



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.

Finding Feature Information in This Module

Your Cisco IOS software release may not support all of the features documented in this module. For the latest feature information and caveats, see the release notes for your platform and software release. To reach links to specific feature documentation in this module and to see a list of the releases in which each feature is supported, use the “[Feature Information for AAL1 CES on AIM-ATM](#)” section on page 13.

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Americas Headquarters:
Cisco Systems, Inc., 170 West Tasman Drive, San Jose, CA 95134-1706 USA

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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 the AAL1 CES on AIM-ATM Feature

- 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.

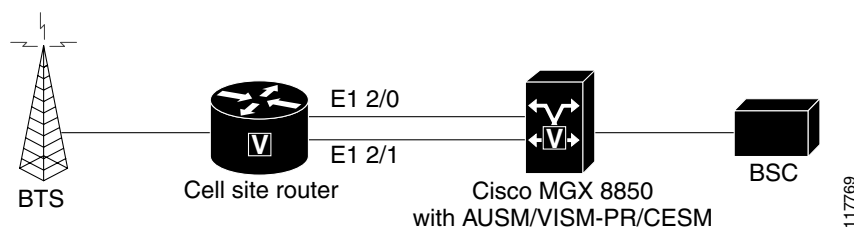
CES

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 [Figure 1](#).

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] E1 slot/port TDM-group-number**
20. **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 1	Enables the network module in the specified slot to use the network clock for its timing.
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. <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.

	Command or Action	Purpose
Step 10	<pre>tdm-group tdm-group-no timeslots timeslot-list</pre> <p>Example: Router(config-controller)# tdm-group 2 timeslots 17-31</p>	Configure a TDM channel group for the T1 or E1 interface.
Step 11	<pre>interface atm interface-number/subinterface-number</pre> <p>Example: Router(config) # interface atm 1/0</p>	Enters configuration mode for the selected ATM interface.
Step 12	<pre>pvc vpi/vci [ces]</pre> <p>Example: Router(config-if)# pvc 4/44 ces</p>	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	<pre>ces-cdv time</pre> <p>Example: Router(config-if-ces-vc)# ces-cdv 500</p>	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	<pre>exit</pre> <p>Example: Router(config-if-ces-vc)# exit</p>	Exits back to interface configuration mode.
Step 15	<pre>pvc vpi/vci ces</pre> <p>Example: Router(config-if)# pvc 8/88 ces</p>	Creates a second PVC and enters interface-ATM-VC configuration mode.
Step 16	<pre>ces-cdv time</pre> <p>Example: Router(config-if-ces-vc)# ces-cdv 1000</p>	Configures the CDV for 1000 microseconds.
Step 17	<pre>exit</pre> <p>Example: Router(config-if-ces-vc)# exit</p>	Exits back to interface configuration mode.
Step 18	<pre>exit</pre> <p>Example: Router(config-if)# exit</p>	Exits back to configuration mode.

	Command or Action	Purpose
Step 19	<p>connect <i>connection-name atm slot/port</i> [<i>name of PVC/SVC vpi/vci</i>] t1 <i>slot/port</i> <i>TDM-group-number</i></p> <p>Example: Router(config)# connect alpha ATM 1/0 4/44 E1 2/0 1</p>	Defines connections between T1 or E1 controller ports and the ATM interface.
Step 20	<p>connect <i>connection-name atm slot/port</i> [<i>name of PVC/SVC vpi/vci</i>] t1 <i>slot/port</i> <i>TDM-group-number</i></p> <p>Example: Router(config)# connect alpha ATM 1/0 8/88 E1 2/0 2</p>	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](#).
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 <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 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.
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.	

	Command or Action	Purpose
Step 11	<code>interface atm slot/imagroup-number</code> Example: Router(config)# <code>interface atm 0/ima0</code>	Enter interface configuration mode for the IMA group.
Step 12	<code>pvc vpi/vci [ces]</code> Example: Router(config-if)# <code>pvc 5/55 ces</code>	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	<code>partial-fill octet</code> Example: Router(config-if-ces-vc) # <code>partial-fill 35</code>	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	<code>exit</code> Example: Router(config-if-ces-vc) # <code>exit</code>	Exits back to interface configuration mode.
Step 15	<code>pvc vpi/vci [ces]</code> Example: Router(config-if)# <code>pvc 6/66 ces</code>	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	<code>ces-cdv time</code> Example: Router(config-if-ces-vc) # <code>ces-cdv 1000</code>	Configures the CDV for 1000 microseconds.
Step 17	<code>exit</code> Example: Router(config-if-ces-vc) # <code>exit</code>	Exits back to interface configuration mode.
Step 18	<code>exit</code> Example: Router(config-if) # <code>exit</code>	Exits back to configuration mode.
Step 19	<code>connect connection-name atm slot/port [name of PVC/SVC vpi/vci] E1 slot/port TDM-group-number</code> Example: Router(config)# <code>connect alpha-IMA atm0/ima0 5/55 E1 2/0 1</code>	Establishes the connection between the T1 or E1 controller ports and the IMA group.

Configuration Examples for AAL1 CES on AIM-ATM

This section provides the following configuration examples:

- [Configuring AAL1 CES on AIM-ATM: Example, page 9](#)
- [Verifying the AAL1 CES on AIM-ATM Feature : Example, page 10](#)

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   lds0                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 lds0

Connection: 4 - lds0
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
Kbps  Kbps  Cells
2/3     TDM10          15   150  PVC   CES-AAL1 CBR   723
2/3     TDM11          20   200  PVC   CES-AAL1 CBR   795
```



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, Release 12.4T</i>
Configuring ATM advanced integration modules	<i>AIM-ATM, AIM-VOICE-30, and AIM-ATM-VOICE-30 on the Cisco 2600 Series, Cisco 3660, and Cisco 3700 Series</i>
Configuring high-density voice network modules	<i>Digital E1 Packet Voice Trunk Network Module Interfaces</i>

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
<p>The Cisco Support website provides extensive online resources, including documentation and tools for troubleshooting and resolving technical issues with Cisco products and technologies.</p> <p>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.</p> <p>Access to most tools on the Cisco Support website requires a Cisco.com user ID and password.</p>	<p>http://www.cisco.com/techsupport</p>

Command Reference

The following commands are introduced or modified in the feature or features documented in this module. For information about these commands, see the *Cisco IOS Asynchronous Transfer Mode Command Reference* at http://www.cisco.com/en/US/docs/ios/atm/command/reference/atm_book.html. For information about all Cisco IOS commands, use the Command Lookup Tool at <http://tools.cisco.com/Support/CLILookup> or a Cisco IOS master commands list.

- **pvc**

Feature Information for AAL1 CES on AIM-ATM

Table 1 lists the features in this module and provides links to specific configuration information. Only features that were introduced or modified in Cisco IOS Releases 12.2(1), 12.0(3)S, 12.2(33)SRA, 12.2(33)SXH, or later releases appear in the table.

Not all commands may be available in your Cisco IOS software release. For release information about a specific command, see the command reference documentation.

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Note

Table 1 lists only the Cisco IOS software release that introduced support for a given feature in a given Cisco IOS software release train. Unless noted otherwise, subsequent releases of that Cisco IOS software release train also support that feature.

Table 1 Feature Information for AAL1 CES on AIM-ATM

Feature Name	Releases	Feature Information
AAL1 CES on AIM-ATM	12.3(8)T	<p>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.</p> <p>In 12.3(8)T, this feature was introduced on the Cisco 3660 and Cisco 3745 routers.</p> <p>The following sections provide information about this feature:</p> <ul style="list-style-type: none"> • CES, page 2 • Configuring AAL1 CES on AIM-ATM, page 3 • Configuring IMA Groups, page 6 <p>The following commands were introduced or modified: pvc.</p>

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