



AAL1 CES on AIM-ATM

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

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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 at the end of this module.

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



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- 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, page 2](#)

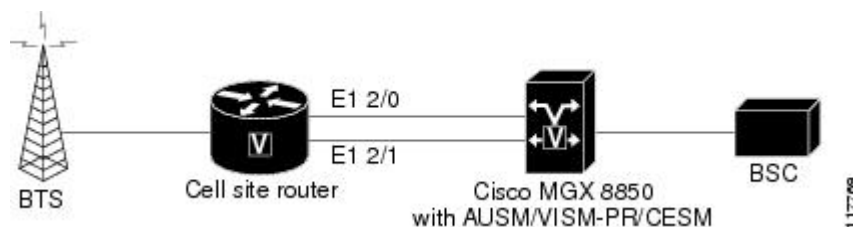
CES

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*



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

	Command or Action	Purpose
Step 4	network-clock-participate slot <i>number</i> 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 <i>number</i> 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 <i>aim-slot</i> 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 <i>tdm-group-no</i> timeslots <i>timeslot-list</i> Example: Router(config-controller)# tdm-group 1 timeslots 1	Configure a TDM channel group for the T1 or E1 interface. <i>tdm-group-no</i> is a value from 0 to 23 for T1 and from 0 to 30 for E1; it identifies the group. <i>timeslot-list</i> 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 <i>tdm-group-no</i> timeslots <i>timeslot-list</i> Example: Router(config-controller)# tdm-group 2 timeslots 17-31	Configure a TDM channel group for the T1 or E1 interface.

	Command or Action	Purpose
Step 11	interface atm <i>interface-number /subinterface-number</i> Example: Router(config) # interface atm 1/0	Enters configuration mode for the selected ATM interface.
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-vc)# 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.

Command or Action	Purpose
Step 18 <code>exit</code> Example: <pre>Router(config-if)# exit</pre>	Exits back to configuration mode.
Step 19 <code>connect connection-name atm slot/port [name of PVC/SVC vpi/vci] T1 slot/port TDM-group-number</code> Example: <pre>Router(config)# connect alpha ATM 1/0 4/44 E1 2/0 1</pre>	Defines connections between T1 or E1 controller ports and the ATM interface.
Step 20 <code>connect connection-name atm slot/port [name of PVC/SVC vpi/vci] T1 slot/port TDM-group-number</code> Example: <pre>Router(config)# connect alpha ATM 1/0 8/88 E1 2/0 2</pre>	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	Enables privileged EXEC mode. Enter your password when prompted.
	Example: Router> enable	
Step 2	configure terminal	Enters global configuration mode.
	Example: Router# configure terminal	
Step 3	network-clock-participate <i>slot number</i>	Enables the network module in the specified slot to use the network clock for its timing.
	Example: Router(config)# network-clock-participate slot 2	

	Command or Action	Purpose
Step 4	network-clock-participate <i>aim number</i> 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 <i>aim-slot</i> 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 <i>interface-number /subinterface-number</i> Example: Router(config)# interface atm 2/1	Enters configuration mode for the selected ATM interface.
Step 8	ima-group <i>group-number</i> 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.
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.

	Command or Action	Purpose
Step 12	pvc vpi /vci [ces] Example: <pre>Router(config-if)# pvc 5/55 ces</pre>	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: <pre>Router(config-if-ces-vc)# partial-fill 35</pre>	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: <pre>Router(config-if-ces-vc)# exit</pre>	Exits back to interface configuration mode.
Step 15	pvc vpi /vci [ces] Example: <pre>Router(config-if)# pvc 6/66 ces</pre>	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: <pre>Router(config-if-ces-vc)# ces-cdv 1000</pre>	Configures the CDV for 1000 microseconds.
Step 17	exit Example: <pre>Router(config-if-ces-vc)# exit</pre>	Exits back to interface configuration mode.
Step 18	exit Example: <pre>Router(config-if)# exit</pre>	Exits back to configuration mode.

Command or Action	Purpose
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, page 10](#)
- [Verifying the AAL1 CES on AIM-ATM Feature Example, page 11](#)

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 /
Interface Name      VPI  VCI  Type  Encaps  SC    Peak  Avg/Min  Burst  Sts
2/3       TDM10      15   150  PVC   CES-AAL1 CBR    723    Kbps    Cells  UP
2/3       TDM11      20   200  PVC   CES-AAL1 CBR    795    Kbps    Cells  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	<i>Cisco IOS Asynchronous Transfer Mode Command Reference</i>
Configuring voice features	<i>Cisco IOS Voice Configuration Library</i> , 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 www.cisco.com/go/cfn. 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 modified: pvc.

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