

# IBM Channel Attach Commands

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This chapter contains the commands used to configure IBM channel attach interface features. The commands are in alphabetical order. For hardware technical descriptions and for information about installing the router interfaces, refer to the hardware installation and maintenance publication for your particular product.

For interface configuration information and examples, refer to the IBM Channel Attach chapter of the *Router Products Configuration Guide*.

For a conversion table of the modular products and Cisco 7000 series processors, see Appendix E.

## channel-protocol

Use the **channel-protocol** interface configuration command to define a data rate of either 3 mega bytes per second or 4.5 mega bytes per second for the Parallel Channel Adapter (PCA) adapter card.

**channel-protocol** [ s | s4 ]

### Syntax Description

- |    |   |
|----|---|
| s  | (Optional) Specifies a data rate of 3 mega bytes per second   |
| s4 | (Optional) Specifies a data rate of 4.5 mega bytes per second |

### Default

If no value is specified, the default data rate for the PCA is 3 mega bytes per second.

### Command Mode

Interface configuration

### Usage Guidelines

This command is valid for a PCA adapter card configured on a Channel Interface Processor (CIP) on the Cisco 7000 series.

## claw

Use the **claw** interface configuration command to establish the IBM channel attach configuration for an ESCON Channel Adapter (ECA) interface or Bus and Tag Parallel Channel Adapter (PCA) interface on the Cisco 7000 series. This command defines information that is specific to the interface hardware and the IBM channels supported on the interface.

**claw** *path device-address ip-address host-name device-name host-app device-app*

### Syntax Description

<i>path</i>	A hexadecimal value in the range of 0x0000 – 0xFFFF. This specifies the data path and consists of two digits for the physical connection (either on the host or on the ESCON Director switch), one digit for the control unit address, and one digit for the channel logical address. If not specified in the IOCP, the control unit address and channel logical address default to 0.
<i>device-address</i>	A hexadecimal value in the range of 0x00 – 0xFE. This is the unit address associated with the control unit number and path as specified in the host IOCP file. The device address must have an even value.
<i>ip-address</i>	The IP address specified in the host TCPIP application configuration file.
<i>host-name</i>	The host name specified in the device statement in the host TCPIP application configuration file.
<i>device-name</i>	The CLAW workstation name specified in the device statement in the host TCPIP application configuration file.
<i>host-app</i>	The host application name as specified in the host application file. When connected to the IBM TCP host offerings, this value will be <b>TCPIP</b> , which is the constant specified in the host TCP/IP application file. When attached to other applications, this value must match the value hard coded in the host application.
<i>device-app</i>	The CLAW workstation application specified in the host TCPIP application. For the initial release of IBM channel attach support, this value will be <b>TCPIP</b> , which is a constant in the host application code.

### Default

This command has no defaults.

### Command Mode

Interface configuration

### Example

The following example shows how to enable IBM channel attach routing on the CIP port 0, which is supporting a directly connected ESCON channel:

```
interface Channel 3/0
ip address 198.92.5.1 255.255.255.0
claw 0100 00 198.92.0.21 CISCOVM EVAL TCPIP TCPIP
```

## interface channel

Use the **interface channel** interface configuration command to specify a channel attach interface and enter interface configuration mode.

**interface channel** *slot*/*port*

### Syntax Description

*slot* On the Cisco 7000 series, specifies the slot number where the CIP is located.

*port* On the Cisco 7000 series, specifies the port number where the CIP is located.

### Default

This command has no defaults.

### Command Mode

Global configuration

### Usage Guidelines

This command is used only on the Cisco 7000 series.

## show extended channel statistics

Use the **show extended channel statistics** privileged EXEC command to display information about the Channel Interface Processor (CIP) interfaces on the Cisco 7000 series. This command displays information that is specific to the interface hardware. The information displayed is generally useful for diagnostic tasks performed by technical support personnel only.

**show extended channel** *slot/port* **statistics** [*path* [*device-address* ]]

### Syntax Description

<i>slot</i>	On the Cisco 7000 series, specifies the slot number.
<i>port</i>	On the Cisco 7000 series, specifies the port number.
<i>path</i>	(Optional) A hexadecimal value in the range of 0x0000 – 0xFFFF. This specifies the data path and consists of two digits for the physical connection (either on the host or on the ESCON Director switch), one digit for the control unit address, and one digit for the channel logical address. If not specified, the control unit address and channel logical address default to 0.
<i>device-address</i>	(Optional) A hexadecimal value in the range of 0x00 – 0xFE. This is the unit address associated with the control unit number and path as specified in the host IOCP file. The device address must have an even value.

### Command Mode

Privileged EXEC

### Sample Display

The following is sample output on the Cisco 7000 from the **show extended channel statistics** command:

```
router# show extended channel 3/0 statistics

Path: C300

  Dev   Connects  Command  Selective  System  Device  CU
      Retries  Cancels   Reset     Reset   Errors  Busy
  60      92         85        5         4       1       0
  61      94         0         4         3       1       0

  Dev-Lnk  Blocks      Bytes      Dropped Blk  Fail  Con
          Read   Write  Read  Write  Read  Write  memd  Con
  60-00     6     0    192   0     8     0     0     0   Y
  60-01    82     0   7373  0     0     0     0     0   Y
  Total:   88     0   7565  0     8     0     0     0
  61-00     0     4     0    128   0     0     0     0   Y
  61-01     0    85     0   9081  0     0     0     0   Y
  Total:     0    89     0   9209  0     0     0     0

Path C300
Total:     88     89   7565  9209   8     0     0

Last stats 8 seconds old, next in 2 seconds
```

Table 29-1 describes the fields shown in the display.

**Table 29-1 Show Extended Channel Statistics Field Descriptions**

Field	Description
Path	The path from the CLAW configuration. It tells which port on the switch is used by the channel side of the configuration.
Dev	The device address for each of the devices. For CLAW you get two device addresses. In the configuration statement, you only specify the even address.
Connects	The number of times the channel started a channel program on the device.
Command Retries	The number of times the CIP either had no data to send to the channel (for the read subchannel) or the number of times the CIP had no buffers to hold data from the channel (for the write subchannel). Every command retry that is resumed results in a connect. A command retry may be ended via a cancel.
Cancels	The host requested any outstanding operation to be terminated. It is a measure of the number of times the host program was started.
Selective Reset	Selective reset effects only one device whereas a system reset effects all devices on the given channel. It is a reset of the device. On VM this will occur whenever you have a device attached and issue a CP IPL command.
System Reset	The number of times the system IPL command was issued. There is always one when the ECA is initialized. One will also occur if the channel is taken off line.
Device Errors	Errors detected by the ECA or PCA due to problems on the link. This value should always be 0.
CU Busy	The number of times the adapter returned a control unit busy indication to the host. It will occur after a cancel or reset if the host requests an operation before the CIP has finished processing the cancel or reset.
Dev-Ink	The first number is the device address. The second number is the logical link. Link 0 is always used for CLAW control messages. For IP datagram mode, link 1 is for actual datagram traffic.
Blocks Read/Blocks Write	CLAW uses the even subchannel for reads and the odd subchannel for writes. Each count is one IP datagram or one control message.
Bytes Read/Bytes Write	Bytes is the sum of the bytes in the blocks.
Dropped Blk Read/Write	If the router switch processor sends data to the CIP faster than it can send it to the channel, then the block is dropped. High values mean the host is not running fast enough. There are drops on write too. A write drop will occur if the CIP fails to get a MEMD buffer n times for a given block. See Failed memd counter.
Failed memd	The number of times the CIP could not obtain a MEMD buffer on the first try. If this value is high, try allocating more large buffers.
Con	For link 0, connect of Y means the system validate has completed. For all other links, it means the connection request sequence has completed. Con is an abbreviation for connected.

## show extended channel subchannel

Use the **show extended channel subchannel** privileged EXEC command to display information about the Channel Interface Processor (CIP) interfaces on the Cisco 7000 series. This command displays information that is specific to the interface hardware. The information displayed is generally useful for diagnostic tasks performed by technical support personnel only.

**show extended channel** *slot/port* **subchannel**

### Syntax Description

*slot*                                      On the Cisco 7000 series, specifies the slot number.

*port*                                        On the Cisco 7000 series, specifies the port number.

### Command Mode

Privileged EXEC

### Sample Display

The following is sample output on the Cisco 7000 from the **show extended channel subchannel** command:

```
router# show extended channel 3/0 subchannel

Channel3/0: state up
  Flags: VALID ESCON LOADED RQC_PEND MEMD_ENABLED
  Link: C4, Buffers 0, CRC errors 0, Load count 1
  Link Incident Reports
    implicit 0, bit-error 0, link failed 0,
    NOS 0, sequence timeout 0, invalid sequence 0
  Neighbor Node - VALID
    Class: Switch           Type Number : 009033       Tag: C4
    Model: 001              Manufacturer: IBM
    Plant: 51                Sequence      : 000000010067
  Local Node - VALID
    Class: CTCA-standalone  Type Number : C7000        Tag: 30
    Model: 0                 Manufacturer: CSC
    Plant: 17                Sequence      : 00000C04953F

Mode      Path Device                               Last
CLAW      C300  60  198.92.1.58 CISCOVM AUBURN TCPIP TCPIP      Sense
CLAW      C300  61  198.92.1.58 CISCOVM AUBURN TCPIP TCPIP      0000
CLAW      C300  61  198.92.1.58 CISCOVM AUBURN TCPIP TCPIP      0080

Last stats 1 seconds old, next in 9 seconds
```

The first line describes the status of the specified CIP and port. The status can be up, down, or administratively down:

```
Channel3/0: state up
```

The next line describes the flags on the CIP:

```
Flags: VALID ESCON LOADED RQC_PEND MEMD_ENABLED
```

- **VALID**— An adapter is installed. All displays should contain this.
- **ESCON**— The adapter is an ESCON adapter

## show extended channel subchannel

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- LOADED— The microcode on the adapter has been loaded
- RQC\_PEND— The adapter is attempting to send status to the channel
- MEMD\_ENABLED— The adapter is allowed to send and receive datagrams

The next line displays Link Incident Reports.

```
Link Incident Reports
  implicit 0, bit-error 0, link failed 0,
  NOS 0, sequence timeout 0, invalid sequence 0
```

Link Incidents are errors on an ESCON channel. These errors are reported to the host operating system and are recorded here for additional information.

Implicit incidents indicate a recoverable error occurred in the ECA.

Bit errors indicate the bit error rate threshold was reached. The bit error rate threshold is 15 error bursts within 5 minutes. An error burst is defined as a time period of 1.5+/-0.5 seconds during which one or more code violations occurred. A code violation error is caused by an incorrect sequence of 10 bit characters.

Link failed means a loss of synchronization or light has occurred.

NOS means the channel or switch transmitted the Not Operational Sequence.

Sequence timeout occurs when a connection recovery timeout occurs or when waiting for the appropriate response while in the transmit OLS (off-line sequence) state.

Invalid Sequence occurs when a UD or UDR is recognized in the wait for offline sequence state. UD is an unconditional disconnect and UDR is an unconditional disconnect response.

The neighbor node describes the channel or switch. The local node describes the router. The VALID flag shows information has been exchanged between the router and channel or switch.

The information displayed under Neighbor Node is as follows:

```
Neighbor Node - VALID
  Class: Switch           Type Number : 009033       Tag: C4
  Model: 001             Manufacturer: IBM
  Plant: 51              Sequence    : 000000010067
```

Class will be switch or channel depending on whether the connection is a switched point-to-point connection or a point-to-point connection. The type number describes the model of switch or processor. The TAG describes the physical location of the connector. Model is a further classification of type. Manufacturer, is who made it. Plant and sequence are manufacturer specific information to uniquely define this one device.

The information displayed under Local Node is as follows:

```
Local Node - VALID
  Class: CTCA-standalone Type Number : C7000       Tag: 30
  Model: 0               Manufacturer: CSC
  Plant: 17              Sequence    : 00000C04953F
```

The class will be CTCA. The type number and mode define the router. The tag is the slot and port where the channel interface processor resides. Manufacturer will always be CSC (for cisco Systems). Plant is the location where the CIP was manufactured. Sequence is the base ethernet address assigned to the RP.

The last three lines show currently configured information for the inbound and outbound channel connections:

```
Mode      Path Device                               Last
                                                Sense
```



```
CLAW    C300    60    198.92.1.58 CISCOVM AUBURN TCPIP TCPIP          0000
CLAW    C300    61    198.92.1.58 CISCOVM AUBURN TCPIP TCPIP          0080
```

Mode will always be CLAW. Path, device, ip address, and names are from the CLAW command. Since a CLAW command always defines two devices, both devices are shown. Last sense is the two bytes of sense data transmitted to the host at the time of the last unit exception. Normally the value will be 0000 if no unit exception has occurred, or 0080 to indicate that a resetting event has occurred. Resetting events occur whenever an ESCON device starts unless the first command is a 0x02 read command. The CLAW read subchannel always starts with a 0x02 read command so a resetting event will not occur.

## show interfaces channel

Use the **show interfaces channel** privileged EXEC command to display information about the Channel Interface Processor (CIP) interfaces on the Cisco 7000 series. This command displays information that is specific to the interface hardware. The information displayed is generally useful for diagnostic tasks performed by technical support personnel only.

**show interfaces channel** [*slot/port*]

### Syntax Description

*slot* (Optional) On the Cisco 7000 series, specifies the slot number.

*port* (Optional) On the Cisco 7000 series, specifies the port number.

### Command Mode

Privileged EXEC

### Sample Display

The following is sample output on the Cisco 7000 from the **show interfaces channel** command:

```
Router# show interfaces channel 3/0

Channel3/0 is up, line protocol is up
  Hardware is cxBus IBM Channel
  Internet address is 198.92.1.145, subnet mask is 255.255.255.248
  MTU 4096 bytes, BW 0 Kbit, DLY 0 usec, rely 255/255, load 1/255
  Encapsulation CHANNEL, loopback not set, keepalive not set
  ECA type daughter card
  Data transfer rate 12 Mbytes  Number of subchannels 1
  Last input never, output never, output hang never
  Last clearing of "show interface" counters 0:00:04
  Output queue 0/0, 0 drops; input queue 0/75, 0 drops
  Five minute input rate 0 bits/sec, 0 packets/sec
  Five minute output rate 0 bits/sec, 0 packets/sec
    0 packets input, 0 bytes, 0 no buffer
    Received 0 broadcasts, 0 runts, 0 giants
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
    0 packets output, 0 bytes, 0 underruns
    0 output errors, 0 collisions, 0 interface resets, 0 restarts
```

Table 29-2 describes the fields shown in the display.

**Table 29-2 Show Interfaces Channel Field Descriptions**

Field	Description
Channel... is {up   down   administratively down}	Indicates whether the interface hardware is currently active (whether synchronization is achieved on an ESCON channel, or if operational out is enabled on a parallel channel) and if it has been taken down by an administrator.
line protocol is {up   down   administratively down}	Indicates whether the software processes that handle the line protocol think the line is usable (that is, whether keepalives are successful).
Hardware is	Hardware type.

Field	Description
Internet address is	IP address and subnet mask.
MTU	Maximum transmission unit of the interface.
BW	Bandwidth of the interface in kilobits per second.
DLY	Delay of the interface in microseconds.
rely	Reliability of the interface as a fraction of 255 (255/255 is 100% reliability), calculated as an exponential average over 5 minutes.
load	Load on the interface as a fraction of 255 (255/255 is completely saturated), calculated as an exponential average over 5 minutes. The calculation uses the value from the <b>bandwidth</b> interface configuration command.
Encapsulation	Encapsulation method assigned to interface.
loopback	Indicates whether loopbacks are set or not.
keepalive	Indicates whether keepalives are set or not.
daughter card	Type of adapter card.
Data transfer rate	Rate of data transfer.
Number of subchannels	Number of subchannels.
Last input	Number of hours, minutes, and seconds since the last packet was successfully received by an interface. Useful for knowing when a dead interface failed.
Last output	Number of hours, minutes, and seconds since the last packet was successfully transmitted by an interface.
output hang	Number of hours, minutes, and seconds (or never) since the interface was last reset because of a transmission that took too long. When the number of hours in any of the "last" fields exceeds 24 hours, the number of days and hours is printed. If that field overflows, asterisks are printed.
Last clearing	The time at which the counters that measure cumulative statistics (such as number of bytes transmitted and received) shown in this report were last reset to zero. Note that variables that might affect routing (for example, load and reliability) are not cleared when the counters are cleared. These asterisks (***) indicate the elapsed time is too large to be displayed. 0:00:00 indicates the counters were cleared more than $2^{31}$ ms (and less than $2^{32}$ ms) ago.
Output queue, drops input queue, drops	Number of packets in output and input queues. Each number is followed by a slash, the maximum size of the queue, and the number of packets dropped due to a full queue.
Five minute input rate, Five minute output rate	Average number of bits and packets transmitted per second in the last 5 minutes.
packets input	Total number of error-free packets received by the system.
bytes input	Total number of bytes, including data and MAC encapsulation, in the error free packets received by the system.
no buffer	Number of received packets discarded because there was no buffer space in the main system. Compare with ignored count. Broadcast storms on Ethernets and bursts of noise on serial lines are often responsible for no input buffer events.
broadcasts	Total number of broadcast or multicast packets received by the interface.

## show interfaces channel

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Field	Description
runts	Number of packets that are discarded because they are smaller than the medium's minimum packet size.
giants	Number of packets that are discarded because they exceed the medium's maximum packet size.
input errors	Total number of no buffer, runts, giants, CRCs, frame, overrun, ignored, and abort counts. Other input-related errors can also increment the count, so that this sum may not balance with the other counts.
CRC	Number of code violation errors seen on the ESCON interface, where a received transmission character is recognized as invalid. On a parallel interface, the number of parity errors seen.
frame	Number of packets received incorrectly having a CRC error and a noninteger number of octets. This value is always 0.
overrun	Number of times the serial receiver hardware was unable to hand received data to a hardware buffer because the input rate exceeded the receiver's ability to handle the data. This value is always 0.
ignored	Number of received packets ignored by the interface because the interface hardware ran low on internal buffers. These buffers are different than the system buffers mentioned previously in the buffer description. Broadcast storms and bursts of noise can cause the ignored count to be incremented.
abort	Illegal sequence of one bits on a serial interface. This usually indicates a clocking problem between the serial interface and the data link equipment. This value is always 0.
packets output	Total number of messages transmitted by the system.
bytes	Total number of bytes, including data and MAC encapsulation, transmitted by the system.
underruns	Sum of all errors that prevented the final transmission of datagrams out of the interface being examined. Note that this may not balance with the sum of the enumerated output errors, as some datagrams may have more than one error, and others may have errors that do not fall into any of the specifically tabulated categories.
output errors	Number of output errors.
collisions	Number of collisions detected. This value is always 0.
interface resets	Number of times an interface has been completely reset. This can happen if packets queued for transmission were not sent within several seconds. On a serial line, this can be caused by a malfunctioning modem that is not supplying the transmit clock signal, or by a cable problem. If the system notices that the carrier detect line of a serial interface is up, but the line protocol is down, it periodically resets the interface in an effort to restart it. Interface resets can also occur when an interface is looped back or shut down.  On the Channel Interface Processor, this may occur if the host software is not requesting data
restarts	Number of times the controller was restarted because of errors.