Proposal for EPICS Interface for IU HV Control System

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CAEN HV GUI Example

File Edit CSS Window Help

100%

OPI Runtime

caenA1525card.opi

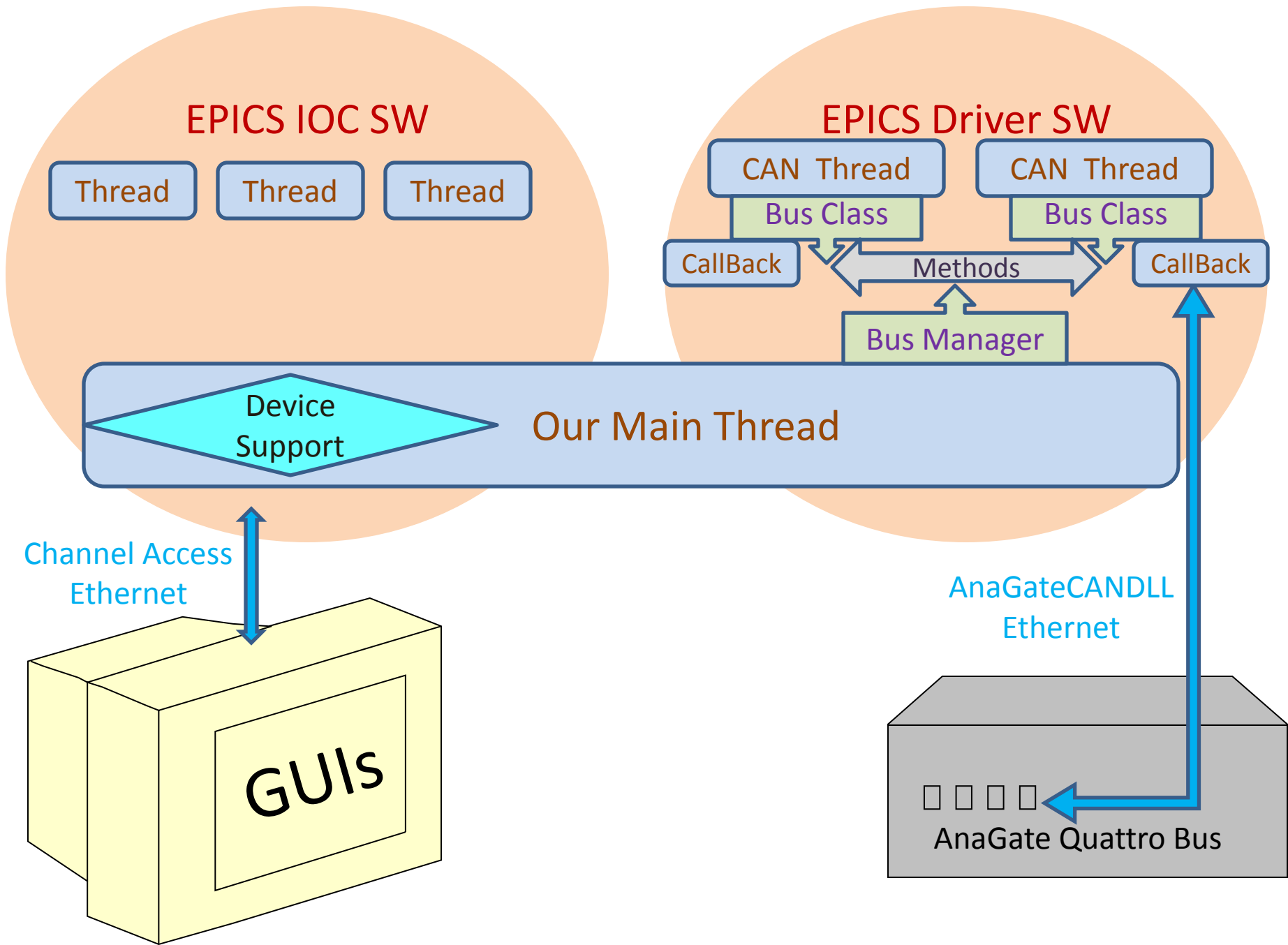## CAEN SY1527 HV CHANNEL CONTROL

Channels 0-11 | Channels 12-23

Channel Name	Measured Voltage	Setpoint Voltage	HV ON/OFF	Channel Status	Measured Current	Trip Current	Trip Timeout	Software Max Voltage	Ramp up Rate	Ramp down Rate
CHANNEL00	369.0 V	1,982		Ramping Up	0.00 uA	300.0 uA	10.0 s	3500.0 V	20.0 V/s	20.0 V/s
CHANNEL01	1236.0 V	2,000		Ramping Down	0.00 uA	300.0 uA	10.0 s	3500.0 V	20.0 V/s	20.0 V/s
CHANNEL02	0.0 V	2,000		Off	0.00 uA	300.0 uA	10.0 s	3500.0 V	50.0 V/s	50.0 V/s
CHANNEL03	0.0 V	200		Off	0.00 uA	300.0 uA	10.0 s	3500.0 V	20.0 V/s	20.0 V/s
CHANNEL04	0.5 V	500		Off	0.00 uA	300.0 uA	10.0 s	3500.0 V	50.0 V/s	50.0 V/s
CHANNEL05	199.5 V	200		On	0.00 uA	300.0 uA	10.0 s	3500.0 V	50.0 V/s	50.0 V/s
CHANNEL06	0.0 V	200		Off	0.00 uA	300.0 uA	10.0 s	3500.0 V	50.0 V/s	50.0 V/s
CHANNEL07	0.5 V	500		Off	0.00 uA	300.0 uA	10.0 s	3500.0 V	30.0 V/s	30.0 V/s
CHANNEL08	0.0 V	200		Off	0.00 uA	300.0 uA	10.0 s	3500.0 V	50.0 V/s	50.0 V/s
CHANNEL09	198.0 V	200		On	0.00 uA	300.0 uA	10.0 s	3500.0 V	50.0 V/s	50.0 V/s
CHANNEL10	0.0 V	200		Off	0.00 uA	300.0 uA	10.0 s	3500.0 V	50.0 V/s	50.0 V/s
CHANNEL11	0.0 V	200		Off	0.00 uA	300.0 uA	10.0 s	3500.0 V	50.0 V/s	50.0 V/s

Not logged in

Suggested Principle

- Continuously scan the bus to maintained a synchronized buffer layer. Scan speed will depend on the bandwidth of the system.

- The requests to change hardware could be delayed, or they could be directly send when modified by a "user".

- Parameters values that EPICS records see may be "old" if requests come within a scan period.

EPICS Support Structure

- Our EPICS support would consist of three pieces:
  - Driver   -   Synchronizing software/hardware parameters
  - Device Support   -   Connecting values to EPICS PVs
  - EPICS application -   Variables, GUIs, Alarms etc

- Driver part can be made independent of EPICS framework

- Device Support requests values from the buffer layer and assigns them to PVs.

- EPICS application is a set of EPICS records, GUIs, Alarm handlers etc, and can be dealt with together with CAEN HV system.

EPICS IOC SW

Thread   Thread   Thread

Device Support

Our Main Thread

EPICS Driver SW

CAN Thread   CAN Thread

Bus Class   Bus Class

CallBack   Methods   CallBack

Bus Manager

Channel Access Ethernet

AnaGateCANDLL Ethernet

GUIs

AnaGate Quattro Bus

Bus and Callback Threads

Bus thread periodically requests all IDs on the bus to know which boards are alive.

For each HV parameter on the board:

- *Bus* thread periodically:
  1. Requests the parameter value from the "live" boards on the *bus* using the corresponding to that parameter *command*.
  2. Scans through all [*bus,board,command*] triplet FIFOs for that *bus* and *command*, and synchronizes the buffer layer until responses from all boards are received and processed. On TIMEOUT generate an error or raise an alarm.
  3. Write to boards if the parameter value on the board needs an (or can skip this and write every time an EPICS record is processed/modified by "user").

- Callback thread:
  – Keeps reading the messages from the bus and fills up the FIFOs for each [*bus,board,command*] triplet.

Questions

- How is the trip current setting control implemented?

- Is there a ramp rate control in the firmware?

- What is the alarm logic for HVs? What is the DAC Voltage to ADC Voltage correspondence?

- What needs to be done with the LED control?

- How easy is it to add more parameters, like status indication: On, Off, Tripped, Ramping up etc to the board .

- Can a message from the board FULLY describe what command it is responding to using "extra bytes"?

- Does the board abandon a planned response if a new request is sent to it?