



Configuring Channel Access

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IP Network Administration

Background

- IP addresses have to parts
 - Host part
 - Network part
 - Subnet mask determines the boundary
 - Part of the design of IP network
 - Specified when configuring network interface
 - Must be consistent with design of the network
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IP Network Administration

Background

- Subnet mask example
 - Class B network default subnet mask
 - 0xffff0000
 - Class C network default subnet mask
 - 0xfffff000
 - A subnet mask can define a subnet within a network class
 - Class B network subnet net mask
 - 0xfffff000
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IP Network Administration

Background

- IP addresses with all ones host part are “directed broadcast addresses”
 - Network part of directed broadcast address determines what subnet the broadcast will occur on
 - Scope of directed broadcast address limited to the specified IP subnet
 - Specified network isn't attached to the local host
 - Forward through the routing system
 - Common router default configuration
 - Directed broadcasts not forwarded



IP Network Administration

Background

- What broadcast address is required to reach a particular server?
 - Log into the server's host
 - UNIX: `ifconfig -a`
 - vxWorks: `ifShow`
 - Windows: `ipconfig`
 - Client and server on same host
 - Use loop back address
 - Client and server on different host
 - Use broadcast address of server's network interface
 - Client must have a route to this network interface
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IP Network Administration Background

■ Protocols

■ General purpose internet protocols

■ TCP/IP

- Transmission control protocol
- Full duplex virtual circuit
 - Incoming and an outgoing pipe
 - Stream of bytes

■ UDP/IP

- User datagram protocol
- Packet oriented protocol
 - Broadcasting
 - Delivery not guaranteed
 - Message boundaries preserved

■ Specialized internet protocols

- ARP, ICMP, RIP, IGMP, DNS, FTP, TFTP, BOOTP ...

IP Network Administration

Background

■ Internet Protocol Port Numbers

- IP address / port number / protocol type
 - unique source and destination identity of internet datagram
 - Positive integers
 - $PORT < 1024$
 - Well known servers
 - $1024 < PORT < 5000$
 - Ephemeral client assignments
 - $5000 > PORT$
 - Well know and experimental servers
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IP Network Administration

Background

- Client / Server communication paradigm
 - Clients
 - Initiate requests for services
 - Use ephemeral port numbers
 - Failure results in only localized problems
 - Servers
 - Respond to requests for services
 - Reside at well known port numbers
 - Central point of failure and potential bottleneck
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Environment Variables

■ Bash

- `export -p | grep variable`
- `export variable=value`

■ CSH

- `setenv | grep variable`
- `setenv variable value`

■ Windows

- Use system component on the control panel
 - Use dos shell
 - `set variable=value`
 - `set`
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IANA Registered Channel Access Port Numbers

- Channel Access d
 - default ports
 - UDP port 5064
 - Destination of search messages
 - CA server
 - UDP port 5065
 - Destination of CA server beacons
 - CA Repeater
 - TCP port 5064
 - Destination of CA circuits
 - CA server
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Project Specific Channel Access Port Numbers

- Situations where this might be required
 - Setup independent tightly coupled domains in production system
 - Isolate test system from operational system
 - Set environment variables
 - EPICS_CA_SERVER_PORT
 - Default: 5064
 - EPICS_CA_REPEATER_PORT
 - Default 5065
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Channel Access Connect Sequence

1. Find channel's server using UDP search request messages
 - Sent to each entry in the client's search address list
 2. Connect to server using TCP
 3. Initiate Channel Access asynchronous request response protocol
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Client's Search Address List

- Client and server are both attached to the same IP subnet
 - No specialized configuration required
 - EPICS_CA_AUTO_ADDR_LIST defaults to YES
 - Broadcast address of each network interface used
 - Multi – IP subnet system
 - Augment the list with EPICS_CA_ADDR_LIST
 - Broadcast example (check router configuration)
172.18.0.255
 - Multiple host example
ioc3 ioc4 172.18.0.2
 - Port numbers example
172.18.0.3:9000 ioc1:9000 ioc2
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Channel Access Disconnect Sequence

1. No messages received from server for EPICS_CA_CONN_TMO seconds
 - No TCP response messages
 - No UDP server beacons
 - EPICS_CA_CONN_TMO should be at least two times EPICS_CAS_BEACON_PERIOD
 2. Server does not respond to an “are-you-there” message sent over TCP within 5 seconds
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Configuring the Maximum Array Size

- Currently the largest array transported must fit inside the Channel Access network buffers
 - Set `EPICS_CA_MAX_ARRAY_BYTES`
 - For the client
 - For the server
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Channel Access Network Buffers Memory Management

- Network buffers are maintained on free lists
 - Allocation from free list
 - malloc contiguous N from pool if that fails
 - Buffers no longer in use
 - returned to the free list
 - Two free lists
 - 16k byte buffers
 - Ordinary communication
 - EPICS_CA_MAX_ARRAY_BYTES byte buffers
 - Clients with large arrays
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