Managing and Troubleshooting the Universal Port Card

Note The information herein applies to the Cisco AS5350, Cisco AS5400, and Cisco AS5400HPX universal gateways. Note that the latter requires use of Cisco IOS release 12.2(2)XB or later.

Note The cards that reside in the AS5350 and AS5400 chassis, sometimes referred to as dial feature cards (DFC), are of two types: trunk cards, which provide an E1, T1, or T3 interface, and universal port cards, which host the universal DSPs that dynamically handle voice, dial, and fax calls.

A universal port card is a hardware card that processes digital signals for the Cisco AS5350 and Cisco AS5400 universal gateways. Ports on the universal port card support multiple types of services such as modem, fax, digital data, and voice. You can manage your port connections at the universal-port-card slot level, service-processing-element (SPE) level, or port level using monitoring and troubleshooting commands. A port is defined as an endpoint on a trunk card through which multiservice tones, voice, and data flow. There are multiple ports per SPE.

Tip For more information, see these references:

- On the universal port card: *Cisco AS5350 (or Cisco AS5400) Universal Gateway Chassis Installation Guide*, *Cisco AS5350 (or Cisco AS5400) Universal Gateway Card Installation Guide*, and *Cisco AS5350 (or Cisco AS5400) Universal Gateway Regulatory Compliance and Safety Information*. These publications ship with your Cisco AS5350 or Cisco AS5400 gateway and are available online at http://www.cisco.com/univercd/cc/td/doc/product/access/acs_serv/as5350/index.htm or http://www.cisco.com/univercd/cc/td/doc/product/access/acs_serv/as5400/index.htm
- On CLI commands supported on the universal port card: *Monitoring Voice and Fax Services on the Cisco AS5400 Universal Gateway*, available online at http://www.cisco.com/univercd/cc/td/doc/product/software/. Select your Cisco IOS release and search for this title.
- On how universal-port-card commands compare to MICA modem commands: *Comparing NextPort SPE Commands to MICA Modem Commands*, available online at http://www.cisco.com/warp/public/76/nextport_compare.html

The universal port card introduces slot and SPE software hierarchies. On the Cisco AS5350 and Cisco AS5400, the hierarchy designation is *slot/spe* and *slot/port:*

- Slot values range from **1** to **7**.
- Port values range from **0** to **one less than the total port count available on the card**.
- SPEs range from **0** to **17**.

For example, universal-port-card port 2/5 is the sixth port in the second chassis slot on the gateway. Slot **0** is reserved for the motherboard.

You can perform the following functions on an SPE:

- General configuration such as busyout, shutdown, or clear
- View statistics and states
- Configure auto and manual recovery process
- Upgrade firmware

This chapter includes the following sections:

Managing SPE Performance Statistics

Configuration

By default, an event log is enabled and based on one event queue per SPE port. The log contains raw data in binary form, which must be viewed using the **show** commands listed in the "Viewing SPE Performance Statistics" section on page 5-3. You may configure some aspects of how the record is kept using the following global configuration mode commands (at the `AS5350(config)#` or `AS5400(config)#` prompt):

- **spe call-record modem** *max-userid*—Generates a modem call record after a modem call is terminated. The *max-userid* is the maximum userid size, in bytes, allowable in the modem. The **call-record** default is 30; the range is 0 to 100. You may display this record on the console or a configured syslog server. This call record is not stored in the port event log. To disable this function, use the **no** form. This replaces the **modem call-record** command.
- **spe log-size** *number*—Allows you to configure the size of the history event queue buffer for manageable SPEs in the gateway. The default is 100 events per port. Use the **show port** [**modem** | **voice** | **fax**] **log** command to view port events. It is used in the same way the **modem buffer-size** command is used for MICA modems.
- **show port** [**modem** | **voice** | **fax**] **log reverse** command to view port events with the most recent event first.

The following privileged EXEC mode commands allow you to clear some or all of the log events relating to the SPEs (at the `AS5350#` or `AS5400#` prompt):

- **clear spe log**—Allows you to clear all event entries in the slot history event log.
- **clear spe counters**—Clears statistical counters for all types of services for the specified SPE, SPE range, or all the SPEs. If you do not specify the range of SPEs or a SPE, all SPEs' statistics are cleared. It is used in the same way the **clear modem counters** command is used for MICA modems.
- **clear port log**—Allows you to clear all event entries in the port level history event log. This command clears the entire port log. You cannot remove individual service events from the port log. You can use **show port modem log** or **show port digital log** to display specific service events, but you must use **clear port log** to clear the entire port log.

Viewing SPE Performance Statistics

You can view SPE statistics using the Cisco IOS software with the gateway. To view performance statistics for the universal port cards, enter one or more of the following commands in privileged EXEC mode (at the `AS5350#` or `AS5400#` prompt):

show spe voice Commands

- **show spe voice active**—Displays the active statistics of all SPEs, a specified SPE, or a specified SPE range serving voice traffic.
- **show spe voice** *slot* | *slot*/*spe* **summary**—Displays the history statistics of all SPEs in a particular slot, specified SPE, or specified SPE range serving voice traffic.

show spe digital Commands

- **show spe digital active**—Displays the active statistics of all SPEs, a specified SPE or a specified SPE range serving digital traffic.
- **show spe digital csr**—Displays the digital call success rate statistics for a specific SPE, range of SPEs, or all the SPEs.
- **show spe digital disconnect-reason**—Displays the digital disconnect reasons for the specified SPE or SPE range. The disconnect reasons are displayed with Class boundaries.
- **show spe digital** *slot* | *slot*/*spe* **summary**—Displays the history statistics of all SPEs in a particular slot, specified SPE or the specified SPE range serving digital traffic.

show spe modem Commands

- **show spe modem active**—Displays the active statistics of all SPEs, a specified SPE, or a specified SPE range serving modem traffic. It is used in the same way the **show modem** command is used for MICA modems. (The **show modem** command is not supported on the Cisco AS5350 or Cisco AS5400.)
- **show spe modem csr**—Displays the call success rate statistics for a specific SPE, range of SPEs, or all the SPEs.
- **show spe modem disconnect-reason**—Displays the disconnect reasons for the specified SPE or SPE range. The disconnect reasons are displayed with Class boundaries. It is used in the same way the **show modem call-stats** command is used for MICA modems. (The **show modem call-stats** command is not supported on the Cisco AS5350 or Cisco AS5400.)

- **show spe modem** {**high** | **low**} **speed**—Shows the connect-speeds negotiated within each high/low speed modulation or codecs for a specific range of SPEs or all the SPEs.
- **show spe modem** *slot* | *slot*/*spe* **summary**—Displays the history statistics of all SPEs in a particular slot, specified SPE, or specified SPE range. It is used in the same way the **show modem** command is used for MICA modems. (The **show modem** command is not supported on the Cisco AS5350 or Cisco AS5400.)

show spe Commands

- **show spe log**—Displays the oldest event first from the slot history event log.
- **show spe log reverse**—Displays the latest event first from the log.
- **show spe version**—List all SPEs and the SPE firmware files used. This helps you decide if you need to update your SPE firmware files. It is used in the same way the **show modem mapping** command is used for MICA modems. (The **show modem mapping** command is not supported on the Cisco AS5350 or Cisco AS5400.)
- **show spe fax active** command displays the active statistics of all SPEs, a specified SPE, or a specified SPE range serving fax-relay traffic.

show port Commands

- **show port config**—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.
- **show port** [**digital** | **modem** | **voice** | **fax**] **log**—Displays the event log with oldest event first. For modems, this command is used the same way the **show modem log** command is used for MICA modems. (The **show modem log** command is not supported on the Cisco AS5350 or Cisco AS5400.)
- **show port** [**digital** | **modem** | **voice** | **fax**] **log reverse**—Displays the latest event first from the port history event log.
- **show port modem calltracker**—Displays the port level information for an active modem call using the calltracker database. If there is no call on the specified port, the information of the most recent call is displayed. The call tracker feature must be enabled by invoking the **calltracker enable** command. (For detailed information about the call tracker feature, see *Call Tracker plus ISDN and AAA Enhancements for the Cisco AS5300 and Cisco AS5800*, available online at http://www.cisco.com/univercd/cc/td/doc/product/software/ios121/121newft/121limit/121x/121xh/121xh_2/dt_cltrk.htm)
- **show port modem test**—Displays the test log for the specified SPE port range or all the SPE ports.
- **show port operational-status**—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.

Managing Ports

This section describes how to manage universal ports. You can clear ports, remove ports from service, and disable ports from dial-up service by using port configuration mode. For details on disabling a port from dial-up service, see the "Troubleshooting" section on page 5-9.

Clear Ports

To clear a port means to deactivate calls on a port or to clear the *Bad* state on a port and reset it. Ports need to be cleared if communication attempts with the port have failed or if the port is to be removed from operation.

Use the **show spe slot/spe** command to view the active ports on an SPE. To clear ports on an SPE, enter the following command in privileged EXEC mode. You can clear all ports on the gateway, all ports on a slot, or a port. This replaces the **clear modem** command.

- The example below clears port 1 on slot 4.

```
AS5400# clear port 4/1
AS5400# This will clear port 4/01 [confirm] yes
AS5400#
```

- The example below clears all active ports on slot 4.

```
AS5400# clear port 4
AS5400# This will clear port 4/00 - 4/107 [confirm] yes
AS5400#
```

  If *slot/port* is specified, the port on that SPE is cleared. If *slot* is specified, all active ports on that particular slot are cleared. If no argument is specified, all ports are cleared.

  Additionally, this command clears the *Bad* state on a port and resets it. However, the port is not cleared if the SPE was previously in a *Bad* state due to an SPE firmware download.

Port Configuration Mode

Port configuration mode allows you to enter a mode similar to line configuration mode. This mode allows individual ports or ranges of ports to be shut down or put in busyout mode. Port configuration mode commands replace the **modem range**, **modem busyout**, and **modem shutdown** commands used with MICA modems.

- The example below demonstrates how to enter port configuration mode for a single port.

```
AS5400# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
AS5400(config)# port 3/1
AS5400(config-port)#
```

- The example below demonstrates how to enter port configuration mode for a range of ports.

```
AS5400# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
AS5400(config)# port 3/1 3/18
AS5400(config-port)#
```

Port Configuration Mode Commands

The following commands are available in port configuration mode:

- **busyout** *card/port*—Gracefully disables a port or all ports on a trunk card by waiting for the active services on the specified port to terminate. You can busy out all ports or just one port on a card—for example, **busyout 1** specifies all ports on card 1; **busyout 1/4** specifies just port 4 on card 1. Use the **no** form of this command to re-enable the ports. This replaces the **modem busyout** command. Maintenance activities such as testing can still be performed while a port is in busyout mode.

  Note **port busyout** and **spe busyout** are different commands, and do not affect one another. If you busyout a port or spe with one command, you can clear it only with the analogous **clear** command.

- **shutdown**—Clears active calls on the port. No more calls can be placed on the port. The state of the SPEs are reflected in the **show spe** command display. Use the **no** form of this command to re-enable the ports. This command replaces the **modem shutdown** command.

Note When a port is in busyout mode or shutdown mode, the state of the SPE is changed to the consolidated states of all the underlying ports on that SPE.

Managing SPEs

This section describes how to manage SPEs by setting the SPE country code, entering SPE configuration mode, upgrading the SPE firmware, performing busyout on SPEs, and clearing active calls on the SPEs.

SPE Country

On the Cisco AS5350 and Cisco AS5400, DS-0 companding law selection is configured for the entire system rather than on individual voice ports.

To configure companding on your CT1/CE1/CT3 controller lines, you must use the **spe country** command in global configuration mode. (This command replaces the **modem country** command. If you do not specify a country, your controller line uses the default.

For T1 interfaces, the default is **t1-default (Mu-Law);** for E1 interfaces, the default is **e1-default (A-Law)**. Use the **no** form of this command to set the country code to the default.

Supported countries include, but are not limited to, those shown in Table 5-1:

Table 5-1 Supported Countries and Corresponding Companding Law

Country	Companding Law	Country	Companding Law
Australia	A-Law	Netherlands	A-Law
Austria	A-Law	New Zealand	A-Law
Belgium	A-Law	Norway	A-Law
China	A-Law	Poland	A-Law
Cyprus	A-Law	Portugal	A-Law

Table 5-1 Supported Countries and Corresponding Companding Law (continued)

Country	Companding Law	Country	Companding Law
Czech/Slovak Republic	A-Law	Russia	A-Law
Denmark	A-Law	Singapore	A-Law
Finland	A-Law	South Africa	A-Law
France	A-Law	Spain	A-Law
Germany	A-Law	Sweden	A-Law
Hong Kong	Mu-Law	Switzerland	A-Law
India	A-Law	Taiwan	Mu-Law
Ireland	A-Law	Thailand	A-Law
Israel	A-Law	Turkey	A-Law
Italy	A-Law	United Kingdom	A-Law
Japan	Mu-Law	USA	Mu-Law
Malaysia	A-Law	—	—

Note The gateway must be in idle state (no calls are active) to execute the SPE country command.

- The following example sets country code to **usa**.

```
AS5400(config)# spe country usa
AS5400(config)#
```

- The following example verifies that DS-0 companding was set to **usa** (or Mu Law). It also displays the SPE busyout status.

```
AS5400# show spe

SPE settings:
==============
Country code configuration usa
Polling interval: 12 secs.
History log events: 50(per port)
Port legends:
============
Port state: (s)shutdown (t)test (r)recovery (d)download
            (b)busiedout (p)busyout pending, (B)bad (a)active call
Call type: (m)modem (d)digital (v)voice (_)not in use

                    SPE          SPE     SPE  SPE   Port         Call
SPE#    Port #      State        Busyout Shut Crash State        Type
4/00    0000-0005   ACTIVE             0    0     0 _______      _______
4/01    0006-0011   ACTIVE             0    0     0 _______      _______
4/02    0012-0017   ACTIVE             0    0     0 _______      _______
4/03    0018-0023   ACTIVE             0    0     0 _______      _______
4/04    0024-0029   ACTIVE             0    0     0 _______      _______
4/05    0030-0035   ACTIVE             0    0     0 _______      _______
4/06    0036-0041   ACTIVE             0    0     0 _______      _______
4/07    0042-0047   ACTIVE             0    0     0 _______      _______
4/08    0048-0053   ACTIVE             0    0     0 _______      _______
4/09    0054-0059   ACTIVE             0    0     0 _______      _______
4/10    0060-0065   ACTIVE             0    0     0 _______      _______
```

```
4/11    0066-0071    ACTIVE              0    0     0 _______        _______
4/12    0072-0077    ACTIVE              0    0     0 _______        _______
4/13    0078-0083    ACTIVE              0    0     0 _______        _______
4/14    0084-0089    ACTIVE              0    0     0 _______        _______
4/15    0090-0095    ACTIVE              0    0     0 _______        _______
4/16    0096-0101    ACTIVE              0    0     0 _______        _______
4/17    0102-0107    ACTIVE              0    0     0 _______        _______
```

SPE Configuration Mode

SPE configuration mode allows you to enter SPE configuration mode, which is similar to line configuration mode. You can configure an SPE by specifying a slot and an SPE associated with the slot or, you can choose to configure a range of SPEs by specifying the first and last SPE in the range.

The following example demonstrates how to enter SPE configuration mode.

```
AS5400# config t
Enter configuration commands, one per line.  End with CNTL/Z.
AS5400(config)# spe 1/1 1/17
AS5400(config-SPE)#
```

SPE Configuration Mode Commands

The following commands are available in SPE configuration mode:

- **firmware location**—Allows you to transfer a specified version of SPE firmware from system Flash memory to the SPEs named upon entering SPE configuration mode. For further information on firmware upgrades, see the "Upgrading SPE Firmware" section on page 5-12.
- **firmware upgrade** *busyout* | *download-maintenance* | *reboot*—Allows you to specify the upgrade method. Three methods of upgrade are available.
  - *Busyout* (the default) upgrades when all calls are terminated on an SPE.
  - *Download-maintenance* waits upgrades at the next download maintenance. For further information on firmware upgrades, see the "Upgrading SPE Firmware" section on page 5-12. The default download-maintenance time is 03:00.
  - *Reboot* upgrades at the next reboot. Note that, for the **firmware upgrade reboot** command to take effect after a reload, you must have saved the running configuration with the **copy running-config startup-config** command.
- **busyout**—Gracefully disables an SPE by waiting for all the active services on the specified SPE to terminate. If there are active ports on the specified SPE, the state of the SPE is changed to *Busiedout*. The SPE is temporarily disabled. Use the **no** form of this command to re-enable the SPEs.
- **shutdown**—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 *Out-of-Service*. The state of the SPEs is reflected in the **show spe** command display. Use the **no** form of this command to re-enable the ports on the SPE.

Troubleshooting

This section provides troubleshooting information that apply to your modems regardless of service type mode. You learn how to perform diagnostic tests on installed ports or SPEs, configure automatic recovery of ports on an SPE, and configure a scheduled recovery of SPEs.

Configure SPE Diagnostic Tests

You can perform three types of diagnostic tests on your SPE modem:

- SPE Startup Test, page 5-9
- SPE Auto-Test, page 5-9
- SPE Back-to-Back Test, page 5-10

SPE Startup Test

To perform diagnostic testing on all your installed SPE ports during the system's initial startup or rebooting process, in global configuration mode with the prompt displayed as `AS5350#` or `AS5400#`, enter the following command:

port modem startup-test—Perform diagnostic testing for all modems.

The results of the SPE port startup test are displayed in the **show port modem test** command output. SPE ports that pass the diagnostic test are *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, this diagnostic test may take from 5 to 10 minutes to complete. Perform additional testing on an inoperative SPE port by executing the **test port modem back-to-back** command. The **no port modem startup-test** command disables startup testing.

SPE Auto-Test

To perform diagnostic testing on all the installed SPE ports during the system's initial startup or rebooting process, or during service, in global configuration mode with the prompt displayed as `AS5350(config)#` or `AS5400(config)#`, enter the following command:

port modem autotest—Perform diagnostic testing for all ports.

The results of the SPE port auto-test are displayed in the **show port modem test** command's output. Ports that pass the diagnostic test are marked as *Idle*, *Busy*, *Downloading*, and *Reset*, and are put into service. Ports that fail the diagnostic test are marked as *Bad*, and are not put into service or tested again until they are no longer marked as *Bad*. If all the ports of an SPE are bad, the corresponding SPE is also marked bad. These ports cannot be used for call connections. Depending on how many ports are present and not marked *Bad*, this diagnostic test may take from 5 to 10 minutes to complete. You may perform additional testing on an inoperative port by executing the **test port modem back-to-back** command. The **no port modem autotest** command disables testing.

You may additionally configure the following options:

- **port modem autotest minimum** *ports*—Define the minimum number of free ports available for autotest to begin.
- **port modem autotest time** *hh:mm interval*—Enable autotesting time and interval.
- **port modem autotest error** *threshold*—Define the maximum number of errors detected for autotest to begin.

A sample diagnostic autotest setting the time at 12:45 and at 8 hour intervals looks like the following:

```
AS5400(config)# port modem autotest time 12:45 8
AS5400(config)#
```

SPE Back-to-Back 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 gateway. For example, if mobile users cannot dial into port 2/5 (the sixth port on the universal port card 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 following command in privileged EXEC mode (the prompt is displayed as `AS5350#` or `AS5400#`) to perform internal back-to-back port tests between two ports:

test port modem back-to-back *slot/port slot/port* [*num-packets*]—Perform internal back-to-back port tests between two ports, sending test packets of the specified size.

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 connect and complete 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:

```
AS5400# 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
```

A port that has been confirmed to have problems can often be fixed using the **clear spe** command. For more information, see the "Clear an SPE" section on page 5-12.

The results of the **test port modem back-to-back** command are displayed in the **show port modem test** command's output:

```
AS5400# show port modem test

 Date Time             Modem  Test               Reason            State Result
 3/02 12:00:57 PM       2/01  Back-To-Back     :STARTUP TEST      Idle  PASS
 3/02 12:00:57 PM       2/00  Back-To-Back     :STARTUP TEST      Idle  PASS
 3/02 12:00:58 PM       2/02  Back-To-Back     :STARTUP TEST      Idle  PASS
 3/02 12:00:58 PM       2/03  Back-To-Back     :STARTUP TEST      Idle  PASS
 3/02 12:00:58 PM       2/04  Back-To-Back     :STARTUP TEST      Idle  PASS
 3/02 12:00:58 PM       2/05  Back-To-Back     :STARTUP TEST      Idle  PASS
...
 3/02 12:01:14 PM       3/95  Back-To-Back     :STARTUP TEST      Idle  PASS
 3/02 12:01:14 PM       3/94  Back-To-Back     :STARTUP TEST      Idle  PASS
 3/02 12:01:15 PM       3/75  Back-To-Back     :STARTUP TEST      Idle  PASS
```

```
 3/02 12:01:15 PM       3/74  Back-To-Back     :STARTUP TEST      Idle  PASS
 3/02 12:13:52 PM       3/20  Back-To-Back     :USER INITIATED    Idle  PASS
 3/02 12:13:52 PM       2/10  Back-To-Back     :USER INITIATED    Idle  PASS
...
 3/02 12:44:00 PM      3/102  No Test (Time)   :MIN IDLE MODEMS   Idle  NOTST
 3/02 12:44:00 PM      3/103  No Test (Time)   :MIN IDLE MODEMS   Idle  NOTST
 3/02 12:44:00 PM      3/104  No Test (Time)   :MIN IDLE MODEMS   Idle  NOTST
 3/02 12:44:00 PM      3/105  No Test (Time)   :MIN IDLE MODEMS   Idle  NOTST
 3/02 12:44:00 PM      3/106  No Test (Time)   :MIN IDLE MODEMS   Idle  NOTST
 3/02 12:44:00 PM      3/107  No Test (Time)   :MIN IDLE MODEMS   Idle  NOTST
 3/02 12:44:21 PM       2/73  Back-To-Back     :TIME INTERVAL     Idle  PASS
 3/02 12:44:21 PM       2/72  Back-To-Back     :TIME INTERVAL     Idle  PASS
 3/02 12:44:21 PM       2/33  Back-To-Back     :TIME INTERVAL     Idle  PASS
 3/02 12:44:21 PM       2/32  Back-To-Back     :TIME INTERVAL     Idle  PASS
 3/02 12:44:21 PM       3/37  Back-To-Back     :TIME INTERVAL     Idle  PASS
```

Note The *Reason* column indicates why the test was started. The *TIME INTERVAL* is one of the triggers under autotest; the other is the error threshold.

SPE Recovery

You may configure automatic recovery (removal from service and reloading of SPE firmware) of ports on an SPE at any available time from global configuration mode (the prompt is `AS5350(config)#` or `AS5400(config)#`) as shown:

spe recovery {**port-action** {**disable** | **recover** | **none**} | **port-threshold** *num-failures*}

When an SPE port fails to connect for a certain number of consecutive times, 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 **port-action,** where you can choose to *disable* (mark the port as *Bad*) or *recover* the port when the SPE is in IDLE and has no active calls. The default for *num-failures* is **30**.

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

SPE Download Maintenance

You may configure a scheduled recovery of SPEs from global configuration mode (the prompt is `AS5350(config)#` or `AS5400(config)#`) as shown:

spe download maintenance time *hh:mm* | **stop-time** *hh:mm* | **max-spes** *num-of-spes* | **window** *time-period* | **expired-window** {*drop-call* | *reschedule*}

Download maintenance starts at **time**, steps through all the SPEs that need recovery and SPEs that need a firmware upgrade, and starts maintenance on **max-spes** at a time. It waits for the **window** delay time for all the ports on the SPE to become inactive before moving the SPE to the *idle* state. It downloads firmware immediately after the SPE moves to idle. If the ports are still in use by the end of (**window**), depending on the **expired-window** setting, connections on the SPE ports are shut down 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 are below **max-spes,** or until **stop-time** (if set), or until all SPEs marked for recovery or upgrade have had their firmware reloaded. The default download-maintenance time is 03:00.

Clear an SPE

The **clear spe** privileged EXEC mode command allows you to manually recover a port that is frozen in a suspended state. This command causes the firmware configured for that SPE to be downloaded to the specified SPE or the range of SPEs and Power On Self Test (POST) to be executed. This command can be executed regardless of the state of the SPEs. All active ports running on the SPE are prematurely terminated and messages are logged into the appropriate log. This replaces the **clear modem** command.

The following example shows a coldstart on SPE 1 on slot 1:

```
AS5400# clear spe 1/1
AS5400# Are you sure you want to clear SPE 1/1(Y/N)? Y
```

Upgrading SPE Firmware

With new systems, Cisco loads a Cisco IOS software-compatible version of SPE firmware into each installed SPE. A map of the version(s) of SPE firmware copied to RAM for each SPE is stored in nonvolatile random-access memory (NVRAM) so that it is retained over power cycles.

Note You do not have to take any action to use the pre-installed version of SPE firmware with new systems.

You can acquire new SPE firmware from the Cisco Software Center in one of two ways:

- **Bundled** in regular Cisco IOS releases. See the "Using SPE Firmware Bundled with Cisco IOS Software" section on page 5-20 for details.
- **Unbundled** from Cisco.com. This is a more up-to-date version of SPE firmware released before the next Cisco IOS release, or a special version of SPE firmware shipped with a new board. See the "Upgrading SPE Firmware from the Cisco.com FTP Server" section on page 5-14 for details.

When you have the new firmware, you can configure different firmware versions onto individual SPEs or ranges of SPEs on a universal port card. You can also configure different upgrade methods by using the **firmware upgrade** command.

This section provides instructions for the following:

Important Upgrade Commands

There are several commands you use to upgrade SPE firmware. For examples on using the commands, see the "Upgrading SPE Firmware from the Cisco.com FTP Server" section on page 5-14 and the "Using SPE Firmware Bundled with Cisco IOS Software" section on page 5-20.

- Use the **copy tftp flash** *filename* command to copy any version of SPE firmware (no matter how it is obtained) into system Flash memory. You can store several versions of the SPE firmware in system Flash memory under different filenames.
- Use the **firmware location** SPE configuration command to transfer a specified version of SPE firmware from system Flash memory to the SPEs named on entering SPE configuration mode.
- Use the **firmware upgrade** *busyout* | *download-maintenance* | *reboot* SPE configuration command to configure when the file named in the **firmware location** command will be loaded to the SPEs. Three methods of upgrade are available:
  - *Busyout* (the default) upgrades when all calls are terminated on an SPE.
  - *Download-maintenance* waits upgrades at the next download maintenance (see the "SPE Download Maintenance" section on page 5-11). The default download-maintenance time is 03:00.
  - *Reboot* upgrades at the next reboot. Note that, for the **firmware upgrade reboot** command to take effect after a reload, you must have saved the running configuration with the **copy running-config startup-config** command.

Note The **copy ios-bundled** command is not necessary with the universal port card. 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.

Displaying SPE Firmware Versions

Use the **show spe version** command to list the versions of SPE firmware running on the SPEs, residing in system Flash memory, and bundled with Cisco IOS software. This helps you decide if you need to change the version running on the modems.

Note The version number (version column) may not match the filename (UPG firmware-filename column) for a short period of time while a range of SPEs is in the process of downloading new firmware. The version number updates at the beginning of the upgrade process, whereas the filename updates upon completion of the process. This is done intentionally to enable you to recognize the upgrade process from the **show spe version** output.

```
AS5400# show spe version

IOS-Bundled Default Firmware-Filename             Version  Firmware-Type
====================================             =======  =============
system:/ucode/np_spe_firmware1                   0.0.6.75 SPE firmware

On-Flash Firmware-Filename                        Version  Firmware-Type
==========================                        =======  =============
flash:np.spe                                      0.6.4.5  SPE firmware
flash:np_6_77.spe                                 0.0.6.77 SPE firmware
flash:np_6_79.spe                                 0.0.6.79 SPE firmware
```

```
SPE-# SPE-Type   SPE-Port-Range     Version    UPG Firmware-Filename
 2/00    CSMV6         0000-0005    0.0.6.75    N/A ios-bundled default
 2/01    CSMV6         0006-0011    0.0.6.75    N/A ios-bundled default
 2/02    CSMV6         0012-0017    0.0.6.75    N/A ios-bundled default
 2/03    CSMV6         0018-0023    0.0.6.75    N/A ios-bundled default
 2/04    CSMV6         0024-0029    0.0.6.75    N/A ios-bundled default
 2/05    CSMV6         0030-0035    0.0.6.75    N/A ios-bundled default
 2/06    CSMV6         0036-0041    0.0.6.77    N/A np_6_77.spe
 2/07    CSMV6         0042-0047    0.0.6.77    N/A np_6_77.spe
 2/08    CSMV6         0048-0053    0.0.6.77    N/A np_6_77.spe
 2/09    CSMV6         0054-0059    0.0.6.77    N/A np_6_77.spe
 2/10    CSMV6         0060-0065    0.0.6.77    N/A np_6_77.spe
 2/11    CSMV6         0066-0071    0.0.6.77    N/A np_6_77.spe
 2/12    CSMV6         0072-0077    0.0.6.79    N/A np_6_79.spe
 2/13    CSMV6         0078-0083    0.0.6.79    N/A np_6_79.spe
 2/14    CSMV6         0084-0089    0.0.6.79    N/A np_6_79.spe
 2/15    CSMV6         0090-0095    0.0.6.79    N/A np_6_79.spe
 2/16    CSMV6         0096-0101    0.0.6.79    N/A np_6_79.spe
 2/17    CSMV6         0102-0107    0.0.6.79    N/A np_6_79.spe
```

Upgrading SPE Firmware from the Cisco.com FTP Server

Upgrading SPE firmware from the Cisco.com FTP server is a three-step process:

- Downloading the SPE firmware from Cisco.com FTP server to a local TFTP server
- Copying the SPE firmware file to the gateway and SPEs (which may also involve removing old firmware)
- Configuring SPEs to use an Upgraded Firmware File

Download 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 Cisco's Software Center.

You can download software from the 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 (subject to change without notice): http://www.cisco.com/kobayashi/sw-center/

Step 3 Under **Software Products & Downloads**, click **Access Software**.

Step 4 Click **AS5350 Series** or **AS5400 Series**.

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, 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 you download it 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 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.
220-
220-  Cisco Connection Online       |        |      Cisco Systems, Inc.
220-  Email: cco-team@cisco.com   |||      |||  170 West Tasman Drive
220-  Phone: +1.800.553.2447  .:|||||:..:|||||:.  San Jose, CA 95134
220-
220- NOTE: As of February 1,1997 ftp.cisco.com will now point to this
220- service. Please be advised. To use the former ftp.cisco.com after
220-  February 1, connect to ftpeng.cisco.com
220-
220-  You may login with:
220- + Your CCO username and password, or
220- + A special access code followed by your e-mail address, or
220- + "anonymous" followed by your e-mail address for guest access.
220-
220 cio-sys FTP server (CIOESD #103 Sun Dec 15 14:43:43 PST 1996) ready.
```

Step 2 Enter your CCO 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-######################################################################
230-
230- *****  NOTE: As of February 1, 1997, "cco.cisco.com",   *****
230- *****  "www.cisco.com" and "ftp.cisco.com" are now all  *****
230- *****  logical names for the same machine.              *****
230- *****                                                   *****
230- *****  The old "ftp.cisco.com" is an entirely           *****
230- *****  different machine, which is now known as         *****
230- *****  "ftpeng.cisco.com" or "ftp-eng.cisco.com".       *****
230- *****                                                   *****
230- *****  In general, "ftpeng.cisco.com" is used only for  *****
230- *****  distribution of Cisco Engineering-controlled     *****
230- *****  projects, such as beta programs, early field     *****
230- *****  trials, developing standards documents, etc.     *****
230- *****                                                   *****
```

```
230- *****  Be sure to confirm you have connected to         *****
230- *****  the machine you need to interact with.          *****
230-
230-  If you have any odd problems, try logging in with a minus sign (-) as
230-  the first character of your password.  This will turn off a feature
230-  that may be confusing your ftp client program.
230-  Please send any questions, comments, or problem reports about this
230-  server to cco-team@cisco.com.
230-
230-  NOTE:
230-  o To download files from CCO, you must be running a *passive-mode*
230-    capable FTP client.
230-  o To drop files on this system, you must cd to the /drop directory.
230-  o Mirrors of this server can be found at
230-
230-     + ftp://www-europe.cisco.com European (Amsterdam)
230-     + ftp://www-fr.cisco.com     France     (Paris)
230-     + ftp://www-au.cisco.com     Australia  (Sydney)
230-     + ftp://www-jp.cisco.com     Japan      (Tokyo)
230-     + ftp://www-kr.cisco.com     Korea      (Seoul)
230-
230- Please read the file README
230- it was last modified on Sat Feb  1 12:49:31 1997 - 163 days ago
230  User harry logged in.  Access restrictions apply.
Remote system type is UNIX.
Using binary mode to transfer files.
```

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/5350

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 View the contents of the directory with the **ls** command:

```
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-1.0.1.2.bin
-r--r--r-- 1 ftpadmin ftpint 635 Jul 10 18:08 SPE-firmware.3.1.30.readme
226 Transfer complete.
```

Step 5 Specify a binary image transfer:

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

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

Step 7 Quit your terminal session:

```
ftp> quit
Goodbye.
```

Step 8 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-1.0.1.2.bin
server% pwd
/auto/tftpboot
```

Step 9 Transfer these files to a local TFTP or RCP server that your gateway or router can access.

Copy the SPE Firmware File from Local TFTP Server to the SPEs

The procedure for copying the SPE firmware file from your local TFTP server to a universal port card is a two-step process:

1. Transfer the SPE firmware to the gateway's Flash memory.
2. 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. 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 gateway restarts.

Transfer SPE Firmware to Flash Memory

Follow these steps to download the universal SPE firmware to Flash memory:

Step 1 Check the image in the gateway Flash memory:

```
AS5400# show flash
System flash directory:
File  Length   Name/status
  1   4530624  c5350-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 gateway Flash memory. You are prompted for the download destination and the remote host name.

Note The system no longer asks you if you want to erase Flash memory before reloading it. SPE firmware code is small; unlike with system images, you can sometimes hold more than one version of SPE firmware in Flash memory.

If you do not have available space to copy the SPE firmware, during the copy operation the system displays a message telling you to delete the current file and squeeze the Flash memory to make room for the new image. Enter the **delete flash:***version* command, followed by the **squeeze flash** command, to perform this delete-and-squeeze operation. Then proceed with the copy operation.

```
AS5400# copy tftp flash

Address or name of remote host [192.168.19.91]?
Source filename [c5350-js-mz.xm.Feb16]?
Destination filename [c5350-js-mz.xm.Feb16]?
Accessing tftp://192.168.19.91/c5350-js-mz.xm.Feb16...
Loading c5350-js-mz.xm.Feb16 from 192.168.19.91 (via FastEthernet0/0):
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
[OK - 10573848/21147648 bytes]
10573848 bytes copied in 77.356 secs (137322 bytes/sec)
```

Step 3 Verify that the file has been copied into the gateway Flash memory:

```
AS5400# show flash

-#- ED --type-- --crc--- -seek-- nlen -length- -----date/time------ name
1 .. unknown 12375B0E 92704 6 337539 Feb 21 2001 22:46:51 np.spe
2 .. image 1A58C7EA AA7F9C 20 10573848 Feb 21 2001 23:11:59 c5350-js-mz.xm.Feb16
5079140 bytes available (10911644 bytes used)
```

Configure SPEs to Use an Upgraded Firmware File

Follow these steps to configure the SPEs to use the upgraded firmware:

Step 1 Enter the **enable** command.

```
AS5400> enable
```

Step 2 Enter your password.

```
Password: password
AS5400#
```

You are in privileged EXEC mode when the prompt changes to `AS5350#` or `AS5400#`.

Step 3 Display SPE firmware versions to obtain the On-Flash firmware filename.

Note As explained previously, the version number and UPG firmware filename may not match until the upgrade is complete.

```
AS5400# show spe version

IOS-Bundled Default Firmware-Filename             Version  Firmware-Type
=====================================             =======  =============
system:/ucode/np_spe_firmware1                    0.0.6.75 SPE firmware

On-Flash Firmware-Filename                        Version  Firmware-Type
==========================                        =======  =============
flash:np.spe                                      0.6.4.5  SPE firmware
flash:np_6_77.spe                                 0.0.6.77 SPE firmware
flash:np_6_79.spe                                 0.0.6.79 SPE firmware
flash:np-spe-upw-1.0.1.2.bin                      1.0.1.2  SPE firmware
```

```
SPE-# SPE-Type   SPE-Port-Range     Version    UPG Firmware-Filename
 2/00    CSMV6         0000-0005    0.0.6.75    N/A ios-bundled default
 2/01    CSMV6         0006-0011    0.0.6.75    N/A ios-bundled default
 2/02    CSMV6         0012-0017    0.0.6.75    N/A ios-bundled default
 2/03    CSMV6         0018-0023    0.0.6.75    N/A ios-bundled default
 2/04    CSMV6         0024-0029    0.0.6.75    N/A ios-bundled default
 2/05    CSMV6         0030-0035    0.0.6.75    N/A ios-bundled default
 2/06    CSMV6         0036-0041    0.0.6.77    N/A np_6_77.spe
 2/07    CSMV6         0042-0047    0.0.6.77    N/A np_6_77.spe
 2/08    CSMV6         0048-0053    0.0.6.77    N/A np_6_77.spe
 2/09    CSMV6         0054-0059    0.0.6.77    N/A np_6_77.spe
 2/10    CSMV6         0060-0065    0.0.6.77    N/A np_6_77.spe
 2/11    CSMV6         0066-0071    0.0.6.77    N/A np_6_77.spe
 2/12    CSMV6         0072-0077    0.0.6.79    N/A np_6_79.spe
 2/13    CSMV6         0078-0083    0.0.6.79    N/A np_6_79.spe
 2/14    CSMV6         0084-0089    0.0.6.79    N/A np_6_79.spe
 2/15    CSMV6         0090-0095    0.0.6.79    N/A np_6_79.spe
 2/16    CSMV6         0096-0101    0.0.6.79    N/A np_6_79.spe
 2/17    CSMV6         0102-0107    0.0.6.79    N/A np_6_79.spe
```

Step 4 Enter global configuration mode by typing the **configure** command. The example uses the terminal configuration option.

```
AS5400# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
AS5400(config)#
```

You are in global configuration mode when the prompt changes to `AS5350(config)#` or `AS5400(config)#`.

Step 5 Enter SPE configuration mode, which is similar to line configuration mode. You can choose to configure a single SPE or range of SPEs by specifying the first and last SPE in the range.

```
AS5400(config)# spe slot/spe

or

AS5400(config)# spe slot/spe slot/spe
```

You are in SPE configuration mode when the prompt changes to `AS5350(config-SPE)#` or `AS5400(config-SPE)#`.

Step 6 Specify the SPE firmware file in Flash memory to use for the selected SPEs. This is the firmware filename that you obtained in Step 3.

```
AS5400(config-SPE)# firmware location np-spe-upw-1.0.1.2.bin
```

Step 7 Specify when the SPE firmware upgrade is to occur.

```
AS5400(config-SPE)# firmware upgrade busyout | download-maintenance | reboot
```

Step 8 Type the **exit** command to exit SPE config mode.

```
AS5400(config-SPE)# exit
AS5400(config)#
```

Step 9 Press the **Enter** key to verify your command registers, then type **Ctrl-Z** to return to privileged EXEC mode.

```
AS5400(config)# Ctrl-Z
AS5400#
```

Step 10 Save your changes when ready.

```
AS5400# copy running-config startup-config
```

Using SPE Firmware Bundled with Cisco IOS Software

Use this procedure to update SPE firmware on the SPEs in your gateway if you decide to use the version of SPE firmware bundled with Cisco IOS software instead of the version already mapped to your ports.

To set the SPE firmware mapping to the SPE firmware version bundled with Cisco IOS software, enter the following commands:

Step 1 Enter the **enable** command.

```
AS5400> enable
```

Step 2 Enter your password.

```
Password: password
AS5400#
```

You are in privileged EXEC mode when the prompt changes to `AS5350#` or `AS5400#`.

Step 3 Enter global configuration mode by typing the **configure** command. The example uses the terminal configuration option.

```
AS5400# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
AS5400(config)#
```

You are in global configuration mode when the prompt changes to `AS5350(config)#` or `AS5400(config)#`.

Step 4 Enter SPE configuration mode, which is similar to line configuration mode. You can choose to delete the configuration for a single SPE or range of SPEs by specifying the first and last SPE in the range. The SPE firmware used by the SPEs automatically reverts to the version bundled with the current Cisco IOS image.

```
AS5400(config)# spe slot/spe

or

AS5400(config)# spe slot/spe slot/spe
```

You are in SPE configuration mode when the prompt changes to `AS5350(config-SPE)#` or `AS5400(config-SPE)#`.

Step 5 If the previous download was unbundled firmware, enter the no form of the **firmware location** command to revert to the default Cisco IOS bundled SPE firmware:

```
AS5400(config-SPE)# no firmware location
```

Step 6 Type the **exit** command to exit SPE config mode.

```
AS5400(config-SPE)# exit
AS5400(config)#
```

Step 7 Press the **Enter** key to verify your command registers, then type **Ctrl-Z** to return to privileged EXEC mode.

```
AS5400(config)# Ctrl-Z
AS5400#
```

Step 8 Save your changes when ready.

```
AS5400# copy running-config startup-config
```

This process does not delete any existing SPE firmware that resides in system Flash memory in case you later want to revert to it. If you decide to delete the code from system Flash memory, remember that *all* files in system Flash memory are deleted; therefore save and restore any important files (for example, the Cisco IOS software image).

Note If the new Cisco IOS image contains the same SPE firmware as the old one, no new code is downloaded to the SPEs.

Health Monitor

The Health Monitor allows you to see the status of different components of the AS5400:

The **show health-monitor summary** command shows the status of the following components:

- Chassis: Power supply, Temperature, Fans
- Memory: Processor, I/O Memory
- DFC: CT3, E1, T1, NP108

The **show health-monitor summary** command provides high level component status.

The **show health-monitor** command shows more details such as the status of sub components.

The following example shows the display output of the **show health-monitor** command:

```
AS5400#show health-monitor
Chassis:
   Power Supply                            Failure
      Redundant Power System is present.
      PS Input Voltage status:     failure
      PS Output Voltage status:    failure
      PS Fan status:                normal
      PS Thermal status:            normal
      PS OverVoltage status:        normal
   Temperature                                OK
   Fans                                       OK

Memory:
   Free Memory processor                      OK
   Memory Fragmentation Processor             OK
   Free Memory I/O                            OK
   Memory Fragmentation I/O                   OK
   Detailed summary:
                Head    Total(b)     Used(b)     Free(b)   Lowest(b)  Largest(b)
Processor   62EC07E0   219412512    67221920   152190592   142181548   139874020
      I/O   40000000    67110380    46387964    20722416    20722416    20706928

DFC's:
   Slot 1 (NP108 DFC)                         OK
   Slot 2 (NP108 DFC)                         OK
   Slot 3 (NP108 DFC)                         OK
   Slot 4 (NP60 DFC)                          OK
   Slot 5 (NP108 DFC)                         OK, 1 SPE's BAD
   Slot 7 (CT3 DFC)                           OK
AS5400#
AS5400#
AS5400#
AS5400#
AS5400#show health-monitor summ
AS5400#show health-monitor summary ?
  |  Output modifiers
  <cr>
```

The following example shows the display output of the **show health-monitor summary command**:

```
AS5400#show health-monitor summary
Chassis:
   Power Supply                            Failure
   Temperature                                OK
   Fans                                       OK

Memory:
```

```
   Free Memory processor                        OK
   Memory Fragmentation Processor               OK
   Free Memory I/O                              OK
   Memory Fragmentation I/O                     OK

DFC's:
   Slot 1 (NP108 DFC)                           OK
   Slot 2 (NP108 DFC)                           OK
   Slot 3 (NP108 DFC)                           OK
   Slot 4 (NP60 DFC)                            OK
   Slot 5 (NP108 DFC)                           OK
   Slot 7 (CT3 DFC)                             OK
```

Interface Queue Wedge Monitor

The Interface Queue Wedge Monitor displays information about interface queue wedges and the times that they occur. An interface queue is wedged when the packet count that is being transmitted (output queue) or received (input queue) is equal to or greater than the maximum packet count size of the queue, and consequently, no more packets are being transmitted or received.

The Interface Queue Wedge Monitor is enabled or disabled using following commands.

- **interface-monitor enable**
- **[no] interface-monitor enable**

The Interface Queue Wedge Monitor is disabled by default.

When the Interface Queue Wedge Monitor is enabled, it monitors all the input and output queue wedge interfaces. The **show wedged-interfaces [output/input]** command displays the queue wedged interfaces.

The **show wedged-interfaces output** command displays the output queue wedge interfaces and their respective time-since-wedges.

The **show wedged-interfaces input** command displays the input queue wedge interfaces and their respective time-since-wedges.

Interface Queue Wedge Output Procedure

When the Interface Queue Wedge Monitor is enabled, and an interface (such as a FastEthernet0/0 output queue is already wedged, the following message is displayed on the console, syslog, and buffer:

```
Eg:  00:39:15: %HHM-3-INTFWEDGE: FastEthernet0/0 Output Queue Wedged
```

The following procedure shows an example of how to enable, disable, and show the results of a wedged interface output:

Step 1 Enable the Interface Queue Wedge Monitor.

```
AS5400##conf t
Enter configuration commands, one per line.  End with CNTL/Z.
AS5400#(config)#interface-monitor enable
AS5400#(config)#^Z
AS5400##
```

Step 2 Show interfaces. (In this case, some interfaces are already wedged.)

```
AS5400##sh wedged-interfaces output
Interface Name             Time Since Wedge
Async4/00                  00:23:33
```

```
Async4/01                  00:23:26
Async4/02                  00:23:21
Async4/03                  00:23:15
FastEthernet0/0            00:24:35
FastEthernet0/1            00:24:50
Virtual-Access2            00:38:19
Virtual-Access3            00:38:19
AS5400##
```

Step 3 Show interface wedge process running.

```
AS5400##show proc cpu | i Intf
  39           0       341          0  0.00%  0.00%  0.00%   0 Intf Wedge Monit
AS5400##
```

Step 4 Disable interface monitor.

```
AS5400##conf t
Enter configuration commands, one per line.  End with CNTL/Z.
AS5400#(config)#no interface-monitor enable
AS5400#(config)#^Z
AS5400##
AS5400##
```

Step 5 Show interface wedge process running again. (No process is running now.)

```
AS5400##show proc cpu | i Intf
AS5400##
```

Step 6 Show wedged interface output. (No output.)

```
AS5400##show wedged-interfaces output
Interface Name             Time Since Wedge
AS5400##
AS5400##
```

Step 7 Enable the Interface Queue Wedge Monitor again.

```
AS5400##conf t
Enter configuration commands, one per line.  End with CNTL/Z.
AS5400#(config)#interface-monitor enable
AS5400#(config)#^Z

AS5400##
00:39:03: %HHM-3-INTFWEDGE: Async4/00 Output Queue Wedged
00:39:04: %SYS-5-CONFIG_I: Configured from console by console
00:39:06: %HHM-3-INTFWEDGE: Async4/01 Output Queue Wedged
00:39:09: %HHM-3-INTFWEDGE: Async4/02 Output Queue Wedged
00:39:12: %HHM-3-INTFWEDGE: Async4/03 Output Queue Wedged
00:39:15: %HHM-3-INTFWEDGE: FastEthernet0/0 Output Queue Wedged
00:39:18: %HHM-3-INTFWEDGE: FastEthernet0/1 Output Queue Wedged
00:39:39: %HHM-3-INTFWEDGE: Virtual-Access2 Output Queue Wedged
00:39:42: %HHM-3-INTFWEDGE: Virtual-Access3 Output Queue Wedged
AS5400##
AS5400##
AS5400##
```

Step 8 Show wedge output.

```
AS5400##sh wedge out
Interface Name             Time Since Wedge
Async4/00                  00:25:26
Async4/01                  00:25:20
Async4/02                  00:25:15
Async4/03                  00:25:08
```

```
FastEthernet0/0            00:26:29
FastEthernet0/1            00:26:44
Virtual-Access2            00:40:12
Virtual-Access3            00:40:12
AS5400##
```

Step 9 Show interface wedge process running again. (Process is running now.)

```
AS5400##show proc cpu | i Intf
  39           0        25          0  0.00%  0.00%  0.00%   0 Intf Wedge Monit
```

Wedge Interface Input Procedure

The following procedure shows an example of how to enable, disable, and show the results of wedged interface input:

Step 1 Show wedged interfaces. (Interfaces are already wedged.)

```
AS5400##sh wedged-interfaces input
Interface                  Time Since Wedge
Async4/00                  00:21:58
Async4/01                  00:21:51
Async4/02                  00:21:26
Async4/03                  00:21:21
FastEthernet0/0            11:58:28
FastEthernet0/1            11:58:46
Virtual-Access2            00:08:46
Virtual-Access3            00:08:46
AS5400##
AS5400##
```

Step 2 Show interface wedge process running.

```
AS5400##sh proc cpu | i Intf
  39           0        21          0  0.00%  0.00%  0.00%   0 Intf Wedge Monit
AS5400##
AS5400##
AS5400##
```

Step 3 Disable interface monitor.

```
AS5400##conf t
Enter configuration commands, one per line.  End with CNTL/Z.
AS5400#(config)#no interface-monitor enable
AS5400#(config)#^Z
AS5400##
AS5400##
AS5400##
```

Step 4 Show interface wedge process running again. (No process is running now.)

```
AS5400##sh proc cpu | i Intf
AS5400##
AS5400##
```

Step 5 Show wedged interface input. (No input.)

```
AS5400##show wedged-interfaces output
Interface                  Time Since Wedge
AS5400##
AS5400##
```

Step 6 Enable the Interface Queue Wedge Monitor again.

```
AS5400##conf t
Enter configuration commands, one per line.  End with CNTL/Z.
AS5400#(config)#interface-monitor enable
AS5400#(config)#^Z
AS5400##
AS5400##

AS5400##
12:00:50: %HHM-3-INTFWEDGE: Async4/00 Input Queue Wedge
12:00:53: %HHM-3-INTFWEDGE: Async4/01 Input Queue Wedge
12:00:56: %HHM-3-INTFWEDGE: Async4/02 Input Queue Wedge
12:00:59: %HHM-3-INTFWEDGE: Async4/03 Input Queue Wedge
12:01:02: %HHM-3-INTFWEDGE: FastEthernet0/0 Input Queue Wedge
12:01:05: %HHM-3-INTFWEDGE: FastEthernet0/1 Input Queue Wedge
12:01:26: %HHM-3-INTFWEDGE: Virtual-Access2 Input Queue Wedge
12:01:29: %HHM-3-INTFWEDGE: Virtual-Access3 Input Queue Wedge
AS5400##
AS5400##
```

Step 7 Show interface wedge process running again. (Process is running now.)

```
AS5400##sh proc cpu | i Intf
  39           8       110         72  0.00%  0.00%  0.00%   0 Intf Wedge Monit
AS5400##
```

Step 8 Show wedge input.

```
Here is the o/p again
---------------------

AS5400##sh wedged-interfaces input
Interface                 Time Since Wedge
Async4/00                 00:24:14
Async4/01                 00:24:06
Async4/02                 00:23:42
Async4/03                 00:23:37
FastEthernet0/0           12:00:44
FastEthernet0/1           12:01:01
Virtual-Access2           00:11:02
Virtual-Access3           00:11:02
```

Where to Go Next

At this point you can go to:

- Chapter 6, "Configuring Voice over IP" to learn how to configure voice and fax traffic over an IP network.
- Appendix C, "Comprehensive Configuration Examples."
- *Monitoring Voice and Fax Services on the Cisco AS5400 Universal Gateway,* available online at http://www.cisco.com/univercd/cc/td/doc/product/software/.
  Select your Cisco IOS release and search for this title.

Tip The following publications are useful for those familiar with the Cisco universal gateway products that use MICA modems.

- *Comparing Universal Port SPE Commands to MICA Modem Commands*, available online at http://www.cisco.com/warp/customer/76/nextport_compare.html
- *Managing Port Services on the Cisco AS5350 Universal Gateway*, available online at http://www.cisco.com/univercd/cc/td/doc/product/access/acs_serv/as5350/sw_conf/alxnxpt.htm
- *Managing Port Services on the Cisco AS5400 Universal Gateway*, available online at http://www.cisco.com/univercd/cc/td/doc/product/software/ios121/121newft/121t/121t3/nextport/index.htm.

Tip The following publications are available on the Documentation CD-ROM that came with your gateway, or on the World Wide Web from the Cisco home page.

- For more advanced configuration topics, see the Cisco IOS software configuration guide, feature modules, and command-reference publications *Dial Solutions Configuration Guide* and *Dial Solutions Command Reference Guide* for your Cisco IOS release.