Triggerphilosophy in a Distributed System of Transient Recorders

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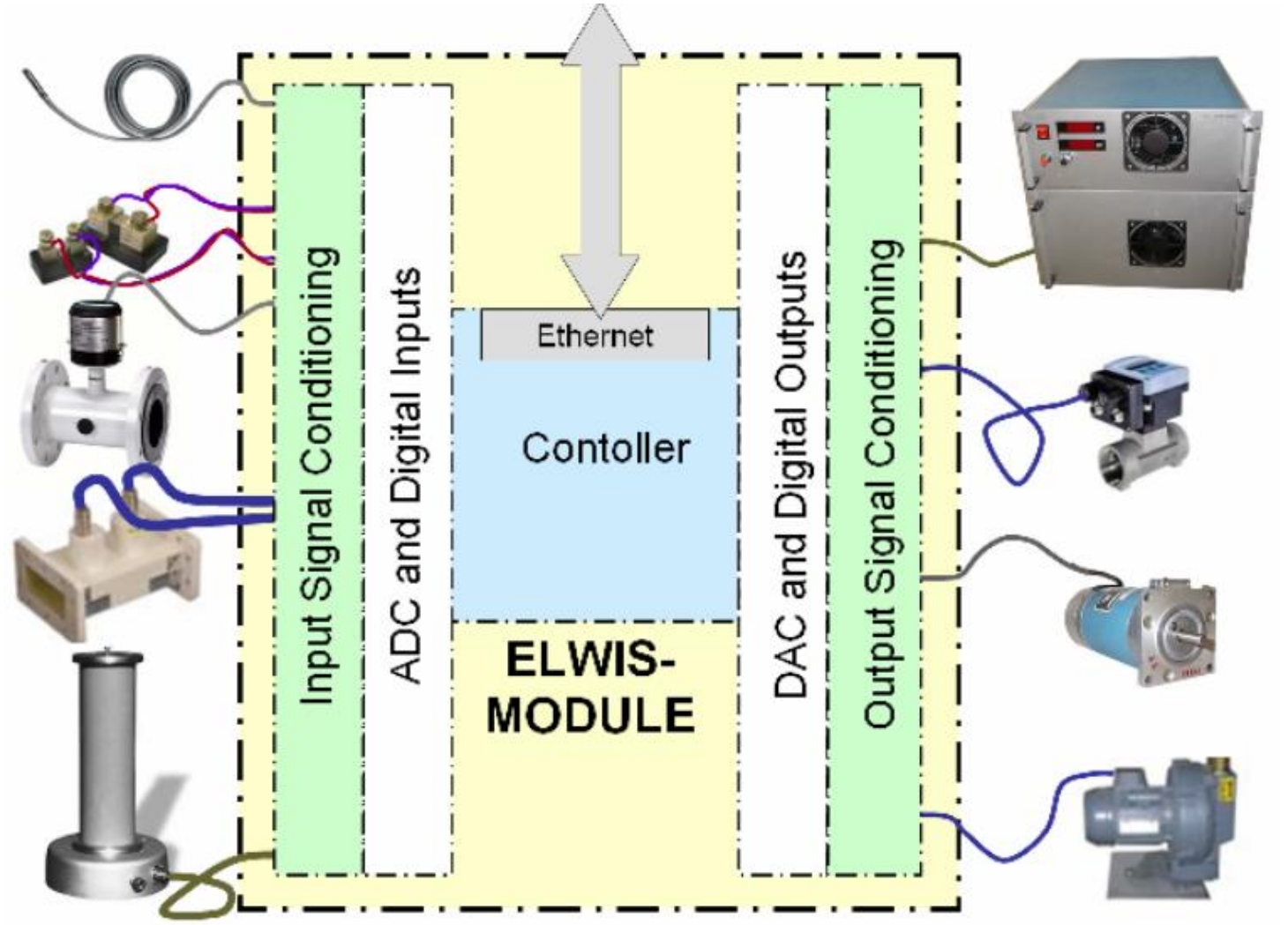
The ELWIS Modul

- ELWIS is an automation system that can be used instead of SPS.
- It is extreme modular and satisfy the requirements of simple or sophisticated automation in a high frequency system of an accelerator with just 3 different type of analog and digital peripheral devices (Down Converter Box, Low Frequency Signal Condition Box and Switch Box).
- ELWIS was developed because the conventional SPS didn't support some important function like IQ-Modulation and Transient Recorder function.
- Employ LabView for programming ELWIS.

The ELWIS Modul



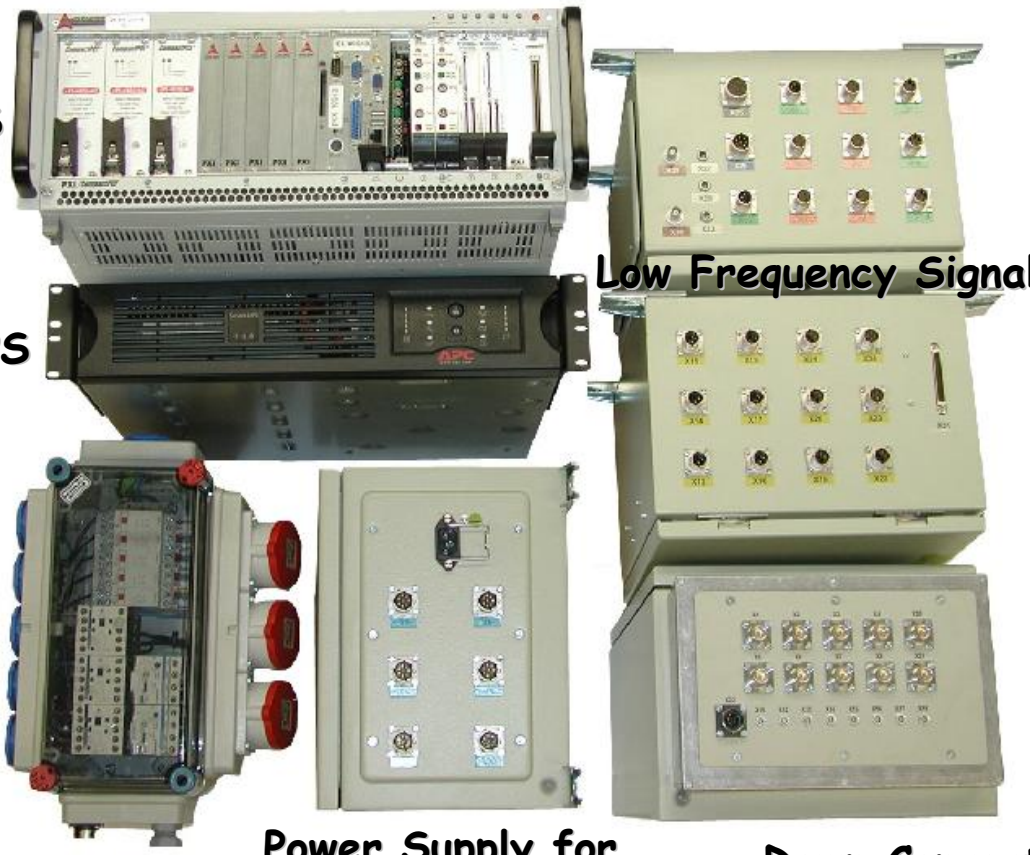
ELWIS Peripheral Devices

Switch Box

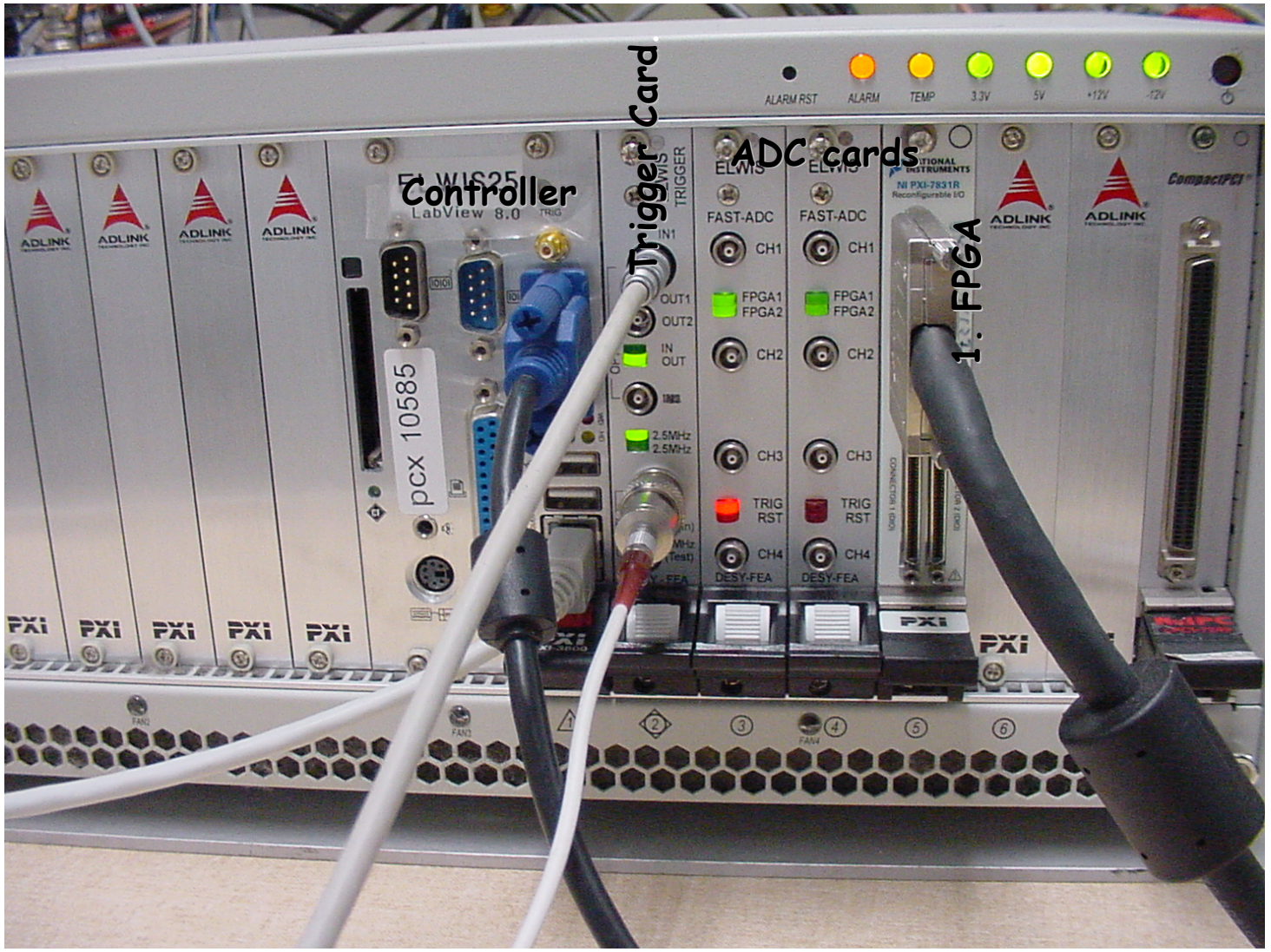
Low Frequency Signal Conditioning Box

Down Converter Box

ELWIS with 7 Sub-assembly



The ELWIS Crate

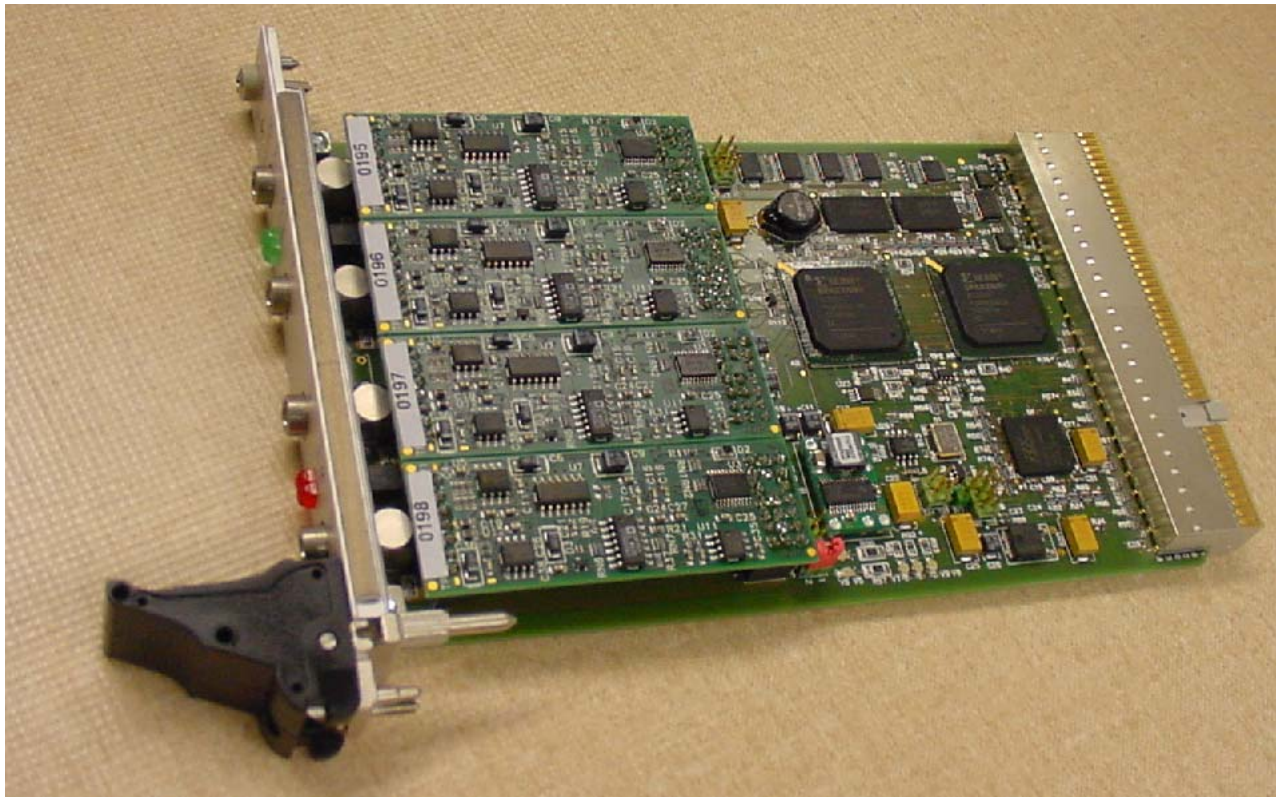


Fast ADC-Card for ELWIS

- This PXI-Card was developed at DESY.
- 4 ADC channels with a sampling rate of 10 MHz and a resolution of 14 Bits.
- For phase measurement a reference clock of 2,5 MHz is used.
- The two signals 10 MHz and 2,5 MHz are supplied external.
- A reduced I/Q DataStream with 2,5 Ms/s is generated internally.
- The data are stored in a ring buffer for a period of 800ms.
- After a trigger event, the storing in the ring buffer is stopped and the data can be read via cPCI bus.

Fast ADC-Card for ELWIS

- The trigger algorithm includes amplitude,phase, reflection, and klystron perveance.
- VISA Interface (easy for LabVIEW).

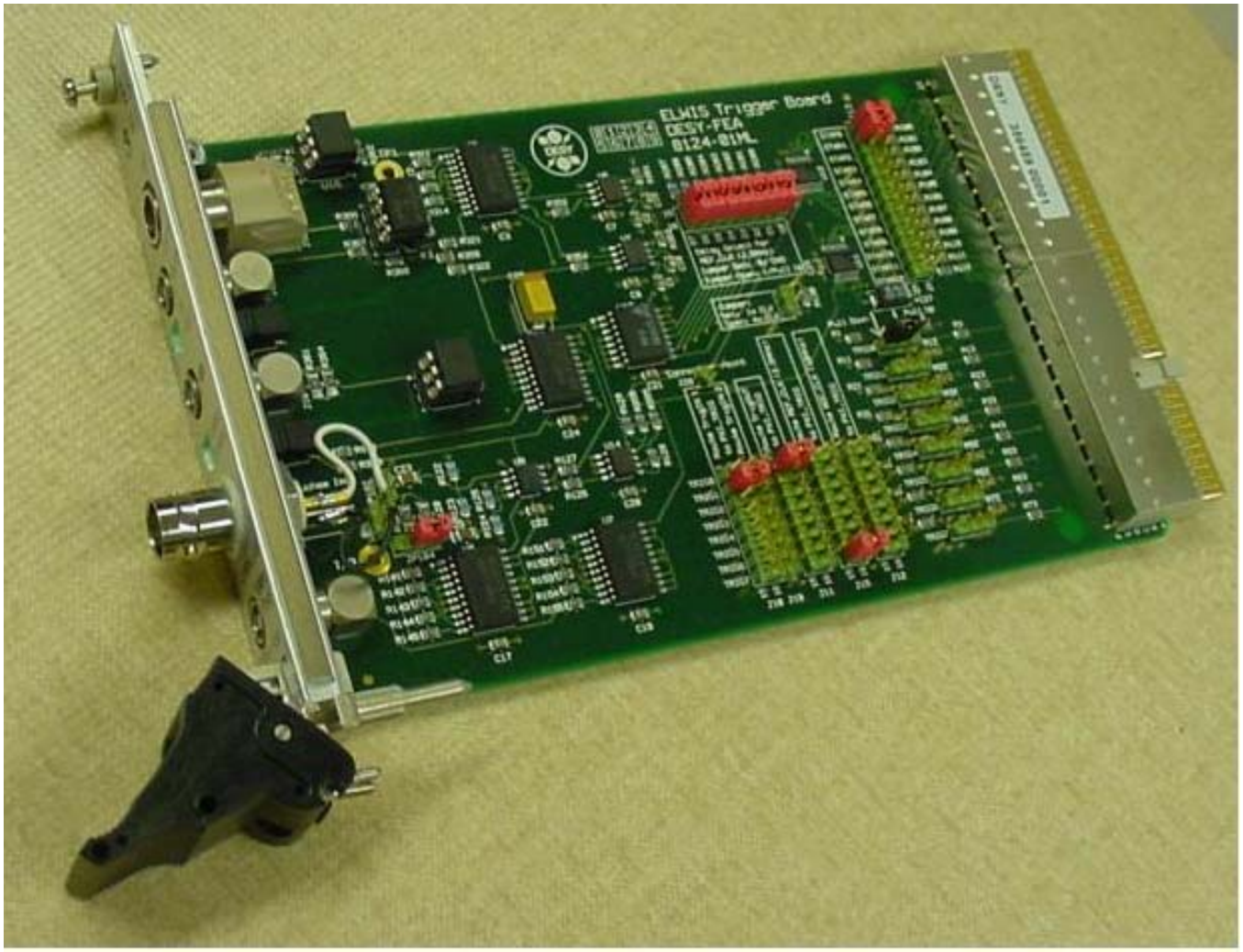


ELWIS Trigger Board

- The main challenge of this board is to distribute the generated 10 MHz and the reference clock 2.5 MHz on the backplain.

- It has the function of emitting or receiving a trigger signal for stopping the transient recorders.

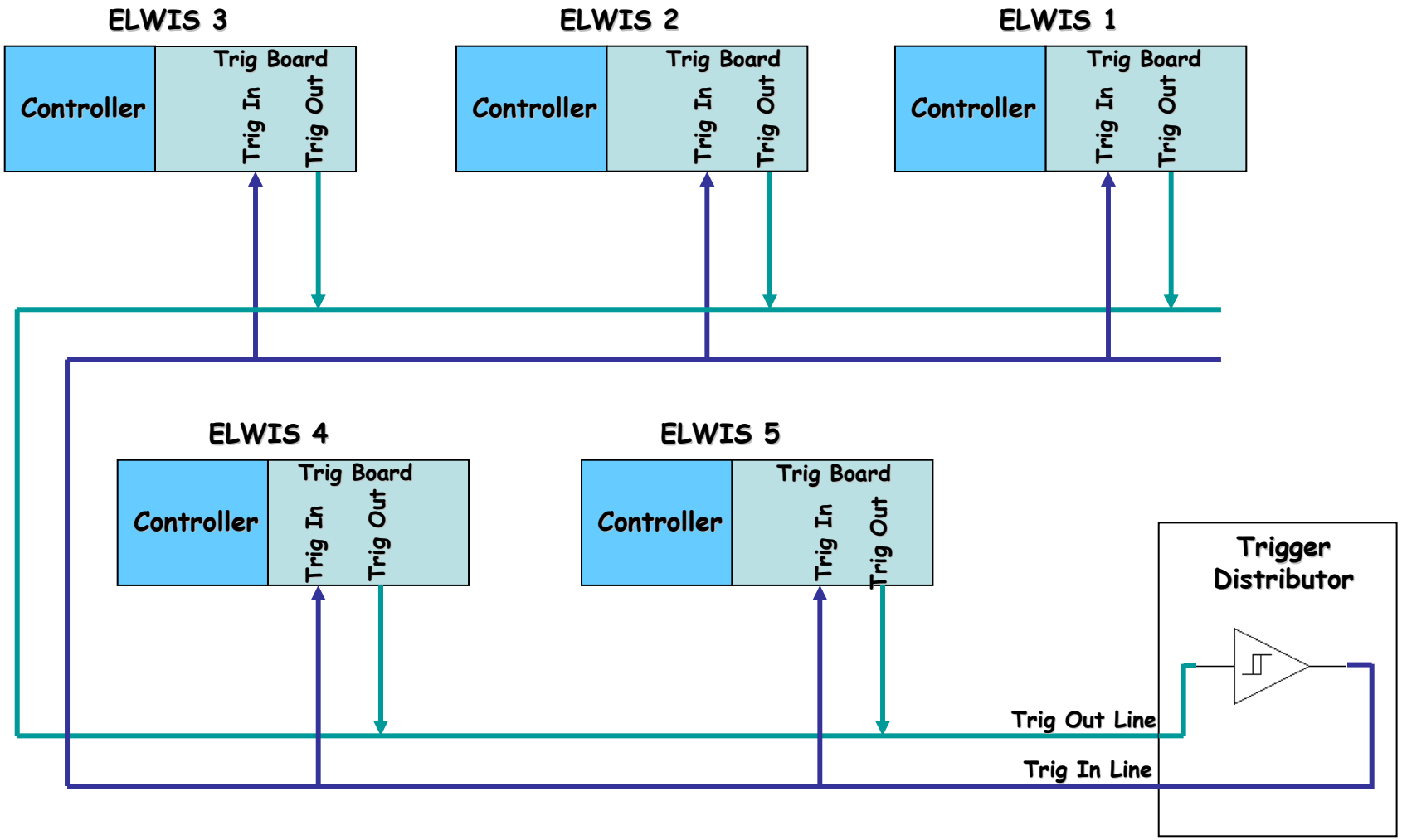
ELWIS Trigger Board



Trigger philosophy

- All ELWIS modules are connected via the Trigger Distributor.
- If an event on the Trigger Board is identified, an optocoupler on this board will switch the Trig Out line to low level.
- The comparator switches over and a trigger signal on the Trig In line will be generated.
- The transient recorders in all ELWIS modules are stopped by the Trig In signal (also the one which has the event, will be stopped by this signal).
- Every event triggers all modules.

Trigger philosophy



Measurement & status

- The time delay between Trig In and Trig Out depend on the distances between the ELWIS modules.
- This time is greater than 300 μs.
- To overcome this differences in the time of stopping the TR, a pre and post trigger period time are adjustable on the fast ADC card by software.
- Reading data from the ring buffer and storing it on a local device takes about (13 s).
- Every channel has a data stream of 16 MB that will be stored in binary file.

PETRA 3 Trigger Plan