



# Configuring and Managing Cisco Access Servers and Dial Shelves

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This chapter describes configuration and monitoring tasks for the Cisco AS5800 and AS5400 access servers, including dial shelves and dial shelf controllers on the Cisco AS5800 access servers in the following main sections:

- [Any Internet Protocol \(IP\) addresses and phone numbers used in this document are not intended to be actual addresses and phone numbers. Any examples, command display output, network topology diagrams, and other figures included in the document are shown for illustrative purposes only. Any use of actual IP addresses or phone numbers in illustrative content is unintentional and coincidental © 2007–2009 Cisco Systems, Inc. All rights reserved. Cisco AS5800 Dial Shelf Architecture and DSIP Overview](#)
- [How to Configure Dial Shelves](#)
- [Port Management Services on Cisco Access Servers](#)
- [Upgrading and Configuring SPE Firmware](#)

For further information and configuration examples for the Cisco AS5400, refer to the *Cisco AS5400 Universal Access Server Software Configuration Guide*.

For further information and configuration examples for the Cisco AS5800, refer to the *Cisco AS5800 Universal Access Server Operations, Administration, Maintenance, and Provisioning Guide*.

For more information on the Cisco access servers, go to the Cisco Connection Documentation site on Cisco.com, or use the Cisco Documentation CD-ROM.

To identify the hardware platform or software image information associated with a feature, use the Feature Navigator on Cisco.com to search for information about the feature or refer to the software release notes for a specific release. For more information, see the “Identifying Supported Platforms” section in the “Using Cisco IOS Software” chapter.

For a complete description of the commands in this chapter, refer to the *Cisco IOS Dial Technologies Command Reference*. To locate documentation of other commands that appear in this chapter, use the command reference master index or search online.



# Cisco AS5800 Dial Shelf Architecture and DSIP Overview

The Cisco AS5800 is a rack-mounted system consisting of a router shelf and a dial shelf. The dial shelf contains feature and controller cards (trunk cards), modem cards, and dial shelf controller (DSC) cards.

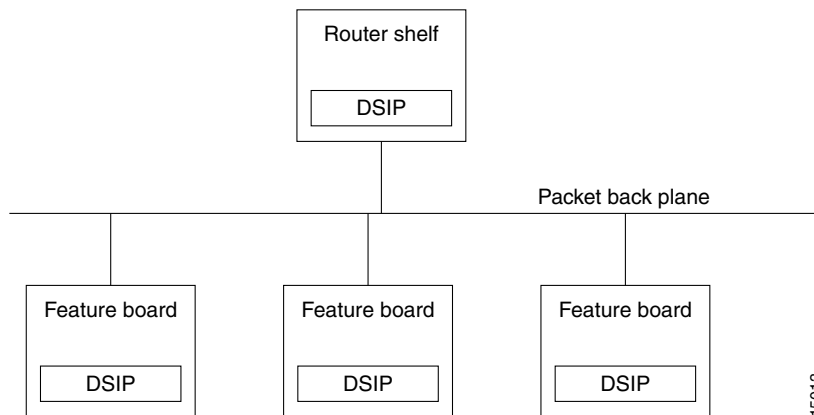


## Note

For more information about split dial shelf configuration, refer to the hardware installation guides that accompanied your Cisco AS5800 Universal Access Server and the *Cisco AS5800 Universal Access Server Software Installation and Configuration Guide*.

The Dial Shelf Interconnect Protocol (DSIP) is used for communication between router shelf and dial shelf on an AS5800. [Figure 1](#) diagrams the components of the architecture. The router shelf is the host for DSIP commands, which can be run remotely on the feature boards of the dial shelf using the command, **execute-on**. DSIP communicates over the packet backplane via the dial shelf interconnect (DSI) cable.

**Figure 1** DSIP Architecture in the Cisco AS5800



## Split Dial Shelves Feature

The split dial shelves feature provides for doubling the throughput of the Cisco AS5800 access server by splitting the dial shelf slots between two router shelves, each router connected to one Dial Shelf Controller (DSC), two of which must be installed in the system. Each router shelf is configured to control a certain set from the range of the dial shelf slots. Each router shelf will operate as though any other slots in the dial shelf contained no cards, even if there is a card in them, because they are controlled by the other router shelf. Thus the configuration on each router shelf would affect only the “owned” slots.

Each router shelf should own modem cards and trunk cards. Calls received on a trunk card belonging to one router shelf cannot be serviced by a modem card belonging to the other router shelf. Each router shelf operates like a single Cisco AS5800 access server system, as if some slots are unavailable.

Refer to the section [“Configuring Dial Shelf Split Mode”](#) for more information about configuring split dial shelves.

# How to Configure Dial Shelves

To configure and maintain dial shelves, perform the tasks in the following sections:

- [Configuring the Shelf ID](#)
- [Configuring Redundant DSC Cards](#)
- [Synchronizing to the System Clocks](#)
- [Configuring Dial Shelf Split Mode](#)
- [Executing Commands Remotely](#)
- [Verifying DSC Configuration](#)
- [Monitoring and Maintaining the DSCs](#)
- [Troubleshooting DSIP](#)

## Configuring the Shelf ID

The Cisco AS5800 consists of a router shelf and a dial shelf. To distinguish the slot/port number on the Cisco AS5800, you must specify the shelf number. The default shelf number is 0 for the router shelf and 1 for the dial shelf.



### Caution

You must reload the Cisco AS5800 for the new shelf number to take effect. Because the shelf number is part of the interface names when you reload, all NVRAM interface configuration information is lost.

Normally you do not need to change the shelf IDs; however, if you do, we recommend that you change the shelf number when you initially access the setup facility. For information on the setup facility, refer to the *Cisco AS5800 Universal Access Server Software Installation and Configuration Guide*.

If you are booting the router shelf from the network (netbooting), you can change the shelf numbers using the **shelf-id** command.

To configure the dial shelf, you save and verify the configuration in EXEC mode, and enter **shelf-id** commands in global configuration mode, as indicated in the following steps:

	Command	Purpose
Step 1	Router# <b>copy startup-configure tftp</b>	Saves your current configuration. Changing the shelf number removes all interface configuration information when you reload the Cisco AS5800.
Step 2	Router# <b>configure terminal</b>	Begins global configuration mode.
Step 3	Router(config)# <b>shelf-id number router-shelf</b>	Specifies the router shelf ID.
Step 4	Router(config)# <b>shelf-id number dial-shelf</b>	Specifies the dial shelf ID.
Step 5	Router(config)# <b>exit</b>	Exits global configuration mode.
Step 6	Router# <b>copy running-config startup-config</b>	Saves your configuration. This step is optional.
Step 7	Router# <b>show version</b>	Verifies that the correct shelf number will be changed after the next reload.

	Command	Purpose
Step 8	Router# <b>reload components all</b>	Instructs the DSC (or DSCs in a redundant configuration) be reloaded at the same time as a reload on the router shelf.  Type “yes” to the “save config” prompt.  Configure one interface so that its router shelf has connectivity to the server with the configuration.
Step 9	Router# <b>copy tftp startup-config</b>	Because changing the shelf number removes all interface configuration information when you reload the Cisco AS5800, edit the configuration file saved in step 1 and download it.

If you are booting the router shelf from Flash memory, use the following commands beginning in EXEC mode:

	Command	Purpose
Step 1	Router# <b>copy running-config tftp</b>  or Router# <b>copy startup-config tftp</b>	Saves your current (latest) configuration to a server.
Step 2	Router# <b>configure terminal</b>	Begins global configuration mode.
Step 3	Router(config)# <b>shelf-id number router-shelf</b>	Configures the router shelf ID.
Step 4	Router(config)# <b>shelf-id number dial-shelf</b>	Configures the dial shelf ID.
Step 5	Router(config)# <b>exit</b>	Exits global configuration mode.
Step 6	Router> <b>copy running-config startup-config</b>	Saves your configuration. This step is optional. If this step is skipped, type “No” at the “save configuration” prompt.
Step 7	Router> <b>show version</b>	Allows verification that the correct shelf number will be changed after the next reload.  Edit the configuration file saved in Step 1.
Step 8	Router> <b>copy tftp startup-config</b>	Copies the edited configuration to NVRAM on the Cisco AS5800.
Step 9	Router# <b>reload components all</b>	Instructs the DSC (or DSCs in a redundant configuration) to be reloaded at the same time as a reload on the router shelf.

## Configuring Redundant DSC Cards

The Redundant Dial Shelf Controller feature consists of two DSC cards on a Cisco AS5800 dial shelf. The DSC cards provide clock and power control to the dial shelf cards. Each DSC card provides the following:

- Master clock for the dial shelf
- Fast Ethernet link to the router shelf
- Environmental monitoring of the feature boards
- Bootstrap images on start-up for the feature boards

The Redundant Dial Shelf Controller feature is automatically enabled when two DSC cards are installed. DSC redundancy is supported with Cisco AS5800 software at the Dial Shelf Interconnect Protocol (DSIP) level.

This feature enables a Cisco AS5800 dial shelf to use dual DSCs for full redundancy. A redundant configuration allows for one DSC to act as backup to the active card, should the active card fail. This increases system availability by preventing loss of service. The redundant DSC functionality is robust under high loads and through DSC or software crashes and reloads. The redundant DSC functionality is driven by the following events:

- User actions
- Control messages
- Timeouts
- Detection of component failures
- Error and warning messages

DSC redundancy provides maximum system availability by preventing loss of service if one of the DSCs fails. There is no load sharing between the Broadband Inter-Carrier Interfaces (BICI). One BIC is used as a backup, carrying only control traffic, such as keepalives, until there is a switchover.

Before starting this configuration task:

- Your Cisco AS5800 router shelf and dial shelf must be fully installed, with two DSC cards installed on the dial shelf.
- Your Cisco AS5800 access server must be running Cisco IOS Release 12.1(2)T.
- The external DSC clocking port must be configured identically on both router shelves and must be physically connected to both DSCs. This assures that if a DSC card needs replacing or if the backup DSC card becomes primary, clocking remains stable.

## Synchronizing to the System Clocks

The time-division multiplexing (TDM) bus in the backplane on the dial shelf must be synchronized to the T1/E1 clocks on the trunk cards. The Dial Shelf Controller (DSC) card on the dial shelf provides hardware logic to accept multiple clock sources as input and use one of them as the primary source to generate a stable, PPL synchronized output clock. The input clock can be any of the following sources:

- Trunk port in slots 0 through 5—up to 12 can be selected (2 per slot)
- An external T1 or E1 clock source fed directly through a connector on the DSC card
- A free-running clock from an oscillator in the clocking hardware on the DSC card

For dual (redundant) DSC cards, the external DSC clocking port should be configured so that the clock signal fed into both DSCs is identical.

To configure the external clocks, use the following commands from the router shelf login beginning in global configuration mode. One external clock is configured as the primary clock source, and the other is configured as the backup clock source.

	Command	Purpose
Step 1	Router(config)# <b>dial-tdm-clock priority value</b>	Configures the trunk card clock priority. Priority range is a value between 1 and 50.
Step 2	Router(config)# <b>dial-tdm-clock priority X</b> {trunk-slot Y port Z} <b>external {t1   e1}</b> [120-ohm]	Selects the T1/E1 trunk slot and port that is providing the clocking source. T1/E1 selection is based on the incoming signal. Select the impedance. The default impedance is 75-ohm.
Step 3	Router(config)# <b>dial-tdm-clock priority value</b> <b>external t1</b> or Router(config)# <b>dial-tdm-clock priority value</b> <b>external e1</b>	Configures the T1/E1 external clock on the dial shelf controller front panel. T1/E1 selection is based on the signal coming in. Priority range is a value between 1 and 50.
Step 4	Router(config)# <b>Ctrl-Z</b> Router#	Verifies your command registers when you press the return key. Enter <b>Ctrl-Z</b> to return to privileged EXEC mode.
Step 5	Router# <b>copy running-config startup-config</b>	Saves your changes.

## Verifying External Clock Configuration

To verify that the primary clock is running, enter the **show dial-shelf clocks** privileged EXEC command:

```
Router# show dial-shelf 12 clocks
```

```
Slot 12:
System primary is 1/2/0 of priority 202
TDM Bus Master Clock Generator State = NORMAL
Backup clocks:
Source  Slot      Port      Priority      Status      State
-----
Trunk   2              1          208          Good        Default
Slot    Type          11 10 9  8  7  6  5  4  3  2  1  0
2       T1           G  G  G  G  G  G  G  G  G  G  G  G
```

For more information on configuring external clocks, refer to the Cisco document *Managing Dial Shelves*.

## Configuring Dial Shelf Split Mode

This section describes the procedure required to transition a router from normal mode to split mode and to change the set of slots a router owns while it is in split mode. Since the process of switching the ownership of a slot from one router to the other is potentially disruptive (when a feature board is restarted, all calls through that card are lost), a router shelf cannot take over a slot until ownership is relinquished by the router that currently claims ownership, either by reconfiguring the router or disconnecting that router or its associated DSC.

The dial shelf is split by dividing the ownership of the feature boards between the two router shelves. You must configure the division of the dial shelf slots between the two router shelves so that each router controls an appropriate mix of trunk and modem cards. Each router shelf controls its set of feature boards as if those were the only boards present. There is no interaction between feature boards owned by one router and feature boards owned by the other router.

Split mode is entered when the **dial-shelf split slots** command is parsed on the router shelf. This can occur when the router is starting up and parsing the stored configuration, or when the command is entered when the router is already up. Upon parsing the **dial-shelf split slots** command, the router frees any resources associated with cards in the slots that it no longer owns, as specified by exclusion of slot numbers from the *slot-numbers* argument. The router should be in the same state as if the card had been removed from the slot; all calls through that card will be terminated. The configured router then informs its connected DSC that it is in split mode, and which slots it claims to own.

In split mode, a router shelf by default takes half of the 2048 available TDM timeslots. The TDM split mode is configured using the **dial-shelf split backplane-ds0** command. (The **dial-shelf split slot** command must be defined for the **dial-shelf split backplane-ds0** command to be active.) If the **dial-shelf split slots** command is entered when the total number of calls using timeslots exceeds the number that would normally be available to the router in split mode, the command is rejected. This should occur only when a change to split mode is attempted, in which the dial shelf has more than 896 calls in progress (more than half of the 1,792 available timeslots). Otherwise, a transition from normal mode to split mode can be made without disturbing the cards in the slots that remain owned, and calls going through those cards will stay up.

To configure a router for split dial shelf operation, perform the following steps:

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**Step 1** Ensure that both DSCs and both router shelves are running the same Cisco IOS image.



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**Note** Having the same version of Cisco IOS running on both DSCs and both router shelves is not mandatory; however, it is a good idea. There is no automatic checking that the versions are the same.

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**Step 2** Schedule a time when the Cisco AS5800 can be taken out of service without unnecessarily terminating calls in progress. The entire procedure for transitioning from normal mode to split mode should require approximately one hour if all the hardware is already installed.

**Step 3** Busy out all feature boards and wait for your customers to log off.

**Step 4** Reconfigure the existing router shelf to operate in split mode.

**Step 5** Enter the **dial-shelf split slots** command, specifying the slot numbers that are to be owned by the existing router shelf.

**Step 6** Configure the new router shelf to operate in split mode on other feature boards.

**Step 7** Enter the **dial-shelf split slots** command, specifying the slot numbers that are to be owned by the new router shelf. Do not specify any of the slot numbers that you specified in Step 6. The range of valid slot numbers is 0 through 11.

To perform this step, enter the following command in global configuration mode:

Command	Purpose
<pre>Router(config)# dial-shelf split slots slot-numbers</pre>	<p>Enter list of slot numbers, for example:</p> <pre>dial-shelf split slots 0 1 2 6 7 8</pre> <p>In this example, the other router shelf could be configured to own the other slots: 3 4 5 9 10 11.</p> <p><b>Normal mode:</b> This command changes the router shelf to split mode with ownership of the slots listed.</p> <p>In case of conflicting slot assignments, the command is rejected and a warning message is issued. Issue a <b>show dial-shelf split slots</b> command to the other router shelf to display its list of owned dial shelf slots.</p> <p>Online insertion and removal (OIR) events on all slots are detected by both DSCs and added to the list of feature boards physically present in the dial shelf; however, OIR event processing is done only for assigned slots.</p> <p><b>Split mode:</b> This command adds the dial shelf slots listed to the router shelf's list of owned dial shelf slots.</p>

**Step 8** Install the second DSC, if it has not already been installed.

**Step 9** Connect the DSIP cable from the second DSC to the new router shelf.

**Step 10** Ensure that split mode is operating properly.

Enter the **show dial-shelf** command for each router. This command has been extended so that the response indicates that the router shelf is running in split mode and which slots the router shelf owns. The status of any cards in any owned slots is shown, just as they are in the present **show dial-shelf** command. When in split mode, the output will be extended as in the following example:

```
System is in split dial shelf mode.
Slots owned: 0 2 3 4 5 6 (connected to DSC in slot 13)
Slot   Board   CPU      DRAM      I/O Memory  State  Elapsed
      Type   Util    Total (free) Total (free)
0      CE1     0%/0%   21341728( 87%) 8388608( 45%) Up     00:11:37
2      CE1     0%/0%   21341728( 87%) 8388608( 45%) Up     00:11:37
4      Modem(HMM) 20%/20% 6661664( 47%) 6291456( 33%) Up     00:11:37
5      Modem(DMM) 0%/0%   6661664( 31%) 6291456( 32%) Up     00:11:37
6      Modem(DMM) 0%/0%   6661664( 31%) 6291456( 32%) Up     00:11:37
13     DSC     0%/0%   20451808( 91%) 8388608( 66%) Up     00:16:31
Dial shelf set for auto boot
```

**Step 11** Enable all feature boards to accept calls once again.

## Changing Slot Sets

You can change the sets of slots owned by the two router shelves while they are in split mode by first removing slots from the set owned by one router, and then adding them to the slot set of the other router. The changed slot set information is sent to the respective DSCs, and the DSCs determine which slots have been removed and which added from the new slot set information. It should be clear that moving a slot in this manner will disconnect all calls that were going through the card in that slot.



To perform this task, enter the following commands as needed:

Command	Purpose
Router (config)# <b>dial-shelf split slots remove</b> <i>slot-numbers</i>	Removes the dial shelf slots listed from the router shelf's list of owned dial shelf slots. The effect of multiple commands is cumulative.
Router (config)# <b>dial-shelf split slots</b> <i>slot-numbers</i>	Adds the dial shelf slots listed to the router shelf's list of owned dial shelf slots.

#### When a Slot Is Removed

The router shelf that is losing the slot frees any resources and clears any state associated with the card in the slot it is relinquishing. The DSC reconfigures its hub to ignore traffic from that slot, and if there is a card in the slot, it will be reset. This ensures that the card frees up any TDM resource it might be using and allows it to restart under control of the router shelf that is subsequently configured to own the slot.

#### When a Slot Is Added

If there are no configuration conflicts, and there is a card present in the added slot, a dial-shelf OIR insertion event is sent to the router shelf, which processes the event the same as it always does. The card in the added slot is reset by the DSC to ensure a clean state, and the card downloads its image from the router shelf that now owns it.

If the other router shelf and the other DSC claim ownership of the same slot, the command adding the slot should be rejected. However, should a configuration conflict exist, error messages are sent to both routers and the card is not reset until one of the other router shelves and its DSC stop claiming ownership of the slot. Normally, this will not happen until you issue a **dial-shelf split slots remove** command surrendering the ownership claim on the slot by one of the routers.

## Leaving Split Mode

Split mode is exited when the dial shelf configuration is changed by a **no dial-shelf split slots** command. When the split dial shelf line is removed, the router shelf will start using all of the TDM timeslots. Feature boards that were not owned in split mode and that are not owned by the other router will be reset. Cards in slots that are owned by the other router will be reset, but only after the other DSC has been removed or is no longer claiming the slots. The split dial shelf configuration should not be removed while the second router shelf is still connected to the dial shelf.

When a router configured in split mode fails, all calls associated with the failed router are lost. Users cannot connect back in until the failed router recovers and is available to accept new incoming calls; however, the other split mode router shelf will continue to operate normally.

## Troubleshooting Split Dial Shelves

The system will behave as configured as soon as the configuration is changed. The exception is when there is a misconfiguration, such as when one router is configured in split mode and the other router is configured in normal mode, or when both routers are configured in split mode and both claim ownership of the same slots.

Problems can arise if one of the two routers connected to a dial shelf is not configured in split mode, or if both are configured in split mode and both claim ownership of the same slots. If the state of the second router is known when the **dial-shelf split slots** command is entered and the command would result in a conflict, the command is rejected.

If a conflict in slot ownership does arise, both routers will receive warning messages until the conflict is resolved. Any card in a slot which is claimed by both routers remains under the control of the router that claimed it first, until you can resolve the conflict by correcting the configuration of one or both routers.

It should be noted that there can also be slots that are not owned by either router (orphan slots). Cards in orphan slots cannot boot up until one of the two routers claims ownership of the slot because neither DSC will download bootstrap images to cards in unowned orphan slots.

## Managing a Split Dial Shelf

If you are installing split dial shelf systems, a system controller is available that provides a single system view of multiple point of presences (POPs). The system controller for the Cisco AS5800 Universal Access Server includes the Cisco 3640 router running Cisco IOS software. The system controller can be installed at a remote facility so that you can access multiple systems through a console port or Web interface.

There are no new MIBs or MIB variables required for the split dial shelf configuration. A split dial shelf appears to Simple Network Management Protocol (SNMP) management applications as two separate Cisco AS5800 systems. One console to manage the whole system is not supported—you must have a console session per router shelf (two console sessions) to configure each split of the Cisco AS5800. The system controller must manage a split dial shelf configuration as two separate Cisco AS5800 systems.

The normal mode configuration of the Cisco AS5800 requires the dial shelf and router shelf IDs to be different. In a split system, four unique shelf IDs are desirable, one for each router shelf and one for each of the slot sets; however, a split system will function satisfactorily if the router shelf IDs are the same. If a system controller is used to manage a split dial shelf configuration, the two routers must have distinct shelf IDs, just as they must when each router has its own dial shelf.

You can download software configurations to any Cisco AS5800 using SNMP or a Telnet connection. The system controller also provides performance monitoring and accounting data collection and logging.

In addition to the system controller, a network management system with a graphical user interface (GUI) runs on a UNIX SPARC station and includes a database management system, polling engine, trap management, and map integration.

To manage a split dial shelf, enter the following commands in EXEC mode as needed:

Command	Purpose
Router# <b>show dial-shelf split</b>	Displays the slots assigned to each of the router shelves and the corresponding feature boards in 'orphan' slots (slots not currently assigned to either router).
Router# <b>show dial-shelf</b>	Displays information about the dial shelf, including clocking information.
Router# <b>show context</b>	Displays information about the dial shelf, including clocking information, but works only for owned slots. Use <b>show context all</b> to display all the information available about any slot. This is intended to cover the case where ownership of a feature board is moved from one router shelf to the other after a crash.

## Executing Commands Remotely

Although not recommended, it is possible to connect directly to the system console interface in the DSC to execute dial shelf configuration commands. All commands necessary for dial shelf configuration, and **show**, and **debug** command tasks can be executed remotely from the router console. A special command, **execute-on**, is provided for this purpose. This command enables a special set of EXEC mode commands to be executed on the router or the dial shelf. This command is a convenience that avoids connecting the console to the DSC. For a list of commands you can execute using **execute-on**, refer to the command description in the *Cisco IOS Dial Technologies Command Reference*.

To enter a command that you wish to execute on a specific card installed in the dial shelf while logged onto the router shelf console, use the following commands in privileged EXEC mode as needed:

Command	Purpose
Router# <b>execute-on slot</b> <i>slot command</i>	Executes a command from the router shelf on a specific slot in the dial shelf.
Router# <b>execute-on all</b> <i>command</i>	Executes a command from the router shelf on all cards in the dial shelf.

## Verifying DSC Configuration

To verify that you have started the redundant DSC feature, enter the **show redundancy** privileged EXEC command:

```
Router# show redundancy

DSC in slot 12:

Hub is in 'active' state.
Clock is in 'active' state.

DSC in slot 13:

Hub is in 'backup' state.
Clock is in 'backup' state.

Router#
```

## Monitoring and Maintaining the DSCs

To monitor and maintain the DSC cards, use the following commands in privileged EXEC mode, as needed:

Command	Purpose
Router# <b>hw-module shelf/slot</b> { <b>start</b>   <b>stop</b> }	Stops the target DSC remotely from the router console. Restart the DSC if it has been stopped.
Router# <b>show redundancy</b> [ <b>history</b> ]	Displays the current or history status for redundant DSC.

Command	Purpose
Router# <b>debug redundancy</b> {all ui clk hub}	Use this debug command if you need to collect events for troubleshooting, selecting the appropriate required key word.
Router# <b>show debugging</b>	Lists the debug commands that are turned on, including those for redundant DSC.

## Troubleshooting DSIP

There are a number of show commands available to aid in troubleshooting dial shelves. Use the following EXEC mode commands to monitor DSI and DSIP activity as needed:

Command	Purpose
Router# <b>clear dsip tracing</b>	Clears tracing statistics for the DSIP.
Router# <b>show dsip</b>	Displays all information about the DSIP.
Router# <b>show dsip clients</b>	Displays information about DSIP clients.
Router# <b>show dsip nodes</b>	Displays information about the processors running the DSIP.
Router# <b>show dsip ports</b>	Displays information about local and remote ports.
Router# <b>show dsip queue</b>	Displays the number of messages in the retransmit queue waiting for acknowledgment.
Router# <b>show dsip tracing</b>	Displays DSIP tracing buffer information.
Router# <b>show dsip transport</b>	Displays information about the DSIP transport statistics for the control/data and IPC packets and registered addresses.
Router# <b>show dsip version</b>	Displays DSIP version information.

The privileged EXEC mode **show dsi** command can also be used to troubleshoot, as it displays the status of the DSI adapter, which is used to physically connect the router shelf and the dial shelf to enable DSIP communications.

The following is an example troubleshooting scenario:

**Problem:** The router shelf boots, but there is no communication between the router and dial shelves.

- 
- Step 1** Run the **show dsip transport** command.
  - Step 2** Check the “DSIP registered addresses” column. If there are zero entries there, there is some problem with the Dial Shelf Interconnect (DSI). Check if the DSI is installed in the router shelf.
  - Step 3** If there is only one entry and it is our own local address, then first sanity check the physical layer. Make sure that there is a physical connection between the RS and DS. If everything is fine from cabling point of view, go to step 3.
  - Step 4** Check the DSI health by issuing the **show dsi** command. This gives a consolidated output of DSI controller and interface. Check for any errors like runts, giants, throttles and other usual FE interface errors.
-

**Diagnosis:** If an entry for a particular dial shelf slot is not found among the registered addresses, but most of other card entries are present, the problem is most likely with that dial shelf slot. The DSI hardware on that feature board is probably bad.

## Port Management Services on Cisco Access Servers

### Port Management Services on the Cisco AS5400 Access Server

Port service management on the Cisco AS5400 access server implements service using the NextPort dial feature card (DFC). The NextPort DFC is a hardware card that processes digital service port technology for the Cisco AS5400 access server. A port is defined as an endpoint on a DFC card through which multiservice tones and data flow. The ports on the NextPort DFC support both modem and digital services. Ports can be addressed-aggregated at the slot level of the NextPort module, the Service Processing Element (SPE) level within the NextPort module, and the individual port level. Cisco IOS Release 12.1(3)T or higher is required for the NextPort DFC.

Instead of the traditional line-modem one-to-one correspondence, lines are mapped to an SPE that resides on the Cisco AS5400 NextPort DFC. Each SPE provides modem services for six ports. Busyout and shutdown can be configured at the SPE or port level. The NextPort DFC introduces the slot and SPE software hierarchy. On the Cisco AS5400, the hierarchy designation is *slot/SPE*.

The NextPort DFC slot is defined as a value between 1 and 7. Slot 0 is reserved for the motherboard. Each NextPort DFC provides 18 SPEs. The SPE value ranges from 0 to 17. Since each SPE has six ports, the NextPort DFC has a total of 108 ports. The port value ranges from 0 to 107.

The NextPort DFC performs the following functions:

- Converts pulse code modulation (PCM) bitstreams to digital packet data.
- Forwards converted and packetized data to the main processor, which examines the data and forwards it to the backhaul egress interface.
- Supports all modem standards (such as V.34 and V.42*bis*) and features, including dial-in and dial-out.

### Port Management Services on the Cisco AS5800 Access Server

Port service management on the Cisco AS5800 access server implements service on the Universal Port Card (UPC). A universal port carries a single channel at the speed of digital signal level 0 (DS0), or the equivalent of 64-kbps on a T1 facility.

Network traffic can be a modem, voice, or fax connection. The 324 port UPC uses NextPort hardware and firmware to provide universal ports for the Cisco AS5800 access server. These ports are grouped into 54 service processing elements (SPEs). Each SPE supports six universal ports. To find the total number of ports supported by a UPC, multiply the 54 SPEs by the six ports supported on each SPE. The total number of universal ports supported by a single UPC is 324. Configuration, management, and troubleshooting of universal ports can be done at the UPC, SPE, and port level. Each UPC also has a SDRAM card with a minimum of a 128 MB of memory.

The Cisco AS5800 access server can be equipped with a maximum of seven UPCs with upgradable firmware. The UPC supports data traffic, and depending on the software and platform is universal port capable. Each UPC plugs directly into the dial shelf backplane and does not need any external connections. Each UPC has three LEDs, which indicate card status.

The Cisco AS5800 access server is capable of terminating up to 2,048 incoming modem connections (slightly more than an OC3) when equipped with seven UPCs and three CT3 trunk cards. A split shelf configuration with a second router shelf and second dial shelf controller are required to achieve full

capacity. A single router with a standard configuration supports up to 1,344 port connections. Cisco IOS Release 12.1(3)T or higher is required for the UPC. Unless your system shipped with UPCs installed, you must upgrade the Cisco IOS image on the dial shelf and router shelf or shelves.

Instead of the traditional line-modem one-to-one correspondence, lines are mapped to an SPE that resides on the Cisco AS5800 access server UPC. Each SPE provides modem services for six ports. Busyout and shutdown can be configured at the SPE or port level. The UPC introduces the shelf, slot, and SPE software hierarchy. On the Cisco AS5800 access server, the hierarchy designation is *shelf/slot/SPE*.

A UPC can be installed in slots numbered 2 to 11 on the dial shelf backplane. If installed in slots 0 or 1, the UPC automatically powers down. Slots 0 and 1 only accept trunk cards; they do not accept mixes of cards. We recommend that you install mixes of T3 and T1 cards, or E1 trunk cards in slots 2 to 5. You can use double-density modem cards, UPCs, and VoIP cards simultaneously. Trunk cards can operate in slots 0 to 5 and are required for call termination.

The UPC performs the following functions:

- Converts pulse code modulation (PCM) bitstreams to digital packet data.
- Forwards converted and packetized data to the dial shelf main processor, which examines the data and forwards it to the router shelf. From the router shelf, the data is routed to the external network.

- Supports all modem standards (such as V.34 and V.42*bis*) and features, including dial-in and dial-out.
- Supports online insertion and removal (OIR), a feature that allows you to remove and replace UPCs while the system is operating. A UPC can be removed without disrupting the operation of other cards and their associated calls. If a UPC is removed while the system is operating, connections or current calls on that card are dropped. Calls being handled by other cards are not affected.

**Note**

All six ports on an SPE run the same firmware.

## Upgrading and Configuring SPE Firmware

SPE firmware is automatically downloaded in both the Cisco AS5400 and AS5800 access servers.

### AS5400 Access Server

SPE firmware is automatically downloaded to a NextPort DFC from the Cisco AS5400 when you boot the system for the first time, or when you insert a NextPort DFC while the system is operating. When you insert DFCs while the system is operating, the Cisco IOS image recognizes the cards and downloads the required firmware to the cards.

The SPE firmware image is bundled with the access server Cisco IOS image. The SPE firmware image uses an *autodetect* mechanism, which enables the NextPort DFC to service multiple call types. An SPE detects the call type and automatically configures itself for that operation. For further information on upgrading SPE firmware from the Cisco IOS image, refer to the section “[Configuring SPEs to Use an Upgraded Firmware File.](#)”

The firmware is upgradeable independent of Cisco IOS upgrades, and different firmware versions can be configured to run on SPEs in the same NextPort DFC. You can download firmware from the Cisco System Cisco.com File Transfer Protocol (FTP) server.

### AS5800 Access Server

SPE firmware is automatically downloaded to an AS5800 UPC from the router shelf Cisco IOS image when you boot the system for the first time or when you insert a UPC while the system is operating. The Cisco IOS image recognizes the card and the dial shelf downloads the required portware to the cards. Cisco IOS Release 12.1(3)T or higher is required for the UPC.

The SPE firmware image (also known as *portware*) is bundled with the Cisco IOS UPC image. The SPE firmware image uses an *autodetect* mechanism, which enables the UPC to service multiple call types. An SPE detects the call type and automatically configures itself for that operation. For further information on upgrading SPE firmware from the Cisco IOS image, refer to the section “[Configuring SPEs to Use an Upgraded Firmware File.](#)”

The firmware is upgradable independent of Cisco IOS upgrades, and different firmware versions can be configured to run on SPEs in the same UPC. You can download firmware from the Cisco.com File Transfer Protocol (FTP) server.

### Firmware Upgrade Task List

Upgrading SPE firmware from the Cisco.com FTP server is done in two steps:

- [Downloading SPE Firmware from the Cisco.com FTP Server to a Local TFTP Server](#)
- [Copying the SPE Firmware File from the Local TFTP Server to the SPEs](#)

### Firmware Configuration Task List

To complete firmware configuration once you have downloaded the SPE firmware, perform the tasks in the following sections:

- [Specifying a Country Name](#)
- [Configuring Dial Split Shelves \(AS5800 Only\)](#)
- [Configuring SPEs to Use an Upgraded Firmware File](#)
- [Disabling SPEs](#)
- [Rebooting SPEs](#)
- [Configuring Lines](#)
- [Configuring Ports](#)
- [Verifying SPE Line and Port Configuration](#)
- [Configuring SPE Performance Statistics](#)
- [Clearing Log Events](#)
- [Troubleshooting SPEs](#)
- [Monitoring SPE Performance Statistics](#)

**Note**

---

The following procedure can be used for either a Cisco AS5400 or AS5800 access server.

---

## Downloading SPE Firmware from the Cisco.com FTP Server to a Local TFTP Server

**Note**

---

You must be a registered Cisco user to log in to the Cisco Software Center.

---

You can download software from the Cisco Systems Cisco.com FTP server using an Internet browser or using an FTP application. Both procedures are described.

### Using an Internet Browser

---

- Step 1** Launch an Internet browser.
- Step 2** Bring up the Cisco Software Center home page at the following URL (this is subject to change without notice):  
<http://www.cisco.com/kobayashi/sw-center/>
- Step 3** Click **Access Software** (under Cisco Software Products) to open the Access Software window.
- Step 4** Click **Cisco AS5400 Series** or **Cisco AS5800 Series** software.
- Step 5** Click the SPE firmware you want and download it to your workstation or PC. For example, to download SPE firmware for the universal access server, click **Download Universal Images**.
- Step 6** Click the SPE firmware file you want to download, and then follow the remaining download instructions. If you are downloading the SPE firmware file to a PC, make sure that you download the file to the c:/tftpboot directory; otherwise, the download process does not work.



- Step 7** When the SPE firmware is downloaded to your workstation, transfer the file to a Trivial File Transfer Protocol (TFTP) server in your LAN using a terminal emulation software application.
- Step 8** When the SPE firmware is downloaded to your workstation, transfer the file to a TFTP server somewhere in your LAN using a terminal emulation software application.

---

### Using an FTP Application



**Note** The directory path leading to the SPE firmware files on cco.cisco.com is subject to change without notice. If you cannot access the files using an FTP application, try the Cisco Systems URL <http://www.cisco.com/cgi-bin/ibld/all.pl?i=support&c=3>.

---

- Step 1** Log in to the Cisco.com FTP server called cco.cisco.com:

```
terminal> ftp cco.cisco.com
Connected to cio-sys.cisco.com.
```

- Step 2** Enter your registered username and password (for example, **harry** and **letmein**):

```
Name (cco.cisco.com:harry): harry
331 Password required for harry.
Password: letmein
230-#####
230-# Welcome to the Cisco Systems CCO FTP server.
230-# This server has a number of restrictions. If you are not familiar
230-# with these, please first get and read the /README or /README.TXT file.
230-# http://www.cisco.com/acs/info/cioesd.html for more info.
230-#####
```

- Step 3** Specify the directory path that holds the SPE firmware you want to download. For example, the directory path for the Cisco AS5400 SPE firmware is /cisco/access/5400:

```
ftp> cd /cisco/access/5400
250-Please read the file README
250- it was last modified on Tue May 27 10:07:38 1997 - 48 days ago
250-Please read the file README.txt
250- it was last modified on Tue May 27 10:07:38 1997 - 48 days ago
250 CWD command successful.
```

- Step 4** Enter the **ls** command to view the contents of the directory:

```
ftp> ls
227 Entering Passive Mode (192,31,7,130,218,128)
150 Opening ASCII mode data connection for /bin/ls.
total 2688
drwxr-s--T  2 ftpadmin ftpcio    512 Jun 30 18:11 .
drwxr-sr-t  19 ftpadmin ftpcio    512 Jun 23 10:26 ..
lrwxrwxrwx  1 root      3      10 Aug  6 1996  README ->README.txt
-rw-rw-r--  1 root      ftpcio   2304 May 27 10:07 README.txt
-r--r--r--  1 ftpadmin ftpint  377112 Jul 10 18:08 np-spe-upw-10.0.1.2.bin
-r--r--r--  1 ftpadmin ftpint   635 Jul 10 18:08 SPE-firmware.10.1.30.readme
```

- Step 5** Specify a binary image transfer:

```
ftp> binary
200 Type set to I.
```

- Step 6** Copy the SPE firmware files from the access server to your local environment with the **get** command.

**Step 7** Quit your terminal session:

```
ftp> quit
Goodbye.
```

**Step 8** Enter the **ls -al** command to verify that you successfully transferred the files to your local directory:

```
server% ls -al
total 596
-r--r--r-- 1 280208 Jul 10 18:08 np-spe-upw-10.0.1.2.bin
server% pwd
/auto/tftpboot
```

**Step 9** Transfer these files to a local TFTP or remote copy protocol (RCP) server that your access server or router can access.

---

## Copying the SPE Firmware File from the Local TFTP Server to the SPEs

The procedure for copying the SPE firmware file from your local TFTP server to the Cisco AS5400 NextPort DFCs or Cisco AS5800 UPCs is a two-step process. First, transfer the SPE firmware to the access server's Flash memory. Then, configure the SPEs to use the upgrade firmware. The upgrade occurs automatically, either as you leave configuration mode, or as specified in the configuration.

These two steps are performed only once. After you copy the SPE firmware file into Flash memory for the first time, you should not have to perform these steps again.



### Note

Because the SPE firmware is configurable for individual SPEs or ranges of SPEs, the Cisco IOS software automatically copies the SPE firmware to each SPE each time the access server restarts.

---

To transfer SPE Firmware to Flash memory, perform the following task to download the Universal SPE firmware to Flash memory:

---

**Step 1** Check the image in the access server Flash memory:

```
Router# show flash
System flash directory:
File Length Name/status
  1 4530624 c5400-js-mx
[498776 bytes used, 16278440 available, 16777216 total]
16384K bytes of processor board System flash (Read/Write)
```

**Step 2** Enter the **copy tftp flash** command to download the code file from the TFTP server into the access server Flash memory. You are prompted for the download destination and the remote host name.

```
Router# copy tftp flash
```

**Step 3** Enter the **show flash** command to verify that the file has been copied into the access server Flash memory:

```
Router# show flash
```

---

## Specifying a Country Name

To set the Cisco AS5400 NextPort DFCs or Cisco AS5800 UPCs to be operational for call set up, you must specify the country name. To specify the country name, use the following command in global configuration mode:

Command	Purpose
Router(config)# <b>spe country</b> <i>country name</i>	Specifies the country to set the UPC or DFC parameters (including country code and encoding). If you do not specify a country, the interface uses the default. If the access server is configured with T1 interfaces, the default is <b>usa</b> . If the access server is configured with E1 interfaces, the default is <b>e1-default</b> . Use the <b>no</b> form of this command to set the country code to the default of the domestic country.  <b>Note</b> All sessions in all UPCs or DFCs in all slots must be in the idle state for this command to execute.

## Configuring Dial Split Shelves (AS5800 Only)

The Cisco AS5800 access server requires a split dial shelf configuration using two router shelves to achieve the maximum capacity of 2048 port connections using the seven UPCs and three T3 + 1 T1 trunks. A new configuration command is available to define the split point:

**dial-shelf split backplane-ds0** *option*

The options for this command come in pairs, and vary according to the desired configuration. You will need to log in to each router shelf and separately configure the routers for the intended load. In most circumstances it is recommended that the predefined options are selected. These options are designed to be matched pairs as seen below.

Option Pair	Router Shelf 1			Router Shelf 2			Total
	Option	Maximum Calls	Unused T1	Option	Maximum Calls	Unused T1	
1	<b>2ct3cas</b>	1344		<b>1ct3cas</b>	672		2016
2	<b>part2ct1ct3cas</b>	1152	4	<b>part1ct1ct3cas</b>	888	3	2040
3	<b>2ct3isdn</b>	1288		<b>part1ct1ct3isdn_b</b>	644	7	1932
4	<b>part2ct1ct3isdn</b>	1150	2	<b>part1ct1ct3isdn</b>	897	1	2047
5 <sup>1</sup>	<b>3ce1</b>	960		<b>3ce1</b>	960		1920
6	Default (no option entered)	1/2 of current input		Default (no option entered)	1/2 of current input		
7	<b>no dial-shelf backplane-ds0</b>	1024		<b>no dial-shelf backplane-ds0</b>	1024		2048

1. This option is used to revert to the default for an environment using 6 E1 lines.

The **dial-shelf split slot 0 3 4 5** command must be defined for the **dial-shelf split backplane-ds0** option command to be active. You may also select the **user defined** option to define your own split.

Even if your system is already using a split dial shelf configuration, configuring one router shelf to handle two T3 trunks and the other router to handle the third trunk requires you to take the entire access server out of service. Busyout all connections before attempting to reconfigure. The configuration must be changed to setup one pool of TDM resources that can be used by either DMM cards or UPCs, and a second pool of two streams that contains TDM resources that can only be used by UPCs.

You may have more trunk capacity than 2048 calls. It is your decision how to provision the trunks so the backplane capacity is not exceeded. If more calls come in than backplane DS0 capacity for that half of the split, the call will be rejected and an error message printed for each call. This cannot be detected while a new configuration is being built because the router cannot tell which T1 trunks are provisioned and which are not. The user may want some trunks in hot standby.

The DMM, HMM, and VoIP cards can only use 1792 DS0 of the available 2048 backplane DS0. The UPC and trunk cards can use the full 2048 backplane DS0. The **show tdm splitbackplane** command will show the resources in two groups, the first 1792 accessible to all cards, and the remaining 256 accessible only to UPC and trunk cards.

For more information about split dial shelf configuration, refer to the *Cisco AS5800 Universal Access Server Split Dial Shelf Installation and Configuration Guide* and the hardware installation guides that accompanied your Cisco AS5800 Universal Access Server.

## Configuring SPEs to Use an Upgraded Firmware File

To configure the SPEs to use the upgraded firmware file, use the following commands beginning in privileged EXEC mode to display the firmware version number:

	Command	Purpose
Step 1	Router# <b>show spe version</b>	Displays SPE firmware versions to obtain the On-Flash firmware filename.
Step 2	Router# <b>configure terminal</b>	Enters global configuration mode.
Step 3	AS5400: Router(config)# <b>spe slot/spe</b> or Router(config)# <b>spe slot/spe slot/spe</b>  AS5800: Router(config)# <b>spe shelf/slot/spe</b> or Router(config)# <b>spe shelf/slot/spe shelf/slot/spe</b>	Enters the SPE configuration mode. You can choose to configure a range of SPEs by specifying the first and last SPE in the range.
Step 4	Router(config-spe)# <b>firmware upgrade {busyout   download-maintenance   reboot}</b>	Specifies the upgrade method.  Three methods of upgrade are available. The <b>busyout</b> keyword waits until all calls are terminated on an SPE before upgrading the SPE to the designated firmware. The <b>download-maintenance</b> keyword upgrades the firmware during the download maintenance time. The <b>reboot</b> keyword requests the access server to upgrade firmware at the next reboot.

	Command	Purpose
Step 5	Router(config-spe)# <b>firmware location</b> <i>filename</i>	Specifies the SPE firmware file in Flash memory to use for the selected SPEs. Allows you to upgrade firmware for SPEs after the new SPE firmware image is copied to your Flash memory.  Enter the <b>no firmware location</b> command to revert back to the default Cisco IOS bundled SPE firmware.
Step 6	Router(config-spe)# <b>exit</b>	Exits SPE configuration mode.
Step 7	Router# <b>exit</b>	Exits global configuration mode.
Step 8	Router# <b>copy running-config startup-config</b>	Saves your changes.

**Note**

The **copy ios-bundled** command is not necessary with UPCs or NextPort DFCs. By default, the version of SPE firmware bundled with the Cisco IOS software release transfers to all SPEs not specifically configured for a different SPE firmware file.

## Disabling SPEs

To disable specific SPEs in the Cisco AS5400 NextPort DFCs or Cisco AS5800 UPCs, use the following commands starting in global configuration mode:

	Command	Purpose
Step 1	<p><b>Cisco AS5400 Series Routers</b></p> <pre>Router(config)# <b>spe slot/spe</b></pre> <p>OR</p> <pre>Router(config)# <b>spe slot/spe slot/spe</b></pre> <p><b>Cisco AS5800 Series Routers</b></p> <pre>Router(config)# <b>spe shelf/slot/spe</b></pre> <p>OR</p> <pre>Router(config)# <b>spe shelf/slot/spe shelf/slot/spe</b></pre>	Enters SPE configuration mode. You can also configure SPEs specifying the first and last SPE in a range.

	Command	Purpose
Step 2	Router(config-spe)# <b>busyout</b>	<p>Gracefully disables an SPE by waiting for all the active services on the specified SPE to terminate.</p> <p>You can perform auto-diagnostic tests and firmware upgrades when you put the SPEs in the Busy out state. Active ports on the specified SPE will change the state of the specified range of SPEs to the BusyoutPending state. The state changes from BusyoutPending to Busiedout when all calls end. Use the <b>show spe</b> command to see the state of the range of SPEs.</p> <p>Use the <b>no</b> form of this command to re-enable the SPEs.</p>
Step 3	Router(config-spe)# <b>shutdown</b>	<p>Clears active calls on all ports on the SPE. Calls can no longer be placed on the SPE because the SPE state is changed to Busiedout.</p> <p>Use the <b>no</b> form of this command to re-enable the ports on the SPE.</p>

## Rebooting SPEs

To reboot specified SPEs, use the following command in privileged EXEC mode:

Command	Purpose
<p><b>Cisco AS5400 Series Routers</b></p> <p>Router# <b>clear spe slot/spe</b></p>	<p>Allows manual recovery of a port that is frozen in a suspended state. Reboots SPEs that are in suspended or Bad state. Downloads configured firmware to the specified SPE or range of SPEs and power-on self test (POST) is executed.</p> <p><b>Note</b> Depending on the problem, sometimes downloading the SPE firmware may not help recover a bad port or an SPE.</p> <p>This command can be executed regardless of the state of SPEs. All active ports running on the SPE are prematurely terminated, and messages are logged into the appropriate log.</p>
<p><b>Cisco AS5800 Series Routers</b></p> <p>Router# <b>clear spe shelf/slot/spe</b></p>	

## Configuring Lines

To configure the lines to dial in to your network, use the following commands beginning in global configuration mode:

	Command	Purpose
<b>Step 1</b>	<p><b>Cisco AS5400 Series Routers</b></p> <pre>Router(config)# <b>line</b> slot/port slot/port</pre> <p><b>Cisco AS5800 Series Routers</b></p> <pre>Router(config)# <b>line</b> shelf/slot/port shelf/slot/port</pre>	<p>Enters the line configuration mode. You can specify a range of slot and port numbers to configure.</p> <p>On the Cisco AS5400 access server, the NextPort DFC slot is defined as a value between 1 and 7. Slot 0 is reserved for the motherboard. Each NextPort DFC provides 18 SPEs. The SPE value ranges from 0 to 17. Since each SPE has six ports, the NextPort DFC has a total of 108 ports. The port value ranges from 0 to 107. To configure 108 ports on slot 3, you would enter <b>line 3/00 3/107</b>. If you wish to configure 324 ports on slots 3-5, you would enter <b>line 3/00 5/107</b>.</p> <p>On the Cisco AS5800 access server, the UPC slot is defined as a value between 2 and 11. Each UPC provides 54 SPEs. The SPE value ranges from 0 to 53. Because each SPE has six ports, the UPC has a total of 324 ports. The port value ranges from 0 to 323. To configure 324 ports on slot 3, you would enter <b>line 1/3/00 1/3/323</b>. If you want to configure 972 ports on slots 3-5, you would enter <b>line 1/3/00 1/5/323</b>.</p>
<b>Step 2</b>	Router(config-line)# <b>transport input all</b>	Allows all protocols when connecting to the line.
<b>Step 3</b>	Router(config-line)# <b>autoselect ppp</b>	Enables remote IP users running a PPP application to dial in, bypass the EXEC facility, and connect directly to the network.
<b>Step 4</b>	Router(config-line)# <b>modem inout</b>	Enables incoming and outgoing calls.
<b>Step 5</b>	Router(config-line)# <b>modem autoconfigure type name</b>	Configures the attached modem using the entry for name.

## Configuring Ports

This section describes how to configure Cisco AS5800 UPC or Cisco AS5400 NextPort DFC ports. You need to be in port configuration mode to configure these ports. The port configuration mode allows you to shut down or put individual ports or ranges of ports in busyout mode. To configure Cisco AS5800 UPC or Cisco AS5400 NextPort DFC ports, perform the following tasks beginning in global configuration mode:

	Command	Purpose
<b>Step 1</b>	<p><b>Cisco AS5400 Series Routers</b></p> <pre>Router(config)# port slot/spe</pre> <p>OR</p> <pre>Router(config)# port slot/spe slot/spe</pre> <p><b>Cisco AS5800 Series Routers</b></p> <pre>Router(config)# port shelf/slot/spe</pre> <p>OR</p> <pre>Router(config)# port shelf/slot/spe shelf/slot/spe</pre>	Enters port configuration mode. You can choose to configure a single port or range of ports.
<b>Step 2</b>	<pre>Router(config-port)# busyout</pre>	<p>(Optional) Gracefully disables a port by waiting for the active services on the specified port to terminate. Use the <b>no</b> form of this command to re-enable the ports.</p> <p>Maintenance activities, such as testing, can still be performed while the port is in busyout mode.</p> <p><b>Note</b> When a port is in busyout mode, the state of the SPE is changed to the consolidated states of all the underlying ports on that SPE.</p>
<b>Step 3</b>	<pre>Router(config-port)# shutdown</pre>	<p>(Optional) Clears active calls on the port. No more calls can be placed on the port in the shutdown mode. Use the <b>no</b> form of this command to re-enable the ports.</p> <p><b>Note</b> When a port is in shutdown mode, the state of the SPE is changed to the consolidated states of all the underlying ports on that SPE.</p>
<b>Step 4</b>	<pre>Router(config-port)# exit</pre>	Exits port configuration mode.

## Verifying SPE Line and Port Configuration

To verify your SPE line configuration, enter the **show spe** command to display a summary for all the lines and ports:

**Step 1** Enter the **show spe** command to display a summary for all the lines and ports:

```
Router# show spe
```

**Step 2** Enter the **show line** command to display a summary for a single line.

### AS5400

```
Router# show line 1/1
```

### AS5800

```
Router# show line 1/2/10
```



**Note**

If you are having trouble, make sure that you have turned on the protocols for connecting to the lines (**transport input all**) and that your access server is configured for incoming and outgoing calls (**modem inout**).

## Configuring SPE Performance Statistics

Depending on the configuration, call record is displayed on the console, or the syslog, or on both. The log contains raw data in binary form, which must be viewed using the **show** commands listed in the section “[Monitoring SPE Performance Statistics](#).” You can configure some aspects of history events by using one of the following commands in global configuration mode:

Command	Purpose
Router(config)# <b>spe call-record modem</b> <i>max-userid</i>	Requests the access server to generate a modem call record after a call is terminated. To disable this function, use the <b>no</b> form of this command.
Router(config)# <b>spe log-size</b> <i>number</i>	Sets the maximum size of the history event queue log entry for each port. The default is 50 events per port.

## Clearing Log Events

To clear some or all of the log events relating to the SPEs as needed, use the following privileged EXEC mode commands:

Command	Purpose
Router# <b>clear spe log</b>	Clears all event entries in the slot history event log.
Router# <b>clear spe counters</b>	Clears statistical counters for all types of services for the specified SPE, a specified range of SPEs, or all SPEs. If you do not specify the range of SPEs or an SPE, the statistics for all SPEs are cleared.
Router# <b>clear port log</b>	Clears all event entries in the port level history event log. You cannot remove individual service events from the port log.

## Troubleshooting SPEs

This section provides troubleshooting information for your SPEs regardless of service type mode.

**Note**

SPE ports that pass the diagnostic test are marked as Pass, Fail, and Unkn. Ports that fail the diagnostic test are marked as Bad. These ports cannot be used for call connections. Depending on how many ports are installed, the diagnostic tests may take from 5 to 10 minutes to complete.

- Enter the **port modem startup-test** command to perform diagnostic testing for all modems during the system's initial startup or rebooting process. To disable the test, enter the **no port modem startup-test** command.
- Enter the **port modem autotest** command to perform diagnostic testing for all ports during the system's initial startup or rebooting process. To disable the test, enter the **no port modem autotest** command.

You may additionally configure the following options:

- Enter the **port modem autotest minimum ports** command to define the minimum number of free ports available for autotest to begin.
- Enter the **port modem autotest time hh:mm interval** command to enable autotesting time and interval.
- Enter the **port modem autotest error threshold** command to define the maximum number of errors detected for autotest to begin.
- Enter the **show port modem test** command to displays results of the SPE port startup test and SPE port auto-test.

When an SPE port is tested as Bad, you may perform additional testing by conducting a series of internal back-to-back connections and data transfers between two SPE ports. All port test connections occur inside the access server. For example, if mobile users cannot dial into port 2/5 (which is the sixth port on the NextPort DFC in the second chassis slot), attempt a back-to-back test with port 2/5 and a known-functioning port such as port 2/6.

- Enter the **test port modem back-to-back slot/port slot/port** command to perform internal back-to-back port tests between two ports sending test packets of the specified size.



**Note** You might need to enable this command on several different combinations of ports to determine which one is not functioning properly. A pair of operable ports successfully connects and completes transmitting data in both directions. An operable port and an inoperable port do not successfully connect with each other.

A sample back-to-back test might look like the following:

```
Router# test port modem back-to-back 2/10 3/20
Repetitions (of 10-byte packets) [1]:
*Mar 02 12:13:51.743:%PM_MODEM_MAINT-5-B2BCONNECT:Modems (2/10) and (3/20) connected
in back-to-back test:CONNECT33600/V34/LAP
*Mar 02 12:13:52.783:%PM_MODEM_MAINT-5-B2BMODEMS:Modems (3/20) and (2/10) completed
back-to-back test:success/packets = 2/2
```



**Tip**

You may reboot the port that has problems using the **clear spe EXEC** command.

- Enter the **spe recovery {port-action {disable | recover | none} | port-threshold num-failures}** command to perform automatic recovery (removal from service and reloading of SPE firmware) of ports on an SPE at any available time.

An SPE port failing to connect for a certain number of consecutive times indicates that a problem exists in a specific part or the whole of SPE firmware. Such SPEs have to be recovered by downloading firmware. Any port failing to connect *num-failures* times is moved to a state based on the **port-action** value, where you can choose to disable (mark the port as Bad) or recover the port when the SPE is in the idle state and has no active calls. The default for *num-failures* is 30 consecutive call failures.

**Tip**

You may also schedule recovery using the **spe download maintenance** command.

- Enter the **spe download maintenance time *hh:mm* | stop-time *hh:mm* | max-spes *number* | window *time-period* | expired-window {**drop-call** | **reschedule**}** command to perform a scheduled recovery of SPEs.

The download maintenance activity starts at the set start **time** and steps through all the SPEs that need recovery and the SPEs that need a firmware upgrade and starts maintenance on the maximum number of set SPEs for maintenance. The system waits for the **window** delay time for all the ports on the SPE to become inactive before moving the SPE to the Idle state. Immediately after the SPE moves to Idle state, the system starts to download firmware. If the ports are still in use by the end of **window** delay time, depending upon the **expired-window** setting, connections on the SPE ports are shutdown and the firmware is downloaded by choosing the **drop-call** option, or the firmware download is rescheduled to the next download maintenance time by choosing the **reschedule** option. This process continues until the number of SPEs under maintenance is below **max-spes**, or until **stop-time** (if set), or until all SPEs marked for recovery or upgrade have had their firmware reloaded.

## Monitoring SPE Performance Statistics

This section documents various SPE performance statistics for the Cisco AS5400 NextPort DFCs or Cisco AS5800 UPCs:

- [SPE Events and Firmware Statistics](#)
- [Port Statistics](#)
- [Digital SPE Statistics](#)
- [SPE Modem Statistics](#)

### SPE Events and Firmware Statistics

To view SPE events and firmware statistics for the Cisco AS5400 NextPort DFCs or Cisco AS5800 UPCs, use one or more of the following commands in privileged EXEC mode:

Command	Purpose
<b>Cisco AS5400 series routers</b> Router# <b>show spe slot/spe</b>	Displays the SPE status for the specified range of SPEs.
<b>Cisco AS5800 series routers</b> Router# <b>show spe shelf/slot/spe</b>	
Router# <b>show spe log [reverse   slot]</b>	Displays the SPE system log.
Router# <b>show spe version</b>	Lists all SPEs and the SPE firmware files used.
	<b>Note</b> This list helps you decide if you need to update your SPE firmware files.

## Port Statistics

To view port statistics for the Cisco AS5400 NextPort DFCs or Cisco AS5800 UPCs, use the following commands in privileged EXEC mode as needed:

Command	Purpose
<b>Cisco AS5400 series routers</b> Router# <b>show port config</b> {slot   slot/port}	Displays the configuration information for specified ports or the specified port range. The port should have an active session associated at the time the command is executed.
<b>Cisco AS5800 series routers</b> Router# <b>show port config</b> {slot   shelf/slot/port}	
<b>Cisco AS5400 series routers</b> Router# <b>show port digital log</b> [reverse slot/port] [slot   slot/port]	Displays the digital data event log.
<b>Cisco AS5400 series routers</b> Router# <b>show port modem log</b> [reverse slot/port] [slot   slot/port]	Displays the port history event log.
<b>Cisco AS5800 series routers</b> Router# <b>show port modem log</b> [reverse shelf/slot/port] [shelf/slot   shelf/slot/port]	
<b>Cisco AS5400 series routers</b> Router# <b>show port modem test</b> [slot   slot/port]	Displays the test log for the specified SPE port range or all the SPE ports.
<b>Cisco AS5800 series routers</b> Router# <b>show port modem test</b> [shelf/slot   shelf/slot/port]	
<b>Cisco AS5400 series routers</b> Router# <b>show port operational-status</b> [slot   slot/port]	Displays the operational status of the specified ports or the specified port range. The port should have an active session associated at the time the command is executed.
<b>Cisco AS5800 series routers</b> Router# <b>show port operational-status</b> [shelf/slot   shelf/slot/port]	

## Digital SPE Statistics

To view digital SPE statistics for the Cisco AS5400 NextPort DFCs, use one or more of the following commands in privileged EXEC mode:

Command	Purpose
Router# <b>show spe digital</b> [slot   slot/spe]	Displays history statistics of all digital SPEs.
Router# <b>show spe digital active</b> [slot   slot/spe]	Displays active digital statistics of a specified SPE, the specified range of SPEs, or all the SPEs.
Router# <b>show spe digital csr</b> [summary   slot   slot/spe]	Displays the digital call success rate statistics for a specific SPE, a range of SPEs, or all the SPEs.

Command	Purpose
Router# <b>show spe digital disconnect-reason</b> [summary   slot   slot/spe]	Displays the digital disconnect reasons for the specified SPE or range of SPEs. The disconnect reasons are displayed with Class boundaries.
Router# <b>show spe digital summary</b> [slot   slot/spe]	Displays digital history statistics of all SPEs, a specified SPE, or the specified range of SPEs for all service types.

## SPE Modem Statistics

To view SPE modem statistics for the Cisco AS5400 NextPort DFCs or Cisco AS5800 UPCs, use one or more of the following commands in privileged EXEC mode:

Command	Purpose
<p><b>Cisco AS5400 series routers</b></p> <p>Router# <b>show spe modem active</b> {slot   slot/spe}</p> <p><b>Cisco AS5800 series router:</b></p> <p>Router# <b>show spe modem active</b> {shelf/slot   shelf/slot/spe}</p>	Displays the active statistics of a specified SPE, a specified range of SPEs, or all the SPEs serving modem traffic.
<p><b>Cisco AS5400 series routers</b></p> <p>Router# <b>show spe modem csr</b> {summary   slot   slot/spe}</p> <p><b>Cisco AS5800 series routers</b></p> <p>Router# <b>show spe modem csr</b> {summary   shelf/slot   shelf/slot/spe}</p>	Displays the call success rate statistics for a specific SPE, range of SPEs, or all the SPEs.
<p><b>Cisco AS5400 series routers</b></p> <p>Router# <b>show spe modem disconnect-reason</b> {summary   slot   slot/spe}</p> <p><b>Cisco AS5800 series routers</b></p> <p>Router# <b>show spe modem disconnect-reason</b> {summary   shelf/slot   shelf/slot/spe}</p>	Displays the disconnect reasons for the specified SPE or range of SPEs. The disconnect reasons are displayed with Class boundaries.
<p><b>Cisco AS5400 series routers</b></p> <p>Router# <b>show spe modem high speed</b> {summary   slot   slot/spe}</p> <p><b>Cisco AS5800 series routers</b></p> <p>Router# <b>show spe modem high speed</b> {summary   shelf/slot   shelf/slot/spe}</p>	Shows the connect-speeds negotiated within each high speed modulation or codecs for a specific range of SPEs or all the SPEs.
<p><b>Cisco AS5400 series routers</b></p> <p>Router# <b>show spe modem low speed</b> {summary   slot   slot/spe}</p> <p><b>Cisco AS5800 series routers</b></p> <p>Router# <b>show spe modem low speed</b> {summary   shelf/slot   shelf/slot/spe}</p>	Shows the connect-speeds negotiated within each low speed modulation or codecs for a specific range of SPEs or all the SPEs.

Command	Purpose
<p><b>Cisco AS5400 series routers</b></p> <pre>Router# show spe modem high standard {summary   slot   slot/spe}</pre> <p><b>Cisco AS5800 series routers</b></p> <pre>Router# show spe modem high standard {summary   shelf/slot   shelf/slot/spe}</pre>	Displays the total number of connections within each low modulation or codec for a specific range of SPEs.
<p><b>Cisco AS5400 series routers</b></p> <pre>Router# show spe modem low standard {summary   slot   slot/spe}</pre> <p><b>Cisco AS5800 series routers</b></p> <pre>Router# show spe modem low standard {summary   shelf/slot   shelf/slot/spe}</pre>	Displays the total number of connections within each high modulation or codec for a specific range of SPEs.
<p><b>Cisco AS5400 series routers</b></p> <pre>Router# show spe modem summary {slot   slot/spe}</pre> <p><b>Cisco AS5800 series routers</b></p> <pre>Router# show spe modem summary {shelf/slot   shelf/slot/spe}</pre>	Displays the history statistics of all SPEs, specified SPE or the specified range of SPEs.

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