

Pluribus Networks

Netvisor ONE® Getting Started Guide

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Glossary of Pluribus Networks' Netvisor ONE® and UNUM Terms

To review the Glossary, refer to the online *document*.

Introduction

This document covers the deployment of Netvisor ONE OS on Dell Open Networking switches, Wedge switches, Edgecore switches, and Pluribus Freedom Series switches and also the process for readying for further configurations.

The main difference between Pluribus Freedom Series switches and Edgecore or Dell switches is the day-0 software installation procedure. While the Freedom Series switches come with Netvisor ONE pre-loaded and pre-licensed, the other switches require additional steps to install Netvisor ONE and apply proper licenses. See the subsequent sections in this guide for details.

Additionally, for more detailed information on Netvisor ONE and the feature configurations, refer to other documents available on [Pluribus Networks](https://www.pluribus.com) website.

Hardware Installation

Refer to the hardware installation guides of your platform of choice from the hardware manufacturer to complete the following hardware installation procedures:

- 1) Understanding Safety Considerations
- 2) Unpacking the Switch
- 3) Rack Mounting the Switch
- 4) Powering up the Switch

The steps described in this section prepare the hardware for Netvisor ONE installation.

Dell Hardware Installation

Refer to the hardware installation procedures for Dell Open Networking switches described in the [Dell Platform Getting Started Guides](#).

Pluribus Networks Freedom Series Hardware Installation

Refer to the hardware installation guides [here](#) and follow the procedure mentioned in the document to complete the hardware installation.

Note: The serial port settings required to access the device via the console port are:

- Baud rate - 115200
 - Data bits - 8
 - Stop bits - 1
 - Parity - n
-

Installing Netvisor ONE on Dell and Edgecore Switches

This section describes the procedure for installing Netvisor ONE on Wedge, Edgecore, and Dell Open Networking switches. For the installation procedure for Pluribus Freedom series switches, see the [Upgrading Netvisor ONE Software for Freedom Series Switches](#).

The Open Network Install Environment (ONIE) is an open source initiative that defines an open *install environment* for bare metal network switches like Dell Open Networking and Edgecore. Download an ONIE compatible Netvisor ONE operating system image from Pluribus Networks Cloud (PNC) at cloud.pluribusnetworks.com.

However, before you download the Netvisor ONE image from PNC, you must retrieve the *unique switch identifiers*, which is required later to activate the switch license in PNC.

Obtaining the Switch Unique Identifiers for Dell Switches

For Dell switches, the unique identifier is represented by the *Service Tag*, which is a seven character identifier unique to the device.

When the network administrator connects to a Dell switch via console port for the first time (assuming that no other OS is already installed), the ONIE prompt is displayed. At the prompt type the command, `onie-syseeprom` and note down the Service Tag string as displayed below:

```

ONIE:/ # onie-syseeprom
TlvInfo Header:
  Id String:  TlvInfo
  Version:    1
  Total Length: 179
TLV Name      Code Len Value
-----
Part Number   0x22  6 09H9MN
Serial Number 0x23  20 CN09H9MN2829875P0037
Base MAC Address 0x24  6 14:18:77:25:5A:B9
Manufacture Date 0x25  19 05/25/2017 08:02:43
Device Version 0x26  1 1
Label Revision 0x27  3 A00
Platform Name  0x28  30 x86_64-dellemc_s4148f_c2338-r0
ONIE Version   0x29  10 3.33.1.1-4
MAC Addresses  0x2A  2 256
Manufacturer   0x2B  5 28298
Country Code   0x2C  2 CN
Vendor Name    0x2D  8 Dell EMC
Diag Version   0x2E  10 3.33.3.0-1
Service Tag   0x2F  7 5MP6XC2
Vendor Extension 0xFD  4 0x00 0x00 0x02 0xA2
Product Name   0x21  8 S4148-ON
CRC-32         0xFE  4 0x0CF1D9FF
Checksum is valid.
  
```

Installing Netvisor ONE on Dell and Edgecore Switches (cont'd)

You can also find the service tag from the label of the packaging material as well. The service tag is also located on the device. See the examples (from the packaging label and the top cover of the device) in the figures below:



Figure - 1: Service Tag Location on the Packaging Label



Figure - 2: Service Tag Location on the Device

Installing Netvisor ONE on Dell and Edgecore Switches (cont'd)

Obtaining the Switch Unique Identifiers for Edgecore Switches

For Edgecore switches, the unique identifier is represented by the *Serial Number*.

When the network administrator connects to an Edgecore switch via console for the first time (assuming that no other OS is already installed), the ONIE prompt is displayed.

At the prompt type the command, `onie-syseeprom` and note down the Serial Number string as displayed:

```

ONIE:/ # onie-syseeprom
TlvInfo Header:
  Id String:  TlvInfo
  Version:    1
  Total Length: 168
TLV Name          Code Len Value
-----
Manufacture Date  0x25  19 06/30/2016 15:04:19
Diag Version      0x2E  7 2.0.1.5
Label Revision    0x27  4 R01J
Platform Name     0x28  27 x86_64-accton_as5712_54x-r0
ONIE Version      0x29  13 2015.11.00.05
Manufacturer      0x2B  6 Accton
Country Code     0x2C  2 TW
Base MAC Address  0x24  6 CC:37:AB:F5:37:74
Serial Number    0x23  14 571254X1626007
Part Number      0x22  13 FP1ZZ5654001A
Product Name     0x21  15 5812-54X-O-AC-F
MAC Addresses    0x2A  2 74
Vendor Name      0x2D  8 Edgecore
CRC-32          0xFE  4 0xCB35E235
Checksum is valid.
  
```

Downloading Netvisor ONE ONIE Image from Pluribus Networks Cloud

For a quick introduction on the services offered by Pluribus Networks Cloud (PNC), refer to the links:

- Getting started: <https://www.pluribusnetworks.com/get-started/>
- PN Cloud Overview video: <https://www.pluribusnetworks.com/resources/pluribus-networks-cloud-overview/>

Netvisor ONE supports multiple online and offline installation methods. However, this sections describes the offline installation method with the assumption that the switches do not have access to the internet and PNC.

Note: For offline installation process, a USB drive is required to save both the Netvisor ONE software and the license files.

Note: It is mandatory to save the license files to the USB stick along with Netvisor ONE software. The installation process cannot be completed if you do have the license files.

To download and install Netvisor ONE:

1. Access the latest Netvisor ONE ONIE software from PNC: click **DOWNLOADS** --> **CURRENT** in the left-hand menu panel (**Figure 3** below).
2. Download an image: click the Download button against the ONIE version that you would like to download (**Figure 3**) and save the image to the FAT formatted USB stick root folder:

Pluribus Networks Cloud Welcome

SOFTWARE

OPEN NETVISOR LINUX - 1ST TIME INSTALL Click Current to access Netvisor images
 This image is used for newly purchased or RMA'd products that do not have ONVL installed.

Click to download ONIE Netvisor image

Name	Version	Platform	Checksum	Documentation	Download
ONIE 6.1.0 HF2	6.1.0-18195	ONVL	98527e74753de725e888e682e770da9f		Download
ONIE 6.0.4 GA	6.0.4-17029	ONVL	92a79e2eb948f12b14a27743988997		Download
ONVL 5.2.1 ONIE HF2	5.2.1-15700	ONVL	761c79f279395f2c6534828944c3a6		Download
ONIE 5.1.0 HF5	5.1.0-15080	ONVL	b682526c32e1e43de513b3e83c954a8		Download
ONVL 6.0.0 ONIE HF1	6.0.0-16334	ONVL	a7c3a21cfc85cca78bd3a26c338a2d3		Download
ONVL 5.2.0 ONIE GA	5.2.0-15650	ONVL	6da775e88f7cc86d71e8270576cd99		Download
ONVL 5.1.1 ONIE GA	5.1.1-15300	ONVL	468f983e1c51b348c47a9f6d8f9f7		Download
ONVL 5.1.2 ONIE GA	5.1.2-15459	ONVL	9a0b3528b494f8643b3745389f82		Download
ONVL 5.1.0 ONIE HF3	5.1.0-15027	ONVL	6c834ec5fe822a48147f1c0c54218		Download
ONVL 3.0.0 HF1 ONIE	3.0.0-12817	ONVL	39888935f44b5f1a38e864fc2cc712		Download

OPEN NETVISOR LINUX - UPGRADES
 This represents the most current, generally available version of ONVL. In order stay current on any new features, bug fixes and product enhancements, Pluribus recommends that you install this version of ONVL.

Name	Version	Platform	Checksum	Documentation	Download
ONVL 6.1.0 HF2 (Upgrades from 3.1.1 and earlier)	6.1.0-18195	ONVL	c85d4d8ac1189e12ca076269fca2a2a		Download
ONVL 6.1.0 HF2 (Upgrades from 5.0.0 and later)	6.1.0-18195	ONVL	817a65f9181f74242f1d88a0e99f2c2		Download
ONVL 6.0.4 GA (Upgrades from 3.1.1 and earlier)	6.0.4-17029	ONVL	859b039d78c1794c8ff72ak63fca8		Download
ONVL 6.0.4 GA (Upgrades from 5.0.0 and later)	6.0.4-17029	ONVL	6e8b31c12bca814688c4a89f5c89b		Download
ONVL 5.2.0 HF1 (Upgrades from 5.0.0 and later)	5.2.0-15652	ONVL	515894c7b70f4708a0b64fca8e5e057		Download

Figure 3 - Pluribus Networks Cloud Software Download Page

Note: Ensure that the USB stick is of FAT32 format.

Note: Release notes are also available for download from the **Documentation** column. It is recommended that you download and review the release notes before you begin the ONIE installation process.

- Verify the MD5 checksum of the downloaded Netvisor image against the MD5 checksum obtained from the cloud:

Pluribus Networks Cloud Welcome

SOFTWARE

OPEN NETVISOR LINUX - 1ST TIME INSTALL
 This image is used for newly purchased or RMA'd products that do not have ONVL installed.

Name	Version	Platform	Checksum	Documentation	Download
ONIE 6.1.0 HF2	6.1.0-18195	ONVL	8952e7b4759ef25e886e42c71d6af		Download
ONIE 6.0.4 GA	6.0.4-17029	ONVL	92e79e2b948f12b14dc7744398897		Download
ONVL 5.2.1 ONIE HF2	5.2.1-15700	ONVL	761c79f279395f2c5516828949430e		Download
ONIE 5.1.0 HF5	5.1.0-15080	ONVL	b682526c32e1e43de513b3e83c95408		Download
ONVL 6.0.0 ONIE HF1	6.0.0-16334	ONVL	a7c3a21cfc85cca798bd3a2c318d3d		Download
ONVL 5.2.0 ONIE GA	5.2.0-15650	ONVL	6db7f5db87fcc86d71e8270576cd99		Download
ONVL 5.1.1 ONIE GA	5.1.1-15300	ONVL	468f983e1c51b348c478a916d9f07		Download
ONVL 5.1.2 ONIE GA	5.1.2-15459	ONVL	9eab3528b944f8641b3745189f82		Download
ONVL 5.1.0 ONIE HF3	5.1.0-15027	ONVL	6c834ec5fe822a48147f1c0c54218		Download
ONVL 3.0.0 HF1 ONIE	3.0.0-12817	ONVL	39888935f405f1a88e864f2cc712		Download

OPEN NETVISOR LINUX - UPGRADES
 This represents the most current, generally available version of ONVL. In order stay current on any new features, bug fixes and product enhancements, Pluribus recommends that you install this version of ONVL.

Name	Version	Platform	Checksum	Documentation	Download
ONVL 6.1.0 HF2 (Upgrades from 3.1.1 and earlier)	6.1.0-18195	ONVL	c91d4d8ac1189e12ca076269fca2a2a		Download
ONVL 6.1.0 HF2 (Upgrades from 5.0.0 and later)	6.1.0-18195	ONVL	817a65f918174242f1d88ca0e9f7c2		Download
ONVL 6.0.4 GA (Upgrades from 3.1.1 and earlier)	6.0.4-17029	ONVL	859b839d978c1794c8ff72akc63fcc8		Download
ONVL 6.0.4 GA (Upgrades from 5.0.0 and later)	6.0.4-17029	ONVL	6e8b31c128c8e14688c4a8bf5c89b		Download
ONVL 5.2.0 HF1 (Upgrades from 5.0.0 and later)	5.2.0-15652	ONVL	515894c7b7of470b0d064fc8e5e57		Download

Verify the MD5 checksum

Figure 4 - Pluribus Network Cloud Software Download - MD5 Checksum

Activating a Switch from Pluribus Networks Cloud

To activate a switch,

1. Click the **ACTIVATIONS** option on the left-hand side menu panel as shown in the **Figure 5** below:

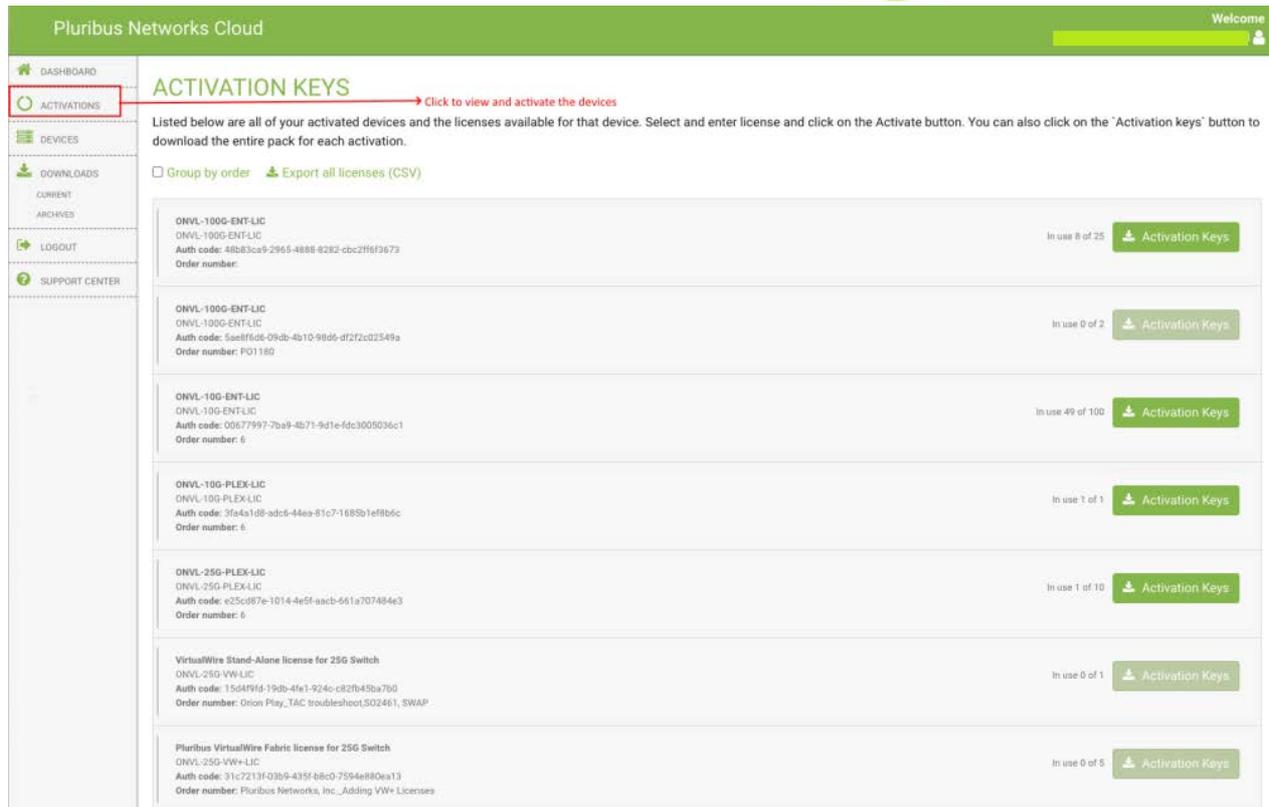


Figure 5 - Pluribus Network Cloud Software Activation Keys

2. Enter the device ID and click the **Activate** button (Figure 6):

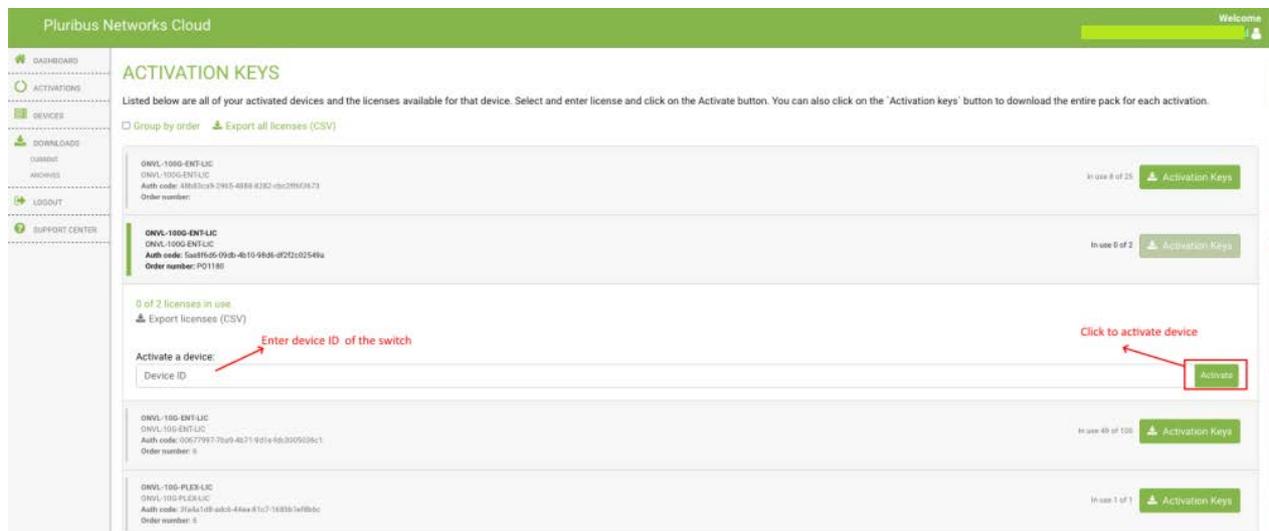


Figure 6 - Pluribus Network Cloud Software Activation Keys - Service Tag or Serial Number

Note: You can activate multiple switches with single *onvl-activation-keys* file if the same license type is used, for example, all switches activated using ONVL-25G-PLEX-LIC can use same *onvl-activation-keys* file downloaded by clicking on ONVL-25G-PLEX-LIC's ACTIVATION KEYS link.

- Once the switch is activated, download the *Activation Keys* file and copy to the same USB stick root folder where you saved the Netvisor ONE ONIE image. To download the activation key(s) for the switch(es) activated using the same license type, click the button as shown in Figure below.

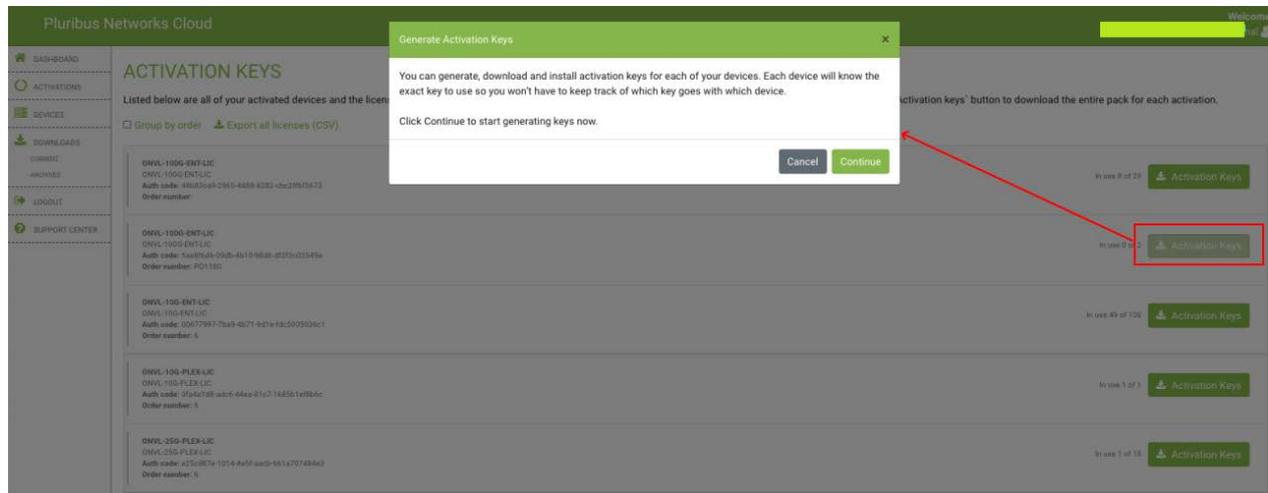


Figure 7 - Pluribus Network Cloud - Downloading Activation Keys

Offline Installation of Netvisor ONE ONIE Image and Switch Activation

Before you start the offline installation of Netvisor ONE ONIE image, ensure that:

- The switch is not connected to the Internet (if necessary, disconnect the management port).
- There is no previously installed Network OS on the switch.
- You are connected to the switch via serial console. For details on connecting to serial console, see the *Using the Serial Console Port for Initial Configuration* section in the *Netvisor ONE Configuration Guide*.

To install the offline image for Netvisor ONE ONIE:

- Rename the Netvisor ONE ONIE image and Activation Keys file saved on the USB drive root folder:
 - Rename the file named `onie-installer-<version-number>` to ***onie-installer***
 - Rename the Activation Keys file `onvl-activation-keys.dms` to ***onvl-activation-keys***
- Initiate the Netvisor ONE installation and switch activation process:

Plug in the USB drive (having the two renamed files) into the switch and reboot it. While the switch is booting up, select *ONIE -> Install OS* grub menu if switch does not automatically boot into ONIE Install menu. After booting into Install OS grub menu, the switch automatically detects the software image on the USB drive and starts the installation process.

Note: The switch reboots twice during the installation process and one more time after activation.

The progress of the installation can be monitored using the serial console:

```
[...]
Extracting stager image
./btrfs.initrd.img
./grub.cfg
./install.sh
./vmlinuz-4.2.0-27-generic
Provisioning fresh box
Netvisor Installer: platform: aquarius
Creating new Netvisor partition /dev/sda4 ...
Warning: The kernel is still using the old partition table.
The new table will be used at the next reboot.
The operation has completed successfully.
Error: /dev/sda4: unrecognized disk label
mke2fs 1.42.13 (17-May-2015)
Discarding device blocks: done
Creating filesystem with 7750353 4k blocks and 1937712 inodes
Filesystem UUID: 92cbbd1-ffd8-4f91-ab89-e683b6258395
Superblock backups stored on blocks:
    32768, 98304, 163840, 229376, 294912, 819200, 884736, 1605632, 2654208

Allocating group tables: done
Writing inode tables: done
Creating journal (32768 blocks): done
Writing superblocks and filesystem accounting information: done

sed: /netvisor_mnt/etc/default/grub: No such file or directory
Installing for i386-pc platform.
Installation finished. No error reported.
Netvisor stage-1 installation Successful
Rebooting into stage-1 to complete stage-2 installation
ONIE:          NOS          install          successful:
http://sandy.pluribusnetworks.com/artifactory/releases/nvOS/6.0.0 GA/nvOS-6.0.0-
6000016331-onvl.pkg
ONIE: Rebooting...
```

After the reboot, the switch comes up with Netvisor-stage1 as shown below:

```
GNU GRUB version 2.02-beta2+e4a1fe391

+-----+
|*Netvisor-stage1|
|ONIE             |
+-----+
```

At the completion of stage1, the switch prints the following messages and restarts again:

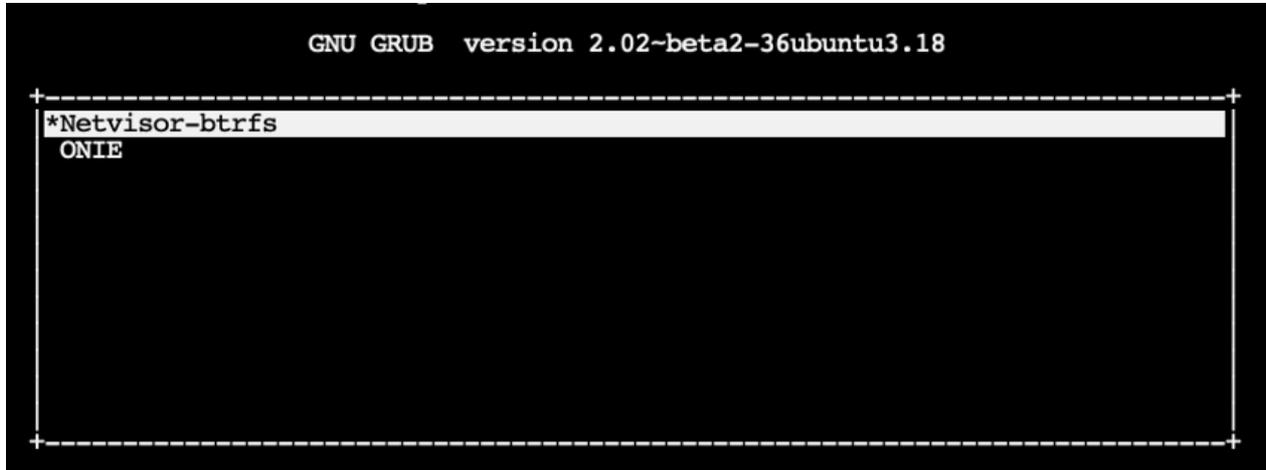
```
[...]
Setting up getty
Generating GRUB config
/init: line 393: can't create /netvisor-mnt/etc/mtab: nonexistent directory
Setting up netvisor initial config
Installing GRUB
mkdir: can't create directory '/netvisor-mnt/sys': File exists
mkdir: can't create directory '/netvisor-mnt/dev': File exists
mkdir: can't create directory '/netvisor-mnt/proc': File exists
mount: mounting none on /netvisor-mnt/dev/pts failed: No such file or directory
Installing for i386-pc platform.
Installation finished. No error reported.
Current default time zone: 'America/Los_Angeles'
Local time is now:      Sun Apr 19 15:33:23 PDT 2020.
Universal Time is now: Sun Apr 19 22:33:23 UTC 2020.
Updating initramfs ...
update-initramfs: Generating /boot/initrd.img-4.15.0-36-generic
Resetting the grubenv file
Netvisor installation completed
```

Offline Installation - ONIE Image and Switch Activation (cont'd)

```
Rebalancing Btrfs block tree
[ 116.597985] BTRFS info (device sda4): relocating block group 6455033856 flags 5
[ 116.617053] BTRFS info (device sda4): relocating block group 5381292032 flags 5
[ 116.637495] BTRFS info (device sda4): relocating block group 4307550208 flags 5
[ 116.655937] BTRFS info (device sda4): relocating block group 3233808384 flags 5
[ 116.670648] BTRFS info (device sda4): relocating block group 2160066560 flags 5
Done, had to relocate 5 out of 9 chunks
Done, had to relocate 0 out of 4 chunks
umount: can't umount /netvisor-mnt/dev/pts: No such file or directory
mount: mounting UUID=92cbbdd1-ffd8-4f91-ab89-e68[ 117.656681] sd 4:0:0:0: [sda]
Synchronizing SCSI cache
3b6258395 on /netvisor_mnt failed: No such file [ 117.669433] reboot: Restarting system
or directory
se[ 117.673993] reboot: machine restart
```

Offline Installation - ONIE Image and Switch Activation (cont'd)

Next, the switch boots up, ready to be activated. Netvisor gets the license key from the USB drive and activates it at the end of this step:



After Netvisor is installed successfully, the *onvl-activation-keys* file in the USB is auto-detected and the switch is activated.

Offline Installation - ONIE Image and Switch Activation (cont'd)

At the end of the activation process the switch reboots one last time:

The below messages are printed on the console after a successful activation:

```
[..]
AUTO-PROVISION: onvl-discover: onvl-activation-keys found: /dev/sdb1
AUTO-PROVISION: Extracting initial bundle.
AUTO-PROVISION: Decrypting signed bundle.
AUTO-PROVISION: Extracting signed bundle.
AUTO-PROVISION: Verifying package signature.
AUTO-PROVISION: Extracting packages.
AUTO-PROVISION: pkgs ready
AUTO-PROVISION: onvl-installer: checking for device installer -
8WWMX42/onvl-activation-keys...
AUTO-PROVISION: onvl-installer: executing device installer - 8WWMX42/onvlactivation-
keys...
AUTO-PROVISION: [INSTALLED]
Running Acceptance Tests...
test passed comment
Total Memory: OK 7.78G
Switch device: OK orion found
[GREEN] switch successfully initialized.
serial number: 1550ST9100083
hostid: 900011c
device id: 8WWMX42
Reboot required.
```

After Netvisor ONE is installed and the switch is activated, wait for a while until the login prompt appears and then log into the serial console using the following credentials:

```
Username: network-admin
Password: admin
```

Now, you are prompted to read and accept the EULA agreement and setup the switch parameters such as switch name, management IP, password, DNS IP etc.

Once these configurations are done, connect the mgmt port of the switch to your mgmt network if you have not connect it previously or disconnected it. Then you can SSH into the switches using the username `network-admin` and the new password you set.

Upgrading Netvisor ONE Software for Freedom Series Switches

The Pluribus Freedom series switch always comes pre-loaded with Netvisor ONE software. However it is recommended to upgrade the Netvisor ONE software to the latest release, which can be obtained from Pluribus Networks Cloud (PNC).

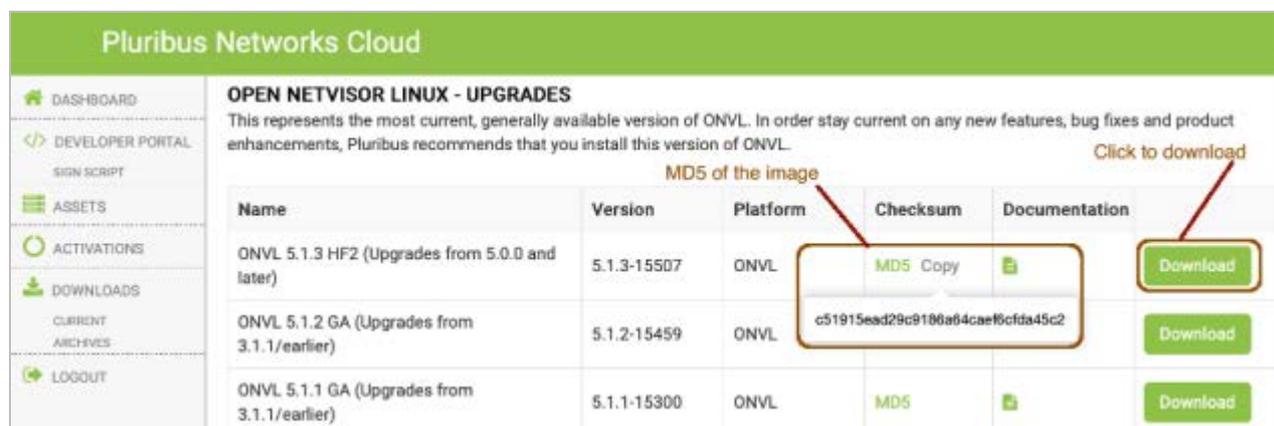
For a quick introduction on the services offered by Pluribus Networks Cloud (PNC), refer to the following links:

- Getting started: <https://www.pluribusnetworks.com/get-started/>
- PN Cloud Overview video: <https://www.pluribusnetworks.com/resources/pluribus-networks-cloud-overview/>

Warning: If you are upgrading from Netvisor ONE version 3.0.4 or earlier to Netvisor ONE version 5.x.x, 6.x.x, or 7.x.x, then, you must first upgrade to Netvisor ONE version 3.1.1 before upgrading to a later release. The direct upgrade from version 3.0.4 or earlier to version 5.x.x/6.x.x/7.x.x is not supported.

Follow the steps described here to download and upgrade the Netvisor ONE software on Freedom series switches:

- 1) Access the latest Netvisor ONE software from PNC: click **DOWNLOADS** --> **CURRENT** in the left-hand menu panel (see Figure 9). For upgrade images scroll down to the **OPEN NETVISOR LINUX - UPGRADES** section on the page.
- 2) Click the Download button to download an image (see Figure):



Name	Version	Platform	Checksum	Documentation
ONVL 5.1.3 HF2 (Upgrades from 5.0.0 and later)	5.1.3-15507	ONVL	MD5 Copy	Click to download
ONVL 5.1.2 GA (Upgrades from 3.1.1/earlier)	5.1.2-15459	ONVL	c51915ead29c9186a94cae16cfd445c2	Download
ONVL 5.1.1 GA (Upgrades from 3.1.1/earlier)	5.1.1-15300	ONVL	MD5	Download

Figure 9 - Pluribus Network Cloud SoftwareUpgrades

- 3) Verify the MD5 checksum of the downloaded file against the MD5 value posted on the cloud (by hovering over the MD5 label, as shown in Figure 9).

Upgrading Netvisor ONE Software for Freedom Series Switches (cont'd)

4) After the image is downloaded, apply the following procedure to upgrade the software on the Freedom series switch:

- o Enable SFTP from the CLI using the command:

```
(admin@netvisor) > admin-sftp-modify enable
sftp password:
confirm sftp password:
```

Note: The default SFTP username is *sftp* and the password can be changed using the *admin-sftp-modify* command:

- o Enable the shell access for the network-admin user using the command:

```
(admin@netvisor) > role-modify name network-admin shell
```

- o Go to the shell from the CLI by typing the command “shell” and going to the “sftp” folder:

```
(admin@Spine) > shell
admin@netvisor:~$ cd /sftp/import/
```

- o To exit the shell, type **exit** so that the prompt goes back to the **cli**
- o Copy the file to the */sftp/import* folder on the switch
- o To upgrade the image, run the command:

```
(admin@Spine) > software-upgrade package <upgrade-image-name>
```

- o Check the status of the upgrade process using the command:

```
(admin@Spine) > software-upgrade-status-show
```

The switch reboots after the upgrade and comes back up with the new image.

- o Verify the license on the switch by using the command:

```
(admin@Spine) > software-license-show
```

Post Installation Configuration

After installation and activation is complete you can proceed to configure the switches for your network.

The [Pluribus Data Center Interconnect Validated Design Guide](#) provides a practical guide to create validated leaf-spine architectures.

The Pluribus Networks Netvisor ONE [Configuration Guide](#) provides an authoritative guide to the many features of Netvisor ONE. Basic knowledge of the management CLI is assumed; use the Configuration Guide to review CLI syntax and structure.

The overall procedure to configure Netvisor ONE based on the Validated Design Guide is as follows:

- 1) Review the topology and design considerations
 - Redundancy requirements
 - IP and VLAN scheme
- 2) Completing the initial switch setup
 - Setup wizard runs automatically upon first login (default login/password: pluribus/admin)
 - Set the timezone
 - Other management interface parameters may need to be configured
 - Review NTP server information to be used for time sync
- 3) Creating the ONVL Fabric
 - fabric-create command or fabric-join command
 - fabric-show command

For more details on configuring the Netvisor ONE features, see the [Configuration Guide](#).

Submitting a Service Request

For Netvisor ONE software support, you can purchase optional support contracts from your partner, reseller, or Pluribus Networks.

Purchasing a support contract from a local partner is sometimes preferred due to geographical or language requirements.

Please contact your local partner to better understand the available service programs and pricing.

If you purchased a Pluribus FreedomCare maintenance agreement, you can contact Pluribus Networks directly for support requirements.

About Pluribus Networks

Pluribus Networks delivers an open, controllerless software-defined network fabric for modern data centers, multi-site data centers and distributed cloud edge environments.

The Linux-based Netvisor® ONE operating system and the Unified Cloud Fabric™ have been purpose-built to deliver radically simplified networking and comprehensive visibility along with white box economics by leveraging hardware from our partners Dell EMC, Edgecore, Celestica and Champion ONE, as well as Pluribus' own Freedom™ Series of switches.

The Unified Cloud Fabric provides a fully automated underlay and virtualized overlay with comprehensive visibility and brownfield interoperability and is optimized to deliver rich and highly secure per-tenant services across data center sites with simple operations having no single point of failure.

Further simplifying network operations is Pluribus UNUM™, an agile, multi-functional web management portal that provides a rich graphical user interface to manage the Unified Cloud Fabric. UNUM has two key modules - UNUM Fabric Manager for provisioning and management of the fabric and UNUM Insight Analytics to quickly examine billions of flows traversing the fabric to ensure quality and performance.

Pluribus is deployed in more than 275 customers worldwide, including the 4G and 5G mobile cores of more than 75 Tier 1 service providers delivering mission-critical traffic across the data center for hundreds of millions of connected devices. Pluribus is networking, simplified.

For additional information contact Pluribus Networks at info@pluribusnetworks.com, or visit www.pluribusnetworks.com.

Follow us on Twitter [@pluribusnet](https://twitter.com/pluribusnet) or on LinkedIn at <https://www.linkedin.com/company/pluribus-networks/>.

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