CA Gateway Update

Ralph Lange
BESSY II
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1 Overview *What is it?*

The CA gateway was developed at the APS by Jim Kowalkowski. Present development is done by Janet Anderson (APS), Jeff Hill (LANL) and Ralph Lange (BESSY).

The CA gateway is an application that uses a CA client on the lower interface to connect to channels (PVs) and sets up monitors to those channels. It uses the portable Channel Access Server (CAS) to provide these channels to other CA clients (the upper interface). The channels' data is cached. There is an Access Security layer within the gateway to configure whose clients from which hosts may have read or write access to a channel provided by the gateway.

2 Design *How does it work?*

There are five basic functional blocks:

1. CA Server:
   The gateway uses the new "portable" Channel Access Server to provide its channels to the clients on the "upper" network.
2. Access Security:
   There is a level of configurable Access Security for the Virtual Connections (i.e. the channels the gateway provides to its clients).
3. Virtual Connections:
   A Virtual Connection (VC) may either have a "real" PV name or an alias name that is mapped to an existing PV on the lower network. Configuration of Access Security and VCs (real and aliased) is done using ASCII configuration files the gateway reads when it starts up.
4. PV Channel Cache:
   For each requested "real" PV a connection via the lower network will be established. All channel attributes are read and a monitor for the value is set up. The attribute and value data is cached.

5. Channel Access Client:
   The CA client established the PV connections across the lower network.

Major design features:

- There is only one connection between the gateway and each server of "real" PVs compared to one for each client. This minimizes the number of TCP connections as well on the upper as on the lower network.
- Read accesses from clients are answered from the data cache. There will be no traffic on the lower network for read accesses.
- The IOC sends monitor events (value or severity changes) only to the gateway, which distributes them to the clients. This minimizes the traffic on the lower network and the load on the IOC.
- PV connections may be held open for a configurable time after the last client disconnects. This saves CA open or close actions on the IOC if there are clients (like scripts or some SDDStools) that open, read and close a set of connections regularily.

3 Applications *What is it good for?*

Reasonable uses of the CA Gateway include:

Controlled Access to a Secure Net

Running the CA Gateway on a host equipped with two network interface cards may be used to isolate a private high reliability network from other networks. The network and IOC load implied from CA clients in other nets is limited and independent from the number and the behaviour of those clients. Additionally access can be restricted using the Gateway's Access Security Layer.

Channel Name Aliasing

A Gateway running on a host within the controls network may be used to introduce PV name aliases. This may be useful for testing database structures or to limit the IOC load for popular channels (like beam current, lifetime).

Panel Speed Up

If the OPI consoles are running on a 100 MBit/s network while the IOCs still use 10 MBit ethernet, accessing the PVs through a Gateway running on a two-interface-machine may speed up the connections to the OPI panels: The Gateway will handle the distribution of monitor events to many CA clients through much faster than the IOC, which has to send all the monitors using the slow line.

Local PV Repeater

The Gateway may be configured to use the loopback driver as upper interface instead of the "real" network. So all CA clients on this host may connect to the local Gateway, which acts as a repeater and bundles all CA connections on this host. (Like one MEDM process bundles all CA connections from different panels on one display.)

4 Status *Does it work?*

Some severe bugs — as well in the Gateway itself as in the GDD library it uses — have been fixed. There are still many left.

The Gateway will not handle ENUM type data properly. This problem is currently being worked upon.

There is (almost) no documentation.

The native HP-UX and the CenterLine C++ compilers will not compile GDD and CAS properly. This seems to be a problem of those compilers, not of the code. The GNU C++ compiler compiles the Gateway without problems. GDD/CAS has been compiled under Solaris, WIN95 and VMS.

The Gateway is under heavy development. It has not been thoroughly tested.

Nevertheless: it is being used in the production systems at APS and BESSY II. Buggy as it is.

5 Plans *What is on the to-do-list?*

The Gateway should work tranparently: A CA client should see no difference between a direct connection and a connection that is routed through a Gateway.

There is some more debugging waiting to be done.

There has to be documentation on how to use the Gateway.

As soon as the CAS is thread safe, there will be a chance to run the gateway on an IOC, which might be useful in some cases.

There might be a chance to get “Virtual Gateways” running, i.e. multiple gateways running on different ports that may be coonfigured independently, which share the PV data and attribute cache and its PV connections. (Comparable to the “Virtual Server” feature of some http-servers, e.g. apache.)

Any suggestions are very welcome. Volunteers for Beta-Testing, too.

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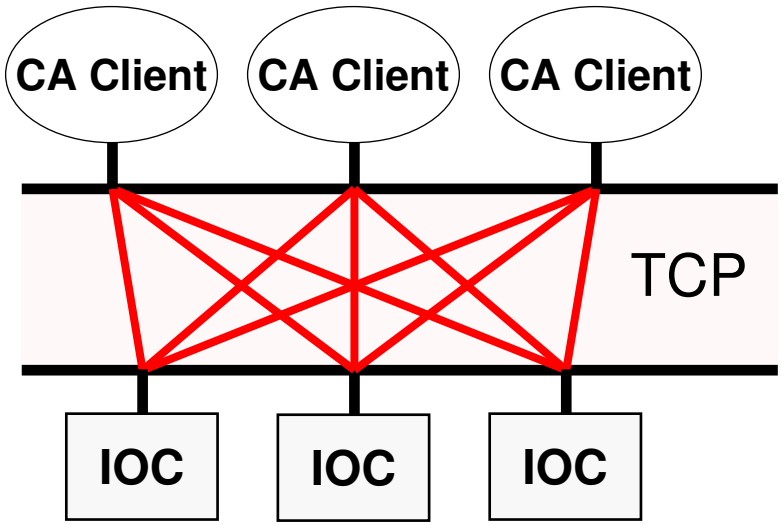
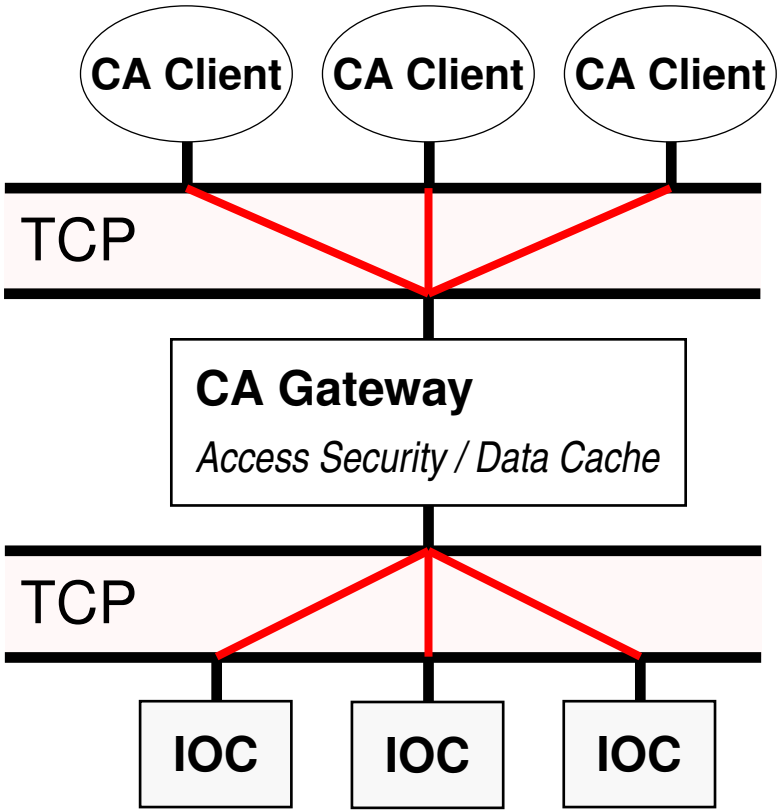
- Status *Does it work?*
- Plans *What is on the to-do-list?*

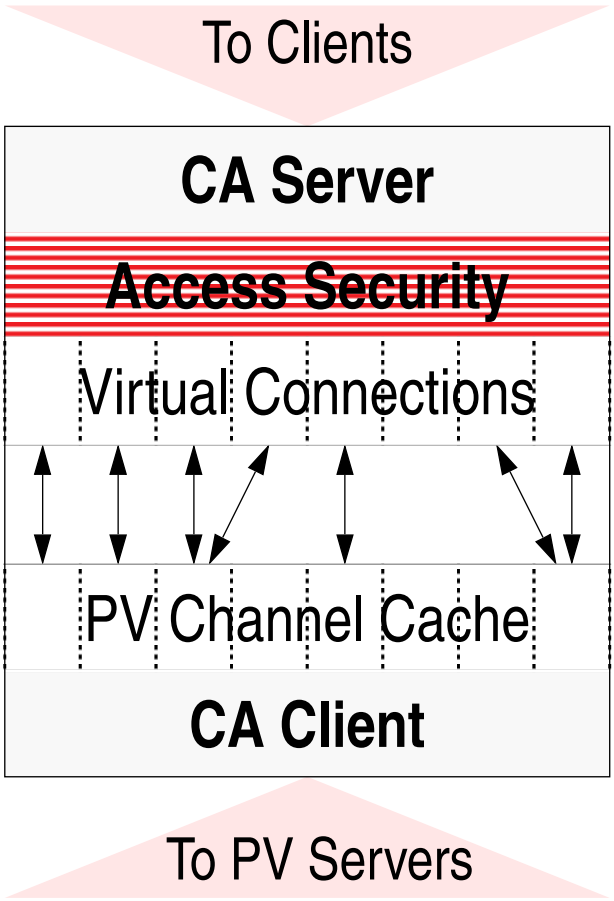
Overview

CA Uses One TCP Connection per Client/Server Combination





Design



"Upper" Network

New "Portable" Server

VC Names May Be "Real" PV Names or Aliases

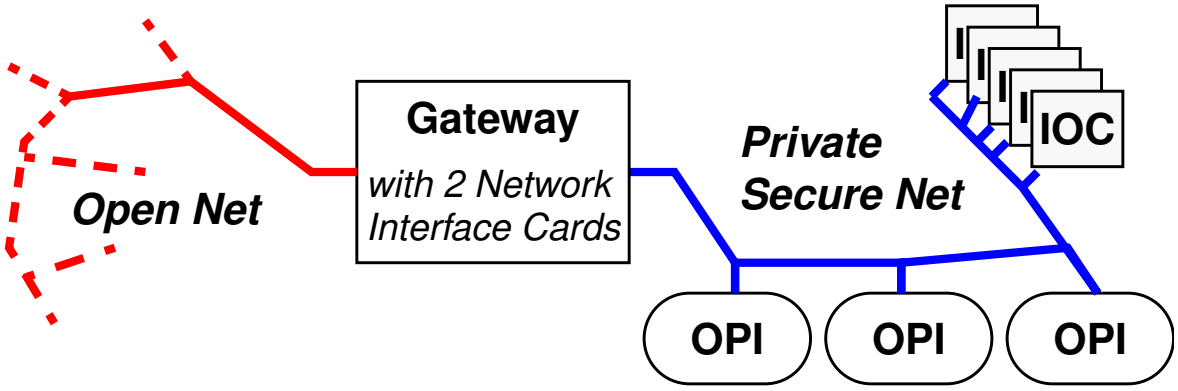
Attributes and Values are Cached

"Lower" Network

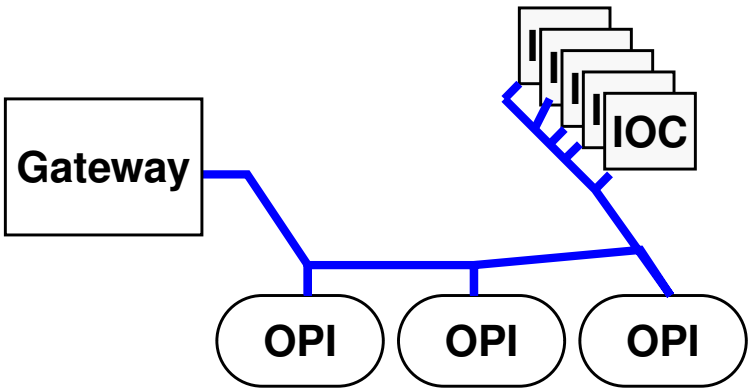
- Reduces Number of TCP Connections
- Reads are Answered from Cache
- Events are Distributed to Clients
- PV Connections may be Held

Applications

Controlled Access to a Secure Net

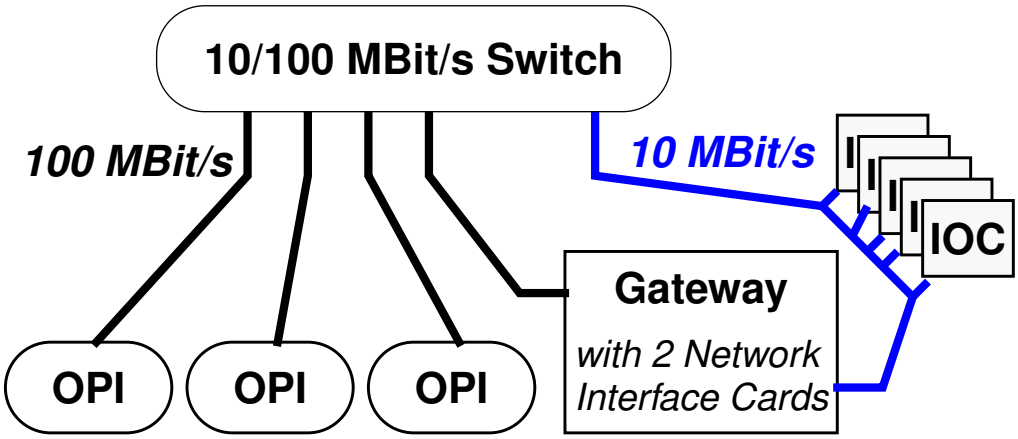


Channel Name Aliasing

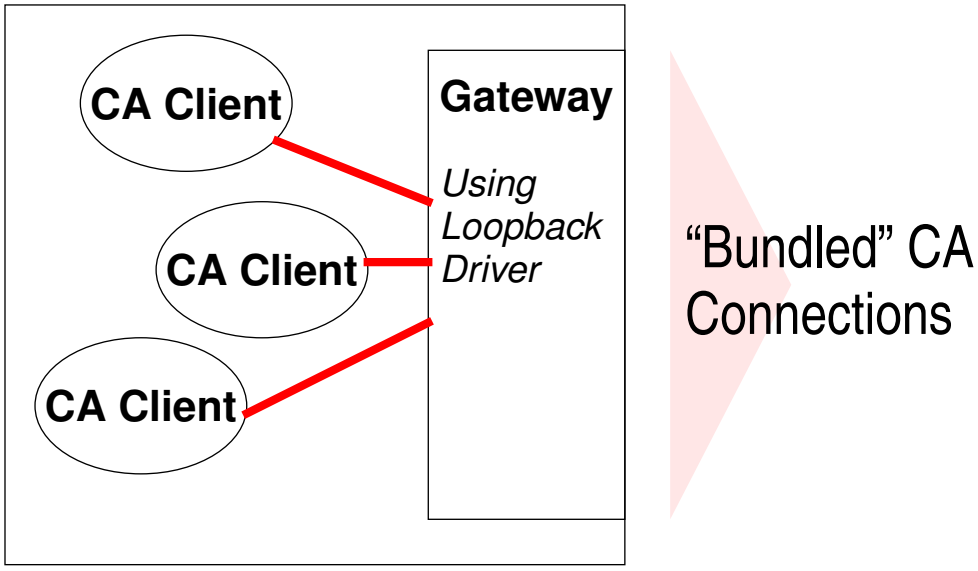


Applications

Panel Speed Up



Local PV Repeater



Status

- Some Severe Bugs (Causing up to 8 Crashes per min) have been Fixed
- Problems with ENUM Data
- No Documentation
- Native HP-UX Compiler does not Compile the GDD and CAS Libraries (g++ does)
- Not Thoroughly Tested
- Used in Production System at APS and BESSY

Plans

- Obtain Transparency:
  There Should be No Difference Between Accessing a PV Directly and via the Gateway
- More Debugging
- Documentation
- Make Gateway Available on IOC (vxWorks)
- “Virtual Gateways”:
  Multiple Gateways Share One PV Data Cache
- Any Suggestions?