Serial Support for Diamond

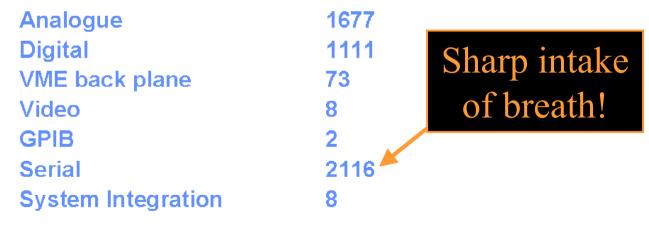
A review of EPICS serial interface options

Pete Owens Daresbury Laboratory

Serial Interfaces

Number of Interfaces

 From the Assessment of Equipment the number particular interfaces is derived



This is NOT necessarily channels but interfaces

Daresbury Laboratory

Overview of DIAMOND to the European EPICS Meeting at PSI May 2001

Serial Support for Diamond - Pete Owens - Daresbury Laboratory EPICS Collaboration Meeting - May 2002 Mark Heron

Serial Interfaces

Need to support serial interfaces to equipment

• Advantages:

- Increased functionality per connection
- Minimises calibration errors from Control System ADCs
- Widely accepted use of RS232/422 etc
- Integration of systems
- Faster commissioning

• Disadvantages:

- High processor load
- Development to support vendor protocols
- Asynchronous I/O
- Need signals for fast logging and interlocks

Vacuum Equipment Test Rack

- MKS 937A multi-sensor vacuum gauge system
- Balzers TPG 300 pressure gauge controller
- Varian Dual ion pump controller
- Digitel MPC ion pump controller
- Mitsubishi 'A' Series PLC valve control

Vacuum Equipment Test Rack

- VME 64x Crate
- Processors:
 - MVME 167 & PPC 604
- IP Carriers:
 - Hytec VICB8002
 - Greenspring VIPC601
- Serial Interface Card:
 - Greenspring IPOctal 8 channel IP card

EPICS Devices

- devAscii Allan Honey/Jeff Hill KECK
- Stream Device *Dirk Zimoch DELTA*
- MPF Mohan Ramanathan APS
- ornlSerial John Sinclair Oak Ridge

• tyGSOctal - Peregrine McGehee - Hawaii



- Allan Honey/Jeff Hill KECK Observatory
- De-facto standard
- Format string in INP or OUT field

field(INP,"@/tyGS/0/0 <R2><%f>")

• Special records for terminators, timeout etc.

devAscii - Experience

- Implemented database for MKS 937A
- Good points
 - easy to use
 - widely used
- Not so good
 - special records
- Limitation

checksums or complex protocols

Stream Device

• Dirk Zimoch - DELTA

- http://www.delta.uni-dortmund.de/controls/pub/doc/streamDevice/
- Device support for common record types.
- Allows to connect records to multiple hardware via arbitrary field bus architectures (*CAN & GPIB supported*).
- Bus data must appear as a stream of bytes.
- Protocol defined in a file.

Stream Device - Protocol File

```
# Stream Device Protocol for the MKS 937A Multi-Sensor System
```

terminator = CR; replytimeout = 1000; # milliseconds extrainput = Ignore;

```
pressure { out "R\$1"; in "%f"; }
enable { out "%{X|E}CC\$1"; in "OK"; }
status {
    out "R\$1";
    in "%{HI|A|L0|F|H|W|L|CON|P|NOG|M|NOT|Not|C}";
}
```

Stream Device - Experience

- Added bus support for tty devices

 modular design, good documentation
- Produced protocol files for:
 - MKS 937A, Varian dual, TPG 300
- Good points
 - protocol files, multi-stage protocols, delays...
- Limitation
 - checksums

MPF (Message Passing Facility)

- Mohan Ramanathan APS
 - http://www.aps.anl.gov/aod/people/mohan/
- Client/server design
 - Server side independent of EPICS, giving configuration flexibility.
- Support available for Digitel MPC
- Custom record

MPF - Experience

- Implemented support for Varian Dual
- Software complex to build and modify
 - Mods to C++ module for the server side, handling the hardware interface
 - Mods to C++ module for the client side, scheduling command requests
 - Mods to C module for custom record support
 - Mods to build files
 - Mods to include files

MPF - Evaluation

- Good points
 - flexibility
 - custom record for Digitel MPC included
 - well-structured software design.
- Bad points
 - development overhead for new devices
 - over-engineered for diamond project.

ornlSerial

• John Sinclair - Oak Ridge

- <u>http://www.sns.gov/projectinfo/ics/epicsCollabMtg/serialSupport.ppt</u>
- Device Manager for configuration
 - Baud, parity, etc.
- Generic interface module
- Device specific plugin modules
 - Construct and parse I/O strings

ornlSerial - Experience

- Implemented plugin module for MKS 937A
- Added record support for standard ai & ao
- Coding straightforward

Device Manager

tyGSOctal doesn't implement
- ioctl (..., SIO_HW_OPTS_SET, ...)

ornlSerial - Evaluation

- Good points
 - Useful for complex protocols (eg. checksums needed).
- ORNL features
 - Non standard use of DISA field (warm start)
 - Non standard ai/ao records
- However
 - requires some programming for device-specific modules.



- All software built and worked
 minor glitches 68k / PPC
- Where existing support exists use it
- For new development we like:
 - stream device for most cases
 - ornlSerial for complex protocols/checksums

Possible Developments

- Stream Device
 - bus support module for device manager
- tyGSOctal
 - SIO_HW_OPTS_SET ioctl call
 - hot swap support
- ornlSerial
 - record support for waveform record

Serial Support for Diamond

The End