



EUDRB-MIMO: A VME-64x based DAQ card for MIMOTEL/MIMO*2 sensors

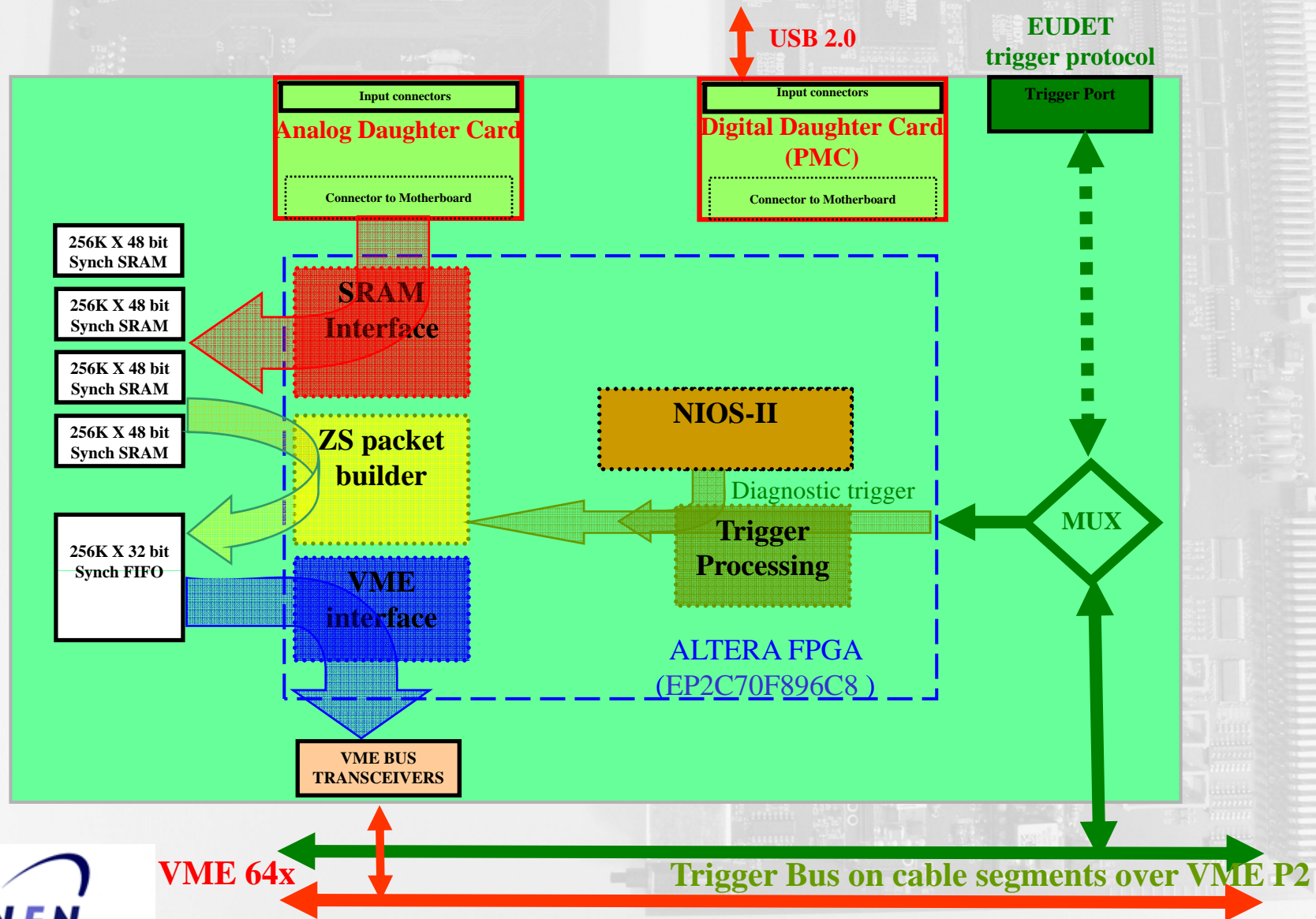
Let me call "EUDRB-MIMO" the configuration (FPGA+NIOS-II firmware) which I am developing to setup the EUDRB for data taking with MIMO*2 and MIMOTEL sensor

This report highlights the progresses of the EUDRB-MIMO since the January review :

- The USB2.0 - NIOS-II link on the EUDRB-MIMO is operating -> diagnostic and slow data acquisition can now be performed through it (I am developing a C++ GUI for this purpose)
- The NonZeroSuppressed and ZeroSuppressed operation modes are now fully developed.
- Operation of the EUDRB with MIMOTEL has also been tested, thanks to W. Dulinski, during the workshop in Ferrara (March)
- The TLU interface module by D. Spazian has been integrated
- The hardware problems with one memory bank on EUDRB#3 has been solved
- The VME interface has been modified to solve the problems encountered with "BERR" terminated block reads
- **The production of more EUDRBs has started at the beginning of March**

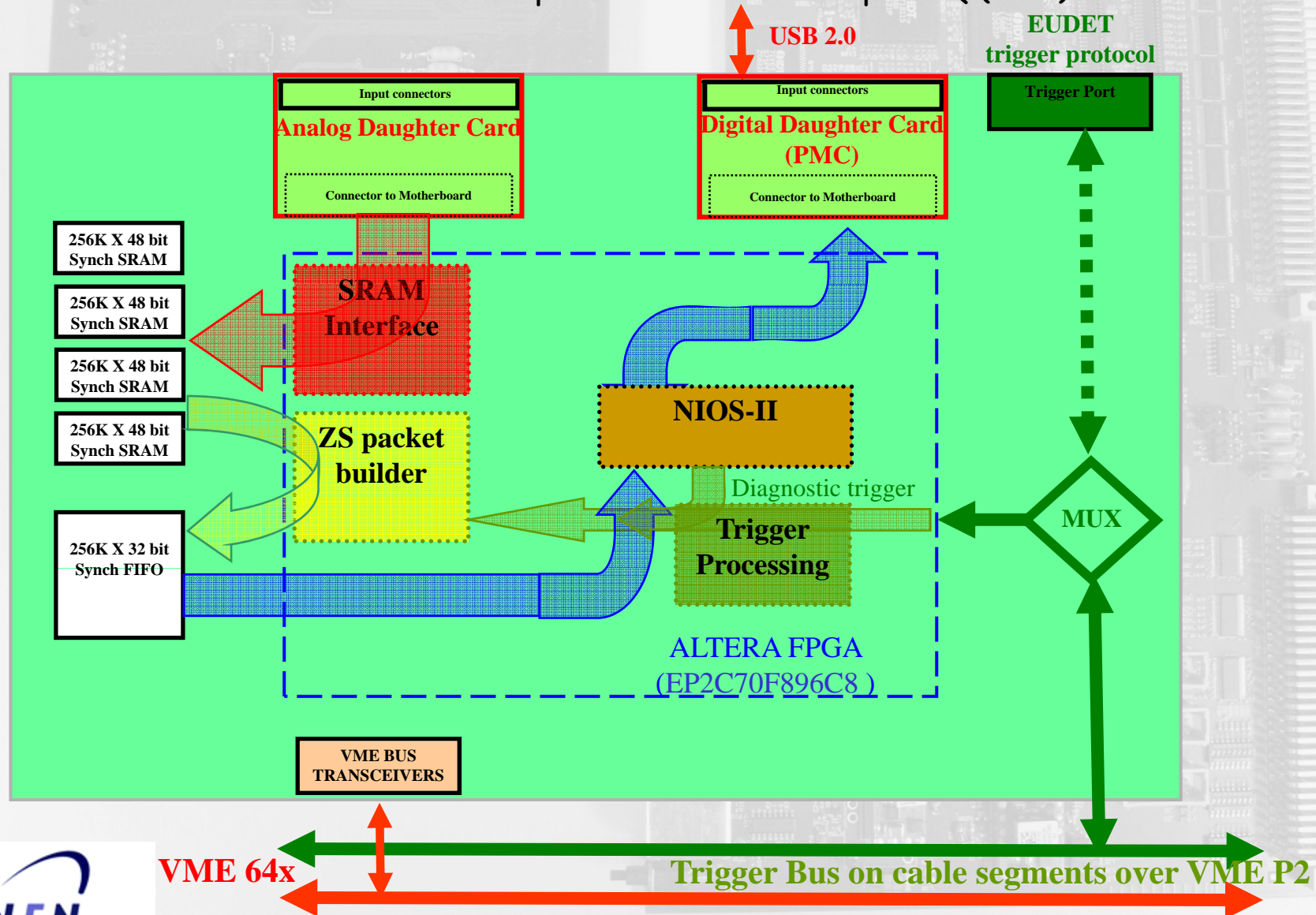
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Overview of Data Flow for ZS operation (mode for real data taking)



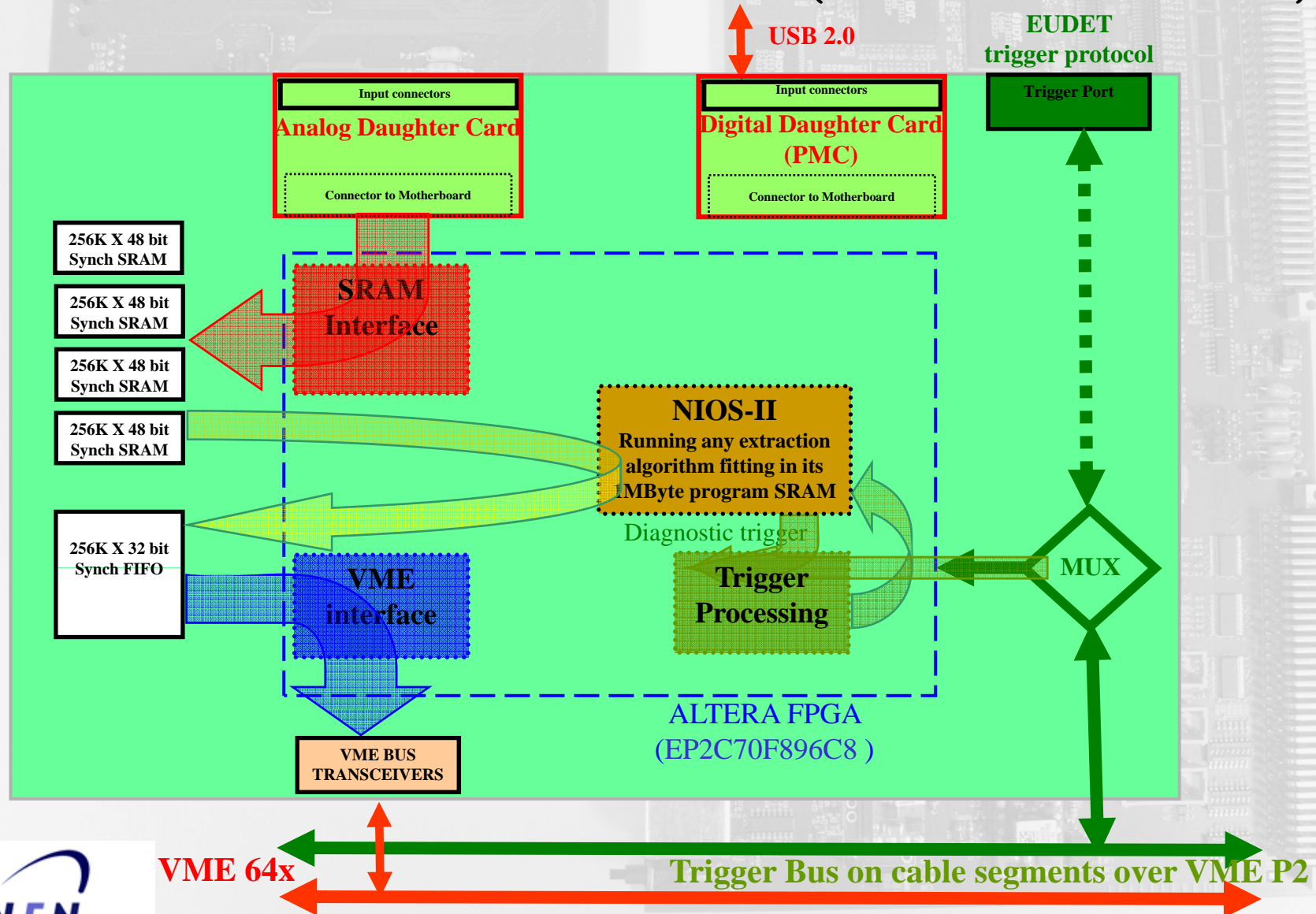
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Overview of Data Flow for ZS operation for benchtop DAQ (slow) via USB2.0



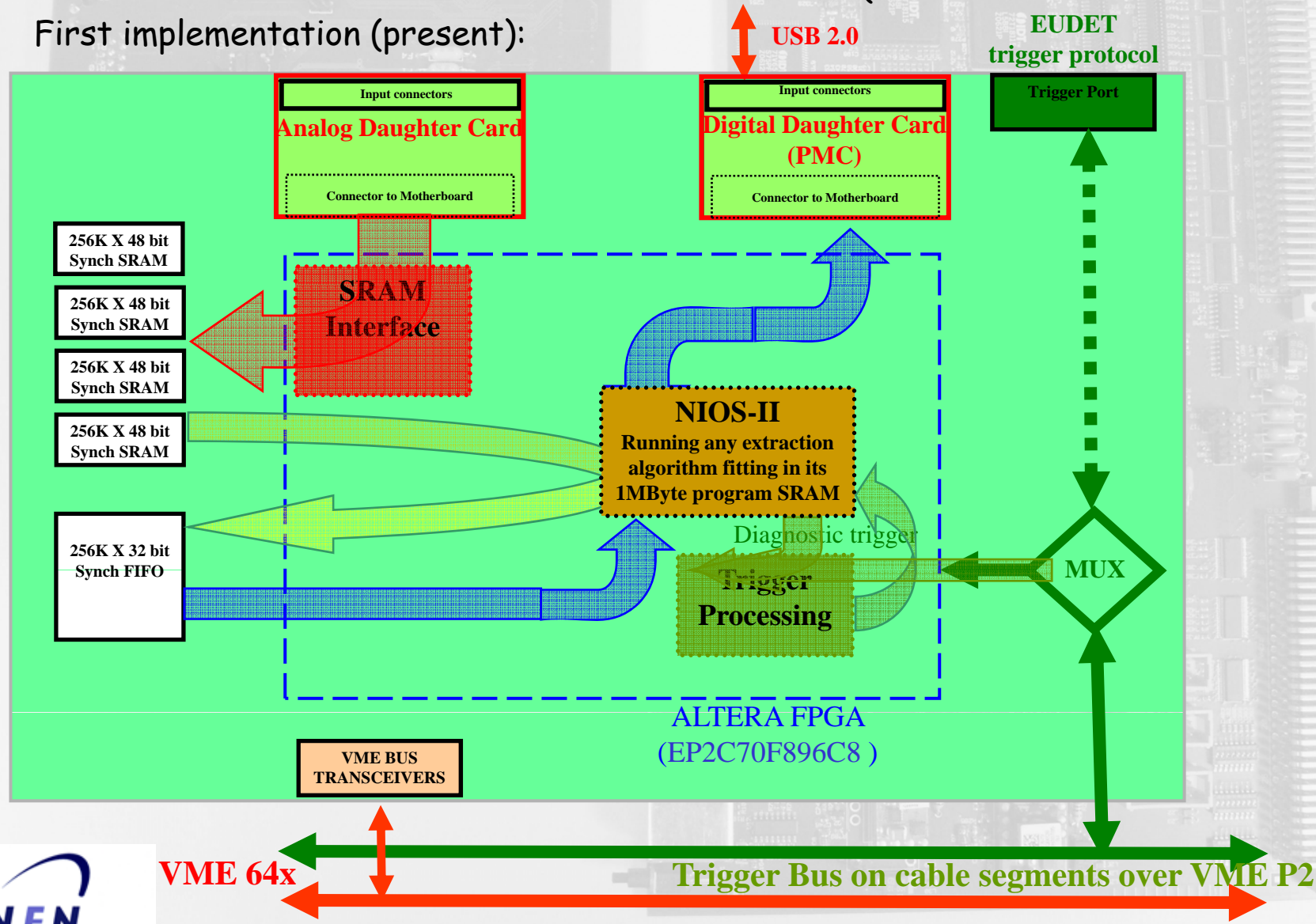
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Overview of Data Flow for NZS readout via VME (for detector characterization)



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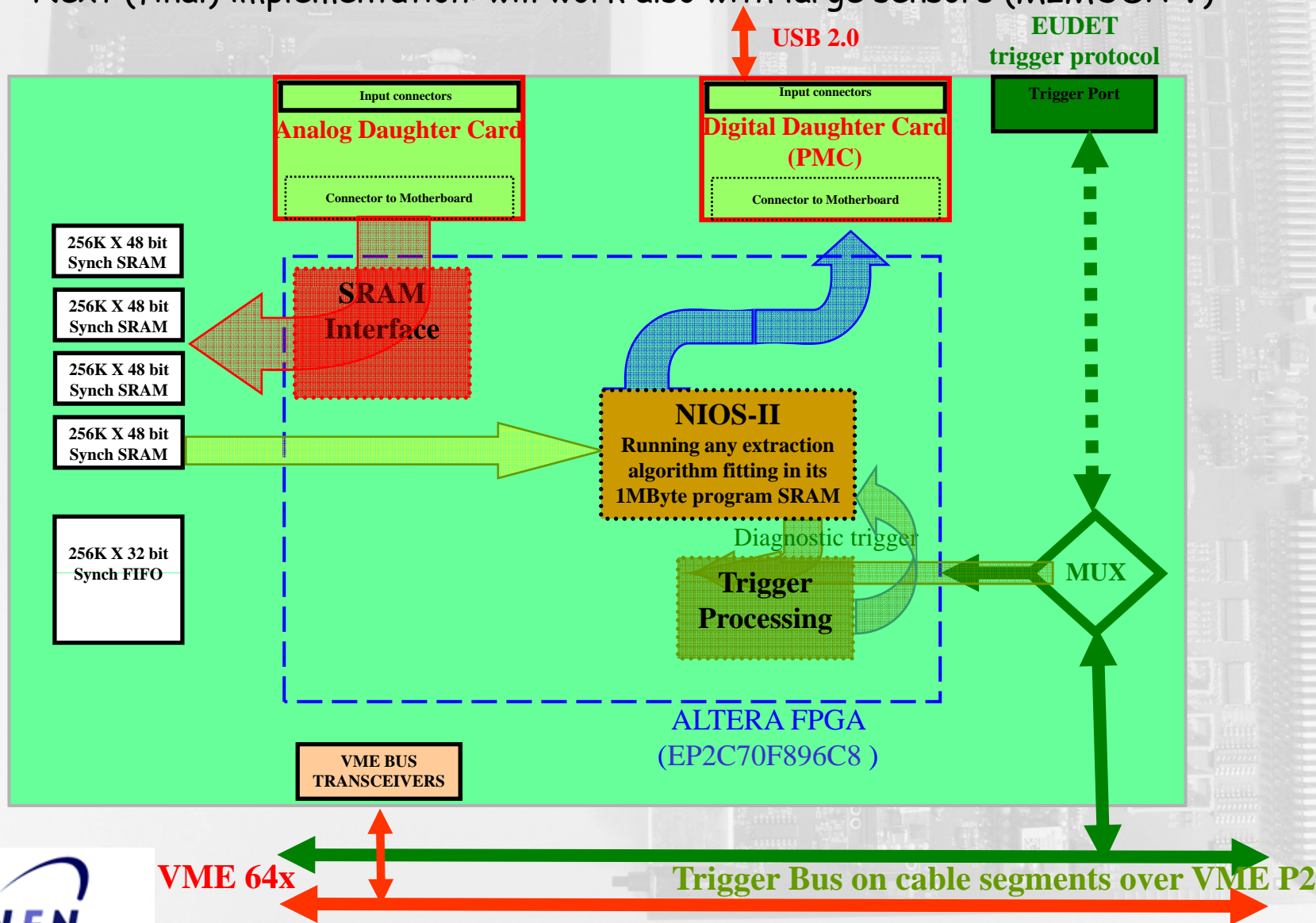
Overview of Data Flow for NZS readout via USB2.0 (for detector characterization)
 First implementation (present):



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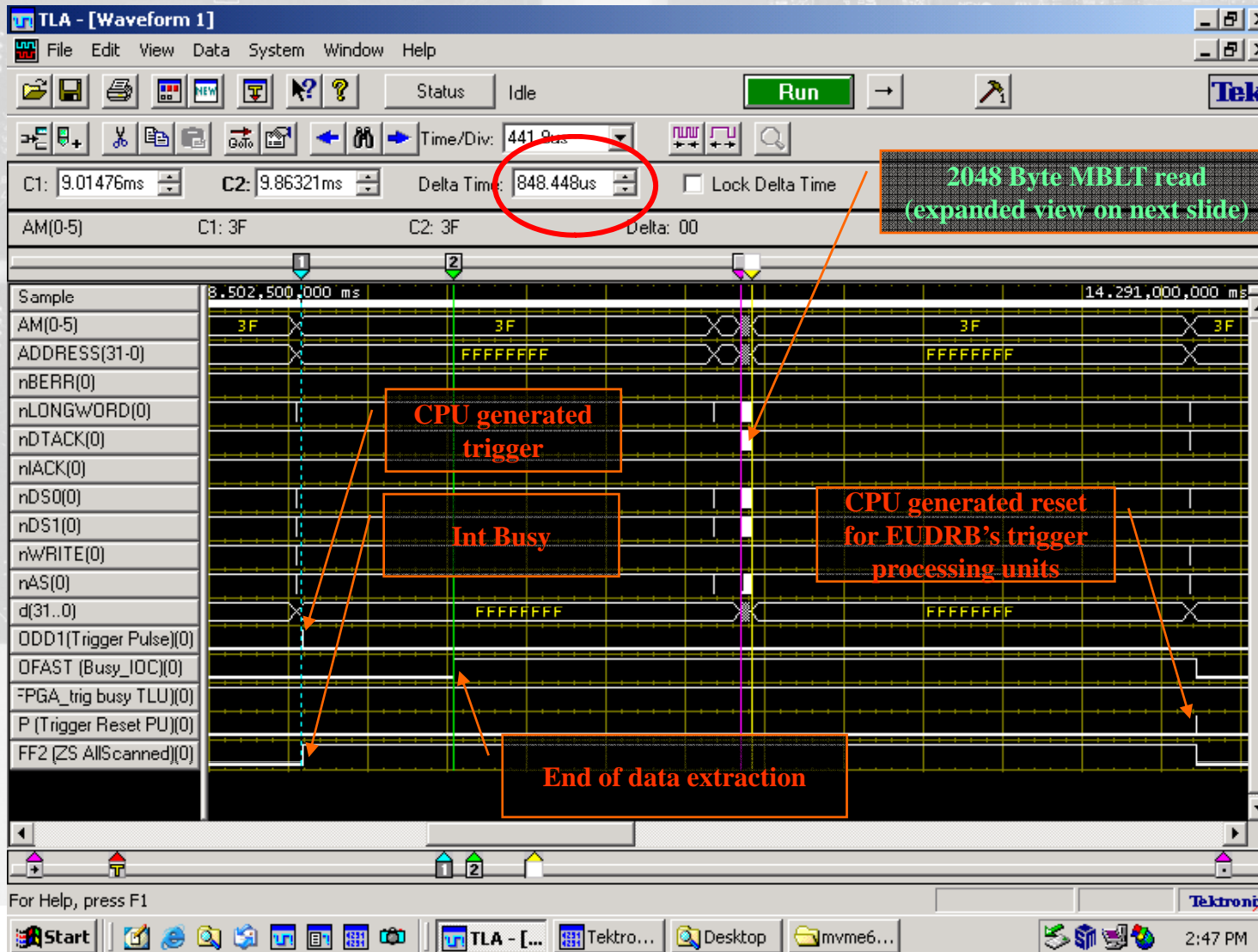
Overview of Data Flow for NZS readout via USB2.0 (for detector characterization)

Next (final) implementation: will work also with large sensors (MIMOSA V)



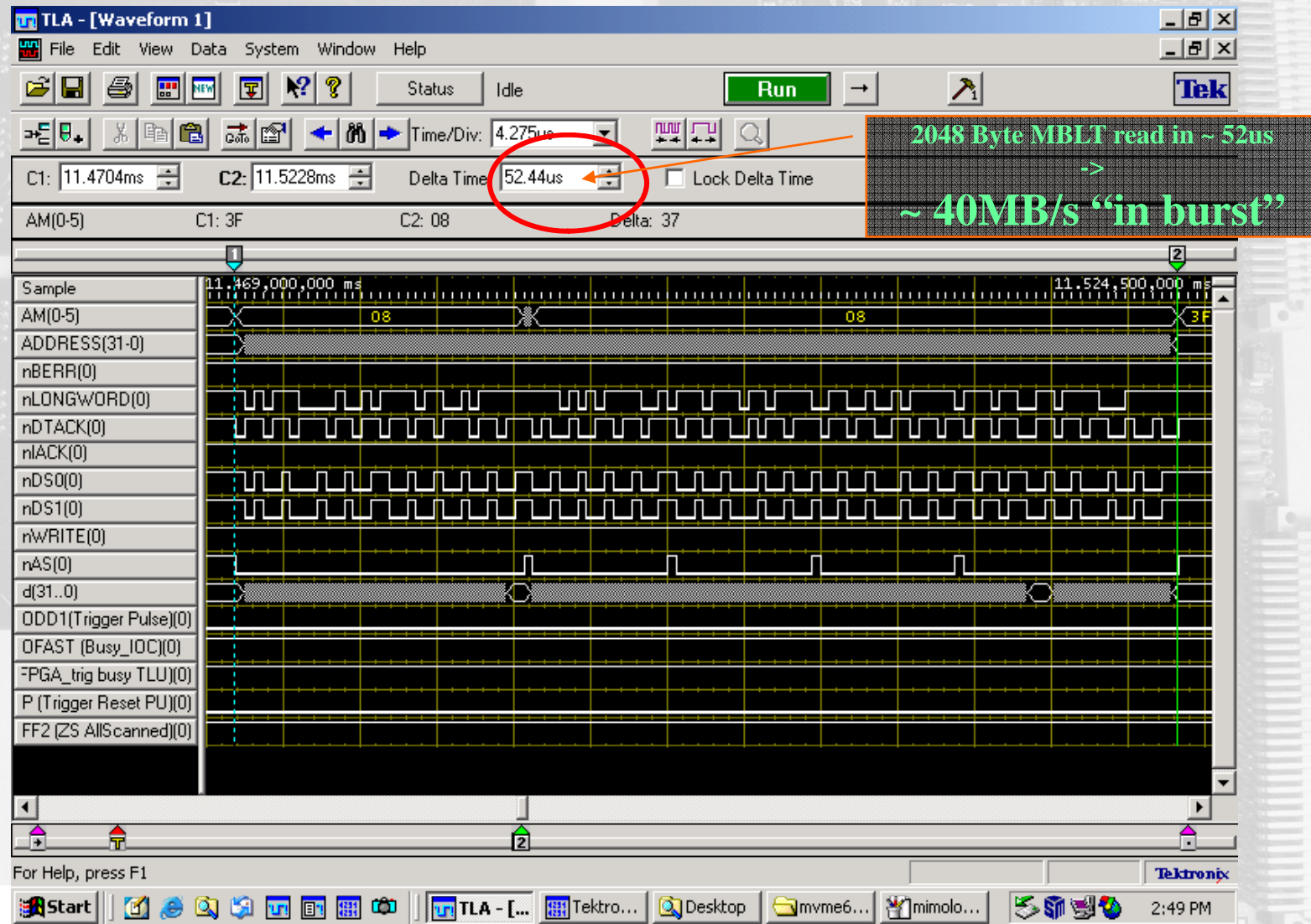
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Results from the workshop in Ferrara (Feb 26th): the VME CPU is running the "mimoloop" program by L.Chiarelli



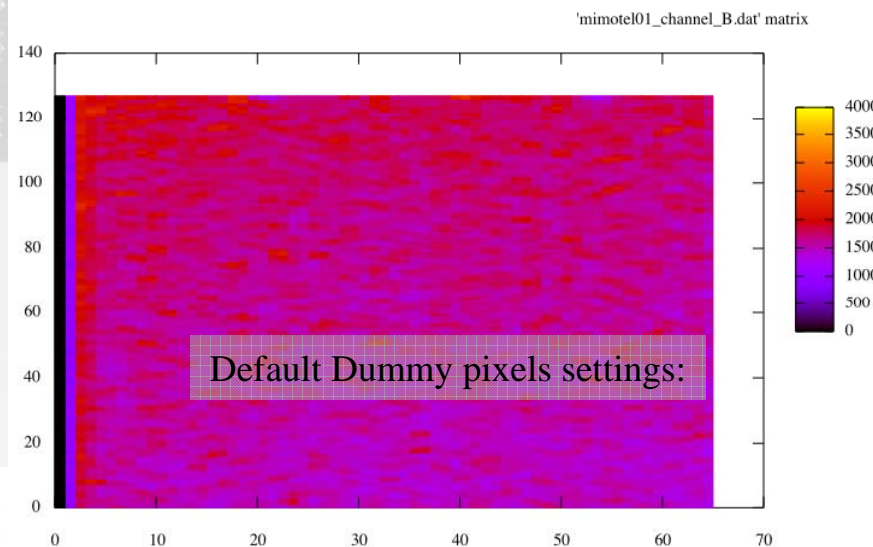
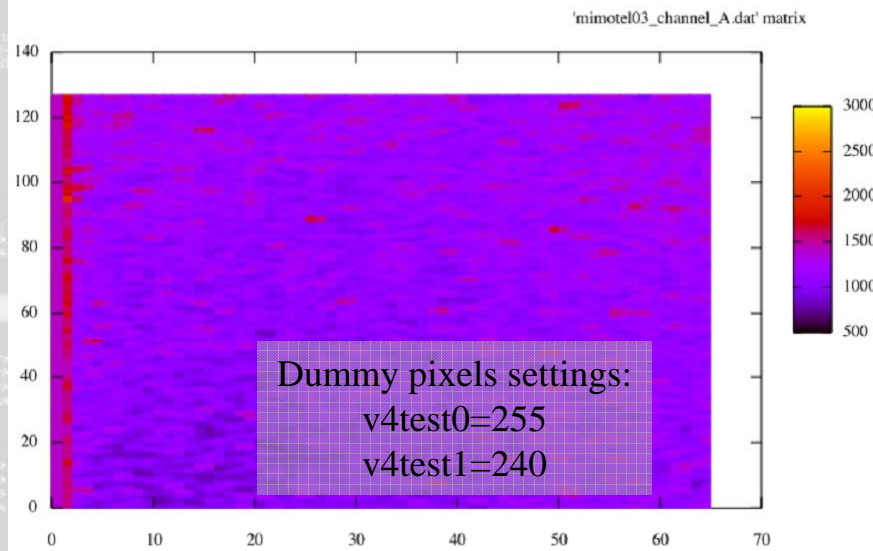
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Results from the **workshop in Ferrara** (Feb 26th): MIMOTEL in NZS mode
(GNUPlot maps by L. Chiarelli)



Note on the images:

- detector timing had been adjusted to MIMOTEL
- NIOS-II data extraction routine was still set for a 128 pixel matrix so the images are partial

Note:

A. Bulgheroni has written, at the workshop, code for the VME CPU to extract CDS data from the NZS event packet of three frames but → **NO meaningful CDS was produced because of an error in the SRAM interface module that caused misalignment of pixel data from different frames (first time tested) IT IS FIXED NOW**

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C++ GUI for debugging (and slow DAQ) via the USB2.0 port

The USB2.0 port on the EUDRB-MIMO has the following features:

- Input pipe for commands and configuration data from the host PC is through the USB endpoint 8
- Output pipe for configuration data to the host PC is through the USB endpoint 2
- Output pipe for event data to the host PC is through the USB endpoint 4
- All endpoints are double buffered (-> 1024 Byte buffer)

The USB2.0 link is controlled by the NIOS-II; the protocol for command/data exchange between the NIOS-II and the host PC is, as much as reasonable, similar to that for the link between the NIOS-II and the VME CPU

A C++ GUI is being developed (A. Cotta Ramusino) for debugging (and slow DAQ) via the USB2.0 port. It has been used to debug the operation of the EUDRB in NZS and ZS readout modes.

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C++ GUI for debugging (and slow DAQ) via the USB2.0 port

NZS acquisition on a fake (software, generated via USB2.0) trigger

The screenshot shows the USBLinkToEUDRB GUI with the following configuration:

- GUI to the USB2.0 port on the EUDRB_MIMOSTAR
- I.N.F.N. - FERRARA, Angelo Cotta Ramusino 07/03/2007
- Sensor Selection: MIMOSTAR2
- ReadOut mode: NonZeroSuppressed
- NIOS II fake trigger: Enabled
- ReadBackOfParameters: Enabled
- VMEReadOut: Disabled

Data Acquisition Tasks:

- Generate Fake TrigReset
- Generate Fake Trigger
- Read Word Count
- WordCount: c600
- Read Event
- EventReady: checked

NonZeroSuppressed Data Show:

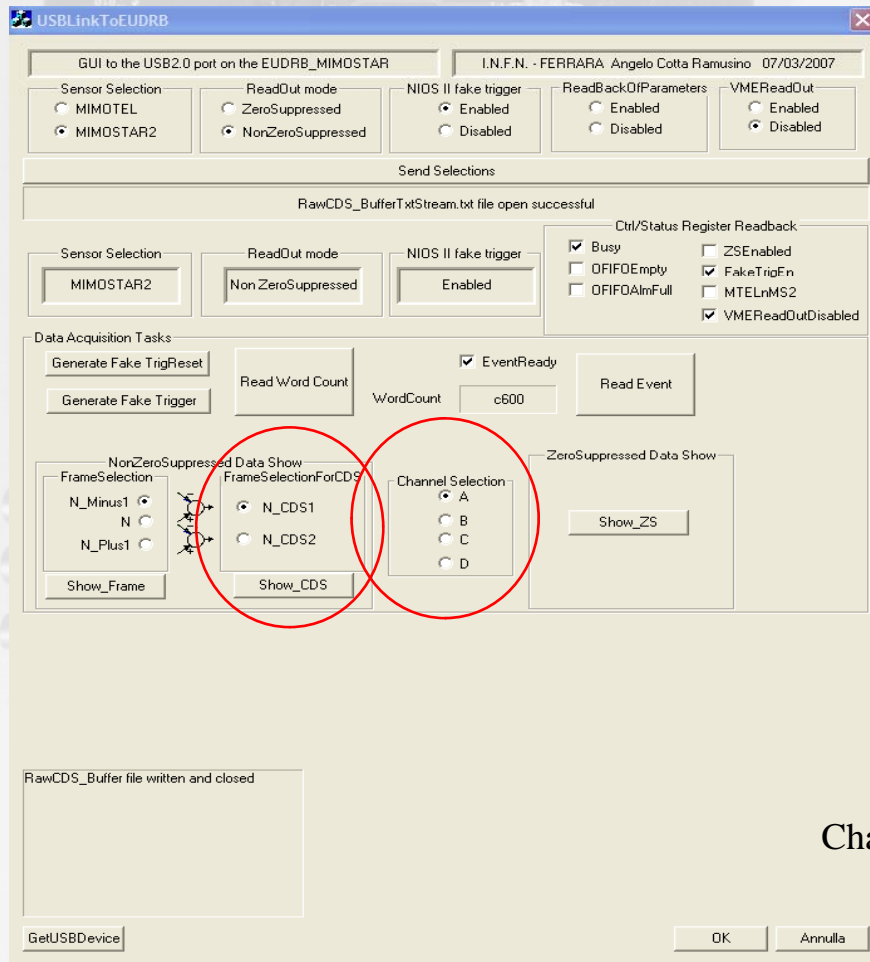
- FrameSelection: N_Minus1, N, N_Plus1
- FrameSelectionForCDS: N_CDS1, N_CDS2
- Channel Selection: A, B, C, D
- Show_ZS button

SubMatrix windows:

- Channel A, frame N-1
- Channel B, frame N-1

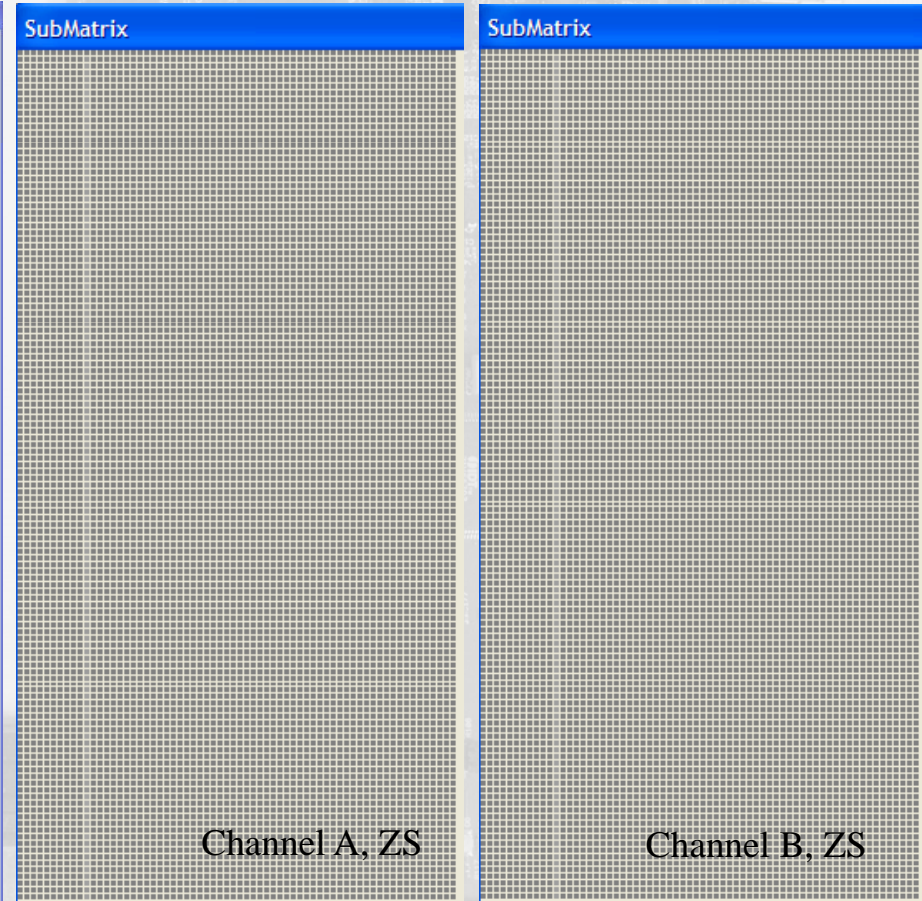
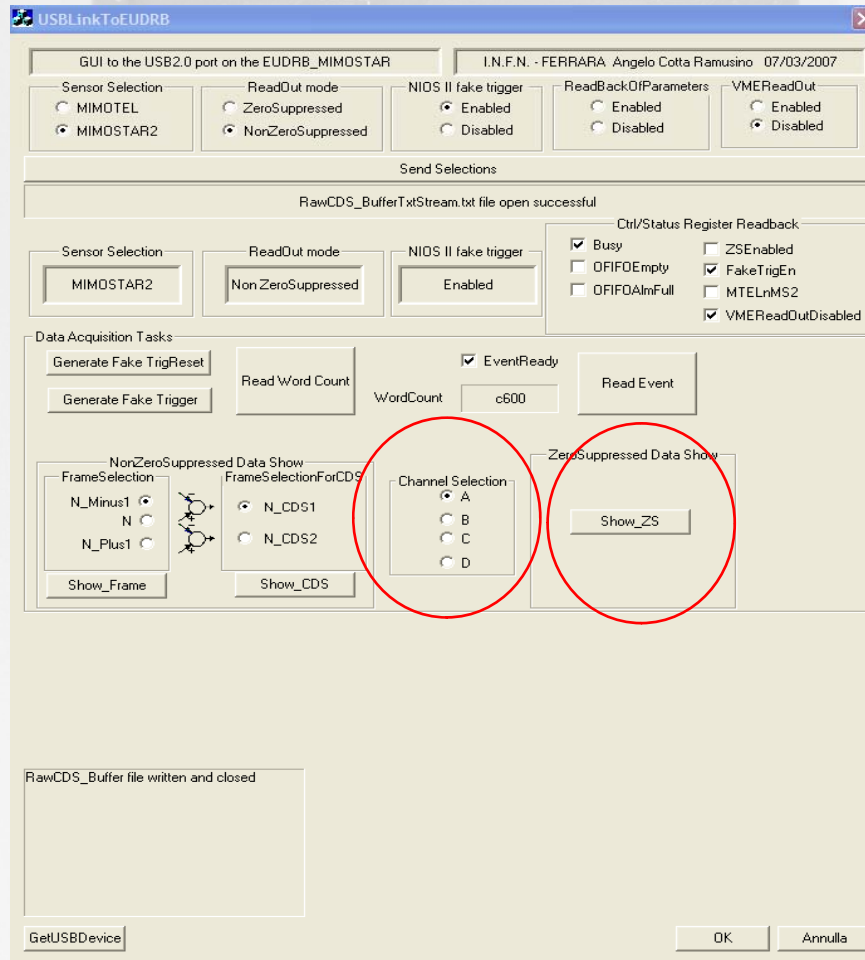
Note: frame N is the one at which the trigger arrived

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C++ GUI for debugging (and slow DAQ) via the USB2.0 port
NZS acquisition on a fake (software, generated via USB2.0) trigger -
CDS calculation



Channel A, (frame N) –frame(N-1)

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Pedestal and threshold memory initialized with the following pattern:
 For channel a: every 10th pixel of a row has a high pedestal and a low threshold.
 For channel b: every 11th pixel of a row has a high pedestal and a low threshold.
 For channel c: every 12th ...

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Next Milestones:

EUDRB-MIMO (A. Cotta R.):

- implement the JTAG structures and functions specific for the MIMOTEL (thanks Gilles!)
- Test the EUDRB-MIMO JTAG interface to the MIMOTEL on the prototype pro-tempore in Ferrara (thanks Wojtek and Tobias !)
- Test the TLU interface (thanks to David Cussan and Emlyn for helping D. Spazian in putting the TLU into operation)
- Pedestal noise analysis on the MIMO*2 and MIMOTEL to characterize the noise performance of the EUDRB A/D section
- Put more boards into operations (two more expected by mid-April)
- Thorough test with continuous data taking in the VME

System tasks (L. Chiarelli):

- writing a library of functions for the VME CPU to perform:
 - generic housekeeping of the EUDRB
 - continuous data taking with pedestal noise analysis