

Statement of volatility and Sanitization instructions

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Product/Release

All Dell Networking PowerSwitch products.

Interoperability issues

None

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Introduction

This document provides two functions:

- Statement of volatility.
 - Describes memories on each product and their type.
- Sanitization Instructions.
 - Describes how to sanitize memory that is nonvolatile and potentially has customer data. Sanitization includes initializing the memory to a known state without any customer data.
 - Instructions to reinstall software back to factory defaults after sanitization has taken place.

Preparation steps

1. Download the appropriate images for your switch. These are located online.
2. Create a bootable ONIE USB flash drive which must be used after sanitization to reinstall the switch to factory defaults.

Sanitization steps

1. Download and extraction of the required firmware files to a local ONIE on the target switch.
2. Execution of commands to perform sanitization, depending on the memory types present in the switch.
3. Perform sanitization in the BIOS for certain memory types (Example: TPM)

Reinstall to factory defaults steps

1. Boot to an ONIE USB flash drive and install ONIE to the switch.
2. Use ONIE to reinstall the Diagnostics operating system, Diagnostics Tools, and the Network operating system (OS10 or Sonic).

Statement of Volatility: Networking Switch Memory Overview

The following table details memory types and their usage in Dell Networking Switches.

Where a memory is Nonvolatile and potentially holds User data (in bold in the table below) the user must sanitize those memories, and instructions are provided for doing so in this document.

Table 1. Memory types and usage

Description	Volatility	User data	How memory is used in the switch
CPU SDRAM	Volatile	Yes	Operating system, application code, and configuration data (in data structures).
SRAMs	Volatile	Yes	CPU Cache, NPU tables and buffers, and so on.
EEPROMs	Nonvolatile	No	Boot, manufacturing, and SW setup information.
FLASH	Nonvolatile	No	CPLD/FPGA bit file.
CPU BIOS Flash	Nonvolatile	Yes	Redundant BIOS code and BIOS NVRAM data.
BMC Boot Flash	Nonvolatile	Yes	Redundant BMC Boot images and BMC NVRAM data.
CPU-CMOS RTC	Nonvolatile	No	Battery backed real time clock and CPU configurations.
TPM	Nonvolatile	Yes	Stores certificates and user secrets.
NVME/Sata Solid State Drive	Nonvolatile	Yes	Network Operating system commissioning information (debug IP address SSH keys, and so on), logs, traces, and boot images, ONIE, and EDA-DIAG (switches without eMMC).
EMMC Solid State Drive	Nonvolatile	Yes	EDA-DIAG (systems with eMMC).
Optics	Nonvolatile	No	Some transceivers have an onboard DSP with an

Table 1. Memory types and usage (continued)

Description	Volatility	User data	How memory is used in the switch
			execution image that is loaded on them. DSPs can be upgraded using SW while inserted in the switch (now or in the future). They are inserted in the switch data ports.

Volatile indicates that the memory does not persist, if the power is removed, and can be ignored.

The following table shows the types of nonvolatile user data capable memory that may be present in each product, and for BIOS, which tool is used for sanitization.

Table 2. Memory types per product

Product	CPU BIOS Flash Tool	TPM	NVMe SSD	SATA SSD	EMMC SSD	BMC Flash
N32XX/E32XX	Updatetool	X (TAA-only)	-	X	X	-
S41XX	Flashrom	X (TAA-only)	-	X	-	-
S43XX	Updatetool	X (TAA-only)	-	X (SED OPAL)	-	X
S52XX	Updatetool	X (TAA-only)	-	X	X	X
S54XX	Updatetool	X (TAA-only)	-	X	X	X
Z91XX	Flashrom	X (TAA-only)	-	X	-	-
Z92XX	Updatetool	X (TAA-only)	-	X	X	X
Z94XX	Updatetool	X (TAA-only)	-	X	X	X
Z96XX	Updatetool	X (TAA-only)	-	X	X	X
Z98XX	Updatetool	X	X (SED OPAL)	-	X	X

TAA indicates that the Trusted Platform Module may or may not be present depending upon the SKU of the product. Instructions are provided to locate the TPM.

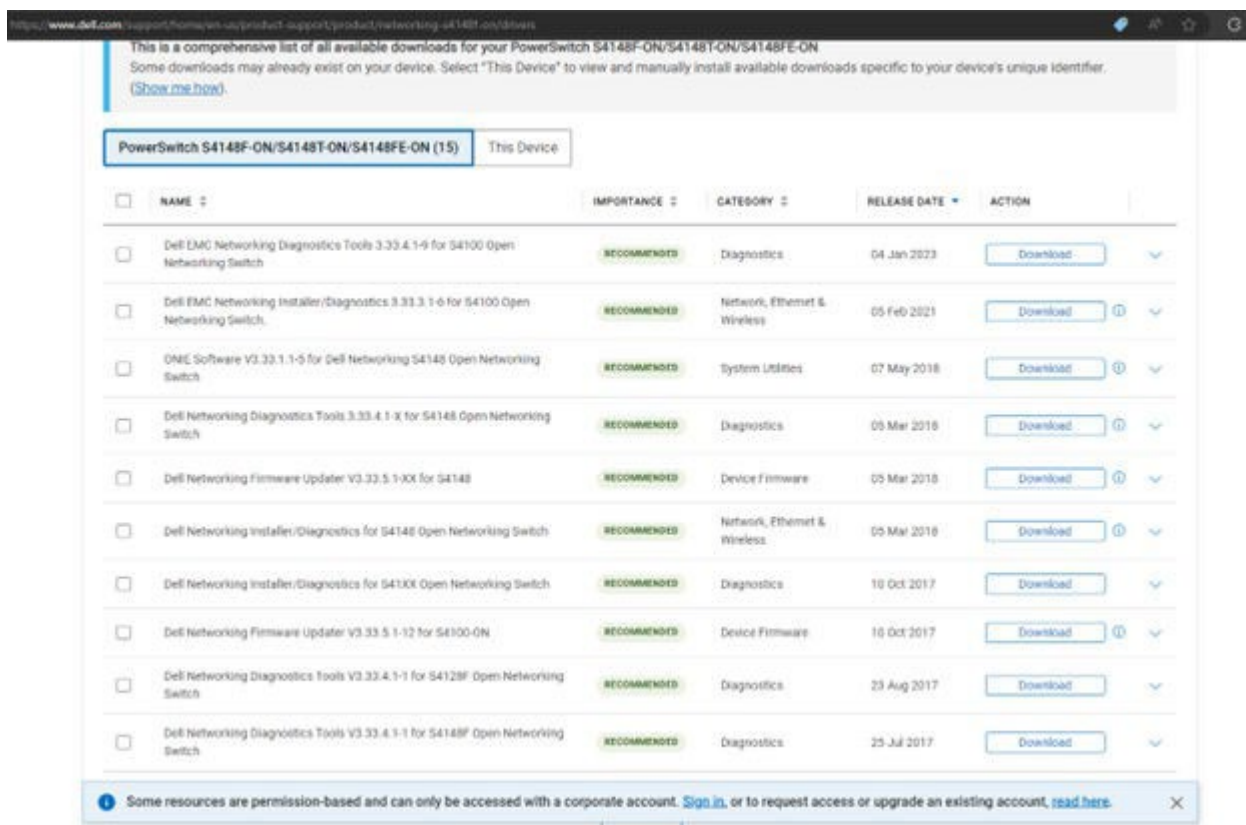
Sanitization and recovery file locations

To prepare for sanitization and recovery, you must download the following images for the respective product which are available on the [Dell support](#) site for each switch under the Drivers and Downloads section.

Table 3. Required software images

Image type	Description and usage
ONIE Recovery image	File to create ONIE recovery USB.
ONIE Firmware	File which has all the latest firmware and utilities to update firmware.
Diagnostics operating system image	Diagnostics operating system ONIE installer file.
Diagnostics tools	Diagnostics tools package.

An example of fetching these files for PowerSwitch S4148 is as follows.



Browse to the [Dell Driver and Downloads Page](#) for S4100-ON series, and locate and download the appropriate files.

NOTE: Examples in this document are shown with the S4100-ON Series images as mentioned in the table.

Table 4. S4100-ON example software images

Image	File name
ONIE recovery image	onie-recovery-x86_64-dellemc_s4100_c2338-r0.3.33.1.1-11.iso
ONIE firmware	onie-update-full-x86_64-dellemc_s4100_c2338-r0.3.33.5.1-26.bin
Diagnostics operating system image	diag-installer-x86_64-dellemc_s4100_c2338-r0-3.33.3.1-6-2024-02-05.bin
Diagnostics tools image	dn-diags-S4100-DiagOS-3.33.4.1-9-2024-11-01.deb

Create a bootable ONIE USB flash drive

You must first create a bootable ONIE flash drive for later use when you reinstall. The Sanitization process wipes the operating system, and the switch is only able to boot from this drive for recovery.

Two options are provided to create an ONIE Recovery USB flash drive, one by an existing switch with ONIE installed on it, the other using a Windows tool called Rufus. Choose the method that you prefer.

Create bootable ONIE USB flash drive using ONIE method

NOTE: The below example is shown using a Dell switch that is booted with ONIE. You must boot and select the existing ONIE partition using the GRUB menu.

NOTE: For ONIE installation on an SSD, a bootable ONIE USB is required with at least 8 GB capacity.

1. Copy the ONIE recovery file using SCP.

```
#scp username@remoteip:filepath
```

```
ONIE:/ # scp vamshidhar.varre@100.64.53.221:/tftboot/users/vamshidhar.varre/dia
g-installer-x86_64-dellemc_s4100_c2338-r0-3.33.3.1-6-2018-02-05.zip .
Host '100.64.53.221' is not in the trusted hosts file.
(ecdsa-sha2-nistp256 fingerprint md5 9b:78:e0:c1:6d:aa:7d:d6:7d:41:aa:4b:7f:db:a3:5e)
Do you want to continue connecting? (y/n) y
vamshidhar.varre@100.64.53.221's password:
/usr/local/bin/site: Command not found.
diag-installer-x86_64-dellemc_s4100_c2338-r0- 100% 165MB 549.7KB/s 05:07
ONIE:/ #
```

2. Extract the .zip file using the unzip utility.

```
#unzip filename.zip
```

```
ONIE:/ # unzip diag-installer-x86_64-dellemc_s4100_c2338-r0-3.33.3.1-6-2018-02-05.zip
Archive: diag-installer-x86_64-dellemc_s4100_c2338-r0-3.33.3.1-6-2018-02-05.zip
  inflating: diag-installer-x86_64-dellemc_s4100_c2338-r0-3.33.3.1-6-2018-02-05.bin
  inflating: diag-installer-x86_64-dellemc_s4100_c2338-r0-3.33.3.1-6-2018-02-05.bin.md5
  inflating: Generic-ON-HW-Diag-12032016_final.pdf
ONIE:/ #
```

The following steps describe how to create a bootable unified extensible firmware interface (UEFI) ONIE-based USB to install ONIE using Embed mode.

To install ONIE UEFI on your switch, use any existing ONIE-based switch to make an ONIE UEFI-based bootable USB. To make a bootable USB, use the ONIE ISO file (onie-recovery-x86_64-dellemc_s4100_c2338-r0.3.33.1.1-11.iso).

1. Power cycle and select ONIE while booting.
2. Boot the ONIE target in ONIE rescue mode.
3. Use ONIE rescue mode to make the ONIE UEFI-bootable USB. Use the up and down arrow keys to select. Press Enter to select an operating software-selected Operating System or enter e to edit the commands before booting. Enter c for a command line. The selected entry, displaying *, runs automatically in the operating system.

```
GNU GRUB version 2.02~beta2+e4a1fe391
```

```
+
|ONIE: Install OS
|*ONIE: Rescue
|ONIE: Uninstall OS
|ONIE: Update ONIE
|ONIE: Embed ONIE
|EDA-DIAG
|
|
|
+
```

4. Confirm that the switch can reach the network.
5. Copy the ONIE ISO image to the solid state drive (SSD) of the ONIE target.

```
ONIE:/ # wget ---quiet https://xx.xx.x.xxx/tftboot/users/<name>/onie-recovery-x86_64-
dell_s4100_c2338-r0.iso
```

To copy the image, you can use SCP, TFTP, or WGET (FTP or HTTPS).

```
Scp username@xx.xx.xxx.xxx:/tftboot/onie-recovery-x86_64-dell_s4100_c2338-r0.iso
```

6. Confirm that the ISO file copied to the SSD over the network.

```
ONIE:/ # ls -l
...
-rw-r---r-- -1 root 0 39780352 May 10 11:55 onie-recovery-x86_64-dell_s4100_c2338-
```

```
r0.iso  
...
```

7. Insert a blank USB in the ONIE target USB slot. Verify the USB block device using the ONIE logs.

```
Info: eth0: Checking link... scsi 6:0:0:0: Direct-Access Kingston DataTraveler 2.0  
1.00 PQ: 0 ANSI: 4  
sd 6:0:0:0: [sdb] 15148608 512-byte logical blocks: (7.75 GB/7.22 GiB)  
sd 6:0:0:0: [sdb] Write Protect is off  
sd 6:0:0:0: [sdb] Write cache: disabled, read cache: enabled, doesn't support DPO or  
FUA  
sd 6:0:0:0: [sdb] Attached SCSI removable disk
```

The logs show that the USB device is present: `/dev/sdb`. You can also check `/sys/block`.

```
ONIE:/ # cd /sys/block/sdbONIE:/sys/block/sdb # ls -l  
-r---r---r-- -l root 0 4096 May 10 13:12 alignment_offset  
lrwxrwxrwx 1 root 0 0 May 10 13:12 bdi -> ../../devices/virtual/bdi/8:16  
-r---r---r-- -l root 0 4096 May 10 13:12 capability  
-r---r---r-- -l root 0 4096 May 10 13:12 dev  
lrwxrwxrwx 1 root 0 0 May 10 13:12 device -> ../../devices/pci0000:00/0000:00:16.0/  
usb1/1-1/1-1.1/1-1.1.1/1-1.1.1:1.0/host6/target6:0:0/6:0:0:0  
...
```

8. Copy the ISO image to the USB using the `dd` command.

```
ONIE:/cd ~ # dd if=./onie-recovery-x86_64-dell_s4100_c2338-r0.iso of=/dev/sdb bs=10M  
3+1 records in  
3+1 records out  
39780352 bytes (37.9MB) copied, 6.890503 seconds, 5.5MB/s  
ONIE:/ #
```

9. Move the USB from the ONIE target—the switch with ONIE—to the USB slot in your switch—the switch without ONIE.

Create bootable ONIE USB flash drive using Rufus utility method

See the ONIE recovery section in the following document on how to use Rufus to create a bootable ONIE USB flash drive:

- [Dell Networking ONIE Technology Guide](#)

Sanitization procedure

First, boot to ONIE on the target switch, then install the required firmware, the firmware commands can be used to sanitize the unit.

Boot to ONIE on the target switch

Boot to ONIE on the target switch and select ONIE: Rescue from the Grub menu.


```

GNU GRUB  version 2.02~beta2+e4a1fe391

/-----/
| ONIE: Install OS
| *ONIE: Rescue
| ONIE: Uninstall OS
| ONIE: Update ONIE
| ONIE: Embed ONIE
| EDA-DIAG
|-----/

Use the ^ and v keys to select which entry is highlighted.
Press enter to boot the selected OS, 'e' to edit the commands
before booting or 'c' for a command-line.

```

Selecting the ONIE: Rescue option boots to an ONIE prompt from which you can install the appropriate tools for Sanitization. Now, you need the ONIE Firmware image that was downloaded earlier.

A .zip ONIE full firmware updater file is provided with a binary file and the md5 sum file, which helps to check the integration of the binary file.

Extracting the firmware and copying to the target switch.

Extract the .zip-file using unzip on the server or ONIE, example below:

```

12:51am ub20login-eqx-01[ /tftpboot/users/vamshidhar.varre ] $ unzip S41X8_FW_Updater_3.33.5.1-26.zip
Archive:  S41X8_FW_Updater_3.33.5.1-26.zip
  inflating: onie-update-full-x86_64-dellemc_s4100_c2338-r0.3.33.5.1-26.bin
  extracting: onie-update-full-x86_64-dellemc_s4100_c2338-r0.3.33.5.1-26.bin.md5
12:51am ub20login-eqx-01[ /tftpboot/users/vamshidhar.varre ] $

```

Or

For .tar file, Untar the file using a tar utility, example below:

```

ONIE:~ # tar xf onie-update-full-x86_64-dell_z9600-r0.3.54.5.1-6.tar
ONIE:~ # ls -lrt
-rw-r--r-- 1 1015 3012 76023671 Sep 19 22:37 onie-update-full-x86_64-dell_z9600-r0.3.54.5.1-6.bin
-rw-r--r-- 1 1015 3012 256 Sep 19 22:37 onie-update-full-x86_64-dell_z9600-r0.3.54.5.1-6.bin.sig
-rw-r--r-- 1 root 0 76032000 Feb 13 08:48 onie-update-full-x86_64-dell_z9600-r0.3.54.5.1-6.tar
ONIE:~ # █

```

Copy the onie-update-full-x86_64-dellemc_s4100_c2338-r0.xx.bin file (xx is the version of the file).

```

ONIE:/ # scp vamshidhar.varre@100.64.53.221:/tftpboot/users/vamshidhar.varre/onie-update-full-x86_64-dellemc_s4100_c2338-r0.3.33.5.1-26.bin .

vamshidhar.varre@100.64.53.221's password:
/usr/local/bin/site: Command not found.
onie-update-full-x86_64-dellemc_s4100_c2338-r 100% 32MB 535.8KB/s 01:01
ONIE:/ #

```

This step makes the file executable so you can run the extract function in the embedded shell script.

```
# chmod 777 onie-update-full-x86_64-dellemc_s4100_c2338-r0.3.33.5.1-26.bin
# ./onie-update-full-x86_64-dellemc_s4100_c2338-r0.3.33.5.1-26.bin -x
```

 **NOTE:** Notice this extracts the image and places it in a temporary location /tmp/tmp.aZLOik/.

```
# cd /tmp/tmp.aZLOik/
```

 **NOTE:** You may see a different directory name on the target switch name as it is randomly created.

Change the directory to the temporary location `/tmp/tmp.aZLOik/` installer and tar to extract the `onie-update.tar.xz` file.

```
# cd installer
# tar -xf onie-update.tar.xz
```

```
ONIE:/ # chmod 777 onie-update-full-x86_64-dellemc_s4100_c2338-r0.3.33.5.1-26.bi
n
ONIE:/ #
ONIE:/ # ./onie-update-full-x86_64-dellemc_s4100_c2338-r0.3.33.5.1-26.bin -x
Verifying image checksum ... OK.
Preparing image archive ... OK.
Image extracted to: /tmp/tmp.aZLOik
To un-mount the tmpfs when finished type: umount /tmp/tmp.aZLOik
ONIE:/ # cd /tmp/tmp.aZLOik
ONIE:/tmp/tmp.aZLOik # ls -lrt
drwxr-xr-x  4 1015  3012          200 Jun 28 03:27 installer
ONIE:/tmp/tmp.aZLOik # cd installer/
ONIE:/tmp/tmp.aZLOik/installer # ls
grub          install-arch      install.sh        onie-update.tar.xz
grub.d        install-platform  machine.conf      update-type
ONIE:/tmp/tmp.aZLOik/installer #
ONIE:/tmp/tmp.aZLOik/installer #
ONIE:/tmp/tmp.aZLOik/installer # tar -xf onie-update.tar.xz
ONIE:/tmp/tmp.aZLOik/installer # ls
grub          install-arch      machine.conf
grub.d        install-platform  onie-update.tar.xz
images       install.sh        update-type
ONIE:/tmp/tmp.aZLOik/installer #
```

This created an images directory, which holds the firmware updater shell archive and the ONIE updater.

```
# cd images
```

```
ONIE:/tmp/tmp.aZLOik/installer # cd images/
ONIE:/tmp/tmp.aZLOik/installer/images # ls -lrt
-rw-r--r--  1 1015  3012  13180791 Jul 20  2023 onie-updater-x86_64-dellemc_s4100_c2338-r0.3.33.1.1-11
-rw-r--r--  1 1015  3012  33271671 Jul 20  2023 onie-firmware-x86_64-dellemc_s4100_c2338-r0.3.33.5.1-26.bin
ONIE:/tmp/tmp.aZLOik/installer/images #
```

Extract the firmware files for the ONIE firmware updater. This step makes the file executable so you can run the extract function in the embedded shell script.

```
# chmod 777 onie-firmware-x86_64-dellemc_s4100_c2338-r0.3.33.5.1-26.bin
```

```
ONIE:/tmp/tmp.aZLOik/installer/images # chmod 777 onie-firmware-x86_64-dellemc_s
4100_c2338-r0.3.33.5.1-26.bin
ONIE:/tmp/tmp.aZLOik/installer/images #
```

```
# ./onie-firmware-x86_64-dellemc_s4100_c2338-r0.3.33.5.1-26.bin -x
```

 **NOTE:** This extracts the image and places it in a temporary location `/tmp/tmp.BI5Aqk`.

```
# cd /tmp/tmp.BI5Aqk
# cd installer/
# tar -xf onie-update.tar.xz
```

```

ONIE:/tmp/tmp.BI5Aqk/installer/images # ./onie-firmware-x86_64-dellemc_s4100_c2338-r0.3.33.5.1-26.bin -x
Verifying image checksum ... OK.
Preparing image archive ... OK.
Image extracted to: /tmp/tmp.BI5Aqk
To un-mount the tmpfs when finished type: umount /tmp/tmp.BI5Aqk
ONIE:/tmp/tmp.BI5Aqk/installer/images # cd /tmp/tmp.BI5Aqk
ONIE:/tmp/tmp.BI5Aqk # ls
installer
ONIE:/tmp/tmp.BI5Aqk # cd installer/
ONIE:/tmp/tmp.BI5Aqk/installer # ls
grub          install-arch  install.sh    machine.conf  update-type
grub.d        install-platform  installer.conf  onie-update.tar.xz
ONIE:/tmp/tmp.BI5Aqk/installer #
ONIE:/tmp/tmp.BI5Aqk/installer #
ONIE:/tmp/tmp.BI5Aqk/installer #
ONIE:/tmp/tmp.BI5Aqk/installer # tar -xf onie-update.tar.xz
ONIE:/tmp/tmp.BI5Aqk/installer #

```

The tar extracted the firmware directory. Now you have a firmware directory that you can perform sanitization functions from.

Sanitization operations

The following details sanitization operations for each memory type for your switch.

Sanitization of BIOS

```

# cd firmware
# cd bios

```

```

ONIE:/tmp/tmp.BI5Aqk/installer # cd firmware/
ONIE:/tmp/tmp.BI5Aqk/installer/firmware # ls -lrt
-rw-r--r--  1 1015    3012      220 Jul 20  2023 machine.conf
-rw-r--r--  1 1015    3012      175 Jul 20  2023 fw-version.make
-rwxr-xr-x  1 1015    3012    13114 Jul 20  2023 fw-install.sh
-rw-r--r--  1 1015    3012      249 Jul 20  2023 fw-component-version
drwxr-xr-x  2 1015    3012      120 Jun 28  03:35 sata
drwxr-xr-x  2 1015    3012      360 Jun 28  03:35 cpld
drwxr-xr-x  2 1015    3012      120 Jun 28  03:35 common_tools
drwxr-xr-x  2 1015    3012      320 Jun 28  03:35 bios
ONIE:/tmp/tmp.BI5Aqk/installer/firmware #
ONIE:/tmp/tmp.BI5Aqk/installer/firmware #
ONIE:/tmp/tmp.BI5Aqk/installer/firmware # cd bios
ONIE:/tmp/tmp.BI5Aqk/installer/firmware/bios # ls

```

Depending on the switch, flashrom or updatetool must be used to update the BIOS.

Flashrom method

For switches that use Flashrom follow these instructions:

1. Erase the BIOS from the flash, and program it with the latest version of the BIOS (S4100-BIOS-3.33.0.1-12.bin).

```

# ./flashrom -p internal -E
# ./flashrom -p internal -w S4100-BIOS-3.33.0.1-12.bin

```



```

ONIE:/tmp/tmp.BI5Aqk/installer/firmware/bios # ls -lrt
-rwxr-xr-x 1 1015 3012 2401 Jul 20 2023 update_bios.sh
-rwxr-xr-x 1 1015 3012 964664 Jul 20 2023 smbiostool
-rwxr-xr-x 1 1015 3012 1571309 Jul 20 2023 flashrom
-rw-r--r-- 1 1015 3012 16777216 Jul 20 2023 S4100-BIOS-3.33.0.2.bin
-rw-r--r-- 1 1015 3012 16777216 Jul 20 2023 S4100-BIOS-3.33.0.1-8.bin
-rw-r--r-- 1 1015 3012 16777216 Jul 20 2023 S4100-BIOS-3.33.0.1-7.bin
-rw-r--r-- 1 1015 3012 16777216 Jul 20 2023 S4100-BIOS-3.33.0.1-6.bin
-rw-r--r-- 1 1015 3012 16777216 Jul 20 2023 S4100-BIOS-3.33.0.1-11.bin
-rw-r--r-- 1 1015 3012 16777216 Jul 20 2023 S4100-BIOS-3.33.0.1-10.bin
-rw-r--r-- 1 1015 3012 16777216 Jul 20 2023 S4100-BIOS-3.33.0.0-5.bin
-rw-r--r-- 1 1015 3012 16777216 Jul 20 2023 S4100-BIOS-3.33.0.0-4.bin
-rw-r--r-- 1 1015 3012 16777216 Jul 20 2023 S4100-BIOS-3.33.0.0-3.bin
-rw-r--r-- 1 1015 3012 16777216 Jul 20 2023 S4100-BIOS-3.33.0.1-9.bin
-rw-r--r-- 1 1015 3012 16777216 Jul 20 2023 S4100-BIOS-3.33.0.1-12.bin
ONIE:/tmp/tmp.BI5Aqk/installer/firmware/bios #
ONIE:/tmp/tmp.BI5Aqk/installer/firmware/bios # ./flashrom -p internal -E
Erasing and writing flash chip... Erase/write done.
ONIE:/tmp/tmp.BI5Aqk/installer/firmware/bios #

```

Updatetool method

For switches that use Updatetool follow these instructions:

1.

```
# cd firmware/bios/
# tar -zxf biosfile.tar.gz
```

```

ONIE:/tmp/tmp.3iAr9z/installer/firmware/bios # tar -zxf Z9600-BIOS-3.54.0.D-9.bin.tar.gz
ONIE:/tmp/tmp.3iAr9z/installer/firmware/bios # ls -lrt
-rw-r--r-- 1 9946 3000 33554432 Sep 19 05:43 Z9600-BIOS-3.54.0.D-9.bin
-rw-r--r-- 1 1015 3012 6882729 Sep 19 22:36 Z9600-X01-BIOS-3.54.0.D-9.bin.tar.gz
-rw-r--r-- 1 1015 3012 64 Sep 19 22:36 Z9600-X01-BIOS-3.54.0.D-9.bin.md5sum
-rw-r--r-- 1 1015 3012 6883371 Sep 19 22:36 Z9600-BIOS-3.54.0.D-9.bin.tar.gz
-rw-r--r-- 1 1015 3012 60 Sep 19 22:36 Z9600-BIOS-3.54.0.D-9.bin.md5sum
ONIE:/tmp/tmp.3iAr9z/installer/firmware/bios #

```

2.

```
#cd..
# cp common_tools/* /bin
# rm -rf /etc/dn/diag
# rm -rf /etc/dn
# mkdir /etc/dn
# mkdir /etc/dn/diag
# cp -r cfg/* /etc/dn/diag
# mkdir -p /lib/modules/$(uname -r)
# libs/lib_setup.sh
# export LD_LIBRARY_PATH=/opt/dell/diag/lib
# cp /bin/amifldrv_mod.o ./
# cp common_tools/reboot-cmd /tmp
```

```

ONIE:/tmp/tmp.YRgr2b/installer/firmware/bios # cd ..
ONIE:/tmp/tmp.YRgr2b/installer/firmware # cp common_tools/* /bin
ONIE:/tmp/tmp.YRgr2b/installer/firmware # rm -rf /etc/dn/diag
ONIE:/tmp/tmp.YRgr2b/installer/firmware # rm -rf /etc/dn
ONIE:/tmp/tmp.YRgr2b/installer/firmware # mkdir /etc/dn
ONIE:/tmp/tmp.YRgr2b/installer/firmware # mkdir /etc/dn/diag
ONIE:/tmp/tmp.YRgr2b/installer/firmware # cp -r cfg/* /etc/dn/diag
ONIE:/tmp/tmp.YRgr2b/installer/firmware # mkdir -p /lib/modules/$(uname -r)
ONIE:/tmp/tmp.YRgr2b/installer/firmware # libs/lib_setup.sh
setting up essential libs infra
/tmp/tmp.YRgr2b/installer/firmware/libs
essential libs infra is done.
ONIE:/tmp/tmp.YRgr2b/installer/firmware # export LD_LIBRARY_PATH=/opt/dell/diag/lib
ONIE:/tmp/tmp.YRgr2b/installer/firmware # cp /bin/amifldrv_mod.o ./
ONIE:/tmp/tmp.YRgr2b/installer/firmware # cp common_tools/reboot-cmd /tmp
ONIE:/tmp/tmp.YRgr2b/installer/firmware # echo 1 4 1 5 > /proc/sys/kernel/printk

```

```
3. # updatetool ---dev=BIOS ---update ---whole ---file=bios/$packed_bios_image
```

```
ONIE:/tmp/tmp.Y8qr2b/installer/firmware # updatetool --dev=BIOS --update --whole --file=bios/Z9600-BIOS-3.54.0.B-9.bin
Write image to BIOS

-----+
|          AMI Firmware Update Utility v5.15.03.0081          |
| Copyright (c) 1985-2022, American Megatrends International LLC. |
| All rights reserved. Subject to AMI licensing agreement.      |
|-----+-----|
Reading flash ..... Done
- ME Data Size Checking ..... Pass
- System Secure Flash ..... Enabled
- FPS Checksums ..... Pass
- Check RomLayout ..... Pass
Loading File To Verify Memory ..... Done
Erasing Main Block ..... Done
Updating Main Block ..... Done
Verifying Main Block ..... Done
Erasing Boot Block ..... Done
Updating Boot Block ..... Done
Verifying Boot Block ..... Done
Erasing NVRAM Block ..... Done
Updating NVRAM Block ..... Done
Verifying NVRAM Block ..... Done
Loading The ME Data To BIOS ..... Done
- Update success for FDR
- Update success for PDR
- IRC region update is UNSUPPORTED, skip updating.
- Successful Update Recovery Loader to OPRx!!
- Successful Update MFSB
- Successful update factory data
- ME Entire Image update success !!
WARNING !!
  System must power-off to have the changes which take effect!

Process completed.
write BIOS image success
Update BIOS image success
ONIE:/tmp/tmp.Y8qr2b/installer/firmware #
```

Sanitization of SATA SSD

Depending upon the capability of the SATA SSD on the switch, you may have access to different options:

- SATA Secure Erase.
- SATA Secure Erase Enhanced. Use this option if available, against SATA Secure Erase.
- SATA Sanitize (available on SED OPAL drives). Use this option if available, against SATA Secure Erase, and SATA Secure Erase Enhanced methods.

SATA Secure Erase Method

All SATA drives generally support the security erase method.

1. Change the directory to common tools.

```
# cd ../common_tools
```

```
ONIE:/tmp/tmp.BI5Aqk/installer/firmware/bios # cd ../common_tools/
ONIE:/tmp/tmp.BI5Aqk/installer/firmware/common_tools #
ONIE:/tmp/tmp.BI5Aqk/installer/firmware/common_tools #
ONIE:/tmp/tmp.BI5Aqk/installer/firmware/common_tools # ls -lrt
-rwxr-xr-x 1 1015 3012 170 Jul 20 2023 reboot-cmd
-rwxr-xr-x 1 1015 3012 1006416 Jul 20 2023 nvramtool
-rwxr-xr-x 1 1015 3012 997142 Jul 20 2023 hdparm
-rw-r--r-- 1 1015 3012 1879 Jul 20 2023 default_nvram_list.cfg
ONIE:/tmp/tmp.BI5Aqk/installer/firmware/common_tools #
```

2. Unmount the partitions.

```
# devices=$(mount | grep sda | awk '{print $1}')
```

```
# for d in $devices
```

```
do
```

```
    echo "unmounting $d"
```

```
    umount $d
```

```
done
```

```

ONIE:/tmp/tmp.BI5Aqk/installer/firmware/common_tools # devices=$(mount | grep sda | awk '{print $1}')
ONIE:/tmp/tmp.BI5Aqk/installer/firmware/common_tools #
ONIE:/tmp/tmp.BI5Aqk/installer/firmware/common_tools # for d in $devices
> do
> echo "unmounting $d"
> umount $d
> done
unmounting /dev/sda2
unmounting /dev/sda1
ONIE:/tmp/tmp.BI5Aqk/installer/firmware/common_tools #

```

3. Set a security password.

```
# ./hdparm ---user-master u ---security-set-pass Hello /dev/sda
```

```

ONIE:/tmp/tmp.BI5Aqk/installer/firmware/common_tools # ./hdparm --user-master u --security-set-pass Hello /dev/sda
security_password="Hello"

/dev/sda:
Issuing SECURITY_SET_PASS command, password="Hello", user=user, mode=high
ONIE:/tmp/tmp.BI5Aqk/installer/firmware/common_tools #

```

4. Secure erase the SSD using hdparm.

```
# ./hdparm ---user-master u ---security-erase Hello /dev/sda
```

```

ONIE:/tmp/tmp.BI5Aqk/installer/firmware/common_tools # ./hdparm --user-master u --security-erase Hello /dev/sda
security_password="Hello"

/dev/sda:
Issuing SECURITY_ERASE command, password="Hello", user=user
ONIE:/tmp/tmp.BI5Aqk/installer/firmware/common_tools #

```

SATA Secure Erase Enhanced Method

To find out if your drive also supports SATA Security Erase Enhanced method, you can check with `hdparm` by dumping the drive information.

```
#./hdparm -I /dev/sda | grep erase
Supported: enhanced erase.
```

If the drive supports enhanced erase you can replace `-security-erase` with `-security-erase-enhanced` in the `hdparm` command in the previous section.

```
# ./hdparm ---user-master u ---security-erase-enhanced Hello /dev/sda
```

Sanitization of SATA SED OPAL SSD

Where a SED OPAL SATA drive is installed, the recommended sanitization method is Cryptographic Erase, which can be performed using the operating system.

SATA Operating system sanitization method

This section requires the `hdparm` tool to be installed.

1. Set a security password.

```
# ./hdparm -user-master u -security-set-pass Hello /dev/sda
```

2. Run the `crypto-scramble` command.

```
# hdparm --yes-i-know-what-i-am-doing -sanitize-crypto-scramble /dev/sda
```

3. Check command status.

```
# hdparm -sanitize-status /dev/sda
```

Typical output must be as follows:

```

Issuing SANITIZE_STATUS command
Sanitize status:
  State:      SD0 Sanitize Idle
  Last Sanitize Operation Completed Without Error

```


Sanitization of NVMe SSD

NVMe SSD Sanitization can be performed from the operating system command line.

NVMe Operating System sanitization method

You must have the `nvme-cli` tool version 2.8 or later preinstalled. To find out if it is installed and the version number, run the following:

```
# nvme version
```

To find out which device your NVMe SSD corresponds to, run the following:

```
# nvme list
```

Note the NVMe device indicates, `/dev/nvme0` for example.

To format the drive with Cryptographic Erase, run the following:

```
# nvme format /dev/nvme0 -ses=2
```

`ses` option selects the type of erase to perform.

-s <ses>, --ses=<ses>

Secure Erase Settings: This field specifies whether a secure erase should be performed as part of the format and the type of the secure erase operation. The erase applies to all user data, regardless of location (e.g., within an exposed LBA, within a cache, within deallocated LBAs, etc). Defaults to 0.

Value	Definition
0	No secure erase operation requested
1	User Data Erase: All user data shall be erased, contents of the user data after the erase is indeterminate (e.g., the user data may be zero filled, one filled, etc). The controller may perform a cryptographic erase when a User Data Erase is requested if all user data is encrypted.
2	Cryptographic Erase: All user data shall be erased cryptographically. This is accomplished by deleting the encryption key.
3-7	Reserved

For Cryptographic Erase select `ses` option 2 which completes within a few seconds. Once erase is done, the drive must be formatted.

Sanitization of EMMC

 **NOTE:** This section requires the `mmc-utils` package to be installed.

1. Delete any data on the drive to unmap it.

```
# umount /dev/mmcblk0p1
# umount /dev/mmcblk0p2
```

2. This command erases the specified number of blocks starting from block 0.

```
mmc erase legacy offset length device
offset: The starting offset of the sectors to erase.
length: The number of sectors to erase.
device: The device path of the MMC device.
```

To know the number of sectors of `emmc`, `fdisk` can help.

```
root@dell-diag-os:~# fdisk -l /dev/mmcblk0
Disk /dev/mmcblk0: 3.64 GiB, 3909091328 bytes, 7634944 sectors
Units: sectors of 1 * 512 = 512 bytes
```

```
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disklabel type: gpt
Disk identifier: 1960CC52-F6AB-4250-85AD-DD4C33762811
Device      Start      End Sectors Size Type
/dev/mmcblk0p1 2048 264191 262144 128M EFI System
/dev/mmcblk0p2 264192 7634910 7370719 3.5G Linux filesystem
root@dell-diag-os:~#
```

- Once you know the number of sectors, use the `mmc erase legacy` command to erase them.

```
# mmc erase legacy 0 7633920 /dev/mmcblk0
Executing Legacy Erase from 0x00000000 to 0x00747c00
High Capacity Erase Unit Size=524288 bytes
High Capacity Erase Timeout=300 ms
High Capacity Write Protect Group Size=8388608 bytes
Legacy Erase Succeed!
```

Sanitization of TPM

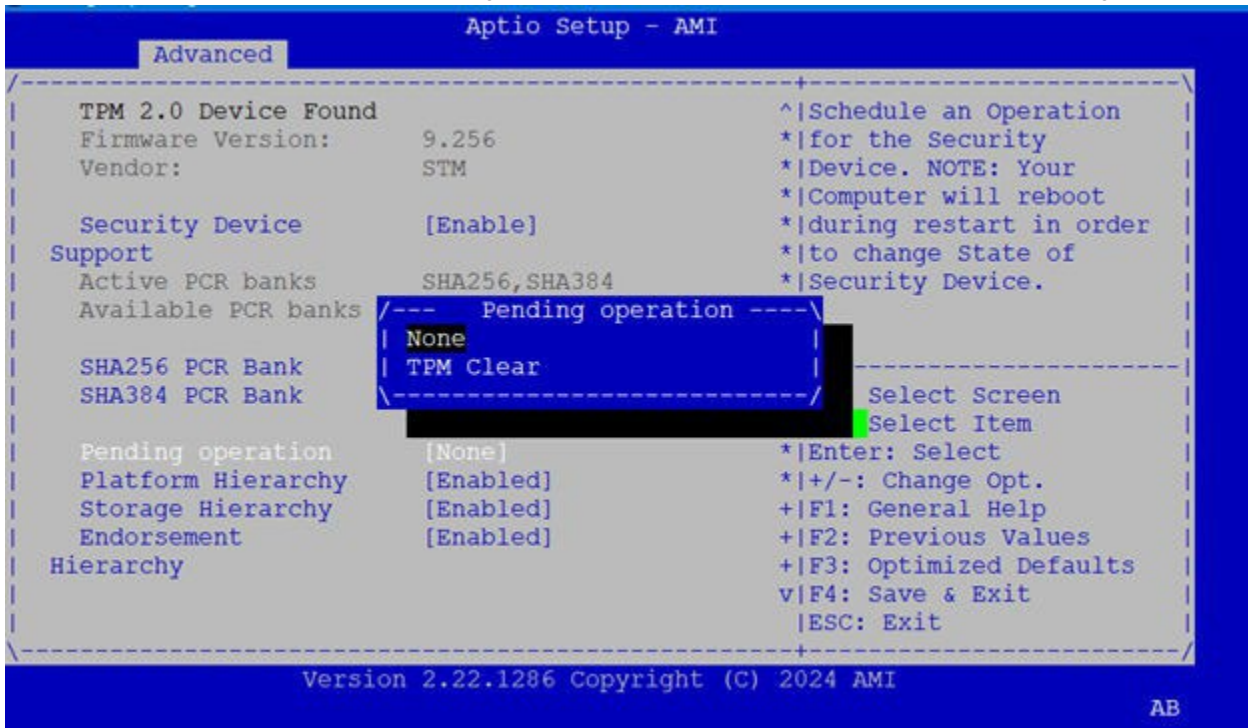
TPM Operating system sanitization method

Although the Linux package `tpm2-tools` supports the `tpm2_clear` command, the TPM is typically locked by the BIOS such that it cannot be performed. The recommended TPM sanitization method is from the BIOS menu.

TPM BIOS sanitization method

The TPM can be cleared by setting a pending operation in the BIOS, and then rebooting the switch.

- Reboot into the BIOS and locate the following screen, select the TPM Clear option, and then reboot again.



Sanitization of BMC

- Program with the latest version of the BIOS.

```
# updatetool --dev=MAIN-BMC --update --file=packed_bmc_image
```

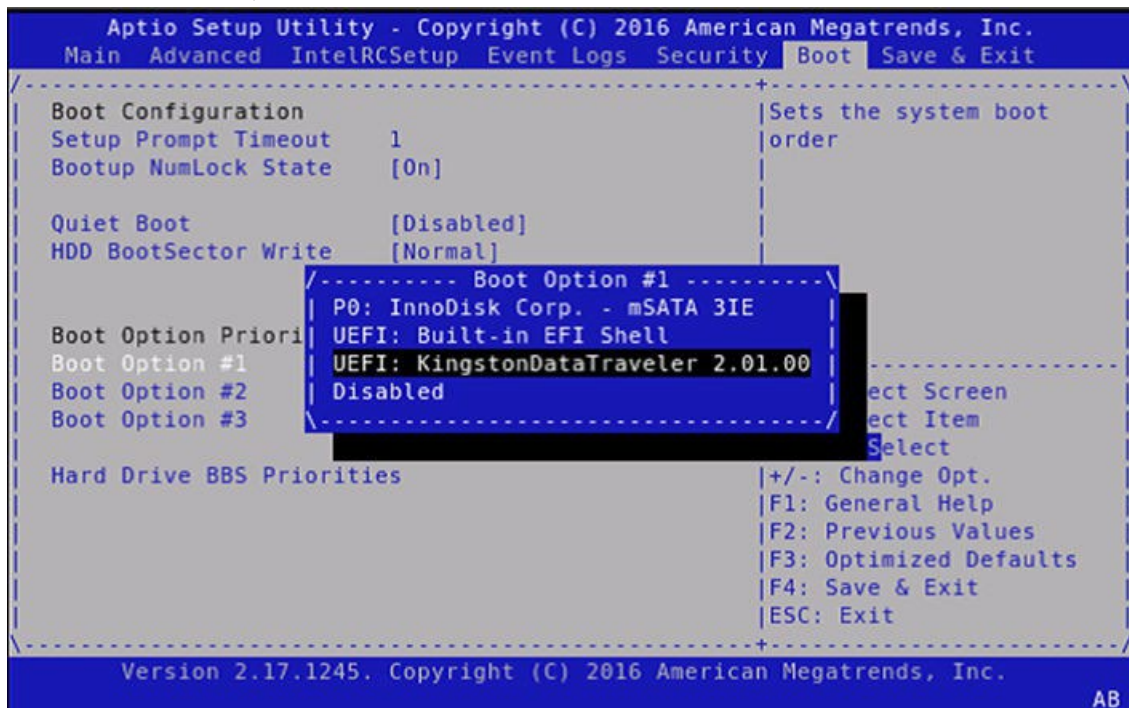
Reinstall to factory defaults procedure

Once Sanitized, see the steps below to reinstall ONIE, Diagnostic operating system, and OS10 or Sonic with the previously created Flash Drive.

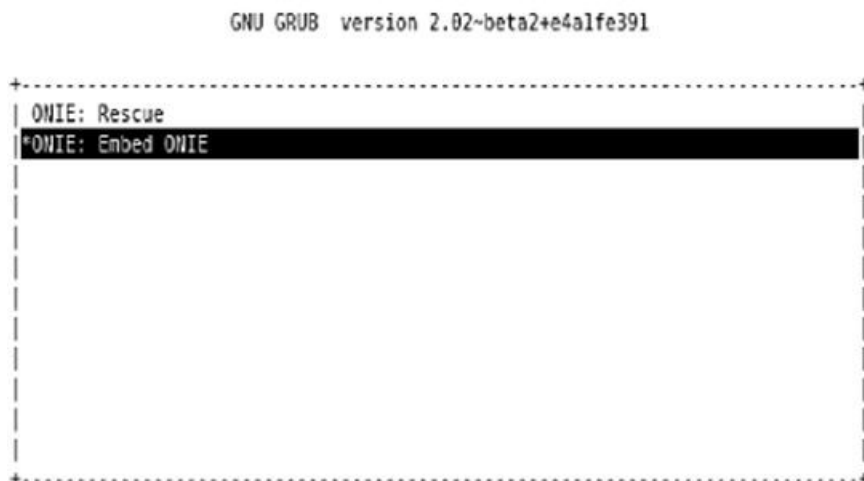
NOTE: The following procedure is also described in the ONIE release notes for the target switch.

Install ONIE

1. Insert ONIE USB to the switch USB slot.
2. Turn on the switch and enter the BIOS setup by tapping the Del or F2 key when the BIOS message displays. If you have already powered on the switch, reboot the switch, and enter the BIOS setup menu by tapping the Del key.
3. In the BIOS Boot menu, select UEFI USB. Select Save and Exit.



After the switch exits the BIOS Boot menu, the switch boots with the ONIE USB and presents the following menu:



Use the ^ and v keys to select which entry is highlighted.
Press enter to boot the selected OS, 'e' to edit the commands
before booting or 'c' for a command-line.

4. Select the Embed ONIE option which installs the UEFI ONIE version 3.26.1.1 on the switch. Any previous installation is removed. Do not press any keys during the Embedded ONIE installation. The following are the Embed ONIE logs:

```
ONIE: Embedding ONIE..  
Platform : x86_64-dell_s4100_c2338-r0  
Version : x.xx.x.x  
Build Date: 2024-05-20T09:14-0700  
[ 4.066378] dummy-irq: no IRQ given. Use irq=N  
[ 14.296290] esas2r: driver will not be loaded because no ATTO esas2r devices were
```

```

found
[ 14.463587] mtdoops: mtd device (mtddev=name/number) must be supplied
[ 16.328319] i8042: No controller found
[ 16.397853] fmc_write_eeprom fake-design-for-testing-f001: fmc_write_eeprom: no
busid passed, refusing all cards
[ 16.568122] intel rapl: driver does not support CPU family 6 model 77
Info: Mounting kernel filesystems. done.
Info: Mounting ONIE-BOOT on /mnt/onie-boot ...
Info: Using eth0 MAC address: 4c:76:25:f4:7c:80
Info: eth0: Checking link... [ 18.571495] scsi 6:0:0:0: Direct-Access Kingston
DataTraveler 2.0 1.00 PQ: 0 ANSI: 4
[ 18.707185] sd 6:0:0:0: Attached scsi generic sg1 type 0
[ 18.707703] sd 6:0:0:0: [sdb] 15148608 512-byte logical blocks: (7.75 GB/7.22 GiB)
[ 18.796392] sd 6:0:0:0: [sdb] Write Protect is off
[ 18.797033] sd 6:0:0:0: [sdb] Write cache: disabled, read cache: enabled, doesn't
support DPO or FUA
[ 19.159563] sd 6:0:0:0: [sdb] Attached SCSI removable disk
up.
Info: Trying DHCPv4 on interface: eth0
ONIE: Using DHCPv4 addr: eth0: 1[ 20.053045] random: dropbearkey urandom read with 94
bits of entropy available
x.xx.xxx.xx / xxx.xxx.xxx.x
Starting: dropbear ssh daemon... done.
Starting: telnetd... done.
discover: ONIE embed mode detected. Running updater.
Starting: discover... done.
Please press Enter to activate this console. Info: eth0: Checking link... up.
Info: Trying DHCPv4 on interface: eth0
ONIE: Using DHCPv4 addr: eth0: x.xx.xxx.xx / xxx.xxx.xxx.x
ONIE: Starting ONIE Service Discovery
Info: Found static url: file:///lib/onie/onie-updater
[ 29.744855] random: nonblocking pool is initialized
ONIE: Executing installer: file:///lib/onie/onie-updater
Verifying image checksum ... OK.
Preparing image archive ... OK.
ONIE: Version : x.xx.x.x
ONIE: Architecture : x86_64
ONIE: Machine : dell_s4100_c2338
ONIE: Machine Rev : 0
ONIE: Config Version: 1
Installing ONIE on: /dev/sda
/proc/devices: No entry for device-mapper found
/proc/devices: No entry for device-mapper found
ONIE: Success: Firmware update URL: file:///lib/onie/onie-updater
ONIE: Success: Firmware update version: x.xx.x.x
ONIE: Rebooting...
discover: ONIE embed mode detected.
Stopping: discover...start-stop-daemon: warning: killing process 1441: No such process
Stopping: dropbear ssh daemon... done.
Stopping: telnetd... done.

Stopping: syslogd... done.
Info: Unmounting kernel filesystems
The system is going down NOW!
Sent SIGTERM to all processes
Sent SIGKILL to all processes
Requesting system reboot

```

After the Embed-ONIE installation is complete, the switch boots and displays the ONIE menu.



The switch comes up in ONIE Install mode by default, as shown:

```
ONIE: OS Install Mode ...
Version : x.xx.x.x
Build Date: 2024-05-20T09:14-0700
ONIE: OS Install Mode ...
Version : x.xx.x.x
Build Date: 2024-05-20T09:14-0700
[ 4.759116] dummy-irq: no IRQ given. Use irq=N
[ 4.835970] esas2r: driver will not be loaded because no ATTO esas2r
devices were found
[ 5.003050] mtdoops: mtd device (mtddev=name/number) must be supplied
[ 6.867708] i8042: No controller found
[ 6.937375] fmc_write_eeprom fake-design-for-testing-f001:
fmc_write_eeprom: no busid passed, refusing all cards
[ 7.107669] intel_rapl: driver does not support CPU family 6 model 77
Info: Mounting kernel filesystems... done.
Info: Mounting ONIE-BOOT on /mnt/onie-boot ...
[ 8.018377] random: fsck urandom read with 73 bits of entropy available
Info: Mounting EFI System on /boot/efi ...
Info: Using eth0 MAC address: 4c:76:25:f4:7c:80
Info: eth0: Checking link... [ 8.902787] scsi 6:0:0:0: Direct-Access
Kingston DataTraveler 2.0 1.00 PQ: 0 ANSI: 4
[ 9.038475] sd 6:0:0:0: Attached scsi generic sg1 type 0
[ 9.038993] sd 6:0:0:0: [sdb] 15148608 512-byte logical blocks: (7.75
GB/7.22 GiB)
[ 9.253877] sd 6:0:0:0: [sdb] Write Protect is off
[ 9.254546] sd 6:0:0:0: [sdb] Write cache: disabled, read cache: enabled,
doesn't support DPO or FUA
[ 9.492124] sd 6:0:0:0: [sdb] Attached SCSI removable disk
up.
Info: Trying DHCPv4 on interface: eth0
ONIE: Using DHCPv4 addr: eth0: x.xx.xxx.xx / xxx.xxx.xxx.x
Starting: dropbear ssh daemon... done.
Starting: telnetd... done.
[ 11.789298] random: nonblocking pool is initialized
discover: installer mode detected. Running installer.
Starting: discover... done.
Please press Enter to activate this console. Info: eth0: Checking link... up.
Info: Trying DHCPv4 on interface: eth0
ONIE: Using DHCPv4 addr: eth0: x.xx.xxx.xx / xxx.xxx.xxx.x
ONIE: Starting ONIE Service Discovery
Info: Fetching
https://xx.xx.xxx.x/onie-installer-x86_64-dell_s4100_c2338-r0 ...
Info: Fetching https://xx.xx.xxx.x/onie-installer-x86_64-dell_s4100_c2338
...
Info: Fetching https://xx.xx.xxx.x/onie-installer-dell_s4100_c2338 ...
Info: Fetching https://xx.xx.xxx.x/onie-installer-x86_64 ...
Info: Fetching https://xx.xx.xxx.x/onie-installer ...
Info: Fetching
```

```
https://xx.xx.xxx.x/onie-installer-x86_64-dell_s4100_c2338-r0 ...
Info: Fetching https://xx.xx.xxx.x/onie-installer-x86_64-dell_s4100_c2338
...
```

5. Stop ONIE Discovery mode.

```
ONIE:/ # onie-stop
The operation has completed successfully.
ONIE:/ #
```

6. Verify the ONIE Linux kernel version and partition layout. This step verifies that you are running the correct kernel in ONIE as the kernel is separate from the ONIE environment.

```
ONIE:/ # uname -a
Linux onie 4.19.152-onie+ #1 SMP Fri May 24 14:38:43 PDT 2024 x86_64 GNU/Linux
ONIE:/ # sgdisk -p /dev/sda
Disk /dev/sda: 31277232 sectors, 14.9 GiB
Logical sector size: 512 bytes
Disk identifier (GUID): 763E53FF-B894-40FD-B0F9-FBAE2ED4B0B5
Partition table holds up to 128 entries
First usable sector is 34, last usable sector is 31277198
Partitions will be aligned on 2048-sector boundaries
Total free space is 30490733 sectors (14.5 GiB)
Number Start (sector) End (sector) Size Code Name
1 2048 526335 256.0 MiB EF00 EFI System
2 526336 788479 128.0 MiB 3000 ONIE-BOOT
ONIE:/ #
```

7. Verify that efibootmgr runs and displays valid boot options.

```
ONIE:/ # efibootmgr
BootCurrent: 0000
Timeout: 1 seconds
BootOrder: 0000,0006,0001,0003
Boot0000* ONIE: Open Network Install Environment
Boot0001* Hard Drive
Boot0003* UEFI: Built-in EFI Shell
Boot0006* UEFI: KingstonDataTraveler 2.01.00 14
```

Install DIAG-OS

For Diagnostic operating system installation (onie installer file diag-installer-x86_64-dellemc_s4100_c2338-r0-3.33.3.1-6-2024-02-05.bin), you must ensure that the TFTP server is reachable over the network, and you must know the Management Port IP, FTP server IP address, and MAC address.

The following example shows how to update the Diagnostic operating system and EDA.

1. Boot into ONIE Install or Rescue mode. If you use Install mode, stop Discovery using the `onie-stop` command.
2. Enter `touch tmp/diag_os_install_mode` at the ONIE prompt.
3. Install the Diagnostic operating system using the `onie-nos-install` command.

```
ONIE:/ # wget http://x.x.x.x/diag-installer-x86_64-dellemc_s4100_c2338-r0.bin
ONIE:/ # touch /tmp/diag_os_install_mode
ONIE:/ # onie-nos-install diag-installer-x86_64-dellemc_s4100_c2338-r0.bin
```

After execution of the above command, the switch reboots, select EDA-DIAG to boot into the Diagnostic operating system.

Log in to the switch using username: root, and password: calvin.

```
Debian GNU/Linux 8 dellemc-diag-os ttyS0

dellemc-diag-os login: root
Password: █
```

Install DIAG Tools

The diagnostic applications, libraries, and configurations are packaged in a Debian package called `dn-diags-{PLATFORM}-{PACKAGE_VERSION}.deb`.

Executables are placed in `/opt/ngos/bin`, libraries are placed in `/opt/ngos/lib`, and configurations are placed in `/etc/dn/diag`. To install the package on the switch, use the `dpkg --install <package_name>` command.

```
#dpkg --install dn-diags-S4100-DiagOS-3.33.4.1-9-2024-11-01.deb
```

Install OS10 or SONiC

Install the Network Operating System (NOS) like Diagnostic Operating System, boot into ONIE install mode and use the `onie-nos-installer` command with the OS10 ONIE installer file or SONiC.

```
#onie-nos-install NOS-installer-file.bin
```

References

See the [Open Networking Hardware Diagnostic Guide](#) for more information about the processes covered in this document.

Technical Assistance Contact Information

Contact information for PowerSwitch equipment:

- Web: [Dell Networking](#)

 **NOTE:** For any other information, direct your questions to your Dell Marketing representative.