



CHAPTER 31

Upgrading Field-Programmable Devices

In general terms, field-programmable devices (FPDs) are hardware devices implemented on switch cards that support separate upgrades. The term “FPD” has been introduced to collectively and generically describe any type of programmable hardware device on SIPs and SPAs. FPDs were introduced on the Catalyst 6500 Series switch to support SPAs and SIPs.

This chapter describes the information that you need to know to verify image versions and to perform SIP and SPA FPD upgrades.

This chapter includes the following sections:

- [Release History, page 31-1](#)
- [FPD Quick Upgrade, page 31-2](#)
- [Overview of FPD Images and Packages, page 31-3](#)
- [Upgrading FPD Images, page 31-3](#)
- [Optional FPD Procedures, page 31-6](#)
- [FPD Image Upgrade Examples, page 31-13](#)
- [Troubleshooting Problems with FPD Image Upgrades, page 31-16](#)

Release History

[Table 31-1](#) provides the release and modification history for all FPD-related features on the Catalyst 6500 Series switch.

Table 31-1 FPD Release History

Release	Modification
Cisco IOS Release 12.2(18)SXE	SIPs and SPAs were released on the Cisco 7600 series router and Catalyst 6500 series switch for the first time. FPD images were introduced to support these SPAs. The Fast Software Upgrade (FSU) procedure supported by Route Processor Redundancy (RPR) for supervisor engines was added to the documentation.

FPD Quick Upgrade

This section provides information if you simply want to upgrade FPDs for SIPs and SPAs as quickly as possible. These instructions are not always feasible for operating network environments and are not the only methods available for upgrading FPDs. If these methods of upgrade are not suitable for your situation, see the various other sections of this document for other methods of upgrading FPDs.

This section addresses the following topics:

- [FPD Quick Upgrade Before Upgrading Your Cisco IOS Release \(Recommended\), page 31-2](#)
- [FPD Quick Upgrade After Upgrading Your Cisco IOS Release, page 31-2](#)

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 any flash disk on your switch before booting the new version of Cisco IOS. The FPD image package can be retrieved from the same site where you went to get your Cisco IOS image. Do not change the name of the FPD image package.
- Step 2** Boot using the new version of Cisco IOS. When the new Cisco IOS boots, it by default searches for the FPD image package in the switch flash file systems 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** An FPD upgrade is not always necessary after Cisco IOS is reloaded. If you have already reloaded your Cisco IOS Software, enter the **show hw-module all fpd** command to see if all system FPDs are compatible. If the FPDs are compatible, no further action is necessary. If at least one FPD needs an upgrade, proceed to [Step 2](#).
- Step 2** Go to the cisco.com site where you downloaded your specific Cisco IOS software and locate the FPD image package, if you have not already.
- Step 3** Download this FPD image package to a flash disk on your switch. Do not change the name of the FPD image package.
- 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 default searches for the FPD image package in the flash file systems and the FPD images will be updated automatically as part of the IOS boot process.
-

Overview of FPD Images and Packages

An FPD image package is used to upgrade FPD images. Whenever a Cisco IOS image is released that supports carrier cards and SPAs, a companion FPD image package is also released for that Cisco IOS software release. The 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 SIPs and SPAs on your switch and are upgrading your Cisco IOS image, you should download the FPD image package file before booting the switch using the new Cisco IOS release. If the SIP or 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. An FPD incompatibility on a SPA disables all interfaces on that SPA until the incompatibility is addressed; an FPD incompatibility on a SIP disables all interfaces for all SPAs in the SIP until the incompatibility is addressed.

**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(18)SXE, then the system will search for the FPD image package file that supports the specific Cisco IOS release (c7600-fpd-pkg.122-18.SXE.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 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 31-3](#)
- [Upgrading FPD Images in a Production System, page 31-5](#)

Migrating to a Newer Cisco IOS Release

This section discusses the following topics:

- [Upgrading FPD Images Before Upgrading the Cisco IOS Release \(Recommended\), page 31-3](#)
- [Upgrading FPD Images in a Production System, page 31-5](#)
- [Upgrading FPD Images Using Fast Software Upgrade, page 31-6](#)

Upgrading FPD Images Before Upgrading the 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 using the following method:

- [Placing FPD Image Package on Flash Disk Before Upgrading Cisco IOS \(Recommended\), page 31-4](#)

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

Placing the FPD image package for the Cisco IOS release that you are upgrading to before upgrading Cisco IOS is the recommended method for upgrading FPD because it is 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 one of your switch's flash file systems. For instance, if you are running Cisco IOS Release 12.2(18)SXE and are upgrading to Cisco IOS Release 12.2(19)SXE, place the FPD image package for Cisco IOS Release 12.2(19)SXE onto a flash file system while still running Cisco IOS Release 12.2(18)SXE. You can locate the FPD image package for a specific IOS release on cisco.com from the same area where you download that Cisco IOS software image. Your switch and SPAs should continue to operate normally since this action will have no impact on the current FPDs.



Caution

Do not change the filename of the FPD image package file. The Cisco IOS software 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 switch using the new upgraded Cisco IOS image. As part of the bootup process, the switch 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 a flash file system, the FPD image package will be located during the bootup procedure and all FPDs that required upgrades will be upgraded.
- Step 3** When the switch has booted, verify the upgrade was successful by entering the **show hw-module all fpd** command.
-

Upgrading FPD Images After Upgrading the Cisco IOS Release

The following steps explain how to upgrade FPD images if you have already upgraded your Cisco IOS release but still need to upgrade 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 for your SIPs and SPAs are compatible, enter the **show hw-module all fpd** command to verify compatibility of all SIPs and SPAs. If all of your SIPs and SPAs are compatible, there is no reason to perform this upgrade.
- Step 2** If an FPD upgrade is necessary, place the FPD image package for the new version of Cisco IOS onto the switch's flash disk or on an accessible FTP or TFTP server. You can locate the FPD image package on cisco.com from the same area where you downloaded your Cisco IOS software image.
- Step 3** Enter the **upgrade hw-module [slot slot-number | subslot slot-number/subslot-number] file-url [force]** 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(18)SXE on the TFTP server abrick/muck/myfolder, you would enter **upgrade hw-module [slot slot-number | subslot slot-number/subslot-number] tftp://abrick/muck/myfolder/c7600-fpd-pkg.122-18.SXE.pkg** to complete this step.

If multiple SIPs or SPAs require upgrades, the different pieces of hardware will have to be updated individually.

Note the **force** option is used in this command. This option will force an FPD upgrade even if no FPD mismatch is detected. In instances where the **upgrade hw-module** command is entered, this option is almost never necessary and should only be entered if requested by a technical support representative.

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

Upgrading FPD Images in a Production System

Adding a SIP or SPA to a production system presents the possibility that the SIP or SPA may contain versions of FPD images that are incompatible with the Cisco IOS release currently running the switch. In addition, the FPD upgrade operation can be 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, type of SPA, and the type of service configured.

For these reasons, we 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 SIP or SPA FPD Image, page 31-5](#)
- [Verifying System Compatibility First, page 31-6](#)

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

Before beginning the upgrade, ensure the following:

- 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).

To perform an upgrade on a spare system, follow these steps:

-
- Step 1** Download the FPD image package file to the switch'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 a flash file system since the switch, by default, searches for the FPD image package in the flash file systems. If the flash file systems are full, use the **upgrade fpd path** command to direct the switch to search for the FPD image package in the proper location.
- Step 2** Insert the SIP or SPA into the spare system.
- If an upgrade is required, the system will perform the necessary FPD image updates so that when this SIP or SPA is inserted to the target production system it will not trigger an FPD upgrade operation there.
- Step 3** Verify the upgrade was successful by entering the **show hw-module all fpd** command.
- Step 4** Remove the SIP or SPA from the spare system after the upgrade.
- Step 5** Insert the SIP or 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 SIP or SPA (the automatic upgrade feature is enabled by default. It can be disabled using the **no upgrade fpd auto** command).

- If the FPD images on the SIP or SPA are compatible with the system, you will only need to reenable the automatic upgrade feature (the automatic upgrade feature can be reenabled using the **upgrade fpd auto** command).
- If the FPD images on the SIP or SPA are not compatible with the system, the SIP or SPA is disabled but will not impact system performance by attempting to perform an automatic upgrade.

To check the FPD images on the SIP or SPA for system compatibility, follow these steps:

-
- | | |
|---------------|---|
| Step 1 | Disable the automatic upgrade feature using the no upgrade fpd auto global configuration command. |
| Step 2 | Insert the SIP or SPA into the system.

If the FPD images are compatible, the SIP or SPA will operate successfully after bootup.

If the FPD images are not compatible, the SIP or 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 one of the procedures outlined in the “Upgrading FPD Images” section on page 31-3 . |
| Step 3 | Reenable the automatic upgrade feature using the upgrade fpd auto global configuration command. |
-

Upgrading FPD Images Using Fast Software Upgrade

The fast software upgrade (FSU) procedure supported by Route Processor Redundancy (RPR) allows you to upgrade the Cisco IOS image on supervisor engines without reloading the system.

When using FSU to upgrade the Cisco IOS image, remember that Cisco IOS software is configured, by default, to automatically load the new FPD images from a flash file system on the router. Therefore, if the FPD image package for the new Cisco IOS has not been downloaded to the router flash file system, the FPD image that needs to be upgraded will not get upgraded if the new supervisor engine with the upgraded Cisco IOS becomes the primary supervisor engine. To ensure FPD is upgraded at the time of the FSU, place the FPD image package for the new version of Cisco IOS onto the flash file system before upgrading the Cisco IOS and follow the instructions in the [“Upgrading FPD Images Before Upgrading the Cisco IOS Release \(Recommended\)” section on page 31-3](#).

If a SIP or SPA is disabled after FSU is used to upgrade Cisco IOS and the supervisor engine with the upgraded Cisco IOS has become the primary supervisor engine, follow the instructions in the [“Upgrading FPD Images After Upgrading the Cisco IOS Release” section on page 31-4](#) to verify and, if necessary, upgrade FPD.

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 SIP and SPA FPD Images, page 31-7](#)

- [Upgrading FPD from an FTP or TFTP Server, page 31-7](#)
- [Modifying the Default Path for the FPD Image Package File Location, page 31-9](#)
- [Upgrading Multiple FPD Images, page 31-10](#)
- [Displaying Current and Minimum Required FPD Image Versions, page 31-10](#)
- [Displaying Information About the Default FPD Image Package, page 31-12](#)
- [Verifying the FPD Image Upgrade Progress, page 31-12](#)

Manually Upgrading SIP and SPA FPD Images

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

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

In this example, *slot-number* is the slot where the SIP 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 **force** is an option that forces the SPA to perform an FPD upgrade even if FPD is compatible (the **force** option is almost never necessary and should only be entered if requested by a technical support representative). Note that **slot slot-number** is entered to specify a SIP FPD upgrade, while **subslot slot-number/subslot-number** is used to specify a SPA FPD upgrade. The SIP or SPA will automatically be reloaded to complete the FPD upgrade.



Caution

An image upgrade can require a long period of time to complete depending on the SIP or 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 a flash file system and use the FPD automatic upgrade. By default, the system searches the flash file system 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 switch's flash file systems.

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 switches 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 switch 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 switch 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 switch you have, do not use the TFTP or FTP upgrade method. Instead, copy the FPD image package to your switch's default flash card before upgrading your Cisco IOS release. This will allow the switch 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 switch 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/
```

**Note**

The final "/" at the end of each of the above examples is required. If the path is specified without the trailing "/" character, the command will not work properly.

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 switch 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 switch 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/myfpdpgk/c7600-fpd-pkg.122-18.SXE.pkg
Loading myname/myfpdpgk/c7600-fpd-pkg.122-18.SXE.pkg from 124.0.0.0 (via FastEthernet0):
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
[OK]
Cisco Field Programmable Device Image Package for IOS
C7600 Family FPD Image Package (c7600-fpd-pkg.122-18.SXE.pkg), Version 12.2(SXE)
Copyright (c) 2004-2005 by cisco Systems, Inc.
Built Fri 25-Mar-2005 09:12 by integ
```

Bundled FPD Image Version Matrix				
Supported Card Types	ID	Image Name	Version	Min. Req. H/W Ver.
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
-----
...<additional output removed for readability>

```

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 SIPs and 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 SIP or 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 a flash file system when performing an automatic FPD image upgrade.



Note

Be sure there is enough space on one of your flash file systems to accommodate the FPD image package file.

Alternatively, you can store an FPD image package file elsewhere. However, because the system looks on the flash file systems by default, you need to change the FPD image package file location so that the system is directed to search an alternate location (such an FTP or TFTP server) that is 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, to instruct the switch to search for the FPD image package elsewhere.

When specifying the *fpd-pkg-dir-url*, be aware of the following:

- The *fpd-pkg-dir-url* is the path to the FPD image package, but the FPD image package should not be specified as part of the *fpd-pkg-dir-url*. For instance, if the *c7600-fpd-pkg.122-18.SXE.pkg* file can be found on the TFTP server using the path *mytftpserver/myname/myfpdpgk/c7600-fpd-pkg.122-18.SXE.pkg* and you wanted the switch to utilize this FPD image package for FPD upgrades, the **upgrade fpd path** **tftp://mytftpserver/myname/myfpdpgk/** command should be entered so the switch knows where to find the file. The actual filename should not be specified.
- The final “/” character in the *fpd-pkg-dir-url* is required. In the preceding example, note that the *fpd-pkg-dir-url* is **tftp://mytftpserver/myname/myfpdpgk/**. Entering **tftp://mytftpserver/myname/myfpdpgk** (the final “/” character is missing) as the *fpd-pkg-dir-url* in that scenario would not work.

If the **upgrade fpd path** global configuration command has not been entered to direct the switch to locate an FPD image package file in an alternate location, the system searches the flash file systems on the Catalyst 6500 Series switch for the FPD image package file.

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

Upgrading Multiple FPD Images

A single piece of hardware can contain multiple FPD images. The Catalyst 6500 Series switch can upgrade up to four FPD images simultaneously. However, only one FPD upgrade per switch slot can occur at a time, so all FPD images on all SIPs and SPAs in a single slot will have to wait for another FPD upgrade to finish.

Users should note that some FPD images require the SIP or SPA to reload to complete. The FPD upgrade process will perform this step automatically, so users do not have to intervene. However, the other FPDs in the hardware of the specified slot will have to wait for this reload to complete before their upgrade process begins.

During an automatic upgrade, the Catalyst 6500 Series switch will upgrade as many FPDs as possible at a time. No user intervention is possible or necessary. The upgrade process will not stop until all FPD images have been updated.

During manual upgrades, it is important to note that users can only specify upgrades for a single piece of hardware each time the **upgrade hw-module** [*slot slot-number* | **subslot** *slot-number/subslot-number*] is entered. The up to four simultaneous upgrades applies to the manual upgrades as well; if you individually specify multiple manual FPD upgrades, only four FPDs can be upgraded simultaneously and that can only occur when the hardware is in different switch slots. The FPD upgrade process will stop when all FPDs for the specified hardware have been upgraded.

Displaying Current and Minimum Required FPD Image Versions

To display the current version of FPD images on the SIPs and SPAs installed on your switch, use the **show hw-module** [*slot-number/subslot-number* | **all**] **fpd** command, where *slot-number* is the slot number where the SIP is installed, and *subslot-number* is the number of the SIP subslot where a target SPA is located. Entering the **all** keyword shows information for hardware in all switch slots.

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

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

```
Router# show hw-module all fpd
```

```
==== =====
Slot Card Type          H/W   Field Programmable   Current   Min. Required
Ver.   Device:"ID-Name"   Version   Version
==== =====
      1 7600-SIP-200      0.550 1-I/O FPGA           1.1       1.1
                        2-EOS FPGA           1.211     1.211
                        3-PEGASUS TX FPGA     1.129     1.129
                        4-PEGASUS RX FPGA     1.3       1.3
                        5-ROMMON           1.2       1.2
-----
      1/1 SPA-2XOC3-ATM   0.225 1-I/O FPGA           1.24      1.24
-----
      4 7600-SIP-200      0.550 1-I/O FPGA           1.1       1.1
                        2-EOS FPGA           1.211     1.211
                        3-PEGASUS TX FPGA     1.129     1.129
                        4-PEGASUS RX FPGA     1.3       1.3
                        5-ROMMON           1.2       1.2
-----
      4/0 SPA-2XT3/E3     1.0   1-ROMMON             2.12      2.12
                        2-I/O FPGA           0.24      0.24
                        3-E3 FPGA             0.6       0.6
                        4-T3 FPGA             0.14      0.14
-----
```

```

4/1 SPA-4XOC3-POS          0.209 1-I/O FPGA          3.4          3.4
-----
4/2 SPA-8XCHT1/E1          0.117 1-ROMMON          2.12          2.12
                                2-I/O FPGA          1.2          1.2
=====

```

This example shows the output when verifying all the FPDs for the carrier card and all the SPAs in a specific slot:

Router# **show hw-module slot 4 fpd**

```

=====
Slot Card Type              H/W   Field Programmable   Current   Min. Required
                          Ver.   Device:"ID-Name"     Version   Version
=====
  4 7600-SIP-200            0.550 1-I/O FPGA           1.1       1.1
                                2-EOS FPGA           1.211     1.211
                                3-PEGASUS TX FPGA    1.129     1.129
                                4-PEGASUS RX FPGA    1.3       1.3
                                5-ROMMON             1.2       1.2
-----
 4/0 SPA-2XT3/E3            1.0   1-ROMMON             2.12      2.12
                                2-I/O FPGA           0.24      0.24
                                3-E3 FPGA            0.6       0.6
                                4-T3 FPGA            0.14      0.14
-----
 4/1 SPA-4XOC3-POS          0.209 1-I/O FPGA           3.4       3.4
-----
 4/2 SPA-8XCHT1/E1          0.117 1-ROMMON             2.12      2.12
                                2-I/O FPGA           1.2       1.2
=====

```

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

Router# **show hw-module subslot 4/2 fpd**

```

=====
Slot Card Type              H/W   Field Programmable   Current   Min. Required
                          Ver.   Device:"ID-Name"     Version   Version
=====
 4/2 SPA-8XCHT1/E1          0.117 1-ROMMON             2.12      2.12
                                2-I/O FPGA           1.2       1.2
=====

```

The output display in this example shows that the SIP in slot 4 is disabled because one of the programmable devices 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 SIP’s FPD image.

Router# **show hw-module all fpd**

```

=====
Slot Card Type              H/W   Field Programmable   Current   Min. Required
                          Ver.   Device:"ID-Name"     Version   Version
=====
  1 7600-SIP-200            0.550 1-I/O FPGA           1.1       1.1
                                2-EOS FPGA           1.211     1.211
                                3-PEGASUS TX FPGA    1.129     1.129
                                4-PEGASUS RX FPGA    1.3       1.3
                                5-ROMMON             1.2       1.2

```

```
-----
1/1 SPA-2XOC3-ATM          0.225 1-I/O FPGA          1.24          1.24
-----
  4 7600-SIP... <DISABLED> 0.550 1-I/O FPGA          1.1            1.1
                                2-EOS FPGA          1.211          1.211
                                3-PEGASUS TX FPGA      1.129          1.129
                                4-PEGASUS RX FPGA      1.3            1.3
                                5-ROMMON              1.1            1.2            *
=====
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 file is required for the upgrade:
  "c7600-fpd-pkg.122-18.SXE.pkg"
```

Displaying Information About the Default FPD Image Package

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

```
Router# show upgrade fpd package default

*****
This IOS release requires the following default FPD Image Package for
the automatic upgrade of FPD images:
*****

Version:12.2(SXE)

Package Filename:c7600-fpd-pkg.122-18.SXE.pkg

List of card type supported in this package:

      No. Card Type          Minimal
      -----
      1) 2 port adapter Enh  1.0
      2) 2xCT3 SPA           0.100
      3) 2xCT3 SPA           0.200
      4) 4xCT3 SPA           0.100
      5) 4xCT3 SPA           0.200

<additional output removed for readability>
```

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:

```
Router# show upgrade fpd progress

FPD Image Upgrade Progress Table:

=====
                                     Approx.
Field Programmable      Time      Elapsed
```

Slot	Card Type	Device : "ID-Name"	Needed	Time	State
1/1	SPA-2XOC3-ATM	1-I/O FPGA	00:06:30	00:01:25	Updating...
4/0	SPA-2XT3/E3	1-ROMMON	00:00:30	00:00:02	Completed
		2-I/O FPGA	00:01:00	00:00:01	Updating...
		3-E3 FPGA	00:00:30	--:--:--	Waiting...
		4-T3 FPGA	00:00:30	--:--:--	Waiting...
4/2	SPA-8XCHT1/E1	1-ROMMON	--:--:--	--:--:--	Waiting...
		2-I/O 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, page 31-13](#)
- [Automatic FPD Image Upgrade Example, page 31-13](#)
- [Manual FPD Image Upgrade Example, page 31-14](#)
- [Pending FPD Upgrade Example, page 31-15](#)

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

The following example displays the output when a SIP-200 requires an FPD upgrade and the **upgrade fpd auto** command is enabled, but the system cannot find the FPD image package file:

```
Mar 25 16:14:13:%FPD_MGMT-3-INCOMP_IMG_VER:Incompatible ROMMON (FPD ID=5) image version
detected for 7600-SIP-200 card in slot 1. Detected version = 1.1, minimum required version
= 1.2. Current HW version = 0.550.
Mar 25 16:14:13:%FPD_MGMT-5-UPGRADE_ATTEMPT:Attempting to automatically upgrade the FPD
image(s) for 7600-SIP-200 card in slot 1. Use 'show upgrade fpd progress' command to view
the upgrade progress ...
Mar 25 16:14:14:%FPD_MGMT-3-PKG_FILE_SEARCH_FAILED:FPD image package
(c7600-fpd-pkg.122-18.SXE.pkg) cannot be found in system's flash card or disk to do FPD
upgrade.
Mar 25 16:14:14:%OIR-6-REMCARD:Card removed from slot 1, interfaces disabled
Mar 25 16:14:14:%FPD_MGMT-5-CARD_DISABLED:7600-SIP-200 card in slot 1 is being disabled
because of an incompatible FPD image version. Note that the c7600-fpd-pkg.122-18.SXE.pkg
package will be required if you want to perform the upgrade operation.
Mar 25 16:14:14:%C6KPWR-SP-4-DISABLED:power to module in slot 1 set off (FPD Upgrade
Failed)
```

Automatic FPD Image Upgrade Example

The following example shows the output displayed when a SIP-200 requires an FPD image upgrade and the **upgrade fpd auto** command is enabled. In this example, the switch has been configured to locate the FPD image package from a TFTP server, but most of the output would be similar regardless of the location of the FPD image package. The required FPD image is automatically upgraded.

```
Mar 25 16:22:48:%FPD_MGMT-3-INCOMP_IMG_VER:Incompatible ROMMON (FPD ID=5) image version
detected for 7600-SIP-200 card in slot 1. Detected version = 1.1, minimum required version
= 1.2. Current HW version = 0.550.
```

Manual FPD Image Upgrade Example

```
Router#
Mar 25 17:01:01:%FPD_MGMT-6-UPGRADE_TIME:Estimated total FPD image upgrade time for
SPA-8XCHT1/E1 card in subslot 4/2 = 00:01:20.
```

```

Mar 25 17:01:01:%FPD_MGMT-6-UPGRADE_START:ROMMON (FPD ID=1) image upgrade in progress for
SPA-8XCHT1/E1 card in subslot 4/2. Updating to version 2.12. PLEASE DO NOT INTERRUPT
DURING THE UPGRADE PROCESS (estimated upgrade completion time = 00:00:20) ...
Router#
Mar 25 17:01:04:%FPD_MGMT-6-UPGRADE_PASSED:ROMMON (FPD ID=1) image in the SPA-8XCHT1/E1
card in subslot 4/2 has been successfully updated from version 2.11 to version 2.12.
Upgrading time = 00:00:03.092
Mar 25 17:01:04:%FPD_MGMT-6-UPGRADE_START:I/O FPGA (FPD ID=2) image upgrade in progress
for SPA-8XCHT1/E1 card in subslot 4/2. Updating to version 1.2. PLEASE DO NOT INTERRUPT
DURING THE UPGRADE PROCESS (estimated upgrade completion time = 00:01:00) ...
Router#
Mar 25 17:01:26:%FPD_MGMT-6-UPGRADE_PASSED:I/O FPGA (FPD ID=2) image in the SPA-8XCHT1/E1
card in subslot 4/2 has been successfully updated from version 1.1 to version 1.2.
Upgrading time = 00:00:22.580
Mar 25 17:01:26:%FPD_MGMT-6-OVERALL_UPGRADE:All the attempts to upgrade the required FPD
images have been completed for SPA-8XCHT1/E1 card in subslot 4/2. Number of
successful/failure upgrade(s):2/0.
Router#
Mar 25 17:01:26:%FPD_MGMT-5-CARD_POWER_CYCLE:SPA-8XCHT1/E1 card in subslot 4/2 is being
power cycled for the FPD image upgrade to take effect.

```

Pending FPD Upgrade Example

In the following example, some FPD images are waiting for upgrades because the FPD upgrade process is upgrading another FPD on the same card (up to four FPD upgrades can occur at once, but the upgrades have to occur on hardware in different line card slots). In this particular example, the FPD upgrade process is happening on a SIP-200.

```

Mar 25 17:04:59:%FPD_MGMT-6-UPGRADE_TIME:Estimated total FPD image
upgrade time for 7600-SIP-200 card in slot 1 = 00:10:00.
Mar 25 17:04:59:%FPD_MGMT-6-UPGRADE_START:ROMMON (FPD ID=5) image
upgrade in progress for 7600-SIP-200 card in slot 1. Updating to version
1.2. PLEASE DO NOT INTERRUPT DURING THE UPGRADE PROCESS (estimated
upgrade completion time = 00:02:00) ...
Mar 25 17:05:08:%FPD_MGMT-6-UPGRADE_PASSED:ROMMON (FPD ID=5) image in
the 7600-SIP-200 card in slot 1 has been successfully updated from
version 1.1 to version 1.2. Upgrading time = 00:00:08.884
Mar 25 17:05:08:%FPD_MGMT-6-PENDING_UPGRADE:4 more FPD image upgrade
operation will be required on 7600-SIP-200 in slot 1 after additional
power-cycle operation on the target card.
Mar 25 17:05:08:%FPD_MGMT-5-CARD_POWER_CYCLE:7600-SIP-200 card in slot
1 is being power cycled for the FPD image upgrade to take effect.
Mar 25 17:05:08:%OIR-6-REMCARD:Card removed from slot 1, interfaces
disabled
Mar 25 17:05:08:%C6KPWR-SP-4-DISABLED:power to module in slot 1 set
off (Reset)
Mar 25 17:05:59:%CWAN_RP-6-CARDRELOAD:Module reloaded on slot 1/0
Mar 25 17:06:02:%FPD_MGMT-6-UPGRADE_TIME:Estimated total FPD image
upgrade time for 7600-SIP-200 card in slot 1 = 00:10:00.
Mar 25 17:06:02:%FPD_MGMT-6-UPGRADE_START:I/O FPGA (FPD ID=1) image
upgrade in progress for 7600-SIP-200 card in slot 1. Updating to version
1.1. PLEASE DO NOT INTERRUPT DURING THE UPGRADE PROCESS (estimated
upgrade completion time = 00:02:00) ...
Mar 25 17:06:21:%FPD_MGMT-6-UPGRADE_PASSED:I/O FPGA (FPD ID=1) image
in the 7600-SIP-200 card in slot 1 has been successfully updated from
version 1.0 to version 1.1. Upgrading time = 00:00:18.592
Mar 25 17:06:21:%FPD_MGMT-6-UPGRADE_START:EOS FPGA (FPD ID=2) image
upgrade in progress for 7600-SIP-200 card in slot 1. Updating to version
1.211. PLEASE DO NOT INTERRUPT DURING THE UPGRADE PROCESS (estimated
upgrade completion time = 00:02:00) ...
Mar 25 17:07:18:%FPD_MGMT-6-UPGRADE_PASSED:EOS FPGA (FPD ID=2) image
in the 7600-SIP-200 card in slot 1 has been successfully updated from

```

```

version 1.210 to version 1.211. Upgrading time = 00:00:56.812
Mar 25 17:07:18:%FPD_MGMT-6-UPGRADE_START:PEGASUS TX FPGA (FPD ID=3)
image upgrade in progress for 7600-SIP-200 card in slot 1. Updating to
version 1.129. PLEASE DO NOT INTERRUPT DURING THE UPGRADE PROCESS
(estimated upgrade completion time = 00:02:00) ...
Mar 25 17:08:17:%FPD_MGMT-6-UPGRADE_PASSED:PEGASUS TX FPGA (FPD ID=3)
image in the 7600-SIP-200 card in slot 1 has been successfully updated
from version 1.120 to version 1.129. Upgrading time = 00:00:59.188
Mar 25 17:08:17:%FPD_MGMT-6-UPGRADE_START:PEGASUS RX FPGA (FPD ID=4)
image upgrade in progress for 7600-SIP-200 card in slot 1. Updating to
version 1.3. PLEASE DO NOT INTERRUPT DURING THE UPGRADE PROCESS
(estimated upgrade completion time = 00:02:00) ...
Mar 25 17:09:03:%FPD_MGMT-6-UPGRADE_PASSED:PEGASUS RX FPGA (FPD ID=4)
image in the 7600-SIP-200 card in slot 1 has been successfully updated
from version 1.2 to version 1.3. Upgrading time = 00:00:45.396
Mar 25 17:09:03:%FPD_MGMT-6-OVERALL_UPGRADE:All the attempts to
upgrade the required FPD images have been completed for 7600-SIP-200
card in slot 1. Number of successful/failure upgrade(s):5/0.
Mar 25 17:09:03:%FPD_MGMT-5-CARD_POWER_CYCLE:7600-SIP-200 card in slot
1 is being power cycled for the FPD image upgrade to take effect.

```

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 SIP or SPA During an FPD Image Upgrade

These instructions should only be used if a previous upgrade attempt has failed due to an external factor such as a power failure or a jacket card or SPA removal.

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



Note

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

```

Mar 29 11:30:36:%SPA_OIR-3-RECOVERY_RELOAD:subslot 4/1:Attempting
recovery by reloading SPA
Mar 29 11:30:51:%SPA_OIR-3-HW_INIT_TIMEOUT:subslot 4/1
Mar 29 11:30:56:%SPA_OIR-3-RECOVERY_RELOAD:subslot 4/1:Attempting
recovery by reloading SPA
Mar 29 11:31:11:%SPA_OIR-3-HW_INIT_TIMEOUT:subslot 4/1
Mar 29 11:31:16:%SPA_OIR-3-RECOVERY_RELOAD:subslot 4/1:Attempting
recovery by reloading SPA
Mar 29 11:31:31:%SPA_OIR-3-HW_INIT_TIMEOUT:subslot 4/1
Mar 29 11:31:31:%SPA_OIR-3-SPA_POWERED_OFF:subslot 4/1:SPA 4xOC3 POS
SPA powered off after 5 failures within 600 seconds

```

The **show hw-module all fpd** command can be used to verify that the SIP or SPA is using a corrupted FPD image. In this example, the SPA in slot 4/1 is corrupted.

```
Router# show hw-module all fpd
```

```
==== =====
```


Slot	Card Type	H/W Ver.	Field Programmable Device:"ID-Name"	Current Version	Min. Required Version
4	7600-SIP-200	0.550	1-I/O FPGA	1.1	1.1
			2-EOS FPGA	1.211	1.211
			3-PEGASUS TX FPGA	1.129	1.129
			4-PEGASUS RX FPGA	1.3	1.3
			5-ROMMON	1.2	1.2
4/1	SPA-4XOC3<DISABLED>	?.?	????????????	?.?	?.?

Performing a FPD Recovery Upgrade

The recovery upgrade procedure can only be performed on a SIP or SPA that has been powered off by the system after it has failed all of the retries attempted to initialize the SIP or 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 subslot 4/1.



Note

Other factors can cause the system to ask “Do you want to perform the recovery upgrade operation?” Only answer **y** to this question if you have attempted an FPD upgrade that has failed due to a power failure or a SIP or SPA removal.

If you are prompted for this question without previously failing an upgrade attempt for one of these reasons, contact Cisco Technical Support.

```
Mar 29 11:29:55:%SPA_OIR-3-RECOVERY_RELOAD:subslot 4/1:Attempting
recovery by reloading SPA
Mar 29 11:30:10:%SPA_OIR-3-HW_INIT_TIMEOUT:subslot 4/1
Mar 29 11:30:15:%SPA_OIR-3-RECOVERY_RELOAD:subslot 4/1:Attempting
recovery by reloading SPA
Mar 29 11:30:31:%SPA_OIR-3-HW_INIT_TIMEOUT:subslot 4/1
Router# upgrade hw-module subslot 4/1 file disk0:c7600-fpd-pkg.122-18.SXE.pkg
```

```
% Cannot 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.
```

```
% The following FPD(s) will be upgraded for SPA-4XOC3-POS (H/W ver =
0.209) in subslot 4/1:
```

```
=====
Field Programmable   Current   Upgrade   Estimated
Device:"ID-Name"    Version   Version   Upgrade Time
=====
1-I/O FPGA          ?.?      3.4       00:02:00
=====
```

```
% Do you want to perform the recovery upgrade operation? [no]:y
% Cannot perform recovery upgrade operation because the target card is
not in a failed state. Please try again later.
```

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.

```
Mar 29 11:31:31:%SPA_OIR-3-SPA_POWERED_OFF:subslot 4/1:SPA 4xOC3 POS SPA powered off after
5 failures within 600 seconds
```

Perform the manual FPD image upgrade method using the **upgrade hw-module subslot** command to recover from a corrupted image after the SIP or SPA has been powered off by the system. In this command, *slot-number* is the slot where the SIP is installed, *subslot-number* is the subslot of the SIP 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 4/1 file disk0:c7600-fpd-pkg.122-18.SXE.pkg
```

```
% Cannot 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.
```

```
% The following FPD(s) will be upgraded for SPA-4XOC3-POS (H/W ver =
0.209) in subslot 4/1:
```

Field Programmable Device:"ID-Name"	Current Version	Upgrade Version	Estimated Upgrade Time
1-I/O FPGA	?.?	3.4	00:02:00

```
% Do you want to perform the recovery upgrade operation? [no]:y
% Proceeding with recovery upgrade operation ...
```

```
Router#
Mar 29 11:37:51:%FPD_MGMT-6-UPGRADE_TIME:Estimated total FPD image
upgrade time for SPA-4XOC3-POS card in subslot 4/1 = 00:02:00.
Mar 29 11:37:51:%FPD_MGMT-6-UPGRADE_START:Unknown FPD (FPD ID=1) image
upgrade in progress for SPA-4XOC3-POS card in subslot 4/1. Updating to
version 3.4. PLEASE DO NOT INTERRUPT DURING THE UPGRADE PROCESS
(estimated upgrade completion time = 00:02:00) ...
Router#
Mar 29 11:39:11:%FPD_MGMT-6-UPGRADE_PASSED:Unknown FPD (FPD ID=1)
image in the SPA-4XOC3-POS card in subslot 4/1 has been successfully
updated from version ?.? to version 3.4. Upgrading time = 00:01:19.528
Mar 29 11:39:11:%FPD_MGMT-6-OVERALL_UPGRADE:All the attempts to
upgrade the required FPD images have been completed for SPA-4XOC3-POS
card in subslot 4/1. Number of successful/failure upgrade(s):1/0.
Mar 29 11:39:11:%FPD_MGMT-5-CARD_POWER_CYCLE:SPA-4XOC3-POS card in
subslot 4/1 is being power cycled for the FPD image upgrade to take
effect.
```

Verifying a Successful Upgrade

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

```
Router# show hw-module all fpd
```

```
====
Slot Card Type          H/W   Field Programmable   Current   Min. Required
Ver.   Device:"ID-Name"   Version   Version
====
    4 7600-SIP-200      0.550 1-I/O FPGA           1.1       1.1
                               2-EOS FPGA           1.211     1.211
                               3-PEGASUS TX FPGA    1.129     1.129
                               4-PEGASUS RX FPGA    1.3       1.3
                               5-ROMMON             1.2       1.2
-----
4/1 SPA-4XOC3-POS      0.209 1-I/O FPGA           3.4       3.4
====
```

