Cisco Nexus 9000 Series NX-OS Mode Switch FPGA/EPLD Upgrade Release Notes, Release 10.2(6)

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This document lists the current and past versions of EPLD images and describes how to update them for use with the Cisco Nexus 9000 Series switches.

This document also covers later releases. If a new Cisco Nexus 9000 Series FPGA/EPLD Upgrade Release Notes document isn't available, then that means that these are the latest available numbers for upgrade.

The following table lists the changes to this document.

Table 1. Changes to this Document

Date	Description
September 1, 2023	Release 10.2(6) became available.

Introduction

The Cisco Nexus 9000 Series NX-OS mode switches contain several programmable logical devices (PLDs) that provide hardware functionalities in all modules. Cisco provides electronic programmable logic device (EPLD) image upgrades to enhance hardware functionality or to resolve known issues. PLDs include electronic programmable logic devices (EPLDs), field programmable gate arrays (FPGAs), and complex programmable logic devices (CPLDs), but they do not include ASICs. In this document, the term EPLD is used for FPGA and CPLDs.

The advantage of having EPLDs for some module functions is that when you need to upgrade those functions, you just upgrade their software images instead of replacing their hardware.

Note: EPLD image upgrades for a line card disrupt the traffic going through the module because the module must power down briefly during the upgrade. The system performs EPLD upgrades on one module at a time, so at any one time the upgrade disrupts only the traffic going through one module.

Cisco provides the latest EPLD images with each release. Typically, these images are the same as provided in earlier releases but occasionally some of these images are updated. These EPLD image updates are not mandatory unless otherwise specified. The EPLD image upgrades are independent from the Cisco In Service Software Upgrade (ISSU) process, which upgrades the system image with no impact on the network environment.

When Cisco makes an EPLD image upgrade available, these release notes announce their availability, and you can download the EPLD images from https://software.cisco.com/download/navigator.html.

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When to Upgrade EPLDs

When new EPLD images are available, the upgrades are always recommended if your network environment allows for a maintenance period in which some level of traffic disruption is acceptable. If such a disruption is not acceptable, then consider postponing the upgrade until a better time.

Note: The EPLD upgrade operation is a disruptive operation. Execute this operation only at a programmed maintenance time. The system ISSU upgrade is a nondisruptive upgrade.

Note: Do not perform an EPLD upgrade during an ISSU system upgrade.

Note: EPLD version is backward compatible.

Switch Requirements

The Cisco Nexus 9000 Series switch must be running the Cisco NX-OS operating system

You must be able to access the switch through a console, SSH, or Telnet (required for setting up a switch running in NX-OS mode).

You must have administrator privileges to work with the Cisco Nexus 9000 Series switch.

EPLD Upgrades Available for NX-OS Mode Releases 10.2(2) through 10.2(6)

Each EPLD image that you can download from Software Download page, is a bundle of EPLD upgrades. To see the recent updated EPLD versions for the Cisco Nexus 9200, 9300, 9300-EX, 9300-FX, and 9500 platforms, see the following tables.

Note: All updates to an image are shown in boldface. If more than one release is shown for a column, the boldface applies to the first release listed for the column.

Note: The 10.2(6) release of EPLD, addresses the Secure Boot Hardware Tampering vulnerability for the Nexus 3K and Nexus 9000 Series switches. Please refer to Security Advisory.

Please review the advisory for affected HW-PIDs (see below table) for more details on how to apply the patch. The 10.2(2) release epld requires a specific sequence of upgrade.

Vulnerable Products addressed in Security Advisory (cisco-sa-20190513-secureboot)

Table 2. Nexus 9000 Series Switches

PID	Fixed IO FPGA Version
N9K-C93180YC-EX	0x15
N9K-C93108TC-EX	0x15
N9K-C93180YC-FX	0x20
N9K-C93108TC-FX	0x20
N9K-C9348GC-FXP	0x10

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PID	Fixed IO FPGA Version
N9K-C93240YC-FX2	0x10
N9K-C9336C-FX2	0x10
N9K-C9364C	0x6
N9K-C9332C	0x10
N9K-C93180YC-FX	0x20
N9K-C9232C	0x8
N9K-SUP-A+	0x14
N9K-SUP-B+	0x14
N9K-SUP-B	0x30
N9K-SUP-A	0x30

Cisco Secure Boot Hardware Tampering Vulnerability - Remediation Steps

The following section details updating your EPLD version for affected switches listed in: https://sec.cloudapps.cisco.com/security/center/content/CiscoSecurityAdvisory/cisco-sa-20190513-secureboot

Nexus 9000 Modular chassis with dual supervisor:

Note: It is required to update both Golden and Primary regions of FPGA to address this particular vulnerability. It is by design, that we don't allow updating both primary and golden at the same time (to avoid programming errors, that may cause switch to not boot, hence only one region is allowed to be programmed per reload).

Please do not attempt to upgrade Golden region of FPGA once it is on a fixed version.

1. Copy the EPLD image to bootflash (e.g. used n9000-epld.10.2.6.img).
2. If you have dual supervisor, determine which is the standby Supervisor by doing 'show module' and start upgrading it first. On the N9K, Only supervisors need upgrade for this vulnerability. LC/FM/SC cards are not affected.
3. Assuming standby supervisor is slot 28. Update the Primary FPGA region of standby supervisor.

install epld bootflash:n9000-epld.10.2.6.img module 28

Expected result: Switch will update primary EPLD of standby supervisor and will reload the standby supervisor module automatically. Please don't interrupt, power cycle or reload when EPLD update is happening. Once standby is booted, it will again come up as standby supervisor. A 'show version module 28 epld' will continue to show old version.

switch# show mod | grep SUP

27 0 Supervisor Module N9K-SUP-A active *

28 0 Supervisor Module N9K-SUP-A ha-standby

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27 9.3(0.416) 1.0 SUP1

28 9.3(0.416) 0.3011 SUP2

switch# show version module 28 epld

EPLD Device Version

IO FPGA 0x27

This is expected, as the switch would have booted from Golden FPGA which is still not updated. You can verify this from syslog which would say:

%CARDCLIENT-5-MOD_BOOT_GOLDEN: Module 28 IOFPGA booted from Golden

4. Update the Golden (also called backup) FPGA region of the standby supervisor.

install epld bootflash:n9000-epld.10.2.6.img module 28 golden

Module 28 : IO FPGA [Programming] : 100.00% (64 of 64 total sectors)

Module 28 EPLD upgrade is successful.

Module Type Upgrade-Result

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28 SUP Success

Expected result: Switch will update the golden EPLD of standby supervisor and will reload the standby supervisor module automatically. Please don't interrupt, power cycle or reload when EPLD update is happening. Once standby is booted, it will again come up as ha-standby supervisor.

Once this is done, when you check 'show version module 28 epld' you will see FPGA version that is >= to the fixed version for the standby supervisor. Your switch has the fixed version for standby supervisor.

switch# show version module 28 epld

EPLD Device Version

IO FPGA 0x30

Repeat Step 3 and 4, for the active supervisor. At the end of Step 3, supervisor in slot 27 will reload and hence now will be-come standby supervisor. The active supervisor will be Supervisor in slot 28.

(considering SUP 27 is active to begin with, for the above activity, such as steps 3 and 4, commands would have 27 in place of 28.)

Log below shows what happens when epld upgrade happens for active supervisor.

Module 27 : IO FPGA [Programming] : 100.00% (64 of 64 sectors)

Module 27 EPLD upgrade is successful.

Module Type Upgrade-Result

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27 SUP Success

EPLDs upgraded. Performing switchover.

Once the supervisor in Slot 27 becomes ha-standby complete step 4 for Slot 27, and it will again boot and become ha-standby. Both the supervisors now have the vulnerability fixed version of FPGA.

At the end of the upgrades, switch should boot with primary for both SUPs, logs below

switch# show logging log | grep -i fpga | grep -i 27

2019 Jul 10 07:55:04 switch %CARDCLIENT-5-MOD_BOOT_PRIMARY: Module 27 IOFPGA booted from Primary

switch# show logging log | grep -i fpga | grep -i 28

2019 Jul 10 07:58:01 switch %CARDCLIENT-5-MOD_BOOT_PRIMARY: Module 28 IOFPGA booted from Primary

Nexus 9000 Modular chassis with single supervisor:

Note: It is required to update both Golden and Primary regions of FPGA to address this particular vulnerability. It is by design, that we don't allow updating both primary and golden at the same time (to avoid programming errors, that may cause switch to not boot, hence only one region is allowed to be programmed per reload).

Please do not attempt to upgrade Golden region of FPGA once it is on a fixed version.

1. Copy the EPLD image to bootflash (e.g. used n9000-epld.10.2.6.img).
2. Assuming the supervisor is in Slot27. Update the Primary FPGA region.

install epld bootflash:n9000-epld.10.2.6.img module 27

Expected result: Switch will update primary EPLD of the supervisor and will reload the switch automatically. Please don't interrupt, power cycle or reload when EPLD update is happening. Once the supervisor is booted, the 'show version module 27 epld' will continue to show old version

Switch#show version module 27 epld

Name InstanceNum Version Date

IO FPGA 0 0x27 20160111

BIOS version v08.35(08/31/2018)

Alternate BIOS version v08.32(10/18/2016)

This is expected, as the switch would have booted from Golden FPGA which is still not updated. You can verify this from syslog which would say:

%CARDCLIENT-5-MOD_BOOT_GOLDEN: Module 27 IOFPGA booted from Golden

3. Since in this case there is only one supervisor, update the Golden (also called backup) FPGA region.

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install epld bootflash:n9000-epld.10.2.6.img module 27 golden

Module 27 : IO FPGA [Programming] : 100.00% (64 of 64 total sectors)

Module 27 EPLD upgrade is successful.

Module Type Upgrade-Result

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27 SUP Success

Expected result: Switch will update the golden EPLD of the supervisor and will reload the switch automatically. Please don't interrupt, power cycle or reload when EPLD update is happening.

Once this is done, when you check ‘show version module 27 epld' you will see FPGA version that is >= to the fixed version for the supervisor. Your supervisor has the vulnerability fixed version of FPGA.

SWITCH# show version module 27 epld

Name InstanceNum Version Date

IO FPGA 0 0x30 20190625

BIOS version v08.35(08/31/2018)

Alternate BIOS version v08.32(10/18/2016)

At the end of the upgrades, switch should boot with primary for the SUP, log below

switch# show logging log | grep -i fpga | grep -i 27

2019 Jul 10 07:55:04 switch %CARDCLIENT-5-MOD_BOOT_PRIMARY: Module 27 IOFPGA booted from Primary

IMPORTANT NOTE:

If you attempt to upgrade the Golden region of the FPGA once it is on the fixed version, the system will not automatically al-low you to upgrade the Golden region of SUP, and will provide the following prompt:

switch# install epld bootflash:n9000-epld.10.2.6.img module all golden

Digital signature verification is successful

Compatibility check:

Module Type Upgradable Impact Reason

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22 FM Yes disruptive Module Upgradable

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24	FM	Yes	disruptive	Module Upgradable
27	SUP	No	none	Golden Not Upgradable
28	SUP	No	none	Golden Not Upgradable
29	SC	Yes	disruptive	Module Upgradable
30	SC	Yes	disruptive	Module Upgradable

Retrieving EPLD versions.... Please wait.

Images will be upgraded according to following table:

Module	Type	EPLD	Running-Version	New-Version	Upg-Required
22	FM	IO FPGA	0x19	0x19	Yes
24	FM	IO FPGA	0x19	0x19	Yes
29	SC	IO FPGA	0x17	0x20	Yes
30	SC	IO FPGA	0x17	0x20	Yes

Module 27 (EPLD ver 0x29) Golden upgrade not supported

Module 28 (EPLD ver 0x30) Golden upgrade not supported

The above modules require upgrade.

Since both System Controller modules need an upgrade,a chassis reload will happen at the end of the upgrade.

Do you want to continue (y/n) ? [n] y

Nexus 9000 and Nexus 3000 TOR:

Note: It is required to update both Golden and Primary regions of FPGA to address this particular vulnerability. It is by design, that we don't allow updating both primary and golden at the same time (to avoid programming errors, that may cause switch to not boot, hence only one region is allowed to be programmed per reload).

Please do not attempt to upgrade Golden region of FPGA once it is on a fixed version.

1. Copy the EPLD image to bootflash (e.g. used n9000-epld.10.2.6.img).
2. Update the Primary FPGA region.

install epld bootflash:n9000-epld.10.2.6.img module 1

Expected result: Switch will update EPLD and will reload automatically. Please don't interrupt, power cycle or reload when EPLD update is happening. Switch would boot up with golden FPGA, ‘show version module 1 epld’ would show the old Fpga version for IO, due to this. This is expected.

show version module 1 epld

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Name InstanceNum Version Date

IO FPGA 0 0x06 20180920

MI FPGA 0 0x01 20170609

BIOS version v01.14(06/15/2019)

Alternate BIOS version v01.12(07/25/2018)

You can verify this from syslog which would say:

%CARDCLIENT-5-MOD_BOOT_GOLDEN: Module 1 IOFPGA booted from Golden

%CARDCLIENT-2-FPGA_BOOT_GOLDEN: IOFPGA booted from Golden

3. Update the Golden (also called backup) FPGA region.

install epld bootflash:n9000-epld.10.2.6.img module 1 golden

Expected result: Switch will update EPLD and will reload automatically. Please don't interrupt, power cycle or reload when EPLD update is happening.

Once this is done, when you check 'show version module 1 epld' you will see FPGA version that is >= to the fixed version.

show version module 1 epld

Name InstanceNum Version Date

IO FPGA 0 0x07 20180920

MI FPGA 0 0x01 20170609

BIOS version v01.14(06/15/2019)

Alternate BIOS version v01.12(07/25/2018)

After uprade is complete, switch should boot up with primary, shown logs below

show logging log | grep -i fpga

2019 Jul 9 19:46:11 Deervalley4 %CARDCLIENT-2-FPGA_BOOT_PRIMARY: IOFPGA booted from Primary

2019 Jul 9 19:46:11 Deervalley4 %CARDCLIENT-2-FPGA_BOOT_PRIMARY: MIFPGA booted from Primary

2019 Jul 9 19:46:11 Deervalley4 %CARDCLIENT-5-MOD_BOOT_PRIMARY: Module 1 IOFPGA booted from Primary

2019 Jul 9 19:46:11 Deervalley4 %CARDCLIENT-5-MOD_BOOT_PRIMARY: Module 1 MIFPGA booted from Primary

Note: For N3K-C36180YC-R and N3K-C3636C-R, CPU FPGA will have the fix, so look for CPU FPGA instead of IO.

Table 3. Available EPLD Images for the Cisco Nexus 9200, 9300, 9300-EX, and 9300-FX Platform Switches

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Switch or Uplink Module	EPLD Device	Release 10.2(2)	Release 10.2(3)	Release 10.2(4)	Release 10.2(5)	Release 10.2(6)
Cisco Nexus 92348GC-X (N9K-C92348GC-X)	IOFPGA	0x14 (0.020)	0x14 (0.020)	0x14 (0.020)	0x14 (0.020)	0x14 (0.020)
Cisco Nexus 93108TC-EX (N9K-C93108TC-EX)	IOFPGA	0x15 (0.021)	0x15 (0.021)	0x15 (0.021)	0x15 (0.021)	0x15 (0.021)
	MIFPGA	0x2 (0.002)	0x2 (0.002)	0x2 (0.002)	0x2 (0.002)	0x2 (0.002)
Cisco Nexus 93108TC-FX (N9K-C93108TC-FX)	IOFPGA	0x22 (0.034)	0x22 (0.034)	0x22 (0.034)	**0x23(0.035)**	0x23(0.035)
	MIFPGA	0x3 (0.003)	0x3 (0.003)	0x3 (0.003)	0x3 (0.003)	0x3 (0.003)
Cisco Nexus 93108TC2-FX (N9K-C93108TC2-FX)	IOFPGA	0x22 (0.034)	0x22 (0.034)	0x22 (0.034)	0x22 (0.034)	0x22 (0.034)
	MIFPGA	0x3 (0.003)	0x3 (0.003)	0x3 (0.003)	0x3 (0.003)	0x3 (0.003)
Cisco Nexus 9316D-GX (N9K-C9316D-GX)	IOFPGA	0x15 (0.021)	0x15 (0.021)	0x18 (0.024)	0x18 (0.024)	0x18 (0.024)
	MIFPGA	0x6 (0.006)	0x6 (0.006)	0x6 (0.006)	0x6 (0.006)	0x6 (0.006)
Cisco Nexus 93180YC-FX3 (N9K-C93180YC-FX3)	IOFPGA	0x12 (0.018)	0x12 (0.018)	0x12 (0.018)	0x12 (0.018)	**0x13 (0.019)**[1]
	MIFPGA	0x16 (0.021)	**0x18 (0.024)**	0x18 (0.024)	0x18 (0.024)	0x18 (0.024)
Cisco Nexus 93180YC-FX3S (N9K-C93180YC-FX3S)	IOFPGA	0x12 (0.018)	0x12 (0.018)	0x12 (0.018)	0x12 (0.018)	**0x13 (0.019)**[1]
	MIFPGA	0x15 (0.022)	**0x17 (0.021)**	0x17 (0.021)	0x17 (0.021)	0x17 (0.021)
Cisco Nexus 93180YC-EX (N9K-C93180YC-EX)	IOFPGA	0x15 (0.021)	0x15 (0.021)	0x15 (0.021)	0x15 (0.021)	0x15 (0.021)
	MIFPGA	0x4 (0.004)	0x4 (0.004)	0x4 (0.004)	0x4 (0.004)	0x4 (0.004)
Cisco Nexus 93180YC-FX (N9K-C93180YC-FX)	IOFPGA	0x22 (0.034)	0x22 (0.034)	0x22 (0.034)	**0x23(0.035)**	0x23(0.035)
	MIFPGA	0x10 (0.016)	0x10 (0.016)	0x10 (0.016)	0x10 (0.016)	0x10 (0.016)
Cisco Nexus 93216TC-FX2 (N9K-C93216TC-FX2)	IOFPGA	0x16 (0.022)	0x16 (0.022)	0x16 (0.022)	0x16 (0.022)	0x16 (0.022)
	MIFPGA0	0x5 (0.005)	0x5 (0.005)	0x5 (0.005)	0x5 (0.005)	0x5 (0.005)
	MIFPGA1	0x5 (0.005)	0x5 (0.005)	0x5 (0.005)	0x5 (0.005)	0x5 (0.005)
Cisco Nexus 93240YC-FX2	IOFPGA	0x13 (0.019)	0x13 (0.019)	0x17 (0.023)	0x17 (0.023)	0x17 (0.023)

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Switch or Uplink Module	EPLD Device	Release 10.2(2)	Release 10.2(3)	Release 10.2(4)	Release 10.2(5)	Release 10.2(6)
(N9K-C93240YC-FX2)	MIFPGA1	0x12 (0.018)	0x12 (0.018)	0x12 (0.018)	0x12 (0.018)	0x12 (0.018)
	MIFPGA2	0x7 (0.007)	0x7 (0.007)	0x7 (0.007)	0x7 (0.007)	0x7 (0.007)
Cisco Nexus 9332C (N9K-C9332C)	IOFPGA	0x13 (0.019)	0x13 (0.019)	0x17 (0.023)	0x17 (0.023)	0x17 (0.023)
	MIFPGA	0x3 (0.003)	0x3 (0.003)	0x3 (0.003)	0x3 (0.003)	0x3 (0.003)
Cisco Nexus 9332D-GX2B (N9K-C9332D-GX2B)	IOFPGA	0x11 (0.017)	0x11 (0.017)	0x13 (0.019)	0x13 (0.019)	0x13 (0.019)
	MIFPGA	0x13 (0.019)	0x13 (0.019)	0x13 (0.019)	**0x14(0.020)**	0x14(0.020)
Cisco Nexus 9336C-FX2 (N9K-C9336C-FX2)	IOFPGA	0x13 (0.019)	0x13 (0.019)	**0x17 (0.023)**	0x17 (0.023)	0x17 (0.023)
	MIFPGA	0x5 (0.005)	0x5 (0.005)	0x5 (0.005)	0x5 (0.005)	0x5 (0.005)
Cisco Nexus 9336C-FX2-E (N9K-C9336C-FX2-E)	IOFPGA	0x10 (0.016)	0x10 (0.016)	**0x13 (0.019)**	0x13 (0.019)	0x13 (0.019)
	MIFPGA	0x5 (0.005)	0x5 (0.005)	0x5 (0.005)	0x5 (0.005)	0x5 (0.005)
Cisco Nexus 93360YC-FX2 (N9K-C93360YC-FX2)	IOFPGA	0x16 (0.022)	0x16 (0.022)	0x16 (0.022)	0x16 (0.022)	0x16 (0.022)
	MIFPGA0	0x4 (0.004)	0x4 (0.004)	0x4 (0.004)	0x4 (0.004)	0x4 (0.004)
	MIFPGA1	0x3 (0.003)	0x3 (0.003)	0x3 (0.003)	0x3 (0.003)	0x3 (0.003)
Cisco Nexus 9348GC-FXP (N9K-C9348GC-FXP)	IOFPGA	0x10 (0.016)	0x10 (0.016)	0x10 (0.016)	**0x13(0.019)**	**0x14 (0.020)**[1]
	MIFPGA	0x10 (0.016)	0x10 (0.016)	0x10 (0.016)	0x10 (0.016)	0x10 (0.016)
Cisco Nexus 9348GC-FXP (N9K-C9348GC2-FXP)	IOFPGA	0x10 (0.016)	0x10 (0.016)	0x10 (0.016)	0x10 (0.016)	0x10 (0.016)
	MIFPGA	0x3 (0.003)	0x3 (0.003)	0x3 (0.003)	0x3 (0.003)	0x3 (0.003)
Cisco Nexus 93600CD-GX (N9K-C93600CD-GX)	IOFPGA	0x15 (0.021)	0x15 (0.021)	**0x18 (0.024)**	0x18 (0.024)	0x18 (0.024)
	MIFPGA	0x9 (0.009)	0x9 (0.009)	0x9 (0.009)	0x9 (0.009)	0x9 (0.009)
Cisco Nexus 9364C (N9K-C9364C)	IOFPGA	0x7 (0.007)	0x7 (0.007)	0x7 (0.007)	0x7 (0.007)	0x7 (0.007)
	MIFPGA0	0x11 (0.017)	0x11 (0.017)	0x11 (0.017)	0x11 (0.017)	0x11 (0.017)

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Switch or Uplink Module	EPLD Device	Release 10.2(2)	Release 10.2(3)	Release 10.2(4)	Release 10.2(5)	Release 10.2(6)
	MIFPGA1	0x4 (0.004)	0x4 (0.004)	0x4 (0.004)	0x4 (0.004)	0x4 (0.004)
Cisco Nexus 9364C-GX (N9K-C9364C-GX)	IOFPGA	0x6 (0.006)	0x6 (0.006)	0x6 (0.006)	0x6 (0.006)	0x6 (0.006)
	MIFPGA0	0x5 (0.005)	0x5 (0.005)	0x5 (0.005)	0x5 (0.005)	0x5 (0.005)
	MIFPGA1	0x4 (0.004)	0x4 (0.004)	0x4 (0.004)	0x4 (0.004)	0x4 (0.004)
N9K-C9364D-GX2A	IOFPGA	N/A	0x14(0.020)	0x14(0.020)	0x14(0.020)	**0x15 (0.021)** [1]
	MIFPGA0	N/A	0x23(0.035)	0x23(0.035)	0x23(0.035)	0x23(0.035)
	MIFPGA1	N/A	0x11(0.017)	**0x14(0.020)**	0x14(0.020)	0x14(0.020)
N9K-C9348D-GX2A	IOFPGA	N/A	0x16(0.022)	0x16(0.022)	0x16(0.022)	0x16(0.022)
	MIFPGA0	N/A	0x8(0.008)	0x8(0.008)	**0x10(0.016)**	0x10(0.016)
	MIFPGA1	N/A	0x5(0.005)	0x5(0.005)	**0x7(0.007)**	0x7(0.007)
N9K-C93108TC-FX3P	IOFPGA	0x8(0.008)	0x8(0.008)	0x8(0.008)	0x8(0.008)	0x8(0.008)
	MIFPGA	0x9(0.009)	0x9(0.009)	**0x10(0.016)**	0x10(0.016)	0x10(0.016)

1. Clock stretch bug fix (don't drive low at the end of clock stretch) to prevent PSU flap issue caused by slow SCL rise time.

Table 4. Available EPLD Images for the Cisco Nexus 9500 Platform Switches

Component	EPLD Device	Release 10.2(2)	Release 10.2(3)	Release 10.2(4)	Release 10.2(5)	Release 10.2(6)
Supervisor A (N9K-SUP-A)	IOFPGA	0x31 (0.049)	0x31 (0.049)	0x31 (0.049)	**0x32(0.050)**	**0x32(0.050)**
Supervisor A+ (N9K-SUP-A+)	IOFPGA	0x17 (0.023)	0x17 (0.023)	**0x18 (0.024)**	0x18 (0.024)	0x18 (0.024)
Supervisor B (N9K-SUP-B)	IOFPGA	0x30 (0.048)	0x30 (0.048)	0x30 (0.048)	0x30 (0.048)	0x30 (0.048)
Supervisor B+ (N9K-SUP-B+)	IOFPGA	0x17 (0.023)	0x17 (0.023)	**0x18 (0.024)**	0x18 (0.024)	0x18 (0.024)
System Controller (N9K-SC-A)	IOFPGA	0x22 (0.034)	0x22 (0.034)	0x22 (0.034)	0x22 (0.034)	0x22 (0.034)
32-port 100-Gigabit QSFP28 line card (N9K-X9432C-S)	IOFPGA	0x14 (0.020)	0x14 (0.020)	0x14 (0.020)	0x14 (0.020)	0x14 (0.020)
	MIFPGA	0x4 (0.004)	0x4 (0.004)	0x4 (0.004)	0x4 (0.004)	0x4 (0.004)
32-port 100-Gigabit QSFP28 line card	IOFPGA	0x13 (0.019)	0x13 (0.019)	0x13 (0.019)	0x13 (0.019)	0x13 (0.019)

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Component	EPLD Device	Release 10.2(2)	Release 10.2(3)	Release 10.2(4)	Release 10.2(5)	Release 10.2(6)
(N9K-X9732C-EX) (for -E fabric modules)	MIFPGA	0x9 (0.009)	0x9 (0.009)	0x9 (0.009)	0x9 (0.009)	0x9 (0.009)
32-port 100-Gigabit QSFP28 line card (N9K-X9732C-EXM) (for -E fabric modules)	IOFPGA	0x11 (0.017)	0x11 (0.017)	0x11 (0.017)	0x11 (0.017)	0x11 (0.017)
	MIFPGA	0x5 (0.005)	0x5 (0.005)	0x5 (0.005)	0x5 (0.005)	0x5 (0.005)
36-port 100-Gigabit QSFP28 line card (N9K-X9732C-FX)	IOFPGA	0x7 (0.007)	0x7 (0.007)	0x7 (0.007)	0x7 (0.007)	0x7 (0.007)
	MIFPGA	0x2 (0.002)	0x2 (0.002)	0x2 (0.002)	0x2 (0.002)	0x2 (0.002)
16-port 400-Gigabit QSFP-DD line card (N9K-X9716D-GX)	IOFPGA	0x9 (0.009)	0x9 (0.009)	0x9 (0.009)	0x9 (0.009)	0x9 (0.009)
	MIFPGA	0x9 (0.009)	0x9 (0.009)	0x9 (0.009)	**0x10(0.016)**	**0x11 (0.017)**[1]
36-port 100-Gigabit QSFP28 line card (N9K-X9736C-EX)	IOFPGA	0x13 (0.019)	0x13 (0.019)	**0x14 (0.020)**	0x14 (0.020)	0x14 (0.020)
	MIFPGA	0x9 (0.009)	0x9 (0.009)	0x9 (0.009)	0x9 (0.009)	0x9 (0.009)
36-port 100-Gigabit QSFP28 line card (N9K-X9736C-FX)	IOFPGA	0x7 (0.007)	0x7 (0.007)	**0x11 (0.017)**	**0x12(0.018)**	0x12(0.018)
	MIFPGA	0x7 (0.007)	0x7 (0.007)	0x7 (0.007)	0x7 (0.007)	0x7 (0.007)
48-port 1/10GBASE-T and 4-port 40-Gigabit QSFP+ line card (N9K-X9464TX)	IOFPGA	0x9 (0.009)	0x9 (0.009)	0x9 (0.009)	0x9 (0.009)	0x9 (0.009)
	MIFPGA	0x8 (0.008)	0x8 (0.008)	0x8 (0.008)	0x8 (0.008)	0x8 (0.008)
48-port 1-/10-/25-Gigabit SFP28 and 4-port 40-/100-Gigabit QSFP28 line card (N9K-X97160YC-EX)	IOFPGA	0x12 (0.018)	0x12 (0.018)	**0x15 (0.021)**	0x15 (0.021)	0x15 (0.021)
	MIFPGA	0x5 (0.005)	0x5 (0.005)	0x5 (0.005)	0x5 (0.005)	0x5 (0.005)
48-port 10-Gigabit SFP+ and 4-port 100-Gigabit QSFP28 line card (N9K-X9788TC-FX)	IOFPGA	0x4 (0.004)	0x4 (0.004)	**0x7 (0.007)**	0x7 (0.007)	0x7 (0.007)
	MIFPGA	0x6 (0.006)	0x6 (0.006)	0x6 (0.006)	0x6 (0.006)	0x6 (0.006)
48-port 10-Gigabit SFP+ and 4-port 100-Gigabit QSFP28 line card (N9K-X9788TC2-FX)	IOFPGA	0x6 (0.006)	0x6 (0.006)	0x6 (0.006)	0x6 (0.006)	0x6 (0.006)
	MIFPGA	0x3 (0.003)	0x3 (0.003)	0x3 (0.003)	0x3 (0.003)	0x3 (0.003)
Fabric module for Cisco Nexus 9504 100-Gigabit -EX line (N9K-C9504-FM-E)	IOFPGA	0x15 (0.021)	0x15 (0.021)	**0x18 (0.024)**	0x18 (0.024)	0x18 (0.024)
Fabric module for Cisco Nexus 9504 100-Gigabit -S line cards (N9K-C9504-FM-S)	IOFPGA	0x11 (0.017)	0x11 (0.017)	0x11 (0.017)	0x11 (0.017)	0x11 (0.017)

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Component	EPLD Device	Release 10.2(2)	Release 10.2(3)	Release 10.2(4)	Release 10.2(5)	Release 10.2(6)
Fabric module for Cisco Nexus 9508 100-Gigabit -EX line cards (N9K-C9508-FM-E)	IOFPGA	0x14 (0.020)	0x14 (0.020)	0x14 (0.020)	0x14 (0.020)	0x14 (0.020)
Fabric module for Cisco Nexus 9508 100-Gigabit -EX line (N9K-C9508-FM-E2)	IOFPGA	0x9 (0.009)	0x9 (0.009)	**0x12 (0.018)**	0x12 (0.018)	0x12 (0.018)
Fabric module for Cisco Nexus 9508 100-Gigabit -S line (N9K-C9508-FM-S)	IOFPGA	0x11 (0.017)	0x11 (0.017)	0x11 (0.017)	0x11 (0.017)	0x11 (0.017)
Fabric module for Cisco Nexus 9516 100-Gigabit -EX and -FX line cards (N9K-C9516-FM-E2)	MIFPGA	0x11 (0.011)	0x11 (0.011)	0x11 (0.011)	0x11 (0.011)	0x11 (0.011)
	IOFPGA	0x8 (0.008)	0x8 (0.008)	0x8 (0.008)	0x8 (0.008)	0x8 (0.008)

1. MTK retimer MDIO AT glitch fix. Fixed MDIO tri-state output logic.

Table 5. Available EPLD Images for the Cisco Nexus 9500 Platform Switches with R Line Cards

Component	EPLD Device	Release 10.2(2)	Release 10.2(3)	Release 10.2(4)	Release 10.2(5)	Release 10.2(6)
36-port 100-Gigabit QSFP28 line card (N9K-X9636C-RX)	IOFPGA	0x18 (0.024)	0x18 (0.024)	0x18 (0.024)	0x18 (0.024)	0x18 (0.024)
	MIFPGA	0x3 (0.003)	0x3 (0.003)	0x3 (0.003)	0x3 (0.003)	0x3 (0.003)
36-port 100-Gigabit QSFP28 line card (N9K-X9636C-R)	IOFPGA	0x12 (0.018)	0x12 (0.018)	0x12 (0.018)	0x12 (0.018)	0x12 (0.018)
	MIFPGA	0x9 (0.009)	0x9 (0.009)	0x9 (0.009)	0x9 (0.009)	0x9 (0.009)
36-port 40-Gigabit QSF+ line card (N9K-X9636Q-R)	IOFPGA	0x19 (0.025)	0x19 (0.025)	0x19 (0.025)	0x19 (0.025)	0x19 (0.025)
	MIFPGA	0x3 (0.003)	0x3 (0.003)	0x3 (0.003)	0x3 (0.003)	0x3 (0.003)
52-port 100-Gigabit -R line cards (N9K-X96136YC-R)	IOFPGA	0xD	0xD	0xD	0xD	0xD
	MIFPGA	0xF	0xF	0xF	0xF	0xF
	DBFPGA	0xE	0xE	0xE	0xE	0xE
Fabric module for Cisco Nexus 9504 100-Gigabit -R line cards	IOFPGA	0x7 (0.007)	0x7 (0.007)	0x7 (0.007)	0x7 (0.007)	0x7 (0.007)

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Component	EPLD Device	Release 10.2(2)	Release 10.2(3)	Release 10.2(4)	Release 10.2(5)	Release 10.2(6)
(N9K-C9504-FM-R)						
Fabric module for Cisco Nexus 9508 100-Gigabit -R line cards (N9K-C9508-FM-R)	IOFPGA	0x10 (0.016)	0x10 (0.016)	0x10 (0.016)	0x10 (0.016)	0x10 (0.016)

Determining Whether to Upgrade EPLD Images

EPLD image number, you can skip the upgrade.

- To determine the EPLD upgrades needed for a Cisco Nexus 9000 Series switch, use the **show install impact epld bootflash:** command on that switch and indicate the n9000-epld.10.2.6 image. In the following example, the MIFPGA, and IOFPGA EPLD images do not need to be upgraded.

switch# **show install all impact epld n9000-epld.10.2.6.img**

Retrieving EPLD versions.... Please wait.

Images will be upgraded according to following table:

```
Module  Type   EPLD            Running-Version   New-Version  Upg-Required
------  ----  -------------    ---------------  -----------  ------------
   1    LC  MI FPGA              0x0f       0x0f          No
   1    LC  IO FPGA              0x0d       0x0d          No
   1    LC  DB FPGA              0x0e       0x0e          No
  21     FM  IO FPGA             0x07       0x07          No
  27   SUP  IO FPGA              0x15       0x15          No
  28   SUP  IO FPGA              0x15       0x15          No
  29    SC  IO FPGA              0x20       0x20          No
  30    SC  IO FPGA              0x20       0x20          No
```

Compatibility check:

```
Module       Type       Upgradable       Impact   Reason
-----------------------------------------------
   1          LC         Yes      disruptive   Module Upgradable
  21          SUP         Yes      disruptive   Module Upgradable
  27          SUP         Yes      disruptive   Module Upgradable
  28          SUP         Yes      disruptive   Module Upgradable
  29           SC         Yes      disruptive   Module Upgradable
  30           SC         Yes      disruptive   Module Upgradable
```

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Upgrade During ISSU

This feature offers the option to upgrade EPLD images during disruptive system (NXOS) upgrade. You will designate the target EPLD image using the ISSU cli. The EPLD image will be validated during the pre-upgrade stage of the installation and the actual EPLD upgrade will be done before reloading the system. When the system comes back online, all EPLDs and NXOS system (including BIOS) will be upgraded to the new versions.

To upgrade your EPLD image using the ISSU cli, enter the EPLD image to be installed using the **install all nxos <nxos-image> epld <epld-image>** command.

For additional information about ISSU, please see the Cisco Nexus 9000 Series NX-OS Software Upgrade and Downgrade Guide.

Displaying the Status of EPLD Upgrades

To display the status of EPLD upgrades on the switch, use the show install epld status command.

Limitations

When EPLDs are upgraded, the following guidelines and observations apply:

- If a module is not online, you cannot upgrade its EPLD images.
- If there are two supervisors that are installed in the switch (Cisco Nexus 9504, 9508, and 9516 switches only), you can either upgrade only the standby or upgrade all modules (including both supervisor modules) by using the following commands:
    - **install epld bootflash:** image module standby-supervisor-slot-number (upgrades only the standby supervisor module)

Note: After you use this command, you can switchover the active and standby supervisor modules and then upgrade the other supervisor.

    - **install epld bootflash:** image module all (upgrades all of the modules)
- If there is only one supervisor that are installed in the switch, your upgrading or downgrading of EPLD images is disruptive.

Related Documentation

The entire Cisco NX-OS 9000 Series documentation set.

Release Notes

The entire Cisco NX-OS 9000 Series release notes set.

Documentation Feedback

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