An Endcap Electronics
Slow Control Prototype

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Slow Control to Crates:

Need:  Serial
- JTAG (FPGA, Control)
- Shift Registers (FE Boards)

Parallel
- Memories
- ADC’s, DAC’s

Crate Count
20 Cards/ Sector
1 VME Crate/Sector

Total Crates:
12X2 for ME1 Stations
12x2 for ME2+ME3 Station
Slow Control System Proposed

- one PC serves 24 crates
- ethernet 10 Base-T
- VME Bus within Crate
- each board has dumb VME interface
- FPGA

a cheap embedded VME controller

Dynatem D360 $731 (100 piece quantity)

- 25/33 MHz 68EN360 Communications Controller with
- Built-in CPU32+, Processing Core, I/O, and Memory Interface
- Ethernet via 10BaseT or AUI
- 4 MB of 32 bit Wide DRAM
- 2 or 4 MB Flash PROM
- 256 KB or 1 MB of Dual Ported NV SRAM
- VMEbus Slot 1 Capability

Software has been purchased from Accelerated Technologies - Nucleus
- No per machine cost!
- Communications through standard sockets
VME/(JTAG/Parallel) XILINX FPGA
Prototype XCS 30-4 Spartan

JTAG (all registers READ/WRITE)
TRST - single command
TMS   - 16 bit register
TDO   - 16 bit register (immediate shift)
TDI   - 16 bit register
TCLK - generated in FPGA
( a bit count register controls bits shifted)

System Test

Linux PC
RedHat 5.2
300 MHz

10 Base-T
Ethernet

Dynatem D360
Nucleus Software

VME

Xilinx Spartan
VME/JTAG

JTAG
125 nsec CLK

Cathode
Motherboard
Speed

10 Base-T → 10 Mbit/s
JTAG 125 nsec CLK → 8 Mbit/s
Expect: 4.5 Mbit/s

- Can program all 10 Cathode VME cards in parallel
- Using ethernet broadcast can communicate with all VME crate computers in parallel

*Continuously programming a Xilinx FPGA on the Cathode Motherboard we achieved 3 Mbit/s!*

Additional Requirements:

Ironically neither the D360 or FPGA can be loaded with slow control

VME → JTAG/Parallel FPGA
- must be PROM loadable
- use VME Reset Line?

Dynatem D-360
- must be externally bootable
- boot from FLASH ROM or EPROM bootstrap to ethernet

A cable in addition to ethernet will be needed (at least a two twisted pair) to service the VME crate.
All VME Crate Card Prototypes Should Start using this System!

see:
http://www.physics.ohio-state.edu/~durkin/slowcontrol/d360.html