



Cisco Support Community VIP Webcast

IOS Upgrade Catalyst Switches 2900, 3500 and 3700: Easy as π



Leo Laohoo

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November 2016



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Question Manager

Tony De Santiago

Cisco TAC, CCNP



Ask the Expert Event following the Webcast

Now through November
23rd

<https://supportforums.cisco.com/discussion/13157661/ask-expert-ios-upgrade-catalyst-switches-2900-3500-and-3700-easy-pi>



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Portuguese Webcast

Virtual Networks with SDN and NFV

Nov. 23rd at 8 AM EST

With Marcelo da Silva Conterat

<https://supportforums.cisco.com/pt/event/13149141>



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Spanish Webcast

Meraki MX Security Appliance

Nov. 29rd at 11 AM EST

With Hugo Velasco from Ingram



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<https://supportforums.cisco.com/document/13163661/webcast-vip-slides-ios-upgrade-catalyst-switches-2900-3500-and-3700-easy-pi>





Submit Your Questions Now!

Use the Q & A panel to submit your questions and the panel of experts will respond.

Please take a moment to complete the survey at the end of the webcast



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Agenda

- What is in the hype? Why is software upgrade (so) important?
- One command to rule `em all!
- Best Practice
- Compare the Hash (MD5 hash)
- QnA

Topics & Scenarios Covered

- Stack & non-stack upgrade
- Catalyst 2960/G/E/S/X/XR/Compact
- Catalyst 3560/G/E/X/Compact
- Catalyst 3750/G/E/X

Not Included

(due to time constraints)

- Routers (too simple)
- Catalyst 3650/3850 (previously covered)
- Catalyst 4500E (previously covered)
- Catalyst 6500/6800X/6840X (previously covered)
- Nexus-series family of switches
- Rolling Stock Upgrade (RSU)
- USB-related file transfers (future Webex)

IOS Upgrade: Benefits

- Improve the overall performance of the appliances;
- Introduces new features;
- Bug fixes; and
- Addresses Security Vulnerabilities

Polling Question 1

How often do you upgrade the IOS?

- A. Once a year.
- B. Twice (or more) a year.
- C. Depends on TAC recommendation.
- D. Never saw the need.

How many methods are
there to upgrade the IOS of
a Cisco switch?

Up to **FIVE**.

Of the five, this WebEx will focus on the first three.

1. Copy the IOS from the file location to the appliance (including SNMP);
2. Extract the files using the command “archive tar /xtract”;
3. Extract the files using the command “archive download-sw”;
4. Install Mode (Catalyst 3650/3850); and
5. Bundle Mode (Catalyst 3650/3850)

Copy the IOS to the appliance

PRO

- Neither fast nor slow; and
- Simple and easy to remember

CON

- Standalone switch only;
- No file integrity check;
- No Feature Set check;
- No software compatibility check;
and
- Boot variable string not changed.

```
Switch#copy tftp://1.1.1.1/c2960x-universalk9-mz.152-2.E3.bin flash:
Destination filename [c2960x-universalk9-mz.152-2.E3.bin]?
Accessing tftp://1.1.1.1/c2960x-universalk9-mz.152-2.E3.bin...
Loading c2960x-universalk9-mz.152-2.E3.bin from 1.1.1.1 (via Vlan3940): !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
21270528 bytes copied in 609.475 secs (33130 bytes/sec)
Switch#
```

Image above shows the IOS BIN file of a 2960X switch copied into a 3560-Compact switch.

Extract using “archive tar /xtract” command

PRO

- Extracts the TAR file into specified subdirectory.

CON

- Standalone switch only;
- No file integrity check;
- No Feature Set check;
- No software compatibility check;
- Boot variable string not changed;
- Type-o means the IOS can be extracted in the wrong sub-directory

Extract using “archive download-sw” command

- Checks Feature Set (in)compatibility
- Checks software (in)compatibility
- Changes boot variable string (default)
- Command options

```

512K bytes of flash-simulated non-volatile configuration memory.
Base ethernet MAC Address       : 00:08:2F:89:B1:40
Motherboard assembly number     : 73-13272-08
Power supply part number        : 341-0407-01
Motherboard serial number       : FOC20123S58
Power supply serial number      : LIT190434R9
Model revision number           : G0
Motherboard revision number     : A0
Model number                    : WS-C3560CG-8PC-S
System serial number            : FOC2015F2TY
Top Assembly Part Number        : 800-33676-03
Top Assembly Revision Number    : E0
Version ID                      : V03
CLEI Code Number                : CMMD900ARC
Hardware Board Revision Number  : 0x00
3622384K bytes of USB Flash usbflash0 (Read/Write)

Switch Ports Model          SW Version  SW Image
-----
*    1 10      WS-C3560CG-8PC-S    15.0(2)SE10  C3560c405ex-UNIVERSALK9-M

Configuration register is 0xF

Switch#archive down
Switch#archive download-sw tftp://1.1.1.1/c2960s-universalk9-tar.152-2.E5a.tar
  Could not buffer tarfile...using multiple downloads
  examining image...
%Error opening tftp://1.1.1.1/c2960s-universalk9-tar.152-2.E5a.tar (Timed out)
%Error opening flash:update/info (No such file or directory)
ERROR: Image is not a valid IOS image archive.

```

```
Switch#sh license
Index 1 Feature: ipservices
Period left: 8 weeks 4 days
License Type: Evaluation
License State: Active, In Use
License Priority: Low
License Count: Non-Counted

Index 2 Feature: ipbase
Period left: Life time
License Type: Permanent
License State: Active, Not in Use
License Priority: Medium
License Count: Non-Counted

Index 3 Feature: lanbase
Period left: 0 minute 0 second
Switch#arch download-sw usbflash0:c3750e-ipbasek9-tar.122-55.SE11.tar
examining image...
extracting info (108 bytes)
extracting c3750e-ipbasek9-mz.122-55.SE11/info (477 bytes)
extracting info (108 bytes)

Stacking Version Number: 1.45

System Type: 0x00000002
Ios Image File Size: 0x00DEFA00
Total Image File Size: 0x0128BA00
Minimum Dram required: 0x08000000
Image Suffix: ipbasek9-122-55.SE11
Image Directory: c3750e-ipbasek9-mz.122-55.SE11
Image Name: c3750e-ipbasek9-mz.122-55.SE11.bin
Image Feature: IP|LAYER_3|SSH|3DES|MIN_DRAM_MEG=128

Error: The image in the archive which would be used to upgrade
Error: system number 1 does not support the same feature set.
Switch#
```

3750X with active IP Services license

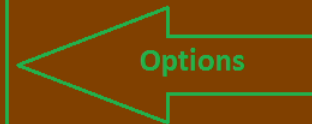
Upgrade with an IP Base Feature Set

Feature Set mismatch.

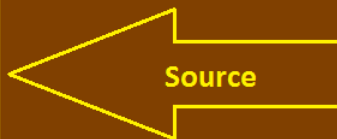
Screenshot of Feature Set compatibility checking example

Switch#archive download-sw ?

/allow-feature-upgrade	Allow installation of image with different feature sets
/destination-system	specify destination system to receive software
/directory	Specify a directory for images
/force-reload	Unconditionally reload system after successful sw upgrade
/force-ucode-reload	Upgrade UCODE after successful sw upgrade and before an unconditional reload
/imageonly	Load only the IOS image(s)
/leave-old-sw	Leave old sw installed after successful sw upgrade
/no-set-boot	Don't set BOOT -- leave existing boot config alone
/no-version-check	skip version check that prevents incompatible image install
/only-system-type	specify individual system type to be updated
/overwrite	OK to overwrite an existing image
/reload	Reload system (if no unsaved config changes) after successful sw upgrade
/safe	Always load before deleting old version
/upgrade-ucode	Upgrade UCODE after successful sw upgrade (no reload)



flash1:	Image file
flash2:	Image file
flash:	Image file
ftp:	Image file
http:	Image file
https:	Image file
rcp:	Image file
scp:	Image file
tftp:	Image file



Switch#archive download-sw

Options available when using “archive download-sw”

Explanation to the different options

/allow-feature-upgrade = This option asking the operator “are you sure you want to change the feature set” (from IP Base to IP Services, for example)?

/imageonly = Unpack the IOS BIN file only (HTML files not extracted).

/leave-old-sw = Do not delete the old IOS subdirectory and associated files.

/no-set-boot = Do not modify the boot variable string.

Explanation to the different options (cont'd)

/no-version-check = Means unpack the IOS file regardless if the file is meant for a different model.

/overwrite = After the IOS has been unpacked, the FIRST (top to bottom) IOS subdirectory (and associated files inside) will be deleted.

/destination-system = This option can be found in stack switches like 2960S/X/XR, 3750-series family of switches. Example:

```
archive download-sw /destination-system 1 /destination-system 2 /destination-system 3  
<LOCATION>/filename.tar
```

Polling Question 2

Have you used the USB ports to upgrade the IOS?

- A. Yes, I have
- B. No, I haven't
- C. I don't know

How Does It Work: “archive download-sw” command

Syntax:

archive download-sw [options] [options] ... [SOURCE]://[IP address]/[Subdirectory]/[filename.tar]

Switch#archive download-sw ?

/allow-feature-upgrade	Allow installation of image with different feature sets
/destination-system	specify destination system to receive software
/directory	Specify a directory for images
/force-reload	Unconditionally reload system after successful sw upgrade
/force-ucode-reload	Upgrade UCODE after successful sw upgrade and before an unconditional reload
/imageonly	Load only the IOS image(s)
/leave-old-sw	Leave old sw installed after successful sw upgrade
/no-set-boot	Don't set BOOT -- leave existing boot config alone
/no-version-check	skip version check that prevents incompatible image install
/only-system-type	specify individual system type to be updated
/overwrite	OK to overwrite an existing image
/reload	Reload system (if no unsaved config changes) after successful sw upgrade
/safe	Always load before deleting old version
/upgrade-ucode	Upgrade UCODE after successful sw upgrade (no reload)

Options

flash1:	Image file
flash2:	Image file
flash:	Image file
ftp:	Image file
http:	Image file
https:	Image file
rcp:	Image file
scp:	Image file
tftp:	Image file

Source

Switch#archive download-sw

BONUS feature

Syntax:

archive download-sw [options] [options] **usbflash0:**[/[Subdirectory]/[filename.tar]

Switch#archive download-sw ?

/allow-feature-upgrade	Allow installation of image with different feature sets
/destination-system	specify destination system to receive software
/directory	Specify a directory for images
/force-reload	Unconditionally reload system after successful sw upgrade
/force-ucode-reload	Upgrade UCODE after successful sw upgrade and before an unconditional reload
/imageonly	Load only the IOS image(s)
/leave-old-sw	Leave old sw installed after successful sw upgrade
/no-set-boot	Don't set BOOT -- leave existing boot config alone
/no-version-check	skip version check that prevents incompatible image install
/only-system-type	specify individual system type to be updated
/overwrite	OK to overwrite an existing image
/reload	Reload system (if no unsaved config changes) after successful sw upgrade
/safe	Always load before deleting old version
/upgrade-ucode	Upgrade UCODE after successful sw upgrade (no reload)

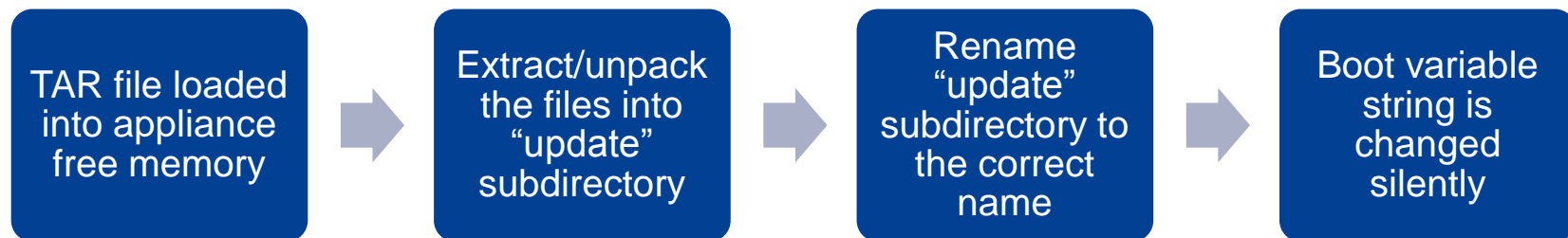
Options

flash1:	Image file
flash2:	Image file
flash:	Image file
ftp:	Image file
http:	Image file
https:	Image file
rcp:	Image file
scp:	Image file
tftp:	Image file

Source

Switch#archive download-sw

How Does It Work: “archive download-sw” command



```
Switch#archive download-sw /no-set-boot /leave-old-sw tftp://1.1.1.1/c3750e-universalk9-tar.152-4.E2.tar
Loading c3750e-universalk9-tar.152-4.E2.tar from 1.1.1.1 (via Vlan100): !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
[OK - 30996480 bytes]

Loading c3750e-universalk9-tar.152-4.E2.tar from 1.1.1.1 (via Vlan100): !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
examining image...
extracting info (108 bytes)
extracting c3750e-universalk9-mz.152-4.E2/info (537 bytes)
extracting info (108 bytes)

Stacking Version Number: 1.59

System Type:          0x00000002
Ios Image File Size:  0x018A8A00
Total Image File Size: 0x01D8FA00
Minimum Dram required: 0x08000000
Image Suffix:         universalk9-152-4.E2
Image Directory:      c3750e-universalk9-mz.152-4.E2
Image Name:           c3750e-universalk9-mz.152-4.E2.bin
Image Feature:        IP|LAYER_3|PLUS|SSH|3DES|MIN_DRAM_MEG=128
FRU Module Version:   03.08.02.WAL

Old image for switch 1: flash:/c3750e-universalk9-mz.152-4.E1
Old image will be left alone

Extracting images from archive into flash...
Installing (renaming): `flash:update/c3750e-universalk9-mz.152-4.E2' ->
                        `flash:/c3750e-universalk9-mz.152-4.E2'
EDS file download on SKU match in progress...

New software image installed in flash:/c3750e-universalk9-mz.152-4.E2

extracting dc profile file from "flash:/c3750e-universalk9-mz.152-4.E2/dc_default_profiles.txt" to "flash:/dc_profile_dir/dc_default_profiles.txt"
All software images installed.
Switch#
```

IOS Upgrade example: Standalone


```
Switch#archive download-sw /no-set-boot /leave-old-sw tftp://1.1.1.1/c3750e-universalk9-tar.152-4.E2.tar
Loading c3750e-universalk9-tar.152-4.E2.tar from 1.1.1.1 (via Vlan100): !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
[OK - 30996480 bytes]

Loading c3750e-universalk9-tar.152-4.E2.tar from 1.1.1.1 (via Vlan100): !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
examining image...
extracting info (108 bytes)
extracting c3750e-universalk9-mz.152-4.E2/info (537 bytes)
extracting info (108 bytes)

Stacking Version Number: 1.59

System Type:          0x00000002
Ios Image File Size:  0x018A8A00
Total Image File Size: 0x01D8FA00
Minimum Dram required: 0x08000000
Image Suffix:         universalk9-152-4.E2
Image Directory:      c3750e-universalk9-mz.152-4.E2
Image Name:           c3750e-universalk9-mz.152-4.E2.bin
Image Feature:        IP|LAYER_3|PLUS|SSH|3DES|MIN_DRAM_MEG=128
FRU Module Version:   03.08.02.WAL

Old image for switch 1: flash:/c3750e-universalk9-mz.152-4.E1
Old image will be left alone

Extracting images from archive into flash...
Installing (renaming): `flash:update/c3750e-universalk9-mz.152-4.E2' ->
                        `flash:/c3750e-universalk9-mz.152-4.E2'
EDS file download on SKU match in progress...

New software image installed in flash:/c3750e-universalk9-mz.152-4.E2

extracting dc profile file from "flash:/c3750e-universalk9-mz.152-4.E2/dc_default_profiles.txt" to "flash:/dc_profile_dir/dc_default_profiles.txt"
All software images installed.
Switch#
```

IOS TAR file get loaded into free memory

```
Switch#archive download-sw /no-set-boot /leave-old-sw tftp://1.1.1.1/c3750e-universalk9-tar.152-4.E2.tar
Loading c3750e-universalk9-tar.152-4.E2.tar from 1.1.1.1 (via Vlan100): !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
[OK - 30996480 bytes]
```

```
Loading c3750e-universalk9-tar.152-4.E2.tar from 1.1.1.1 (via Vlan100): !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
```

```
examining image...
extracting info (108 bytes)
extracting c3750e-universalk9-mz.152-4.E2/info (537 bytes)
extracting info (108 bytes)
```

```
Stacking Version Number: 1.59
```

```
System Type:          0x00000002
  Ios Image File Size: 0x018A8A00
  Total Image File Size: 0x01D8FA00
  Minimum Dram required: 0x08000000
  Image Suffix:        universalk9-152-4.E2
  Image Directory:     c3750e-universalk9-mz.152-4.E2
  Image Name:          c3750e-universalk9-mz.152-4.E2.bin
  Image Feature:       IP|LAYER_3|PLUS|SSH|3DES|MIN_DRAM_MEG=128
  FRU Module Version:  03.08.02.WAL
```

```
Old image for switch 1: flash:/c3750e-universalk9-mz.152-4.E1
  Old image will be left alone
```

```
Extracting images from archive into flash...
Installing (renaming): `flash:update/c3750e-universalk9-mz.152-4.E2' ->
                        `flash:/c3750e-universalk9-mz.152-4.E2'
EDS file download on SKU match in progress...
```

```
New software image installed in flash:/c3750e-universalk9-mz.152-4.E2
```

```
extracting dc profile file from "flash:/c3750e-universalk9-mz.152-4.E2/dc_default_profiles.txt" to "flash:/dc_profile_dir/dc_default_profiles.txt"
All software images installed.
Switch#
```

Extraction process begins

```
Switch#archive download-sw /no-set-boot /leave-old-sw tftp://1.1.1.1/c3750e-universalk9-tar.152-4.E2.tar
Loading c3750e-universalk9-tar.152-4.E2.tar from 1.1.1.1 (via Vlan100): !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
[OK - 30996480 bytes]
```

```
Loading c3750e-universalk9-tar.152-4.E2.tar from 1.1.1.1 (via Vlan100): !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
examining image...
extracting info (108 bytes)
extracting c3750e-universalk9-mz.152-4.E2/info (537 bytes)
extracting info (108 bytes)
```

```
Stacking Version Number: 1.59
```

```
System Type:          0x00000002
  Ios Image File Size: 0x018A8A00
  Total Image File Size: 0x01D8FA00
  Minimum Dram required: 0x08000000
  Image Suffix:        universalk9-152-4.E2
  Image Directory:     c3750e-universalk9-mz.152-4.E2
  Image Name:          c3750e-universalk9-mz.152-4.E2.bin
  Image Feature:       IP|LAYER_3|PLUS|SSH|3DES|MIN_DRAM_MEG=128
  FRU Module Version:  03.08.02.WAL
```

```
Old image for switch 1: flash:/c3750e-universalk9-mz.152-4.E1
Old image will be left alone
```

```
Extracting images from archive into flash...
Installing (renaming): `flash:update/c3750e-universalk9-mz.152-4.E2' ->
                        `flash:/c3750e-universalk9-mz.152-4.E2'
```

```
EDS file download on SKU match in progress...
```

```
New software image installed in flash:/c3750e-universalk9-mz.152-4.E2
```

```
extracting dc profile file from "flash:/c3750e-universalk9-mz.152-4.E2/dc_default_profiles.txt" to "flash:/dc_profile_dir/dc_default_profiles.txt"
All software images installed.
Switch#
```

Sub-directory gets renamed.

```

Switch#archive download-sw /no-set-boot /leave-old-sw tftp://1.1.1.1/c2960x-universalk9-tar.152-5b.E.tar
Loading c2960x-universalk9-tar.152-5b.E.tar from 1.1.1.1 (via Vlan100): !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
[OK - 31590400 bytes]

Loading c2960x-universalk9-tar.152-5b.E.tar from 1.1.1.1 (via Vlan100): !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
examining image...
extracting info (110 bytes)
extracting c2960x-universalk9-mz.152-5b.E/info (688 bytes)
extracting info (110 bytes)

Stacking Version Number: 1.119

System Type:          0x00000000
Ios Image File Size:   0x01876A00
Total Image File Size: 0x01E20A00
Minimum Dram required: 0x08000000
Image Suffix:          universalk9-152-5b.E
Image Directory:       c2960x-universalk9-mz.152-5b.E
Image Name:            c2960x-universalk9-mz.152-5b.E.bin
Image Feature:         IP|LAYER_2|SSH|3DES|MIN_DRAM_MEG=128
FRU Module Version:    No FRU Version Specified

Old image for switch 1: flash:/c2960x-universalk9-mz.152-4.E2
Old image will be left alone
Old image for switch 2: flash2:/c2960x-universalk9-mz.152-4.E2
Old image will be left alone

Extracting images from archive into flash...
Extracting images from archive into flash on switch 2...

Warning: Unable to allocate memory to display the tar extraction of files,
however upgrade process is still continuing. If you would like to
see the tar extraction output, try upgrading one switch at a time.

Warning: Unable to allocate memory to display the tar extraction of files,
however upgrade process is still continuing. If you would like to
see the tar extraction output, try upgrading one switch at a time.

Installing (renaming): `flash:update/c2960x-universalk9-mz.152-5b.E' ->
`flash:/c2960x-universalk9-mz.152-5b.E'
EDS file download on SKU match in progress...

New software image installed in flash:/c2960x-universalk9-mz.152-5b.E

```

IOS Upgrade example: Stack

```
Switch#archive download-sw /no-set-boot /leave-old-sw tftp://1.1.1.1/c2960x-universalk9-tar.152-5b.E.tar
Loading c2960x-universalk9-tar.152-5b.E.tar from 1.1.1.1 (via Vlan100): !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
[ok - 31590400 bytes]
Loading c2960x-universalk9-tar.152-5b.E.tar from 1.1.1.1 (via Vlan100): !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
examining image...
extracting info (110 bytes)
extracting c2960x-universalk9-mz.152-5b.E/info (688 bytes)
extracting info (110 bytes)

Stacking Version Number: 1.119

System Type:                0x00000000
  Ios Image File Size:      0x01876A00
  Total Image File Size:    0x01E20A00
  Minimum Dram required:    0x08000000
  Image Suffix:             universalk9-152-5b.E
  Image Directory:          c2960x-universalk9-mz.152-5b.E
  Image Name:               c2960x-universalk9-mz.152-5b.E.bin
  Image Feature:            IP|LAYER_2|SSH|3DES|MIN_DRAM_MEG=128
  FRU Module Version:       No FRU Version Specified

Old image for switch 1: flash:/c2960x-universalk9-mz.152-4.E2
  Old image will be left alone
Old image for switch 2: flash2:/c2960x-universalk9-mz.152-4.E2
  Old image will be left alone

Extracting images from archive into flash...
Extracting images from archive into flash on switch 2...

warning: Unable to allocate memory to display the tar extraction of files,
         however upgrade process is still continuing. If you would like to
         see the tar extraction output, try upgrading one switch at a time.

warning: Unable to allocate memory to display the tar extraction of files,
         however upgrade process is still continuing. If you would like to
         see the tar extraction output, try upgrading one switch at a time.

Installing (renaming): `flash:update/c2960x-universalk9-mz.152-5b.E' ->
                      `flash:/c2960x-universalk9-mz.152-5b.E'
EDS file download on SKU match in progress...

New software image installed in flash:/c2960x-universalk9-mz.152-5b.E
```

IOS TAR file get loaded into free memory

```
Switch#archive download-sw /no-set-boot /leave-old-sw tftp://1.1.1.1/c2960x-universalk9-tar.152-5b.E.tar
Loading c2960x-universalk9-tar.152-5b.E.tar from 1.1.1.1 (via Vlan100): !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
[OK - 31590400 bytes]

Loading c2960x-universalk9-tar.152-5b.E.tar from 1.1.1.1 (via Vlan100): !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
examining image...
extracting info (110 bytes)
extracting c2960x-universalk9-mz.152-5b.E/info (688 bytes)
extracting info (110 bytes)

Stacking Version Number: 1.119

System Type:                0x00000000
  Ios Image File Size:      0x01876A00
  Total Image File Size:    0x01E20A00
  Minimum Dram required:    0x08000000
  Image Suffix:             universalk9-152-5b.E
  Image Directory:          c2960x-universalk9-mz.152-5b.E
  Image Name:               c2960x-universalk9-mz.152-5b.E.bin
  Image Feature:            IP|LAYER_2|SSH|3DES|MIN_DRAM_MEG=128
  FRU Module Version:       No FRU Version Specified

Old image for switch 1: flash:/c2960x-universalk9-mz.152-4.E2
  old image will be left alone
Old image for switch 2: flash2:/c2960x-universalk9-mz.152-4.E2
  old image will be left alone

Extracting images from archive into flash...
Extracting images from archive into flash on switch 2...

warning: unable to allocate memory to display the tar extraction of files,
however upgrade process is still continuing. If you would like to
see the tar extraction output, try upgrading one switch at a time.

warning: unable to allocate memory to display the tar extraction of files,
however upgrade process is still continuing. If you would like to
see the tar extraction output, try upgrading one switch at a time.

Installing (renaming): `flash:update/c2960x-universalk9-mz.152-5b.E' ->
                        `flash:/c2960x-universalk9-mz.152-5b.E'
EDS file download on SKU match in progress...

New software image installed in flash:/c2960x-universalk9-mz.152-5b.E
```

Extraction process begins

```

Switch#archive download-sw /no-set-boot /leave-old-sw tftp://1.1.1.1/c2960x-universalk9-tar.152-5b.E.tar
Loading c2960x-universalk9-tar.152-5b.E.tar from 1.1.1.1 (via Vlan100): !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
[ok - 31590400 bytes]

Loading c2960x-universalk9-tar.152-5b.E.tar from 1.1.1.1 (via Vlan100): !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
examining image...
extracting info (110 bytes)
extracting c2960x-universalk9-mz.152-5b.E/info (688 bytes)
extracting info (110 bytes)

Stacking Version Number: 1.119

System Type:          0x00000000
Ios Image File Size:  0x01876A00
Total Image File Size: 0x01E20A00
Minimum Dram required: 0x08000000
Image Suffix:         universalk9-152-5b.E
Image Directory:      c2960x-universalk9-mz.152-5b.E
Image Name:           c2960x-universalk9-mz.152-5b.E.bin
Image Feature:        IP|LAYER_2|SSH|3DES|MIN_DRAM_MEG=128
FRU Module Version:   No FRU Version Specified

Old image for switch 1: flash:/c2960x-universalk9-mz.152-4.E2
Old image will be left alone
Old image for switch 2: flash2:/c2960x-universalk9-mz.152-4.E2
Old image will be left alone

Extracting images from archive into flash...
Extracting images from archive into flash on switch 2...

Warning: unable to allocate memory to display the tar extraction of files,
however upgrade process is still continuing. If you would like to
see the tar extraction output, try upgrading one switch at a time.

Warning: unable to allocate memory to display the tar extraction of files,
however upgrade process is still continuing. If you would like to
see the tar extraction output, try upgrading one switch at a time.

Installing (renaming): `flash:update/c2960x-universalk9-mz.152-5b.E' ->
`flash:/c2960x-universalk9-mz.152-5b.E'
EDS file download on SKU match in progress...

New software image installed in flash:/c2960x-universalk9-mz.152-5b.E

```

IOS temporarily unpacked into “update” sub-directory

```
Switch#archive download-sw /no-set-boot /leave-old-sw tftp://1.1.1.1/c2960x-universalk9-tar.152-5b.E.tar
Loading c2960x-universalk9-tar.152-5b.E.tar from 1.1.1.1 (via Vlan100): !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
[OK - 31590400 bytes]

Loading c2960x-universalk9-tar.152-5b.E.tar from 1.1.1.1 (via Vlan100): !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
examining image...
extracting info (110 bytes)
extracting c2960x-universalk9-mz.152-5b.E/info (688 bytes)
extracting info (110 bytes)

Stacking Version Number: 1.119

System Type:           0x00000000
Ios Image File Size:   0x01876A00
Total Image File Size: 0x01E20A00
Minimum Dram required: 0x08000000
Image Suffix:          universalk9-152-5b.E
Image Directory:       c2960x-universalk9-mz.152-5b.E
Image Name:            c2960x-universalk9-mz.152-5b.E.bin
Image Feature:         IP|LAYER_2|SSH|3DES|MIN_DRAM_MEG=128
FRU Module Version:    No FRU Version Specified

Old image for switch 1: flash:/c2960x-universalk9-mz.152-4.E2
Old image will be left alone
Old image for switch 2: flash2:/c2960x-universalk9-mz.152-4.E2
Old image will be left alone

Extracting images from archive into flash...
Extracting images from archive into flash on switch 2...

warning: unable to allocate memory to display the tar extraction of files,
        however upgrade process is still continuing. If you would like to
        see the tar extraction output, try upgrading one switch at a time.

warning: unable to allocate memory to display the tar extraction of files,
        however upgrade process is still continuing. If you would like to
        see the tar extraction output, try upgrading one switch at a time.

Installing (renaming): `flash:update/c2960x-universalk9-mz.152-5b.E' ->
                        `flash:/c2960x-universalk9-mz.152-5b.E'
EDS file download on SKU match in progress...

New software image installed in flash:/c2960x-universalk9-mz.152-5b.E
```

Nothing sinister about this error.


```

Switch#archive download-sw /no-set-boot /leave-old-sw tftp://1.1.1.1/c2960x-universalk9-tar.152-5b.E.tar
Loading c2960x-universalk9-tar.152-5b.E.tar from 1.1.1.1 (via vlan100): !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
[OK - 31590400 bytes]

Loading c2960x-universalk9-tar.152-5b.E.tar from 1.1.1.1 (via vlan100): !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
examining image...
extracting info (110 bytes)
extracting c2960x-universalk9-mz.152-5b.E/info (688 bytes)
extracting info (110 bytes)

Stacking Version Number: 1.119

System Type:          0x00000000
Ios Image File Size:  0x01876A00
Total Image File Size: 0x01E20A00
Minimum Dram required: 0x08000000
Image Suffix:         universalk9-152-5b.E
Image Directory:      c2960x-universalk9-mz.152-5b.E
Image Name:           c2960x-universalk9-mz.152-5b.E.bin
Image Feature:        IP|LAYER_2|SSH|3DES|MIN_DRAM_MEG=128
FRU Module Version:   No FRU version Specified

Old image for switch 1: flash:/c2960x-universalk9-mz.152-4.E2
old image will be left alone
Old image for switch 2: flash2:/c2960x-universalk9-mz.152-4.E2
old image will be left alone

Extracting images from archive into flash...
Extracting images from archive into flash on switch 2...

Warning: unable to allocate memory to display the tar extraction of files,
however upgrade process is still continuing. If you would like to
see the tar extraction output, try upgrading one switch at a time.

warning: unable to allocate memory to display the tar extraction of files,
however upgrade process is still continuing. If you would like to
see the tar extraction output, try upgrading one switch at a time.

Installing (renaming): `flash:update/c2960x-universalk9-mz.152-5b.E' ->
`flash:/c2960x-universalk9-mz.152-5b.E'
EDS file download on SKU match in progress...

New software image installed in flash:/c2960x-universalk9-mz.152-5b.E

```

Sub-directory gets renamed

Polling Question 3


It is NOT possible to boot an IOS using a USB flash drive (even from ROMmon).

- A. True
- B. False

Recommended Best Practice

Release Notes – READ IT

- What model is compatible with each IOS file
- Open & Resolved Caveats
- What the IOS can and can't do



Your
credibility
will
depend
on it!

Recommended Best Practice

Release Notes – READ IT (cont'd)

- Hardware compatibility list
- **Special Notes** (some hardware may require mandatory ROMmon upgrade)
- Google search “Cisco [MODEL] release notes”

Recommended Best Practice

Use the IOS with TAR file extension

- The command “archive download-sw” will extract all the files from the TAR file.
- IOS BIN file located inside the TAR file.

Recommended Best Practice

Check the MD5 Checksum

- Corrupt IOS is the most common cause of appliances failure to boot the correct file.
- How to check will be discussed near the end.

Recommended Best Practice

Check the config-registry value

- 4500 & 6500/6800 supervisor cards are sometimes shipped with a config-registry value of “0x2101” instead of “0x2102”.

Recommended Best Practice

0x2101 vs 0x2102

- Ignore boot variable string; and
- Boot the first IOS (from the top of the list).

Recommended Best Practice

Check the IOS subdirectory

- Check the date & time to make sure the new IOS folder is present
- Command “dir flashX:” where “X” is the stack member number.

```

Switch#sh switch detail
Switch/Stack Mac Address : 74a2.e6b3.d380

```

Switch#	Role	Mac Address	Priority	H/W Version	Current State
*1	Master	74a2.e6b3.d380	15	1	Ready
2	Member	fc99.47a9.0a00	13	1	Ready


```

Switch#sh stack

```

Switch #	Stack Port 1	Status Port 2	Neighbors Port 1	Port 2
1	ok	ok	2	2
2	ok	ok	1	1


```

Switch#dir flash1:
Directory of flash1:

   2  -rw-                856    Mar 1 1993 11:01:03 +11:00  vlan.dat
   3  -rw-                27337  Oct 10 2016 08:07:50 +11:00  config.text
   4  drwx                4096    Jul 21 2016 11:44:18 +11:00  c3750e-universalk9-mz.122-55.SE10
  512 -rw-                4120    Oct 10 2016 08:07:51 +11:00  multiple-fs
  513 -rw-                1940    Oct 10 2016 08:07:50 +11:00  private-config.text

119144448 bytes total (96624640 bytes free)
Switch#dir flash2:
Directory of flash2:/

  511 -rw-                856      Nov 2 2015 10:46:52 +11:00  vlan.dat
     2 -rw-                1940    Oct 10 2016 08:07:53 +11:00  private-config.text
  512 -rw-                27337  Oct 10 2016 08:07:53 +11:00  config.text
     3 drwx                512      Jul 21 2016 11:25:31 +11:00  c3750e-universalk9-mz.122-55.SE10
  514 -rw-                4120     Nov 2 2015 10:46:57 +11:00  multiple-fs

57671680 bytes total (38026752 bytes free)
Switch#

```

Recommended Best Practice

Test me!

- Test to make sure the “archive download-sw” command works
- Verify the behaviour of the IOS

Recommended Best Practice

Log the evidence

- Log the upgrade and reboot process.
- Wealth of information can be gleaned by console logs.

How to verify MD5 Checksum

Using Cisco CLI or using GUI (HashTab)

<http://implbits.com/products/hashtab/>

Verify MD5 Checksum: HashTab

The screenshot shows the Cisco Download Software page for the Catalyst 3560CG-8PC-S Compact Switch. The page is titled "Download Software" and includes navigation links for "Products & Services", "Support", "How to Buy", "Training & Events", and "Partners". The breadcrumb trail indicates the path: Downloads Home > Products > Switches > Campus LAN Switches - Compact > Catalyst 3560-C Series Switches > Catalyst 3560CG-8PC-S Compact Switch > IOS Software-15.2.2E5(MD).

The main content area displays the "Catalyst 3560CG-8PC-S Compact Switch" release information for "Release 15.2.2E5 MD". A table lists the available software files:

Compare	File Information	Release Date	DRAM/Flash
<input type="checkbox"/>	UNIVERSAL c3560c405ex-universalk9-mz.152-2.E5.bin	07-JUN-2016	128 / 64
<input type="checkbox"/>	UNIVERSAL WITH WEB BASE c3560c405ex-universalk9-mz.152-2.E5.bin		
<input type="checkbox"/>	UNIVERSAL NO MAC SEC c3560c405ex-universalk9-mz.152-2.E5.bin		
<input type="checkbox"/>	UNIVERSAL WITH WEB BASE c3560c405ex-universalk9-mz.152-2.E5.bin		

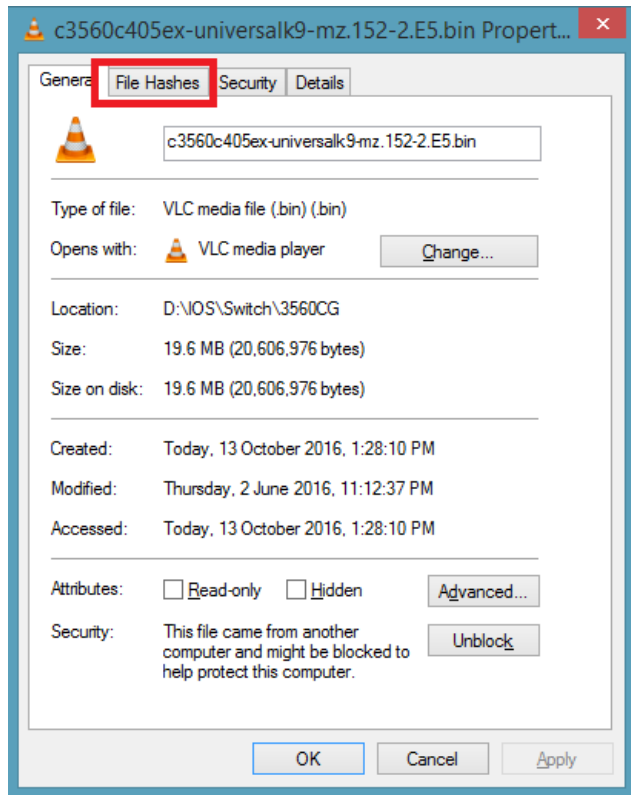
A details window is open over the first file, showing the following information:

- Description: UNIVERSAL
- Release: 15.2.2E5
- Release Date: 07/Jun/2016
- File Name: c3560c405ex-universalk9-mz.152-2.E5.bin
- Min Memory: DRAM 128 MB Flash 64 MB
- Size: 19.65 MB (20606976 bytes)
- MD5 Checksum: **ebd39277c8109e38d1d69725acd4951c**
- SHA512 Checksum: 7a8505dbb67a3ca7f6b9919493720722...

The MD5 Checksum value is highlighted with a red box in the original image.

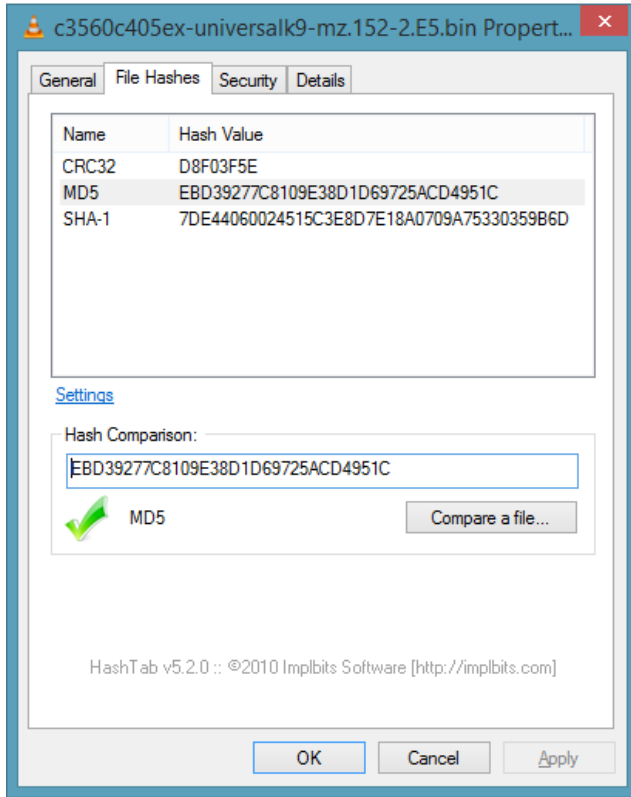
Hover the cursor over the filename until a window appears. Copy the value of the MD5 Checksum.

Verify MD5 Checksum: HashTab (cont'd)



- Open Windows Explorer and go to the folder where the IOS file is stored.
- Right-mouse click and choose the file's "Properties". (Alt + Enter)
- If HashTab is installed, "File Hashes" tab should appear.

Verify MD5 Checksum: HashTab (cont'd)

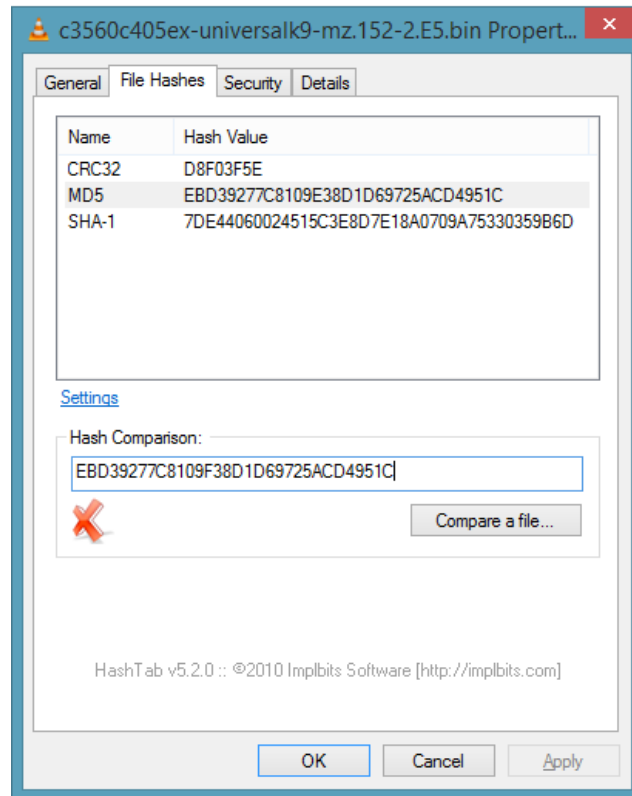


Enter the MD5 Checksum into the “Hash Comparison” box.

The image (left) shows the MD5 Checksum matches.

Verify MD5 Checksum: HashTab (cont'd)

The image (right) shows the MD5 Checksum *does not match*.



Verify MD5 Checksum: Cisco CLI

Command:

```
verify /md5 [subdirectory] [filename.extension] [MD5 checksum]
```

Verify MD5 Checksum: Cisco CLI (cont'd)

```
Switch#verify /md5 bootdisk:/c6880x-adventerprisek9-mz.SPA.151-2.SY5.bin ebaf0105083ae522c119c9ae35070b04
.....
<TRUNCATED>
.....Done!
Verified (bootdisk:/c6880x-adventerprisek9-mz.SPA.151-2.SY5.bin) = ebaf0105083ae522c119c9ae35070b04
Switch#
```

Image above is of the MD5 Checksum matches

Verify MD5 Checksum: Cisco CLI (cont'd)

```
Switch#verify /md5 flash1:/c2960x-universalk9-mz.152-4.E2/c2960x-universalk9-mz.152-4.E2.bin d1b9df2d6d578d736c192ccfd7c7bf2
```

```
.....  
.....  
.....  
.....Done!
```

```
%Error verifying flash:/c2960x-universalk9-mz.152-4.E2/c2960x-universalk9-mz.152-4.E2.bin  
Computed signature  = 79f34621b5a87c3eaa46bf6f42b966de  
Submitted signature = d1b9df2d6d578d736c192ccfd7c7bf2
```

```
Switch#
```

Image above is of the MD5 Checksum *do not match*

Related Information

- 2960 Upgrade using a bin file
<https://supportforums.cisco.com/video/13106346/2960-upgrade-using-bin-file>
- Webcast: Catalyst 2960-X and 2960-XR Switches Overview, Configuration, and Troubleshooting
<https://supportforums.cisco.com/event/12982566/webcast-catalyst-2960-x-and-2960-xr-switches-overview-configuration-and>
- Ask the Expert: Switch and IOS Architecture and Unexpected Reboots on all Cisco Catalyst
<https://supportforums.cisco.com/event/12605816/ask-expert-switch-and-ios-architecture-and-unexpected-reboots-all-cisco-catalyst>
- Upgrading Software Images on Catalyst 3550 Series Switches Using the Command Line Interface
<http://www.cisco.com/c/en/us/support/docs/switches/catalyst-3550-series-switches/41541-190.html>



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<https://supportforums.cisco.com/discussion/13157661/ask-expert-ios-upgrade-catalyst-switches-2900-3500-and-3700-easy-pi>



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<https://supportforums.cisco.com/community/russian>

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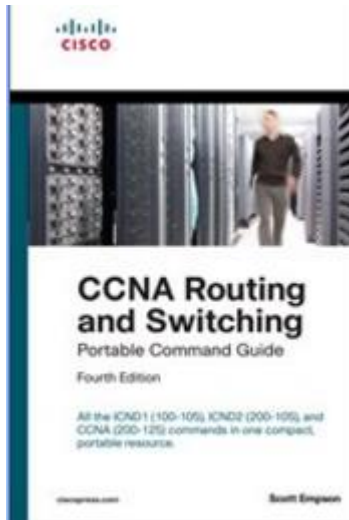
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