AAL1 CES on AIM-ATM

The AAL1 CES on AIM-ATM feature adds circuit emulation service (CES) over ATM AAL1 to Cisco 3660 and Cisco 3745 routers.

Finding Feature Information

Your software release may not support all the features documented in this module. For the latest caveats and feature information, see Bug Search Tool and the release notes for your platform and software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the feature information table.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to www.cisco.com/go/cfn. An account on Cisco.com is not required.

Prerequisites for AAL1 CES on AIM-ATM

The AAL1 CES on AIM-ATM feature requires a Cisco 3660 or Cisco 3745 with an AIM-ATM or AIM-ATM-VOICE-30 installed.

Restrictions for AAL1 CES on AIM-ATM

- AIM-ATM and AIM-ATM-VOICE-30 network modules support a maximum of four T1/E1s. This can consist of two incoming and two outgoing, or three incoming and one outgoing T1/E1s. An IMA group cannot be split between multiple AIMs.
- You cannot install two AIM-ATM modules in a cellular site router. If two AIMs are needed, install one AIM-ATM and one AIM-ATM-VOICE-30.
- This feature supports only synchronous clocking. SRTS and adaptive clocking are not supported.
- This feature supports only structured CES without CAS.
- ATM subinterfaces do not support AAL1 CES.

Information About AAL1 CES on AIM-ATM

The AAL1 CES on AIM-ATM feature, along with the ATM Cell Switching and Lossless Compression R1 feature, enables wireless service providers to optimize the bandwidth used to backhaul the traffic from a cell site to the mobile central office for more efficient use of existing T1 and E1 lines.

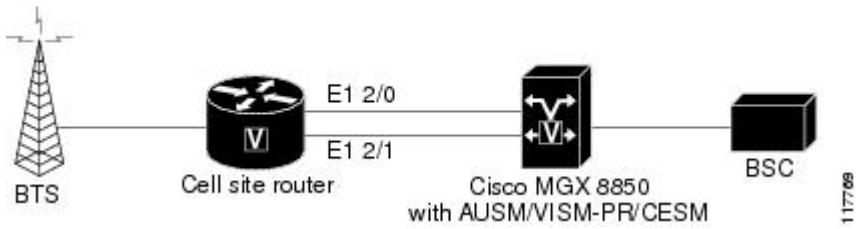
CES

CES is a technique specified by the ATM Forum for carrying constant bit-rate traffic over an ATM network. CES is a cell-based technology where voice traffic is adapted for an ATM network using AAL1, and the circuit is emulated across an ATM network.

How to Configure AAL1 CES on AIM-ATM

The sample configuration in this section is based on the figure below.

Figure 1: AAL1 CES on AIM-ATM Sample Configuration



Configuring AAL1 CES on AIM-ATM

To configure AAL1 CES on AIM-ATM, perform the steps in this section.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **network-clock-participate slot** *number*
4. **network-clock-participate slot** *number*
5. **network-clock-participate aim** *number*
6. **controller t1** | **e1** *slot* / *port*
7. **mode atm aim** *aim-slot*
8. **controller t1** | **e1** *slot* / *port*
9. **tdm-group** *tdm-group-no* **timeslots** *timeslot-list*
10. **tdm-group** *tdm-group-no* **timeslots** *timeslot-list*
11. **interface atm** *interface-number* /*subinterface-number*
12. **pvc** *vpi* / *vci* [**ces**]
13. **ces-cdv** *time*
14. **exit**
15. **pvc** *vpi* / *vci* **ces**
16. **ces-cdv** *time*
17. **exit**
18. **exit**
19. **connect** connection-name **atm** slot/port [name of PVC/SVC | vpi/vci] **T1** slot/port TDM-group-number
20. **connect** connection-name **atm** slot/port [name of PVC/SVC | vpi/vci] **T1** slot/port TDM-group-number

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. Enter your password when prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**network-clock-participate slot** *number* **Example:** `Router(config)# network-clock-participate slot 1`	Enables the network module in the specified slot to use the network clock for its timing.

	Command or Action	Purpose
Step 4	**network-clock-participate slot** *number* **Example:** `Router(config)# network-clock-participate slot 2`	Enables the network module in the specified slot to use the network clock for its timing.
Step 5	**network-clock-participate aim** *number* **Example:** `Router(config)# network-clock-participate aim 0`	Specifies that the AIM in Slot 0 will derive clocking from the network source.
Step 6	**controller t1** | **e1** *slot* / *port* **Example:** `Router(config)# controller e1 1/0`	Enters controller configuration mode for the selected T1 or E1.
Step 7	**mode atm aim** *aim-slot* **Example:** `Router(config-controller)# mode atm aim 1`	Sets the mode of the T1 or E1 controller in AIM Slot 1.
Step 8	**controller t1** | **e1** *slot* / *port* **Example:** `Router(config)# controller e1 2/0`	Enters controller configuration mode for the selected T1 or E1.
Step 9	**tdm-group** *tdm-group-no* **timeslots** *timeslot-list* **Example:** `Router(config-controller)# tdm-group 1 timeslots 1`	Configure a TDM channel group for the T1 or E1 interface. *tdm-group-no* is a value from 0 to 23 for T1 and from 0 to 30 for E1; it identifies the group. *timeslot-list* is a single number, numbers separated by commas, or a pair of numbers separated by a hyphen to indicate a range of timeslots. The valid range is from 1 to 24 for T1. For E1, the range is from 1 to 31.
Step 10	**tdm-group** *tdm-group-no* **timeslots** *timeslot-list* **Example:** `Router(config-controller)# tdm-group 2 timeslots 17-31`	Configure a TDM channel group for the T1 or E1 interface.
Step 11	**interface atm** *interface-number* /*subinterface-number* **Example:** `Router(config) # interface atm 1/0`	Enters configuration mode for the selected ATM interface.

	Command or Action	Purpose
Step 12	**pvc** *vpi* / *vci* [**ces**] **Example:** `Router(config-if)# pvc 4/44 ces`	Creates a PVC for the virtual path identifier (VPI) and virtual channel identifier (VCI) and specifies CES encapsulation. Enters interface-ATM-VC configuration mode.
Step 13	**ces-cdv** *time* **Example:** `Router(config-if-ces -vc)# ces-cdv 500`	Configures the cell delay variation (CDV). The configuration command has the format **ces-cdv** <time> where the time is the maximum tolerable cell arrival jitter with a range of 1 to 65535 microseconds.
Step 14	**exit** **Example:** `Router(config-if-ces-v c)# exit`	Exits back to interface configuration mode.
Step 15	**pvc** *vpi* / *vci* **ces** **Example:** `Router(config-if)# pvc 8/88 ces`	Creates a second PVC and enters interface-ATM-VC configuration mode.
Step 16	**ces-cdv** *time* **Example:** `Router(config-if-ces -vc)# ces-cdv 1000`	Configures the CDV for 1000 microseconds.
Step 17	**exit** **Example:** `Router(config-if-ces -vc)# exit`	Exits back to interface configuration mode.
Step 18	**exit** **Example:** `Router(config-i f)# exit`	Exits back to configuration mode.
Step 19	**connect** connection-name **atm** slot/port [name of PVC/SVC | vpi/vci] **T1** slot/port TDM-group-number **Example:** `Router(config)# connect alpha ATM 1/0 4/44 E1 2/0 1`	Defines connections between T1 or E1 controller ports and the ATM interface.

	Command or Action	Purpose
Step 20	**connect** connection-name **atm** slot/port [name of PVC/SVC | vpi/vci] **T1** slot/port TDM-group-number **Example:** `Router(config)# connect alpha ATM 1/0 8/88 E1 2/0 2`	Defines connections between T1 or E1 controller ports and the ATM interface.

Configuring IMA Groups

To configure IMA groups, perform the steps in this section.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **network-clock-participate** *slot number*
4. **network-clock-participate** *aim number*
5. **controller t1 | e1 slot/port**
6. **mode atm aim** *aim-slot*
7. **interface atm** *interface-number* /*subinterface-number*
8. ima-group *group-number*
9. exit
10. Repeat Step 7 through Step 9 to add ATM 2/3 to IMA group 0.
11. **interface atm** *slot* /imagroup-number
12. **pvc** *vpi* /*vci* [**ces**]
13. **partial-fill** octet
14. exit
15. **pvc** *vpi* /*vci* [**ces**]
16. **ces-cdv** *time*
17. exit
18. exit
19. **connect** connection-name **atm** slot/port [name of PVC/SVC|vpi/vci] **E1** slot/port TDM-group-number

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. Enter your password when prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**network-clock-participate** *slot number* **Example:** `Router(config)# network-clock-participate slot 2`	Enables the network module in the specified slot to use the network clock for its timing.
Step 4	**network-clock-participate** *aim number* **Example:** `Router(config)# network-clock-participate aim 0`	Specifies that the AIM in Slot 0 will derive clocking from the network source.
Step 5	**controller t1 | e1 slot/port** **Example:** `Router(config)# controller e1 1/0`	Enters controller configuration mode for the selected T1 or E1.
Step 6	**mode atm aim** *aim-slot* **Example:** `Router(config-controller)#` **mode atm aim 1**	Sets the mode of the T1 or E1 controller in AIM Slot 1.
Step 7	**interface atm** *interface-number /subinterface-number* **Example:** `Router(config)#` **interface atm 2/1**	Enters configuration mode for the selected ATM interface.
Step 8	ima-group *group-number* **Example:** `Router(config-if)#` **ima-group 0**	Specifies that the link is included in an IMA group. Enter an IMA group number from 0 to 3.

	Command or Action	Purpose
Step 9	exit **Example:** `Router(config-if)# exit`	Exits interface configuration mode.
Step 10	Repeat Step 7 through Step 9 to add ATM 2/3 to IMA group 0.	
Step 11	**interface atm** *slot* /imagroup-number **Example:** `Router(config)# interface atm 0/ima0`	Enter interface configuration mode for the IMA group.
Step 12	**pvc** *vpi* /*vci* [**ces**] **Example:** `Router(config-if)# pvc 5/55 ces`	Creates a PVC for the virtual path identifier (VPI) and virtual channel identifier (VCI) and specifies CES encapsulation. Enters interface-ATM-VC configuration mode.
Step 13	**partial-fill** octet **Example:** `Router(config-if-ces-vc)# partial-fill 35`	Configures the number of AAL1 user octets per cell for CES. The range of values is 1-46 for T1 and 20-47 for E1. **Note** Partial fill and CDV cannot be modified under a CES PVC that is part of any connection. Do not establish the connection until after you enter the partial-fill and CDV values.
Step 14	exit **Example:** `Router(config-if-ces-vc)# exit`	Exits back to interface configuration mode.
Step 15	**pvc** *vpi* /*vci* [**ces**] **Example:** `Router(config-if)# pvc 6/66 ces`	Creates a PVC for the virtual path identifier (VPI) and virtual channel identifier (VCI) and specifies CES encapsulation. Enters interface-ATM-VC configuration mode.
Step 16	**ces-cdv** *time* **Example:** `Router(config-if-ces-vc)# ces-cdv 1000`	Configures the CDV for 1000 microseconds.
Step 17	exit **Example:** `Router(config-if-ces-vc)# exit`	Exits back to interface configuration mode.

	Command or Action	Purpose
Step 18	exit **Example:** `Router(config-if)#` **exit**	Exits back to configuration mode.
Step 19	**connect** connection-name **atm** slot/port [name of PVC/SVC|vpi/vci] **E1** slot/port TDM-group-number **Example:** `Router(config)# connect alpha-IMA atm0/ima0 5/55 E1 2/0 1`	Establishes the connection between the T1 or E1 controller ports and the IMA group.

Configuration Examples for AAL1 CES on AIM-ATM

Configuring AAL1 CES on AIM-ATM Example

The following is a sample configuration for the AAL1 CES on AIM-ATM feature.

```
network-clock-participate slot 1
network-clock-participate slot 2
network-clock-participate aim 1
controller E1 2/0
 framing NO-CRC4
 clock source internal
 tdm-group 1 timeslots 1
```

Note TDM-group defined for 1 timeslot.

```
 tdm-group 2 timeslots 17-31
```

Note TDM-group defined for 15 timeslots.

```
interface ATM2/2
 scrambling-payload
 no atm ilmi-keepalive
 pvc 4/44 ces
```

Note Default CDV value set to 5 microseconds.

```
 pvc 8/88 ces
  ces-cdv 1000
```

Note Default CDV value set to 1 second.

```
connect alpha-tim ATM2/2 4/44 E1 2/0 1
connect beta-tim ATM2/2 8/88 E1 2/0 2
```

Note CES connections for TDM-AAL1 CES PVCs.

```
interface ATM2/1
 ima-group 0
 scrambling-payload
 no atm ilmi-keepalive

interface ATM2/3
 ima-group 0
 scrambling-payload
 no atm ilmi-keepalive

int atm0/ima0
pvc 5/55 ces
```

Note Default CDV value set to 5 microseconds.

```
 partial-fill 35
```

Note Range of partial-fill 1-46 for T1 or 20-47 for E1.

```
 pvc 6/66 ces
  ces-cdv 1000
connect alpha-IMA atm0/ima0 5/55 E1 2/0 1
```

Verifying the AAL1 CES on AIM-ATM Feature Example

The following shows sample output from the **show connection all** command. This command displays all ATM-TDM connections:

```
Router# show connection all
ID   Name               Segment 1            Segment 2           State
=========================================================================
.
.
2    V-220-800          E1 2/2(VOICE) 00     DSP 08/00/00        UP
4    1ds0               ATM2/2 pvc 4/44      E1 2/0 01           UP
5    V-201-801          E1 2/0(VOICE) 01     DSP 08/00/01        UP
6    seimens            ATM2/2 pvc 8/88      E1 2/0 02           UP
.
.
```

The following example shows sample output from the **show connection name** command. This command displays segments used, CDV, and partial fill values for CES connections. Default CDV is set for 5 milliseconds.

```
Router# show connection name 1ds0
Connection: 4 - 1ds0
 Current State: UP
```

```
 Segment 1:  ATM2/2 pvc 4/44
 Segment 2:  E1 2/0 01
  TDM timeslots in use: 1 (1 total)
 Internal Switching Elements: VPD
 CES-CDV: 5000 usec, Partial Fill: 0 bytes
```

The following example shows sample output from the **show atm pvc** command. This command displays all PVCs in use. It also displays the Allocated Peak Value for each connection.

```
Router# show atm pvc
           VCD /                                          Peak  Avg/Min Burst
Interface  Name          VPI   VCI  Type   Encaps   SC   Kbps   Kbps   Cells Sts
2/3        TDM10          15   150  PVC    CES-AAL1 CBR     723               UP
2/3        TDM11          20   200  PVC    CES-AAL1 CBR     795               UP
```

Note Only synchronous clocking is supported.

Additional References

The following sections provide references related to the AAL1 CES on AIM-ATM feature.

Related Documents

Related Topic	Document Title
ATM commands	*Cisco IOS Asynchronous Transfer Mode Command Reference*
Configuring voice features	*Cisco IOS Voice Configuration Library*, Release 12.4T
Configuring ATM advanced integration modules	"AIM-ATM, AIM-VOICE-30, and AIM-ATM-VOICE-30 on the Cisco 2600 Series, Cisco 3660, and Cisco 3700 Series"
Configuring high-density voice network modules	"Digital E1 Packet Voice Trunk Network Module Interfaces"

Standards

Standard	Title
None	--

MIBs

MIB	MIBs Link
None	To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

RFCs

RFC	Title
No new or modified RFCs are supported by this feature, and support for existing RFCs has not been modified by this feature.	--

Technical Assistance

Description	Link
The Cisco Support website provides extensive online resources, including documentation and tools for troubleshooting and resolving technical issues with Cisco products and technologies. To receive security and technical information about your products, you can subscribe to various services, such as the Product Alert Tool (accessed from Field Notices), the Cisco Technical Services Newsletter, and Really Simple Syndication (RSS) Feeds. Access to most tools on the Cisco Support website requires a Cisco.com user ID and password.	http://www.cisco.com/techsupport

Feature Information for AAL1 CES on AIM-ATM

The following table provides release information about the feature or features described in this module. This table lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to . An account on Cisco.com is not required.

Table 1: Feature Information for AAL1 CES on AIM-ATM

Feature Name	Releases	Feature Information
AAL1 CES on AIM-ATM	12.3(8)T	The AAL1 CES on AIM-ATM feature adds circuit emulation service (CES) over ATM AAL1 to Cisco 3660 and Cisco 3745 routers. CES is a technique specified by the ATM Forum for carrying constant bit-rate traffic over an ATM network. It is a cell-based technology where voice traffic is adapted for an ATM network using AAL1, and the circuit is emulated across an ATM network. This feature, along with the ATM Cell Switching and Lossless Compression R1 feature, enables wireless service providers to optimize the bandwidth used to backhaul the traffic from a cell site to the mobile central office for more efficient use of existing T1 and E1 lines. In 12.3(8)T, this feature was introduced on the Cisco 3660 and Cisco 3745 routers. The following commands were introduced or modifief: **pvc**.