Vme

Large leverage from a small extension

Ron Fox and the

Experimental Nuclear Science Group

National superconducting cyclotron laboratory

Michigan state university

East Lansing, MI

Talk Outline

- Brief description of the VME bus.

- What NSCL uses VME bus for.

- Target applications for the extension.

- A description of the extension.

- Applications that use the extension.

- Support for the extension with commercial Vme bus adaptors.

VME-BUS I

- VME (VersaModule Eurocard) **IEEE 1014-1987** and others.

- Physical standard for the cards.

- Electrical standard for the bus.

- A set of protocols for using the bus.

  - Multi-master arbitration (central arbiter).

  - Data transfer

    - Multiple address spaces (A8, A16, A32) (word granularity)

    - Transfer widths of D8, D16, D32, support for UAT.

  - Prioritized, vectored interrupts.

VME-BUS II

VME-BUS III
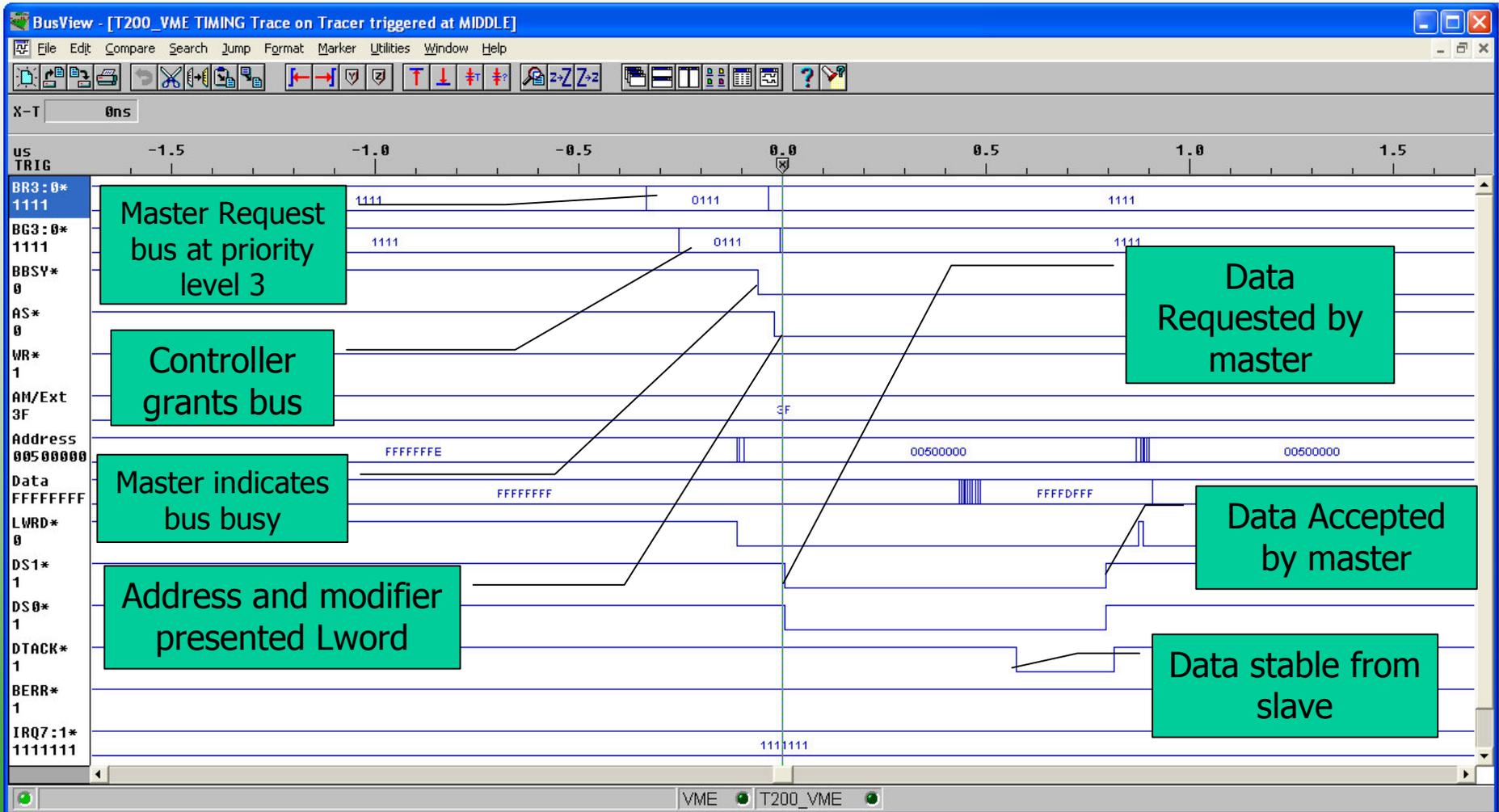
Uses of the VME bus at NSCL

- Accelerator Control systems.
- Experiment control systems.
- Data Taking.

The Vme package targets Experiment control system components. Vme package is also useful in device test.

package Vme provides:

- Ability to create slices, or maps, of address space for each of the common address modifiers (A16, A24, A32, and Geo).

- Ability to set/get long words, words or bytes in an arbitrary offset relative to the start of the address map.

- Address map boundary protection.

What it provides

package require Vme
vme create *name* -device *amod base nbytes*
name set {l|w|b} *offset value*
name get {l|w|b} *offset*

vme delete *name*
vme list

All this in about 500loc of C++.

NSCL

MICHIGAN STATE UNIVERSITY

Example : Rotating a bit through a memory cell

```
package require Vme

vme create mem -device standard 0x500000 0x4
set mask 0x80000000
while {$mask} {
    mem set -l 0 $mask
    set is [mem get -l 0]
    set is [format 0x%x $is]
    if {$mask != $is} {
        error "Should be $mask Was $is"
    }
    set mask [expr $mask >> 1]
}
```

Example : Printing the firmware version of a CAEN V785 ADC

```
package require Vme
vme create adc -device geo \
                [expr 10 << 19] 0x2000

set fwreg [adc get -w 0x1000]
set major [expr ($fwreg >> 8) & 0xff]
set minor [expr $fwreg & 0xff]

puts [format "Firmware revision is %d.%02d" $major $minor]

vme delete adc
```

NSCL

Useful add-on packages

- camac/wienercamac provides ESONE like support for CES CBD8201 and Wiener VC32/CC32 interfaces (pure Tcl)

- caennet – Support for CAEN proprietary serial device control network (not CAN).

- Various module support packages.

- Various module mega-widgets (snidgets).

Hardware Support

- SBS 620 PCI/VME family of bus bridges (main line).

- Wiener PCDA/VC32 PCI/VME bus bridge

- JTEC VM-USB USB VME bus interface.

iSeg VHQ dual detector bias supply

PPAC Bias supply 2KV @ 100uA

VHQ 204x Power supply Controller   SerialNumber   ff83

Channel A   Channel B

☐ ramp ☐ man. ☑ on ☑ kill en   ☐ ramp ☐ man. ☑ on ☐ kill en

☐ I limit ☑ V Limit ☑ stable ☐ 0   ☐ I limit ☐ V Limit ☑ stable ☐ 0

V limit (V)   Current uA   V limit (V)   Current (uA)

200.0   1.6   200.0   1.6

Ramp Speed (V/sec)   I limit set (uA)   Ramp Speed (V/sec)   I limit set (uA)

4   0.0   100   100.0

Set   Set   Set   Set

Set Point   Actual (V)   Set Point   Actual (V)

490   16   0   16

Ramp Off   Ramp Off

Save... Restore... Reset   Exit Lock

For ordinary users

productionControls.tcl

Select Beam: 48Ca 137MeV

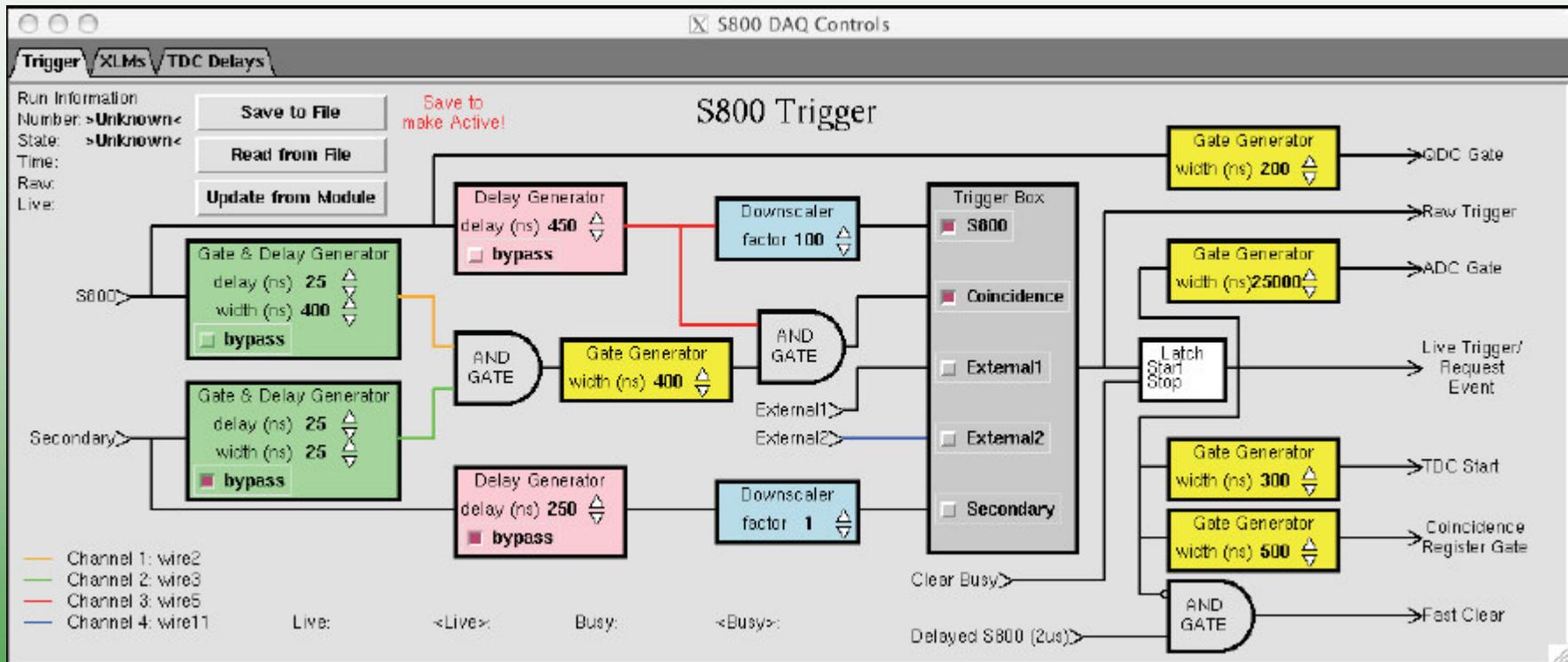|	Scint L	Scint R	Scint U	Scint D	PPAC
Over V	☐	☐	☐	☐	☐
Over I	☐	☐	☐	☐	☐
Ramp	☐	☐	☐	☐	☐
Set V	1320	1280	1260	1200	520
Read V	1	0	1	0	0

Scint Hv On   PPAC Hv On

```
Mon Sep 11 13:22:13 EDT 2006:HV Ready to ramp
Mon Sep 11 13:26:08 EDT 2006:Ramp started for scintlr b
Mon Sep 11 13:26:08 EDT 2006:Ramp started for scintlr a
Mon Sep 11 13:26:09 EDT 2006:Ramp started for scintud a
Mon Sep 11 13:26:09 EDT 2006:Ramp started for scintud b
Mon Sep 11 13:26:12 EDT 2006:Ramp finished for scintlr b
Mon Sep 11 13:26:12 EDT 2006:Ramp finished for scintud a
Mon Sep 11 13:26:12 EDT 2006:Ramp finished for scintud b
Mon Sep 11 13:26:12 EDT 2006:Ramp finished for scintlr a
```

For experts setting up the system

NSCL

MICHIGAN STATE UNIVERSITY

CAEN V812 VME CFD
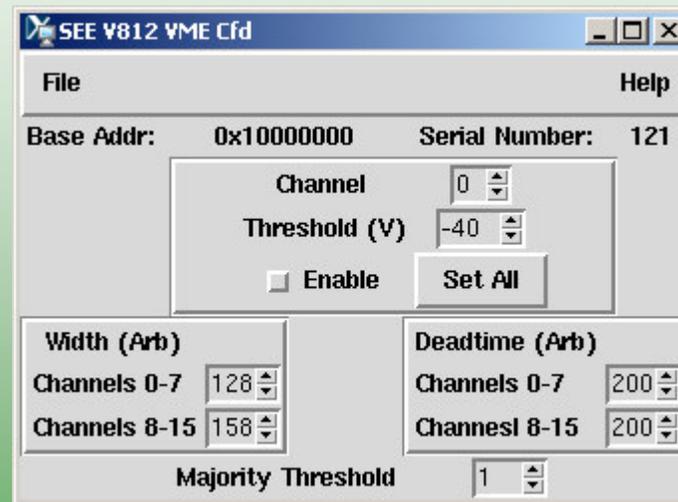
S800 Trigger (D. Bazin)

Pulse Generator
(K. Minamisono)

FPGA Trigger for MoNA (W. Peters, T. Baumann)