8-Pack EPICS Topics

- System Block Diagram
- IOC Crate Hardware
- Infrastructure and Tools
- LLRF Support
- HVPS/Klystron/Vacuum Interface
- Special Instrument Support

Definitions:
- EPICS = Experimental Physics and Industrial Control System
- IOC = I/O Controller (VxWorks VME Crate/Micro)
- OPI = Operator Interface (VMS or UNIX Client Machine)
- PV = Process Variable
### W-ie-ne-r VME Crate

<table>
<thead>
<tr>
<th>M</th>
<th>V</th>
<th>2</th>
<th>7</th>
<th>0</th>
<th>P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>B</td>
<td>S</td>
<td>C</td>
<td>A</td>
<td>P</td>
<td>I</td>
</tr>
<tr>
<td>N</td>
<td>A</td>
<td>Q</td>
<td>S</td>
<td>S</td>
<td>D</td>
<td>G</td>
</tr>
</tbody>
</table>

### APC Smart UPS

- **Ethernet**
- **Cisco Term Srvr**

### Slow IOC (TR07/9) Crate Hardware

<table>
<thead>
<tr>
<th>Slow IOC</th>
<th>DCM ↔ PLC/5</th>
<th>1 HVPS PLC/504</th>
</tr>
</thead>
</table>

**Feb 22, 2002**

S. Allison, R. Chestnut
### Fast IOC (TR08) Crate Hardware

<table>
<thead>
<tr>
<th></th>
<th>Interrupt</th>
<th>Fast IOC</th>
</tr>
</thead>
<tbody>
<tr>
<td>APC Smart UPS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ethernet</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cisco Term Srvr</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>W-ie-ne-r VME Crate</strong></td>
<td>M V2700 PPC</td>
<td>L D 8 PAC 8 P L L</td>
</tr>
<tr>
<td></td>
<td>M V M IC A D C</td>
<td>I F S P E C I A L S</td>
</tr>
<tr>
<td></td>
<td>V M I C A D C</td>
<td>S P E C I A L S</td>
</tr>
<tr>
<td></td>
<td>7 V M I C D A C S</td>
<td></td>
</tr>
<tr>
<td></td>
<td>. . . . . . . . . . . . . . .</td>
<td>. . . . . . . . . . . . . . .</td>
</tr>
</tbody>
</table>

**Feb 22, 2002**
S. Allison, R. Chestnut
Infrastructure and Tools

- Use Existing PEPII/NLCTA OPIs and Network
- Add 8-Pack PVs to Existing Standalone Processes
- Use Existing Servers – Logging, IOC Booting, CUD Mgmt
- Share Some Existing Data Space with PEPII/NLCTA
- Share Matlab Licenses and VxWorks PPC BSP

Significant Tasks:
- User Interface – 8-Pack Unique
- Data Storage and Backup (50 GB/yr)
- Waveform Archival/Display Improvements over NLCTA?
- Add UNIX System (Process and Quota) Monitoring
- EPICS Archiver Development
- Improved MATLAB Support (ie, Channel Access)?
- EPICS GPIB Support for ???? Devices?
- Add VME Wiener Crate Monitoring?
- Add Fault Accounting?
LLRF Requirements (FAST)

- Pulse Width Modulation Based on Some Sort of User-Defined Simple Pattern
- Deadman?
- Fault Processing on Interrupt:

  - Interrupt
  - ADC Acq/Conv (All 64 Channels)
  - Other Calcs including Pulse Width Pattern
  - Fault Check against User Limits
  - Set 5 DAC Channels (Readback when?)
  - Update History and Diagnostics, Capture Fault Data

  Time →

  Next Interrupt
LLRF Requirements (SLOW)

- Simple Pulse Width/Power Ramp After Fault
- Control of 128 Analogs (64 IQ Pairs)
- Possible SLED and/or Klystron Phase Feedbacks (~1/sec)
- Power Adjustment (~1 min) based on # Faults
- Periodic (~1 hr) Waveform Acquisition and Archival
- Periodic (~1 min) Scalar Analog Archival
- Scalar and Waveform Fault Data Capture
- Latched Interlock Reporting and Reset
- Per Channel Calibration and User Constants for:
  - Power/Phase from Scalar IQ Readbacks
  - Power/Phase from IQ Waveforms?
  - Power/Phase to IQ Control
LLRF Significant Tasks

- Driver/Device Support for VMIC ADC and DAC
- Driver/Device Support for SIS 100 MHz Digitizer
- Interface to IQA Module – Latched Faults and Thresholds?
- Fast Processing Database and Subroutines
- Database and Sequences for Slower Tasks
- VME Digital I/O?, Scaler Board?
- Feedback Loops?
- Calibration?
- Commissioning
HVPS/Klystron/Vacuum Interface

- Monitor ~256 HVPS/Klys Signals via AB Interface (~2sec)
- Send a Few(?) Control Inputs to HVPS via same AB Interface
- Monitor Handful of Vacuums:
  CAMAC->SLC Micro->MCC DB->Slow IOC
- HVPS/Klystron/Vacuum Fault Data Capture
- Check HVPS and Vacuums in LLRF Processing

Significant Tasks:
- Write to Big AB DCM (not done for PEPII/NLCTA)
- PLC/5 Read from DCM and Write to HVPS PLC (Alan Hill)
- Database (Signal List Definition)
- Commissioning
Special Instrument Support

- Acquire PMT and Acoustic Sensor Waveforms on Fault (possibly also on request and at some slow period)
- PMT Control using same VMIC DAC as LLRF
- Thermal Power Measurement, possibly GPIB