PA-A2 ATM-CES Port Adapter

Description

The ATM-CES port adapters (PA-A2-4T1C-OC3SM, PA-A2-4T1C-T3ATM, PA-A2-4E1XC-OC3SM, PA-A2-4E1XC-E3ATM, PA-A2-4E1YC-OC3SM, and PA-A2-4E1YC-E3ATM) are available on Cisco 7200 series routers. The ATM-CES has four T1 (1.544 Mbps) or four E1 (2.048 Mbps) ports (75- or 120-ohm) that can support both structured (N x 64 kbps) and unstructured ATM Forum-compliant circuit emulation services (CES), and one port that supports an OC-3 (155 Mbps) single-mode intermediate reach interface or a T3 (45 Mbps) or E3 (34 Mbps) standards-based ATM interface. The target application of the ATM-CES port adapter is access to a broadband public or private ATM network where multiservice consolidation of voice, video, and data traffic over a single ATM link is a requirement.

The ATM-CES port adapter supports the following features:

- Cross-connect Circuit Emulation Services (CES)—structured and unstructured
- Four-port T1 or E1 (75- or 120-ohm) constant bit rate (CBR)
- Network timing distribution
- On/off hook Channel Associated Signaling (CAS)
- Segmentation and reassembly (SAR) of up to 512 buffers simultaneously, where each buffer represents a packet
- Total of 2046 virtual circuits (VCs) of which up to 124 VCs can be CES VCs
- ATM adaptation layer (AAL) 5
- Single-port SONET/SDH OC-3 single-mode intermediate reach ATM uplink
- Single-port DS3/E3 ATM WAN uplink over T3/E3
- Traffic shaping
- Operation, Administration, and Maintenance (OAM) cells
- Online insertion and removal (OIR)
- Available Bit Rate (ABR)-ready hardware

Platforms

This feature is supported on the Cisco 7200 series routers.

Configuration Tasks

For information on how to configure the ATM-CES interfaces, refer to the "Configuring ATM" chapter of the *Wide-Area Networking Configuration Guide* and the "Configuring Interfaces" chapter of the *Configuration Fundamentals Configuration Guide*. All ATM and interface commands might not be applicable to the ATM-CES interface. If a command is not available, the router displays the message "Command not supported on this interface."

In addition to the commands in the "Configuring ATM" chapter, you can configure the four T1 or E1 interfaces as a CBR interface to convert CBR traffic into ATM cells for transport across an ATM network. You can also configure the the OC3 or DS3 or E3 interface.

Perform the tasks in the following sections to configure the interfaces on the ATM-CES port adapter. The first five tasks are required. Depending on the type interface on the ATM-CES port adapter, perform only one of the first three tasks.

- Configure the ATM-CES Port Adapter for OC3
- Configure the ATM-CES Port Adapter for DS3
- Configure the ATM-CES Port Adapter for E3
- Configure the ATM-CES Port Adapter for Circuit Emulation Services
- Configure Network Clock Source and Priorities
- Troubleshoot the ATM-CES Port Adapter
- Monitor and Maintain the ATM-CES Port Adapter

For information on other commands that can be used by the ATM-CES port adapter such as LAN emulation and bridging, refer to the Cisco IOS Release 11.1 configuration guides.

For ATM-CES configuration examples, see "Configuration Examples" later in this section.

Circuit Emulation Services (CES) Overview

Voice and video services (circuit emulation) allow you to interconnect existing T1 or E1 interfaces and other kinds of constant bit rate (CBR) equipment. CBR services include such features as PBX interconnect, consolidated voice and data traffic, and video conferencing.

With circuit emulation, data received from an external device at the edge of an ATM network is converted to ATM cells, sent through the network, reassembled into a bit stream, and passed out of the ATM network to its destination. T1/E1 circuit emulation does not interpret the contents of the data stream. All the bits flowing into the input edge port of the ATM network are reproduced at one corresponding output edge port.

An emulated circuit is carried across the ATM network on a PVC, which is configured through the network management system.

The ATM-CES port adapter offers two types of services:

- Circuit emulation service internetworking function (CES-IWF)
- Network timing

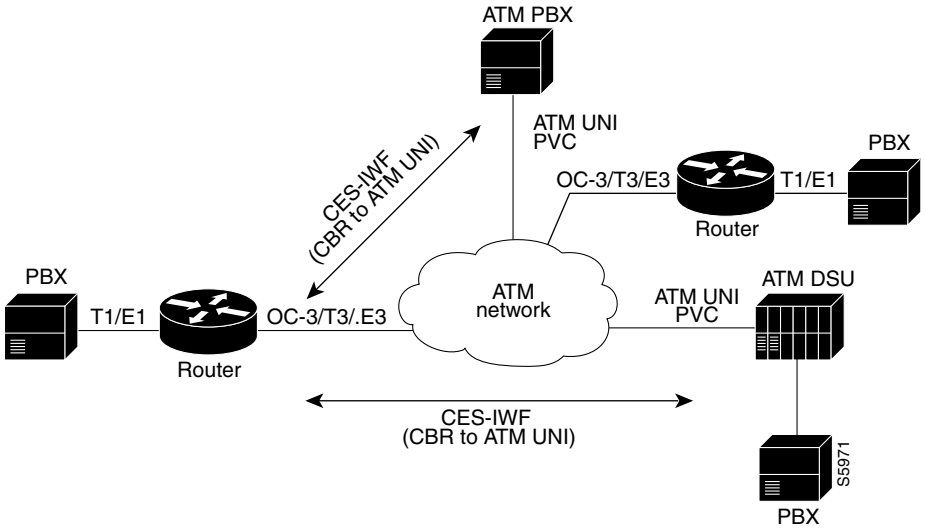
CES Service Overview

CES-IWF is a service based on ATM Forum standards that allows communications to occur between CBR and ATM UNI interfaces, that is, between non-ATM telephony devices (such as classic PBXs or TDMs) and ATM devices (such as Cisco 7200 series routers). Thus, a Cisco 7200 series router

equipped with an ATM-CES port adapter offers a migration path from classic T1/E1 CBR data communications services to emulated CES T1/E1 unstructured (clear channel) services or structured (N x 64) services in an ATM network.

Figure 2 shows a simplified representation of CES-IWF functions in an ATM network.

Figure 2 Typical CES-IWF Operations in an ATM Network



The ATM-CES port adapter offers the following circuit emulation services:

- Unstructured (Clear Channel) CES services
- Structured (N x 64) CES services
- Channel Associated Signaling (CAS) for structured CES services only

For information on configuring CES services, refer to "Configure the ATM-CES Port Adapter for Circuit Emulation Services" later in this section.

Note For additional information and examples of these services, refer to the *PA-A2 ATM-CES Port Adapter Installation and Configuration* publication.

Network Timing Services Overview

CES-IWF and CBR traffic relate to a quality of service (QOS) classification defined by the ATM Forum for Class A (AAL1) traffic in ATM networks. In general, Class A traffic pertains to voice and video transmissions.

In an ATM networking environment, CBR refers to a particular class of traffic that is generated by edge (source) devices and propagated into ATM networks for transmission to other edge (destination) devices in the network.

The ATM-CES port adapter has been designed specifically to handle CBR traffic in an ATM networking environment. To provide requisite timing functions in support of CES operations, you can specify any one of three clocking modes:

- Synchronous clocking mode (required for T1/E1 structured CES operations)

- Synchronous residual time stamp (SRTS) clocking mode
- Adaptive clocking mode

However, to support synchronous clocking or SRTS clocking in your ATM networking environment, your network must incorporate the following facilities:

- A primary reference source (PRS)—A precision reference timing signal that must be made available, wherever required, to synchronize the flow of CBR data from its source to its destination.
- Network clock synchronization services—This refers to a network clock synchronization and distribution service that provides a PRS to those user and network devices that require a precision reference timing signal for synchronizing the flow of CBR traffic.

For information on configuring timing services, refer to "Configure Network Clock Source and Priorities" later in this section.

Note For more information and examples of network clocking, refer to the *PA-A2 ATM-CES Port Adapter Installation and Configuration* publication.

Configure the ATM-CES Port Adapter for OC3

For information on how to configure the OC3 interface on the ATM-CES port adapter, refer to the "Configuring ATM" chapter of the *Wide-Area Networking Configuration Guide* and the "Configuring Interfaces" chapter of the *Configuration Fundamentals Configuration Guide*. All ATM and interface commands might not be applicable to the ATM-CES interface. If a command is not available, the router displays the message "Command not supported on this interface."

For information on other commands that can be used by the ATM-CES port adapter such as LAN emulation and bridging, refer to the Cisco IOS Release 11.1 configuration guides.

Configure the ATM-CES Port Adapter for DS3

The ATM-CES port adapter can contain a DS3 (45 Mbps) standards-based ATM interface. You must configure at least one permanent virtual circuit (PVC) or switched virtual circuit (SVC) on the DS3 port. The virtual circuit options you use must match in three places: on the router, on the ATM switch, and at the remote end of the PVC or SVC connection.

To configure the DS3 port on the ATM-CES port adapter, perform the following tasks beginning in global configuration mode:

Task		Command
Step 1	Specify an ATM-CES port adapter interface.	**interface atm** *slot*/**0**
Step 2	If IP routing is enabled on the system, assign a source IP address and subnet mask to the interface.	**ip address** *ip-address mask*
Step 3	Optionally, set the cable length to long. The default is short. Short is up to 50 feet, and long is greater than 50 feet.	**atm lbo** {**long** | **short**}
Step 4	Optionally, set the clock source to external.	**no atm clock internal**
Step 5	Optionally, enable DS3 scrambling.	**atm ds3-scramble**
Step 6	Specify the DS3 framing mode.	**atm framing** {**cbitadm** | **cbitplcp** | **m23adm** | **m23plcp**}

Task		Command
Step 7	Configure a permanent virtual circuit (PVC).[1]	**atm pvc** *vcd vpi vci aal-encap* [*peak average burst*] [**oam** *seconds*]
Step 8	Associate an existing map list to an interface.[2]	**map-group** *name*
Step 9	Change the shutdown state to up and enable the ATM interface, thereby starting the segmentation and reassembly (SAR) operation on the interface.	**no shutdown**

1. For more information on creating PVCs, refer to the "Configure PVCs on the Cisco 700 Family" section in the "Configuring ATM" chapter of the *Wide-Area Networking Configuration Guide*.
2. For information on creating map groups, refer to the "Configuring ATM" chapter of the *Wide-Area Networking Configuration Guide*.

Note For more information on creating PVCs and information on mapping a protocol addresses to a PVC, refer to the "Configuring ATM" chapter of the *Wide-Area Networking Configuration Guide*.

For additional commands that can be used with the DS3 port, refer to the "Configuring ATM" chapter of the *Wide-Area Networking Configuration Guide* and the "Configuring Interfaces" chapter of the *Configuration Fundamentals Configuration Guide*. All ATM and interface commands might not be applicable to the ATM-CES interface. If a command is not available, the router displays the message "Command not supported on this interface."

For information on other commands that can be used by the ATM-CES port adapter such as LAN emulation and bridging, refer to the Cisco IOS Release 11.1 configuration guides.

Configure the ATM-CES Port Adapter for E3

The ATM-CES port adapter can contain a E3 (34 Mbps) standards-based ATM interface. You must configure at least one permanent virtual circuit (PVC) or switched virtual circuit (SVC) on the E3 port. The virtual circuit options you use must match in three places: on the router, on the ATM switch, and at the remote end of the PVC or SVC connection.

To configure the E3 port on the ATM-CES port adapter, perform the following tasks beginning in global configuration mode:

Task		Command
Step 1	Specify an ATM-CES port adapter interface.	**interface atm** *slot*/**0**
Step 2	If IP routing is enabled on the system, assign a source IP address and subnet mask to the interface.	**ip address** *ip-address mask*
Step 3	Optionally, set the clock source to external.	**no atm clock internal**
Step 4	Optionally, disable E3 scrambling.	**no atm e3-scramble**
Step 5	Optionally, specify the E3 framing mode. The default is G.751 PLCP encapsulation.	**atm framing** [**g832adm** | **g751adm** | **g751plcp**]
Step 6	Configure a permanent virtual circuit (PVC).[1]	**atm pvc** *vcd vpi vci aal-encap* [*peak average burst*] [**oam** *seconds*]
Step 7	Associate an existing map list to an interface.[2]	**map-group** *name*
Step 8	Change the shutdown state to up and enable the ATM interface, thereby starting the segmentation and reassembly (SAR) operation on the interface.	**no shutdown**

1. For more information on creating PVCs, refer to the "Configure PVCs on the Cisco 700 Family" section in the "Configuring ATM" chapter of the *Wide-Area Networking Configuration Guide*.
2. For information on creating map groups, refer to the "Configuring ATM" chapter of the *Wide-Area Networking Configuration Guide*.

Note For more information on creating PVCs and information on mapping a protocol addresses to a PVC, refer to the "Configuring ATM" chapter of the *Wide-Area Networking Configuration Guide*.

For additional commands that can be used with the DS3 port, refer to the "Configuring ATM" chapter of the *Wide-Area Networking Configuration Guide* and the "Configuring Interfaces" chapter of the *Configuration Fundamentals Configuration Guide*. All ATM and interface commands might not be applicable to the ATM-CES interface. If a command is not available, the router displays the message "Command not supported on this interface."

For information on other commands that can be used by the ATM-CES port adapter such as LAN emulation and bridging, refer to the Cisco IOS Release 11.1 configuration guides.

Configure the ATM-CES Port Adapter for Circuit Emulation Services

After you create the ATM interface, you can perform the tasks in the following sections to configure the T1/E1 interfaces on the ATM-CES port adapter. The T1/E1 interface is called a constant bit rate (CBR) port and supports circuit emulation services (CES):

- Configure Unstructured (Clear Channel) CES Services
- Configure Structured (N x 64) CES Services
- Configure Channel-Associated Signaling (for Structured CES Services Only)

Configure Unstructured (Clear Channel) CES Services

A circuit that you set up on a CBR port for unstructured service is always identified as "circuit 0," because only one such circuit can be established on any given CBR port. Such a circuit consumes the entire bandwidth of the port, which is provisioned manually at the time you set up the unstructured circuit and remains dedicated to that port, whether that port is actively transmitting CBR data or not.

A CES module converts CBR traffic into ATM cells for propagation through an ATM network. The ATM cell stream is directed to an outgoing ATM port or CBR port. If the outgoing port is an ATM port on the same Cisco 7200 series router, the PVC is called a "hard PVC." As a general rule when setting up a hard PVC, you must interconnect a CBR port and the ATM port in the same ATM-CES port adapter. Only hard PVCs are supported in the Cisco 7200 series router.

To configure the T1/E1 port on the ATM-CES port adapter for unstructured (clear channel) CES services, perform the following tasks beginning in global configuration mode:

Task		Command
Step 1	Specify an ATM-CES port adapter interface.	**interface cbr** *slot/port*
Step 2	Configure the port to perform unstructured CES services. The default is unstructured.	**ces aal1 service** [**structured** | **unstructured**]
Step 3	Optionally, select the clock method. The default is synchronous.	**ces aal1 clock** {**adaptive** | **srts** | **synchronous**}

Task		Command
Step 4	If synchronous clocking is selected, configure the clock source.	**ces dsx1 clock** {**loop-timed** | **network-derived**}
Step 5	Specify the circuit number for unstructured services and optionally specify the logical name of the PVC. If you do not specify a circuit name, the default is CBRx/x:x.	**ces circuit 0** [**circuit-name** *name*]
Step 6	Define the particular ATM destination port for the PVC.	**ces pvc 0 interface atm** *slot/port* **vci** *number* **vpi** *number*
Step 7	Change the shutdown state to up and enable the ATM interface, thereby starting the segmentation and reassembly (SAR) operation on the interface.	**no shutdown**
Step 8	Enable the PVC.	**no ces circuit 0 shutdown**

For additional command that can be used with the CBR port, refer to the "Configuring ATM" chapter of the *Wide-Area Networking Configuration Guide* and the "Configuring Interfaces" chapter of the *Configuration Fundamentals Configuration Guide*. All ATM and interface commands might not be applicable to the ATM-CES interface. If a command is not available, the router displays the message "Command not supported on this interface."

For information on other commands that can be used by the ATM-CES port adapter such as LAN emulation and bridging, refer to the Cisco IOS Release 11.1 configuration guides.

Configure Structured (N x 64) CES Services

Structured (N x 64 kbps) CES services differ from unstructured CES services in that the structured services allow you to allocate the bandwidth in a highly flexible and efficient manner. With the structured services, you use only the bandwidth actually required to support the active structured circuit(s) that you configure.

For example, in configuring an ATM-CES port adapter for structured service, you can define multiple hard PVCs for any given ATM-CES port adapter's T1/E1 port. The ATM-CES port adapter provides up to 24 time slots per T1 port and up to 31 time slots per E1 for defining structured CES circuits. To see the bandwidth that is required on an ATM link for this particular circuit, use the **show ces circuit** command.

Note In the ATM-CES port adapter, any bits not available for structured CES services are used for framing and out-of-band control.

For simplicity in demonstrating configuration tasks for structured CES services, the procedures in this section are directed primarily at setting up a single CES circuit per T1/E1 port. However, these procedures outline the essential steps and command syntax that you would use if you were to set up multiple CES circuits on a T1/E1 port.

Structured CES services require network clock synchronization by means of the synchronous clocking mode. You must select the clock source and define its priority locally for each Cisco 7200 series router in your network. You do this by means of the **network-clock-select** command.

To configure the T1/E1 port on the ATM-CES port adapter for structured (N x 64 kbps) CES services without CAS, perform the following tasks beginning in global configuration mode:

Task		Command
Step 1	Specify an ATM-CES port adapter interface.	**interface cbr** *slot*/*port*
Step 2	Configure the port to perform structured CES services. The default is unstructured.	**ces aal1 service** [**structured** | **unstructured**]
Step 3	Optionally, select the clock method. The default is synchronous. Adaptive and SRTS are only available for unstructured mode.	**ces aal1 clock** {**adaptive** | **srts** | **synchronous**}
Step 4	If synchronous clocking is selected, configure the clock source.	**ces dsx1 clock** {**loop-timed** | **network-derived**}
Step 5	Specify the line code format used for the physical layer. The default is AMI.	**ces dsx1 linecode** {**ami** | **b8zs**} (for T1) **ces dsx1 linecode** {**ami** | **hdb3**} (for E1)
Step 6	Specify the framing format The default for T1 is ESF and for E1 is E1_LT.	**ces dsx1 framing** {**esf** | **sf**} (for T1) **ces dsx1 framing** {**e1_crc_mfCASlt** | **e1_crc_mflt** | **e1_lt** | **e1_mfCAS_lt**} (for E1)
Step 7	Optionally, specify the line build out (cable length). Values are (in feet): 0_110, 10_200, 220_330, 330_440, 440_550, 550_660, 660_above, and square_pulse. The default is 0_110 feet.	**ces dsx1 lbo** *length*
Step 8	Specify the circuit number for structured services and optionally specify the logical name of the PVC. For T1 structured service the range is 1 through 24. For E1 structured service the range is 1 through 31. If you do not specify a circuit name, the default is CBRx/x:x.	**ces circuit** *circuit-number* [**circuit-name** *name*]
Step 9	Specify the timeslots to be used by the PVC. For T1 the range is 1 through 24. For E1 structured service the range is 1 through 31. Use a dash to indicate a range (for example 1-24). Use a comma to separate the timeslot (for example, 1,3,5).	**ces circuit** *circuit-number* **timeslots** *range*
Step 10	Optionally, configure the circuit cell delay variation. Range is 1 through 65535 milliseconds. The default range is 2000 milliseconds.	**ces circuit cdv** *range*
Step 11	Define the particular ATM destination port for the PVC.	**ces pvc** *circuit-number* **interface atm** *slot*/*port* **vci** *number* **vpi** *number*
Step 12	Change the shutdown state to up and enable the ATM interface, thereby starting the segmentation and reassembly (SAR) operation on the interface.	**no shutdown**
Step 13	Enable the PVC.	**no ces circuit** *circuit-number* **shutdown**

Note You need not specify individual circuit options on a separate command line, even though that is done in Step 8 and Step 9 above. If you want, you can specify all the desired circuit options on the same command line, provided that you observe the following rules: (1) specify the DS0 time slots as the first option; (2) specify each desired option thereafter in strict alphabetic order; and, (3) separate consecutive command line options with a space. You can display the options available for any structured CES circuit by using the **ces circuit** *circuit-number* **?** command, which displays in alphabetic order all the options available for use in the command line.

For additional command that can be used with the CBR port, refer to the "Configuring ATM" chapter of the *Wide-Area Networking Configuration Guide* and the "Configuring Interfaces" chapter of the *Configuration Fundamentals Configuration Guide*. All ATM and interface commands might not be applicable to the ATM-CES interface. If a command is not available, the router displays the message "Command not supported on this interface."

For information on other commands that can be used by the ATM-CES port adapter such as LAN emulation and bridging, refer to the Cisco IOS Release 11.1 configuration guides.

Configure Channel-Associated Signaling (for Structured CES Services Only)

Because the ATM-CES port adapter emulates constant bit rate services over ATM networks, it must be capable of providing support for handling channel-associated signaling (CAS) information introduced into structured CES circuits by PBXs and time-division multiplexing (TDM) devices. The **ces circuit cas** interface command provides this feature.

With respect to the CAS information carried in a CBR bit stream, an ATM-CES port adapter can be configured to operate as follows:

- Without the CAS feature enabled (the default state).

  In this case, the ATM-CES port adapter does not sense the CAS information (carried as so-called "ABCD" bits in the CBR bit stream) and provides no support for CAS functions.

- With the CAS feature enabled, but without the (Cisco-proprietary) "on-hook detection" feature enabled.

  In this case, in addition to packaging incoming CBR data into ATM AAL1 cells in the usual manner for transport through the network, the ATM-CES port adapter in the ingress node senses the ABCD bit patterns in the incoming data, incorporates these patterns in the ATM cell stream, and propagates the cells to the next node in the network. The ATM cells are transported across the network from link to link until the egress node is reached.

  At the egress node, the ATM-CES port adapter strips off the ABCD bit patterns carried by the ATM cells, reassembles the CAS ABCD bits and the user's CBR data into original form, and passes the frames out of the ATM network in the proper DS0 time slot.

  All these processes occur transparently without user intervention.

- With both the CAS and on-hook detection features enabled.

  In this case, the CAS and on-hook detection features work together to enable an ingress node in an ATM network to monitor on-hook and off-hook conditions for a specified 1 x 64 structured CES circuit. As implied by the notation "1 x 64," the on-hook detection (or bandwidth-release) feature is supported only in a structured CES circuit that involves a single time slot at each end of the connection.

The time slot configured for the structured CES circuit at the ingress node (time slot 2) can be different from the DS0 time slot configured at the egress node (time slot 4). Only one such time slot can be configured at each end of the circuit when the on-hook detection feature is used.

When you invoke this feature, the ingress ATM-CES port adapter monitors the ABCD bits in the incoming CBR bit stream to detect on-hook and off-hook conditions in the circuit. In an "off-hook" condition, all the bandwidth provisioned for the specified CES circuit is used for transporting ATM AAL1 cells across the network from the ingress node to the egress node.

In an on-hook condition, the network periodically sends dummy ATM cells from the ingress node to the egress node to maintain the connection. However, these dummy cells consume only a fraction of the circuit's reserved bandwidth, leaving the rest of the bandwidth available for use by other network traffic. This bandwidth-release feature enables the network to make more efficient use of its resources.

When the CAS feature is enabled for a CES circuit, the bandwidth of the DS0 channel is limited to 56 kbps for user data, because CAS functions consume 8 kbps of channel bandwidth for transporting the ABCD signaling bits. These signaling bits are passed transparently from the ingress node to the egress node as part of the ATM AAL1 cell stream.

In summary, when the optional CAS and on-hook detection features are enabled, the following conditions apply:

- The permanent virtual connection (PVC) provisioned for the CES circuit always exists.
- The bandwidth for the CES circuit is always reserved.
- During an on-hook state, most of the bandwidth reserved for the CES circuit is not in use. (Dummy cells are sent from the ingress node to the egress node to maintain the connection.) Therefore, this bandwidth becomes available for use by other network traffic, such as available bit rate (ABR) traffic.
- During an off-hook state, all the bandwidth reserved for the CES circuit is dedicated to that circuit.

To configure the T1/E1 port on the ATM-CES port adapter for channel associated signaling, first perform the tasks in the "Configure Structured (N x 64) CES Services" section and then perform the following tasks beginning in global configuration mode:

Task		Command
Step 1	Specify an ATM-CES port adapter interface.	**interface cbr** *slot*/*port*
Step 2	Enable channel associated signaling.	**ces circuit** *circuit-number* **cas**
Step 3	Optionally, enable the signal mode as robbed bit.	**ces dsx1 signalmode robbedbit**
Step 4	Optionally, enable on-hook detection.	**ces circuit** *circuit-number* **on-hook-detection** *hex-number*

Configure Network Clock Source and Priorities

You can specify up to four network clock sources for a Cisco 7200 series router. The highest priority active port in the chassis supplies primary reference source to all other chassis interfaces that require network clock synchronization services. The fifth network clock source is always the local oscillator on the ATM-CES port adapter.

To direct a CBR port to use the network-derived clock, you must configure the CBR port with the **ces dsx1 clock source network-derived** interface command. For information on configuring the CRB port, refer to "Configure the ATM-CES Port Adapter for Circuit Emulation Services" earlier in the section.

To establish the sources and priorities of the requisite clocking signals for an ATM-CES port adapter in a Cisco 7200 series router, perform the following tasks beginning in global configuration mode:

Task		Command
Step 1	Establish a priority 1 clock source.	**network-clock-select 1** {**atm** | **cbr**} *slot/port*
Step 2	Establish a priority 2 clock source.	**network-clock-select 2** {**atm** | **cbr**} *slot/port*
Step 3	Establish a priority 3 clock source.	**network-clock-select 3** {**atm** | **cbr**} *slot/port*
Step 4	Establish a priority 4 clock source.	**network-clock-select 4** {**atm** | **cbr**} *slot/port*

To verify the clock signal sources and priorities that you established in the previous procedure for your ATM-CES port adapter, use the **show network-clocks** privileged EXEC command.

Troubleshoot the ATM-CES Port Adapter

To set the following loopbacks to troubleshoot the ATM-CES port adapter using Cisco IOS software, perform the first task beginning in global configuration mode followed by any of the other tasks depending on your needs:

Task	Command
Place the ATM interface into external loopback at the cell level	**loopback cell**
Place the ATM interface into internal loopback at the PLIM	**loopback diagnostic**
Place the ATM interface into external loopback at the line	**loopback line**
Place the ATM interface into external loopback at the payload level.	**loopback payload**
Place the ATM interface into external special test loopback.	**loopback test**
Place the CBR interface into external loopback at the line (does not penetrate the line).	**ces dsx1 loopback line**
Place the CBR interface into external loopback at the payload level (sets the received signal to be looped through the device and returned.	**ces dsx1 loopback payload**

These loopback commands loop all packets from the ATM interface back to the interface and also direct the packets to the network.

Monitor and Maintain the ATM-CES Port Adapter

After configuring the new interface, you can display its status. You can also display the current state of the ATM-CES port adapter and connected virtual circuits. To show current virtual circuits and traffic information, perform the following tasks in EXEC mode:

Task	Command
Display high-level circuit status for all CBR interfaces.	**show ces circuit**
Display high-level circuit status for a particular CBR interface.	**show ces circuit interface cbr** *slot*/*port*
Display detailed circuit status for a particular CBR interface	**show ces circuit interface cbr** *slot*/*port circuit-number*
Display detailed CES information for a CBR interface.	**show ces interface**
Display high-level CES port information for a CBR interface.	**show ces status**
Display the clock signal sources and priorities that you established on the router.	**show network clocks**
Display the configured list of ATM static maps to remote hosts on an ATM network.	**show atm map**
Display statistics for the CBR interface.	**show interface cbr** *slot*/*port*
Display statistics for the ATM interface.	**show interface atm** *slot*/*port*

For information on other show commands that can be used with the ATM-CES port adapter, refer to the "Configuring ATM" chapter of the *Wide-Area Networking Configuration Guide* and the "Configuring Interfaces" chapter of the *Configuration Fundamentals Configuration Guide*.

Configuration Examples

This section provides several examples of configuring the ATM-CES port adapter. For additional examples, refer to the "Configuring ATM" chapter of the *Wide-Area Networking Configuration Guide* and the *PA-A2 ATM-CES Port Adapter Installation and Configuration* publication.

The following example shows how to configure the DS3 port on the ATM-CES port adapter. In this example, the ATM interface is configured for **cbitplcp** framing and **aal5snap** encapsulation.

```
router(config)# interface atm 6/0
router(config-if)# ip address 1.1.1.1 255.255.255.0
router(config-if)# atm lbo short
router(config-if)# atm clock internal
router(config-if)# no atm ds3-scramble
router(config-if)# atm framing cbitplcp
router(config-if)# atm pvc 55 255 128 aal5snap
router(config-if)# map-group sanjose
router(config-if)# no shutdown
router(config-if)# exit
router(config)# exit
```

The following example shows how to configure the T1 port on the ATM-CES port adapter for unstructured (clear channel) CES services. In this example, the T1 port uses **adaptive** clocking and the circuit name "CBR-PVC-A."

```
router(config)# interface cbr 6/0
router(config-if)# ces aal1 service unstructured
router(config-if)# ces aal1 clock adaptive
router(config-if)# atm clock internal
router(config-if)# ces dsx1 clock network-derived
router(config-if)# ces circuit 0 circuit-name CBR-PVC-A
router(config-if)# ces pvc 0 interface atm 6/0 vpi 0 vci 512
router(config-if)# no shutdown
router(config-if)# no ces circuit 0 shutdown
router(config-if)# exit
router(config)# exit
```

The following example shows how to establish the the T1 port on the ATM-CES port adapter as the first clocking priority and the ATM port as the second clocking priority.

```
router(config)# network-clock-select 1 cbr 6/0
router(config)# network-clock-select 2 atm 6/0
router(config)# exit
```

The following example shows a sample output from the **show network-clocks** command. This example shows the clock sources created and the current clock source. Under normal operating conditions, the priority 1 clock source is assumed to be the active source.

```
router# show network-clocks
Priority 1 clock source: CBR 6/0 up
Priority 2 clock source: ATM 6/0 up
Priority 3 clock source: not configured
Priority 4 clock source: not configured
Priority 5 clock source: Local oscillator

Current clock source:CBR, priority:1
```

Command Reference

This section documents new or modified commands. All other commands used with this feature are documented in the Cisco IOS Release 11.1 command references.

- **atm ds3-scramble**
- **atm e3-scramble**
- **atm framing (DS3)**
- **atm lbo**
- **ces aal1 clock**
- **ces aal1 service**
- **ces circuit**
- **ces dsx1 clock source**
- **ces dsx1 framing**
- **ces dsx1 lbo**
- **ces dsx1 linecode**
- **ces dsx1 loopback**

- **ces dsx1 signalmode robbedbit**
- **ces pvc**
- **interface cbr**
- **loopback**
- **network-clock-select**
- **show atm interface atm**
- **show atm map**
- **show atm traffic**
- **show atm vc**
- **show ces circuit**
- **show ces interface cbr**
- **show ces status**
- **show interface cbr**
- **show network-clocks**

atm ds3-scramble

To enable scrambling of the ATM cell payload for the DS-3 PLIM on an ATM interface, use the **atm ds3-scramble** interface configuration command. To disable scrambling of the ATM cell payload for the DS-3 PLIM, use the **no** form of this command.

atm ds3-scramble
no atm ds3-scramble

Syntax Description

This command has no keywords and arguments.

Default

DS3 scrambling is disabled.

Command Mode

Interface configuration

Usage Guidelines

This command was modified in Cisco IOS Release 11.1 CA to change the command syntax from **ds3 scramble** to **atm ds3-scramble**.

D3 scrambling is used to assist clock recovery on the receiving end.

Example

The following example disables DS3 scrambling on the interface:

```
interface atm 4/0
 no atm ds3-scramble
```

atm e3-scramble

To enable scrambling of the ATM cell payload for the E3 PLIM on an ATM interface, use the **atm e3-scramble** interface configuration command. To disable scrambling of the ATM cell payload for the E3 PLIM, use the **no** form of this command.

atm e3-scramble
no atm e3-scramble

Syntax Description

This command has no keywords and arguments.

Default

E3 scrambling is enabled.

Command Mode

Interface configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 11.1 CA.

E3 scrambling is used to assist clock recovery on the receiving end.

Example

The following example disables E3 scrambling on the interface:

```
interface atm 2/0
 no atm e3-scramble
```

atm framing (DS3)

To specify DS3 line framing on an ATM interface, use the **atm framing** interface configuration command. To return to the default C-bit with Physical Layer Convergence Protocol (PLCP) framing, use the **no** form of this command.

atm framing [**cbitadm** | **cbitplcp** | **m23adm** | **m23plcp**]
no atm framing [**cbitadm** | **cbitplcp** | **m23adm** | **m23plcp**]

Syntax Description

cbitadm	(Optional) Specifies C-bit with ATM direct mapping.
cbitplcp	(Optional) Specifies C-bit with PLCP framing. This is the default.
m23adm	(Optional) Specifies M23 ATM direct mapping.
m23plcp	(Optional) Specifies M23 with PLCP framing.

Default

cbitplcp

Command Mode

Interface configuration

Usage Guidelines

This command was modified in Cisco IOS Release 11.1 CA to include Cisco 7200 series routers with the ATM-CES port adapter.

This command is available only on Cisco 4500 and Cisco 4700 routers with DS3 access speeds, and on Cisco 7200 series routers with the ATM-CES port adapter. This command is not available on the Cisco 7000 series or Cisco 7500 series.

Framing on the interface must match that on the switch for this ATM link.

Example

The following example specifies M23 ADM framing on a router that has been set up with DS3 access to an ATM network:

```
interface atm 4/0
 atm framing m32adm
```

atm framing (E3)

To specify E3 line framing, use the **atm framing** interface configuration command. To return to the default G.751 Physical Layer Convergence Protocol (PLCP) framing, use the **no** form of this command.

atm framing [**g832adm | g751adm | g751plcp**]
no atm framing [**g832adm | g751adm | g751plcp**]

Syntax Description

g832adm	(Optional) Specifies G.832 ATM direct mapping.
g751adm	(Optional) Specifies G.751 ATM direct mapping.
g751plcp	(Optional) Specifies G.751 PLCP encapsulation. This is the default.

Default

The default framing is **g751plcp**.

Command Mode

Interface configuration

Usage Guidelines

This command was modified in Cisco IOS Release 11.1 CA to include the **g751plcp** keyword and to include information on the Cisco 7200 series routers with the ATM-CES port adapter.

The default framing is described in the ITU-T Recommendation G.751.

Note The ITU-T carries out the functions of the former Consultative Committee for International Telegraph and Telephone (CCITT).

Framing on the interface must match that on the switch for this ATM link.

Example

The following example specifies G.832 ADM framing on a router that has been set up with E3 access to an ATM network:

```
interface atm 4/0
 atm framing g832adm
```

atm lbo

To specify the cable length (line build-out) for the ATM interface, use the **atm lbo** interface configuration command. To return to the default, use the **no** form of this command.

atm lbo {**long** | **short**}
no atm lbo

Syntax Description

long	Specifies a cable length greater than 50 feet.
short	Specifies a cable length of less than 50 feet. This is the default.

Default

short

Command Mode

Interface configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 11.1 CA.

Example

The following example specifies that the ATM interface use a cable less than 50 feet:

```
interface atm 4/0
 atm lbo short
```

Related Command

ces dsx1 lbo

ces aal1 clock

To configure the AAL1 timing recovery clock for the CBR interface, use the **ces aal1 clock** interface configuration command. To return the clock to the default, use the **no** form of this command.

ces aal1 clock {**adaptive | srts | synchronous**}
no ces aal1 clock

Syntax Description

adaptive	Adjusts output clock on a received AAL1 on first-in, first-out basis. Use in unstructured mode.
srts	Sets the clocking mode to synchronous residual time stamp.
synchronous	Configures the timing recovery to synchronous for structured mode.

Default

synchronous

Command Mode

Interface configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 11.1 CA for the ATM-CES port adapter.

The clock mode must be **synchronous** for structured mode. In unstructured mode, use **adaptive** when a network-derived clock is not available.

Use **srts** when a network-derived clock is available but devices attached to the CES port use a different clock reference. The **srts** keyword samples the incoming clock, subtracts from the network clock, and sends the remainder in an AAL1 header. The clock is reconstructed during output by adding the residual to the network reference.

Use **synchronous** for all other modes.

Example

The following command sets the AAL1 timing recovery clock to adaptive mode.

```
interface cbr 4/0
 ces aal1 clock adaptive
```

Related Commands

ces aal1 service
ces dsx1 clock source
network-clock-select

ces aal1 service

To configure the type of circuit emulation service used on the CBR interface, use the **ces aal1 service** interface configuration command.

ces aal1 service {**structured** | **unstructured**}

Syntax Description

structured	Sets the type of service to structured (cross-connect).
unstructured	Sets the type of service to unstructured (clear-channel).

Default

unstructured

Command Mode

Interface configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 11.1 CA for the ATM-CES port adapter.

The **structured** keyword means that each time slot is an independent entity grouped into circuits, where each circuit has an independent PVC.

The **unstructured** keyword reduces the incoming serial data on the receiving end of the ATM network. The keyword also sets the service to single circuit, single PVC, where all time slots are carried.

Example

The following example changes the mode for the **ces aal1 service** command to structured.

```
interface cbr 4/0
 ces aal1 service structured
```

Related Commands

ces aal1 clock
ces circuit
ces dsx1 clock source
ces dsx1 framing
ces dsx1 lbo
ces dsx1 linecode
ces dsx1 loopback
ces dsx1 signalmode robbedbit
ces pvc
show ces circuit
show ces circuit

show ces interface cbr
show ces status
show interface cbr

ces circuit

To configure the connection attributes for the CBR interface, use the **ces circuit** interface command. To return the connection attributes to the default or to enable the circuit, use the **no** form of this command.

ces circuit *circuit-number* [**cas**] [**cdv** *range*] [**circuit-name** *name*] [**on-hook-detection** *hex-number*] [**partial-fill** *range*] [**shutdown]** [**timeslots** *range*]
no ces circuit *circuit-number* [**cas**] [**cdv** *range*] [**circuit-name** *name*] [**on-hook-detection** *hex-number*] [**partial-fill** *range*] [**shutdown]** [**timeslots** *range*]

Syntax Description

circuit-number	Selects the circuit identification. For unstructured service, use 0. For T1 structured service, the range is 1 through 24. For E1 structure service, the range is 1 through 31.
cas	(Optional) Enables channel associated signaling for structured service only. The default is **no cas**.
cdv *range*	(Optional) Enables the peak-to-peak cell delay variation requirement. The range for CDV is 1 through 65535 milliseconds. The default is 2000 milliseconds.
circuit-name *name*	(Optional) Sets the ASCII name for the CES-IWF circuit. The string for the circuit name is 0 through 255. The default is CBRx/x:0.
on-hook-detection *hex-number*	(Optional) Enables detection of whether the circuit is on-hook. Hex values are 0 through F to indicate a 2- or 4-bit AB[CD] pattern to detect on-hook. The AB[CD] bits are determined by the manufacturer of the voice/video telephony device that is generating the CBR traffic.
partial-fill *range*	(Optional) Enables the partial AAL1 cell fill service for structured service only. The range is 0 through 47. The default is 47.
shutdown	(Optional) Marks the CES-IWF circuit administratively down. The default is **no shutdown**.
timeslots *range*	(Optional) Configures the time slots for the CES-IWF circuit for structured service only. The range is 1 through 24 for T1. The range is 1 through 31 for E1.

Default

No circuit is configured.

Command Mode

Interface configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 11.1 CA for the ATM-CES port adapter.

For unstructured service, the circuit number is 0. For T1 structured service, the circuit number is 1 through 24. For E1 structured service, the time slots are 1 through 31.

Channel-associated signaling (CAS) provides information about the time slot (on or off the hook) and is updated once per multiframe.

With both the CAS and on-hook detection features enabled, these features work together to enable an ingress node in an ATM network to monitor on-hook and off-hook conditions for a specified 1 x 64 structured CES circuit. As implied by the notation "1 x 64," the on-hook detection (or bandwidth-release) feature is supported only in a structured CES circuit that involves a single time slot at each end of the connection.

The time slot configured for the structured CES circuit at the ingress node (time slot 2) can be different from the DS0 time slot configured at the egress node (time slot 4). Only one such time slot can be configured at each end of the circuit when the on-hook detection feature is used.

When you invoke the on-hook feature, the ingress ATM-CES port adapter monitors the ABCD bits in the incoming CBR bit stream to detect on-hook and off-hook conditions in the circuit. In an "off-hook" condition, all the bandwidth provisioned for the specified CES circuit is used for transporting ATM AAL1 cells across the network from the ingress node to the egress node.

In an on-hook condition, the network periodically sends dummy ATM cells from the ingress node to the egress node to maintain the connection. However, these dummy cells consume only a fraction of the circuit's reserved bandwidth, leaving the rest of the bandwidth available for use by other network traffic. This bandwidth-release feature enables the network to make more efficient use of its resources.

When the CAS feature is enabled for a CES circuit, the bandwidth of the DS0 channel is limited to 56 kbps for user data, because CAS functions consume 8 kbps of channel bandwidth for transporting the ABCD signaling bits. These signaling bits are passed transparently from the ingress node to the egress node as part of the ATM AAL1 cell stream.

In summary, when the optional CAS and on-hook detection features are enabled, the following conditions apply:

- The permanent virtual connection (PVC) provisioned for the CES circuit always exists.
- The bandwidth for the CES circuit is always reserved.
- During an on-hook state, most of the bandwidth reserved for the CES circuit is not in use. (Dummy cells are sent from the ingress node to the egress node to maintain the connection.) Therefore, this bandwidth becomes available for use by other network traffic, such as available bit rate (ABR) traffic.
- During an off-hook state, all the bandwidth reserved for the CES circuit is dedicated to that circuit.

Example

The following example sets the structured service CDV range to 5000 milliseconds and enables the interface.

```
interface cbr 4/0
 ces circuit 3 cdv 5000
 ces circuit 3 no shutdown
```

Related Commands

ces aal1 service
show ces circuit
show ces circuit
show ces interface cbr
show ces status
show interface cbr

ces dsx1 clock source

To configure a transmit clock source for the CBR interface, use the **ces dsx1 clock source** interface configuration command. To return the clock source to the default, use the **no** form of this command.

ces dsx1 clock source {**loop-timed** | **network-derived**}
no ces dsx1 clock source

Syntax Description

loop-timed	Configures the transmit clock to loop (RX-clock to TX-clock).
network-derived	Configures the transmit clock to be derived from the network.

Default

network-derived

Command Mode

Interface configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 11.1 CA for the ATM-CES port adapter.

Use the command to configure the transmit clock source to the ATM-CES port adapter.

Example

The following example sets the clock source to loop-timed.

```
interface cbr 4/0
 ces dsx1 clock source loop-timed
```

Related Commands

ces aal1 clock
ces aal1 service
network-clock-select
show ces circuit
show ces interface cbr
show interface cbr

ces dsx1 framing

To select the frame type for the data line on the CBR interface, use the **ces dsx1 framing** interface configuration command. To return the frame type to the default, use the **no** form of this command.

ces dsx1 framing {**esf** | **sf**} (for T1)
ces dsx1 framing {**e1_crc_mfCASlt** | **e1_crc_mf_lt** | **e1_lt** | **e1_mfCAS_lt**} (for E1)
no ces dsx1 framing

Syntax Description

esf	Configures the line type to extended super frame for T1. This is the default for T1.
sf	Configures the line type to super frame for T1.
e1_crc_mfCASlt	Configures the line type to E1 CRC with channel-associated signaling (CAS) enabled.
e1_crc_mf_lt	Configures the line type to E1 CRC with CAS disabled.
e1_lt	Configures the line type to E1 with CAS disabled. This is the default for E1.
e1_mfCAS_lt	Configures the line type to E1 with CAS enabled.

Default

esf (for T1)

e1_lt (for E1)

Command Mode

Interface configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 11.1 CA for the ATM-CES port adapter.

Use this command in configurations where the router communicates with the data line. The service provider determines which framing type is required for your circuit.

Example

The following example sets the data line type to super frame.

```
interface cbr 4/0
ces dsx1 framing sf
```

Related Commands

ces aal1 service
show ces circuit
show ces interface cbr
show ces status
show interface cbr

ces dsx1 lbo

To configure cable length for the CBR interface, use the **ces dsx1 lbo** interface configuration command. To return the cable length to the default, use the **no** form of this command.

ces dsx1 lbo *length*
no ces dsx1 lbo

Syntax Description

length	Sets the cable length. Values are (in feet): **0_110**, **110_200**, **220_330**, **330_440**, **440_550**, **550_660**, **660_above**, and **square_pulse**. The default is **0_110** feet.

Default

0_110 feet

Command Mode

Interface configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 11.1 CA for the ATM-CES port adapter.

Set the cable length to the desired number of feet on your system.

Example

The following example sets the cable length to 440 feet:

```
interface cbr 4/0
 ces dsx1 lbo 440_550
```

Related Commands

atm lbo
ces aal1 service
show ces circuit
show ces interface cbr
show ces status
show interface cbr

ces dsx1 linecode

To select the linecode type for the CBR interface, use the **ces dsx1 linecode** interface configuration command. To return the linecode to the default, use the **no** form of this command.

ces dsx1 linecode {**ami** | **b8zs**} (for T1)
ces dsx1 linecode {**ami** | **hdb3**} (for E1)
no ces dsx1 linecode

Syntax Description

ami	Specifies the alternate mark inversion (AMI) as the linecode type. Valid for T1 and E1 interfaces.
b8zs	Specifies B8ZS as the linecode type. Valid for T1 interfaces. This is the default for T1.
hdb3	Specifies HDB3 as the linecode type. Valid for E1 interfaces. This is the default for E1.

Default

b8zs (for T1)
hdb3 (for E1)

Command Mode

Interface configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 11.1 CA for the ATM-CES port adapter.

Use this command in configurations where the switch communicates with the data line. The service provider determines which linecode type is required for your circuit.

Example

The following example specifies B8ZS as the linecode type:

```
interface cbr 4/0
 ces dsx1 linecode b8zs
```

Related Commands

ces aal1 service
show ces circuit
show ces interface cbr
show ces status
show interface cbr

ces dsx1 loopback

To enable a loopback for the CBR interface, use the **ces dsx1 loopback** interface configuration command. To disable the loopback, use the **no** form of this command.

ces dsx1 loopback {**line** | **noloop** | **payload**}
no ces dsx1 loopback {**line** | **noloop** | **payload**}

Syntax Description

line	Sets the received signal to be looped at the line (does not penetrate the line).
noloop	Sets the interface to no loop.
payload	Sets the received signal to be looped through the device and returned.

Default

No loopback is set.

Command Mode

Interface configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 11.1 CA for the ATM-CES port adapter.

This command is useful when testing the circuit emulation port adapter module.

Example

The following example sets a payload loopback:

```
interface cbr 4/0
 ces dsx1 loopback payload
```

Related Commands

ces aal1 service
loopback
show ces circuit
show ces interface cbr
show ces status
show interface cbr

ces dsx1 signalmode robbedbit

To enable the signal mode as robbed bit on a CBR interface, use the **ces dsx1 signalmode robbedbit** interface configuration command. To return the signal mode to the default, use the **no** form of this command.

ces dsx1 signalmode robbedbit
no ces dsx1 signalmode robbedbit

Syntax Description

This command has no keywords or arguments.

Default

No signal mode is enabled.

Command Mode

Interface configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 11.1 CA for the ATM-CES port adapter.

A T1 frame consists of 24 time slots (DS0) that send at a rate of 64 kbps. T1 defines the ability to send signaling in-band on individual time slots by removing the low bit of each byte for signaling in robbedbit mode. This procedure allows 8 kbps for signaling and leaves 56 kbps for data.

In structured mode, you can send the T1 signaling information across the network. This means that after you enable **robbedbit** signaling mode on the port, and enable CAS on individual circuits that need this type of service, you are robbing bits from the DS0. The system then puts the bits in the specified format to be sent across the network and reinserts them at the passive side on the CES-IWF connection.

Example

The following example enables channel associated signaling and robbed bit signaling:

```
interface cbr 4/0
 ces circuit 1 cas
 ces dsx1 signalmode robbedbit
```

Related Commands

ces aal1 service
ces circuit
show ces circuit
show ces interface cbr
show ces status
show interface cbr

ces pvc

To configure the destination port for the circuit on the CBR interface, use the **ces pvc** interface configuration command. To remove the destination port on the circuit, use the **no** form of this command.

ces pvc *circuit-number* {**interface atm** *slot*/*port* **vci** *number* **vpi** *number*}
no ces pvc *circuit-number* {**interface atm** *slot*/*port* **vci** *number* **vpi** *number*}

Syntax Description

circuit-number	Selects the circuit identification. The range is 0 to 24. For unstructured service, use 0. For T1 structure service, the range is 1 through 24. For E1 structure service, the range is 1 through 31.
interface atm *slot*/*port*	Slot and port number of the ATM interface. Used to create a hard PVC. Only a hard PVC can be configured for the CBR interfaces on the ATM-CES port adapter.
vci *number*	Virtual channel identifier of the destination PVC. Range is 1 through 16383.
vpi *number*	Virtual path identifier of the destination PVC. Range is 0 through 255.

Default

No destination port is configured.

Command Mode

Interface configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 11.1 CA for the ATM-CES port adapter.

Use the **interface** option to create a hard PVC. Use the **dest-atm-addr** option to create a soft PVC. Soft PVCs are not supported on Cisco 7200 series routers.

You must configure both sides of the CES circuits because at the source (the active side in CES-IWF), the time slots are not recognized at the destination (the passive side).

Each CES circuit has an ATM address. When configuring the source PVC, you need the destination ATM address.

Examples

The following example shows setting a hard PVC. In this example, the destination of ATM port 0 in slot 1 is assigned to circuit 31 on CBR port 0 in slot 1.

```
interface cbr 1/0
 ces pvc 31 interface atm 1/0 vpi 0 vci 512
```

Related Commands

ces aal1 service
show ces circuit
show ces circuit
show ces interface cbr
show ces status
show interface cbr

interface cbr

To specify the T1 or E1 constant bit rate interface on an ATM-CES port adapter, and enter interface configuration mode, use the **interface cbr** global configuration command.

interface cbr *slot*/*port*

Syntax Description

slot	Backplane slot number.
port	Interface port number.

Default

None

Command Mode

Global configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 11.1 CA for the ATM-CES port adapter.

The ATM-CES port adapter has four T1 (1.544 Mbps) or four E1 (2.048 Mbps) ports (75- or 120-ohm) that can support both structured (N x 64 kbps) and unstructured ATM Forum-compliant circuit emulation services (CES), and one port that supports an OC-3 (155 Mbps) single-mode intermediate reach interface or a T3 (45 Mbps) or E3 (34 Mbps) standards-based ATM interface.

Example

The following example specifies the first T1 or E1 port on the ATM-CES port adapter in slot 1:

```
interface cbr 1/0
```

Related Commands

show ces interface cbr
show interface cbr

loopback

To place the ATM interface into loopback mode, use the following form of the **loopback** interface configuration command. To remove the loopback, use the **no** form of this command.

loopback [**cell** | **diagnostic** | **line** | **payload** | **test**]
no loopback [**cell** | **diagnostic** | **line** | **payload** | **test**]

Syntax Description

cell	(Optional) Places the interface into external loopback at cell level
diagnostic	(Optional) Places the interface into internal loopback at the PLIM.
line	(Optional) Places the interface into external loopback at the line. This is the default.
payload	(Optional) Places the interface into external loopback at the payload level.
test	(Optional) Places the ATM interface into external special test loopback.

Default

line; packets loop from the ATM interface back to the ATM network.

Command Mode

Interface configuration

Usage Guidelines

This command was modified in Cisco IOS Release 11.1 CA for the ATM-CES port adapter.

This command is useful for testing because it loops all packets from the ATM interface back to the interface as well as directing the packets to the network.

Example

The following example loops all packets back to the ATM interface:

```
interface atm 4/0
 loopback diagnostic
```

Related Command

ces dsx1 loopback

network-clock-select

To establish the sources and priorities of the requisite clocking signals for an ATM-CES port adapter, use the **network-clock-select** global configuration command. To remove the clock source, use the **no** form of this command.

network-clock-select *priority* {**cbr** | **atm**} *slot*/*port*
no network-clock-select *priority* {**cbr** | **atm**} *slot*/*port*

Syntax Description

priority	Specifies the priority of the clock source. Values are 1 (highest priority) to 4 (lowest priority).
cbr	Specifies a CBR interface to supply the clock source.
atm	Specifies an ATM interface to supply the clock source.
slot	Backplane slot number.
port	Interface port number.

Default

No priority clock source is established.

Command Mode

Global configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 11.1 CA.

To support synchronous or synchronous residual time stamp (SRTS) clocking modes on the CBR interface, you must specify a primary reference source to synchronize the flow of CBR data from its source to its destination.

You can specify up to four clock priorities. The highest priority active interface in the router supplies primary reference source to all other interfaces that require network clock synchronization services. The fifth priority is the local oscillator on the ATM-CES port adapter.

Use the **show network-clocks** command to display the currently configured clock priorities on the router.

Example

The following example defines two clock priorities on the router:

```
network-clock-select 1 cbr 2/0
network-clock-select 2 atm 2/0
```

Related Commands

ces aal1 clock
ces dsx1 clock source
show network-clocks

show atm interface atm

To display ATM-specific information about an ATM interface, use the **show atm interface atm** privileged EXEC command.

show atm interface atm *slot/port*

Syntax Description

slot/port	Slot number and port number of the interface.

Command Mode

Privileged EXEC

Usage Guidelines

This command was modified in Cisco IOS Release 11.1 CA for the ATM-CES port adapter.

Sample Display

The following is sample output from the **show atm interface atm** command to display statistics on slot 4, port 0:

```
Router# show atm interface atm 4/0

ATM interface ATM4/0:
AAL enabled: AAL5, Maximum VCs: 1024, Current VCs: 6
Tx buffers 256, Rx buffers 256, Exception Queue: 32, Raw Queue: 32
VP Filter: 0x7B, VCIs per VPI: 1024, Max Datagram Size:4496, MIDs/VC:16
PLIM Type:4B5B - 100Mbps, No Framing, TX clocking: LINE
4897 input, 2900 output, 0 IN fast, 0 OUT fast
Rate-Queue 1 set to 100Mbps, reg=0x4EA DYNAMIC, 1 VCCs
ATM4/0.1:AAL3/4-SMDS address c111.1111.1111 Multicast e222.2222.222
Config. is ACTIVE
```

Table 4 describes the fields shown in the display.

Table 4 Show ATM Interface ATM Field Descriptions

Field	Description
ATM interface	Slot and port number of the interface.
AAL enabled	Type of AAL. If both AAL5 and AAL3/4 are enabled on the interface, the output will include both AAL5 and AAL3/4.
Maximum VCs	Maximum number of virtual circuits this interface can support.
Current VCs	Number of active virtual circuits.
Tx buffers, Rx buffers	Number of transmit and receive buffers.
Exception Queue	Number of exception buffers.
Raw Queue	Queue size.
VP Filter	Hexadecimal value of the VP filter.
VCIs per VPI	Maximum number of VCIs to support per VPI.

Table 4 Show ATM Interface ATM Field Descriptions (Continued)

Field	Description
Max Datagram Size	The configured maximum number of bytes in the largest datagram.
MIDs/VC	The configured maximum number of message identifiers allowed per virtual circuit on this interface.
PLIM Type	Physical Layer Interface Module (PLIM) type (E3, 4B/5B, or SONET).
Framing	For E3, this might be G.804; otherwise, no framing.
TX clocking	Clocking on the router. For E3 or SONET, this might be INTERNAL, meaning the AIP or NPM generates the clock. Otherwise, LINE indicates that the ATM switch provides the clocking.
input	Number of packets received and process-switched.
output	Number of packets sent from process switch.
IN fast	Number of input packets fast-switched.
OUT fast	Number of output packets fast-switched.
Rate-Queue	List of configured rate queues.
reg=	Actual register value passed to the AIP to define a specific rate queue (AIP only).
DYNAMIC	Indicates that the rate queue is dynamic and was created automatically by the software. Dynamic rate queues are created when an **atm pvc** command specifies a peak or average rate that does not match any user configured rate queue. The value PERMANENT indicates that the rate queue was user-configured.
VCCs	Number of virtual channel connections (VCCs) dynamically attached to this rate queue.
ATM4/0.1	Indicates that the subinterface supports ATM adaptation layer AAL3/4 and displays the SMDS E.164 unicast address and the SMDS E.164 multicast address assigned to the subinterface.
Config. is	ACTIVE or VALID in *n* SECONDS. ACTIVE indicates that the current AIP or NPM configuration has been loaded into the AIP and is being used. There is a 5-second window when a user changes a configuration and the configuration is sent to the AIP.

Related Command

atm pvc

show atm map

To display the list of all configured ATM static maps to remote hosts on an ATM network, use the **show atm map** privileged EXEC command.

show atm map

Syntax Description

This command has no arguments or keywords.

Command Mode

Privileged EXEC

Usage Guidelines

This command was modified in Cisco IOS Release 11.1 CA to include a sample display for the ATM-CES port adapter.

Sample Display

The following is sample output from the **show atm map** command for an ATM-CES port adapter on the Cisco 7200 series router.

```
Router# show atm map
Map list alien: PERMANENT
ip 128.1.1.1 maps to VC 6
ip 128.1.1.2 maps to VC 6
```

Table 5 describes the fields shown in the display.

Table 5 Show ATM Map Field Descriptions

Field	Description
Map list	Name of map list.
PERMANENT	This map entry was entered from configuration; it was not entered automatically by a process.
protocol address maps to VC *x*	Name of protocol, the protocol address, and the VCD that the address is mapped to.

Related Commands

atm pvc
map-list

show atm traffic

To display current, global ATM traffic information to and from all ATM networks connected to the router, use the **show atm traffic** privileged EXEC command.

show atm traffic

Syntax Description

This command has no arguments or keywords.

Command Mode

Privileged EXEC

Usage Guidelines

This command was modified in Cisco IOS Release 11.1 CA to include a sample display for the ATM-CES port adapter.

Sample Display

The following is sample output from the **show atm traffic** command for an ATM-CES port adapter on the Cisco 7200 series router.

```
Router# show atm traffic
0 Input packets
1044 Output packets
1021 Broadcast packets
0 Packets received on non-existent VC
0 Packets attempted to send on non-existent VC
0 OAM cells received
0 OAM cells sent
```

Table 6 describes the fields shown in the display.

Table 6 Show ATM Traffic Field Descriptions

Field	Description
Input packets	Total packets input.
Output packets	Total packets output (nonbroadcast).
Broadcast packets	Total broadcast packets output.
Packets received on nonexistent VC	Packets received on virtual circuits not configured.
Packets attempted to send on nonexistent VC	Packets that were attempted to be sent on a virtual circuit that was not configured.
OAM cells received	Total Operation, Administration, and Maintenance (OAM) cells received.
Cells sent	Total cells sent.

Related Command

atm pvc

show atm vc

To display all active ATM virtual circuits (PVCs and SVCs) and traffic information, use the **show atm vc** privileged EXEC command.

show atm vc [*vcd*]

Syntax Description

vcd	(Optional) Specifies which virtual circuit to display information about.

Command Mode

Privileged EXEC

Usage Guidelines

This command was modified in Cisco IOS Release 11.1 CA to include a sample display for the ATM-CES port adapter.

If no *vcd* value is specified, the command displays information for all PVCs and SVCs. The output is in summary form (one line per virtual circuit).

Sample Displays

The following is sample output from the **show atm vc** command when no *vcd* value is specified, displaying statistics for all PVCs for an ATM-CES port adapter on a Cisco 7200 series router. The status field is either ACTIVE or INACTIVE.

```
Router# show atm vc
                                        AAL /         Peak   Avg.  Burst
Interface     VCD   VPI   VCI Type  Encapsulation  Kbps   Kbps  Cells Status
ATM6/0          1     0    16  PVC  AAL5-ILMI     155000 155000    94 ACTIVE
ATM6/0          2     0     5  PVC  AAL5-SAAL     155000 155000    94 ACTIVE
ATM6/0.1      303     0   282  SVC  LANE-LES      155000 155000    32 ACTIVE
ATM6/0.1      304     0   281  SVC  LANE-LEC      155000 155000    32 ACTIVE
ATM6/0.1      307     0   286 MSVC  LANE-LEC      155000 155000    32 ACTIVE
ATM6/0.1      308     0   285 MSVC  LANE-LES      155000 155000    32 ACTIVE
ATM6/0.1      309     0   288  SVC  LANE-BUS      155000 155000    32 ACTIVE
ATM6/0.1      310     0   287  SVC  LANE-LEC      155000 155000    32 ACTIVE
ATM6/0.1      311     0   290 MSVC  LANE-LEC      155000 155000    32 ACTIVE
ATM6/0.1      312     0   289 MSVC  LANE-BUS      155000 155000    32 ACTIVE
ATM6/0.1      314     0   292  SVC  LANE-LES      155000 155000    32 ACTIVE
ATM6/0.1      315     0   293  SVC  LANE-BUS      155000 155000    32 ACTIVE
```

The following is sample output from the **show atm vc** command when a *vcd* value *is* specified, displaying statistics for that virtual circuit only.

```
Router# show atm vc 8

ATM4/0: VCD: 8, VPI: 8, VCI: 8, etype:0x0, AAL5 - LLC/SNAP, Flags: 0x30
PeakRate: 0, Average Rate: 0, Burst: 0 *32cells, VCmode: 0xE000
InPkts: 181061, OutPkts: 570499, InBytes: 757314267, OutBytes: 2137187609
InPRoc: 181011, OutPRoc: 10, Broadcasts: 570459
InFast: 39, OutFast: 36, InAS: 11, OutAS: 6
```

The following is sample output from the **show atm vc** command when generation of OAM F5 loopback cells has been enabled.

```
Router# show atm vc 7
ATM4/0: VCD: 7, VPI: 7, VCI: 7, etype:0x0, AAL5 - LLC/SNAP, Flags: 0x30
PeakRate: 0, Average Rate: 0, Burst: 0 *32cells, VCmode: 0xE000
OAM frequency: 10, InARP DISABLED
InPkts: 0, OutPkts: 0, InBytes: 0, OutBytes: 0
InPRoc: 0, OutPRoc:0, Broadcast:0
InFast:0, OutFast:0, InAS:0, OutAS:0
OAM F5 cells sent: 1, OAM cells received: 0
```

The following is sample output from the **show atm vc** command for an incoming multipoint virtual circuit.

```
Router# sh atm vc 3
ATM2/0: VCD: 3, VPI: 0, VCI: 33, etype:0x809B, AAL5 - MUX, Flags: 0x53
PeakRate: 0, Average Rate: 0, Burst: 0, VCmode: 0xE000
OAM DISABLED, InARP DISABLED
InPkts: 6646, OutPkts: 0, InBytes: 153078, OutBytes: 0
InPRoc: 6646, OutPRoc: 0, Broadcasts: 0
InFast: 0, OutFast: 0, InAS: 0, OutAS: 0
interface =  ATM2/0, call remotely initiated, call reference = 18082
vcnum = 3, vpi = 0, vci = 33, state = Active
 aal5mux vc, multipoint call
Retry count: Current = 0, Max = 10
timer currently inactive, timer value = never
Root Atm Nsap address: DE.CDEF.01.234567.890A.BCDE.F012.3456.7890.1234.12
```

The following is sample output from the **show atm vc** command for an outgoing multipoint virtual circuit.

```
Router# sh atm v 6
ATM2/0: VCD: 6, VPI: 0, VCI: 35, etype:0x800, AAL5 - MUX, Flags: 0x53
PeakRate: 0, Average Rate: 0, Burst: 0, VCmode: 0xE000
OAM DISABLED, InARP DISABLED
InPkts: 0, OutPkts: 818, InBytes: 0, OutBytes: 37628
InPRoc: 0, OutPRoc: 0, Broadcasts: 818
InFast: 0, OutFast: 0, InAS: 0, OutAS: 0
interface =  ATM2/0, call locally initiated, call reference = 3
vcnum = 6, vpi = 0, vci = 35, state = Active
 aal5mux vc, multipoint call
Retry count: Current = 0, Max = 10
timer currently inactive, timer value = never
Leaf Atm Nsap address: DE.CDEF.01.234567.890A.BCDE.F012.3456.7890.1234.12
Leaf Atm Nsap address: CD.CDEF.01.234567.890A.BCDE.F012.3456.7890.1234.12
```

Table 7 describes the fields shown in the displays.

Table 7 Show ATM VC Field Descriptions

Field	Description
Intfc.	Interface slot and port.
VCD	Virtual circuit descriptor (virtual circuit number).
VPI	Virtual path identifier.
VCI	Virtual channel identifier.
Type	Type of virtual circuit, either PVC or SVC.
AAL/Encaps	Type of ATM adaptation layer (AAL) and encapsulation.
etype	Ethernet type.

Table 7 Show ATM VC Field Descriptions (Continued)

Field	Description
Flags	Bit mask describing virtual circuit information. The flag values are summed to result in the displayed value. 0x40 SVC 0x20 PVC 0x10 ACTIVE 0x1 AAL5-SNAP 0x2 AAL5-NLPID 0x3 AAL5-FRNLPID 0x4 AAL5-MUX 0x5 AAL3/4-SMDS 0x6 QSAAL
PeakRate	Number of packets transmitted at the peak rate.
Average Rate	Number of packets transmitted at the average rate.
Burst	Value that, when multiplied by 32, equals the maximum number of ATM cells the virtual circuit can transmit at the peak rate of the virtual circuit.
VCmode	AIP-specific or NPM-specific register describing the usage of the virtual circuit. Contains values such as rate queue, peak rate, and AAL mode, which are also displayed in other fields.
InPkts	Total number of packets received on this virtual circuit. This number includes all silicon-switched, fast-switched, autonomous-switched, and process-switched packets.
OutPkts	Total number of packets sent on this virtual circuit. This number includes all silicon-switched, fast-switched, autonomous-switched, and process-switched packets.
InBytes	Total number of bytes received on this virtual circuit. This number includes all silicon-switched, fast-switched, autonomous-switched, and process-switched bytes.
OutBytes	Total number of bytes sent on this virtual circuit. This number includes all silicon-switched, fast-switched, autonomous-switched, and process-switched bytes.
InPRoc	Number of process-switched input packets.
OutPRoc	Number of process-switched output packets.
Broadcast	Number of process-switched broadcast packets.
InFast	Number of fast-switched input packets.
OutFast	Number of fast-switched output packets.
InAS	Number of autonomous-switched or silicon-switched input packets.
OutAS	Number of autonomous-switched or silicon-switched output packets.
OAM frequency: 10	OAM cells are sent every 10 seconds.
OAM F5 cells sent: 1	Number of OAM cells sent on this virtual circuit.
OAM cells received: 0	Number of OAM cells received on this virtual circuit.

Related Command

atm pvc

show ces circuit

To show detailed circuit information for the CBR interface, use the **show ces circuit** privileged EXEC command.

show ces circuit [**interface cbr** *slot/port* [*circuit-number*]]

Syntax Description

interface cbr *slot/port*	(Optional) Slot and port number of the CBR interface.
circuit-number	(Optional) Circuit identification. For unstructured service, use 0. For T1 structure service, the range is 1 through 24. For E1 structure service, the range is 1 through 31.

Command Mode

Privileged EXEC

Usage Guidelines

This command first appeared in Cisco IOS Release 11.1 CA for the ATM-CES port adapter.

Examples

The following is sample output from the **show ces circuit** command.

```
Switch# show ces circuit
Interface  Circuit  Circuit-Type     X-interface   X-vpi   X-vci  Status
 CBR6/0      1       HardPVC           ATM6/0        0       34  UP
 CBR6/1      1       HardPVC           ATM6/1        0       34  UP
```

Table 8 describes the fields shown in the display.

Table 8 Show CES Circuit Field Descriptions

Field	Description
Interface	Type, slot, and port number of the interface.
Circuit	Circuit number assigned to the PVC.
Circuit-Type	Type of circuit.Values are HardPVC or SoftPVC. Only HardPVC is supported on the ATM-CES port adapter.
X-interface	Type, slot, and port number of the destination interface.
X-vpi	Virtual path identifier of the destination interface.
X-vci	Virtual channel identifier of the destination interface.
Status	State of the circuit. Values are Up or Down.

The following is sample output from the **show ces circuit** command for a circuit 1 on CBR interface 6/0.

```
Switch# show ces circuit interface cbr 6/0 1
circuit: Name CBR6/0:1, Circuit-state ADMIN_UP / Interface CBR6/0, Circuit_id 1,
Port-Type T1, Port-State UP
Port Clocking network-derived, aal1 Clocking Method CESIWF_AAL1_CLOCK_Sync
Channel in use on this port: 1
Channels used by this circuit: 1
Cell-Rate: 171, Bit-Rate 64000
cas OFF, cell-header 0X3E80 (vci = 1000)
Configured CDV 2000 usecs, Measured CDV unavailable
ErrTolerance 8, idleCircuitdetect OFF, onHookIdleCode 0x0
state: VcActive, maxQueueDepth       128, startDequeueDepth       111
Partial Fill:       47, Structured Data Transfer 24
HardPVC
src: CBR6/0 vpi 0, vci 16
Dst: ATM6/0 vpi0, vci 1000
```

Table 8 describes the fields shown in the display.

Table 9 Show CES Circuit Interface Field Descriptions

Field	Description
circuit Name	Name of the circuit specified with the **ces circuit** interface command.
Circuit-state	Current configuration state of the circuit. Values are ADMIN_UP or ADMIN_DOWN.
Interface	Type, slot, and port number of the interface.
Circuit_ID	Circuit identification specified with the **ces pvc** interface command.
Port-Type	Type of interface on the ATM-CES port adapter. Values are T1 or E1.
Port-State	Current status of the port. Values are Up or Down.
Port Clocking	Clocking mode used by the interface specified with the **ces dsx1 clock** interface command. Values are Loop-Timed or Network-Derived Adaptive.
aal1 Clocking Method	AAL1 clocking mode used by the interface specified with the **ces aal1 clock** interface command. Values are Adaptive, Synchronous Residual Time Stamp (SRTS), or Synchronous.
Channel in use on this port	Number of active channels used by this interface.
Channels used by this circuit	Number of channels used by the circuit
Cell-Rate	Number of cells transmitted or received on the interface per second.
Bit-Rate	Speed at which the cells are transmitted or received.
cas	Indicates whether channel-associated signaling (CAS) is enabled on the interface with the **ces circuit** interface command.
cell-header	ATM cell header VCI bytes used for debugging only.
Configured CDV	Indicates the peak-to-peak cell delay variation (CDV) requirement (CDV) in milliseconds specified with the **ces circuit** interface command. The range for CDV is 1 through 65535 milliseconds. The default is 2000 milliseconds.
Measured CDV	Indicates the actual cell delay variation in milliseconds.
ErrTolerance	For internal use only.

Table 9 Show CES Circuit Interface Field Descriptions (Continued)

Field	Description
idleCircuitdetect	Indicates whether idle circuit detection is enabled (ON) or disabled (OFF).
onHookIdleCode	Indicates that the on-hook detection feature is enabled with the **ces circuit** interface command and the hex value (0 through F) that indicates a 2 or 4 bit AB[CD] pattern to detect on-hook. The AB[CD] bits are determined by the manufacturer of the voice/video telephony device that is generating the CBR traffic.
state	Current state of the circuit. Values are VcActive, VcInactive, VcLOC (loss of cell), or VcAlarm (alarm condition).
maxQueueDepth	Maximum queue depth in bits.
startDequeueDepth	Start dequeue depth in bits.
Partial Fill	Indicates the partial AAL1 cell fill service for structured service only specified by the **ces circuit** interface command. The range is 0 through 47. The default is 47.
Structured Data Transfer	Size (in bytes) of the structured data transfer frame.
HardPVC	Only hard PVC are supported by the ATM-CES port adapter.
src	Source interface type, slot, and port number and VPI and VCI for the circuit.
Dst	Destination interface interface type, slot, and port number and the VPI and VCI for the circuit.

Related Commands

show ces circuit
show ces status

show ces interface cbr

To show detailed CBR port information, use the **show ces interface cbr** privileged EXEC command.

show ces interface cbr *slot*/*port*

Syntax Description

slot	Backplane slot number.
port	Interface port number.

Command Mode

Privileged EXEC

Usage Guidelines

This command first appeared in Cisco IOS Release 11.1 CA for the ATM-CES port adapter.

Example

The following is sample output from the **show ces circuit** command for CBR interface 6/0.

```
router# show ces interface cbr 6/0
Interface:      CBR6/0          Port-type:T1-DCU
IF Status:      UP              Admin Status: UP
Channels in use on this port: 1
LineType: ESF           LineCoding: B8ZS  LoopConfig: NoLoop
SignalMode: NoSignalling   XmtClockSrc: network-derived
DataFormat: Structured     AAL1 Clocking Mode: Synchronous  LineLength: 0_110
LineState: LossOfSignal
Errors in the Current Interval:
  PCVs        0   LCVs        0   ESs         0   SESs        0   SEFSs       0
  UASs        0   CSSs        0   LESs        0   BESs        0   DMs         0
Errors in the last 24Hrs:
  PCVs      514   LCVs        0   ESs         0   SESs        1   SEFSs       0
  UASs        0   CSSs        0   LESs        0   BESs        0   DMs         0
Input  Counters: 0 cells, 0 bytes
Output Counters: 0 cells, 0 bytes
```

Table 10 describes the fields shown in the display.

Table 10 Show CES Circuit Interface CBR Field Descriptions

Field	Description
Interface	Type, slot, and port number of the interface.
Port-type	Type of port on the ATM-CES port adapter. Values are: T1-DCU or E1-DCU.
IF Status	Status of the interface. Values are Up or Down.
Admin Status	Configured status of the interface. Values are Up or Down (administratively configured down).
Channels in use on this port	Number of active channels used by this interface.

Table 10 Show CES Circuit Interface CBR Field Descriptions (Continued)

Field	Description
LineType	Framing used on the interface specified with the **ces dsx1 framing** interface command. Values are ESF or SF for T1 and E1-CRC-MFCASLT, E1-CRC-MFLT, E1-LT, or E1-MFCASLT for E1.
LineCoding	Line coding used on the interface specified with the **ces dsx1 linecode** interface command. Values are AMI, B8ZS (for T1), and HDB3 (for E1).
LoopConfig	Indicates whether the interface in in a loop state specified by the **ces dsx1 loopback** interface command. Values are line loopback, payload loopback, or noloop.
SignalMode	For T1 to use robbed bit signaling or not.
XmitClockSrc	Transmit clock source specified by the **ces dsx1 clock** interface command. Values are loop-timed or network-derived.
DataFormat	Type of CES services specified by the **ces aal1 service** interface command. Values are structured or unstructured.
AAL1 Clocking Mode	AAL1 clocking mode used by the interface specified with the **ces aal1 clock** interface command. Values are adaptive, synchronous residual time stamp (SRTS), or synchronous.
LineLength	Cable length specified by the **ces dsx1 lbo** interface command. Values are 0-110, 10-200, 220-330, 330-440, 440-550, 550-660, 660-above, and square-pulse.
LineState	Current status of the line. Values are: • Unknown • NoAlarm • RcvFarEndLOF • XmtFarEndLOF • RcvAIS • XmtAIS • LossOfFrame • LossOfSignal • LoopbackState • T16AIS
Errors in the Current Interval	Error statistics received during the current 15-minute interval.
PCVs	Number of Path Code Violations (PCVs). PCVs indicate a frame synchronization bit error in the D4 and E1 no-CRC formats, or a CRC error in the ESF and E1 CRC formats.
LCVs	Number of Line Code Violations (LCVs). LCVs indicate the occurrence of either a Bipolar Violation (BPV) or Excessive Zeros (EXZ) error event.
ESs	Number of errored seconds. In ESF and E1 CRC links, an Errored Second is a second in which one of the following are detected: one or more Path Code Violations, one or more Out of Frame defects, one or more Controlled Slip events, or a detected AIS defect. For SF and E1 no-CRC links, the presence of Bipolar Violations also triggers an Errored Second.

Table 10 Show CES Circuit Interface CBR Field Descriptions (Continued)

Field	Description
SESs	Number of Severely Errored Seconds (SESs). A SESs is a second with 320 or more path code violation errors events, one or more Out of Frame defects, or a detected AIS defect.
SEFSs	Number of Severely Errored Framing Seconds (SEFS). SEFS is a second with one or more Out of Frame defects or a detected incoming AIS.
UASs	Number of Unavailable Seconds (UASs). UAS is a count of the total number of seconds on the interface.
CSSs	Number of Controlled Slip Second (CSS). CSS is a 1-second interval containing one or more controlled slips.
LESs	Number of Line Errored Seconds (LES). LES is a second in which one or more Line Code Violation errors are detected.
BESs	Number of Bursty Errored Seconds (BES). BES is a second with fewer than 320 and more than one Path Coding Violation error, no Severely Errored Frame defects, and no detected incoming AIS defects. Controlled slips are not included in this parameter.
DMs	Number of Degraded Minutes (DMs). A degraded minute is one in which the estimated error rate exceeds 1E-6 but does not exceed 1E-3. For more information, refer to RFC 1406.
Errors in the last 24Hrs	Error statistics received during the during the last 24 hours.
Input Counters	Number of cells and bytes received on the interface.
Output Counters	Number of cells and bytes.

Related Command

show interface cbr

show ces status

To display the status of the ports on the ATM-CES port adapter, use the **show ces status** privileged EXEC command.

show ces status

Syntax Description

This command has no keywords or arguments.

Command Mode

Privileged EXEC

Usage Guidelines

This command first appeared in Cisco IOS Release 11.1 CA for the ATM-CES port adapter.

Example

The following is sample output from the **show ces status** command. This output shows the interface name, the status of the interface, the administrative status of the interface, the port type, and the number of channels in use on the interface. The status of the interface can be UP (in operation) or DOWN (not in operation).

```
Router# show ces status
Interface          IF      Admin         Port   Channels in
  Name           Status   Status         Type        use
-------------- -------- --------- ----------- -----------
     CBR0/0/0       UP        UP           T1         1-24
     CBR0/0/1       UP        UP           T1         1-24
     CBR0/0/2       UP        UP           T1         1-24
     CBR0/0/3       UP        UP           T1
```

Related Command

show ces circuit

show interface cbr

To display the information about the constant bit rate (CBR) interface on the ATM-CES port adapter, use the **show interface cbr** privileged EXEC command.

show interface cbr

Syntax Description

This command has no keywords or arguments.

Command Mode

Privileged EXEC

Usage Guidelines

This command first appeared in Cisco IOS Release 11.1 CA for the ATM-CES port adapter.

Example

The following is sample output from the **show interface cbr** command.

```
Switch# show interface cbr 6/0
CBR6/0 is up, line protocol is up
  Hardware is DCU
  MTU 0 bytes, BW 1544 Kbit, DLY 0 usec, rely 255/255, load 248/255
  Encapsulation ET_ATMCES_T1, loopback not set
  Last input 00:00:00, output 00:00:00, output hang never
  Last clearing of "show interface" counters never
  Queueing strategy: fifo
  Output queue 0/0, 0 drops; input queue 0/75, 0 drops
  5 minute input rate 1507000 bits/sec, 3957 packets/sec
  5 minute output rate 1507000 bits/sec, 3955 packets/sec
     3025960 packets input, 142220120 bytes, 0 no buffer
     Received 0 broadcasts, 0 runts, 0 giants
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     3030067 packets output, 142413149 bytes, 0 underruns
     0 output errors, 0 collisions, 0 interface resets
     0 output buffer failures, 0 output buffers swapped out
```

Table 11 describes the fields shown in the display.

Table 11 Show Interface CBR Field Descriptions

Field	Description
CBR6/0 is...	Type, slot, and port number of the interface and indicates whether the interface hardware is currently active (whether carrier detect is present), down, or if it has been taken down by an administrator.
line protocol is...	Indicates whether the software processes that handle the line protocol think the line is usable (that is, whether keepalives are successful). Values are up, down, or administratively down.
Hardware is...	Hardware type.
MTU	Maximum transmission unit of the interface.
BW	Bandwidth of the interface in kilobits per second.

Table 11 Show Interface CBR Field Descriptions (Continued)

Field	Description
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 **bandwidth** interface configuration command.
Encapsulation	Encapsulation method assigned to interface.
loopback not set	Indicates whether or not loopback is set.
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. *** indicates 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.
Queueing strategy	First-in, first-out queuing strategy (other queueing strategies you might see are priority-list, custom-list, and weighted fair).
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.
5 minute input rate, 5 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.
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.

Table 11 Show Interface CBR Field Descriptions (Continued)

Field	Description
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	Cyclic redundancy checksum generated by the originating LAN station or far end device does not match the checksum calculated from the data received. On a LAN, this usually indicates noise or transmission problems on the LAN interface or the LAN bus itself. A high number of CRCs is usually the result of collisions or a station transmitting bad data. On a serial link, CRCs usually indicate noise, gain hits or other transmission problems on the data link.
frame	Number of packets received incorrectly having a CRC error and a noninteger number of octets.
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.
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 the interface. This usually indicates a clocking problem between the interface and the data link equipment.
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	Number of times that the transmitter has been running faster than the router can handle. This may never be reported on some interfaces.
output errors	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.
collisions	Because collisions do not occur on CBR interfaces, this statistic is always zero.
interface resets	Number of times an interface has been reset. The interface may be reset by the administrator or automatically when an internal error occurs.
output buffer failures	Number of no resource errors received on the output.
output buffers swapped out	Number of packets swapped to DRAM.

Related Command

show ces interface cbr

show network-clocks

To show which ports are designated as network clock sources, use the **show network-clocks** EXEC command.

show network-clocks

Syntax Description

This command has no keywords or arguments.

Command Mode

EXEC

Usage Guidelines

This command first appeared in Cisco IOS Release 11.1 CA for the ATM-CES port adapter.

Example

The following is sample output from the **show network-clocks** EXEC command.

```
Switch# show network-clocks
Priority 1 clock source: ATM3/0/0
Priority 2 clock source: System clock
Priority 3 clock source: System clock
Priority 4 clock source: System clock

Current clock source:ATM3/0/0, priority:1
```

Related Command

network-clock-select

Supported MIBs

The ATM UNI specification defines the required management information base (MIB) functionality for ATM interfaces. MIB attributes are readable and writable across the Interim Local Management Interface (ILMI) by using the Simple Network Management Protocol (SNMP). The ILMI uses SNMP, without UDP, and Internet Protocol (IP) addressing along with the ATM MIB.

The ATM-CES port adapter fully supports RFC 1213 and a subset of the following interface MIBS: RFC 1406, RFC 1407, and SONET MIB RFC 1595.

For RFC1406, we support DS1 Near End Group including—DS1 Configuration Table, DS1 Current Table, DS1 Interval Table, and DS1 Total Table.

For RFC1406, we do not support DS1 Far End Group and DS1 Fractional Group.

For RFC1407, we support DS3 Near End Group including—DS3/E3 Configuration Table, DS3/E3 Current Table, DS3/E3 Interval Table, and DS3/E3 Total Table.

For RFC1407, we do not support DS3 Far End Group and DS3/E3 Fractional Group.

For RFC1595, we support SONET Medium Group including—sonetMediumTable; SONET Section Group including—sonetSectionCurrentTable and sonetSectionIntervalTable; SONET Line Group including—sonetLineCurrentTable, sonetLineIntervalTable; and SONET Path Group including—sonetPathCurrentTable and sonetPathIntervalTable.

For RFC1595, we do not support SONET Far End Line Group, SONET Far End Path Group, SONET VT Group, and SONET Far End VT Group.

Note Refer to the ATM UNI specification for additional details on the MIBs.

What to Do Next

For more information on the ATM-CES port adapter, refer to the *PA-A2 ATM-CES Port Adapter Installation and Configuration* publication. Also refer to the "PA-A2 ATM-CES Port Adapter Enhancements" section in this document.