

Secure Erase

Cisco trustworthy technologies provide product assurance functionality as well as foundational security capabilities that enhance the security and resilience of Cisco solutions. These technologies are adopted by Cisco Nexus 9000 switches used in a data center. Secure Erase is one of the Cisco Trustworthy technologies.

- Secure erase, on page 1
- Guidelines and limitations for secure erase, on page 2
- Perform a secure erase, on page 2
- Secure erase examples, on page 4

Secure erase

Secure erase is a security feature that

- erases all customer information on Nexus 9000 switches,
- performs a factory reset that clears environment variables, and
- is useful while returning a device or recovering a compromised device.

Cisco Nexus 9000 switches consume storage to conserve system software images, switch configuration, software logs, and operational history. These areas can have customer-specific information such as details regarding network architecture, and design as well as a potential target for data thefts.

Beginning with Cisco NX-OS Release 10.2(2)F, the Secure Erase feature is introduced to erase all customer information for Nexus 9000 switches. Secure Erase is an operation to remove all the identifiable customer information on Cisco NX-OS devices in conditions of product removal due to Return Merchandise Authorization (RMA), or upgrade or replacement, or system end-of-life.

Note Secure erase feature does not erase content in external storage.

The secure erase process is used in the following two scenarios:

- Return Material Authorization (RMA) for a device - If you must return a device to Cisco for RMA, remove all the customer-specific data before obtaining an RMA certificate for the device.

- Recovering the compromised device - If the key material or credentials that are stored on a device is compromised, reset the device to factory configuration, and then reconfigure the device.

The device reloads to perform a factory reset which results in the EoR chassis modules to enter the power down mode. After a factory reset, the device clears all configuration, logs, and storage information.

Guidelines and limitations for secure erase

Ensure that you read the guidelines and limitations before performing secure erase.

FEX mode

- If you perform secure erase in FEX mode, the switch boots in TOR mode after completion of the secure erase operation.
- If you configure secure erase of a FEX, factory reset is initiated and FEX configuration is removed.
- Always monitor FEX secure erase using the FEX console. If failure occurs, reboot, bring up FEX, and initiate secure erase again.

Software patches

- Software patches installed on the device are not restored after the secure erase operation.

General guidelines and limitations

- If the **factory-reset** command is issued through a session, the session is not restored after the completion of the factory reset process.
- The top of rack switches and supervisor modules return to the loader prompt.
- End of row switch modules remain in a powered-down state.

Feature support

- Starting from 10.2(2)F, Secure Erase feature is introduced in NX-OS, and 9300-FX3, -FX3S, and -FX3P switches are supported in TOR and FEX mode.
- Beginning with Cisco NX-OS Release 10.4(1)F, Secure Erase is supported on N9K-C9332D-H2R switch.
- Beginning with Cisco NX-OS Release 10.4(2)F, Secure Erase is supported on N9K-C93400LD-H1 switch.
- Beginning with Cisco NX-OS Release 10.4(3)F, Secure Erase is supported on N9K-C9364C-H1 switch.

Perform a secure erase

Use the secure erase procedure to delete all the necessary data before shipping to RMA.

Note Parallel secure erase operations are not supported.

To erase multiple modules in a single EoR chassis, the recommended order is: line card, fabric, standby supervisor, system controller, and then active supervisor.

Before you begin

- Ensure that you back up all the software images, configurations, and personal data.
- Ensure that there is an uninterrupted power supply while performing secure erase.
- Ensure that In-Service Software Upgrade (ISSU) or In-Service Software Downgrade (ISSD) is not in progress.

Procedure

Use the **factory-reset module** *mod* command to perform a factory reset. You can also use the command with **all** option. To use the factory reset command, no system configuration is required.

Example:

```
switch(config)# factory-reset [module <3>]
```

To secure erase FEX, use the **factory-reset fex** [*all fex_no*] command. To secure erase all FEX at once, use the **all** option.

Note
Ensure that the FEX is not in Active-Active scenario, before initiating secure erase operation.

Additional options

Use the option **mod** to reset the start-up configurations:

- For top of rack switches, use the **factory-reset** or **factory-reset module 1** command.
- For top of rack switches in LXC mode, use the **factory-reset module 1** or **27** command.
- For end of row module switches, use the [{ **module** < *module* > [**bypass-secure-erase**] [**preserve-image**]}] command.

  Beginning with Cisco NX-OS Release 10.2(3), the following options are supported for the factory-reset command:

  - **bypass-secure-erase** : Use this option when secure data removal is not required (repartition and reformat storage only).

    preserve-image : This option preserves the running image and autoboots after the completion of erase operations.

After the factory reset process is successfully completed, the switch reboots automatically and powers down. All data specified for secure erase is removed.

What to do next

You can boot the secure erase image to trigger the data wipe.

Secure erase examples

This section comprises examples of secure erase factory reset command and FEX logs.

This is an example output for configuring secure erase factory reset command.

```
FX2-2- switch#
FX2-2- switch# show fex
FEX              FEX              FEX              FEX
Number          Description      State            Model
Serial
------------------------------------------------------------------------
109             FEX0109          Online          N2K-C2348TQ-10GE
FOC1816R0F2
110             FEX0110          Online          N2K-C2348TQ-10G-E
FOC2003R1SQ
```

```
FX2-2-switch# factory-reset fex all
!!!! WARNING:
This command will perform factory-reset of all FEX modules !!!!
The factory reset operation will erase ALL persistent storage on the specified FEX module.
This includes configuration, all log data, and the full contents of flash and SSDs.
Special steps are taken in an effort to render data non-recoverable. Please, proceed with
caution and understanding that this operation cannot be undone and will leave the system
in a fresh-from-factory state.
!!!! WARNING !!!!

Do you want to continue? (y/n) [n] y
Initiating factory-reset for the FEX: 109 --- SUCCESS!!
FEX: 109 is reloading for the reset operation to proceed.
Factory reset may take time...
Please, wait and do not power off the FEX...
Trying to remove the FEX:109 config !!!
Initiating factory-reset for the FEX: 110 --- SUCCESS!!
FEX: 110 is reloading for the reset operation to proceed.
Factory reset may take time...
Please, wait and do not power off the FEX...
Trying to remove the FEX:110 config !!!
Successfully removed FEX:110 config. !!!
```

This is an example of FEX log.

```
FX2-2-switch# 2021
FEX console logs:
================
bgl-ads-4157:138> telnet 10.127.118.15 2007
Trying 10.127.118.15...
Connected to 10.127.118.15.
Escape character is '^]'.

fex-109#
fex-109# [129266.313614] writing reset reason 9, Factory-reset requested by abc
[129266.391801] Restarting system - Factory-reset requested by abc [9]
U-Boot 2011.12 (Jun 25 2014 - 16:28:41) Cisco Systems
CPU0: P1020E, Version: 1.1, (0x80ec0011)
Core: E500, Version: 5.1, (0x80212051)
Clock Configuration:
CPU0:666.667 MHz, CPU1:666.667 MHz,
CCB:333.333 MHz,
```

```
DDR:333.333 MHz (666.667 MT/s data rate) (Asynchronous), LBC:83.333 MHz
L1: D-cache 32 kB enabled
I-cache 32 kB enabled
Board: P1020FEX
[MCPSUMR 0x00000000, RSTRSCR 0x00000000, AUTORSTSR 0x0000c000]
I2C buses: ready
Golden image
U-boot retry count 0
Jump to upgradeable image at 0xefd20040
U-Boot 2011.12 (Jun 25 2014 - 16:19:54) Cisco Systems
CPU0: P1020E, Version: 1.1, (0x80ec0011)
Core: E500, Version: 5.1, (0x80212051)
Clock Configuration:
CPU0:666.667 MHz, CPU1:666.667 MHz,
CCB:333.333 MHz,
DDR:333.333 MHz (666.667 MT/s data rate) (Asynchronous), LBC:83.333 MHz
L1: D-cache 32 kB enabled
I-cache 32 kB enabled
Board: P1020FEX
[MCPSUMR 0x00000000, RSTRSCR 0x00000000, AUTORSTSR 0x0000c000]
I2C buses: ready
Upgradeable image
DRAM: Configuring DDR for 666.667 MT/s data rate
Time-out count = 480
DDR configuration get done
1 GiB (DDR3, 32-bit, CL=6, ECC on)
Memory test from 0x40000 to 0x1fdfffff
Data line test.................. OK
Address line test.............. OK
OK
Flash: 288 MiB
L2: 256 KB enabled
Set dbglevel to its default value (0x1)
PCIe1: Root Complex of mini PCIe SLOT, x1, regs @ 0xffe0a000
PCIe1: Bus 00 - 01
PCIe2: Root Complex of PCIe SLOT, no link, regs @ 0xffe09000
PCIe2: Bus 02 - 02
Net: eTSEC1, eTSEC3
Hit Ctrl-L to stop autoboot: 0
WARN: user forced bootcmd="run sysboot"
.. WARNING: adjusting available memory to 30000000
## Booting kernel from Legacy Image at 01000000 ...
Image Name: Linux-2.6.27.47
Created: 2015-11-20 10:22:39 UTC
Image Type: PowerPC Linux Kernel Image (gzip compressed)
Data Size: 8936305 Bytes = 8.5 MiB
Load Address: 00000000
Entry Point: 00000000
Verifying Checksum ... OK
## Flattened Device Tree blob at 00c00000
Booting using the fdt blob at 0x00c00000
Uncompressing Kernel Image ... OK
Loading Device Tree to 03ffb000, end 03fffe82 ... OK
setup_arch: bootmem
mpc85xx_fex_setup_arch()
arch: exit
[0.436112] Host controller irq 17
[0.477490] pci 0000:00:00.0: ignoring class b20 (doesn't match header type 01)
[0.566841] Assign root port irq 17 for 0000:00:00.0
[2.210329] Enabling all PCI devices
[2.802226] FSL:i2c-mpc - probing i2c controller
modprobe: FATAL: Could not load /lib/modules/2.6.27.47/modules.dep: No such file or directory
[2.975494] FSL:i2c-mpc - probing i2c controller
modprobe: FATAL: Could not load /lib/modules/2.6.27.47/modules.dep: No such file or directory
```

```
modprobe: FATAL: Could not load /lib/modules/2.6.27.47/modules.dep: No such file or directory
modprobe: FATAL: Could not load /lib/modules/2.6.27.47/modules.dep: No such file or directory
modprobe: FATAL: Could not load /lib/modules/2.6.27.47/modules.dep: No such file or directory
modprobe: FATAL: Could not load /lib/modules/2.6.27.47/modules.dep: No such file or directory
modprobe: FATAL: Could not load /lib/modules/2.6.27.47/modules.dep: No such file or directory
modprobe: FATAL: Could not load /lib/modules/2.6.27.47/modules.dep: No such file or directory
[3.889037]
[3.889041] Watchdog init<0>
Mount failed for selinuxfs on /selinux: No such file or directory
INIT: version 2.86 booting
Setting system clock: [ OK ]
Mounting all filesystems: [ OK ]
/sbin/dhclient-script: configuration for eth1 not found. Continuing with defaults.
/etc/sysconfig/network-scripts/network-functions: line 78: eth1: No such file or directory
Mounting system image: [ OK ]
Unpacking system image: [ OK ]
Uncompressing system image: [ OK ]
Loading system image: [ OK ]
net.ipv4.ip_forward = 0
net.ipv4.ip_default_ttl = 64
net.ipv4.ip_no_pmtu_disc = 1
Starting internet superserver: inetd [ OK ]
net.core.rmem_max = 524288
net.core.wmem_max = 524288
net.core.rmem_default = 524288
net.core.wmem_default = 524288
net.core.somaxconn = 1024
net.core.netdev_max_backlog = 1024
modprobe: FATAL: Could not load /lib/modules/2.6.27.47/modules.dep: No such file or directory
[23.255118] Device eth0 configured with sgmii interface
Non issu restart
[24.151321]
[24.151327] base_addr is 26524<0>
Secure erase requested! Please, do not power off module!
Starting the secure erase. !!
This may take time. Please wait !!
>>>> Wiping all storage devices ...
[28.706882] NX-OS starts punching watchdog
grep: Backu: No such file or directory
+++ Starting mtd secure erase for the partition /dev/mtd2 +++
Erasing /dev/mtd2 ...
Erasing 128 Kibyte @ 17e0000 -- 99 % complete.
---> SUCCESS
Writing random data onto /dev/mtd2
Filling /dev/mtd2 using random data ...
Erasing blocks: 192/192 (100%)
Writing data: 24576k/24576k (100%)
Verifying data: 24576k/24576k (100%)
---> SUCCESS
Erasing /dev/mtd2 ...
Erasing 128 Kibyte @ 17e0000 -- 99 % complete.
---> SUCCESS
+++ Skipping cmos secure erase +++
>>>> Done
+++ Skipping nvram secure erase +++
>>>> Done
>>>> Iniatilzing system to factory defaults ...
+++ Starting init-system +++
Initializing /dev/mtd5
/isan/bin/mount_jffs2.sh: line 68: ${LOG_FILE}: ambiguous [ 651.954326] Restarting system.
U-Boot 2011.12 (Jun 25 2014 - 16:28:41) Cisco Systems
CPU0: P1020E, Version: 1.1, (0x80ec0011)
Core: E500, Version: 5.1, (0x80212051)
Clock Configuration:
```

```
CPU0:666.667 MHz, CPU1:666.667 MHz,
CCB:333.333 MHz,
DDR:333.333 MHz (666.667 MT/s data rate) (Asynchronous), LBC:83.333 MHz
L1: D-cache 32 kB enabled
I-cache 32 kB enabled
Board: P1020FEX
[MCPSUMR 0x00000000, RSTRSCR 0x00000000, AUTORSTSR 0x0000c000]
I2C buses: ready
Golden image
U-boot retry count 1
Jump to upgradeable image at 0xefd20040
U-Boot 2011.12 (Jun 25 2014 - 16:19:54) Cisco Systems
CPU0: P1020E, Version: 1.1, (0x80ec0011)
Core: E500, Version: 5.1, (0x80212051)
Clock Configuration:
CPU0:666.667 MHz, CPU1:666.667 MHz,
CCB:333.333 MHz,
DDR:333.333 MHz (666.667 MT/s data rate) (Asynchronous), LBC:83.333 MHz
L1: D-cache 32 kB enabled
I-cache 32 kB enabled
Board: P1020FEX
[MCPSUMR 0x00000000, RSTRSCR 0x00000000, AUTORSTSR 0x0000c000]
I2C buses: ready
Upgradeable image
DRAM: Configuring DDR for 666.667 MT/s data rate
Time-out count = 480
DDR configuration get done
1 GiB (DDR3, 32-bit, CL=6, ECC on)
Memory test from 0x40000 to 0x1fdfffff
Data line test..... OK
Address line test..... OK
OK
Flash: 288 MiB
L2: 256 KB enabled
Set dbglevel to its default value (0x1)
PCIe1: Root Complex of mini PCIe SLOT, x1, regs @ 0xffe0a000
PCIe1: Bus 00 - 01
PCIe2: Root Complex of PCIe SLOT, no link, regs @ 0xffe09000
PCIe2: Bus 02 - 02
Net: eTSEC1, eTSEC3
Hit Ctrl-L to stop autoboot: 0
WARN: user forced bootcmd="run sysboot"
.. WARNING: adjusting available memory to 30000000
## Booting kernel from Legacy Image at 01000000 ...
Image Name: Linux-2.6.27.47
Created: 2015-11-20 10:22:39 UTC
Image Type: PowerPC Linux Kernel Image (gzip compressed)
Data Size: 8936305 Bytes = 8.5 MiB
Load Address: 00000000
Entry Point: 00000000
Verifying Checksum ... OK
## Flattened Device Tree blob at 00c00000
Booting using the fdt blob at 0x00c00000
Uncompressing Kernel Image ... OK
Loading Device Tree to 03ffb000, end 03fffe82 ... OK
setup_arch: bootmem
mpc85xx_fex_setup_arch()
arch: exit
[ 0.436112] Host controller irq 17
[ 0.477490] pci 0000:00:00.0: ignoring class b20 (doesn't match header type 01)
[ 0.566841] Assign root port irq 17 for 0000:00:00.0
[ 2.210556] Enabling all PCI devices
[ 2.804559] FSL:i2c-mpc - probing i2c controller
modprobe: FATAL: Could not load /lib/modules/2.6.27.47/modules.dep: No such file or directory
```

```
[ 2.975502] FSL:i2c-mpc - probing i2c controller
modprobe: FATAL: Could not load /lib/modules/2.6.27.47/modules.dep: No such file or directory
modprobe: FATAL: Could not load /lib/modules/2.6.27.47/modules.dep: No such file or directory
modprobe: FATAL: Could not load /lib/modules/2.6.27.47/modules.dep: No such file or directory
modprobe: FATAL: Could not load /lib/modules/2.6.27.47/modules.dep: No such file or directory
modprobe: FATAL: Could not load /lib/modules/2.6.27.47/modules.dep: No such file or directory
modprobe: FATAL: Could not load /lib/modules/2.6.27.47/modules.dep: No such file or directory
modprobe: FATAL: Could not load /lib/modules/2.6.27.47/modules.dep: No such file or directory
[ 3.889014]
[ 3.889018] Watchdog init<0>
Mount failed for selinuxfs on /selinux: No such file or directory
INIT: version 2.86 booting
Setting system clock: [ OK ]
Mounting all filesystems: [ OK ]
/sbin/dhclient-script: configuration for eth1 not found. Continuing with defaults.
/etc/sysconfig/network-scripts/network-functions: line 78: eth1: No such file or directory
Mounting system image: [ OK ]
Unpacking system image: [ OK ]
Uncompressing system image: [ OK ]
Loading system image: [ OK ]
net.ipv4.ip_forward = 0
net.ipv4.ip_default_ttl = 64
net.ipv4.ip_no_pmtu_disc = 1
Starting internet superserver: inetd [ OK ]
net.core.rmem_max = 524288
net.core.wmem_max = 524288
net.core.rmem_default = 524288
net.core.wmem_default = 524288
net.core.somaxconn = 1024
net.core.netdev_max_backlog = 1024
modprobe: FATAL: Could not load /lib/modules/2.6.27.47/modules.dep: No such file or directory
[ 22.630994] Device eth0 configured with sgmii interface
Non issu restart
[ 23.535827]
[ 23.535832] base_addr is 26524<0>
INIT: Entering runlevel: 3
fex login: Sorry, user root is not allowed to execute '/sbin/sysctl -q -w vm.drop_caches=3'
 as root on fex.
[ 28.090052] NX-OS starts punching watchdog
fex login:
```

This is an example output for configuring secure erase factory reset command on a module:

```
switch# factory-reset [all | module <mod>]
switch# factory-reset [module <3>]
!!!! WARNING !!!!
The factory reset operation will erase ALL persistent storage on the specified module.
This includes configuration, all log data, and the full contents of flash and SSDs.
Special steps are taken to render data non-recoverable. Please, proceed with caution and
understanding that this operation cannot be undone and will leave the system in a
fresh-from-factory state.
!!!! WARNING !!!!
Continue? (y/n) [n] y
A module reload is required for the reset operation to proceed. Please, wait...
…truncated…
Secure erase requested! Please, do not power off module!
>>>> Wiping all storage devices ...
+++ Starting mmc secure erase for /dev/mmcblk0 +++
*** Please, wait - this may take several minutes ***
\
---> SUCCESS
+++ Starting SSD secure erase for /dev/sda +++
*** Please, wait - this may take several minutes ***
\
---> SUCCESS
```

```
+++ Starting cmos secure erase +++
\
---> SUCCESS
>>>> Done
+++ Starting nvram secure erase +++
\
---> SUCCESS
>>>> Done
```

This is an example output log for configuring secure erase factory reset command on a line card.

```
switch# show mod
Mod    Ports        Module-Type                       Model        Status
----   ------     -------------------------------  -------------  ---------
1        32          32x40/100G Ethernet Module    N9K-X9732C-FX    ok
22        0           4-slot Fabric Module         N9K-C9504-FM-E   ok
24        0           4-slot Fabric Module         N9K-C9504-FM-E   ok
26        0           4-slot Fabric Module         N9K-C9504-FM-E   ok
27        0           Supervisor Module            N9K-SUP-B+       active *
28        0           Supervisor Module            N9K-SUP-B+       ha-standby
29        0           System Controller            N9K-SC-          active
30        0           System Controller            N9K-SC-          standby

Mod        Sw             Hw         Slot
----------------------------------------
1         10.2(1.196)     0.1070     LC1
22        10.2(1.196)     1.2        FM2
24        10.2(1.196)     1.2        FM4
26        10.2(1.196)     1.1        FM6
27        10.2(1.196)     1.0        SUP1
28        10.2(1.196)     1.2        SUP2
29        10.2(1.196)     1.4        SC1
30        10.2(1.196)     1.4        SC2

switch#
switch# factory-reset mod 1
!!!! WARNING !!!!
The factory reset operation will erase ALL persistent storage on the specified module.
This includes configuration, all log data, and the full contents of flash and SSDs.
Special steps are taken in an effort to render data non-recoverable.
Please, proceed with
caution and understanding that this operation cannot be undone and will leave the system
in
a fresh-from-factory state.
!!!! WARNING !!!!
Continue? (y/n) [n] y
A module reload is required for the reset operation to proceed. Please, wait...
reloading module 1 ...
.....................................................................
SUCCESS! All persistent storage devices detected on the specified module have been purged.

switch#
switch# show mod
Mod             Ports      Module-Type                    Model             Status
-------      ---------   ----------------------------    --------------    ------------
1                32        32x40/100G Ethernet Module    N9K-X9732C-FX       powered-dn
22                0            4-slot Fabric Module      N9K-C9504-FM-E        ok
24                0            4-slot Fabric Module      N9K-C9504-FM-E        ok
26                0            4-slot Fabric Module      N9K-C9504-FM-E        ok
27                0            Supervisor Module         N9K-SUP-B+           active *
28                0            Supervisor Module         N9K-SUP-B+           ha-standby
29                0            System Controller         N9K-SC-A             active
30                0            System Controller         N9K-SC-A             standby

Mod     Power-Status         Reason
```

```
------  ----------------    ------------
1         powered-dn        Configured Power down

Mod     Sw                 Hw         Slot
22      10.2(1.196)        1.2        FM2
24      10.2(1.196)        1.2        FM4
26      10.2(1.196)        1.1        FM6
27      10.2(1.196)        1.0        SUP1
28      10.2(1.196)        1.2        SUP2
29      10.2(1.196)        1.4        SC1
switch#
```

This is an example output log for configuring secure erase factory reset command on a module.

```
switch# factory-reset mod 26
!!!! WARNING !!!!
The factory reset operation will erase ALL persistent storage on the specified module.
This includes configuration, all log data, and the full contents of flash and SSDs.
Special steps are taken in an effort to render data non-recoverable.
Please, proceed with
caution and understanding that this operation cannot be undone and will leave the system
in
a fresh-from-factory state.
!!!! WARNING !!!!
Continue? (y/n) [n] y
A module reload is required for the reset operation to proceed. Please, wait...
reloading module 26 ...
.............................................................................
.........................
.............................................................................
.........................
.............................................................................
.........................
.............................................................................
.........................
.............................................................................
.........................
.............................................................................
.........................
...................................................................
SUCCESS! All persistent storage devices detected on the specified module have been cleared.
>>>> Please, note - multiple write passes were required to remove data from one or more
devices. <<<<

switch# show mod

Mod       Ports      Module-Type                 Model             Status
------  --------    ---------------------------  -------------    ------------
1         32         32x40/100G Ethernet Module  N9K-X9732C-FX     powered-dn
22         0         4-slot Fabric Module        N9K-C9504-FM-E     ok
24         0         4-slot Fabric Module        N9K-C9504-FM-E     ok
26         0         4-slot Fabric Module        N9K-C9504-FM-E    powered-dn

Mod         Power-Status       Reason
------     ---------------    ------------------------
1             powered-dn        Configured Power down
26            powered-dn        Configured Power down

Mod    Sw            Hw           Slot
----  ------       ---------    -----------
22    10.2(1.196)    1.2            FM2
24    10.2(1.196)    1.2            FM4
27    10.2(1.196)    1.0            SUP1
28    10.2(1.196)    1.2            SUP2
```

```
29    10.2(1.196)    1.4            SC1
switch#
```