Survey for future bus for CO/FE Front End Computers

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Current state of FEC

**Definition**

FEC — Front End Computer

- Over 1000 FECs for control of all accelerators.
- There are many different buses currently used at CERN:
  - VME64x*, VXI*, VXS,
  - cPCI*, PXI,
  - μTCA, ATCA,
  - Industrial PCs*.
- VME standards are becoming obsolete,
- Migration from PPC to Intel CPUs,
- CLIC project needs a FEC standard to be chosen,
- White Rabbit will be ready soon,

*Used as a FECs
Current CO infrastructure

- Workstations and development
- Operator consoles
- Fixed displays
  - CMW clients (C++/Java)
  - CMW servers (C++/Java)
- File servers
- Database services
- Application servers
- SCADA servers, etc.
- VME, cPCI, VXI, ...
- FEC
- White-box
  - PC FEC
- CMW server (C/C++)
  - RT Frameworks, SCADA, etc.
- Physical equipments
  - Point-to-point interfacing (A&D I/O, Serial link, video, etc.)
  - Industrial Fieldbuses

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RAS requirements

Definition

RAS — Reliability, Availability, Serviceability

RAS requirements:

- remote management over Ethernet:
  - monitor: voltage/current, temp., power and fan status,
  - control: fan speed, CPU reset, power on/off.
- highly modular design (reduced repair time),
- redundant power supply,
- support for RTM (Rear Transition Module),
- clock lines and trigger lines (White Rabbit?),
- service units (power, fanout, LED panels) and sockets (power, Ethernet, Terminal) accessibility.
It would be nice to have...

These are not actual requirements but we would like to have those:

- multiple fast serial links (to hub and/or adjacent slots) supporting Gigabit Ethernet and/or PCI Express and/or other differential buses,
- hot-swap for power supply and cooling units,
Other requirements:

- supported by multiple companies,
- based on commonly used standards,
- modules available off the shelf:
  - digital and analogue I/Os,
  - fast digitizers/oscilloscopes,
  - waveform generators,
  - serial interfaces (RS232, RS485, CAN, ...),
- standardized connectors/backplane layout,
- cost effective.
Possible choices?

There are several standards we may choose from:

- VME64x, VXI – Old, almost obsolete standard,
- VXS – VME with serial links extensions,
- VPX – Complete serial-based standard from creators of VME,
- PXI – One CPU per crate, still PCI bus, depends on NI,
- PXI-serial – One CPU per crate, PCI dropped for PCI-Express,
- ATCA – Serial links and redundancy but quit complicated, created for telecom companies,
- μTCA – Smaller version of ATCA, not many AMCs for Physics.
Thank you for your attention.

Questions?