI cards
- Trigger neighbor PXI cards
- LabView application notification

What does REDNET provide to the users MTR - controlling the devices



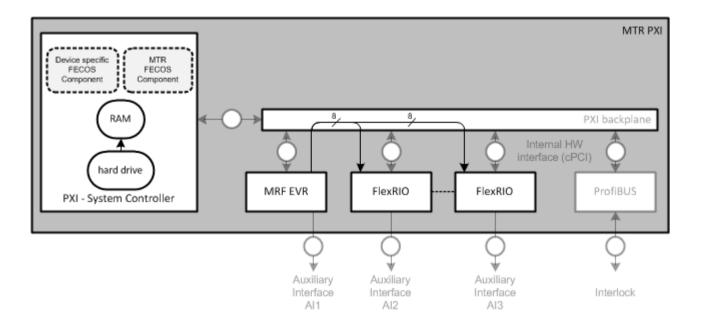
- No configuration files are needed.
- Device specific application requests the MTR which responses it needs (+ parameters such as timing event, pulse delay, width...)
- Multiple interfaces can be used concurrently
- Global propagation delay compensation parameter (<10ns steps)

What does REDNET provide to the users Responses – Auxiliary interface outputs



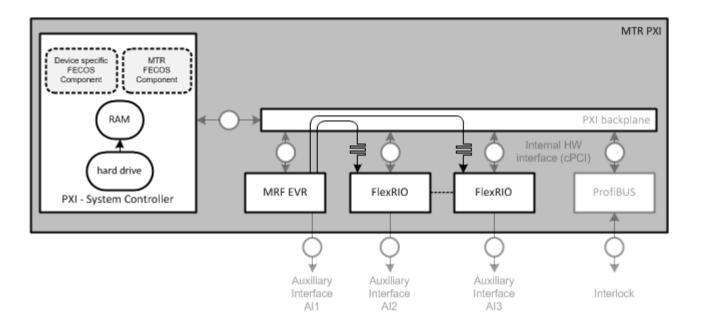
- Pulses or output toggle
- Configurable pulse delay and width (< 10 ns steps)
- Each digital/optic output can have different configuration (ES, event, delay, width, type)

What does REDNET provide to the users Responses – Redistribution of events to PXI cards



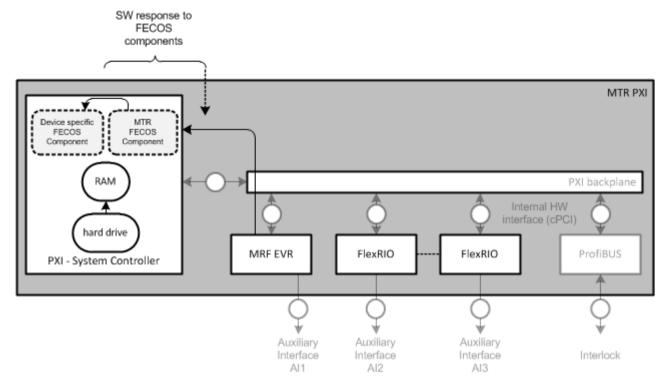
- Each received timing event can be distributed to other PXI modules
- EVR distributes timing event value and execution slot to which the event belongs

What does REDNET provide to the users Responses – Triggering PXI cards



- Trigger pulses generated on PXI star trigger lines
- Useful for simple devices (ADC cards etc.) which only need trigger signals

What does REDNET provide to the users Responses - LabView application notification



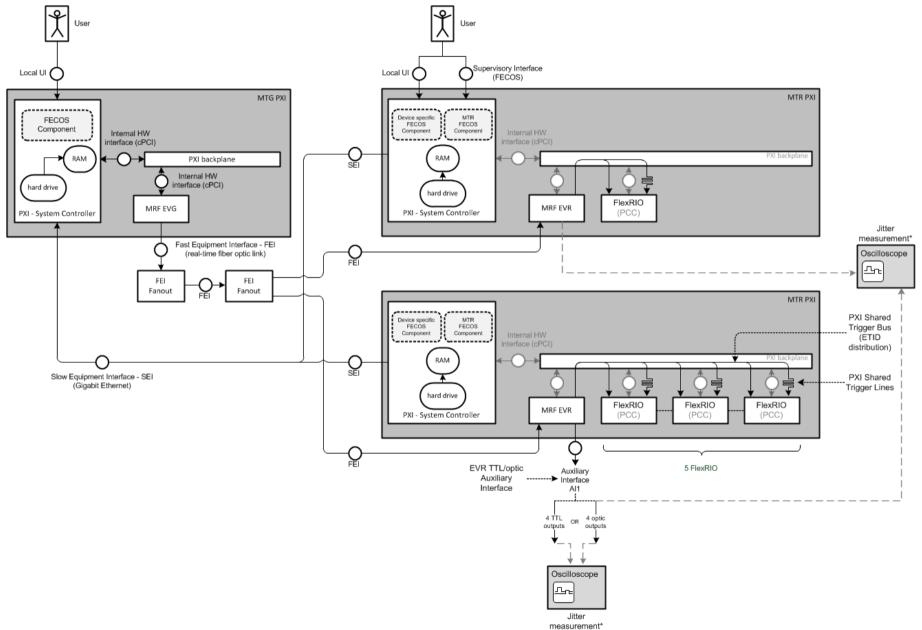
- EVR issues an IRQ when a specific timing event is received
- MTR distributes the received event to all subscribed device specific applications as a FECOS event

Documentation

- Refined the requirements in detail
- Finished top level architecture and design
- All documents are ported to Enterprise Architect models
 - All requirements covered by the top-level architecture
 - Traceability
- Fully mastered the MRF EVG and EVR cards
 - □ FPGA + 2.5 Gbps
 - LabView support for MRF
- Made mock-up demo of the system
 - Emission of timing events, commands, asyn. events, acknowledgments, uses FECOS...
- Defined tasks for future CWOs

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What have we done in CWO2 REDNET Mock-up demo



What have we done in CWO2 REDNET Mock-up demo

- Listing of available sequence files on HDD
- Sequence file editing
- Emission and reception:
 - Timing events
 - Commands
 - Asynchronous timing events
 - (Emitted at any time)
- Acknowledgments
 - Each MTR sends ACK
 - MTG lists all received ACKs

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What have we done in CWO2 REDNET Mock-up demo contd.

- Response generation:
 - I/O signals on MRF EVR
 - Distribution of received events over PXI RT trigger bus (to PCC)
 - SW notifications
 - User can configure which responses are generated for received events

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What follows in future CWOs

- Internal architecture design for the MTG and MTR:
 - LabView application
 - FPGA (MRF EVG & EVR)
- Implementation of the system
 - Full size accelerator cycles
 - Execution slot support
 - Full auxiliary interface outputs support
 - Synchronization with GPS
 - Heartbeat event generation
 - MTR & MTG configuration (xml files)
 - □ ...

Thank you for your attention

Questions?