



NFAS with D-Channel Backup

This chapter describes how to implement the Non-Facility Associated Signaling (NFAS) with D-Channel Backup feature with two new switch types: DMS100 and NI2. ISDN NFAS allows a single D channel to control multiple ISDN PRI interfaces. You can configure a backup D channel for use when the primary NFAS D channel fails.

Once you configure channelized T1 controllers for ISDN PRI, you need configure to only the NFAS primary D channel; its configuration is distributed to all the members of the associated NFAS group.



Note

A controller configured with backup D channel loses one B channel.

Use of a single D channel to control up to 10 PRI interfaces can free one B channel on each interface to carry other traffic.

Any hard failure causes a switchover to the backup D channel and currently connected calls remain connected. The backup D channel cannot be used for data transfer.



Note

On the Nortel dms100 switch, when a single D channel is shared, multiple PRI interfaces may be configured in a single trunk group. The additional use of alternate route indexing, which is a feature of the dms100 switch, provides a rotary from one trunk group to another. This enables the capability of building large trunk groups in a public switched network.

Feature History for NFAS with D-Channel Backup

Release	Modification
12.1(5)XM	This feature was introduced.
12.2(11)T	This feature was implemented on the Cisco AS5850 platform.

Finding Support Information for Platforms and Cisco IOS Software Images

Use Cisco Feature Navigator to find information about platform support and Cisco IOS software image support. Access Cisco Feature Navigator at <http://www.cisco.com/go/fn>. You must have an account on Cisco.com. If you do not have an account or have forgotten your username or password, click **Cancel** at the login dialog box and follow the instructions that appear.

**Note**

For more information about related Cisco IOS voice features, see the following:

- [“Overview of ISDN Voice Interfaces” on page 3](#)
- Entire Cisco IOS Voice Configuration Library—including library preface and glossary, other feature documents, and troubleshooting documentation—at http://www.cisco.com/en/US/products/ps6441/prod_configuration_guide09186a0080565f8a.html.

For a list of references cited in this chapter, see the [“Additional References” section on page 217](#).

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Prerequisites for Configuring NFAS with D-Channel Backup

- Perform the prerequisites that are listed in the [“Prerequisites for Configuring an ISDN Voice Interface” section on page 15](#).
- Configure your router’s channelized T1 controllers for ISDN, as described in the “Configuring ISDN PRI” section of the “Configuring Channelized E1 and Channelized T1” chapter in the *Dial Solutions Quick Configuration Guide*.

Restrictions for Configuring NFAS with D-Channel Backup

Restrictions are described in the [Restrictions for Configuring ISDN Voice Interfaces, page 4](#). In addition, the following apply:

- NFAS is supported with only a channelized T1 controller and, as a result, is ISDN PRI capable.
- The router must connect to either a 4ess, dms250, dms100, or National ISDN switch type. [Table 47](#) shows applicable ISDN switch types and supported NFAS types.

Table 47 ISDN Switch Types and Supported NFAS Types

ISDN Switch Type	NFAS Type
Lucent 4ESS	Custom NFAS
Nortel DMS250	Custom NFAS
Nortel DMS100	Custom NFAS
Lucent 5ESS	Custom; does not support NFAS

Table 47 ISDN Switch Types and Supported NFAS Types (continued)

ISDN Switch Type	NFAS Type
Lucent 5ESS	NI-2 NFAS
AGCS GTD5	NI-2 NFAS
Other switch types	NI-2 NFAS

Information about NFAS


Note

General information about ISDN voice interfaces is presented in the [“Information About ISDN Voice Interfaces”](#) section on page 4.

Non-Facility Associated Signaling is a classification of signalling protocols that provide the signalling channel in a separate physical line from the bearer channels.

How to Configure NFAS with D-Channel Backup

This section contains the following procedures:

- [Configuring NFAS on PRI Groups, page 209](#)
- [Configuring a VoIP Dial Peer for NFAS Voice, page 211](#)
- [Disabling a Channel or Interface, page 211](#)
- [Verifying NFAS Configuration, page 212](#)

Configuring NFAS on PRI Groups

To configure NFAS on PRI groups, perform the following steps.


Note

When a backup NFAS D channel is configured and the primary NFAS D channel fails, rollover to the backup D channel is automatic and all connected calls stay connected. If the primary NFAS D channel recovers, the backup NFAS D channel remains active and does not switch over again unless the backup NFAS D channel fails.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **controller**
4. **pri-group timeslots nfas_d primary nfas_interface nfas_group**
5. **pri-group timeslots nfas_d backup nfas_interface nfas_group**
6. **pri-group timeslots 1-24 nfas_d none nfas_int nfas_group**

7. exit

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: Router> enable	Enters privileged EXEC mode. Enter your password when prompted.
Step 2	configure terminal Example: Router# configure terminal	Enters configuration mode.
Step 3	controller {t1 e1} controller-number Example: Router(config)# controller t1 3	Enters controller configuration mode for the specified controller number.
Step 4	pri-group timeslots range nfas_d primary nfas_interface number nfas_group number Example: Router(config-controller)# pri-group timeslots 1-24 nfas_d primary nfas_interface 1 nfas_group 1	Configures, on one channelized T1 controller, the NFAS primary D channel. Keywords are as follows: <ul style="list-style-type: none"> • nfas_interface number—Value assigned by the service provider to ensure unique identification of a PRI interface. • nfas_group number—Group identifier unique on the router. Multiple NFAS groups can exist on the router. <p>The interface number is the number of the interface assigned to an interface that is part of an nfas group. All interfaces that are part of an nfas group have the same group number and each is identified uniquely within the group by the interface number.</p>
Step 5	pri-group timeslots range nfas_d backup nfas_interface number nfas_group number Example: Router(config-controller)# pri-group timeslots 1-24 nfas_d backup nfas_interface 2 nfas_group 1	Configures, on a different channelized T1 controller, the NFAS backup D channel to be used if the primary D channel fails. Keywords are as above. Repeat this step on other channelized T1 controllers, as appropriate.
Step 6	pri-group timeslots 1-24 nfas_d none nfas_int number nfas_group number Example: Router(config-controller)# pri-group timeslots 1-24 nfas_d none nfas_int 3 nfas_group 1	(Optional) Configures, on other channelized T1 controllers, a 24 B channel interface, if desired.
Step 7	exit Example: Router(config-controller)# exit	Exits the current mode.

Configuring a VoIP Dial Peer for NFAS Voice

To configure a VoIP dial peer for NFAS voice, perform the following steps.



Note

Dial peers are used by the Cisco IOS voice stack for handling calls going from the PSTN to the VoIP side or vice versa. The dial-peer configuration for each NFAS controller should contain the primary of the NFAS group.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **dial-peer voice voip**
4. **port**
5. **exit**

DETAILED STEPS

	Commands	Purpose
Step 1	enable Example: Router> enable	Enters privileged EXEC mode. Enter your password when prompted.
Step 2	configure terminal Example: Router# configure terminal	Enters configuration mode.
Step 3	dial-peer voice tag voip Example: Router(config)# dial-peer voice 99 voip	Enters dial-peer configuration mode for the specified VoIP dial peer.
Step 4	port controller:D Example: Router(config-dial-peer)# port 4:D	Associates the dial peer with a specific voice port—in this case, the D channel associated with ISDN PRI for the NFAS primary.
Step 5	exit Example: Router(config-dial-peer)# exit	Exits the current mode.

Disabling a Channel or Interface

To disable a channel or interface, perform the following steps.

**Note**

You can disable a specified channel or an entire PRI, thus taking it out of service or put it into one of the other states that is passed in to the switch.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **isdn service dsl b_channel state**
4. **isdn service dsl b_channel 0 state**
5. **exit**

DETAILED STEPS

	Commands	Purpose
Step 1	enable Example: Router> enable	Enters privileged EXEC mode. Enter your password when prompted.
Step 2	configure terminal Example: Router# configure terminal	Enters configuration mode.
Step 3	isdn service [dsl number nfas_int number] b_channel number state {0 1 2} Example: Router(config)# isdn service nfas_int 3 b_channel 1 state 1	Takes an individual B channel out of service or sets it to a different state. State values are as follows: <ul style="list-style-type: none"> • 0—In service • 1—Maintenance • 2—Out of service
Step 4	isdn service [dsl number nfas_int number] b_channel 0 state {0 1 2} Example: Router(config)# isdn service nfas_int 3 b_channel 0 state 1	As above. Setting the b-channel number to 0 sets the entire PRI interface to a specified state value.
Step 5	exit Example: Router(config)# exit	Exits the current mode.

Verifying NFAS Configuration

To verify NFAS configuration, perform the following steps (listed alphabetically).

SUMMARY STEPS

1. **show dial-peer voice**
2. **show isdn nfas group**
3. **show isdn service**
4. **show isdn status**
5. **show running-config**

DETAILED STEPS

Step 1 **show dial-peer voice**

Use this command to display the configuration information for dial peers.

```
Router# show dial-peer voice
```

```
VoiceOverIpPeer1
  information type = voice,
  tag = 1, destination-pattern = '',
  answer-address = '', preference=0,
  numbering Type = 'unknown'
  group = 1, Admin state is up, Operation state is down,
  incoming called-number = '', connections/maximum = 0/unlimited,
  DTMF Relay = disabled,
  modem passthrough = system,
  huntstop = disabled,
  in bound application associated: DEFAULT
  out bound application associated:
  permission :both
  incoming COR list:maximum capability
  outgoing COR list:minimum requirement
  type = voip, session-target = '',
  technology prefix:
  settle-call = disabled
  ip precedence = 0, UDP checksum = disabled,
  session-protocol = cisco, session-transport = udp, req-qos = best-effor
  acc-qos = best-effort,
  fax rate = voice, payload size = 20 bytes
  fax protocol = system
  fax NSF = 0xAD0051 (default)
  codec = g729r8, payload size = 20 bytes,
  Expect factor = 0, Icpif = 20,
  Playout: Mode adaptive,
  Expect factor = 0,
  Max Redirects = 1, Icpif = 20,signaling-type = cas,
  CLID Restrict = disabled
  VAD = enabled, Poor QOV Trap = disabled,
  voice class perm tag = ''
  Connect Time = 0, Charged Units = 0,
  Successful Calls = 0, Failed Calls = 0,
  Accepted Calls = 0, Refused Calls = 0,
  Last Disconnect Cause is "",
  Last Disconnect Text is "",
  Last Setup Time = 0.
```

Step 2 **show isdn nfas group**

Use this command to display information about members of an NFAS group.

```
Router# show isdn nfas group 1

ISDN NFAS GROUP 1 ENTRIES:
The primary D is Serial1/0:23.
The backup D is Serial1/1:23.
The NFAS member is Serial2/0:23.
There are 3 total nfas members.
There are 93 total available B channels.
The primary D-channel is DSL 0 in state INITIALIZED.
The backup D-channel is DSL 1 in state INITIALIZED.
The current active layer 2 DSL is 1.
```

Step 3 show isdn service

Use this command to display information about ISDN channels and the service states.

Step 4 show isdn status

Use this command to display the status of all ISDN interfaces, including active layers, timer information, and switch-type settings.

Step 5 show running-config

Use this command to display the basic router configuration.

Examples

This section provides the following output examples:

- [Sample Output for the show isdn nfas group Command, page 214](#)

Sample Output for the show isdn nfas group Command

The following three examples show D channel state changes when rollover occurs from the primary NFAS D channel to the backup D channel. The first example shows the output with the primary D channel in service and the backup D channel in standby.

```
Router# show isdn nfas group 0

ISDN NFAS GROUP 0 ENTRIES:
The primary D is Serial1/0:23.
The backup D is Serial1/1:23.
The NFAS member is Serial2/0:23.
There are 3 total nfas members.
There are 70 total available B channels.
The primary D-channel is DSL 0 in state IN SERVICE.
The backup D-channel is DSL 1 in state STANDBY.
The current active layer 2 DSL is 0.
```

The following example shows output during rollover. The configured primary D channel is in maintenance busy state and the backup D channel is waiting.

```
Router# show isdn nfas group 0

ISDN NFAS GROUP 0 ENTRIES:
The primary D is Serial1/0:23.
The backup D is Serial1/1:23.
The NFAS member is Serial2/0:23.
There are 3 total nfas members.
There are 70 total available B channels.
The primary D-channel is DSL 0 in state MAINTENANCE BUSY.
The backup D-channel is DSL 1 in state WAIT.
```

The current active layer 2 DSL is 1.

The following example shows output when rollover is complete. The configured primary D channel is now in standby and the backup D channel is in service.

```
Router# show isdn nfas group 0

ISDN NFAS GROUP 0 ENTRIES:
The primary D is Serial1/0:23.
The backup D is Serial1/1:23.
The NFAS member is Serial2/0:23.
There are 3 total nfas members.
There are 70 total available B channels.
The primary D-channel is DSL 0 in state STANDBY.
The backup D-channel is DSL 1 in state IN SERVICE.
The current active layer 2 DSL is 1.
```

Configuration Examples for NFAS with D-Channel Backup

This section contains the following configuration examples:

- [NFAS Primary and Backup D Channels: Example, page 215](#)
- [POTS Dial-Peer Configuration: Example, page 217](#)
- [PRI Service State: Example, page 217](#)

NFAS Primary and Backup D Channels: Example

The following example configures ISDN PRI and NFAS on multiple T1 controllers of a Cisco 7500 series router. The D-channel of T1 1/0/0 is configured as primary D-channel and T1 1/0/1 is configured as backup D-channel. Once you configure the NFAS primary D channel, that channel is the only interface you see and have to configure.

```
version 12.x
service timestamps debug datetime msec localtime show-timezone
service timestamps log datetime msec localtime show-timezone
service password-encryption
!
hostname travis-nas-01
!
aaa new-model
aaa authentication login default local
aaa authentication login NO_AUTHENT none
aaa authorization exec default local if-authenticated
aaa authorization exec NO_AUTHOR none
aaa authorization commands 15 default local if-authenticated
aaa authorization commands 15 NO_AUTHOR none
aaa accounting exec default start-stop group tacacs+
aaa accounting exec NO_ACCOUNT none
aaa accounting commands 15 default stop-only group tacacs+
aaa accounting commands 15 NO_ACCOUNT none
enable secret 5 $1$LsoW$K/qBH9Ih2WstUxvazDgmY/
!
username admin privilege 15 password 7 06455E365E471D1C17
username gmcilla password 7 071824404D06140044
username krist privilege 15 password 7 0832454D01181118
!
call rsvp-sync
shelf-id 0 router-shelf
```

```

shelf-id 1 dial-shelf
!
resource-pool disable
!
modem-pool Default
  pool-range 1/2/0-1/2/143,1/3/0-1/3/143
!
clock timezone CST -6
clock summer-time CST recurring
!
ip subnet-zero
ip domain-name cisco.com
ip name-server 172.22.53.210
ip name-server 171.69.2.133
ip name-server 171.69.2.132
ip name-server 171.69.11.48
!
isdn switch-type primary-5ess
isdn voice-call-failure 0
!
controller T1 1/0/0
  framing esf
  linecode b8zs
  pri-group timeslots 1-24 nfas_d primary nfas_interface 1 nfas_group 1
  description PacBell 3241933
!

controller T1 1/0/1
  framing esf
  linecode b8zs
  pri-group timeslots 1-24 nfas_d backup nfas_interface 2 nfas_group 1
  description PacBell 3241933
!
interface Loopback0
  ip address 172.21.10.1 255.255.255.255
!
interface FastEthernet0/0/0
  ip address 172.21.101.20 255.255.255.0
  half-duplex
!
interface Serial1/0/0:23
  no ip address
  ip mroute-cache
  isdn switch-type primary-5ess
  isdn incoming-voice modem
  no cdp enable
!
interface Group-Async0
  no ip address
  group-range 1/2/00 1/3/143
!
router eigrp 1
  network 172.21.0.0
  no eigrp log-neighbor-changes
!
ip classless
ip route 0.0.0.0 0.0.0.0 172.21.101.1
ip http server
ip http authentication aaa
!
snmp-server engineID local 0000000902000030F2F51400
snmp-server community 5urf5h0p RO
snmp-server community 5crapmetal RW
snmp-server community SNMPv1 view v1default RO

```

POTS Dial-Peer Configuration: Example

The following example shows configuration of a POTS dial peer with the primary controller of an NFAS group:

```
dial-peer voice 35 pots
    incoming called-number 45...
    destination-pattern 35...
    direct-inward-dial
    port 1/0/0:D
    prefix 35
```

PRI Service State: Example

The following example reenables the entire PRI after it was disabled:

```
isdn service dsl 0 b-channel 0 state 0
```

Additional References

General ISDN References

- [“ISDN Features Roadmap” on page 1](#)—Describes how to access Cisco Feature Navigator; also lists and describes, by Cisco IOS release, ISDN features for that release
- [“Overview of ISDN Voice Interfaces” on page 3](#)—Describes relevant underlying technology; lists related documents, standards, MIBs, and RFCs; and describes how to obtain technical assistance
- [“Additional References” section on page 64](#)—Lists additional ISDN references

