

# *Channel Access in Depth*

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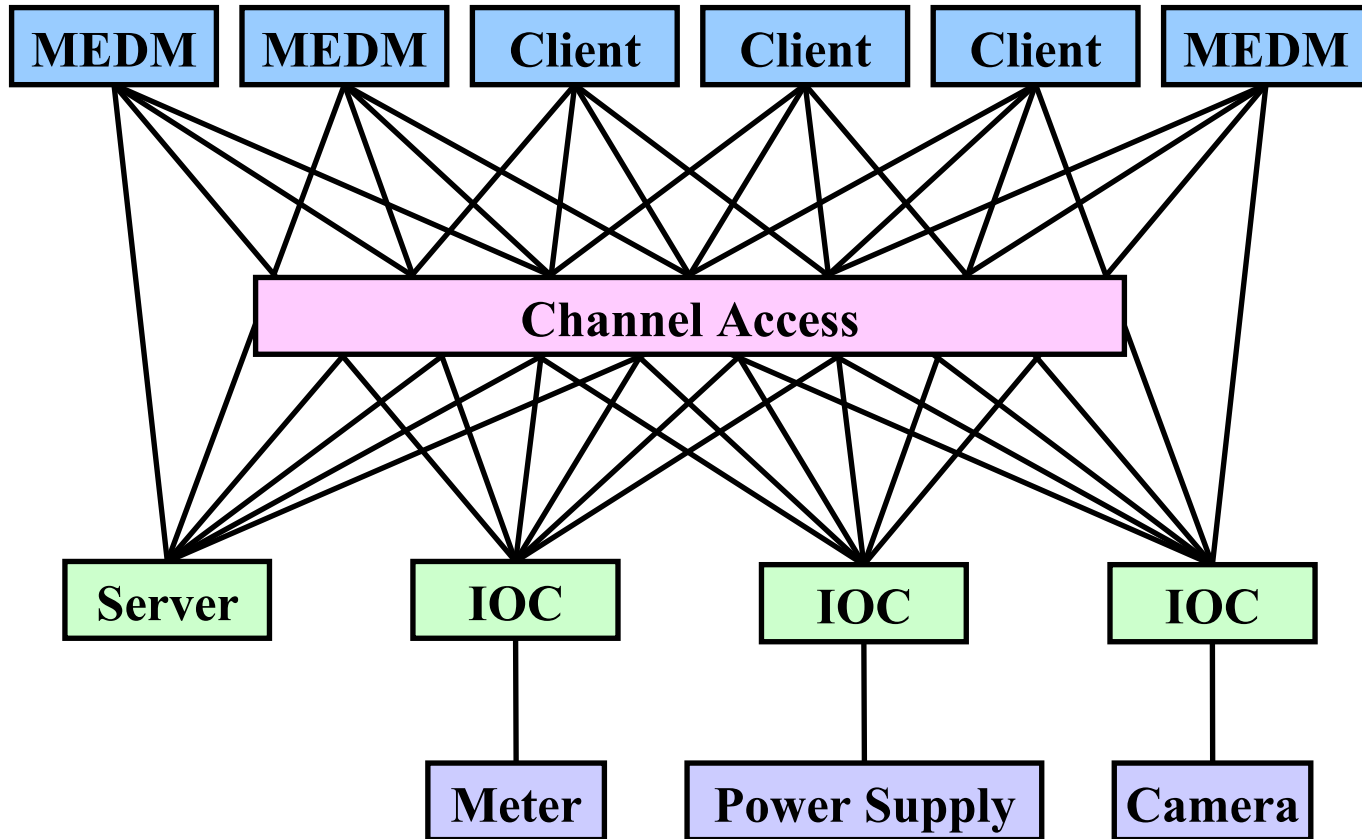
*Based on presentation by K. Evans, APS*

# Topics Covered

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- **Channel Access**
  - The means by which EPICS Clients and Servers talk to each other
- **CaSnooper**
  - An application to monitor Search Requests for Process variables
- **CASW**
  - An application to monitor Beacon Anomalies
- **ParseCASW**
  - An application to convert CASW output to identifiable events
- **RunCaSnooper**
  - An application that provides an interface to CaSnooper and CASW with an associated MEDM and StripTool

# EPICS Overview



# *Channel Access Concepts*

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- **Network Protocols**
- **Process Variable Connection Process**
- **Search Request**
- **Exist Test**
- **Beacons**
- **Beacon Anomaly**
- **CaRepeater**

# Network Protocols

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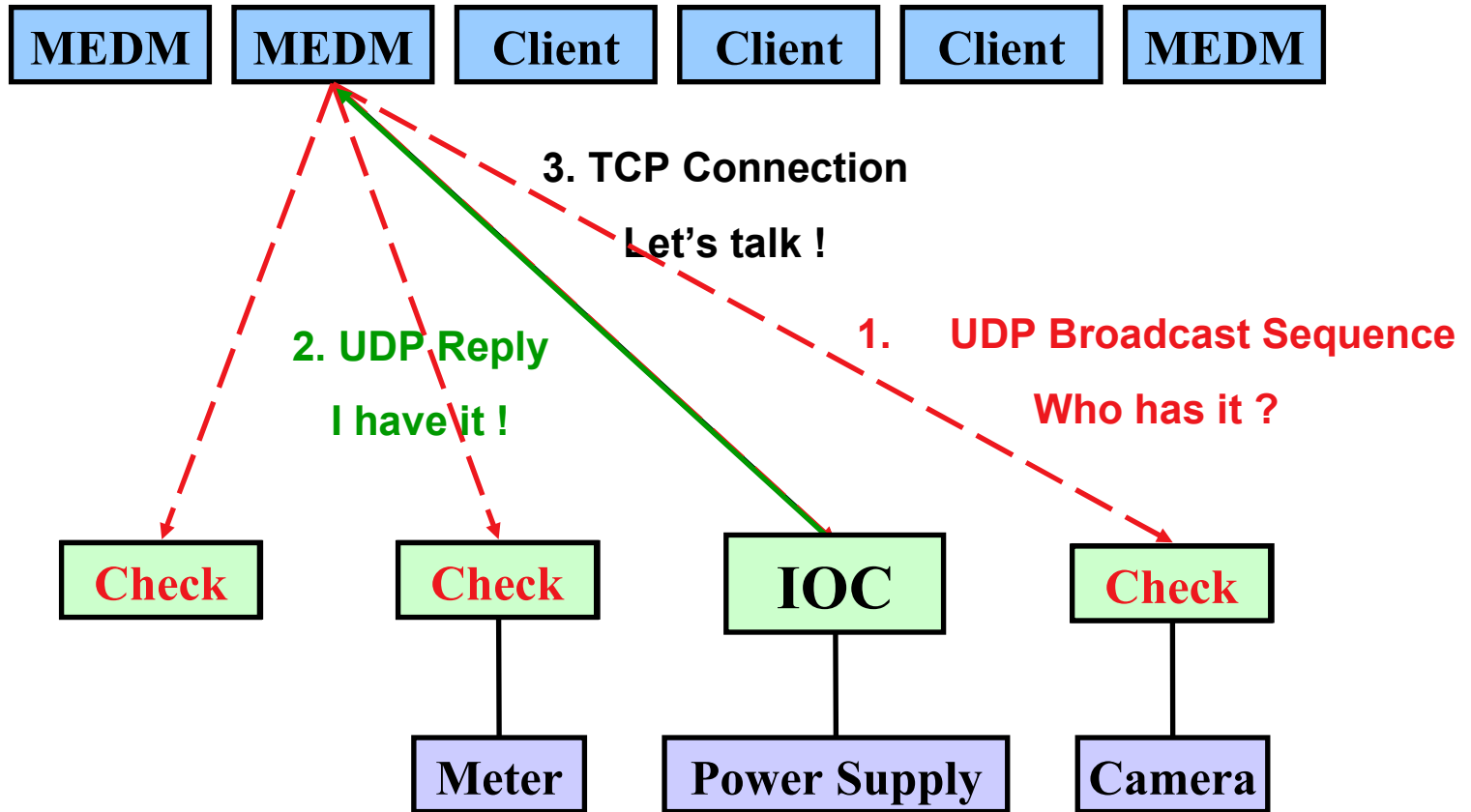
- **Channel Access uses two Network Protocols, UDP and TCP**
- **UDP (User Datagram Protocol)**
  - One way, unreliable
  - Send out packets, no guarantee they reach their destination
  - Can be broadcast or directed (unicasts)
    - *Broadcasts: To all IP addresses, e.g. 123.45.6.255*
    - *Unicasts: To a specific IP address, e.g. 123.45.6.100*
  - Broadcasts may not leave subnets for security reasons
- **TCP (Transmission Control Protocol)**
  - Two way, reliable, persistent
  - Socket at each end
  - Acknowledgements, timeouts, retransmissions, etc. guarantee reliability

# Connection Process

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- **A client (e.g. MEDM) wanting a PV sends a UDP search request**
  - Sent to EPICS\_CA\_ADDR\_LIST
  - (Or its default -- broadcast to all interfaces on the host machine)
  - Sent on EPICS\_CA\_SERVER\_PORT [5064]
  - Do you have this PV?
- **Each Server that gets a packet does an exist test**
  - Do I have this PV?
- **Server with the PV sends a directed UDP reply to the Client**
  - I have this PV.
- **A TCP connection is established between the Server and the Client (or an existing one is used)**
  - One per Client-Server pair, no matter how many PVs
  - Referred to as a Circuit
  - Let's talk.

# Search and Connect Graphically



# Search Request

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- **A client makes a search request when it wants to find out what server has the PV**
    - Happens when a PV is first created in the client
    - On a beacon anomaly (unresolved PVs only)
    - When another PV is created (unresolved PVs only)
  - **A search request consists of a sequence of UDP packets**
    - Starts with a small interval (30 ms), that doubles each time
    - Until it gets larger than 5 s, then it stays at 5 s
- 
- Stops after 100 packets or when it gets a response
  - Used to never try again until it sees a beacon anomaly or creates a new PV
    - *As of 3.14.7 retries at a slow rate*
  - Total time is about 8 minutes to do all 100
  - The sequence may be different owing to fine tuning
- **Usually connects on the first packet or the first few**

# *Exist Test*

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- Every time a Server receives a search request packet, its **pvExistTest** routine is called
- The Server has to check if it has the PV
  - Returns **ExistsHere** or **DoesNotExistHere**
- Normally a search request sequence ends after a few packets
  - Because one Server soon returns **ExistsHere**
- For PVs that do not exist
  - There are 100 tests per search request sequence for that PV
  - This happens every time a Client initiates a search request sequence
    - *Each time the Client searches for a new PV*
    - *At each beacon anomaly, perceived or real*

# Beacons

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- **A Beacon is a UDP broadcast packet sent by a Server**
- **When it is healthy, each Server broadcasts a UDP beacon at regular intervals (like a heartbeat)**
  - EPICS\_CA\_BEACON\_PERIOD, 15 s by default



- **When it is coming up, each Server broadcasts a startup sequence of UDP beacons**
  - Starts with a small interval (25 ms, 75 ms for VxWorks)
  - Interval doubles each time
  - Until it gets larger than 15 s, then it stays at 15 s



- Takes about 10 beacons and 40 s to get to steady state
- **Clients monitor the beacons**
  - Determine connection status, whether to reissue searches

# Beacon Anomaly

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- **A Beacon Anomaly is any change from the normal beacon interval (15 s)**
- **No beacons:**
  - After 30 sec the client sends message over TCP connection
  - If no beacons and no reply, connection is down
  - That is when MEDM screens go white
- **Abnormal interval:**
  - Short: IOC has come up
  - Long: IOC was disconnected
- **May cause clients to reissue outstanding search requests**
- **Network problems can look like beacon anomalies**



# *Virtual Circuit Disconnect*

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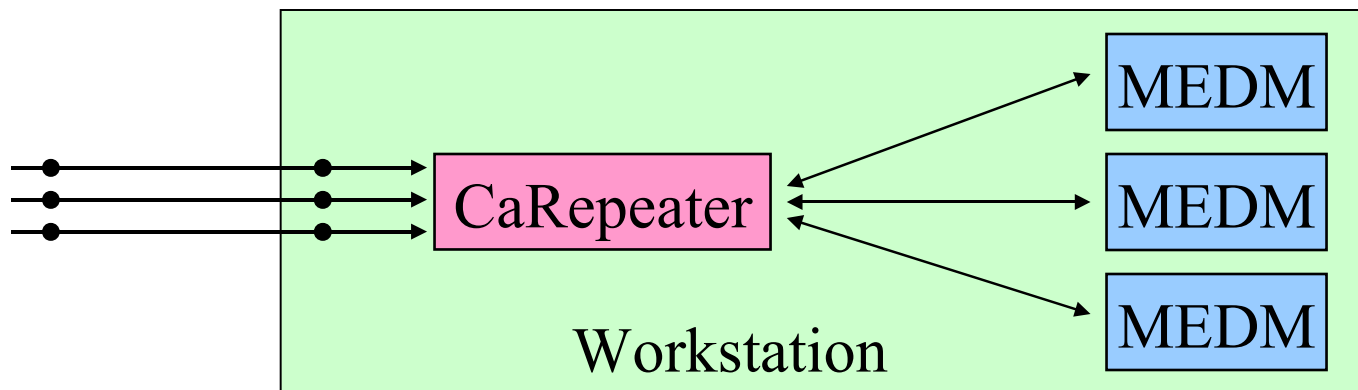
- **3.13 and early 3.14**
  - Hang-up message or no response from server for 30 sec.
  - If not a hang-up, then client sends “Are you there” query
  - If no response for 5 sec, TCP connection is closed
  - MEDM screens go white
  - Clients reissue search requests
- **3.14.5 and later**
  - Hang-up message from server
  - TCP connection is closed
  - MEDM screens go white
  - Clients reissue search requests

# Virtual Circuit Unresponsive

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- **3.14.5 and later**
  - No response from server for 30 sec.
  - Client then sends “Are you there” query
  - If no response for 5 sec, TCP connection is **not** closed
    - *For several hours, at least*
  - MEDM screens go white
  - Clients **do not** reissue search requests
    - *Helps with network storms*
  
  - Clients that do not call `ca_poll` frequently get a virtual circuit disconnect even though the server may be OK
    - *Clients written for 3.13 but using 3.14 may have a problem*
    - *May be changed in future versions*

- **UDP broadcasts are not guaranteed to go to every process on a workstation**
- **CaRepeater solves this problem**
  - There is one CaRepeater process per workstation
  - Clients make a TCP connection to it when they start up
  - CaRepeater receives the beacons
    - *EPICS\_CA\_REPEATER\_PORT* [usually 5065]
  - CaRepeater forwards the beacons to the Client
- **This problem does not exist on most modern systems**



# *Multiple Servers on the Same Host*

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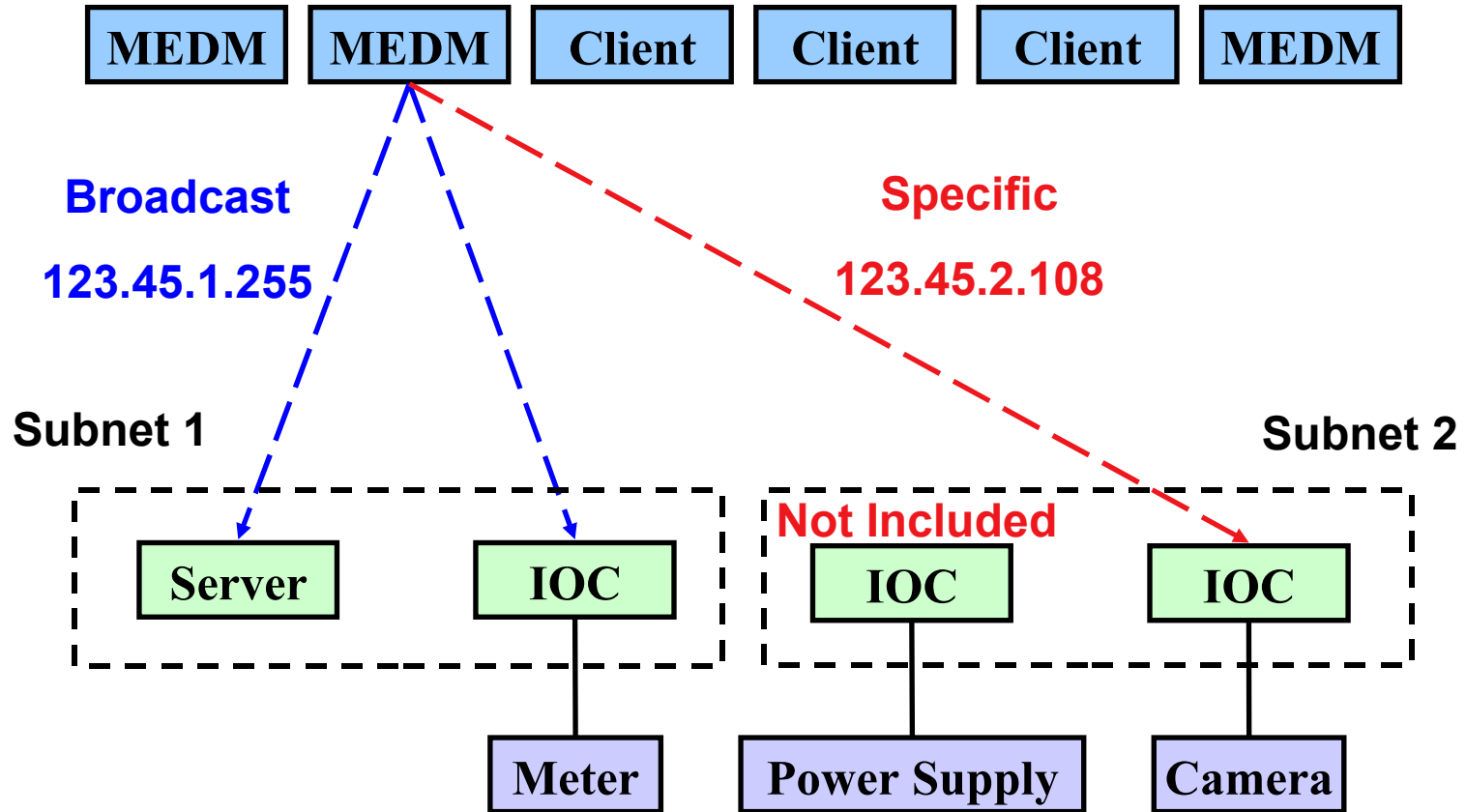
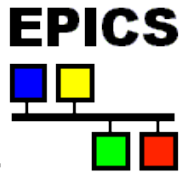
- **Used to not be possible at all (Base 3.13)**
- **Now, it can be done, but there are problems**
- **Will get message**
  - cas warning: Configured TCP port was unavailable. Using dynamically assigned TCP port 45003, but now two or more servers share the same UDP port. Depending on your IP kernel this server may not be reachable with UDP unicast (a host's IP in EPICS\_CA\_ADDR\_LIST)
- **First part means clients will establish their circuit on another port than the default 5064.**
  - Not a problem
- **Second part means unicast search requests may not get to both servers**
  - UDP deficiency, similar to the CaRepeater problem
  - May be a problem when EPICS\_CA\_ADDR\_LIST is used

# Important Environment Variables

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- **EPICS\_CA\_ADDR\_LIST**
  - Determines where to search
  - Is a list (separated by spaces)
    - *“123.45.1.255 123.45.2.14 123.45.2.108”*
  - Default is broadcast addresses of all interfaces on the host
    - *Works when servers are on same subnet as clients*
  - Broadcast address
    - *Goes to all servers on a subnet*
    - *Example: 123.45.1.255*
    - *Use ifconfig -a on UNIX to find it (or ask an administrator)*
- **EPICS\_CA\_AUTO\_ADDR\_LIST**
  - YES: Include default addresses above in searches
  - NO: Do not search on default addresses
  - If you set EPICS\_CA\_ADDR\_LIST, usually set this to NO

# EPICS\_CA\_ADDR\_LIST



# Other Environment Variables

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- **CA Client**

EPICS\_CA\_ADDR\_LIST  
 EPICS\_CA\_AUTO\_ADDR\_LIST  
 EPICS\_CA\_CONN\_TMO  
 EPICS\_CA\_BEACON\_PERIOD  
 EPICS\_CA\_REPEATER\_PORT  
 EPICS\_CA\_SERVER\_PORT  
 EPICS\_CA\_MAX\_ARRAY\_BYTES  
 EPICS\_TS\_MIN\_WEST

- **CA Server**

EPICS\_CAS\_SERVER\_PORT  
 EPICS\_CAS\_AUTO\_BEACON\_ADDR\_LIST  
 EPICS\_CAS\_BEACON\_ADDR\_LIST  
 EPICS\_CAS\_BEACON\_PERIOD  
 EPICS\_CAS\_BEACON\_PORT  
 EPICS\_CAS\_INTF\_ADDR\_LIST  
 EPICS\_CAS\_IGNORE\_ADDR\_LIST

- **See the Channel Access Reference Manual for more information**

# Summary

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- **Clients send search requests when they want a PV**
- **Each server has to check if it has the PV for every packet in the search-request sequence**
- **Servers send beacons at regular intervals and with a faster pattern when they come up**
- **A beacon anomaly is any pattern that is not a regular beacon**
- **Beacon anomalies may cause clients to resend search requests for any unresolved PVs**
- **Search request sequences end early for found PVs but not for non-existent PVs**
- **Search requests put a load on the servers and add to network traffic**
  - This can cause problems
  - Consequently, undesirable beacon anomalies and search requests should be minimized or eliminated
- **Searches are on port 5064 and beacons are on port 5065**

- **CaSnooper is a server whose `ExistTest` routine keeps track of search requests rather than seeing if it has the PV**
- **It can print the names of all PVs being searched for and related statistics using several report formats**
- **It can also check if these PVs are connected (C) or not (NC)**
- **It has internal PVs if started with the `-n` option**
  - `ExistTest` rates that can be monitored
  - Others that allow it to be controlled from an MEDM screen
  - The PV prefix [default `CaSnoop`] can be changed to prevent collisions
- **Running CaSnooper:**
  - Run at the command line to get one report
  - Run with PVs for monitoring, say with `SDDSmonitor` or `StripTool`
  - Run with PVs and control with MEDM for continuous operation
- **To run CaSnooper you may need the full path**
  - `/usr/local/epics/extensions/bin/solaris-sparc/caSnooper`
  - It is not installed at the APS for 3.13 (3.13 servers have less capability)

# Sample CaSnooper Output

Two lines from RunCaSnooper →

Print top 10 (-p10) →

Check top 10 (-c10) →

```

CaSnooper
Starting CcSnooper...
Type Ctrl-C to stop it
Starting CaSnooper 2.1.0.1 (8-27-2003) at Nov 04 13:50:08
EPICS 3.14.3
Individual Name is CaSnoop.test
PV name prefix is CaSnoop

Nov 04 13:50:42:
There were 17508 requests to check for PV existence for 2307 different PVs.
Max(Hz): 11.17
Mean(Hz): 0.22
StDev(Hz): 0.61

PVs with top 10 requests:
1 willow:52275 FEL:$(M8).VAL 11.17
2 willow:52275 FEL:$(M8).RBV 8.94
3 gateway433:33790 FE:09:ID:SR:HPOS:CC.VAL 4.15
4 gateway433:33790 FE:09:ID:SR:VPOS:CC.VAL 4.15
5 willow:52275 FEL:VUV4f2_able.VAL 3.35
6 gateway435:33270 s17id:scan1.NPTS 3.06
7 gateway435:33270 s17id:scan1.MPTS 3.06
8 gateway435:33270 s17id:scan1.PASM 3.06
9 gateway435:33270 s17id:scan1.P1EP 3.06
10 gateway435:33270 s17id:scan1.P1AR 3.06

Nov 04 13:51:01:
There were 23868 requests to check for PV existence for 2329 different PVs.
Max(Hz): 10.45
Mean(Hz): 0.19
StDev(Hz): 0.56

Connection status for top 10 PVs after 10.00 sec:
1 willow:52275 FEL:$(M8).VAL NC 10.45
2 willow:52275 FEL:$(M8).RBV NC 8.36
3 gateway433:33790 FE:09:ID:SR:HPOS:CC.VAL NC 4.01
4 gateway433:33790 FE:09:ID:SR:VPOS:CC.VAL NC 4.01
5 willow:52275 FEL:VUV4f2_able.VAL NC 3.13
6 gateway435:33270 s17id:scan1.NPTS NC 3.04
7 gateway435:33270 s17id:scan1.P1PV NC 3.04
8 gateway435:33270 s17id:scan1.R1PV NC 3.04
9 gateway435:33270 s17id:scan1.CMND NC 3.04
10 gateway435:33270 s17id:scan1.P1EP NC 3.04
    
```

individual name, prefix

statistics

machine:port, (can be used to identify source)

name

search rate in Hz

Not connected, will be C for connected (hardly ever the case)

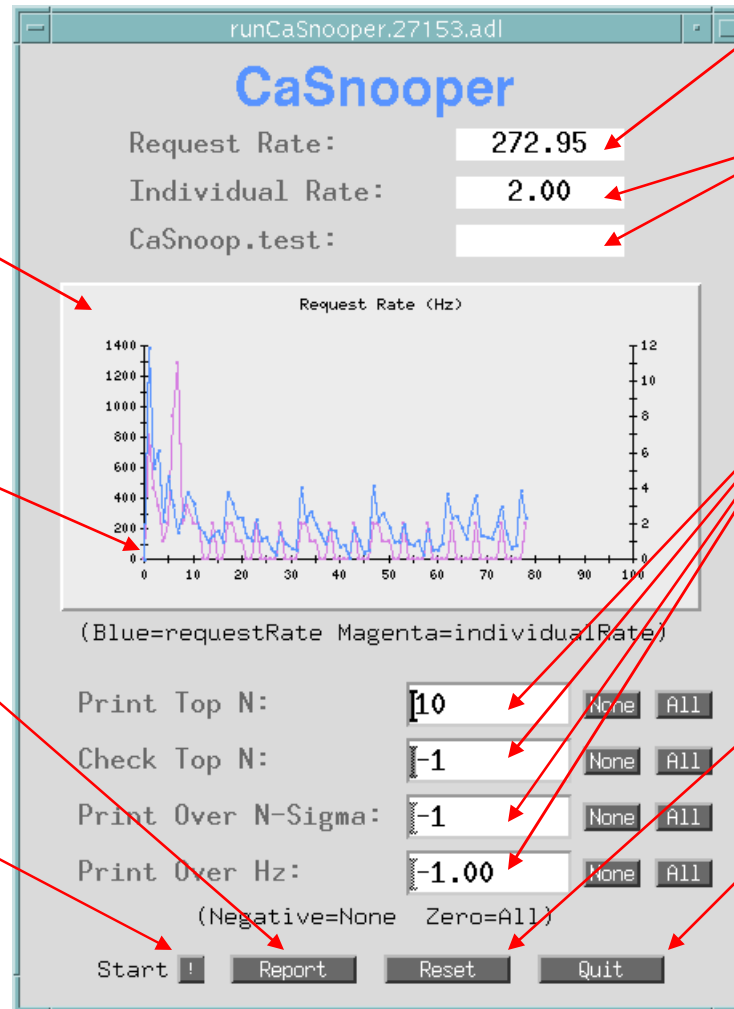
# Control CaSnooper via MEDM

Cartesian plot of requestRate and individualRate

CaSnooper was started here (with EPICS\_CA\_REPEATER\_PORT = 5065)

Execute selected reports in the CaSnooper stdout

Shell command to start CaSnooper, CASW, StripTool, etc.



Request rate

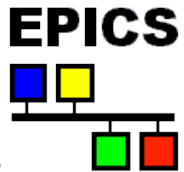
Individual rate for CaSnoop.test, which doesn't exist

Use these to set what will happen when you press Report. Case illustrated will print the top 10.

Reset the counters in CaSnooper

Stop CaSnooper

# CaSnooper Options



```
XTerm
46 krypton:EVANS>/usr/local/epics/extensions/bin/solaris-sparc/caSnooper -h
CaSnooper 2.1.0.1 (8-27-2003) EPICS 3.14.3
Usage: caSnooper [options]
Options:
  -c<integer> Check validity of top n requests (0 means all)
  -d<integer> Set debug level to n
  -h          Help (This message)
  -i<string>  Specify a PV name to watch individually
  -l<decimal> Print all requests over n Hz
  -p<integer> Print top n requests (0 means all)
  -n[<string>] Make internal PV names available
                Use string as prefix for internal PV names
                (10 chars max length) Default string is: CaSnoop
  -s<integer> Print all requests over n sigma
  -t<decimal> Run n seconds, then print report
  -w<decimal> Wait n sec before collecting data

47 krypton:EVANS>█
```

- **CASW (Channel Access Server Watcher) monitors Beacon Anomalies**
- **Is a simple command-line utility**
- **Part of EPICS Base**
- **May need a full path to the version of base desired**
  - 3.14  
(Recommended) /usr/local/epics/base3.14.3/bin/solaris-sparc/casw
  - 3.13: /usr/local/epics/base/bin/solaris/casw
- **Prints a line with a timestamp when it sees a beacon anomaly**

CaSnooper Starting

```
Starting CASW...
Type Ctrl-C to stop it
There will no output until a beacon anomaly occurs
pcdiag6.aps4.anl.gov:5064      2003-11-04 11:50:39.322522701
pcdiag6.aps4.anl.gov:5064      2003-11-04 11:50:44.331146567
pcdiag6.aps4.anl.gov:5064      2003-11-04 11:50:44.331729436
pcdiag6.aps4.anl.gov:5064      2003-11-04 11:50:49.337082255
pcdiag6.aps4.anl.gov:5064      2003-11-04 11:50:49.338022943
chiron:5064                    2003-11-04 11:50:52.285177497
chiron:5064                    2003-11-04 11:50:52.299845797
chiron:5064                    2003-11-04 11:50:52.320118219
chiron:5064                    2003-11-04 11:50:52.348091798
chiron:5064                    2003-11-04 11:50:52.408653298
chiron:5064                    2003-11-04 11:50:52.536166793
chiron:5064                    2003-11-04 11:50:52.788118789
chiron:5064                    2003-11-04 11:50:53.299866476
chiron:5064                    2003-11-04 11:50:54.321393444
pcdiag6.aps4.anl.gov:5064      2003-11-04 11:50:54.344781889
pcdiag6.aps4.anl.gov:5064      2003-11-04 11:50:54.345192506
chiron:5064                    2003-11-04 11:50:56.369893513
pcdiag6.aps4.anl.gov:5064      2003-11-04 11:50:59.352993929
pcdiag6.aps4.anl.gov:5064      2003-11-04 11:50:59.353456538
chiron:5064                    2003-11-04 11:51:00.466606322
pcdiag6.aps4.anl.gov:5064      2003-11-04 11:51:04.357752360
pcdiag6.aps4.anl.gov:5064      2003-11-04 11:51:04.359234565
chiron:5064                    2003-11-04 11:51:08.660414353
pcdiag6.aps4.anl.gov:5064      2003-11-04 11:51:09.366160712
pcdiag6.aps4.anl.gov:5064      2003-11-04 11:51:14.373282812
pcdiag6.aps4.anl.gov:5064      2003-11-04 11:51:19.380480042
chiron:5064                    2003-11-04 11:51:23.560740900
pcdiag6.aps4.anl.gov:5064      2003-11-04 11:51:24.387719304
pcdiag6.aps4.anl.gov:5064      2003-11-04 11:51:29.397511716
pcdiag6.aps4.anl.gov:5064      2003-11-04 11:51:34.401504995
chiron:5064                    2003-11-04 11:51:38.661120641
pcdiag6.aps4.anl.gov:5064      2003-11-04 11:51:39.410394708
pcdiag6.aps4.anl.gov:5064      2003-11-04 11:51:44.416328586
pcdiag6.aps4.anl.gov:5064      2003-11-04 11:51:49.424073457
pcdiag6.aps4.anl.gov:5064      2003-11-04 11:51:54.432394468
pcdiag6.aps4.anl.gov:5064      2003-11-04 11:51:59.438268469
pcdiag6.aps4.anl.gov:5064      2003-11-04 11:52:04.445217601
pcdiag6.aps4.anl.gov:5064      2003-11-04 11:52:09.457422947
pcdiag6.aps4.anl.gov:5064      2003-11-04 11:52:14.460862062
pcdiag6.aps4.anl.gov:5064      2003-11-04 11:52:19.467448738
pcdiag6.aps4.anl.gov:5064      2003-11-04 11:52:24.471852165
pcdiag6.aps4.anl.gov:5064      2003-11-04 11:52:29.473472890
pcdiag6.aps4.anl.gov:5064      2003-11-04 11:52:34.478712317
pcdiag6.aps4.anl.gov:5064      2003-11-04 11:52:39.484049642
pcdiag6.aps4.anl.gov:5064      2003-11-04 11:52:44.489705934
```

- **CASW produces a list of beacons that came at the wrong time**
  - Listed in the order they happen
    - *Intervals between anomalies are important*
    - *Not easy to see from the output*
  - Anomalies from different causes are mixed together
  - Cause of an anomaly sequence is not readily apparent
- **ParseCASW parses the CASW output**
  - Uses artificial intelligence to try to determine the event that caused the anomaly (e.g. an IOC coming up)
  - Prints the events instead of the anomalies
- **Can be used in two ways**
  - Parse output saved from CASW (or OAG data logging)
  - Pipe CASW into ParseCASW in real time

# ParseCASW Output

```

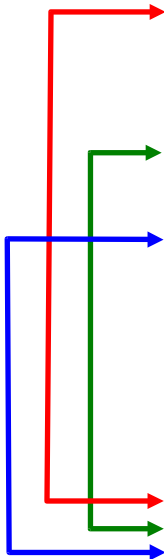
Emacs 21
File Edit Options Buffers Tools Help

iocid04b:5064      2004-05-18 15:07:02.699825995
iocid04b:5064      2004-05-18 15:07:02.820376078
iocid04b:5064      2004-05-18 15:07:02.949850578
iocid04b:5064      2004-05-18 15:07:03.227257161
iocid04b:5064      2004-05-18 15:07:03.773111244
iocid04b:5064      2004-05-18 15:07:04.860120243
iocid04b:5064      2004-05-18 15:07:06.983292074
iocid04b:5064      2004-05-18 15:07:11.248919487
ioclid5:5064       2004-05-18 15:08:02.752896604
iocid01:5064       2004-05-18 15:08:06.104330352
iocid01:5064       2004-05-18 15:08:06.106132852
iocid01:5064       2004-05-18 15:08:06.138858851
iocid01:5064       2004-05-18 15:08:06.208655601
iocid01:5064       2004-05-18 15:08:06.338916851
iocid01:5064       2004-05-18 15:08:06.605788351
---:-- casw.051804.txt (Text)--L77-- 8%-----
iocid04b:5064 May 18 14:28:08 Medium long sequence ←
iocid03:5064 May 18 14:40:53 Medium long sequence
iocid03:5064 May 18 14:45:36 Short sequence
ioclid5:5064 May 18 15:00:50 Short sequence ←
ioclid5:5064 May 18 15:04:17 Medium long sequence ←
iocid04b:5064 May 18 15:07:02 Medium long sequence ← Flakey IOC
ioclid5:5064 May 18 15:08:02 Short sequence
iocid01:5064 May 18 15:08:06 Server coming up ← Most common
iocid02:5064 May 18 15:08:57 Probably server coming up
iocid03:5064 May 18 15:09:54 Probably server coming up
iocid04:5064 May 18 15:10:46 Server coming up
iocid05:5064 May 18 15:11:39 Server coming up
ioclid5:5064 May 18 15:12:05 Medium long sequence ← Flakey IOC
iocs21fb:5064 May 18 15:14:23 Server coming up
iocid04b:5064 May 18 15:14:52 Medium long sequence ←
---:-- parsecasw.txt (Text)--L9-- 5%-----

```

Long File

Short File



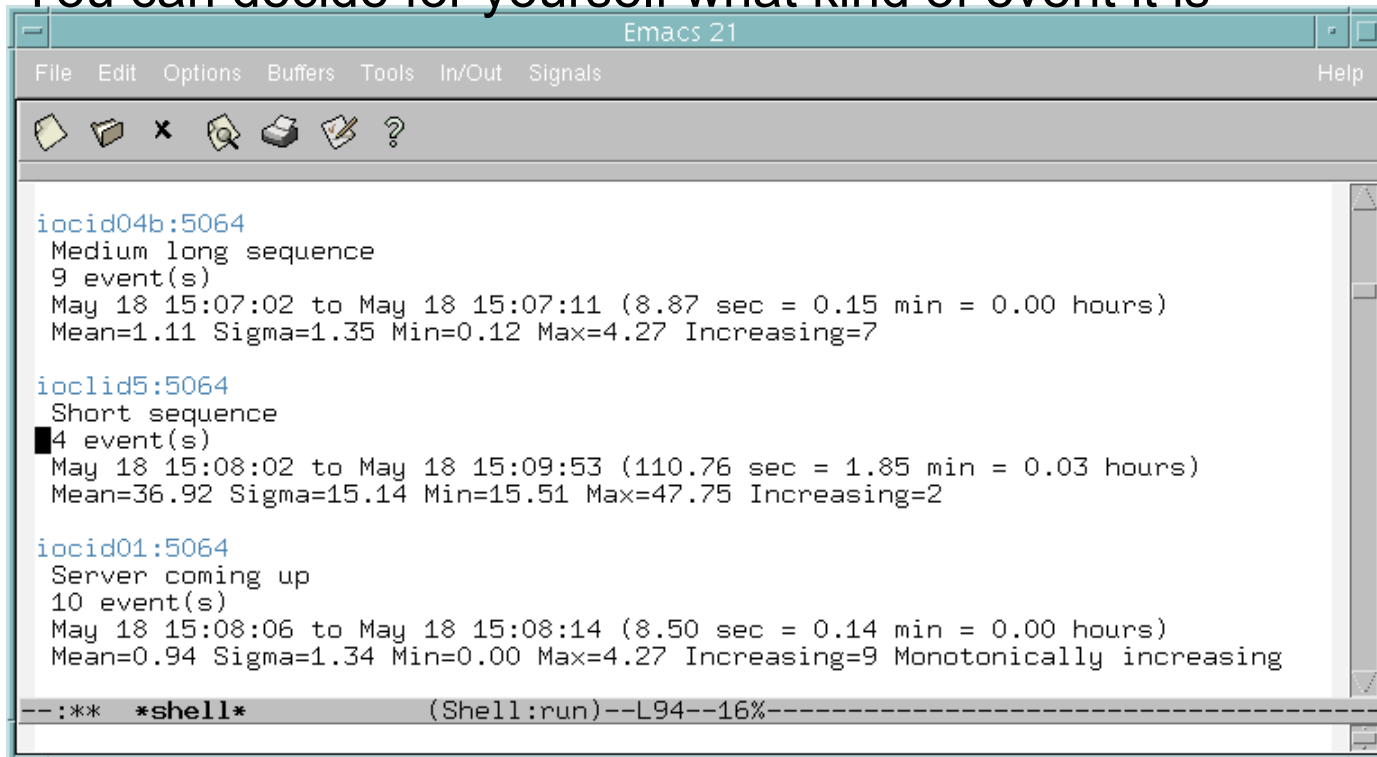
Flakey IOC

Most common

Flakey IOC

# ParseCASW Verbose Output

- With the `-v` option you get more details
  - You can decide for yourself what kind of event it is



```

Emacs 21
File Edit Options Buffers Tools In/Out Signals Help

iocid04b:5064
Medium long sequence
9 event(s)
May 18 15:07:02 to May 18 15:07:11 (8.87 sec = 0.15 min = 0.00 hours)
Mean=1.11 Sigma=1.35 Min=0.12 Max=4.27 Increasing=7

ioclid5:5064
Short sequence
4 event(s)
May 18 15:08:02 to May 18 15:09:53 (110.76 sec = 1.85 min = 0.03 hours)
Mean=36.92 Sigma=15.14 Min=15.51 Max=47.75 Increasing=2

iocid01:5064
Server coming up
10 event(s)
May 18 15:08:06 to May 18 15:08:14 (8.50 sec = 0.14 min = 0.00 hours)
Mean=0.94 Sigma=1.34 Min=0.00 Max=4.27 Increasing=9 Monotonically increasing

--:** *shell* (Shell:run)--L94--16%

```

# ParseCASW Options

```

XTerm
41 krypton:EVANS>parsecasw -h

ParseCASW

Usage: parsecasw [Options] [filename]
       casw | parsecasw [Options]
Parses CASW output and divides it into groups of beacon anomalies.
Reads from stdin if no filename is specified.

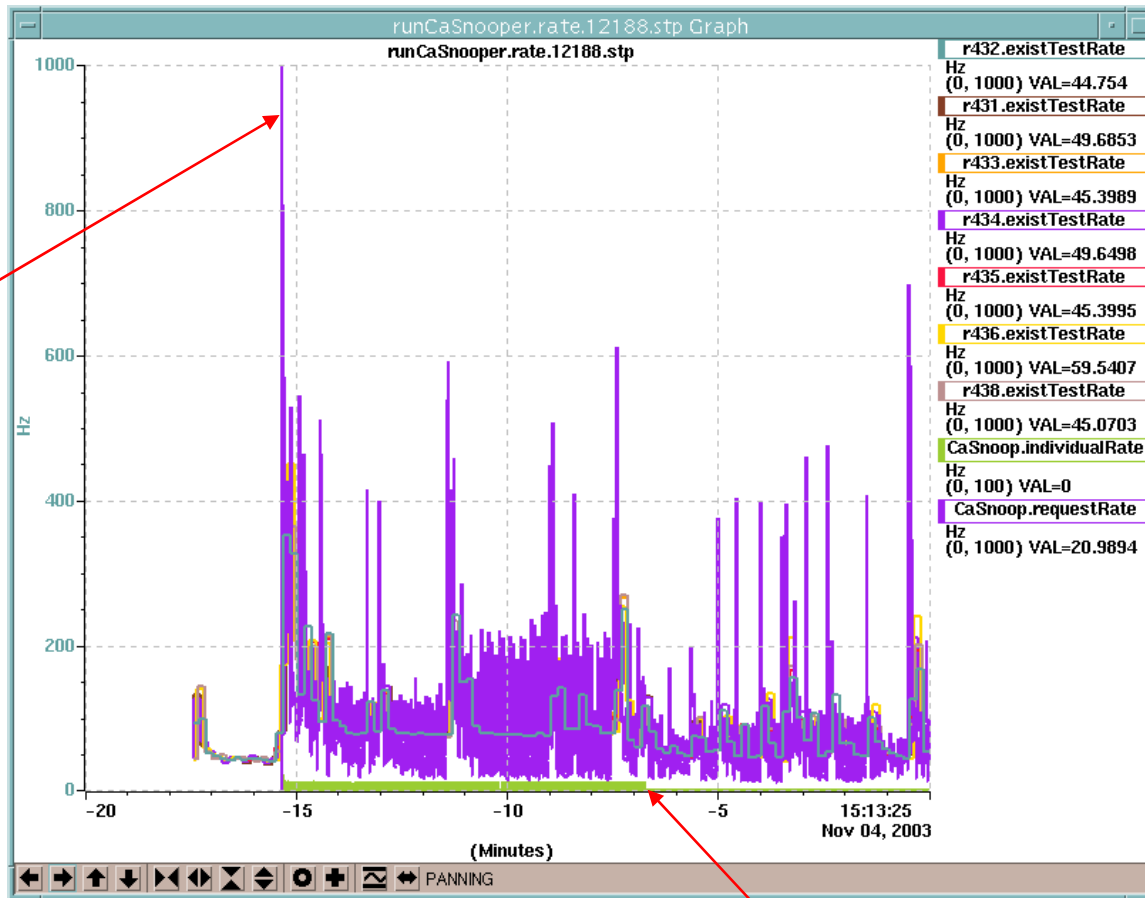
Options (First character is sufficient):
  -help          This message. Use with -v for more information.
  -echo          Echo input lines
  -int <int>    Do checking and output at this interval when reading
                from stdin. (Default is 60 sec)
  -oag           Use OAG data logger format (Default is CASW output)
  -server        Sort by server (Default is by group)
  -terse         Terse output (Default is between terse and verbose)
  -verbose       Verbose output. When used with -h produces more
                extensive help information.

42 krypton:EVANS>

```

# StripTool

CaSnooper was started here



Reverse Gateways  
(1 min update)

CaSnooper  
(1 sec update)

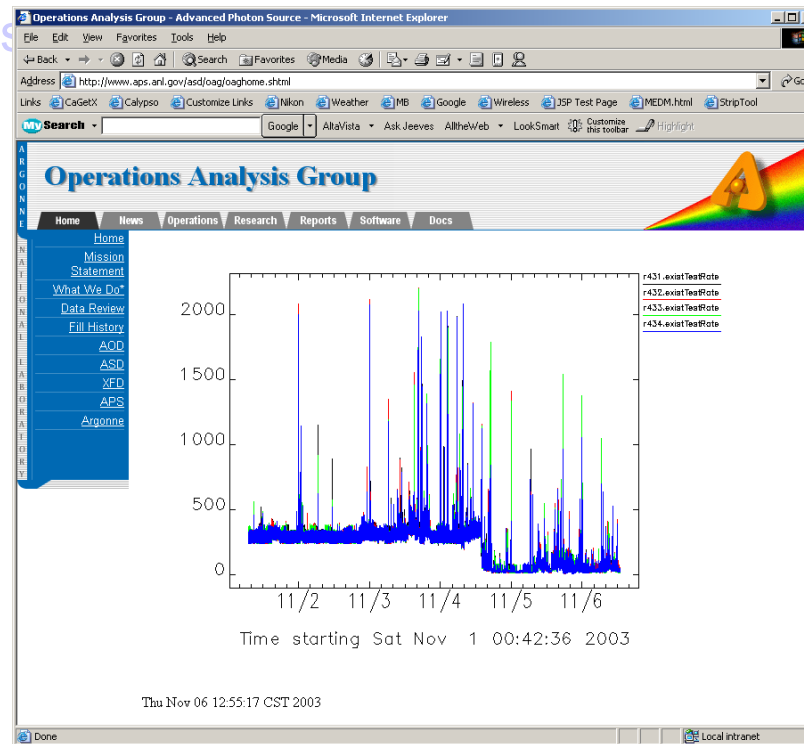
(Reverse Gateways,  
CaSnooper, and all  
IOCs see the same  
Search Requests)

Search for individual PV  
ended after about 8  
minutes

# OAG Monitoring

- The search request rates from the Reverse Gateways on the machine subnet are being continuously monitored
- You can access the history from

<http://www.aps.gov/arg/DataReview.html>

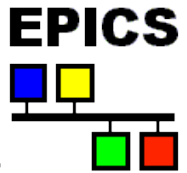


# RunCaSnooper

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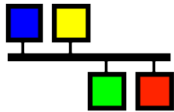
- **RunCaSnooper is a shell script that provides an interface to CaSnooper and CASW with an associated MEDM and StripTool**
- **Is APS specific, but the script can be modified for your situation**
  - Is part of locappsTools (Type iocHelp for a list)
- **By default it brings up an MEDM and a StripTool and does not start CaSnooper**
  - If CaSnooper is running, the MEDM screen will not be white
  - If it is white, you can start CaSnooper from the MEDM screen
  - Uses EPICS\_CA\_REPEATER\_PORT=9876 by default, not 5065
  - You can also start CASW and StripTool from the MEDM screen
- **Everything is generated on the fly and stored in /tmp**
- **Look in /tmp for:**
  - Logs of the CaSnooper reports and CASW output
  - MEDM ADL file and StripTool configuration files
- **Start it (type runCaSnooper) with no options:**
  - Displays extensive directions
  - Then optionally allows you to start it (type y to continue)

# RunCaSnooper



The screenshot displays the RunCaSnooper software interface. It features several windows and panels:

- CaSnooper (top left):** A text window showing startup logs: "Starting CcSnooper... Type Ctrl-C to stop it. Starting CaSnooper 2.1.0.1 (8-27-2003) at Nov 04 16:36:03. EPICS 3.14.3. Individual Name is CaSnoop.test. PV name prefix is CaSnoop."
- CASW (middle left):** A text window showing "Starting CASW... Type Ctrl-C to stop it. There will no output until a beacon anomaly occurs." Below this is a list of PVS with top 10 entries, including gateway433, chiron:5064, willow:522, and gateway432.
- runCaSnooper.rate.12188.stp Graph (center):** A large graph showing request rates in Hz over time (minutes). The y-axis ranges from 0 to 1000 Hz, and the x-axis ranges from -20 to 0 minutes. The graph shows a significant increase in activity starting around -10 minutes.
- runCaSnooper.rate.12188.stp (right of graph):** A list of test rates for various requesters (r432, r431, r433, r434, r435, r436, r438) and CaSnoop itself. Each entry shows the rate in Hz and a 1000 Hz average value (VAL).
- runCaSnooper.12188.adl (right):** A control panel for CaSnooper. It displays: Request Rate: 54.01, Individual Rate: 0.00, and CaSnoop.test: [empty]. It includes a "Request Rate (Hz)" graph and several control buttons: Check Top N, Print Top N, Print Over N-Sigma, Print Over Hz, Start, Report, Reset, and Quit.
- clock V3.6 (top right):** A digital clock showing 4:43:39 pm on 11/04/03.
- Taskbar (bottom):** A taskbar with icons for Sun ONE, Emacs, Phoebus, Hydra, Gateway, IocappsTools, StripTool, Nike, and EXIT.



# RunCaSnooper Options

```
XTerm
48 krypton:EVANS>runCaSnooper -h

RunCaSnooper: Provides an interface to CaSnooper and CASW with an
associated MEDM and StripTool

Usage:
runCaSnooper [Options]
Options:
  -h          Help
  -d          Use no defaults, only the switches you enter
  +d          Use default setup without printing help
  -m          Do not start MEDM
  +m          Start MEDM [Default]
  -s          Do not start StripTool
  +s          Start StripTool [Default]
  -c          Do not start CaSnooper [Default]
  +c          Start CaSnooper
  -crp <int> Set EPICS_CA_REPEATER_PORT for CaSnooper [Default is 5064]
              Use a number greater than 5000, for example 6666
  -w          Do not start CASW [Default]
  +w          Start CASW
  -p <string> Specify a prefix for CaSnooper process variables
              [Default is CaSnoop]
  -i <string> Specify an individual name for CaSnooper
              [Default is CaSnoop.test]
  -clean      Remove caSnooper./* files created by runCaSnooper in /tmp
              (This will also remove any log files created !)
```

# References

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- Jeffery O. Hill, ***EPICS R3.14 Channel Access Reference Manual***, (EPICS Documentation, 2005 or latest).  
<http://www.aps.anl.gov/epics/modules/base/R3-14/index.php>
- W. Richard Stevens, ***UNIX Network Programming***, (Prentice-Hall, Upper Saddle River, NJ, 1998) Vol. 1.
- K. Evans, Jr., ***CaSnooper Reference Manual***, (EPICS Documentation, 2005 or latest).  
<http://www.aps.anl.gov/epics/extensions/caSnooper/index.php>