**SNS Neutron Data**

Zero to 10 million events per second:

- **Pixel ID**
  - Where was the detector hit by a neutron?
- **Time of flight**
  - When was the detector hit by a neutron?
- plus beam pulse charge & time stamp
- plus maybe additional detector internals [raw ADC counts, ...]

**SNS events as pvData**

<table>
<thead>
<tr>
<th>Structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>// Time stamp for all;</td>
<td>NTScalar protonCharge double value</td>
</tr>
<tr>
<td>// eventID in ..userTag</td>
<td>NTScalarArray time_of_flight uint[] value</td>
</tr>
<tr>
<td>time_t timeStamp</td>
<td>NTScalarArray pixel uint[] value</td>
</tr>
<tr>
<td></td>
<td>NTScalarArray position_x uint[] value</td>
</tr>
</tbody>
</table>

Could also arrange as array-of [i.e., pixel], but above structure allows flexible subscription: XY histogram to subscribe to just 'pixel' updates, while c.f.o.f. histogram can receive only the 'time_of_flight' changes, optimizing network usage.

**EPICS “V4”**

- **pvData – Structured Data**
  - Java, C++
  - Normative Types: Structs w/ time, alarm, ...
- **pvAccess – Network protocol**
  - Similar to CA
  - Search via UDP 5076, connect by default on TCP 5075
  - Server decides on byte order
  - Partial transfers, whatever client requests
  - Clever ‘size’: 1 byte if <255, ...
  - Protocol freeze in Oct. 2014

**Generic V4 Tools**

**pvAccess**

1GigE network:
Up to 150k events at 100Hz, i.e. 15 Million events per second, before network saturation

10GigE network:
100 M evt/sec before CPU saturation

**Operational on SNS Beam Lines**

Updated SNS beam lines: USANS, CORELLI, HYSPEC, VISION, SEQUOIA.

More soon.

**Summary**

Control System Software update of SNS beam lines to EPICS successfully uses V4 to transfer neutron events from detectors to first processing stages

- **pvData easily wraps the SNS neutron event information**
- **pvAccess meets our performance needs**
- **Overall stability exceeded our expectations for a first production deployment of this new technology**

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