



Configuring Signalling Features

This chapter describes signalling-related features and their configuration for the ATM switch router.



Note

This chapter provides advanced configuration instructions for the Catalyst 8540 MSR, Catalyst 8510 MSR, and LightStream 1010 ATM switch routers. For general information about ATM signaling protocols, refer to the *Guide to ATM Technology*. For complete descriptions of the commands mentioned in this chapter, refer to the *ATM Switch Router Command Reference* publication.

This chapter includes the following sections:

- Configuring Signalling IE Forwarding on page 16-2
- Configuring ATM SVC Frame Discard on page 16-3
- Configuring E.164 Addresses on page 16-4
- Configuring Signalling Diagnostics Tables on page 16-12
- Configuring Closed User Group Signalling on page 16-15
- Disabling Signalling on an Interface on page 16-21
- Multipoint-to-Point Funnel Signalling on page 16-21

Configuring Signalling IE Forwarding

You enable signalling information element (IE) forwarding of the specified IE from the calling party to the called party.


Note

The default is to transfer all the information elements in the signalling message.

To configure interface signalling IE transfer, perform the following steps, beginning in global configuration mode:

	Command	Purpose
Step 1	Switch(config)# interface atm <i>card/subcard/port</i> Switch(config-if)#	Selects the interface to be configured.
Step 2	Switch(config-if)# atm signalling ie forward { aal-info all bli-repeat-ind called-subaddress calling-number higher-layer-info lower-layer-info unknown-ie }	Configures the signalling information element forwarding.

Example

The following example shows how to disable signalling of all forwarded IEs on ATM interface 0/0/0:

```
Switch(config)# interface atm 0/0/0
Switch(config-if)# no atm signalling ie forward all
```

Displaying the Interface Signalling IE Forwarding Configuration

To display the interface signalling IE forwarding configuration, use the following privileged EXEC command:

Command	Purpose
more system:running-config	Displays the interface signalling IE forwarding configuration.

Example

The following example displays the modified configuration of the signalling IE forwarding:

```
Switch# more system:running-config
Building configuration...

Current configuration:
!
version XX.X
no service pad
service udp-small-servers
service tcp-small-servers
!
hostname Switch
!
<information deleted>
!
interface ATM0/0/0
 no atm signalling ie forward calling-number
 no atm signalling ie forward calling-subaddress
 no atm signalling ie forward called-subaddress
 no atm signalling ie forward higher-layer-info
 no atm signalling ie forward lower-layer-info
 no atm signalling ie forward blli-repeat-ind
 no atm signalling ie forward aal-info
!
<information deleted>
```

Configuring ATM SVC Frame Discard

You can select the criteria used to install frame discard on switched virtual channels (SVCs). The default is to install packet discard based on the presence of the ATM adaptation layer 5 (AAL5) information element in the SETUP message.



Note

The term *frame discard* is referred to as *packet discard* on ATM switch router virtual circuits.

You can use this global configuration function to modify frame discard for all connections.

To configure frame discard, use the following command in global configuration mode:

Command	Purpose
atm svc-frame-discard-on-aal5ie	Configures the SVC frame discard.

This command changes the information that the ATM switch router uses to decide whether or not to install frame discard on SVCs. User-Network Interface (UNI) 4.0 signalling allows for explicit signalling of frame discard. Pre-UNI 4.0 versions use the presence of the AAL5 information elements to determine whether or not to install frame discard. If the AAL5 information element is present, frame discard is installed; otherwise it is not, as shown in the following example.

- When you configure **atm svc-frame-discard-on-aal5ie**, frame discard is installed if the AAL5 information element is present.
- When you configure **no atm svc-frame-discard-on-aal5ie**, frame discard is installed on UNI 4 or PNNI interfaces if explicitly requested by the SETUP and CONNECT messages.

Example

In the following example, the ATM switch router behavior is set to not use the AAL5 information element to dictate frame discard.

```
Switch(config)# no atm svc-frame-discard-on-aal5ie
```

Displaying the ATM Frame Discard Configuration

To display the ATM frame discard configuration, use the following privileged EXEC command:

Command	Purpose
more system:running-config	Displays the frame discard configuration.

Example

The following example shows how to display the frame discard configuration:

```
Switch# more system:running-config
Building configuration...

Current configuration:
!
version XX.X
no service pad
service udp-small-servers
service tcp-small-servers
!
hostname Switch
!
network-clock-select 1 ATM0/0/0
network-clock-select 4 ATM0/0/0
ip host-routing
no atm svc-frame-discard-on-aal5ie
!
<information deleted>
```

Configuring E.164 Addresses

E.164 support allows networks that use network service access point (NSAP) ATM addresses formats (for example, 45.000001234567777F00000000.000000000000.00) to work with networks that use E.164 address formats (for example, 1-123-456-7777). For an overview of address types and E.164 subtypes, refer to the *Guide to ATM Technology*.

The following sections describe configuring E.164 support:

- E.164 Conversion Methods on page 16-5
- Configuring E.164 Gateway on page 16-5
- Configuring E.164 Address Autoconversion on page 16-8
- Configuring E.164 Address One-to-One Translation Table on page 16-9

E.164 Conversion Methods

There are three features you can configure on the ATM switch router for E.164 address conversion. The feature you chose depends on the address format you are using. The features are as follows:

- E.164 gateway—Use this feature when addresses are in international code designator (ICD) or data country code (DCC) format and a call must traverse an E.164 network.
- E.164 address autoconversion—Use this feature when addresses are in E164_ZDSP or E164_AESA format and a call must traverse an E.164 network. An E.164_AESA uses the ATM end system address (AESA) format with the E.164 number embedded; an E164_ZDSP is an E164_AESA address with all zeros after the embedded E.164 number; for example, 45.000001234567777F00000000.000000000000.00.
- E.164 address one-to-one translation table—Use this feature when you want to create an E.164 to AESA address translation table manually. This feature is not recommended for most networks.



Caution

Manually creating the E.164 to AESA address translation table is a time consuming and error prone process. We strongly recommend that you use either the E.164 gateway or E.164 autoconversion feature instead of the E.164 one-to-one address translation feature.

Configuring E.164 Gateway

The E.164 gateway feature allows calls with AESAs to be forwarded, based on prefix matching, on interfaces that are statically mapped to E.164 addresses. To configure the E.164 gateway feature, you must first configure a static ATM route with an E.164 address, then configure the E.164 address to use on the interface.

When a static route is configured on an interface, all ATM addresses that match the configured address prefix are routed through that interface to an E.164 address.

Signalling uses E.164 addresses in the called and calling party IEs, and uses AESAs in the called and calling party subaddress IEs. For a detailed description of how the E.164 gateway feature works, refer to the *Guide to ATM Technology*.



Note

Enter access lists for E.164 addresses in the E164_AESA format, not native E.164 format. For example, if the E.164 address is 7654321, then the E164_AESA format is 45.000000007654321F00000000.000000000000.00. To filter prefix “765”, enter the prefix 45.00000000765..., not just 765.... Access lists operate on the called and calling party IEs. Refer to Chapter 11, “Using Access Control.”

Configuring an E.164 Address Static Route

To configure an E.164 address static route, use the following command in global configuration mode:

Command	Purpose
atm route <i>address-prefix atm card/subcard/port</i> [e164-address <i>address-string</i> [number-type { international local national subscriber }] [internal] [scope <i>org-scope</i>]	At the configure prompt, configures the static route prefix with the E.164 address.

Example

The following example uses the **atm route** command to configure a static route using the 13-byte switch prefix 47.00918100000000410B0A1081 to ATM interface 0/0/0 with the E.164 address 1234567:

```
Switch(config)# atm route 47.00918100000000410B0A1081 atm 0/0/0 e164-address 7654321
```

To complete the E.164 address static route configuration, proceed to the “Configuring an ATM E.164 Address on an Interface” section on page 16-7.

Displaying the E.164 Static Route Configuration

To display the E.164 address configuration, use the following privileged EXEC command:

Command	Purpose
show atm route	Displays the static route E.164 address configuration.

Example

The following example displays the E.164 address configuration using the **show atm route** privileged EXEC command:

```
Switch# show atm route
Codes: P - installing Protocol (S - Static, P - PNNI, R - Routing control),
       T - Type (I - Internal prefix, E - Exterior prefix, SE -
             Summary Exterior prefix, SI - Summary Internal prefix,
             ZE - Suppress Summary Exterior, ZI - Suppress Summary Internal)
  P  T Node/Port      St Lev Prefix
  ~  ~ ~~~~~
S  E 1  ATM0/1/0      DN  0  47.0091.8100.0000.0001/72
P  SI 1  0             UP  0  47.0091.8100.0000.0002.eb1f.fe00/104
R  I 1  ATM2/0/0     UP  0  47.0091.8100.0000.0002.eb1f.fe00.0002.eb1f.fe00/152
R  I 1  ATM2/0/0     UP  0  47.0091.8100.0000.0002.eb1f.fe00.4000.0c/128
P  SI 1  0             UP  0  47.0091.8100.0000.0040.0b0a.2b81/104
S  E 1  ATM0/0/0      DN  0  47.0091.8100.0000.0040.0b0a.2b81/104
           (E164 Address 1234567)
R  I 1  ATM2/0/0     UP  0  47.0091.8100.0000.0040.0b0a.2b81.0040.0b0a.2b81/152
R  I 1  ATM2/0/0     UP  0  47.0091.8100.0000.0040.0b0a.2b81.4000.0c/128
```

Configuring an ATM E.164 Address on an Interface

One E.164 address can be configured per ATM port. Signalling uses E.164 addresses in the called and calling party IEs, and uses AESA addresses in the called and calling party subaddress IEs.

To configure an E.164 address on a per-interface basis, perform the following steps, beginning in global configuration mode:

	Command	Purpose
Step 1	Switch(config)# interface atm <i>card/subcard/port</i> Switch(config-if)#	Selects an interface port.
Step 2	Switch(config-if)# atm e164 address <i>e164-address</i>	Associates the E.164 address to the interface.

Example

The following example shows how to configure the E.164 address 7654321 on ATM interface 0/0/1:

```
Switch(config)# interface atm 0/0/1
Switch(config-if)# atm e164 address 7654321
```

Displaying the E.164 Address Association to Interface Configuration

To display the E.164 configuration, use the following EXEC command:

Command	Purpose
show atm interface atm <i>card/subcard/port</i>	Shows the E.164 address configuration on a per-port basis.

Example

The following example shows how to display the E.164 address configuration for ATM interface 0/0/1:

```
Switch# show atm interface atm 0/0/1

Interface:      ATM0/0/1      Port-type:      oc3suni
IF Status:     UP              Admin Status:   up
Auto-config:   enabled        AutoCfgState:  completed
IF-Side:       Network        IF-type:        NNI
Uni-type:      not applicable  Uni-version:    not applicable
Max-VPI-bits: 8              Max-VCI-bits:  14
Max-VP:        255          Max-VC:         16383
ConfMaxSvpcVpi: 255        CurrMaxSvpcVpi: 255
ConfMaxSvccVpi: 255        CurrMaxSvccVpi: 255
ConfMinSvccVci: 35         CurrMinSvccVci: 35
Svc Upc Intent: pass        Signalling:     Enabled
ATM Address for Soft VC: 47.0091.8100.0000.0041.0b0a.1081.4000.0c80.0010.00
→ ATM E164 Address: 7654321
<information deleted>
```

When the E.164 gateway feature is configured, the switch first attempts to make a connection using the E.164 gateway feature. If that connection fails, the switch attempts to make the connection using the E.164 address autoconversion feature, described in the following section.

Configuring E.164 Address Autoconversion

If your network uses E164_ZDSP or E164_AESA addresses, you can configure E.164 address autoconversion. The E164_ZDSP and E164_AESA addresses include an embedded E.164 number in the E.164 portion of an E.164 ATM address. This embedded E.164 number is used in the autoconversion process.

For a detailed description of the E.164 autoconversion feature and differences in the autoconversion process between the E164_ZDSP and E164_AESA address formats, refer to the *Guide to ATM Technology*.



Note

Enter access lists for E.164 addresses in the E164_AESA format, not the native E.164 format. For example, if the E.164 address is 7654321, then the E164_AESA format is 45.000000007654321F00000000.000000000000.00. To filter prefix “765,” enter the prefix 45.00000000765..., not just 765.... Access lists operate on the called and calling party IEs. Refer to Chapter 11, “Using Access Control.”

E.164 address autoconversion configuration is the same, regardless of which type of address (E164_ZDSP or E164_AESA) your network uses. To configure E.164 address autoconversion, perform the following steps, beginning in global configuration mode:

	Command	Purpose
Step 1	Switch(config)# atm route <i>address-prefix</i> atm <i>card/subcard/port</i> [e164-address <i>address-string</i> [number-type { international local national subscriber }]] [internal] [scope <i>org-scope</i>]	At the configure prompt, configures the static route prefix with the E.164 address.
Step 2	Switch(config-if)# interface atm <i>card/subcard/port</i> Switch(config-if)#	Selects the ATM interface.
Step 3	Switch(config-if)# atm e164 auto-conversion	Configures E.164 autoconversion.
Step 4	Switch(config-if)# exit Switch(config)#	Returns to global configuration mode.

Examples

In the following example a static route is configured on interface 0/0/1 using the ATM address of the ATM switch router on the opposite side of the E.164 public network; E.164 autoconversion is also enabled:

```
Switch(config)# atm route 45.000007654321111F atm 0/0/1
Switch(config)# interface atm 0/0/1
Switch(config-if)# atm e164 auto-conversion
```

The converse configuration is done at the ATM switch router across the E.164 network; a static route is configured to the ATM address of the above switch, and E.164 autoconversion is enabled:

```
Switch(config)# atm route 45.000001234567777F atm 0/0/1
Switch(config)# interface atm 0/0/1
Switch(config-if)# atm e164 auto-conversion
```


Displaying the E.164 Address Autoconversion

To display the E.164 configuration on an interface, use the following EXEC command:

Command	Purpose
<code>show atm interface atm card/subcard/port</code>	Shows the E.164 address configuration on a per-port basis.

Example

The following example shows how to display the E.164 configuration for ATM interface 0/0/1:

```
Switch# show atm interface atm 0/0/1
```

```
Interface:      ATM0/0/1      Port-type:      oc3suni
IF Status:     DOWN        Admin Status:   down
Auto-config:   disabled    AutoCfgState:  not applicable
IF-Side:      Network     IF-type:       UNI
Uni-type:     Private     Uni-version:   V3.0
Max-VPI-bits: 8          Max-VC:        16383
Max-VP:       255        CurrMaxSvpcVpi: 255
ConfMaxSvpcVpi: 255    CurrMaxSvccVpi: 255
ConfMaxSvccVpi: 255    CurrMinSvccVci: 33
ConfMinSvccVci: 33    Signalling:    Enabled
Svc Upc Intent: pass
ATM Address for Soft VC: 47.0091.8100.0000.0002.eb1f.fe00.4000.0c80.0010.00
→ ATM E164 Auto Conversion Interface
Configured virtual links:
  PVCLs  SoftVCLs  SVCLs  TVCLs  PVPLs  SoftVPLs  SVPLs  Total-Cfgd  Inst-Conns
        2         0         0         0         0         0         0           2           0
Logical ports(VP-tunnels): 0
Input cells: 0          Output cells: 0
5 minute input rate:      0 bits/sec,      0 cells/sec
5 minute output rate:    0 bits/sec,      0 cells/sec
Input AAL5 pkts: 0, Output AAL5 pkts: 0, AAL5 crc errors: 0
```

Configuring E.164 Address One-to-One Translation Table

The ATM interface to a public network commonly uses an E.164 address for ATM signalling, with international code designator (ICD) or data country code (DCC) format AESA addresses carried in the subaddress fields of the message. The one-to-one translation table allows signalling to look up the E.164 addresses and the AESA addresses in a database, allowing a one-to-one correspondence between AESA addresses and E.164 addresses.



Caution

Manually mapping AESA addresses to E.164 addresses is a time consuming and error prone process. We highly recommend that you use either the E.164 gateway or E.164 autoconversion feature instead of the E.164 one-to-one address translation feature.

For a detailed explanation of how the E.164 translation table feature works, refer to the *Guide to ATM Technology*.

Configuring one-to-one E.164 translation tables requires the following steps:

-
- Step 1** Configure specific ATM interface(s) to connect to E.164 public networks to use the translation table.
 - Step 2** Configure the translation table.
 - Step 3** Add entries to the translation table for both the called and calling parties.
-

To configure E.164 translation on the interface, perform the following steps, beginning in global configuration mode:

	Command	Purpose
Step 1	Switch(config)# interface atm <i>card/subcard/port</i> Switch(config-if)#	Selects an interface port.
Step 2	Switch(config-if)# atm e164 translation	Configures the ATM E.164 interface.
Step 3	Switch(config-if)# exit Switch(config)#	Returns to EXEC configuration mode.
Step 4	Switch(config)# atm e164 translation-table Switch(config-atm-e164)#	Changes to E.164 ATM configuration mode.
Step 5	Switch(config-atm-e164)# e164 address <i>address</i> nsap-address ¹ <i>nsap-address</i>	Configures the E.164 translation table.

1. The NSAP address is the same as the ARB_AESA address.

Example

The following example shows how to configure the ATM interface 0/0/1 to use the one-to-one E.164 translation table and specifies three table entries:

```
Switch(config)# interface atm 0/0/1
Switch(config-if)# atm e164 translation
Switch(config-if)# exit
Switch(config)# atm e164 translation-table
Switch(config-atm-e164)# e164 address 1111111 nsap-address 11.11111111111111111111.112233445566.11
Switch(config-atm-e164)# e164 address 2222222 nsap-address 22.22222222222222222222.112233445566.22
Switch(config-atm-e164)# e164 address 3333333 nsap-address 33.33333333333333333333.112233445566.33
```

Displaying the ATM E.164 Translation Table Configuration

To display the ATM E.164 translation table configuration, use the following privileged EXEC commands:

Command	Purpose
more system:running-config	Displays the E.164 translation table configuration.
show atm interface atm <i>card/subcard/port</i>	Displays the E.164 address configuration on a per-port basis.

Example

The following example shows how to display the E.164 translation table configuration:

```
Switch# more system:running-config
Building configuration...

Current configuration:
!
version XX.X
no service pad
service udp-small-servers
service tcp-small-servers
!
hostname Switch
!
atm e164 translation-table
  e164 address 1111111 nsap-address 11.11111111111111111111111111111111.112233445566.11
  e164 address 2222222 nsap-address 22.222222222222222222222222222222.112233445566.22
  e164 address 3333333 nsap-address 33.333333333333333333333333333333.112233445566.33
!
atm service-category-limit cbr 64544
atm service-category-limit vbr-rt 64544
atm service-category-limit vbr-nrt 64544
atm service-category-limit abr-ubr 64544
atm address 47.0091.8100.0000.0040.0b0a.2b81.0040.0b0a.2b81.00
!
<information deleted>
```

Example

The following example shows how to display the E.164 configuration for ATM interface 0/0/1:

```
Switch# show atm interface atm 0/0/1

Interface:      ATM0/0/1      Port-type:      oc3suni
IF Status:     DOWN              Admin Status:   administratively down
Auto-config:   enabled            AutoCfgState:  waiting for response from peer
IF-Side:       Network        IF-type:        UNI
Uni-type:      Private         Uni-version:    V3.0
Max-VPI-bits: 8              Max-VCI-bits:  14
Max-VP:        255           Max-VC:         16383
ConfMaxSvpcVpi: 255         CurrMaxSvpcVpi: 255
ConfMaxSvccVpi: 255         CurrMaxSvccVpi: 255
ConfMinSvccVci: 35          CurrMinSvccVci: 35
Svc Upc Intent: pass        Signalling:     Enabled
ATM Address for Soft VC: 47.9999.9999.0000.0000.0000.0216.4000.0c80.0010.00
→ ATM E164 Translation Interface
Configured virtual links:
  PVCLs  SoftVCLs  SVCLs  PVPLs  SoftVPLs  SVPLs  Total-Cfgd  Installed-Conns
    2      0        0      0      0        0      2            0
Logical ports(VP-tunnels): 0
Input cells: 0              Output cells: 0
5 minute input rate:        0 bits/sec,      0 cells/sec
5 minute output rate:       0 bits/sec,      0 cells/sec
Input AAL5 pkts: 0, Output AAL5 pkts: 0, AAL5 crc errors: 0
```

Configuring Signalling Diagnostics Tables

Signalling diagnostics enable you to diagnose a specific call failure in your network and pinpoint the location of the call failure along with the reason for the failure. To do this, you must configure a signalling diagnostics table that stores the filtering criteria and a filter index, an integer value between 1 and 50, used to uniquely identify each set of filtering criteria you select. Each filtering criteria occupies one entry in the signalling diagnostics table. Each entry in the filter table is entered using command-line interface (CLI) commands or Simple Network Management Protocol (SNMP). Then the diagnostics software module, when enabled, filters rejected calls based on the entries in your filter table. A successful match in the filter table causes the rejected call information to be stored for analysis.



Note Signalling diagnostics is a tool for troubleshooting failed calls and should not be enabled during normal operation of the ATM switch router.

To configure the signalling diagnostics table entries, perform the following steps, beginning in global configuration mode:

	Command	Purpose
Step 1	Switch(config)# atm signalling diagnostics enable	Enables ATM signalling diagnostics.
Step 2	Switch(config)# atm signalling diagnostics index Switch(config-atmsig-diag)#	Changes to ATM signalling diagnostics configuration mode.
Step 3	Switch(config-atmsig-diag)# age-timer <i>seconds</i>	Configures the timeout value for the entry, in seconds.
Step 4	Switch(config-atmsig-diag)# called-nsap-address <i>nsap-address</i>	Configures a filtering criteria based on the called NSAP address of the rejected call.
Step 5	Switch(config-atmsig-diag)# called-address-mask <i>nsap-address-mask</i> ¹	Configures a filtering criteria based on the called address mask value used to identify the valid bits of the calling NSAP address of the rejected call.
Step 6	Switch(config-atmsig-diag)# calling-nsap-address <i>nsap-address</i>	Configures a filtering criteria based on the calling NSAP address of the rejected call.
Step 7	Switch(config-atmsig-diag)# atm signalling diagnostics enable	Enables ATM signalling diagnostics.
Step 8	Switch(config-atmsig-diag)# clear-cause <i>clear-cause-code</i> ²	Configures a filtering criteria based on the cleared cause code of the rejected call.
Step 9	Switch(config-atmsig-diag)# connection-category { soft-vc soft-vp reg-vc all }	Configures a filtering criteria based on the VC connection category of the rejected call.
Step 10	Switch(config-atmsig-diag)# incoming-port atm <i>card/subcard/port</i>	Configures a filtering criteria based on the incoming port of the rejected call.
Step 11	Switch(config-atmsig-diag)# outgoing-port atm <i>card/subcard/port</i>	Configures a filtering criteria based on the outgoing port of the rejected call.
Step 12	Switch(config-atmsig-diag)# max-records <i>max-num-records</i>	Configures the maximum number of entries to be stored in the display table for each of the entries in the filter table.

	Command	Purpose
Step 13	Switch(config-atmsig-diag)# purge	Purges all the filtered records in the filter table.
Step 14	Switch(config-atmsig-diag)# scope { internal external }	Configures a filtering criteria based on the scope of the rejected call which either failed internally in the switch or externally on other switches.
Step 15	Switch(config-atmsig-diag)# service-category { cbr abr vbr-rt vbr-nrt ubr all }	Configures a filtering criteria based on the service category of the rejected call.
Step 16	Switch(config-atmsig-diag)# status [active filter-criteria inactive filter-criteria delete filter-criteria]	Configures the status of the entry in the filter table.

1. The combination of the configured *calling_addr_mask* (*called_address_mask*) and the configured *calling_nsap_address* (*called_nsap_address*) are used to filter the rejected call.
2. You can obtain the cause code values from the ATM forum UNI3.1 specification.

The display table contains the records that were collected based on every filtering criteria in the filter table. Each filtering criteria has only a specified number of records that are stored in the table. After that specified number of records is exceeded, the table is overwritten.

Examples

The following example shows how to enable signalling diagnostics on the ATM switch router:

```
Switch(config)# atm signalling diagnostics enable
```

The following example shows how to change to signalling diagnostics mode on the ATM switch router:

```
Switch(config)# atm signalling diagnostics 1
Switch(cfg-atmsig-diag)#
```

The following example shows how to specify the timeout value for the entry in seconds:

```
Switch(config)# atm signalling diagnostics 1
Switch(cfg-atmsig-diag)# age-timer 3600
```

The following example shows how to configure filter criteria for calls rejected based on the called NSAP address of the call:

```
Switch(config)# atm signalling diagnostics 1
Switch(cfg-atmsig-diag)# called-nsap-address 47.009181000000061705BD901.010203040506.0
```

The following example shows how to configure filter criteria for calls rejected based on the called address mask of the call:

```
Switch(config)# atm signalling diagnostics 1
Switch(cfg-atmsig-diag)# called-address-mask ff.ff.ff.00
```

The following example shows how to configure filter criteria for calls rejected based on the connection type:

```
Switch(config)# atm signalling diagnostics 1
Switch(cfg-atmsig-diag)# cast-type p2p p2mp
```

The following example shows how to configure the filter entry for filtering failed calls based on the clear cause value 3 (destination unreachable):

```
Switch(config)# atm signalling diagnostics 1
Switch(cfg-atmsig-diag)# clearcause 3
```

The following example shows how to configure filter criteria for call failures based on the category of the virtual circuit:

```
Switch(config)# atm signalling diagnostics 1
Switch(cfg-atmsig-diag)# connection-category soft-vc
Switch(cfg-atmsig-diag)# connection-category soft-vc soft-vp
```

The following example shows how to configure the filter entry for filtering failed calls that came in through ATM interface 1/1/1:

```
Switch(config)# atm signalling diagnostics 1
Switch(cfg-atmsig-diag)# incoming-port atm 1/1/1
```

The following example shows how to configure the filter entry for filtering failed calls that went out through ATM interface 1/1/1:

```
Switch(config)# atm signalling diagnostics 1
Switch(cfg-atmsig-diag)# outgoing-port atm 1/1/1
```

The following example shows how to specify the maximum number of entries to be stored in the display table for each of the entries in the filter table:

```
Switch(config)# atm signalling diagnostics 1
Switch(cfg-atmsig-diag)# max-records 40
```

The following example shows how to purge all the filtered records corresponding to this entry in the filter table:

```
Switch(config)# atm signalling diagnostics 1
Switch(cfg-atmsig-diag)# purge
```

The following example shows how to configure filter criteria for calls that failed internally in the switch:

```
Switch(config)# atm signalling diagnostics 1
Switch(cfg-atmsig-diag)# scope internal
```

The following example shows how to configure filter criteria in signalling diagnostics index 1 for call failures based on the service category:

```
Switch(config)# atm signalling diagnostics 1
Switch(cfg-atmsig-diag)# service-category cbr
Switch(cfg-atmsig-diag)# service-category ubr
Switch(cfg-atmsig-diag)# service-category abr ubr
```

The following example shows how to delete an index entry in the filter table:

```
Switch(config)# atm signalling diagnostics 1
Switch(cfg-atmsig-diag)# status delete
```

Displaying the Signalling Diagnostics Table Configuration

To display the signalling diagnostics information, use the following EXEC commands:

Command	Purpose
show atm signalling diagnostics record <i>filter-index</i>	Displays the ATM signalling diagnostics for a record.

Command	Purpose
show atm signalling diagnostics filter [filter-index]	Displays the ATM signalling diagnostics for a filter.
show atm signalling diagnostics status	Displays the ATM signalling diagnostic status.

Examples

The following example shows the signalling diagnostic records for index 1:

```
Switch# show atm signalling diagnostics record 1
D I S P L A Y      I N D E X      1
-----
Scope: internal, Cast Type: p2p, Conn Indicator: Setup Failure
Connection Kind: switched-vc
Service Category: UBR (Unspecified Bit Rate)
Clear Cause: 0x29, Diagnostics: NULL
Incoming Port: ATM1/0/3, Outgoing Port:ATM0/1/3
Calling-Address: 47.009181000000006011000000.470803040506.00
Calling-SubAddr: NULL
Called-Address : 47.009181000000006083C42C01.750203040506.00
Called-SubAddr : NULL
Crankback Type : No Crankback
DTL's :
NodeId:56:160:47.009181000000006011000000.006083AB9001.00 Port: 0/1/3:2
NodeId:56:160:47.00918100000000603E7B4101.00603E7B4101.00 Port: 0/0/0:2
NodeId:56:160:47.009181000000006083C42C01.006083C42C01.00 Port: 0
```

The following example shows the signalling diagnostics data for filter index 1:

```
Switch# show atm signalling diagnostics filter 1
F I L T E R      I N D E X      1
-----
Scope: internal, Cast Type: p2mp
Connection Kind: soft-vc
Service Category: CBR (Constant Bit Rate) UBR (Unspecified Bit Rate)
Clear Cause: 0, Initial TimerValue: 600
Max Records: 20, NumMatches: 0, Timer expiry: 600
Incoming Port: ATM0/0/1, Outgoing Port: ATM0/1/1
Calling Nsap Address:47.111122223333444455556666.777788889999.00
Calling Address Mask:FF.FFFFFFFF000000000000000000.000000000000.00
Called Nsap Address :47.111122223333444455556666.777788889999.01
Called Address Mask :FF.FFFFFFFF000000000000000000.000000000000.00
Status : active
```

The following example shows the signalling diagnostics status:

```
Switch# show atm signalling diagnostics status
Signalling diagnostics disabled globally
```

Configuring Closed User Group Signalling

You can configure closed user groups (CUGs) on the ATM switch router to form restricted access groups that function as ATM virtual private networks (VPNs). Access restrictions for users are configured through CUG interlock codes. For a description of how CUGs work using signaling, and an example of CUGs, refer to the *Guide to ATM Technology*.

Configuring a CUG is described in the following sections:

- Configuring Aliases for CUG Interlock Codes on page 16-16
- Configuring CUG on an Interface on page 16-16
- Displaying the CUG on page 16-18

Configuring Aliases for CUG Interlock Codes

You can define an alias for each CUG interlock code used on the ATM switch router. Using an alias can simplify configuration of a CUG on multiple interfaces. When you use an alias, you no longer need to specify the 48-hexadecimal-digit CUG interlock code on each interface attached to a CUG member.

To configure an alias for a CUG interlock code, use the following command in global configuration mode:

Command	Purpose
atm signalling cug alias <i>alias-name</i> interlock-code <i>interlock-code</i>	Configures the alias for the CUG interlock code.

Example

The following example shows how to configure the alias TEST for the CUG interlock code 4700918100000000603E5A790100603E5A790100.12345678:

```
Switch(config)# atm signalling cug alias TEST interlock-code
4700918100000000603E5A790100603E5A790100.12345678
```

Configuring CUG on an Interface

Your first step in CUG configuration is to identify the *access interfaces*. Transmission and reception of CUG interlock codes is not allowed over access interfaces. Configuring all interfaces leading outside of the network as access interfaces ensures that all CUG interlock codes are generated and used only within this network.

You implement CUG procedures only if you configure the interface as an access interface.

Each access interface can be configured to permit or deny calls either *from* users attached to this interface or *to* unknown users who are not members of this interface's CUGs. In International Telecommunications Union Telecommunications Standardization Sector (ITU-T) terminology, this is called *outgoing access*. Similarly, each access interface can be configured to permit or deny calls either *to* the users attached to this interface or *from* unknown users who are not members of this interface's CUGs. In ITU-T terminology, this is called *incoming access*.



Note

Interfaces to other networks should be configured as CUG access interfaces, even if no CUGs are configured on the interface. In this case, if you want the ATM switch router to exchange SVCs with the neighbor network, calls *to* and *from* unknown users should be permitted on the interface.

You can configure each access interface to have one or more CUGs associated with it, but only one CUG can be selected as the *preferential* CUG. In this software release, calls received *from* users attached to this interface can only be associated with the preferential CUG. Calls destined *to* users attached to this interface can be accepted based on membership in any of the CUGs configured for the interface.

**Note**

You can configure CUG service without any preferential CUG. If a preferential CUG is not configured on the interface, and calls *from* users attached to this interface *to* unknown users are permitted, the calls will proceed as non-CUG calls, without generating any CUG IEs.

For each CUG configured on the interface, you can specify that calls *to* or *from* other members of the same CUG be denied. In ITU-T terminology, this is called *outgoing-calls-barred* (OCB) and *incoming-calls-barred* (ICB), respectively.

Table 16-1 describes the relationship between the ITU-T CUG terminology and Cisco CUG terminology.

Table 16-1 Cisco CUG and ITU-T CUG Terminology Conversion

ITU-T CUG Terminology	Cisco CUG Terminology
preferential CUG	preferential
incoming access allowed	permit-unknown-cugs to-user
outgoing access allowed	permit-unknown-cugs from-user
incoming calls barred (ICB)	deny-same-cug to-user
outgoing calls barred (OCB)	deny-same-cug from-user

To configure an access interface and the CUGs in which the interface is a member, perform the following steps, beginning in global configuration mode:

	Command	Purpose
Step 1	Switch(config)# interface atm <i>card/subcard/port</i> Switch(config-if)#	Specifies an ATM interface and enter interface configuration mode.
Step 2	Switch(config-if)# atm signalling cug access [permit-unknown-cugs { to-user from-user permanent both-directions permanent }]	Configures the interface as a CUG access interface.
Step 3	Switch(config-if)# atm signalling cug assign { alias <i>alias-name</i> interlock-code <i>interlock-code</i> } [deny-same-cug { to-user from-user }] [preferential]	Configures the CUG where this interface is a member.

Example

The following example shows how to configure an interface as a CUG access interface and assign a preferential CUG:

```
Switch(config)# interface atm 3/0/0
Switch(config-if)# atm signalling cug access permit-unknown-cugs both-direction permanent
Switch(config-if)# atm signalling cug assign interlock-code
4700918100000000603E5A790100603E5A790100.12345678 preferential
```

Displaying the CUG

To display the global CUG configuration, use the following privileged EXEC commands:

Command	Purpose
show atm signalling cug [interface atm card/subcard/port] [access alias alias-name interlock-code <i>interlock-code</i>]	Displays the CUG interface configuration status.
more system:running-config	Displays the CUG global configuration status.

Examples

The following example displays the global CUG configuration using the **show atm signalling cug** EXEC command:

```
Switch# show atm signalling cug
Interface:          ATM3/0/0
Cug Alias Name:
Cug Interlock Code: 4700918100000000603E5A790100603E5A790100.12345678
Non preferential Cug
Permit Network to User Calls
Permit User to Network Calls
```

The following example displays the global CUG access configuration using the **show atm signalling cug access** command:

```
Switch# show atm signalling cug access
Closed User Group Access Interface Parameters:

Interface:          ATM3/0/0
Network To User (incoming) access: Permit calls from unknown CUGs to User
User To Network (outgoing) access: Permit permanent calls to unknown groups
```

The following example displays the CUG global configuration using the **more system:running-config** command:

```
Switch# more system:running-config
Building configuration...
Current configuration:
!
version XX.X
no service pad
service udp-small-servers
service tcp-small-servers
!
hostname ls1010-2
!
atm signalling cug alias TEST interlock-code
47.0091810000000061705BDA01.0061705BDA01.00.12345678
!
atm address 47.0091.8100.0000.0061.705b.da01.0061.705b.da01.00

<information deleted>
!
interface ATM0/0/0
  atm signalling cug access permit-unknown-cugs both-direction permanent
<information deleted>
```

Displaying the Signalling Statistics

To display the ATM signalling statistics, use the following EXEC command:

Command	Purpose
show atm signalling statistics	Displays the ATM signalling statistics.

Example

The following example displays the ATM signalling statistics:

```
Switch# show atm signalling statistics
Global Statistics:
Calls Throttled: 0
Max Crankback: 3
Max Connections Pending: 255
Max Connections Pending Hi Water Mark: 1
ATM0:0   UP Time 01:06:20 # of int resets: 0
-----
Terminating connections: 0      Soft VCs: 0
Active Transit PTP SVC: 0      Active Transit MTP SVC: 0
Port requests: 0               Source route requests: 0
Conn-Pending: 0                Conn-Pending High Water Mark: 1
Calls Throttled: 0             Max-Conn-Pending: 40
      Messages:   Incoming   Outgoing
-----
PTP Setup Messages:           0           0
MTP Setup Messages:           0           0
  Release Messages:           0           0
  Restart Messages:           0           0
      Message:   Received   Transmitted   Tx-Reject   Rx-Reject
Add Party Messages:           0           0           0           0
  Failure Cause:   Routing    CAC    Access-list   Addr-Reg   Misc-Failure
Location Local:     0           0           0           0           12334
Location Remote:   0           0           0           0           0
ATM 0/0/3:0   UP Time 3d21h # of int resets: 0
-----
Terminating connections: 0      Soft VCs: 0
Active Transit PTP SVC: 0      Active Transit MTP SVC: 0
Port requests: 0               Source route requests: 0
Conn-Pending: 0                Conn-Pending High Water Mark: 0
Calls Throttled: 0             Max-Conn-Pending: 40

<information deleted>
```

Disabling Signalling on an Interface

If you disable signalling on a Private Network-Network Interface (PNNI) interface, PNNI routing is also disabled and Integrated Local Management Interface (ILMI) is automatically restarted whenever signalling is enabled or disabled.

To disable signalling on an interface, perform the following steps, beginning in global configuration mode:

	Command	Purpose
Step 1	Switch(config)# interface atm card/subcard/port Switch(config-if)#	Selects the interface to be configured.
Step 2	Switch(config-if)# no atm signalling enable	Disables signalling on the interface.

Example

The following example shows how to shut down signalling on ATM interface 0/1/2:

```
Switch(config)# interface atm 0/1/2
Switch(config-if)# no atm signalling enable
Switch(config-if)#
%ATM-5-ATMSOFTSTART: Restarting ATM signalling and ILMI on ATM0/1/2.
```

Multipoint-to-Point Funnel Signalling

Multipoint-to-point funnel signalling (funneling) merges multiple incoming switched virtual channels (SVCs) into a single outgoing SVC. This feature supports the Microsoft Corporation Proprietary Funnel Join (or Flow Merge) Protocol.

No configuration is necessary to enable this feature. For a complete description, refer to the *Guide to ATM Technology*.

Displaying Multipoint-to-Point Funnel Connections

To display multipoint-to-point funnel connections, use the following EXEC commands:

Command	Purpose
show atm status	Displays the number of active funnels.
show atm vc cast mp2p	Displays the status of the multipoint-to-point messages on the specific interfaces.

Examples

Use the **show atm status** command to display the number of active funnels, point-to-point and point-to-multipoint setup messages. An example of the **show atm status** command output follows:

```
Switch# show atm status
NUMBER OF INSTALLED CONNECTIONS: (P2P=Point to Point, P2MP=Point to MultiPoint,
MP2P=Multipoint to Point)
Type      PVCs  SoftPVCs   SVCs   TVCs   PVPs  SoftPVPs   SVPs   Total
P2P       26    0           0      0      2     0          0      28
P2MP      1     0           0      0      0     0          0       1
MP2P      0     0           1      0      0     0          0       1
TOTAL INSTALLED CONNECTIONS =                30

PER-INTERFACE STATUS SUMMARY AT 13:34:48 UTC Thu Jan 29 1998:
  Interface      IF      Admin  Auto-Cfg  ILMI Addr  SSCOP  Hello
  Name           Status  Status  Status    Reg State  State  State
-----
ATM0/0/0         UP      up      done     UpAndNormal  Active 2way_in
ATM0/0/1         DOWN    down    waiting  n/a         Idle  n/a
ATM0/0/2         UP      up      done     UpAndNormal  Active 2way_in
ATM0/0/3         UP      up      done     UpAndNormal  Active 2way_in
ATM0/0/3.55     UP      up      waiting  WaitDevType  Idle  n/a
ATM0/0/3.60     UP      up      waiting  WaitDevType  Idle  n/a
ATM0/0/3.65     UP      up      waiting  WaitDevType  Idle  n/a
ATM0/1/0         UP      up      n/a      UpAndNormal  Active n/a
ATM0/1/1         UP      up      done     UpAndNormal  Active n/a
ATM0/1/2         DOWN    shutdown waiting  n/a         Idle  n/a
ATM0/1/3         DOWN    down    waiting  n/a         Idle  n/a
```

Use the **show atm vc cast mp2p** command to display the status of the multipoint-to-point messages on the specific interfaces. An example of the **show atm vc cast mp2p** command output follows:

```
Switch# show atm vc cast mp2p
Interface  VPI  VCI  Type  X-Interface  X-VPI  X-VCI  Encap  Status
ATM0/1/0   0    40   SVC   ATM0/1/1    0     35     UP
           0    35   SVC   ATM0/1/1    0     36     UP
ATM0/1/1   0    35   SVC   ATM0/1/0    0     40     UP
ATM0/1/1   0    36   SVC   ATM0/1/0    0     40     UP
```