CHAPTER 16

Upgrading Field-Programmable Devices

In general terms, field-programmable devices (FPDs) are hardware devices implemented on router cards that support separate software upgrades. A field-programmable gate array (FPGA) is a type of programmable memory device that exists on most hardware components of a Cisco 7304 router. The term “FPD” has been introduced to collectively and generically describe any type of programmable hardware device on SPAs, including FPGAs. Cisco IOS Release 12.2(20)S2 introduces the Cisco FPD upgrade feature to manage the upgrade of FPD images on SPAs only. This feature does not upgrade images on an MSC.

This chapter describes the difference between upgrading FPGA versions on MSCs versus SPAs, and the information that you need to know to verify image versions and to perform an upgrade for MSC FPGA images and FPD images when incompatibilities arise.

This chapter includes the following sections:

Release History

Table 16-1 provides the release and modification history for all FPD-related features on the Cisco 7304 router.

Table 16-1f Release History

Release	Modification
Cisco IOS Release 12.2(25)S3	The following FPD-related changes were introduced: • By default, the SPA used to automatically reload before and after a manual FPD upgrade. This behavior was changed. By default, the SPA is no longer reloaded automatically before and after a manual FPD upgrade. • The **force** option was removed from the **hw-module subslot** *slot/subslot* **file** *file-url* **force** command and replaced by the **reload** option. With the **reload** option, the user now has the option of reloading or not reloading after an FPD upgrade. • The output of the **show upgrade fpd file** *file-url* command was changed to only display brief versioning information. The output generated from this command in previous Cisco IOS releases can still be generated in this release by entering the **show upgrade fpd** *file-url* **detail** command. • The multiple periods (".....") used to show an FPD procedure is being processed are no longer used starting with this release.
Cisco IOS Release 12.2(20)S6	The **show upgrade** commands used to monitor FPD behavior (**show upgrade file**, **show upgrade package default**, **show upgrade progress**, and **show upgrade table**) have been changed to add the **fpd** keyword. The output previously generated with the aforementioned commands can now be generated by entering the appropriate **show upgrade fpd** command (**show upgrade fpd file**, **show upgrade fpd package default**, **show upgrade fpd progress**, and **show upgrade fpd table**).
Cisco IOS Release 12.2(20)S2	SPAs and MSCs were introduced, as was the FPD upgrade process and all functions and features related to FPD.

SPA FPD Quick Upgrade

This section provides information if you simply want to upgrade FPD for SPAs as quickly as possible. These instructions are not always feasible for operating network environments and are not the only methods available for upgrading FPD. If you need more information on FPD upgrades, see the various other sections of this document for detailed information related to FPD upgrades.

This section addresses the following topics:

FPD Quick Upgrade Before Upgrading your Cisco IOS Release (Recommended)

Step 1 When getting your Cisco IOS image, download the FPD image package for the Cisco IOS release that you are upgrading to to the disk0: Flash disk before booting the new version of Cisco IOS. The FPD image package can be retrieved from the same site where you go to get your Cisco IOS image.

Step 2 Boot using the new version of Cisco IOS. When the new Cisco IOS boots, it by defaults searches for the FPD image package in disk0: and the FPD images will be updated automatically as part of the IOS boot process.

FPD Quick Upgrade After Upgrading your Cisco IOS Release

Step 1 Go to the cisco.com site where you downloaded your specific Cisco IOS software and locate the FPD image package, if you haven't already.

Step 2 Download this FPD image package to disk0:.

Do not change any FPD-related settings on your system (if **upgrade fpd auto** or **upgrade fpd path** has been changed, change the settings back to the default settings using the **no** form of the command). Reboot your Cisco IOS release software. When the new Cisco IOS boots, it by defaults searches for the FPD image package in disk0: and the FPD images will be updated automatically as part of the IOS boot process.

Overview of MSC FPGA Image and SPA FPD Image Upgrade Support

FPGA versions must be compatible with the Cisco IOS software that is running on the router; if an incompatibility exists between an FPGA version and the Cisco IOS software release running the router, the device with the FPGA will not operate properly until the incompatibility is resolved.

The Cisco 7304 router supports upgrades for FPGA devices on its MSCs and SPAs, but uses different methods to upgrade those images:

- Cisco 7304 MSC-100—FPGA images are bundled with the Cisco IOS software, like the FPGA bundles for other Cisco 7304 router hardware. The MSC-100 supports automatic upgrades only for its FPGA device.
- Shared Port Adapters—FPGA software upgrades are part of an FPD image package that corresponds to a Cisco IOS software release. The SPA supports automatic and manual upgrades for its FPGA device using the Cisco FPD upgrade feature that is further described in this chapter.

Overview of SPA FPD Images and Packages

An FPD image package is used to upgrade FPD images. Whenever a Cisco IOS image is released that supports SPAs, a companion SPA FPD image package is also released for that Cisco IOS software release. The SPA FPD image package is available from Cisco.com and is accessible from the Cisco Software Center page where you also go to download your Cisco IOS software image.

If you are running SPAs on your router and are upgrading your Cisco IOS image, you should download the FPD image package file before booting the router using the new Cisco IOS release. If the SPA requires an FPD upgrade and the Cisco IOS image is unable to locate an FPD image package, the system messages will indicate that the FPD image is incompatible and you will need to go to the Cisco Software Center on Cisco.com to download the FPD image package for your Cisco IOS software release.

Note The FPD automatic upgrade feature only searches for the FPD image package file that is the same version number as the Cisco IOS release being used by the system. For example, if the Cisco IOS release being used is Cisco IOS Release 12.2(20)S2, then the system will search for the FPD image package file that supports the specific Cisco IOS release (spa_fpd.122-20.S2.pkg). Therefore, ensure the FPD image package file on your system is compatible with your Cisco IOS release and do not change the name of the FPD image package file.

Upgrading MSC FPGA Images

On the Cisco 7304 router, automatic FPGA version checking and updating is performed during every system startup for all line cards, NSEs, NPEs, MSCs, and the 7300-CC-PA in the system. However, the Cisco 7304 MSC-100 FPGA version cannot be updated manually.

For more information about FPGA upgrade processes that apply to the Cisco 7304 MSC-100, refer to the *Cisco 7304 FPGA Bundling and Update* document at the URL:

http://www.cisco.com/univercd/cc/td/doc/product/software/ios121/121newft/121limit/121ex/121ex10/73fpga.htm

Verifying the FPGA Version on an MSC

To verify FPGA version information on MSCs, you can use the following commands on the Cisco 7304 router:

- **show diag**—Displays current software and hardware FPGA versions for MSCs and SPAs.
- **show c7300**—Displays FPGA status for NPEs, NSEs, line cards, and MSCs.

Verifying Current FPGA Versions Using the show diag Command

To verify the FPGA version on the Cisco 7304 MSC-100 and on all of the SPAs in its subslots, use the **show diag** command and specify only the slot number of the MSC.

The following example shows output from the **show diag** command for a Cisco 7304 MSC-100 located in slot number 4 and a 4-Port 10/100 Fast Ethernet SPA located in subslot 0. The FPGA version information appears at the end of the output for each card:

```
Router# show diag 4
Slot 4:
```

```
        7304-MSC-100 SPA Carrier Card Line Card
        Line Card state: Active
        Insertion time: 2d19h ago
        Bandwidth points: 400000
        EEPROM contents at hardware discovery:
        Hardware Revision        : 0.18
        Boot Time out            : 0000
        PCB Serial Number        : CSJ0714YZC8
        Part Number              : 73-8789-01
        Board Revision           : A0
        Fab Version              : 02
        RMA Test History         : 00
        RMA Number               : 0-0-0-0
        RMA History              : 00
        Deviation Number         : 0-0
        Product Number           : 7304-MSC-100
        Top Assy. Part Number    : 68-1163-04
        Manufacturing Test Data  : 00 00 00 00 00 00 00 00
        Field Diagnostics Data   : 00 00 00 00 00 00 00 00
        Calibration Data         : Minimum: 0 dBmV, Maximum: 0 dBmV
              Calibration values :
        EEPROM format version 4
.
.
.
        FPGA information:
          Current FPGA version     : 00.23
          IOS bundled FPGA version : 00.23
        CPLD version     : 01.02

Subslot 4/0:
        Shared port adapter: SPA-4FE-7304, 4 ports
        Info: hw-ver=0x100, sw-ver=0x0 fpga-ver=0x0
        State: ok
        Insertion time: 23:17:47 ago
        Bandwidth: 400000 kbps
        EEPROM contents:
        Hardware Revision        : 1.0
        Boot Time out            : 0190
        PCB Serial Number        : JAB073204G5
        Part Number              : 73-8717-03
        73/68 Level Revision     : 01
        Fab Version              : 02
        RMA Test History         : 00
        RMA Number               : 0-0-0-0
        RMA History              : 00
        Deviation Number         : 0
        Product Number           : SPA-4FE-7304
        Product Version Id       : V01
        Top Assy. Part Number    : 68-2181-01
        73/68 Level Revision     : A0
        CLEI Code                : CNS9420AAA
        Base MAC Address         : 0000.0000.0000
        MAC Address block size   : 1024
.
.
.
        FPGA version:
          Software version : 04.17
          Hardware version : 04.17

Subslot 4/1: Empty subslot
```

Verifying Current FPGA Versions Using the show c7300 Command

You can also use the **show c7300** command to verify the FPGA status for all of the NPEs, NSEs, line cards, and MSCs on the Cisco 7304 router. The following example shows that all FPGAs are current for the NSE-100 and the Cisco 7304 MSC-100 cards in slots 0 through 5:

```
Router# show c7300
Slot      Card Type           Status          Insertion time
----      ---------           ------          --------------
0,1       NSE100              Active          00:45:29 ago
2         7304-MSC-100        Active          00:44:36 ago
3         7304-MSC-100        Active          00:44:36 ago
4         7304-MSC-100        Active          00:44:36 ago
5         7304-MSC-100        Active          00:14:39 ago

The FPGA versions for the cards listed above are current
.
.
```

Upgrading SPA FPD Images

This section documents some of the common scenarios where FPD image updates are necessary. It discusses the following scenarios:

- Migrating to a Newer Cisco IOS Release, page 16-6
- Upgrading FPD Images for SPAs in a Production System, page 16-8

Migrating to a Newer Cisco IOS Release

This section discusses the following topics:

- Upgrading FPD Images Before Booting the New Cisco IOS Release (Recommended), page 16-6
- Upgrading FPD Images for SPAs in a Production System, page 16-8

Upgrading FPD Images Before Booting the New Cisco IOS Release (Recommended)

If you are still running your old Cisco IOS Release but are preparing to load a newer version of Cisco IOS, you can upgrade FPD for the new Cisco IOS Release one of the following ways:

- Placing FPD Image Package on Flash Disk Before Upgrading IOS (Recommended), page 16-6
- Online FPD Upgrade, page 16-7

Placing FPD Image Package on Flash Disk Before Upgrading IOS (Recommended)

Placing the FPD image package for the IOS release that you are upgrading to before upgrading IOS is the recommended method for upgrading FPD because it is the simple in addition to being fast. To perform this type of FPD upgrade, follow these steps:

Step 1 While still running the Cisco IOS release that will be upgraded, place the FPD image package for the new version of Cisco IOS onto disk0:. For instance, if you are running Cisco IOS Release 12.2(20)S5 and are upgrading to Cisco IOS Release 12.2(25)S3, place the FPD image package for Cisco IOS Release 12.2(25)S3 onto disk0: while still running Cisco IOS Release 12.2(20)S5. The FPD image package for

a specific IOS release can be located on cisco.com from the same area where you download that Cisco IOS software image. Your router and SPAs should continue to operate normally since this action will have no impact on the current SPA FPDs.

Caution Do not change the filename of the FPD image package file. The Cisco IOS searches for the FPD image package file by filename, so the FPD image package file cannot be found if it has been renamed.

Step 2 Reboot your router using the new upgraded Cisco IOS image. As part of the bootup process, the router will search for the FPD image package. Since the default settings for the FPD image package search are to check for the FPD image package for the specific Cisco IOS Release in disk0:, the FPD image package will be located during the bootup procedure and all SPA FPDs that required upgrades will be upgraded.

Step 3 When the router has booted, verify the upgrade was successful by entering the **show hw-module subslot fpd** command.

Online FPD Upgrade

Note The Online FPD Upgrade was introduced in Cisco IOS Release 12.2(25)S3. The method of FPD upgrade cannot be used on routers running pre-Cisco IOS Release 12.2(25)S3 software.

The online FPD upgrade allows users to upgrade FPD before a Cisco IOS release without having to reload the router. The online FPD upgrade is the fastest method of upgrading FPD and will keep the system online for the duration of the upgrade, but it is more complicated than the offline FPD upgrade. If you are not familiar with the FPD upgrade procedure, we recommend using the instructions in the "Placing FPD Image Package on Flash Disk Before Upgrading IOS (Recommended)" section on page 16-6 to perform the FPD upgrade.

To perform an online FPD upgrade, follow these steps:

Step 1 While still running the Cisco IOS release that will be upgraded, place the FPD image package for the new version of Cisco IOS onto the router's Flash Disk or on an accessible FTP or TFTP server. The FPD image package can be located on cisco.com from the same area where you download your Cisco IOS software image.

Step 2 Before proceeding, be aware of the following issues:

- If you enter the **upgrade hw-module subslot** command as specified in Step 3 and then need to reload the router using the non-upgraded IOS release for any reason, the SPA FPD information will be corrupted and a SPA FPD upgrade will need to be performed to restore FPD compatibility on these SPAs. Other router events, such as router reloads or SPA OIRs, will also have this effect. If you are going to use this method to perform an FPD upgrade, we strongly recommend entering the **upgrade hw-module subslot** command to make the upgrade as close to the time of the IOS upgrade as possible to avoid any potential complications.
- Do not use the **reload** option with the **upgrade hw-module subslot** command to perform an online upgrade.

Step 3 Before upgrading the Cisco IOS image, enter the **upgrade hw-module subslot** *file-url* command. The *file-url* command should direct users to the location of the FPD image package. For instance, if you had placed the FPD image package for Release 12.2(25)S3 on the TFTP server abrick/muck/myfolder, you would enter **upgrade hw-module subslot tftp://abrick/muck/myfolder/c7304-fpd.122-25.S3.pkg** to complete this step.

Step 4 Upgrade IOS on the router. When IOS is upgraded, FPD will be upgraded with minimal time needed to complete the upgrade.

Step 5 Verify the upgrade was successful by entering the **show hw-module subslot fpd** command.

Upgrade FPD Images after Booting the New Cisco IOS Release

The following steps explain how to upgrade FPD images if you have already upgraded your Cisco IOS release but haven't upgraded your FPD images.

To perform an FPD upgrade after the new Cisco release has been booted, follow these steps:

Step 1 If you are unsure if your FPD images are compatible with the SPAs in your carrier card, enter the **show hw-module subslot fpd** command.

Step 2 If an FPD upgrade is necessary, place the FPD image package for the new version of Cisco IOS onto the router's Flash Disk or on an accessible FTP or TFTP server. The FPD image package can be located on cisco.com from the same area where you downloaded your Cisco IOS software image.

Step 3 Enter the **upgrade hw-module subslot** *file-url* **reload** command. The *file-url* command should direct users to the location of the FPD image package. For instance, if you had placed the FPD image package for Release 12.2(25)S3 on the TFTP server abrick/muck/myfolder, you would enter **upgrade hw-module subslot tftp://abrick/muck/myfolder/c7304-fpd.122-25.S3.pkg** to complete this step.

Note that the **reload** option is used in this command. When this option is used the SPA will automatically be reloaded to complete the FPD upgrade.

Step 4 Verify the upgrade was successful by entering the **show hw-module subslot fpd** command.

Upgrading FPD Images for SPAs in a Production System

Adding a SPA to a production system presents the risk that the SPA may contain versions of FPD images that are incompatible with the Cisco IOS release currently running the router. In addition, the FPD upgrade operation is a very CPU-intensive operation and therefore the upgrade operation may take more time when it is performed on a production system. The performance impact will vary depending on various factors, including network traffic load, the type of processing engine used, and the type of service configured.

Because of the potential complications, we highly recommend that one of the following alternatives be used to perform the FPD upgrade on a production system if possible:

- Using a Non-Production System to Upgrade the SPA FPD Image, page 16-9
- Verifying System Compatibility First, page 16-9

Using a Non-Production System to Upgrade the SPA FPD Image

Before beginning the upgrade, ensure:

- The spare system is running the same version of the Cisco IOS software release that the target production system is running.
- The automatic upgrade feature is enabled on the spare system (the automatic upgrade feature is enabled by default. It can also be enabled using the **upgrade fpd auto** command).

Use the following procedure to perform an upgrade on a spare system:

Step 1 Download the FPD image package file to the router's flash file system or TFTP or FTP server accessible by the spare system. In most cases, it is preferable to place the file in disk0: since the router, by default, searches for the FPD image package in disk0:. If disk0: is full, use the **upgrade fpd path** command to direct the router to search for the FPD image package in the proper location.

Step 2 Insert the SPA into the spare system.

If an upgrade is required, the system will perform the necessary FPD image updates so that when this SPA is inserted to the target production system it will not trigger an FPD upgrade operation there.

Step 3 Remove the SPA from the spare system after the upgrade.

Step 4 Insert the SPA into the target production system.

Verifying System Compatibility First

If a spare system is not available to perform an upgrade, you can check for system compatibility by disabling the automatic upgrade feature before inserting the SPA.

- If the FPD images on the SPA are compatible with the system, you will only need to re-enable the automatic upgrade feature.
- If the FPD images on the SPA are not compatible with the system, the SPA is disabled but will not impact system performance by attempting to perform an automatic upgrade.

Use the following procedure to check the FPD images on the SPA for system compatibility:

Step 1 Disable the automatic upgrade feature using the **no upgrade fpd auto** global configuration command.

Step 2 Insert the SPA into the system.

If the FPD images are compatible, the SPA is up and running.

If the FPD images are not compatible, the SPA is disabled. At this point we recommend that you wait for a scheduled maintenance when the system is offline to manually perform the FPD upgrade using the **upgrade hw-module subslot** privileged EXEC command.

Step 3 Re-enable the automatic upgrade feature using the **upgrade fpd auto** global configuration command.

Optional FPD Procedures

This section provides information for optional FPD-related functions. None of the topics discussed in this section are necessary for completing FPD upgrades, but may be useful in some FPD-related scenarios. It covers the following topics:

Manually Upgrading SPA FPD Images

To manually upgrade the current FPD version on a SPA card, use the following command:

```
Router# upgrade hw-module subslot slot-number/subslot-number file file-url [reload]
```

In this example, *slot-number* is the slot where the MSC is installed, *subslot-number* is the subslot number where the SPA is located, *file-url* is the location and name of the FPD image package file, and **reload** reloads the SPA to complete the FPD upgrade. By default, the SPA will not be reloaded to complete the FPD upgrade unless the **reload** option is entered. Reloading the SPA drops all traffic traversing that SPA's interfaces. If you would like to reload the SPA later to complete the upgrade, do not enter the reload option and OIR the SPA later to complete the FPD upgrade.

Note The default behavior for SPA automatic upgrades was changed in Cisco IOS Release 12.2(25)S3. If you are using a release prior to Release 12.2(25)S3, your SPA will automatically be reloaded after every FPD upgrade.
The **force** option was also removed in Release 12.2(25)S3 because it was no longer needed with the new behavior for this command.

Caution An image upgrade can require a long period of time to complete depending on the SPA.

Upgrading FPD From an FTP or TFTP Server

The generally recommended method to perform an FPD image upgrade is to download the FPD image package to Flash disk0: and use the FPD automatic upgrade. By default, the system searches disk0: for the FPD image package file when an FPD incompatibility is detected.

This default behavior of loading an FPD image from Flash can be changed using the **upgrade fpd path** global configuration command, which sets the path to search for the FPD image package file to a location other than the router's default Flash location.

For large deployments where all the systems are being upgraded to a specific Cisco IOS software release, we recommend that the FPD image package file be placed on an FTP or TFTP server that is accessible to all the affected systems, and then use the **upgrade fpd path** global configuration command to configure the routers to look for the FPD image package file from the FTP or TFTP server prior to the reloading of the system with the new Cisco IOS release.

Note This approach can also be used if there is not enough disk space on the system Flash card to hold the FPD image package file.

To download an FPD image package file to an FTP or TFTP server, use the following procedure:

Step 1 Copy the FPD image package file to the FTP or TFTP server.

Step 2 Access the router from a connection that does not use the SPA interface for access, if possible. We recommend not using the SPA interface as your connection to the router because an FPD incompatibility disables all interfaces on the SPA, making a manual FPD upgrade impossible through a SPA interface. If access through one of the SPA ports is the only access to the router you have, do not use the TFTP or FTP upgrade method. Instead, copy the FPD image package to your router's default Flash card before upgrading your Cisco IOS Release. This will allow the router to find the FPD image package during the first IOS bootup and upgrade FPD automatically.

Step 3 From global configuration mode, use the **upgrade fpd path** command to instruct the router to locate the FPD image package file from the FTP or TFTP server location.

For example, enter one of the following global configuration commands from the target system's console:

```
Router(config)# upgrade fpd path tftp://my_tftpserver/fpd_pkg_dir/
```
or
```
Router(config)# upgrade fpd path ftp://login:password@my_ftpserver/fpd_pkg_dir/
```

In these examples, *my_tftpserver* or *my_ftpserver* is the path to server name, *fpd_pkg_dir* is the directory on the TFTP server where the FPD image package is located, and *login:password* is your FTP login name and password.

Step 4 Make sure that the FPD automatic upgrade feature is enabled by examining the output of the **show running-config** command (look for the *upgrade fpd auto* configuration line in the output. If there are no upgrade commands in the output, then **upgrade fpd auto** is enabled because it is the default setting.) If automatic upgrades are disabled, use the **upgrade fpd auto** global configuration command to enable automatic FPD upgrades.

Step 5 Enter the **show upgrade fpd file** command to ensure your router is connecting properly to the default FPD image package. If you are able to generate output related to the FPD image package using this command, the upgrade should work properly.
In the following example, the router is able to generate FPD image package information for the FPD image package on the TFTP server.

```
Router# show upgrade fpd file tftp://mytftpserver/myname/myfpdpkg/c7304-fpd.122-25.S3.pkg
Loading myname/myfpdpkg/c7304-fpd.122-25.S3.pkg from 223.255.254.254 (via FastEthernet0):
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
[OK - 1740288 bytes]

Cisco Field Programmable Device Image Package for IOS
C7304 FPD Image Package (c7304-fpd-pkg.122.pkg), Version 12.2(20050304:175718)
Copyright (c) 2004-2005 by cisco Systems, Inc.
Built Fri 04-Mar-2005 09:57 by yega


================================ ==============================================
                                          Bundled FPD Image Version Matrix
                                 ==============================================
```

```
                                                                    Min. Req.
Supported Card Types             ID  Image Name                Version  H/W Ver.
================================ == ======================== ========= =========
4-port FastEthernet SPA           1 4xFE/2xGE SPA Data & I/O     4.18      0.0
-------------------------------- -- ------------------------ --------- ---------
2-port GigabitEthernet SPA        1 4xFE/2xGE SPA Data & I/O     4.18      0.0
-------------------------------- -- ------------------------ --------- ---------
2-port OC3 POS SPA                1 POS SPA IOFPGA P1            3.4       0.0
                                  1 POS SPA IOFPGA P2            3.4       0.200
-------------------------------- -- ------------------------ --------- ---------
4-port OC3 POS SPA                1 POS SPA IOFPGA P1            3.4       0.0
                                  1 POS SPA IOFPGA P2            3.4       0.200
-------------------------------- -- ------------------------ --------- ---------
1-port OC12 POS SPA               1 POS SPA IOFPGA P1            3.4       0.0
                                  1 POS SPA IOFPGA P2            3.4       0.200
-------------------------------- -- ------------------------ --------- ---------
2-port OC12 POS SPA               1 POS SPA IOFPGA P1            3.4       0.0
                                  1 POS SPA IOFPGA P2            3.4       0.200
-------------------------------- -- ------------------------ --------- ---------
2-port T3/E3 Serial SPA           1 T3E3 SPA ROMMON              2.12      0.0
                                  2 T3E3 SPA I/O FPGA            0.24      0.0
                                  3 T3E3 SPA E3 FPGA             0.6       0.0
                                  4 T3E3 SPA T3 FPGA             0.14      0.0
-------------------------------- -- ------------------------ --------- ---------
4-port T3/E3 Serial SPA           1 T3E3 SPA ROMMON              2.12      0.0
                                  2 T3E3 SPA I/O FPGA            0.24      0.0
                                  3 T3E3 SPA E3 FPGA             0.6       0.0
                                  4 T3E3 SPA T3 FPGA             0.14      0.0
================================ ================================================
```

Step 6 Save the configuration and reload the system with the new Cisco IOS release.

During the system startup after the reload, the necessary FPD image version check for all the SPAs will be performed and any upgrade operation will occur automatically if an upgrade is required. In each upgrade operation, the system extracts the necessary FPD images to the SPA from the FPD image package file located on the FTP or TFTP server.

Modifying the Default Path for the FPD Image Package File Location

By default, the Cisco IOS software looks for the FPD image package file on disk0: when performing an automatic FPD image upgrade.

Note Be sure there is enough space on disk0: to accommodate the FPD image package file.

Alternatively, you can store an FPD image package file in another file system. However, because the system looks on disk0: as the default, you need to change the FPD image package file location so that the system is directed to search the alternate location (such as in another file system on the router, or on an FTP or TFTP server) accessible by the Cisco IOS software, enter the **upgrade fpd path** *fpd-pkg-dir-url* global configuration command, where *fpd-pkg-dir-url* is the alternate location.

If the **upgrade fpd path** global configuration command has not been entered to direct the router to locate an FPD image package file in an alternate location, the system searches disk0: on the Cisco 7304 router for the FPD image package file.

Failure to locate an FPD image package file when an upgrade is required will disable the SPA. Because SPAs will not come online until FPD is compatible, the SPA will also be disabled if it requires an FPD upgrade and the automatic upgrade feature is disabled.

Displaying Current and Minimum Required FPD Image Versions

To display the current version of FPD images on the SPAs installed on your router, use the **show hw-module subslot** [*slot-number*/*subslot-number*] **fpd** command, where *slot-number* is the slot number where the MSC is installed, and *subslot-number* is the number of the MSC subslot where the target SPA is located.

Note This command can be used to identify information about FPDs on any SPA. If you enter the location of a line card that is not a SPA, the output displays information about any programmable devices on that line card.

The following examples show the output when using this **show** command.

The output display in this example shows that FPD versions on the SPAs in the system meet the minimum requirements:

```
Router# show hw-module subslot fpd

==== ====================== ====== ============================================
                            H/W   Field Programmable   Current   Min. Required
Slot Card Description       Ver.  Device:"ID-Name"     Version      Version
==== ====================== ====== ================== =========== ==============
 2/0 SPA-4FE-7304           0.32  1-Data & I/O FPGA      4.13        4.13
---- ---------------------- ------ ------------------ ----------- --------------
 2/1 SPA-2GE-7304           0.15  1-Data & I/O FPGA      4.13        4.13
==== ====================== ====== ============================================
```

This example shows the output when using the *slot-number*/*subslot-number* argument to identify a particular SPA:

```
Router# show hw-module subslot 2/1 fpd

==== ====================== ====== ============================================
                            H/W   Field Programmable   Current   Min. Required
Slot Card Description       Ver.  Device:"ID-Name"     Version      Version
==== ====================== ====== ================== =========== ==============
 2/1 SPA-2GE-7304           0.15  1-Data & I/O FPGA      4.13        4.13
==== ====================== ====== ============================================
```

The output display in this example shows that the SPA in slot 2/0 is disabled because one of the programmable devices on the SPA does not meet the minimum version requirements. The output also contains a "NOTES" section that provides the name of the FPD image package file needed to upgrade the disabled SPA's FPD image.

```
Router# show hw-module subslot fpd

==== ====================== ====== ============================================
                            H/W   Field Programmable   Current   Min. Required
Slot Card Description       Ver.  Device:"ID-Name"     Version      Version
==== ====================== ====== ================== =========== ==============
 2/0 SPA-4FE-... <DISABLED> 0.32  1-Data & I/O FPGA      4.12        4.13     *
---- ---------------------- ------ ------------------ ----------- --------------
 2/1 SPA-2GE-7304           0.15  1-Data & I/O FPGA      4.13        4.13
==== ====================== ====== ============================================
 NOTES:
```

```
- FPD images that are required to be upgraded are indicated with a '*'
  character in the "Minimal Required Version" field.
- The following FPD image package files is required for the upgrade:
  "spa_fpd.122-20.S2.pkg"
```

Displaying Information About the Default FPD Image Package

You can use the **show upgrade fpd package default** command to find out which SPAs are supported with your current Cisco IOS release and which FPD image package you need for an automatic upgrade.

Note In Cisco IOS Releases 12.2(20)S2 through 12.2(20)S5, the **show upgrade fpd package default** command is not available. In these releases, enter the **show upgrade package default** command to gather this output.

```
Router# show upgrade fpd package default

**************************************************************************
This IOS release supports the following default FPD Image Package(s) for
automatic upgrade:
**************************************************************************

SPA FPD Image Package:spa_fpd.122-20.S6.pkg

        List of SPAs supported in this package:

                                  Minimal
                 No. SPA Name     HW Ver.
                ---- ------------ -------
                  1) SPA-4FE-7304   0.0
                  2) SPA-2GE-7304   0.0
                ---- ------------ -------
```

Verifying the FPD Image Upgrade Progress

You can use the **show upgrade fpd progress** command to view a “snapshot” of the upgrade progress while an FPD image upgrade is taking place. The following example shows the type of information this command displays:

Note In Cisco IOS Releases 12.2(20)S2 through 12.2(20)S5, the **show upgrade fpd progress** command is not available. In these releases, enter the **show upgrade progress** command to gather this output.

```
Router# show upgrade fpd progress

FPD Image Upgrade Progress Table:

 ==== ================== ================================================
                         Field Programmable    Time
 Slot Card Description   Device :"ID-Name"    Needed   Time Left  State
 ==== ================== ================== ========== ========== ===========
  2/0 SPA-2GE-7304       1-4FE/2GE FPGA      00:06:00   00:05:17  Updating...
 ---- ------------------ ------------------ ---------- ---------- -----------
```

```
 2/1 SPA-4FE-7304        1-4FE/2GE FPGA      --:--:--   --:--:--  Waiting...
==== ================== ==================================================
```

FPD Image Upgrade Examples

This section provides examples of automatic and manual FPD image upgrades. It includes the following examples:

System Cannot Locate FPD Image Package File for an Automatic FPD Image Upgrade Example

The following example displays the output when a SPA requires an FPD upgrade and the **upgrade fpd auto** command is *enabled*, but the system cannot find the FPD image package file.

```
*Jan 13 22:36:56:%FPD_MGMT-3-INCOMP_FPD_VER:Incompatible 4FE/2GE FPGA (FPD ID=1) image
version detected for SPA-4FE-7304 card in subslot 2/0. Detected version = 4.12, minimal
required version = 4.13. Current HW version = 0.32.
*Jan 13 22:36:56:%FPD_MGMT-5-FPD_UPGRADE_ATTEMPT:Attempting to automatically upgrade the
FPD image(s) for SPA-4FE-7304 card in subslot 2/0 ...
*Jan 13 22:36:56:%FPD_MGMT-6-BUNDLE_DOWNLOAD:Downloading FPD image bundle for SPA-4FE-7304
card in subslot 2/0 ...
*Jan 13 22:36:56:%FPD_MGMT-3-OPEN_FAILED:Failed to open disk0:/spa_fpd.122-20.S2.pkg (File
not found). Please make sure that the required file is in a valid path.
*Jan 13 22:36:56:%FPD_MGMT-5-CARD_DISABLED:SPA-4FE-7304 card in subslot 2/0 is being
disabled because of incompatible FPD image version. Note that the spa_fpd.122-20.S2.pkg
package will be required if you want to perform the upgrade operation with the "upgrade
hw-module ..." command.
```

Automatic FPD Image Upgrade Example

The following example shows the output displayed when a SPA requires an FPD image upgrade and the **upgrade fpd auto** command is *enabled*. The required FPD image is automatically upgraded.

```
% Uncompressing the bundle ...  [OK]
*Jan 13 22:38:47:%FPD_MGMT-3-INCOMP_FPD_VER:Incompatible 4FE/2GE FPGA (FPD ID=1) image
version detected for SPA-4FE-7304 card in subslot 2/0. Detected version = 4.12, minimal
required version = 4.13. Current HW version = 0.32.
*Jan 13 22:38:47:%FPD_MGMT-5-FPD_UPGRADE_ATTEMPT:Attempting to automatically upgrade the
FPD image(s) for SPA-4FE-7304 card in subslot 2/0 ...

*Jan 13 22:38:47:%FPD_MGMT-6-BUNDLE_DOWNLOAD:Downloading FPD image bundle for SPA-4FE-7304
card in subslot 2/0 ...
*Jan 13 22:38:49:%FPD_MGMT-6-FPD_UPGRADE_TIME:Estimated total FPD image upgrade time for
SPA-4FE-7304 card in subslot 2/0 = 00:06:00.
```

```
*Jan 13 22:38:49:%FPD_MGMT-6-FPD_UPGRADE_START:4FE/2GE FPGA (FPD ID=1) image upgrade in
progress for SPA-4FE-7304 card in subslot 2/0. Updating to version 4.13. PLEASE DO NOT
INTERRUPT DURING THE UPGRADE PROCESS (estimated upgrade completion time = 00:06:00)
...[................................................................................
(part of the output has been removed for brevity)
..........................................................................................
..........................................................................................
........]
SUCCESS - Completed XSVF execution.

*Jan 13 22:44:33:%FPD_MGMT-6-FPD_UPGRADE_PASSED:4FE/2GE FPGA (FPD ID=1) image upgrade for
SPA-4FE-7304 card in subslot 2/0 has PASSED. Upgrading time = 00:05:44.108
*Jan 13 22:44:33:%FPD_MGMT-6-OVERALL_FPD_UPGRADE:All the attempts to upgrade the required
FPD images have been completed for SPA-4FE-7304 card in subslot 2/0. Number of
successful/failure upgrade(s):1/0.
*Jan 13 22:44:33:%FPD_MGMT-5-CARD_POWER_CYCLE:SPA-4FE-7304 card in subslot 2/0 is being
power cycled for the FPD image upgrade to take effect.
```

Downloading the FPD Image Package from a TFTP Server and Automatic FPD Image Upgrade from Flash Example

In the following example, a Cisco IOS image (c7300-js-mz.122-20.S2.bin) and the FPD image package file that supports that particular Cisco IOS image (spa-fpd.122-20.S2.pkg) are loaded onto disk0: from a TFTP server. The router is then configured to boot using the new Cisco IOS image and reloaded. When the router reboots using the new Cisco IOS image, the FPD version check that occurs at bootup detects the FPD incompatibility and then initiates the FPD image upgrade process. The FPD image is then upgraded automatically. After the system messages indicate that the FPD upgrade was successful, the **show hw-module subslot fpd** command is entered to verify the procedure. The FPD messages are italicized in this example for emphasis.

```
Router# copy tftp://hostname/path/c7300-js-mz.122-20.S2.bin disk0:
Destination filename [c7300-js-mz.122-20.S2.bin]?
Accessing tftp://hostname/path/c7300-js-mz.122-20.S2.bin...
Loading path/c7300-js-mz.122-20.S2.bin from 223.255.254.254 (via
FastEthernet0):!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
[OK - 22870596 bytes]

22870596 bytes copied in 133.476 secs (171346 bytes/sec)

Router# copy tftp://hostname/path/spa-fpd.122-20.S2.pkg disk0:
Destination filename [spa-fpd.122-20.S2.pkg]?
Accessing tftp://hostname/path/spa-fpd.122-20.S2.pkg...
Loading path/spa-fpd.122-20.S2.pkg from 223.255.254.254 (via
FastEthernet0):!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
[OK - 703488 bytes]

703488 bytes copied in 3.672 secs (191582 bytes/sec)

Router# dir disk0:
Directory of disk0:/

    1  -rw-    22802060   Jan 3 2004 15:13:30 -08:00  c7300-js-mz.122-20.S1.bin
    2  -rw-    22870596   Apr 2 2004 09:02:50 -08:00  c7300-js-mz.122-20.S2.bin
    3  -rw-      703488   Apr 2 2004 09:07:02 -08:00  spa-fpd.122-20.S2.pkg

63706112 bytes total (17329152 bytes free)
```

```
Router# config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)# boot system disk0:c7300-js-mz.122-20.S2.bin
Router(config)# end
Router#
Apr  2 17:09:22:%SYS-5-CONFIG_I:Configured from console by console

Router# reload

System configuration has been modified. Save? [yes/no]:y
Building configuration...
[OK]
Proceed with reload? [confirm]

 *Apr  2 17:52:04:%SYS-5-RELOAD:Reload requested by console. Reload Reason:Reload Command.
System Bootstrap, Version 12.1(12r)EX1, RELEASE SOFTWARE (fc1)
TAC Support:http://www.cisco.com/tac
Copyright (c) 2002 by cisco Systems, Inc.

C7300 platform with 524288 Kbytes of main memory

Currently running ROMMON from ROM 0

Self decompressing the image
:################################################################################################
################################################################################################
###### [OK]

(Note:Some output removed for brevity)

Press RETURN to get started!


00:00:18:%LINK-5-CHANGED:Interface FastEthernet0, changed state to reset
00:00:18:%LINK-3-UPDOWN:Interface GigabitEthernet0/0, changed state to down
00:00:18:%LINK-3-UPDOWN:Interface GigabitEthernet0/1, changed state to down
00:00:22:%LINK-3-UPDOWN:Interface FastEthernet0, changed state to up
*Apr  2 17:53:35:%SYS-5-CONFIG_I:Configured from memory by console
*Apr  2 17:53:35:%LINEPROTO-5-UPDOWN:Line protocol on Interface FastEthernet0, changed
state to down
*Apr  2 17:53:36:%SYS-5-RESTART:System restarted --
Cisco Internetwork Operating System Software
IOS (tm) 7300 Software (C7300-JS-M), Version 12.2(20)S2,  RELEASE SOFTWARE (fc2)
Technical Support:http://www.cisco.com/techsupport
Copyright (c) 1986-2004 by cisco Systems, Inc.
Compiled Mon 15-Mar-04 16:54 by ccai
*Apr  2 17:53:36:%FPD_MGMT-3-INCOMP_FPD_VER:Incompatible Data & I/O FPGA (FPD ID=1) image
version detected for SPA-4FE-7304 card in subslot 2/0. Detected version = 4.13, minimum
required version = 4.17. Current HW version = 0.32.
*Apr  2 17:53:36:%FPD_MGMT-5-FPD_UPGRADE_ATTEMPT:Attempting to automatically upgrade the
FPD image(s) for SPA-4FE-7304 card in subslot 2/0 ...
*Apr  2 17:53:36:%FPD_MGMT-6-BUNDLE_DOWNLOAD:Downloading FPD image bundle for SPA-4FE-7304
card in subslot 2/0 ...
*Apr  2 17:53:36:%LINK-5-CHANGED:Interface GigabitEthernet0/1, changed state to
administratively down
*Apr  2 17:53:38:%LINK-3-UPDOWN:Interface FastEthernet0, changed state to down
*Apr  2 17:53:38:%LINK-5-CHANGED:Interface GigabitEthernet0/0, changed state to
administratively down
*Apr  2 17:53:38:%LINK-5-CHANGED:Interface FastEthernet2/0/0, changed state to
administratively down
*Apr  2 17:53:38:%LINK-5-CHANGED:Interface FastEthernet2/0/1, changed state to
administratively down
*Apr  2 17:53:38:%LINK-5-CHANGED:Interface FastEthernet2/0/2, changed state to
administratively down
```

```
*Apr  2 17:53:38:%LINK-5-CHANGED:Interface FastEthernet2/0/3, changed state to
administratively down
*Apr  2 17:53:38:%LINEPROTO-5-UPDOWN:Line protocol on Interface GigabitEthernet0/1,
changed state to down
*Apr  2 17:53:38:%WS_ALARM-6-INFO:ASSERT INFO Gi0/0 Physical Port Administrative State
Down
*Apr  2 17:53:38:%WS_ALARM-6-INFO:ASSERT INFO Gi0/1 Physical Port Administrative State
Down
*Apr  2 17:53:39:%SYS-6-BOOTTIME:Time taken to reboot after reload =   95 seconds
*Apr  2 17:53:39:%LINEPROTO-5-UPDOWN:Line protocol on Interface GigabitEthernet0/0,
changed state to down
*Apr  2 17:53:39:%LINEPROTO-5-UPDOWN:Line protocol on Interface FastEthernet2/0/0, changed
state to down
*Apr  2 17:53:39:%LINEPROTO-5-UPDOWN:Line protocol on Interface FastEthernet2/0/1, changed
state to down
*Apr  2 17:53:39:%LINEPROTO-5-UPDOWN:Line protocol on Interface FastEthernet2/0/2, changed
state to down
*Apr  2 17:53:39:%LINEPROTO-5-UPDOWN:Line protocol on Interface FastEthernet2/0/3, changed
state to down
*Apr  2 17:53:39:%WS_ALARM-6-INFO:ASSERT CRITICAL GBIC Slot 0/1 GBIC is missing
*Apr  2 17:53:40:%LINK-3-UPDOWN:Interface FastEthernet0, changed state to up
*Apr  2 17:53:41:%LINEPROTO-5-UPDOWN:Line protocol on Interface FastEthernet0, changed
state to up
*Apr  2 17:53:50:%FPD_MGMT-6-FPD_UPGRADE_TIME:Estimated total FPD image upgrade time for
SPA-4FE-7304 card in subslot 2/0 = 00:07:00.
*Apr  2 17:53:50:%FPD_MGMT-6-FPD_UPGRADE_START:Data & I/O FPGA (FPD ID=1) image upgrade in
progress for SPA-4FE-7304 card in subslot 2/0. Updating to version 4.17. PLEASE DO NOT
INTERRUPT DURING THE UPGRADE PROCESS (estimated upgrade completion time = 00:07:00)
...[..................................................
(Note:Some output removed for brevity)
.........................]
SUCCESS - Completed XSVF execution.

*Apr  2 17:59:16:%FPD_MGMT-6-FPD_UPGRADE_PASSED:Data & I/O FPGA (FPD ID=1) image in the
SPA-4FE-7304 card in subslot 2/0 has been successfully updated from version 4.13 to
version 4.17. Upgrading time = 00:05:26.136
*Apr  2 17:59:16:%FPD_MGMT-6-OVERALL_FPD_UPGRADE:All the attempts to upgrade the required
FPD images have been completed for SPA-4FE-7304 card in subslot 2/0. Number of
successful/failure upgrade(s):1/0.
*Apr  2 17:59:16:%FPD_MGMT-5-CARD_POWER_CYCLE:SPA-4FE-7304 card in subslot 2/0 is being
power cycled for the FPD image upgrade to take effect.

Router> show hw-module subslot fpd

==== ====================== ====== ==========================================
                            H/W   Field Programmable   Current   Min. Required
Slot Card Description       Ver.  Device:"ID-Name"    Version      Version
==== ====================== ====== ================== =========== ==============
 2/0 SPA-4FE-7304           0.32  1-Data & I/O FPGA      4.17        4.17
==== ====================== ====== ==========================================
```

Incompatible FPD Image Version Detection and Disabled Automatic FPD Image Upgrade Example

The following example displays the output when a SPA requires an FPD upgrade, but the **upgrade fpd auto** command is *disabled*. The SPA is disabled after the OIR insertion or after the system boot and will remain disabled until the FPD incompatibility upgrade is addressed.

```
*Jan 13 22:30:30:%FPD_MGMT-3-INCOMP_FPD_VER:Incompatible 4FE/2GE FPGA (FPD ID=1) image
version detected for SPA-4FE-7304 card in subslot 2/0. Detected version = 4.12, minimal
required version = 4.13. Current HW version = 0.32.
*Jan 13 22:30:30:%FPD_MGMT-4-BYPASS_FPD_AUTO_UPGRADE:Automatic FPD image upgrade is not
enabled, bypassing the image upgrade for SPA-4FE-7304 card in subslot 2/0.
```

```
*Jan 13 22:30:30:%FPD_MGMT-5-CARD_DISABLED:SPA-4FE-7304 card in subslot 2/0 is being
disabled because of incompatible FPD image version. Note that the spa_fpd.122-20.S2.pkg
package will be required if you want to perform the upgrade operation with the "upgrade
hw-module ..." command.
```

Manual FPD Image Upgrade Example

The following example displays the output from the **upgrade hw-module subslot** command using the manual FPD image upgrade method. In this example, the the **hw-module subslot reload** command is then used to reload the router and complete the FPD image upgrade.

```
Router# upgrade hw-module subslot tftp://abrick/muck/luislu/c7304-fpd.122-25.S3.pkg
Loading muck/luislu/c7304-fpd.122-25.S3.pkg from 223.255.254.254 (via FastEthernet0):
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!

% The following FPD(s) will be updated for SPA-4FE-7304 (H/W ver = 0.32) in subslot 5/1:

    ================== =========== =========== ============
    Field Programmable   Current     Upgrade   Estimated
    Device: "ID-Name"    Version     Version   Upgrade Time
    ================== =========== =========== ============
    1-Data & I/O FPGA      4.12        4.18      00:03:00
    ================== =========== =========== ============


% NOTES:
  - Use 'show upgrade fpd progress' command to view the progress of the FPD
    upgrade.
  - You must reload the card after the upgrade. The FPD upgrade is not
    finalized until the card is reloaded.
  - The output of 'show hw-module <target> fpd' will not reflect the
    upgraded FPD version until the card is reloaded to finalize the upgrade.

% Are you sure that you want to perform this operation? [no]: y
% Target card is already disabled, proceeding with upgrade operation without enabling the
card ...

Router#
*Mar 22 14:23:58: %FPD_MGMT-6-UPGRADE_TIME: Estimated total FPD image upgrade time for
SPA-4FE-7304 card in subslot 5/1 = 00:03:00.
*Mar 22 14:23:59: %FPD_MGMT-6-UPGRADE_START: Data & I/O FPGA (FPD ID=1) image upgrade in
progress for SPA-4FE-7304 card in subslot 5/1. Updating to version 4.18. PLEASE DO NOT
INTERRUPT DURING THE UPGRADE PROCESS (estimated upgrade completion time = 00:03:00) ...

*Mar 22 14:26:06: %FPD_MGMT-6-UPGRADE_PASSED: Data & I/O FPGA (FPD ID=1) image in the
SPA-4FE-7304 card in subslot 5/1 has been successfully updated from version 4.12 to
version 4.18. Upgrading time = 00:02:06.884
*Mar 22 14:26:06: %FPD_MGMT-6-OVERALL_UPGRADE: All the attempts to upgrade the required
FPD images have been completed for SPA-4FE-7304 card in subslot 5/1. Number of
successful/failure upgrade(s): 1/0.
Router#hw-module subslot 5/1 reload
Router#
*Mar 22 14:33:03: %WS_ALARM-6-INFO: ASSERT CRITICAL FastEthernet5/1/0 Physical Port Link
Down
*Mar 22 14:33:03: %WS_ALARM-6-INFO: ASSERT INFO FastEthernet5/1/1 Physical Port
Administrative State Down
*Mar 22 14:33:03: %WS_ALARM-6-INFO: ASSERT INFO FastEthernet5/1/2 Physical Port
Administrative State Down
*Mar 22 14:33:03: %WS_ALARM-6-INFO: ASSERT INFO FastEthernet5/1/3 Physical Port
Administrative State Down
```

Troubleshooting Problems with FPD Image Upgrades

This section contains information to help troubleshoot problems that can occur during the upgrade process.

Power Failure or Removal of a SPA During an FPD Image Upgrade

If the FPD upgrade operation is interrupted by a power failure or the removal of the SPA, it could corrupt the FPD image. This corruption of the FPD image file makes the SPA unusable by the router and the system will display the following messages when it tries to power up the SPA:

Note To find more information about FPD-related messages, check the system error messages guide for your Cisco IOS software release.

```
00:00:32:%SPA_OIR-3-HW_INIT_TIMEOUT:subslot 2/0:PWR_OK asserted, SPA_OK deasserted;
attempting recovery
00:00:47:%SPA_OIR-3-HW_INIT_TIMEOUT:subslot 2/0:PWR_OK asserted, SPA_OK deasserted;
attempting recovery
00:01:02:%SPA_OIR-3-HW_INIT_TIMEOUT:subslot 2/0:PWR_OK asserted, SPA_OK deasserted;
attempting recovery
00:01:22:%SPA_OIR-3-HW_INIT_TIMEOUT:subslot 2/0:PWR_OK asserted, SPA_OK deasserted;
attempting recovery
00:01:37:%SPA_OIR-3-HW_INIT_TIMEOUT:subslot 2/0:PWR_OK asserted, SPA_OK deasserted;
attempting recovery
00:01:52:%SPA_OIR-3-SPA_POWERED_OFF:subslot 2/0:SPA SPA-4FE-7304 powered off after 5
failures within 3600 seconds
00:01:52:%SPA_OIR-3-HW_INIT_TIMEOUT:subslot 2/0:PWR_OK deasserted, SPA_OK deasserted;
attempting recovery
```

The **show hw-module subslot fpd** command can be used to verify that the SPA is using a corrupted FPD image. The following example shows that the SPA in slot 2/0 is unable to identify the FPD image, indicating that the image is probably corrupt. At this point, the automatic upgrade procedure cannot correct the problem. Therefore, you will need to perform a recovery upgrade to the SPA.

```
Router# show hw-module subslot fpd

==== ====================== ====== ============================================
                            H/W   Field Programmable   Current   Min. Required
Slot Card Description       Ver.  Device:"ID-Name"     Version      Version
==== ====================== ====== ================== =========== ==============
 2/0 SPA-4FE-7304<DISABLED>  ?.?   ???????????           ?.?         ?.?
---- ---------------------- ------ ------------------ ----------- --------------
 2/1 SPA-2GE-7304            0.15  1-Data & I/O FPGA       4.13        4.13
==== ====================== ====== ============================================
```

Performing a FPD Recovery Upgrade

The recovery upgrade procedure can only be performed on a SPA that has been powered off by the system after it has failed all of the retries attempted to initialize the SPA.

The following example displays the output of an attempt to perform a recovery upgrade before all the initialization retries have been attempted for the SPA in slot 2/0.

```
Router#
07:23:54:%SPA_OIR-3-HW_INIT_TIMEOUT:subslot 2/0:PWR_OK asserted, SPA_OK deasserted;
attempting recovery
```

```
Router# upgrade hw-module subslot 2/0 file disk0:spa_fpd.122-20.S2.pkg

% Can not get FPD version information for version checking. If a previous upgrade attempt
has failed for the target card, then a recovery upgrade would be required to fix the
failure.

% Do you want to perform the recovery upgrade operation? [no]:y
% Uncompressing the bundle ...  [OK]

% The following FPD(s) will be upgraded for card in subslot 2/0 :

        ================== =========== =========== ============
        Field Programmable   Current     Upgrade   Estimated
        Device:"ID-Name"     Version     Version   Upgrade Time
        ================== =========== =========== ============
        1-Data & I/O FPGA     ?.?          4.13      00:06:30
        ================== =========== =========== ============


% Are you sure that you want to perform this operation? [no]:y
% Can not perform recovery upgrade operation because the target card is not in a failed
state. Please try again later.

Router#
07:24:09:%SPA_OIR-3-HW_INIT_TIMEOUT:subslot 2/0:PWR_OK asserted, SPA_OK deasserted;
attempting recovery
```

Once the following error message is displayed, you can perform the recovery upgrade:

Note You must wait to see this error message before you attempt the upgrade.

```
07:25:15:%SPA_OIR-3-SPA_POWERED_OFF:subslot 2/0:SPA SPA-4FE-7304 powered off after 5
failures within 3600 seconds
```

Perform the manual FPD image upgrade method using the **upgrade hw-module subslot** command to recover from a corrupted image after the SPA has been powered off by the system. In this command, *slot-number* is the slot where the MSC is installed, *subslot-number* is the subslot of the MSC where the SPA is located, and *file-url* is the location of the FPD image package file.

Note Before proceeding with this operation, make sure that the correct version of the FPD image package file has been obtained for the corresponding Cisco IOS release that the system is using.

The following example displays the console output of a recovery upgrade operation:

```
Router# upgrade hw-module subslot 2/0 file disk0:spa_fpd.122-20.S2.pkg

% Can not get FPD version information for version checking. If a previous upgrade attempt
has failed for the target card, then a recovery upgrade would be required to fix the
failure.

% Do you want to perform the recovery upgrade operation? [no]:y
% Uncompressing the bundle ...  [OK]


% The following FPD(s) will be upgraded for card in subslot 2/0 :
```

```
================== =========== =========== ============
Field Programmable   Current     Upgrade   Estimated
Device:"ID-Name"    Version     Version   Upgrade Time
================== =========== =========== ============
1-Data & I/O FPGA     ?.?         4.13      00:06:30
================== =========== =========== ============


% Are you sure that you want to perform this operation? [no]:y
% Proceeding with recovery upgrade operation ...

Router#
07:28:42:%FPD_MGMT-6-FPD_UPGRADE_TIME:Estimated total FPD image upgrade time for
SPA-4FE-7304 card in subslot 2/0 = 00:03:30.
07:28:42:%FPD_MGMT-6-FPD_UPGRADE_START:Unknown FPD (FPD ID=1) image upgrade in progress
for SPA-4FE-7304 card in subslot 2/0. Updating to version 4.13. PLEASE DO NOT INTERRUPT
DURING THE UPGRADE PROCESS (estimated upgrade completion time = 00:03:30)
...[.....................................
.....................................................................................
.......(part of the output has been removed for brevity)
................................................]
SUCCESS - Completed XSVF execution.

07:34:25:%FPD_MGMT-6-FPD_UPGRADE_PASSED:Unknown FPD (FPD ID=1) image upgrade for
SPA-4FE-7304 card in subslot 2/0 has PASSED. Upgrading time = 00:05:42.692
07:34:25:%FPD_MGMT-6-OVERALL_FPD_UPGRADE:All the attempts to upgrade the required FPD
images have been completed for SPA-4FE-7304 card in subslot 2/0. Number of
successful/failure upgrade(s):1/0.
07:34:25:%FPD_MGMT-5-CARD_POWER_CYCLE:SPA-4FE-7304 card in subslot 2/0 is being power
cycled for the FPD image upgrade to take effect.
Router#
```

Verifying a Successful Upgrade

After the upgrade process is complete, you can use the **show hw-module subslot fpd** command to verify that the FPD image on the SPA has been successfully upgraded:

```
Router# show hw-module subslot fpd

==== ====================== ====== ==============================================
                            H/W   Field Programmable   Current   Min. Required
Slot Card Description       Ver.  Device:"ID-Name"     Version      Version
==== ====================== ====== ================== =========== ==============
 2/0 SPA-4FE-7304           0.32  1-Data & I/O FPGA     4.13        4.13
---- ---------------------- ------ ------------------ ----------- --------------
 2/1 SPA-2GE-7304           0.15  1-Data & I/O FPGA     4.13        4.13
==== ====================== ====== ==============================================
```