



Using an SD Card with the Cisco IE 2000 Switch

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This document explains how to use a Secure Digital (SD) flash memory module (SD card) with the Cisco IE 2000 Switch.

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Overview

The Cisco IE 2000 Switch includes an SD card slot that supports an optional Cisco SD flash memory module (SD card).

The SD card can be used instead of the internal flash memory of the switch to update or restore configuration settings. In addition, the SD card can be used to boot the switch. You can also copy IOS software and switch configuration settings from a PC or from the switch to the SD card, and then use the SD card to copy this software and settings to other Cisco IE 2000 Switches.

When an SD card is formatted on the switch, the card is formatted with the Disk Operating System File System (DOSFS), a platform-independent industry-standard file system that is supported on various Cisco switches and routers.

The switch does not support third-party SD cards or SD High Capacity (SDHC) cards. Attempting to operate the switch with a non-supported card causes the following message to be displayed:

```
WARNING: Non-IT SD flash detected.  
Use of this card during normal operation can impact and  
severely degrade performance of the system.  
Please use supported SD flash cards only.
```

Note: If the write-protect switch on the SD card is in the lock position, the switch can read data on the card and boot from the card, but updates and files cannot be written to the card.

Inserting and Removing an SD Card

To put an SD card in the switch, make sure that the card is oriented properly, and press it into the SD card slot on the switch until the card is seated. To remove the card, press it to release it, then pull it out of the slot.

The SD card is hot-swappable, but it should not be removed from the switch during the boot process or while sdflash write is in progress.

When an SD card is inserted, a syslog message similar to the following is logged:

```
Mar 30 01:38:51.965: %FLASH-6-DEVICE_INSERTED: Flash device inserted
```

When an SD card is removed, a syslog message similar to the following is logged:

```
Mar 30 01:39:12.467: %FLASH-1-DEVICE_REMOVED: Flash device removed
```

SD Card Operation

The SD card can be accessed by either the switch boot-loader or by Cisco IOS. The following sections describe the operations that can be performed by the controlling software:

- [Boot Loader Operation, page 2](#)
- [IOS Operation, page 3](#)

Note: An SD Flash Manufacturer UNSUPPORTED message is seen during Cisco IOS boot up on switches that are installed with an SD card having a manufacturer ID of 89h and running Cisco IOS versions prior to 15.2(5)E2c. If the IOS on the switch is upgraded to 15.2(5)E2c or later, this error message does not appear. You can ignore this message; it does not affect the usage of the SD card or any other feature/functionality on the switch. (CSCvi24211).

Boot Loader Operation

The following boot loader commands can be executed on the SD card:

- boot—Load and boot an executable IOS image
- cat—Concatenate (type) file or files
- copy—Copy a file
- delete—Delete file or files
- dir—List files in directories
- fsck—Check file system consistency
- format—Format a file system
- mkdir—Create directories
- more—Concatenate (display) file
- rename—Rename a file
- rmdir—Delete empty directories
- sd_init—Initialize sd flash file systems

Important: The switch can be booted from its internal flash memory or from an SD card. The SD card takes precedence over internal flash memory. If an SD card is installed in the switch, the switch attempts to boot in the following order:

1. From the IOS image that is specified in the SD card system boot path
2. From the first IOS image in the SD card
3. From the IOS image that is specified in the internal flash memory system boot path
4. From the first IOS image in the internal flash

IOS Operation

You can insert or remove an SD card while the IOS is running. If you insert a supported Cisco SD card while the IOS is running, the switch validates the Cisco embedded string in the Product Name (PNM) field and displays the product number and the flash capacity of the SD card. If you remove an SD card while the IOS is running, the switch displays a warning message to alert you that the SD card has been removed.

If syslog is enabled, the system also sends a message when the SD card is inserted or removed.

When an SD card is installed in a switch, the following IOS commands operate as described:

- **write** command—Saves the running configuration. If the system boots from an SD card and you run a **write** command, the system saves the running configuration to the SD card, if the card is still installed. If the SD card has been removed, the system saves the running configuration to the internal flash memory and displays this message:

```
WARNING: The SD flash is not present.  
The running-config is saved to the on-board flash.
```

```
NOTE: This warning message is displayed only once.
```

If the system boots from the internal flash memory and you then insert an SD card and run the **write** command, the system saves the running configuration to the internal flash memory.

- **boot** command—Lets you change the system boot parameters.

If the system boots from an SD card and you run a **boot** command, the following behavior applies:

- If the SD card is installed and the system boot path or configuration file path points to the SD card, the system boot path or configuration file path is saved to the SD card
- If the SD card is installed and the system boot path or configuration file path points to the internal flash memory, the system boot path or configuration file path is saved to the internal flash memory
- If the SD card has been removed and the system boot path or configuration file path points to the SD card, the system boot path or configuration file path is not saved and the following message displays:

```
WARNING: The BOOT/config file path points to the  
SD flash card and the SD flash card is not present.  
The environment variable(s) is not saved.
```

```
NOTE: This warning message is displayed only once.
```

If the system boots from the internal flash memory and you then insert an SD card and run the **boot** command, the following behavior applies:

- If the system boot path or configuration file path points to the internal flash memory, the system boot path or configuration file path is saved to the internal flash memory
- If the system boot path or configuration file path points to the SD card, the system boot path or configuration file path is saved to the SD card and the following message is displayed:

```
WARNING: The BOOT/config file path points to the  
SD flash card. The environment variable(s) is  
saved onto the SD flash card.
```

```
NOTE: This warning message is displayed only once.
```

- If the SD card has been removed and the system boot path or configuration file path points to the SD card, the system boot path or configuration file path is not saved and the following message is displayed:

WARNING: The BOOT/config file path points to the SD flash card and the SD flash card is not present. The environment variable(s) is not saved.

NOTE: This warning message is displayed only once.

- **sync** command—Copies the IOS image directory (which includes the IOS image file, FPGA image files, Device Manager files, and Profinet/CIP configuration files), the config.text IOS configuration file, the vlan.dat VLAN configuration file, and IOS boot parameters from the internal flash memory to the SD card or from the SD card to the internal flash memory. This command verifies that the IOS image is appropriate for the switch model and that enough destination flash memory is present, and aborts the sync process if a potential problem is detected. The **sync** command obtains the source IOS image directory path and source IOS configuration files path from the IOS boot parameters on the source flash device that is specified in the **sync** command. By default, this command overwrites the destination IOS image directory and IOS configuration files. The “save-old-files” option can be used to override this default behavior. If the running configuration has not been saved and you run the **sync** command, the switch provides the option for you to save the running configuration before the command executes.

The **sync** command options are:

- Switch# **sync flash: sdflash:**—Sync IOS image directory, configuration files, and boot parameters from internal flash memory to SD card.
- Switch# **sync sdflash: flash:**—Sync IOS image directory, configuration files, and boot parameters from SD card to internal flash memory.
- Switch# **sync flash: sdflash: ios-image-name *IOS_image_path***—Sync the designated IOS image directory, configuration files, and boot parameters from internal flash memory to SD card. For example, *IOS_image_path* might be **flash:/ie2000-universalk9-mz.150-2.EA1/ie2000-universalk9-mz.150-2.EA1.bin**.
- Switch# **sync sdflash: flash: ios-image-name *IOS_image_path***—Sync the designated IOS image directory, configuration files, and boot parameters from SD card to internal flash memory. For example, *IOS_image_path* might be **flash:/ie2000-universalk9-mz.150-2.EA1/ie2000-universalk9-mz.150-2.EA1.bin**.
- Switch# **sync flash: sdflash: skip config.text vlan.dat**—Sync only IOS image directory from internal flash memory to SD card.
- Switch# **sync sdflash: flash: skip config.text vlan.dat**—Sync only IOS image directory from SD card to internal flash memory.
- Switch# **sync flash: sdflash: skip ios-image**—Sync only IOS configuration files from internal flash memory to SD card.
- Switch# **sync sdflash: flash: skip ios-image**—Sync only IOS configuration files from SD card to internal flash memory.
- Switch(config)# **auto sync enable**—Auto sync SD card (described below).

Auto Sync

The auto sync feature automatically copies the IOS image directory (which includes the IOS image file, FPGA image files, Device Manager files, and Profinet/CIP configuration files), the config.text IOS configuration file, the vlan.dat VLAN configuration file, and IOS boot parameters from the internal flash memory to the SD card or from the SD card to the internal flash memory at a given specific time every day or when the device boots up. When auto sync is in progress, the Express Setup LED on the switch blinks red.

Common Industrial Protocol (CIP) provides support for the auto sync feature.

Use the **auto sync** command and options to enable and configure auto sync. Use the **no** form of the commands to disable auto sync or the options. **auto sync** must be enabled for the **auto sync** command options to have effect.

- Switch(config)# [no] **auto sync enable**—Enable or disable the **auto sync** feature. The default is disabled.
- Switch(config)# [no] **auto sync run no-flash-cfg-at-boot**—Auto sync from SD flash to flash every time the device is booted up when the config.text file is not present in flash: drive. The default is disabled (**no auto sync run no-flash-cfg-at-boot**). If config.text file is present in the flash: drive, auto sync at boot does not occur.
- Switch(config)# **auto sync [sdflash|flash]: [flash|sdflash]: [ios-image-name|save-old-files|skip filename]**—Specifies the configuration to use for the auto sync:
 - If *ios-image-name* is not specified, the image to copy is based on the boot system configuration.
 - Primary storage is where the boot image resides. Sync is from the primary to secondary storage.
 - If the destination is flash:, the contents are overwritten. If the destination is SD flash: no files are overwritten.
 - The **skip** option skips sync of the specified file(s).
- Switch(config)# [no] **auto sync run time [hh:mm:ss]**—Run auto sync at the specified time every day. If no time is specified, auto sync runs every day at midnight.

When auto sync is triggered at the set time, it runs with the auto sync configuration options that you configured. If optional parameters are not configured, auto sync runs with the default configuration (see table below). If SD Flash is not present, auto sync is not triggered.

- Switch# **show auto sync configuration**—Display configuration settings. Example:

```
Switch# show auto sync configuration
Auto Sync is enabled.
Auto sync sdflash: to flash: at boot is disabled
Time of sync to start is 02:03:05
Config set for sync is : sync flash: sdflash:
```

- Switch# **show auto sync status**—Display last auto sync time and status. Example:

```
Switch# show auto sync status
Time of last sync: 02:03:05hrs
Sync status : IOS not in sync, Configuration not in sync
Previous sync status : IOS not in sync, Configuration not in sync
```

Table 1 Auto Sync Default Settings

| Command | Default |
|--|--|
| auto sync enable | Disabled |
| auto sync [sdflash flash]: [flash sdflash]: [ios-image-name save-old-files skip filename] | <ul style="list-style-type: none"> ■ Sync from primary (where boot image resides) to secondary storage. ■ <i>ios-image-name</i>—System boot image. |
| auto sync run no-flash-cfg-at-boot | Disabled |
| auto sync run time [hh:mm:ss] | <ul style="list-style-type: none"> ■ auto sync run time—disabled. ■ [hh:mm:ss]—00:00:00. |

SD Card Alarms

The switch supports the following SD card alarms:

- SD Card Alarm—Enabled when the SD card is removed and cleared when the SD card is inserted
- SD Card Unsupported Alarm—Enabled when an unsupported SD card is detected
- SD Card Corrupt Alarm—Enabled when an SD card DOSFS corruption is detected
- SD Card Files Corrupt Alarm—Enabled when the IOS image specified in the SD Card system boot path is corrupted

It takes approximately 2 minutes to trigger the alarm relay (LED output) after an SD card is inserted or removed.

You also can configure alarms and traps that are associated with the SD card alarm to be sent to syslog and the SNMP server.

Enabling SD Card Alarms

SD card alarms are disabled by default.

To use alarms, enter the **alarm facility sd-card enable** global configuration command to enable alarms, then enter the **alarm facility sd-card** global configuration commands to associate the alarm to the relay:

```
Switch(config)# alarm facility sd-card enable
```

```
Switch(config)# alarm facility sd-card notifies
```

```
Switch(config)# alarm facility sd-card sysm
```

```
Switch(config)# alarm facility sd-card syslog
```

```
Switch(config)# alarm facility sd-card relay major
```

Clearing an SD Card Alarm

To clear the last SD card alarm warning state, enter the following command:

```
Switch# clear facility-alarm
```

Feature History

| Platform | Feature | First Supported Release |
|----------|--------------------------------------|------------------------------|
| IE 2000 | Auto Sync SD card | Cisco IOS Release 15.2(6)E1 |
| | SD card for the Cisco IE 2000 Switch | Cisco IOS Release 15.0(2)EA1 |

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