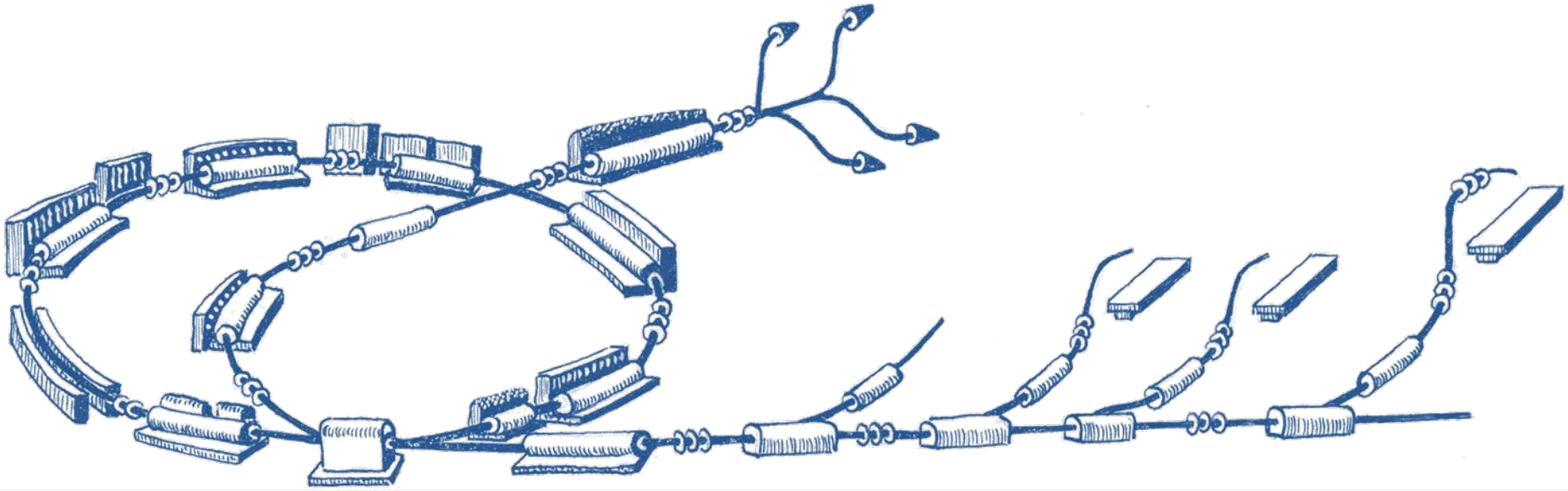
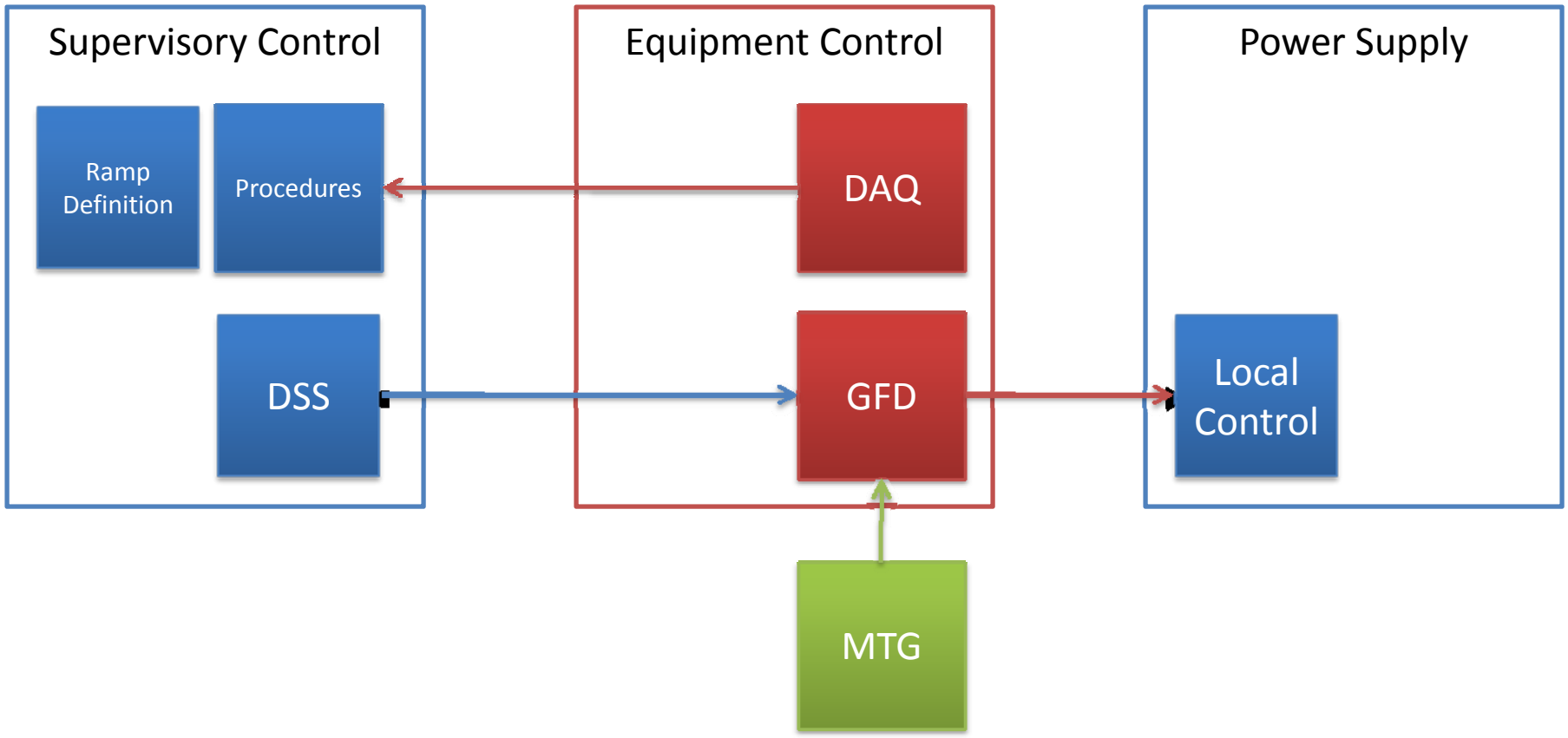
MedAustron Controls Workshop 1

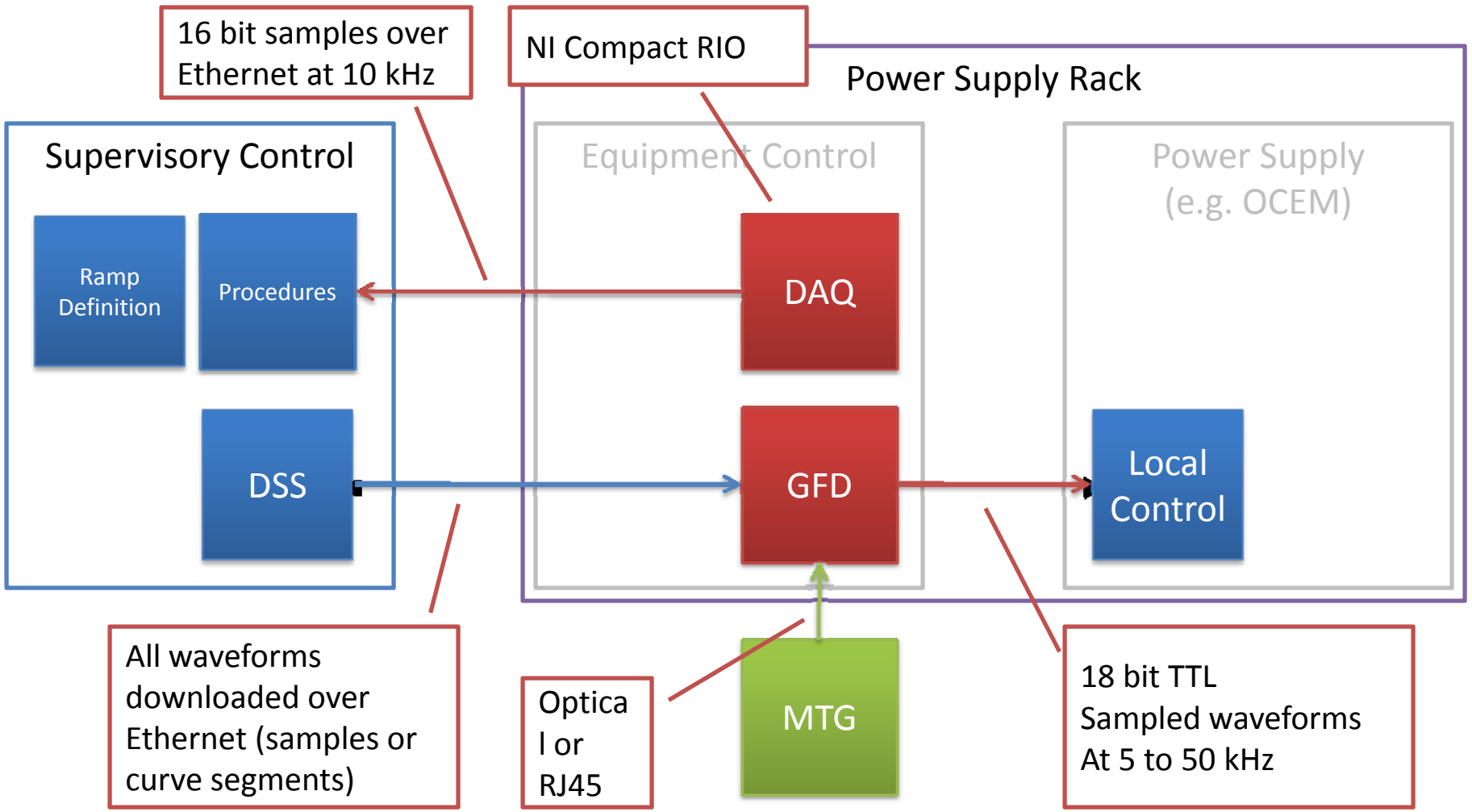
CNAO Power Supply Controls



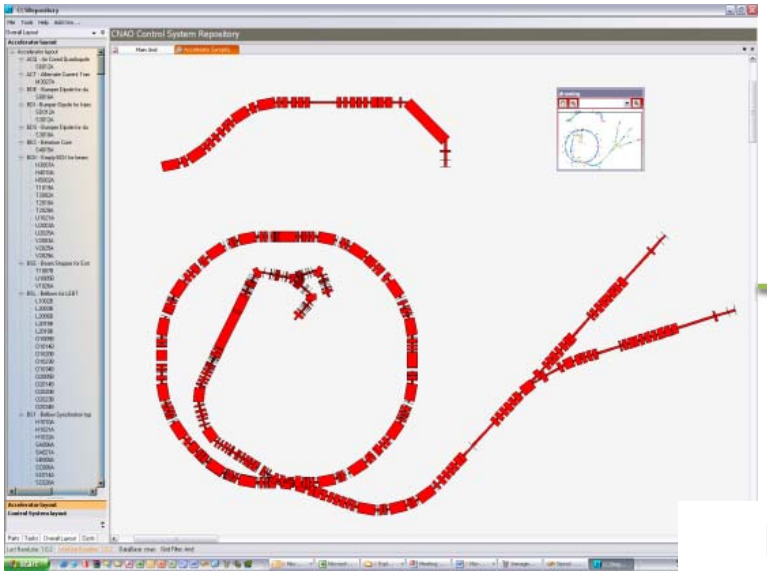
Logical Architecture



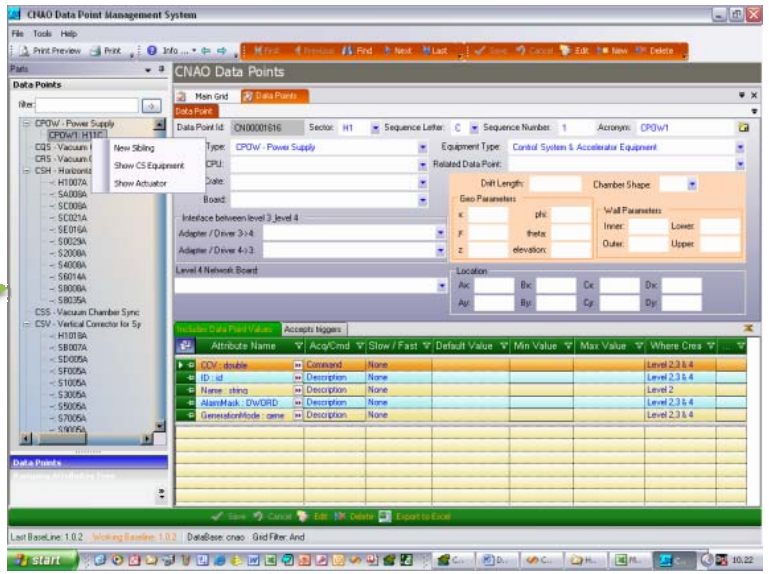
Physical Architecture



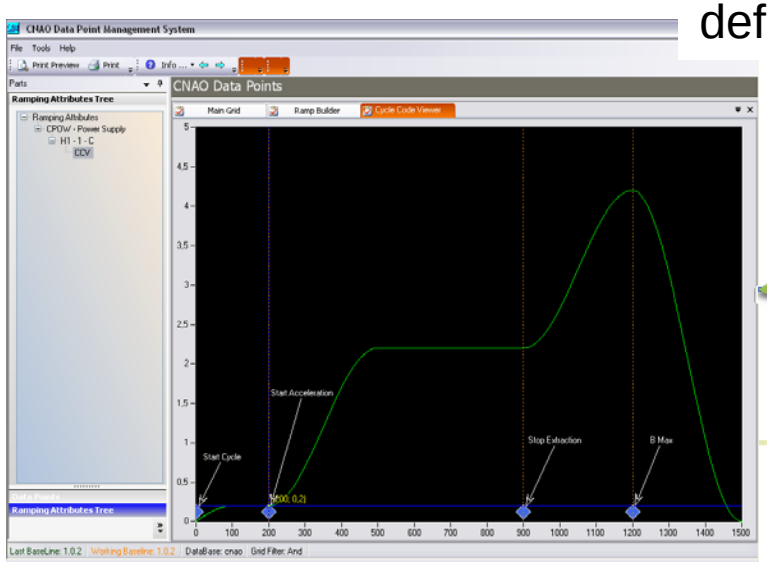
Support Software integrated with PVSS



Datapoint definition



Ramp definition



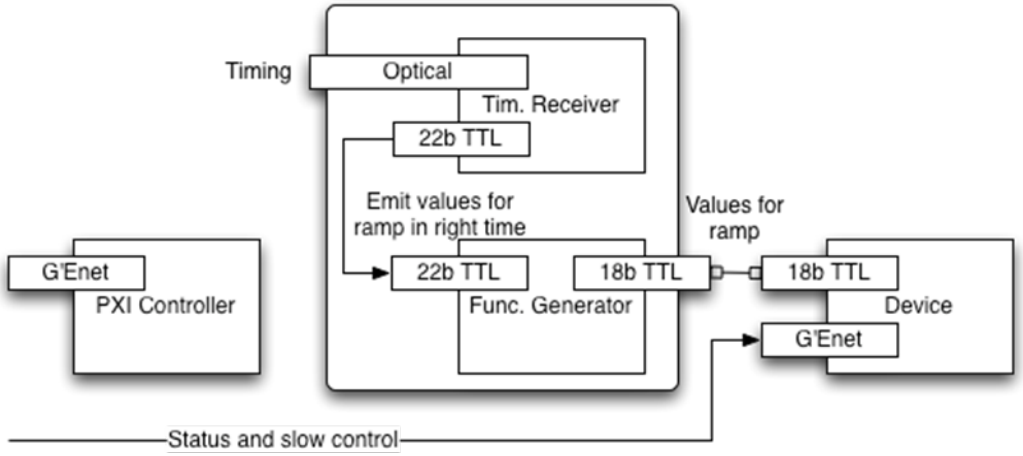
Configuration provision

DSS

Ramp download

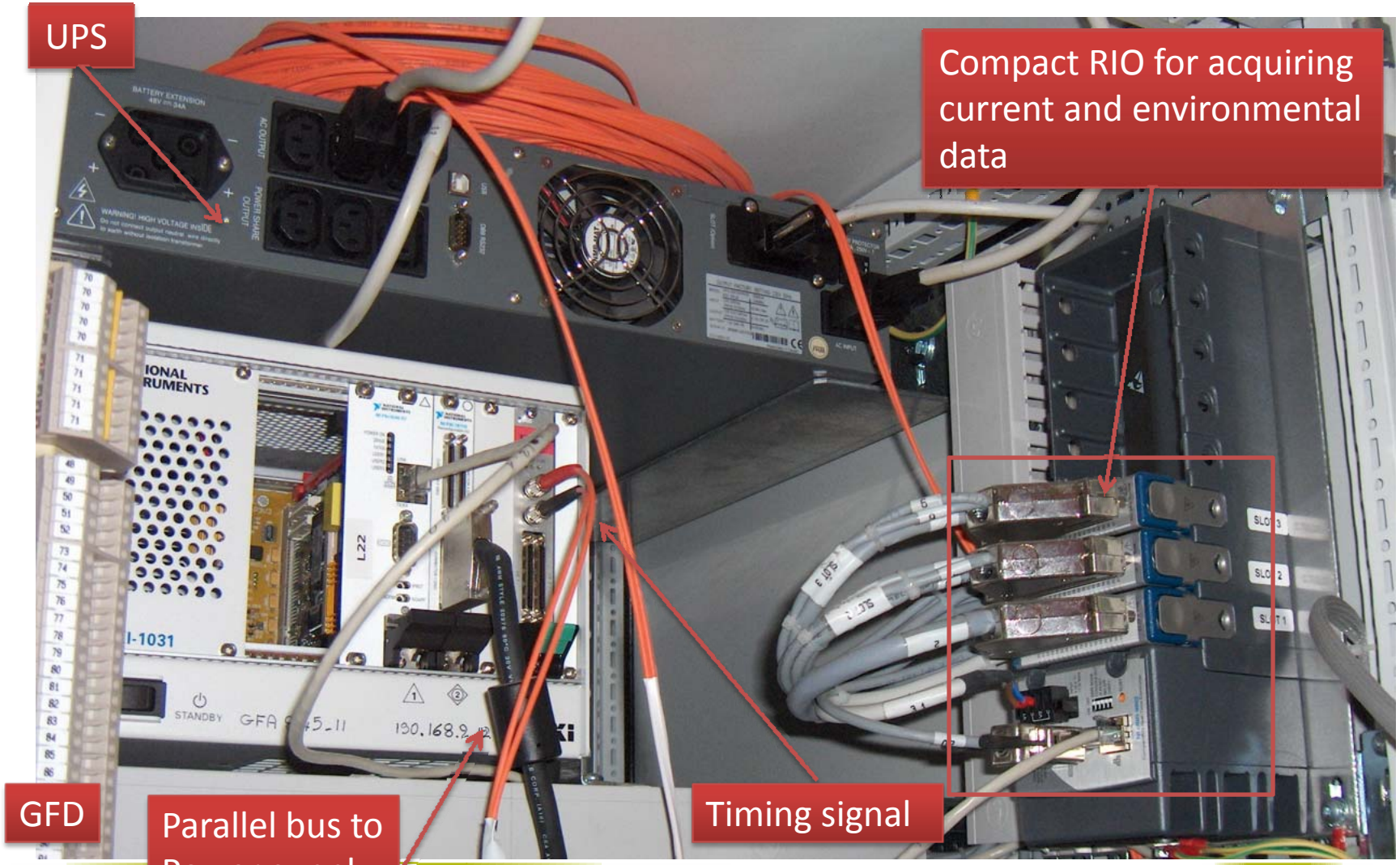
GFD

Digital Function Generator



- Compact PCI crate
- 1 CPU as controller
- 1 FPGA for “anything IO” with
  - 96 pin SCSI-5 plug for output
    - Protocol to power supply logic controller uses 18 bit
  - 96 pin SCSI-5 plug for input from timing receiver card
- 1 timing receiver card (by SIDEA)
  - 1 opto in, 1 22 bit TTL out to FPGA board

Physical Layout (Example)



Advantages

- Entirely **Commercial Off the Shelf**
- **Separation of concerns**
  - Responsibility of power supply functioning belongs to power supply company
- **Generic** design
  - Wherever waveform production is needed
- All waveforms are resident in function generator
- Simple integration with timing and B-train system
- Uses standard Ethernet apart from timing signals
- Good resolution and timing performance
- Support software can be purchased from CNAO
  - Waveform generation, distribution, configuration
  - Integrated with PVSS

Disadvantages

- Price
  - cPCI crate, controller, FPGA boards, cRIO, UPS
  - About 10’000 CHF per unit for control and acquisition
    - 2.5 MIO CHF for control another 0.5 MIO for DAQ
- Space
  - Bulky, sometimes no space within power supply
  - Difficult to access in case of problems
    - Safety when opening power supply
    - Sometimes on top of power supply

Same Design – Different technology

- **PC104** with “anything IO” **FPGA based IO**
  - 600 CHF CPU, 300 CHF FPGA, 300 CHF timing receiver, rounded to 1’500 CHF for control
  - Complete solution should cost less than 3’000 CHF per unit.
  - Examples:
    mesanet.com (4I65),
    connectTech.com (FreeForm104 Spartan based)
    Shop for more at
    http://www.fpga-faq.com/FPGA_Boards.shtml
- **NI single board Rio** sbRIO-96xx O(1500 CHF)
- Keep simplicity of CNAO design
- Keep generic approach
- Lower price comparable to other solutions

NI sb-RIO96xx