

SLAC

EPICS PVA Gateway Stress Testing

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ACCELERATOR
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PVA Gateway Improvement Project

As of summer 2018, an existing PVA Gateway prototype in C++, pva2pva, was being developed by Michael Davidsaver of Osprey DCS. Michael also had a python prototype, p4p. Both were lacking features, particularly Access Security, needed for production use at SLAC.

Fall 2018: SLAC approves SOW for PVA Gateway Improvements. Project put out for bid and awarded to Osprey DCS.

Jan 2019: Michael Davidsaver begins work on PVA Gateway Improvement Project.

PVA Access Security Status

Access Security Features implemented on p4p gateway as of June 2019:

- User name
- User Access Group UAG
- Posix User Groups
- Host IP for CA Client
- Host Access Group
- PV Name Patterns

Not done yet:

- Access control via PVA variable
- PVA Access control on IOC

Authentication

Authentication deals with how does the EPICS server determine the UserId and Host IP of the client.

- First generation PVA Access Security plugin gets username from client, but derive the hostname from the ethernet socket connection.
- Second generation PVA Access Security plugin will use a password based authentication to ensure the client UserId is valid.
- Currently favored authentication method is to use Kerberos tickets.

Access Configuration

CA Access Security is configured by an access configuration file, ACF, that allows EPICS developers to define the following building blocks for determining what level of access is granted to a CA client.

- ◆ UAG, User Access Group, a list of usernames and/or group
- ◆ HAG, Host Access Group, a list of hostnames
- ◆ ASG, Access Security Group, a list of rules governing access for different UAG and HAG

In the IOC, each record has an ASG field which determines which Access Security Group rules are used for its access security.

In the gateway, a pvlist file is used to determine which ASG to use.

- ☑ PVA Access Security supports CA configuration files.

PVA Gateway Caching and Channel Sharing

Gateway caching monitors the upstream server and uses a single update from the server to server multiple downstream clients.

- Gateway caching
- Configurable gateway caching
- Channel Sharing for identical PVA requests
- Channel Sharing for PVA requests with different subsets of channel fields

PVA Gateway Data Reduction Strategies

Gateway data reduction involves configurable rate limits for both upstream and downstream connections to avoid some connections consuming most of the available bandwidth.

- Upstream rate limiting
- Downstream rate limiting

Another strategy for data reduction is for the client to only request a subset of an array.

- PVA Gateway supports CA Filter notation PV.[-5,-1]

PVA Gateway Diagnostics

Gateway diagnostics currently only readable from downstream.

- EPICS style alarm limits, severity and status for each monitor PV
- Number of client side PVA connections
- Number of server side PVA connections
- Total client bandwidth by host and by pv
- Total server bandwidth by host and by pv
- CPU and Memory usage
- Thread count for both client side and server side

PVA Gateway Logging

Gateway doesn't currently have an option to specify a log file, but uses python logging module so it should be easy to specify a log file.

CA style put logs are not yet supported.

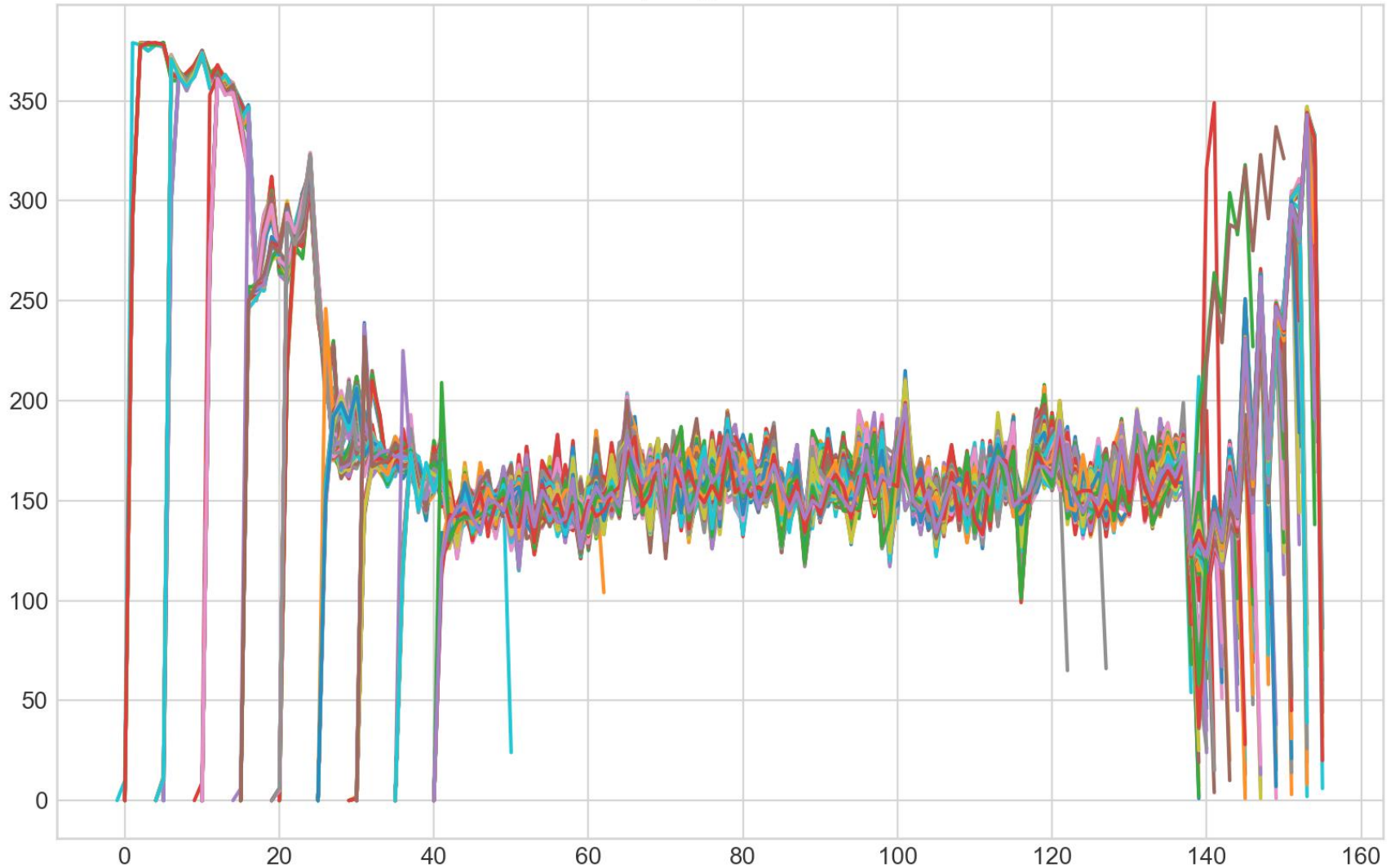
Some classes and methods have python docs, but more is needed.

Also need some additional high level docs including:

- Threading model
- Deployment examples

Stress Test

stressTest pva-gw-test2 PV Rates



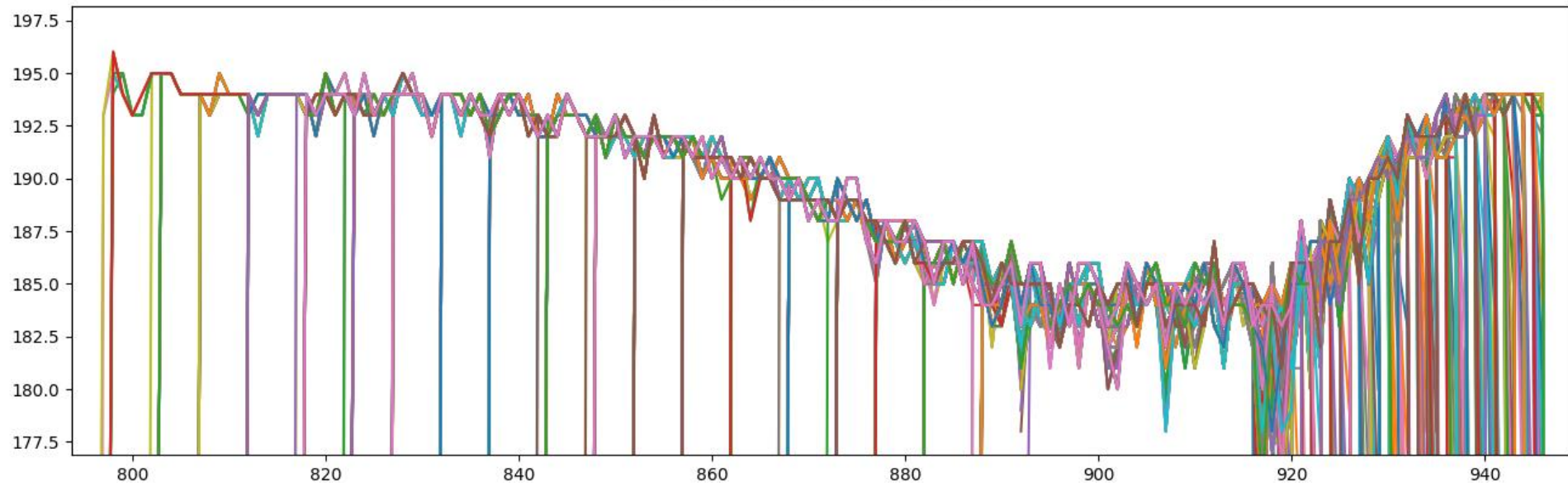
Missed Counter Updates

stressTest pva-gw-test2 PV Missed Count Rates



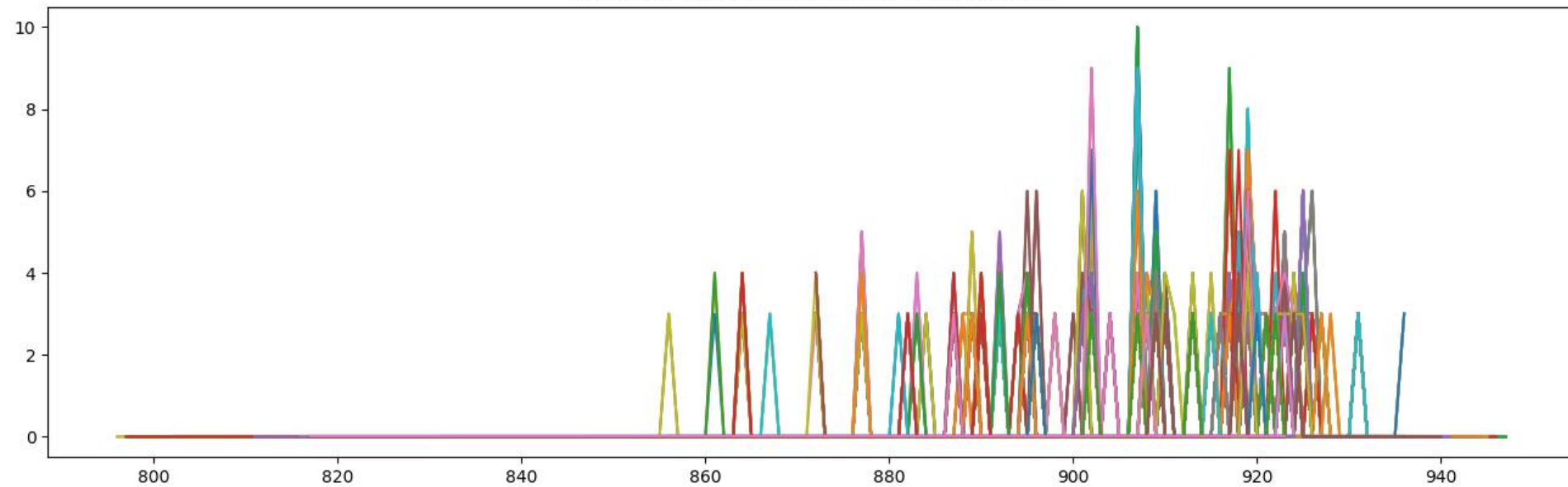
Content

stressTest pva-gw-ctrs3 PV Rates



Content

stressTest pva-gw-ctrs3 PV Missed Count Rates



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Reference Documents

EPICS Application Developers Guide

<https://epics.anl.gov/base/R3-15/5-docs/AppDevGuide/AccessSecurity.html>

EPICS Gateway Users Guide

<https://epics.anl.gov/EpicsDocumentation/ExtensionsManuals/Gateway/Gateway.html#AccessSecurity>