Upgrading the Kiel Neutron Monitor

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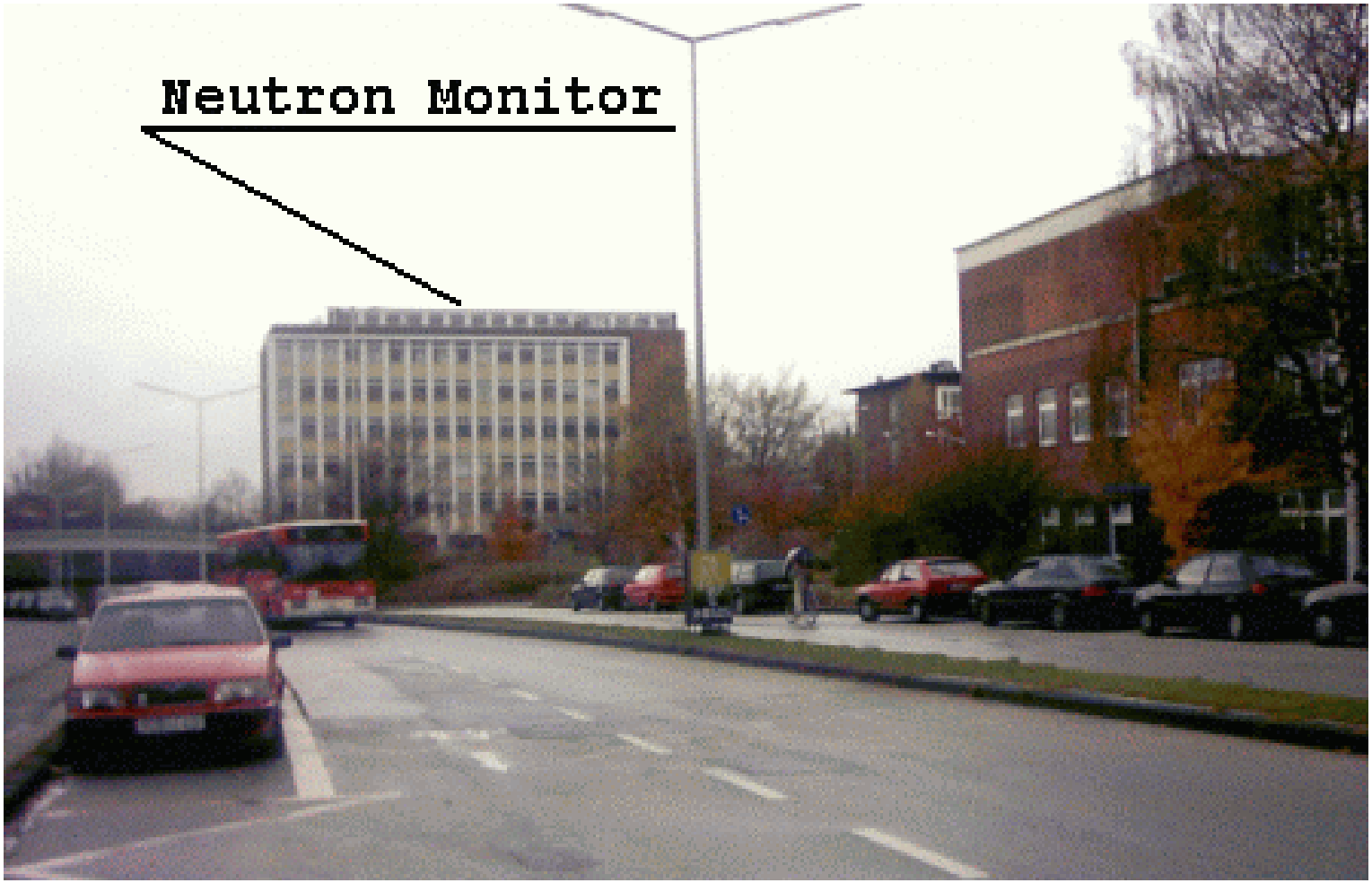
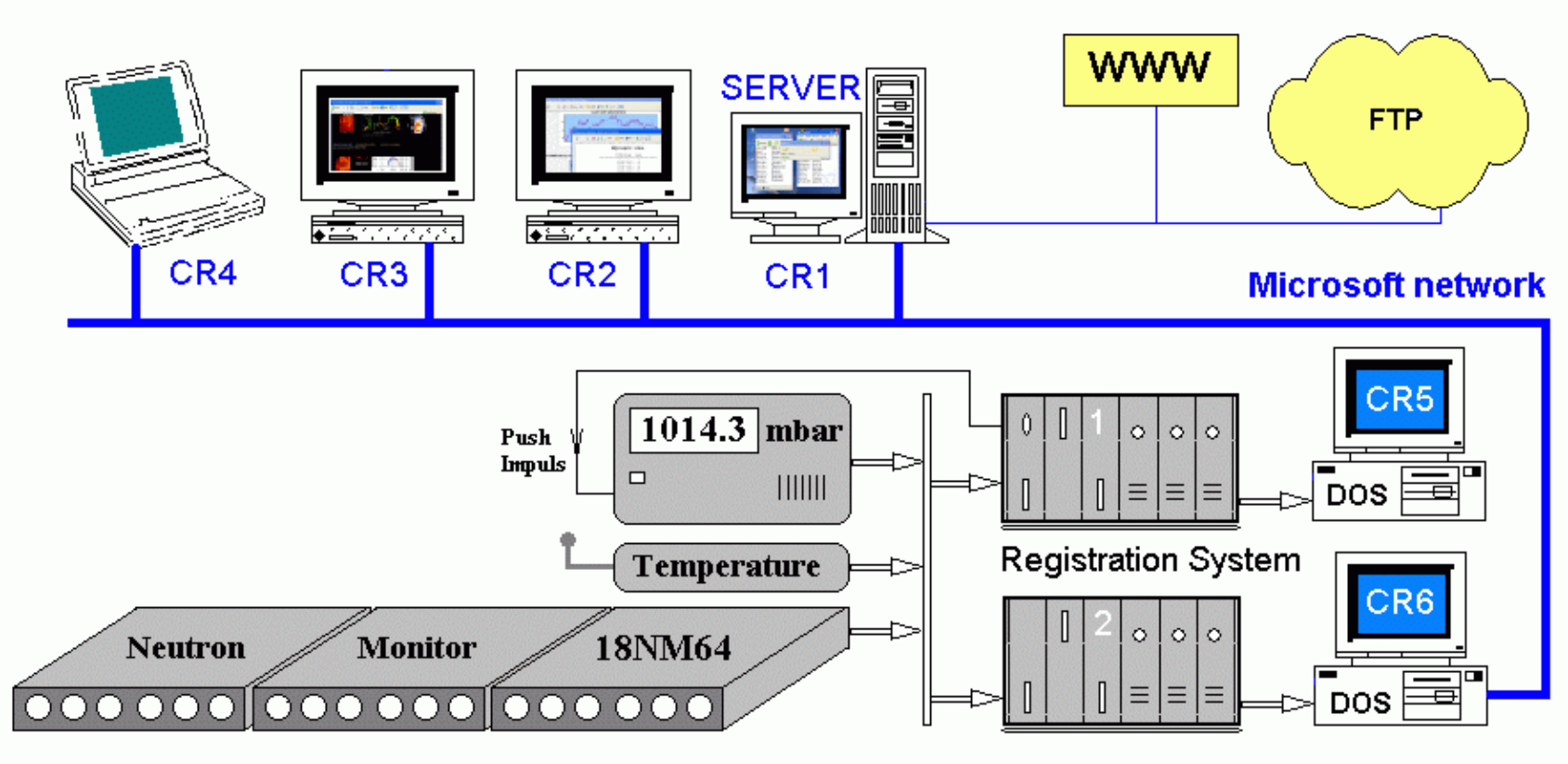
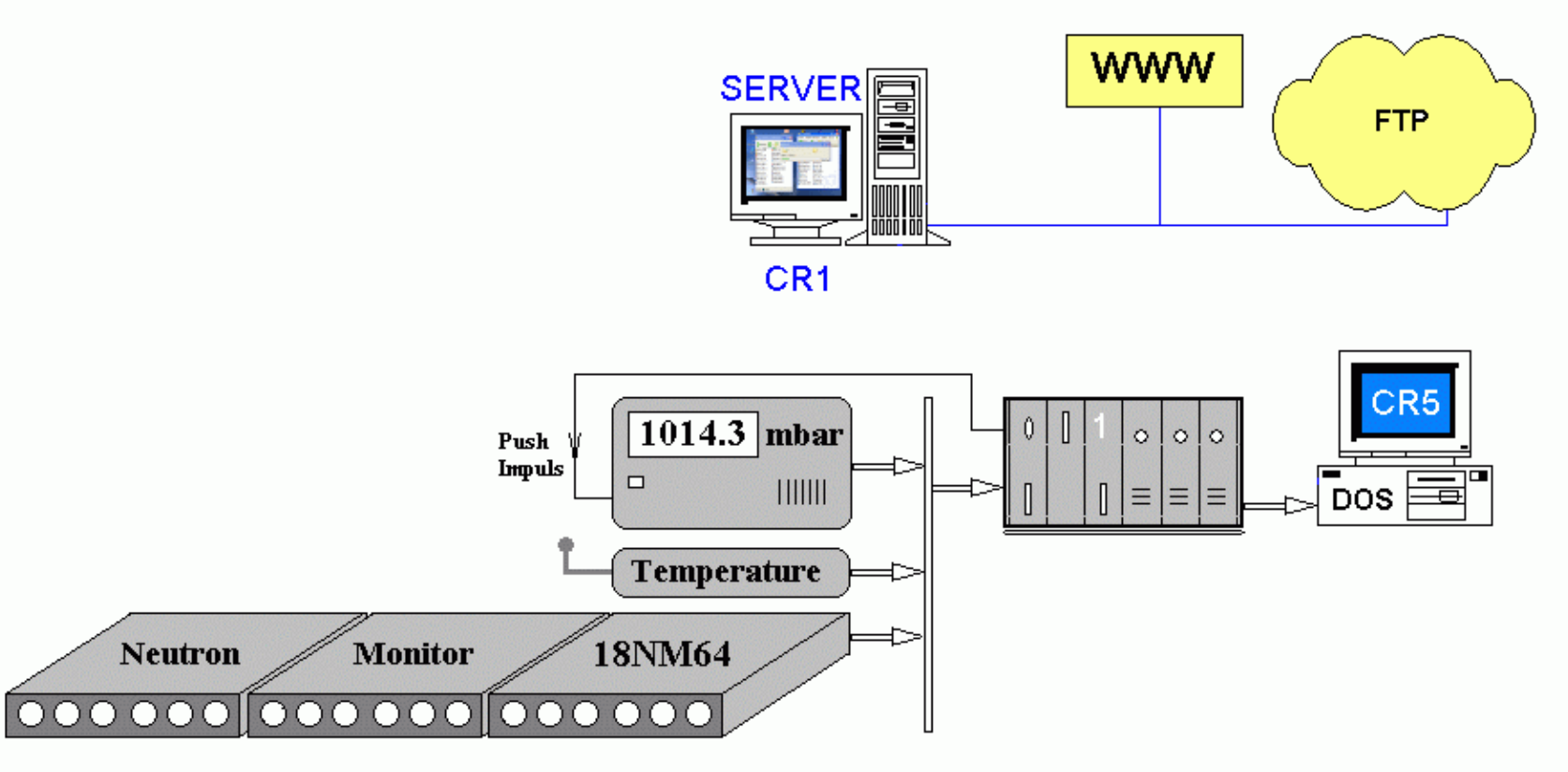
Kiel 18NM24 Neutron Monitor (running since 1957)



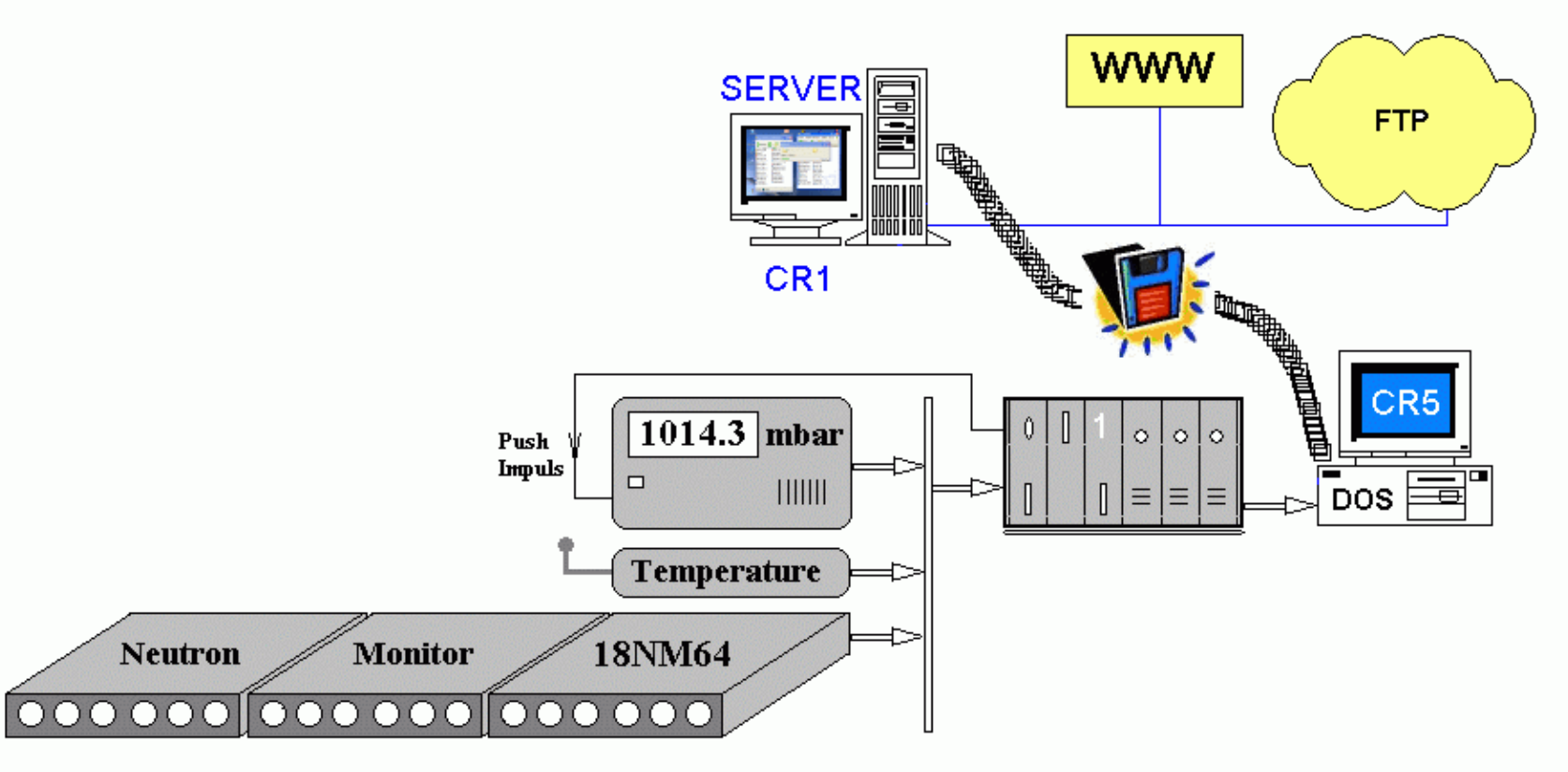
Original 1990s IZMIRAN registration system



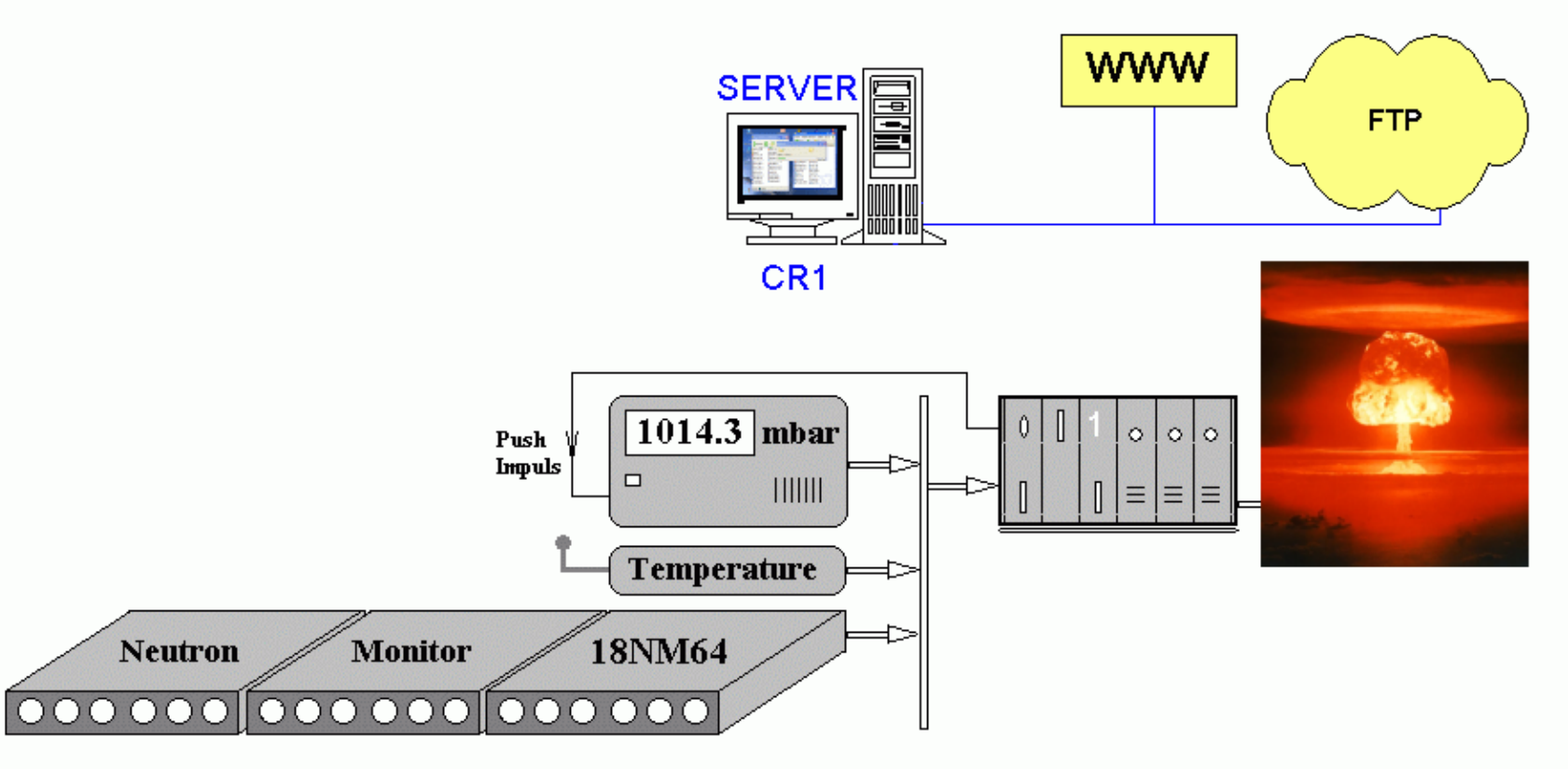
Registration system's redundancy is lost



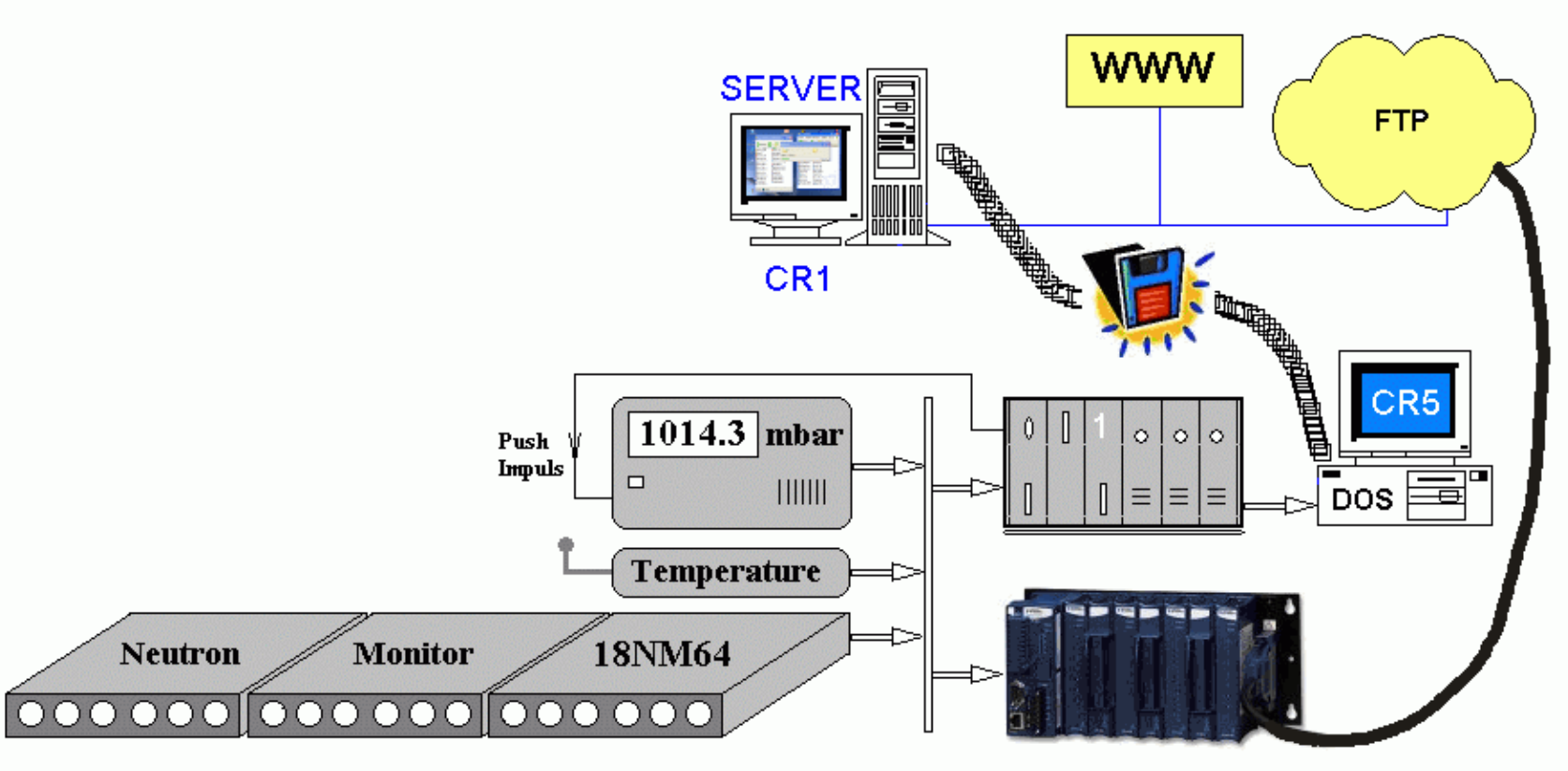
Data transfer via "sneaker network"



Imminent fatal failure at any time



New 2006's registration system: NI CompactFieldPoint



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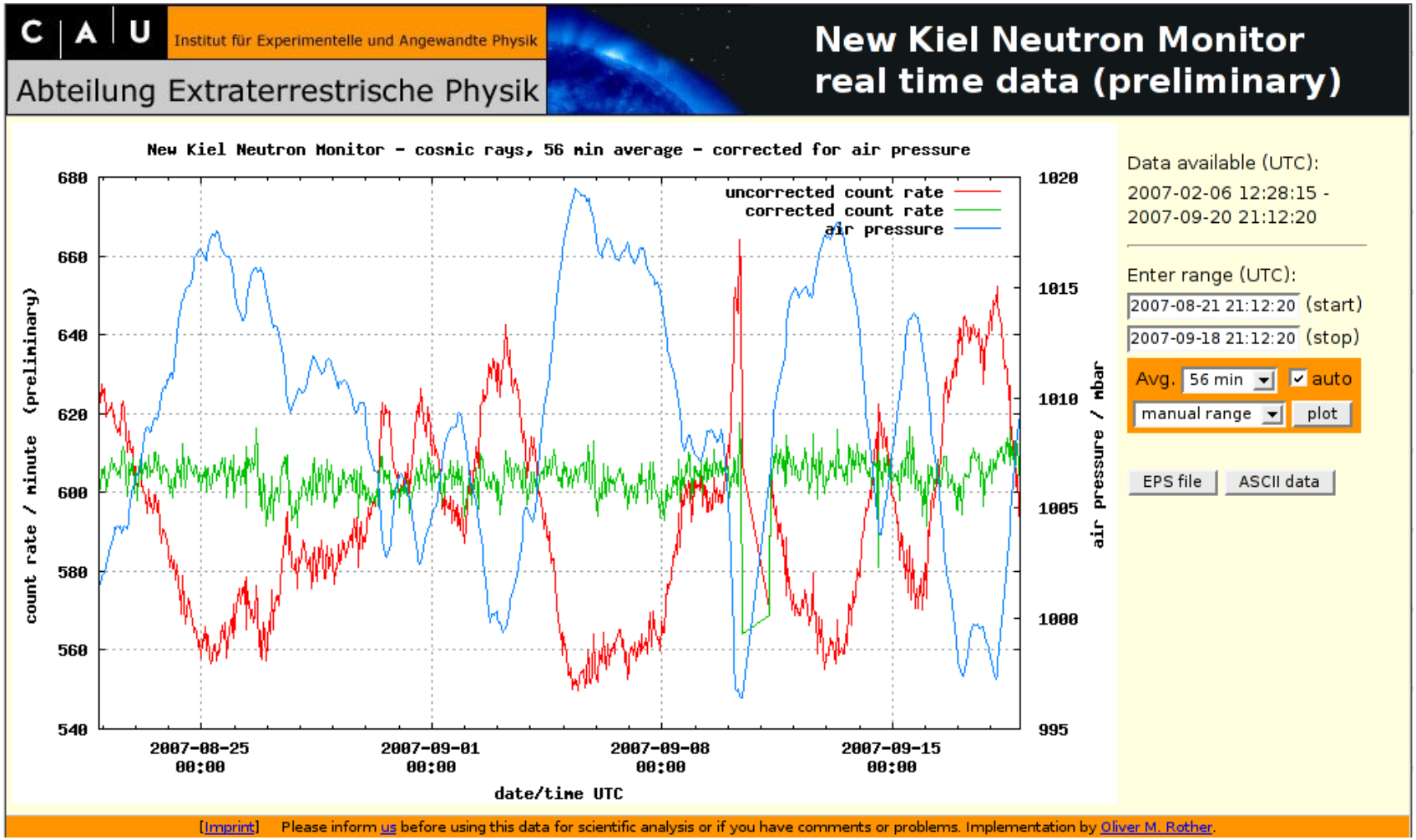

New 2006's registration system: NI CompactFieldPoint

Problems:

- high hardware and software costs, several thousands EUR
- programming language LabView: suited for small, quickly programmed data registration and control applications, **not** for complex systems (badly maintainable code)
- realtime glitches, e.g. looses counts during ftp data transfer of archive files
- proprietary: support depends on commercial supplier, source code and schematics not available – not suited for long-term applications

Registration system requirements

What do we need?

- (sub)microsecond resolution
- short (zero) deadtimes
- optional recognition of PWM signals and multiplicities
- low power consumption
- redundancy
- long-term availability of parts
- cost-efficiency

Does such kind of device exist?

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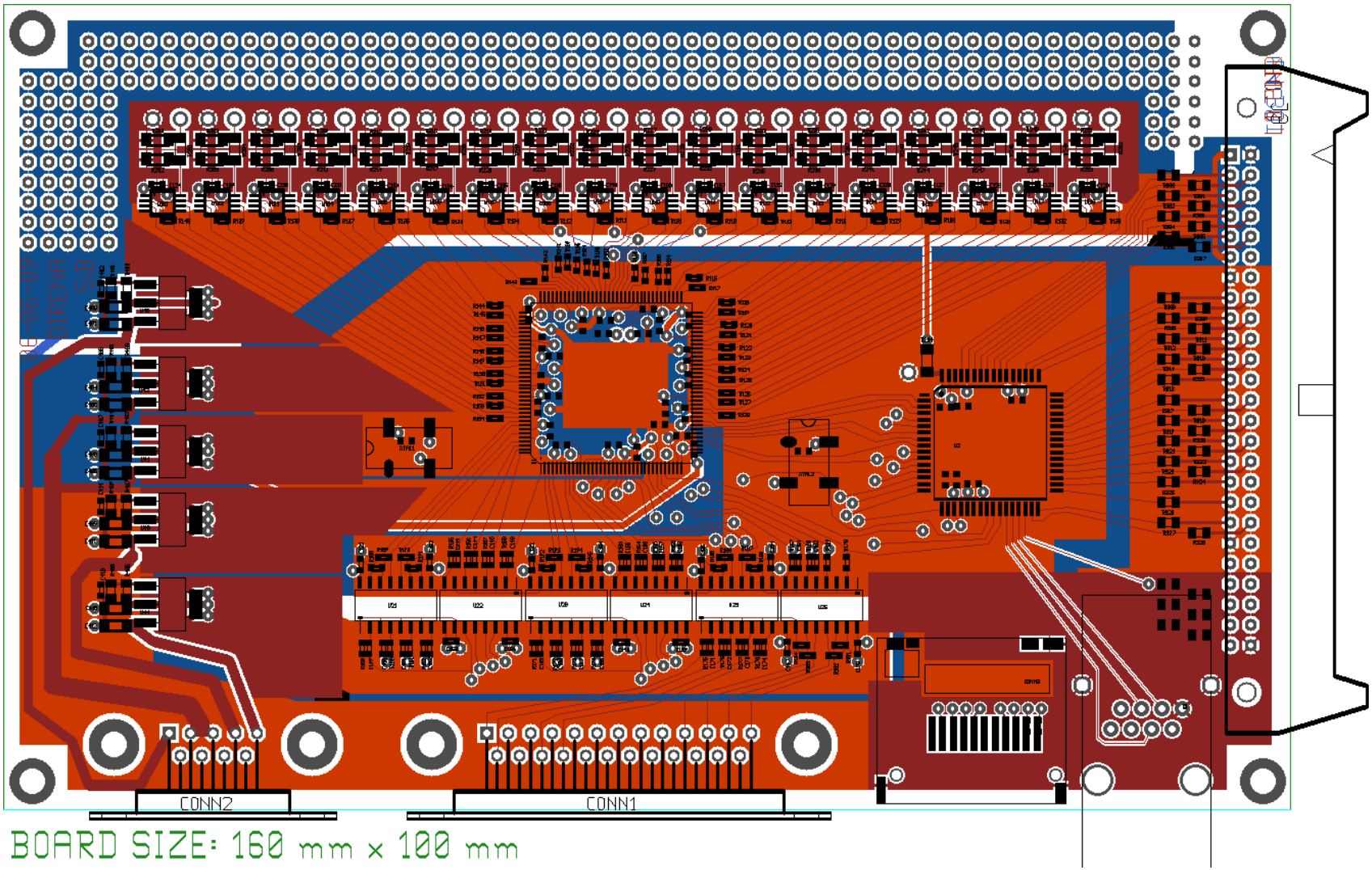
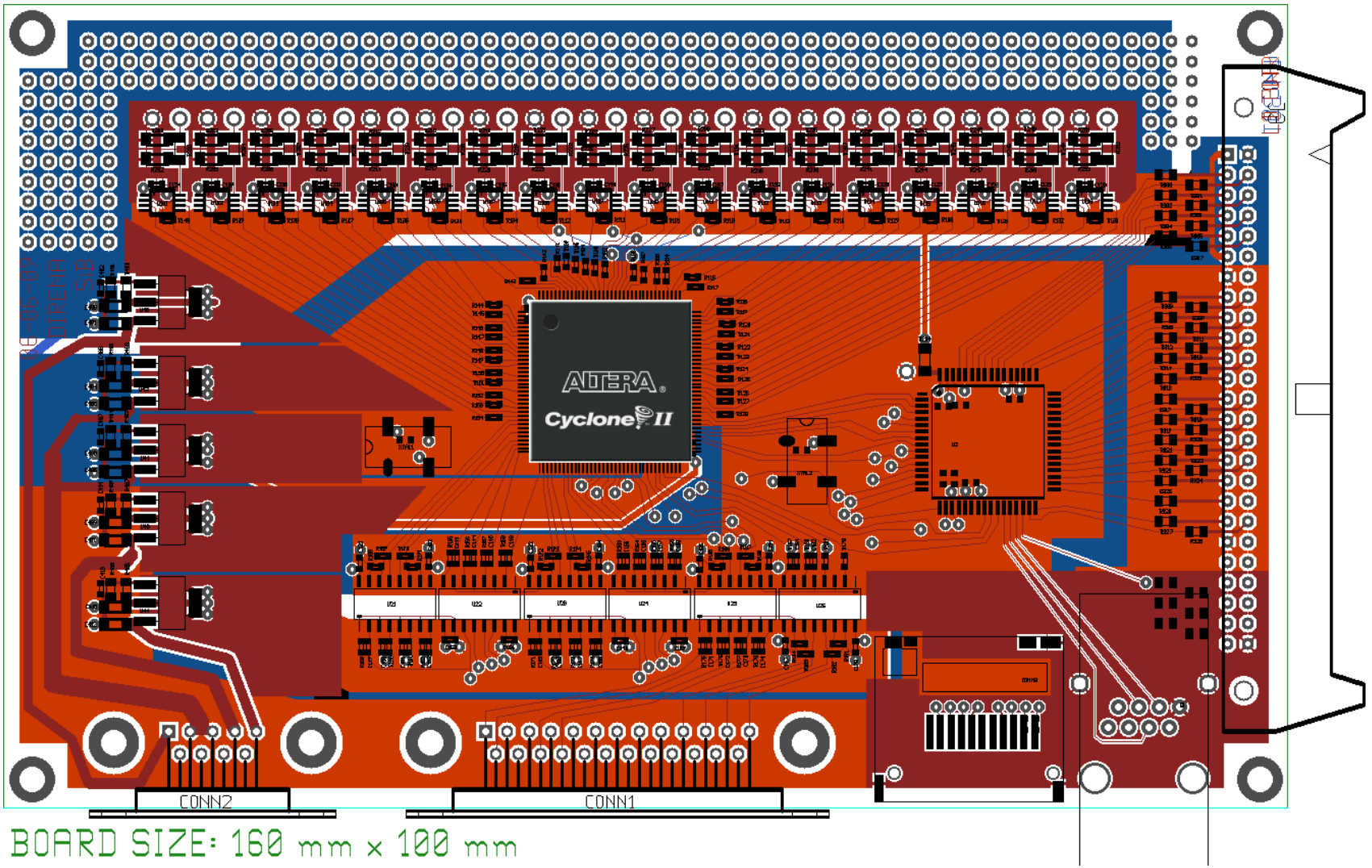
Yes!

Solution: Eierlegende Wollmilchsau

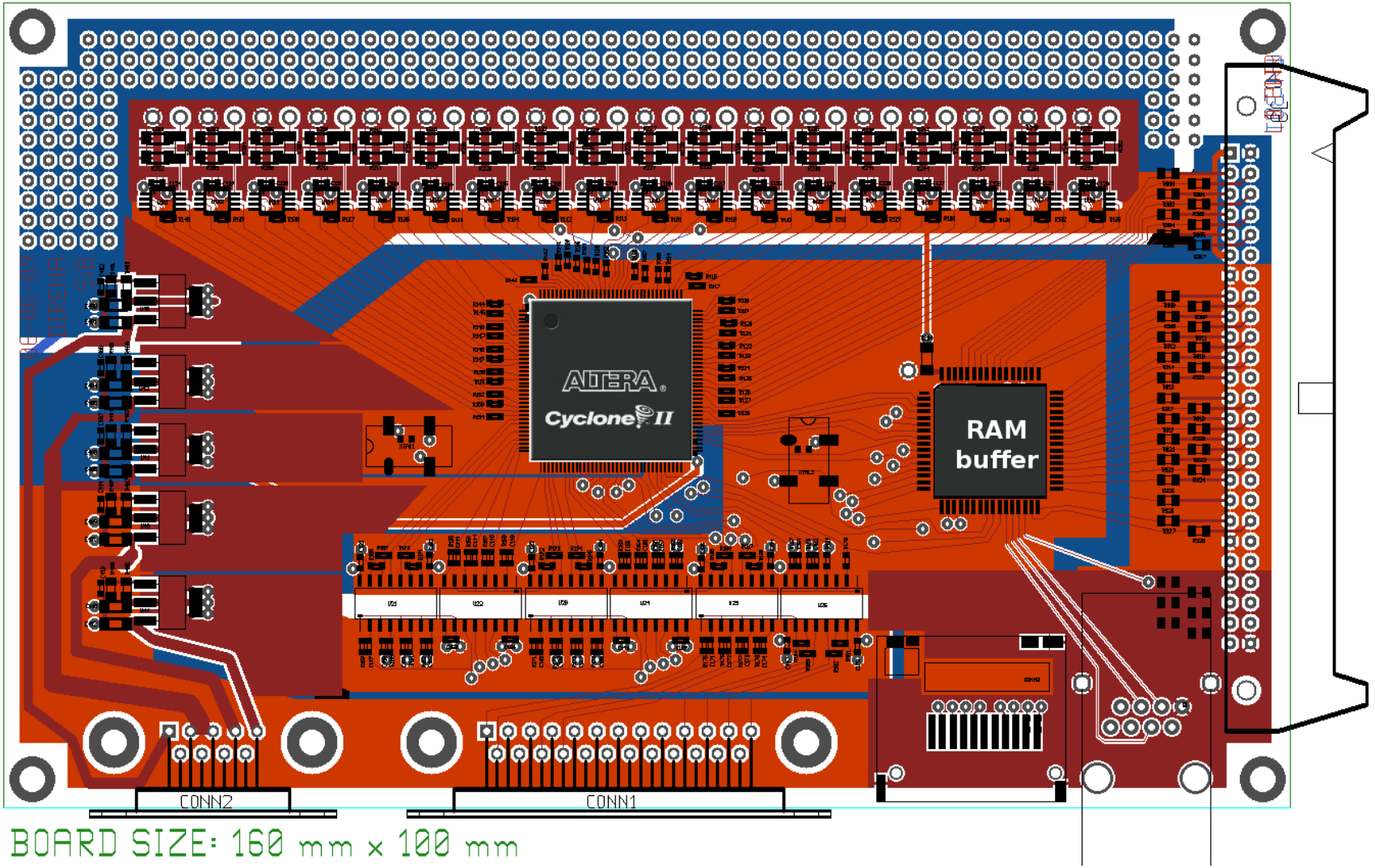
The KiNeMoNIC registration board (DIRENA based)



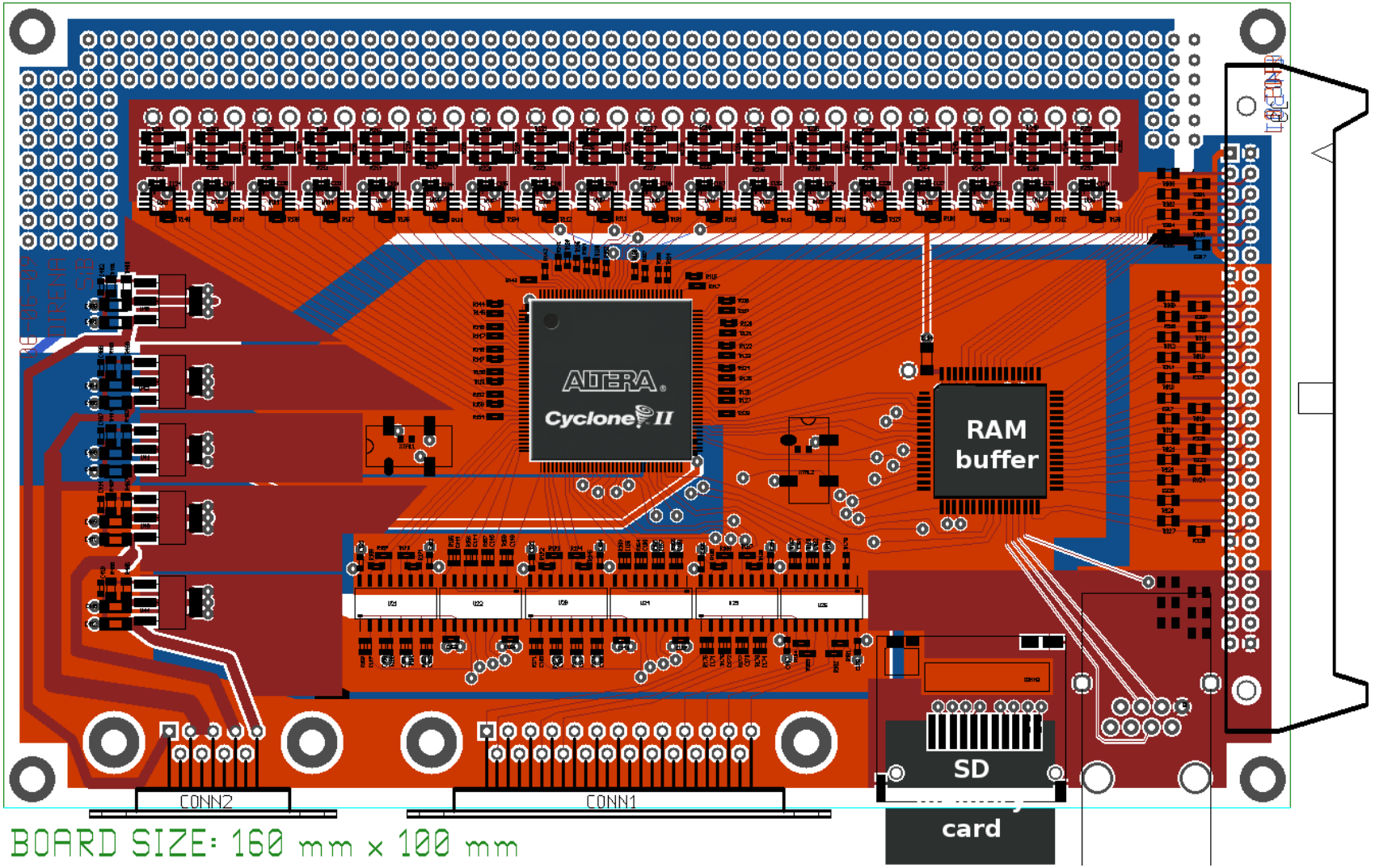
The core: Altera Cyclone II FPGA @ 20–200 MHz



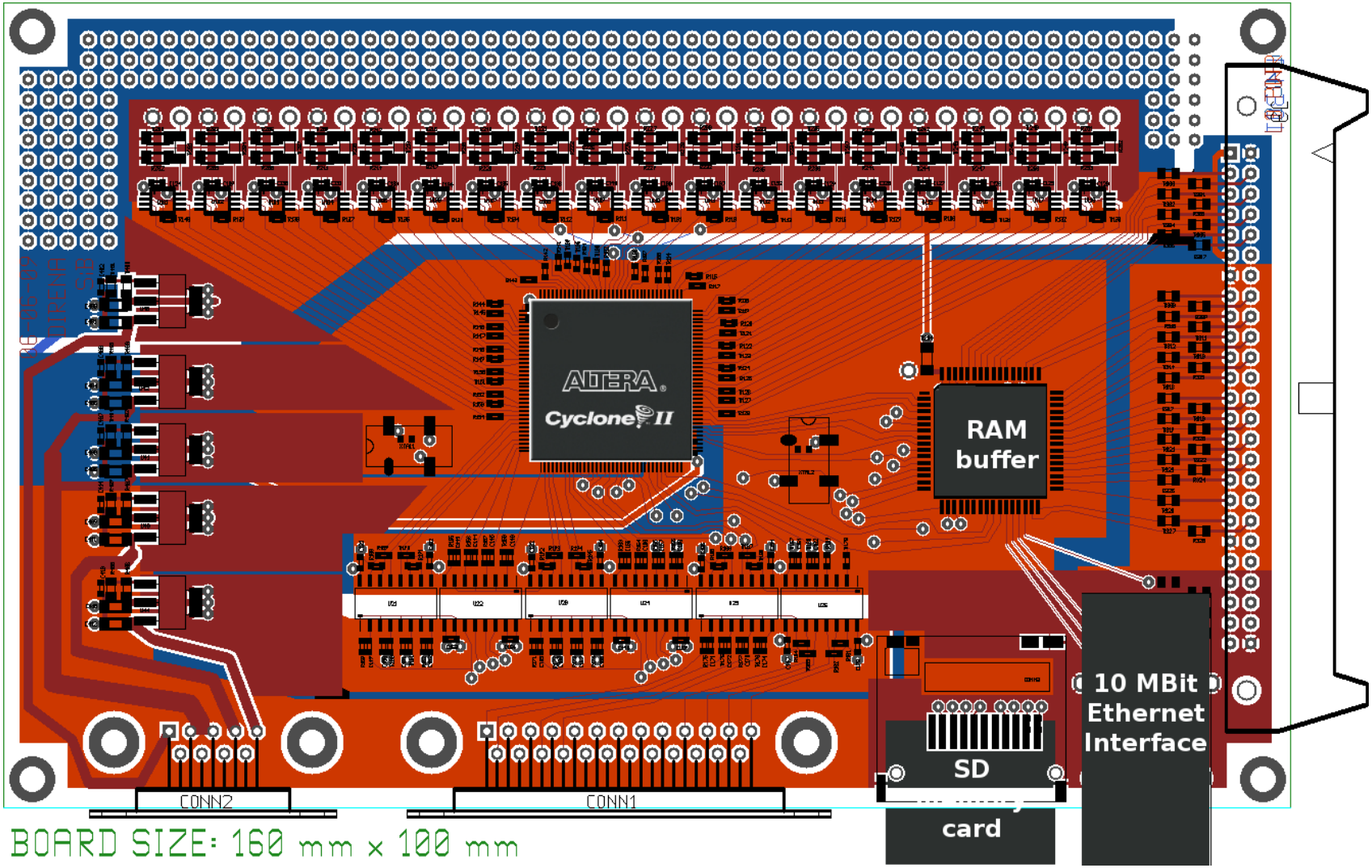
KiNeMoNIC's data storage system



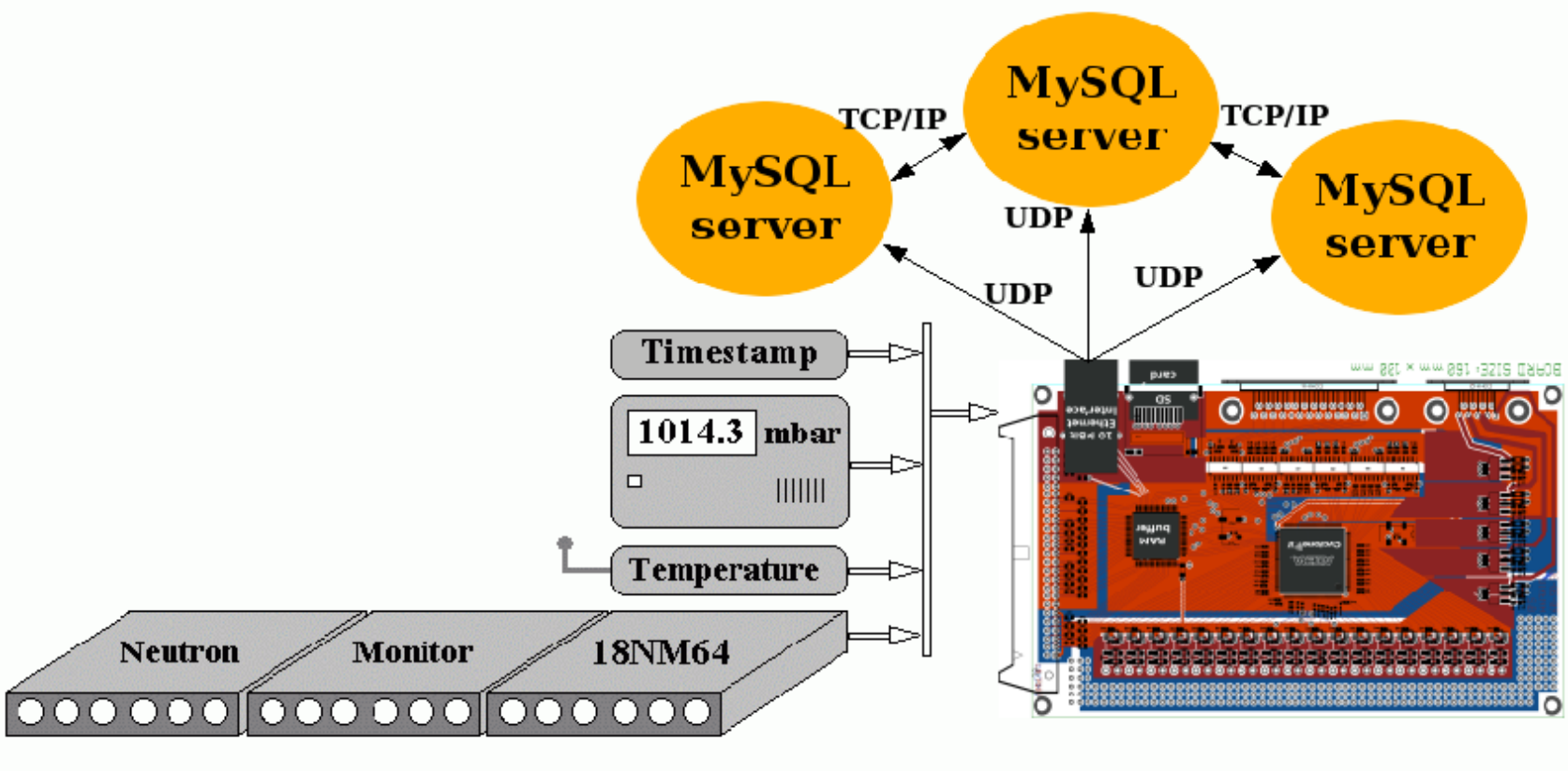
KiNeMoNIC's data storage system



Data distribution



The KiNeMoNIC registration system



Conclusion

KiNeMoNIC – Kiel Neutron Monitor Network Interface Controller

- NM count rate to UDP packet converter
- proved maturity on MSL project (Mars Science Lab)
- purely hardware based
- low power consumption
- (sub)microsecond resoution, zero deadtime
- cost-efficient (about EUR 200 including PCB)
- FPGA code, pcb schematics and layouts are planned to be available under GPL (GNU Public License)