

Version 4.0 EPICS Core

Core Developers 10/3/2005

Release 3.15

- General Time
- Modify the sequencer to support debugging and command line query of data
- Hooks for add/delete channel to the driver layer.

Release 4.0 Goals

- Provide online add/disable of I/O to support continuous operation.
- Provide redundant control of remote I/O to support improved reliability.
- Provide name introspection and domain control in support of seamless integration of large control systems
- Provide triggers, filters, and rate limits to improve resource use of network and client side processing
- Provide atomic read/write of multiple fields in a record
- Remove limitations on string lengths, device states, number of input links to support arbitrary sizes/dimension arrays.
- Record Library to provide pluggable functionality
- Provide hierarchical devices to support higher level view of application in the front-end processors.
- Alternate protocols
- *Write with read-back*
- *Provide channel access diagnostics*

could provide the following in parallel to these efforts:

- Provide a Channel Access Server to Sequences and their diagnostic information
- Revisit Database Library
- Adapters

Not Version 4

- Provide automatic backup and restore to support bump-less reboot and synchronization of redundant controllers.
- Support international users with uni-code and time.
- V3 compatibility provided only through gateways.

Design Constraints

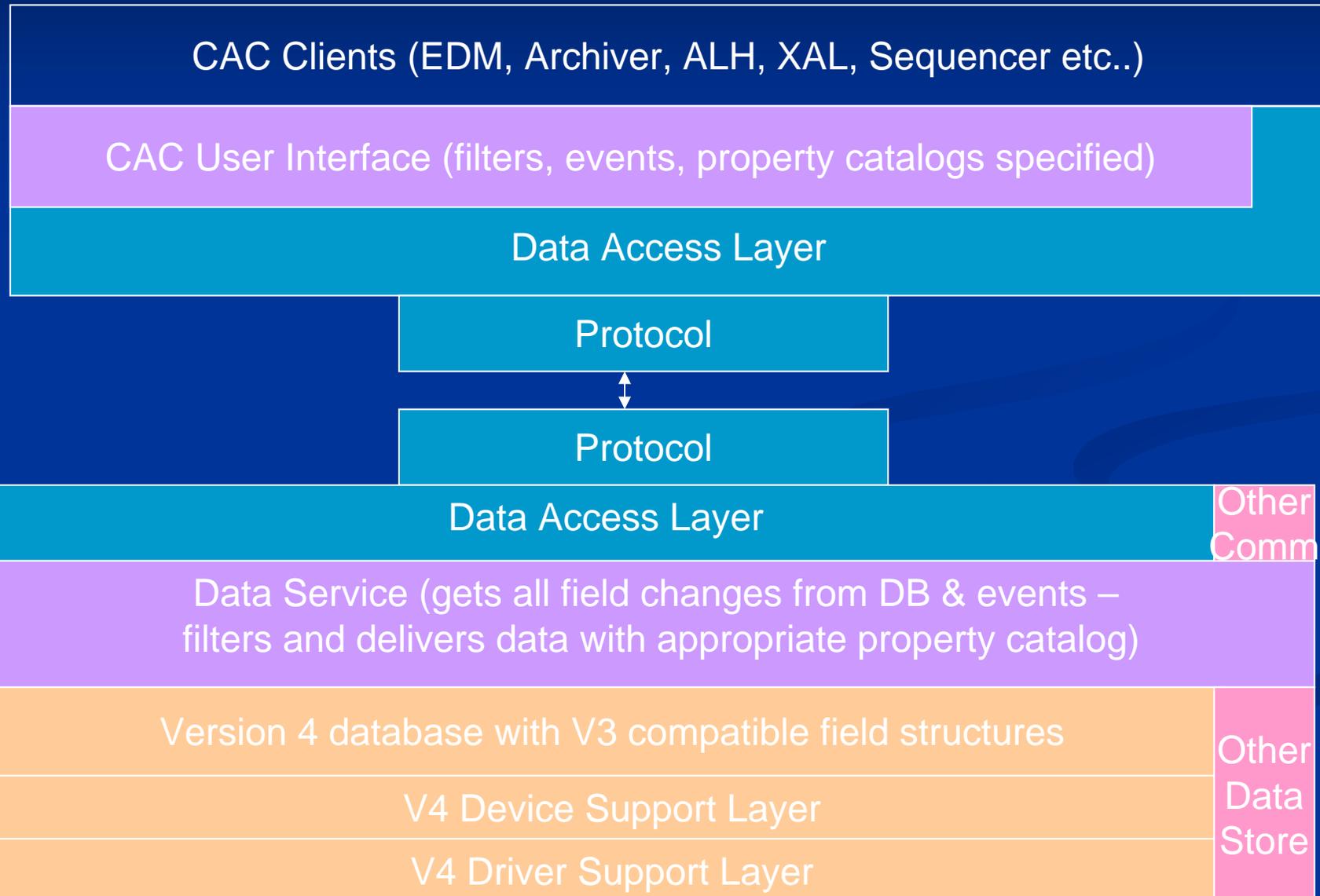
- Design interfaces that allow future upgrades.
- Achievable in 1.5 year time frame
- Design completion in July 05 (not there)
- Keep footprint of IOC Core under 8 meg before clients (we require 16 meg for satisfactory operation)
- Support a proliferation of device size iocs

Release 4.0 Tasks

- Driver/Device interface – APS
- Database Services
 - Building structures and arrays – APS
 - Posting fields and changes (with triggers) from the database to data access middleware - APS
 - Super Record – creating new records from functional blocks Andrew, Bob
 - User extensible fields w/ little code – Marty, Kay and Matthias
- Middleware Interfaces to CA server (vampire tap, redundancy?, alarm stream, cmlog) – Ralph and Benjamin
- Network Communication Services
 - CAS - Jeff (down to Middleware interfaces)
 - Network Protocol - Jeff
 - Name service – Kay
 - Channel Access Client user interface - Kay
 - Channel Access Client – Jeff (up to user interface)
 - Redundancy requirements for field communication – Bob
 - Catalogs and events – Bob
- Gateway (version bending, storage for data) – Ralph and Benjamin

- Make system – Benjamin and Janet to look at
- Integration of EPICS office – Kay

Version 4 Core Architecture



Data Filters

- ***Rate limiting***
- A client will be able to request a data frequency. The data frequency must be tied to the timing system so that all channels being reported from different IOCs, will not be skewed in time. If I monitor BPMs in many IOCs and ask to only be notified once per second, it should be from the same beam pulse.
- ***Deadbands***
- Each client will be able to specify a dead-band around notification as either a percent of range, percent of value, or an absolute value. In this case, each client will be notified on connection. They will only be notified again when their dead-band is exceeded.
- ***Computed Filter***
- Each client can also choose any field available over Channel Access as a filter.
- ***Combinations***
- Any combination of these filters can be applied using Boolean logic (and, or, xor, not)

Events

- ***Introduction***
- In version 3, EPICS supports three event masks for notification - value exceeds value notification dead-band, value exceeds archive dead-band, and change of alarm condition.
- To implement the archive and value notification, dead-bands were set in the record and every client would share this one dead-band for each event. The record would keep the last value that was sent and only notify the client when the absolute value of the difference, exceeded the limits. The other supports event was a change of alarm condition or status.
- ***Change of value event***
- The notification from the database to channel access will not perform dead-band checking. All changes will be passed out of the database as value change events. This function will be performed by the filtering layer outside of the database.
- ***Change of alarm condition***
- This event will continue to be supported.
- ***Event System Events***
- One set of new events must all client notification only when the event system has delivered the event to the IOC. In one case, you can picture a BPM that is triggered at 120 Hz in a LINAC that has multiple users. As one of these users, I am only interested in the beam that is coming to my beamline. The event system delivers a gate or beam mode that indicates which timing gates should be triggered to control beam direction. This same event will be used to determine if the beam should be sent to a particular client.
- ***Soft Events***
- Any condition within the IOC should be able to be computed into an event. The potential use for this is a large number of circular buffers that are only interesting when there is a quench in the ring. In this case, the record would be processed at the scan rate and adding values to the circular buffer. On each scan, a value event would be sent to channel access for anyone that wanted to see the buffer as it changed. When the quench was also detected, both the value and the quench event would be sent...

Property catalogs

- ***Replacements for Currently Supported “catalogs”***
- With the new catalogs, all combinations of metadata will not be supported by a given property catalog. A request for multiple catalogs will be supported. As a field can be a structure, the first two properties in the catalog have greater functionality. For instance, a value could be a structure containing sky coordinates or beam position.
- Value: a single field of any data type can be accessed
- Value: value, time stamp, alarm status, and alarm severity can be accessed.
- Analog alarm: Hi-hi alarm limit, Hi-hi alarm severity, High alarm limit, high alarm severity, low alarm limit, low alarm severity, lo-lo alarm limit, lo-lo alarm severity, hysteresis.
- Analog display: High display limit, low display limit, floating point format
- Analog control: High limit, low limit
- Digital alarm:
- Digital display: Number of states, state string for each state
- ***New general purpose catalogs***
- Analog array display: Time base, offset
- ***Consideration***
- Dynamic data catalog: all fields that can be changed as a result of processing. This would allow a redundant partner to use channel access to monitor record changes as a result of record processing. One issue is that there would need to be a separate catalog for each record type or a catalog that contained the fields of each record that could be modified. It may be better to use a different mechanism that sends just name/value pairs to the backup.