Channel Access Configuration

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Configuration method
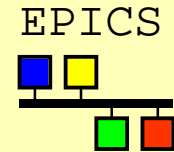
- ◆ CA clients and servers can be configured by setting environment variables
- ◆ On Unix:
  - ◆ csh, tcsh — `setenv VARNAME value`
  - ◆ sh, ksh — `VARNAME=value;export VARNAME`
  - ◆ `printenv` displays all variables from any shell
- ◆ On vxWorks:
  - ◆ `putenv "VARNAME=value"`
  - ◆ `envShow` displays all variable values
- ◆ Environment variables are inherited when you start a new program, not afterwards
  - ◆ Unix: Set the variables, then start the client
  - ◆ vxWorks: Set variables in the startup script
- ◆ Default values for a site are set at build-time in
  `<epics>/base/config/CONFIG_ENV` and
  `<epics>/base/config/CONFIG_SITE_ENV`

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CA name resolution
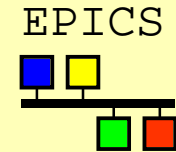
◆ Search requests for CA channel names are broadcast to all CA servers on the client's local TCP/IP subnet

◆ Only a server which recognizes the name will respond to the client

    ◆ If identical record names exist in two IOCs, the first to reply "wins" the connection

◆ The client library then opens a connection with that server to access that channel

◆ Potential problems:

    ◆ Not all LANs support broadcasting

        ◆ Ethernet does, Token Ring doesn't

    ◆ Some sites don't allow broadcasting

        ◆ Bridges/hubs will not forward packets

    ◆ Broadcasts are local to the machine's subnet

        ◆ Sites can span more than a single subnet

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Configuring name resolution
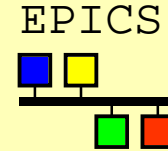
- ◆ **How to disable all broadcasts?**
    - ◆ `EPICS_CA_AUTO_ADDR_LIST = NO`
    - ◆ Default value = YES
    - ◆ IOCs are also clients, so generate broadcasts

- ◆ **How to find channels without broadcast?**
    - ◆ `EPICS_CA_ADDR_LIST`
    - ◆ List of IP addresses, separated by spaces
        `setenv EPICS_CA_ADDR_LIST "164.54.8.145"`
    - ◆ This list is used in addition to broadcasts if these are enabled

- ◆ **How to search other subnets as well?**
   - ◆ Use a broadcast address in `EPICS_CA_ADDR_LIST`
        `setenv EPICS_CA_ADDR_LIST "131.111.69.255"`
    - ◆ Some routers will not pass broadcast addresses

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Connection health
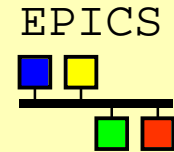
- ◆ CA servers send out an "I'm still here" beacon ever 15 seconds
  - ◆ Usually broadcast, configurable as before

- ◆ If a server is quiet for 30 seconds, any connected clients will
  - ◆ send it an "echo" packet (not broadcast)
  - ◆ allow 5 seconds for it to reply
  - ◆ mark all channels to this server disconnected

- ◆ Potential problems:
  - ◆ Slow or busy links might introduce random delays, some longer than 15 seconds
  - ◆ Busy sites may want to reduce broadcast rates
  - ◆ Clients take 35 seconds to recognize when a server has died

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Configuring connection health
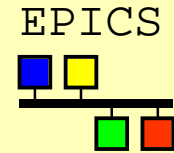
◆ How to change the server beacon period?

  ◆ `putenv "EPICS_CA_BEACON_PERIOD=30.0"`

  ◆ Default value is 15.0 seconds

◆ How to change the client timeout delay?

  ◆ `setenv EPICS_CA_CONN_TMO 60.0`

  ◆ Default value is 30.0 seconds

  ◆ This value determines how long a client takes to notice that a server has died (+5 seconds)

◆ The connection timeout must be longer than the beacon period, preferably twice

  ◆ Breaking the 'preferred' condition could increase network traffic

  ◆ Breaking the 'must be' condition can also cause random client disconnections

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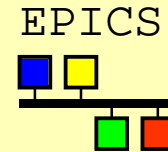
Port numbers

- ◆ Channel Access uses two IP port numbers for its communication (UDP and TCP)
  - ◆ EPICS_CA_SERVER_PORT
    - ◆ Default is 5064
  - ◆ EPICS_CA_REPEATER_PORT
    - ◆ Default is 5065
  - ◆ Both should be > 5000, check with sysadmins
- ◆ The settings for a server and all its clients must be the same
- ◆ Using different port numbers can allow independent projects to share a subnet without any danger of CA name clashes
  - ◆ Can also be used for application testing
  - ◆ No interaction is possible between projects

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Where am I —
What time is it?
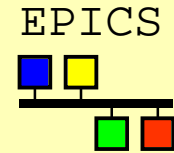
◆ An IOC gets Universal Coordinated Time from its boot host (UTC=GMT)

- ◆ This is converted to local time using the server's value for `EPICS_TS_MIN_WEST`

◆ CA Servers report timestamp values using their local timezone

◆ How to tell a client that the server is in a different timezone?

- ◆ `setenv EPICS_TS_MIN_WEST -480`
  - ◆ Default value is set by site manager (APS=360)
- ◆ Gives server's timezone in minutes relative to GMT; negative means east of Greenwich

◆ Daylight savings changes are hard-coded into the IOC software. Changes may occur on the wrong date in some locations…

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