



D-NFVI Software

D-NFVI Installation

D-NFVI 10.7.1

323-1955-201 - Standard Revision A
May 2022

Copyright© 2022 Ciena® Corporation. All rights reserved.

LEGAL NOTICES

THIS DOCUMENT CONTAINS CONFIDENTIAL AND TRADE SECRET INFORMATION OF CIENA CORPORATION AND ITS RECEIPT OR POSSESSION DOES NOT CONVEY ANY RIGHTS TO REPRODUCE OR DISCLOSE ITS CONTENTS, OR TO MANUFACTURE, USE, OR SELL ANYTHING THAT IT MAY DESCRIBE. REPRODUCTION, DISCLOSURE, OR USE IN WHOLE OR IN PART WITHOUT THE SPECIFIC WRITTEN AUTHORIZATION OF CIENA CORPORATION IS STRICTLY FORBIDDEN.

EVERY EFFORT HAS BEEN MADE TO ENSURE THAT THE INFORMATION IN THIS DOCUMENT IS COMPLETE AND ACCURATE AT THE TIME OF PUBLISHING; HOWEVER, THE INFORMATION CONTAINED IN THIS DOCUMENT IS SUBJECT TO CHANGE.

While the information in this document is believed to be accurate and reliable, except as otherwise expressly agreed to in writing CIENA PROVIDES THIS DOCUMENT “AS IS” WITHOUT WARRANTY OR CONDITION OF ANY KIND, EITHER EXPRESS OR IMPLIED. The information and/or products described in this document are subject to change without notice. For the most up-to-date technical publications, visit www.ciena.com.

Copyright© 2022 Ciena® Corporation. All Rights Reserved

Use or disclosure of data contained in this document is subject to the Legal Notices and restrictions in this section and, unless governed by a valid license agreement signed between you and Ciena, the Licensing Agreement that follows.

The material contained in this document is also protected by copyright laws of the United States of America and other countries. It may not be reproduced or distributed in any form by any means, altered in any fashion, or stored in a data base or retrieval system, without express written permission of the Ciena Corporation.

Security

Ciena® cannot be responsible for unauthorized use of equipment and will not make allowance or credit for unauthorized use or access.

Contacting Ciena

Corporate Headquarters	410-694-5700 or 800-921-1144	www.ciena.com
Customer Technical Support/Warranty		www.ciena.com/support/
Sales and General Information	North America: 1-800-207-3714 International: +44 20 7012 5555	E-mail: sales@ciena.com
In North America	410-694-5700 or 800-207-3714	E-mail: sales@ciena.com
In Europe	+44-207-012-5500 (UK)	E-mail: sales@ciena.com
In Asia	+81-3-3248-4680 (Japan)	E-mail: sales@ciena.com
In India	+91-22-42419600	E-mail: sales@ciena.com
In Latin America	011-5255-1719-0220 (Mexico City)	E-mail: sales@ciena.com
Training		E-mail: learning@ciena.com

For additional office locations and phone numbers, please visit the Ciena web site at www.ciena.com.



READ THIS LICENSE AGREEMENT (“LICENSE”) CAREFULLY BEFORE INSTALLING OR USING CIENA SOFTWARE OR DOCUMENTATION. THIS LICENSE IS AN AGREEMENT BETWEEN YOU AND CIENA COMMUNICATIONS, INC. (OR, AS APPLICABLE, SUCH OTHER CIENA CORPORATION AFFILIATE LICENSOR) (“CIENA”) GOVERNING YOUR RIGHTS TO USE THE SOFTWARE. BY INSTALLING OR USING THE SOFTWARE, YOU ACKNOWLEDGE THAT YOU HAVE READ THIS LICENSE AND AGREE TO BE BOUND BY IT.

1. License Grant. Ciena may provide “Software” to you either (1) embedded within or running on a hardware product (together with Software, “Product”) or (2) as a standalone application, and Software includes upgrades acquired by you from Ciena or a Ciena authorized reseller. The terms of this License apply to your use of the Software and associated documentation whether such has been provided by Ciena, an affiliate of Ciena, or by means of an authorized reseller or distributor. Subject to these terms, and payment of all applicable License fees including any usage-based fees, Ciena grants you, as end user, a non-exclusive, non-transferable, personal License to use the Software only in object code form, subject to any applicable authorized use, activation requirements, usage levels, scope of functionality and release level of the Software, as set forth in the applicable quote accepted by Buyer upon Buyer’s issuance of an acceptable purchase order (“Order”), and in accordance with the detailed ordering information in the Ciena’s generally available, applicable, Product documentation as of the date of such Order. Unless the context does not permit, Software also includes associated documentation. Where an Order is for a (a) perpetual license, you may use the Software and associated documentation for as long as you use the Product for internal business use, or a (b) subscription license, you may only use the Software and associated documentation during the subscription term. A subscription license includes Software upgrades and/or technical support Services during the subscription term (that are not included in a perpetual license), in accordance with the Order and as further described in the applicable Ciena’s service description as of the date of the applicable Order. Prior to the expiration of each subscription term, Ciena will send you a quote for the annual renewal fee(s). To renew the subscription Software license(s) for additional subscription terms, you issue an Order in advance of the then-current expiration date of such subscription term.

2. Open Source and Third-Party Licenses. If any Software is subject to an open-source license that provides the end user with rights that are broader than this License, then such rights shall take precedence. Ciena warrants that using Software in accordance with its documentation will not subject you to any obligation to disclose, distribute or license your own software that interacts with Software.

3. Title. You are granted no title or ownership rights in or to the Software. Unless specifically authorized by Ciena in writing, you are not authorized to create any derivative works based upon the Software. Title to the Software, including any copies or derivative works based thereon, and to all copyrights, patents, trade secrets and other intellectual property rights in or to the Software, are and shall remain the property of Ciena and/or its licensors. Ciena’s licensors are third party beneficiaries of this License. Ciena reserves to itself and its licensors all rights in the Software not expressly granted to you.

4. Confidentiality. The Software contains trade secrets of Ciena. Such trade secrets include, without limitation, the design, structure and logic of individual Software programs, their interactions with other portions of the Software, internal and external interfaces, and the programming techniques employed. The Software and related technical and commercial information, and other information received in connection with the purchase and use of the Software that a reasonable person would recognize as being confidential, are all confidential information of Ciena (“Confidential Information”).

5. Obligations. You shall:

- i) Hold the Software and Confidential Information in strict confidence for the benefit of Ciena using your best efforts to protect the Software and Confidential Information from unauthorized disclosure or use, and treat the Software and Confidential Information with the same degree of care as you do your own similar information, but no less than reasonable care;
- ii) Keep a current record of the location of each copy of the Software you make;
- iii) Use the Software only in accordance with the authorized usage level;
- iv) Preserve intact any copyright, trademark, logo, legend or other notice of ownership on any original or copies of the Software, and affix to each copy of the Software you make, in the same form and location, a reproduction of the copyright notices, trademarks, and all other proprietary legends and/or logos appearing on the original copy of the Software delivered to you; and
- v) Issue instructions to your authorized personnel to whom Software is disclosed, advising them of the confidential nature of the Software and provide them with a summary of the requirements of this License.

6. Restrictions. You shall not:

- i) Use the Software or Confidential Information a) for any purpose other than your own internal business purposes; and b) other than as expressly permitted by this License;
- ii) Allow anyone other than your authorized personnel who need to use the Software in connection with your rights or obligations under this License to have access to the Software;
- iii) Make any copies of the Software except such limited number of copies, in machine readable form only, as may be reasonably necessary for execution in accordance with the authorized usage level or for archival purposes only;
- iv) Make any modifications, enhancements, adaptations, derivative works, or translations to or of the Software;
- v) Reverse engineer, disassemble, reverse translate, decompile, or in any other manner decode the Software;
- vi) Make full or partial copies of the associated documentation or other printed or machine-readable matter provided with the Software unless it was supplied by Ciena in a form intended for reproduction;
- vii) Export or re-export the Software and/or the associated documentation from the country in which it was received from Ciena or its authorized reseller unless authorized by Ciena in writing; or
- viii) Publish the results of any benchmark tests run on the Software.

7. Audit: Upon Ciena's reasonable request you shall permit Ciena to audit the use of the Software to ensure compliance with this License.

8. U.S. Government Use. The Software is provided to the Government only with restricted rights and limited rights. Use, duplication, or disclosure by the Government is subject to restrictions set forth in FAR Sections 52-227-14 and 52-227-19 or DFARS Section 52.227-7013(C)(1)(ii), as applicable. The Software and any accompanying technical data (collectively "Materials") are commercial within the meaning of applicable Federal acquisition regulations. The Materials were developed fully at private expense. U.S. Government use of the Materials is restricted by this License, and all other U.S. Government use is prohibited. In accordance with FAR 12.212 and DFAR Supplement 227.7202, the Software is commercial computer software and the use of the Software is further restricted by this License.

9. Term of License. This License is effective until the applicable subscription term expires or the License is terminated. You may terminate this License by giving written notice to Ciena. This License will terminate immediately if (i) you breach any term or condition of this License or (ii) you become insolvent, cease to carry on business in the ordinary course, have a receiver appointed, enter into liquidation or bankruptcy, or any analogous process in your home country. Termination shall be without prejudice to any other rights or remedies Ciena may have. Upon any termination of this License, you shall destroy and erase all copies of the Software in your possession or control, and forward written certification to Ciena that all such copies of Software have been destroyed or erased. Your obligations to hold the Confidential Information in confidence, as provided in this License, shall survive the termination of this License.

10. Compliance with laws. You agree to comply with all laws related to your installation and use of the Software. Software is subject to U.S. export control laws and may be subject to export or import regulations in other countries. If Ciena authorizes you to import or export the Software in writing, you shall obtain all necessary licenses or permits and comply with all applicable laws.

11. Limitation of Liability. ANY LIABILITY OF CIENA SHALL BE LIMITED IN THE AGGREGATE TO THE AMOUNTS PAID BY YOU TO CIENA OR ITS AUTHORIZED RESELLER FOR THE SOFTWARE. THIS LIMITATION APPLIES TO ALL CAUSES OF ACTION, INCLUDING WITHOUT LIMITATION BREACH OF CONTRACT, BREACH OF WARRANTY, NEGLIGENCE, STRICT LIABILITY, MISREPRESENTATION AND OTHER TORTS. THE LIMITATIONS OF LIABILITY DESCRIBED IN THIS SECTION ALSO APPLY TO ANY LICENSOR OF CIENA. NEITHER CIENA NOR ANY OF ITS LICENSORS SHALL BE LIABLE FOR ANY INJURY, LOSS OR DAMAGE, WHETHER INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL INCLUDING WITHOUT LIMITATION ANY LOST PROFITS, CONTRACTS, DATA OR PROGRAMS, AND THE COST OF RECOVERING SUCH DATA OR PROGRAMS, EVEN IF INFORMED OF THE POSSIBILITY OF SUCH DAMAGES IN ADVANCE.

12. General. Ciena may assign this License to an affiliate or to a purchaser of the intellectual property rights in the Software. You shall not assign or transfer this License or any rights hereunder, and any attempt to do so will be void. This License shall be governed by the laws of the State of New York without regard to conflict of laws provisions. The U.N. Convention on Contracts for the International Sale of Goods shall not apply hereto. This License constitutes the complete and exclusive agreement between the parties relating to the license for the Software and supersedes all proposals, communications, purchase orders, and prior agreements, verbal or written, between the parties. If any portion hereof is found to be void or unenforceable, the remaining provisions shall remain in full force and effect.

Contents

Publication history	1
About this document	3
Trademark acknowledgments	3
Intended audience	3
Related documents	3
CHAPTER 1	
Supported D-NFVI x86 platforms	5
CHAPTER 2	
Software installation preparation	7
Ports	7
Software packages for installation	8
Hardware installation	8
CPU, RAM and disk resources	8
CPU resource usage	8
Disk resource usage	9
RAM resource usage	10
Image discovery using ONIE	10
User accounts	10
Base OS accounts	10
Application software accounts	11
CHAPTER 3	
Installation work flow	13
CHAPTER 4	
Manual installation of the Software	15
List of procedures for manual installation of the software	15
Installing the software manually by using a server	16
Installing the software manually by using a USB key	18
CHAPTER 5	
Network-based software installation	21
List of procedures	21
Performing the network installation using ONIE	22

CHAPTER 6	
System access and setup	23
List of procedures	23
Logging in through the RJ-45 CONSOLE port	24
Connecting to the CLI	26
Connecting to a NETCONF/YANG shell	27
Connecting to the Ciena Base Virtualization OS shell	28
Modifying the resource profile	29
Increasing the number of cores available to the SVS	30

CHAPTER 7	
Upgrading the software	31
Upgrade from 18.06 to 10.5.1 or later	31
Upgrade from 18.06 to SAOS 10.2 or later	32
Upgrade from 17.09 or earlier to 10.2	32
List of procedures for upgrading	32
Downloading the software	34
Installing and activating the software	35
Checking the current software version	36
Activating the software	37
Configuring the hostname	38
Creating the default VRF for L3 interfaces	39
Creating the default maps	40
Configuring the CPU profile	42
Setting the number of CPUs	43

Publication history

May 2022
Revision A

Standard release of this document for D-NFVI 10.7.1.

About this document

This document directs network technicians and system administrators in the installation and startup of D-NFVI Software from Ciena[®] Corporation.

Hyperlinks are indicated by blue text in this document.

Trademark acknowledgments

Ciena is a trademark of Ciena Corporation.

Intended audience

This document is intended for users, such as network technicians and system administrators, who will install the system into a packet networking environment.

It assumes that the intended users possess basic knowledge of, but not limited to:

- Proper hardware installation
- Proper hardware diagnostics
- Ethernet concepts
- IEEE standards
- IETF standards
- Open Systems Interconnection (OSI) Seven Layer Model
- Local Area Networks (LAN)
- Virtual Local Area Networks (VLAN)
- Ethernet Passive Optical Networks (EPON)

Related documents

This document is part of a documentation suite that fully describes the system.

For more information about the documentation suite, refer to *Getting Started* for the release you are using.

CHAPTER 1

Supported D-NFVI x86 platforms

The supported D-NFVI x86 platforms are described in the following table:

Table 1 Supported x86 hardware platforms

Platform	Part number
3906mvi/3926m NFV small server FRU: 8 GB RAM, 120 GB SSD	170-0121-901
3906mvi/3926m NFV medium server FRU: 16 GB RAM, 120 GB SSD	170-0122-901
3906mvi/3926m NFV medium server FRU: 16 GB RAM, 480 GB SSD	170-0122-903
3906mvi/3926m NFV large server FRU: 16 GB RAM, 120 GB SSD	170-0128-900
3906mvi/3926m NFV large server FRU: 32 GB RAM, 480 GB SSD	170-0128-901
3906mvi/3926m NFV large server FRU: 64 GB RAM, 1.9 TB SSD	170-0128-903

The following table describes the limitations for the small server FRU.

Table 2 Limitations for the small server FRU

Item	Details
Performance Mode	Do not use. There are only four hyperthreads which are required to keep the system in default mode to preserve the hyperthreads for use by VNF.
Number of VNFs	Only one is recommended due to the number of cores/hyperthreads.
Number of VFP workers	VFP sub-system must remain in default setup with one worker core.

CHAPTER 2

Software installation preparation

This chapter provides information about requirements that must be completed prior to installing Ciena D-NFVI software on the x86 NFV Server Module of a Ciena Service Virtualization Switch (SVS) or platform.

The x86 NFV Server Module is a virtualization server that hosts D-NFVI software components.

Ports

Access to the following ports is required.

Table 3 Ports that are open

Port	Protocol	Purpose
22	TCP	NETCONF/SSH
68	UDP	DHCP
123	UDP	NTP
179	TCP	BGP
500	UDP	IKE NAT-T
830	TCP	NETCONF/SSH
4500	UDP	IPSEC NAT-T
5900	TCP	VNC for VNF sessions (default). Note: Use the port configured for the VNF.
6702	TCP	gRPC
9339		

Software packages for installation

D-NFVI software packages comprise the following types of files:

- .bin file, which is used to install the Base Virtualization OS and D-NFVI application software by using Open Network Install Environment (ONIE)

Hardware installation

Prior to installation, ensure that the x86 NFV Server Module has been installed according to requirements explained in the Installation document for the switch or platform.

CPU, RAM and disk resources

When deploying VNFs with Ciena D-NFVI Software, the user or orchestrator must be aware of

- resource requirements of the VNFs
- resources available on the underlying x86 NFV Server Module

The following sections explain resource usage for Ciena D-NFVI Software on the x86 NFV Server Module:

- [“CPU resource usage” on page 8](#)
- [“Disk resource usage” on page 9](#)
- [“RAM resource usage” on page 10](#)

The VNFs that are installed also use CPU, RAM, and disk resources. The resources used by D-NFVI Software are not available for use by the installed VNFs.

CPU resource usage

In this release, the second generation of the Service Virtualization Switch (SVS) uses a multi-threaded architecture that provides the ability to increase the bandwidth capacity of the SVS. The mode of operation can be configured to dedicate one shared or two separate physical CPU cores to the D-NFVI software and SVS to modify the base performance of the SVS. When the SVS resides on a separate core, more cores can be assigned to the SVS to further increase the capacity.

Configure the mode of operation by specifying a CPU resource profile. The options are:

- **Default Profile:** One physical core (two logical cores) are reserved for D-NFVI software and the SVS to share. This default profile leaves the maximum remaining CPU resources available for VNF deployment.

Note: The Default Profile is analogous to “Profile B” in previous software releases.

- **Performance Profile:** The SVS is assigned a physical core separate from the DNFVI software. This mode increases SVS performance. The user can also assign additional cores to the SVS to further increase SVS performance.

The service only supports a change from the single core Default Profile to the double core Performance Profile and will only be successful if there are no additional CPU cores specified. To do this, follow the [“Modifying the resource profile” on page 29](#) procedure. After you switch to the Performance Profile, you can then increase the number of cores. To do this, follow the [“Increasing the number of cores using the CLI” on page 1](#) procedure. To revert back to default profile, the system needs to be reset to factory default (RTFD).

Note: The CPU core assignment is assigned by the system and is not user configurable.

The following table summarizes CPU resource deployment.

Table 4 CPU resource deployment

Profile	Usage	SVS
Default Profile	<ul style="list-style-type: none"> • SVS and kernel share the same CPU core. • Increasing the number of CPU resources assigned to the SVS from the Default Profile is not restricted, but it is also not recommended. 	<ul style="list-style-type: none"> • One physical core (two logical cores)
Performance Profile	<ul style="list-style-type: none"> • SVS and kernel use separate CPU cores. When the SVS doesn't share the core with the kernel, you can increase SVS performance. • In most cases, the Performance Profile should be used to increase the CPU resources assigned to the SVS for increased throughput. 	<ul style="list-style-type: none"> • Two physical cores (four logical cores) • The user can assign additional cores to the SVS to further increase SVS performance.

Disk resource usage

The following table lists minimum server requirements for disk resources.

Table 5 Disk resources

Usage	SVS
Ciena infrastructure	36GB
VNF	Total Disk minus 36GB

RAM resource usage

The following table lists minimum server requirements for RAM resources.

Table 6 RAM resources

Usage	SVS
Ciena infrastructure	9GB (for example, 8G for containers and 1G for kernel)
VNF	Total RAM minus 9GB

Image discovery using ONIE

Open Network Install Environment (ONIE) is an open source install environment used by the network operator to install an operating system on a server.

It combines a boot loader with a Linux kernel and software packages which:

- download an operating system image
- partition the internal hard drive
- install the image to disk

ONIE is pre-installed on the x86 NFV Server Module.

User accounts

User accounts allow access to the system for system management activities.

There are two classes of user accounts:

- [“Base OS accounts” on page 10](#)
- [“Application software accounts” on page 11](#)

For more information about managing user accounts, refer to the user guide for the product release you are using.

Base OS accounts

Base OS accounts are used to upgrade the base OS. These accounts can be accessed using the serial console or SSH access from the application software account.

The following lists the base OS accounts.

Table 7 Base OS accounts

Account	Password	Important details
root	default password: wwpciena	<ul style="list-style-type: none"> cannot be used by using SSH login shell is bash in the Base OS
diag	default password: cien123	<ul style="list-style-type: none"> login shell is bash in the Base OS this account has sudo privileges, meaning that it can run commands as root

Application software accounts

Application software accounts can be accessed using ssh to port 830 or port 22. The following table lists application software user accounts.

Table 8 UI application software user accounts

Account	Password	Important details
diag	default password: cien123	<ul style="list-style-type: none"> login shell is CLI in the UI application software this account has sudo privileges within the UI application software <p>Note: This account is managed separately from the Base OS diag user. A different password can be used.</p>
user	default password: cien123	<ul style="list-style-type: none"> login shell is CLI

CHAPTER 3

Installation work flow

This chapter provides a work flow for installing and starting up D-NFVI Software on the x86 NFV Server Module.

For a bundle installation the work flow is the following:

- 1 [“Manual installation of the Software” on page 15](#) or [“Network-based software installation” on page 21](#)
- 2 [“System access and setup” on page 23](#)

Note: When deploying a small number of systems, select the manual installation procedure. When deploying a large number of systems, select the network-based procedure.

For a non-bundle installation the work flow is the following:

- 1 [“Manual installation of the Software” on page 15](#)
- 2 [“System access and setup” on page 23](#)

CHAPTER 4

Manual installation of the Software

Perform a manual installation of the software when you have a small number of systems to deploy.

You can manually install the software using:

- a server
- a USB key

List of procedures for manual installation of the software

The procedures for manual installation of D-NFVI software are:

- [Procedure 1, “Installing the software manually by using a server”](#)
- [Procedure 2, “Installing the software manually by using a USB key”](#)

Procedure 1 Installing the software manually by using a server

Install the software manually by using a server when you are not in physical proximity to the x86 NFV Server Module.

Requirements

To perform this procedure on an x86 NFV Server Module in a Ciena SVS running SAOS 6.17.1 (or later), you will require a user account with diag access. For more information, refer to *39XX/51XX Service Delivery, Aggregation and Virtualization Switches Administration and Security*.

Overview

The D-NFVI software installer removes any existing disk partition with the D-NFVI software installed on it. Any changes or modifications to that partition are lost as a result. The D-NFVI software installer

- removes all contents of the disk except for the EFI and ONIE partitions
- installs a new instance of the D-NFVI software

Steps

At the network operator workstation

- 1 Copy the D-NFVI software file to the HTTP, FTP, or TFTP server of your choice.
- 2 Log in to the SVS.
- 3 Access the x86 NFV Server Module:
`module diag-shell module NFV_FRU`
- 4 Boot into the ONIE: Install OS option in the GRUB menu.
On a system with default factory settings, this is the default option and will boot to the ONIE prompt automatically. See the next step.
- 5 Download the D-NFVI Software image and launch the installer:

```
ONIE:/ #onie-nos-install <URL>
```

where

<URL> is the URL where the D-NFVI image you want to install is located

ONIE downloads the D-NFVI image and executes the installer embedded within it. The installer is fully automated and does not require any user interaction. Once the installation is complete, the system automatically reboots.

After the system reboots, a new GRUB menu appears which shows the D-NFVI software. There are two software banks that contain the same image load. Bank A is the default boot choice and is automatically selected after a three second timeout.

Procedure 2 Installing the software manually by using a USB key

Install the software manually by using a USB key when you are in physical proximity to the x86 NFV Server Module.

Requirements

A USB key:

- of minimum size 2GB
- newly-formatted with one of the following file systems:
 - vFAT/FAT32 partition type, which is common on commercially-available USB keys
 - Linux ext2

Note: Inserting a previously-used USB key that may have other content or files is a security risk.

To perform this procedure on an x86 NFV Server Module in a Ciena SVS running SAOS 6.17.1 (or later), you will require a user account with diag access. For more information, refer to *39XX/51XX Service Delivery, Aggregation and Virtualization Switches Administration and Security*.

Overview

The D-NFVI software installer removes any existing disk partition with the D-NFVI software installed on it. Any changes or modifications to that partition are lost as a result. The D-NFVI software installer

- removes all contents of the disk except for the EFI and ONIE partitions
- installs a new instance of the D-NFVI software

Steps

At the network operator workstation

- 1 Copy the D-NFVI software file to the USB key.
- 2 Rename the D-NFVI software file to `onie-installer`
Ensure that there is no trailing `.bin` extension on the filename.

At the SVS

- 3 Insert the USB key into the USB port of the x86 NFV Server Module.
- 4 Log in to the SVS.
- 5 At the NID command line, log in to a user account.

- 6** Access the x86 NFV Server Module:

```
module diag-shell module NFV_FRU
```
- 7** Boot into the ONIE: Install OS option in the GRUB menu.
On a system with default factory settings, this is the default option and will boot to the ONIE prompt automatically. See the next step.
The installer is fully automated and does not require any user interaction. The installer scans all available partitions and selects a properly formatted USB key with a valid installer image ahead of any network-based installation.
Once the installation is complete, the system automatically reboots.
After the system reboots, a new GRUB menu appears which shows the D-NFVI Software. There are two software banks that contain the same image load. Bank A is the default boot choice and is automatically selected after a three second timeout.
- 8** Remove the USB key from the USB port of the x86 NFV Server Module.

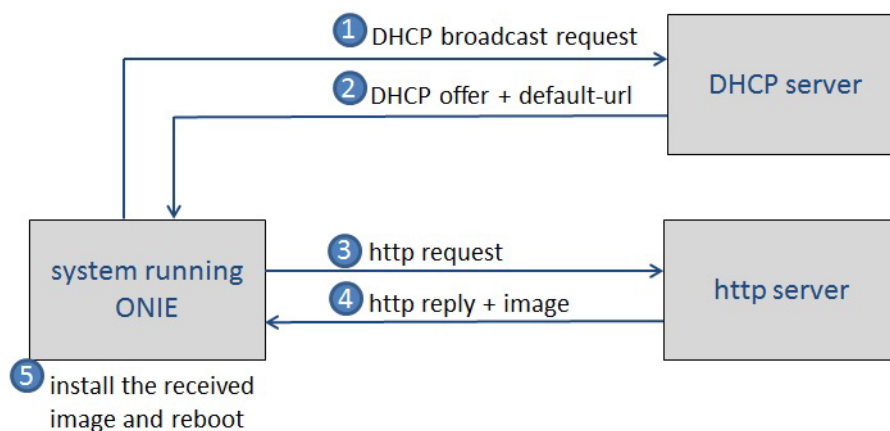
CHAPTER 5

Network-based software installation

For all network installation scenarios, Open Network Install Environment (ONIE) expects the Network Operating System (NOS) installer image to be available on the network by means of HTTP.

The following figure shows the sequence of server interactions for an automated ONIE installation over the network.

Figure 1 Server interactions for ONIE installation



List of procedures

The procedure for a network-based installation is:

- [Procedure 3, “Performing the network installation using ONIE”](#)

Procedure 3 Performing the network installation using ONIE

Perform the network installation using Open Network Install Environment (ONIE) when you are installing a number of systems.

Overview

In this scenario, the DHCP server, target switch and Web server are all located on the same layer 2 network.

The DHCP server provides the following information:

- IP address for the target switch from a pool of IP addresses
- URL of the installer image on the Web server

With this configuration Open Network Install Environment (ONIE) picks up an IP address from the pool defined by the range parameter. ONIE next attempts to download the URL specified by the default-url parameter.

With this technique you can:

- assign the IP addresses that best suit your network
- assign a name to the installer image and sub-directories

Steps

At the SVS

1 Log in to the SVS.

2 Boot the x86 NFV Server Module:

```
module reboot module <ModuleName> now
```

ONIE boots and starts the discovery process after it has acquired an IP address from the DHCP server. The DHCP reply contains the URL from which to download the D-NFVI software image located on the HTTP server. The image is downloaded, and the D-NFVI software installer starts automatically.

Once the D-NFVI software installation is complete, the x86 NFV Server Module reboots. The installer populates both software banks with the same load at installation time, so there is no difference between the two banks.

CHAPTER 6

System access and setup

This chapter provides procedures for accessing and setting up the system.

System access to the platform can be established by means of:

- console port. The console port is used to access the platform by means of a laptop PC. The serial console port is a Serial EIA-561 (RJ-45) port. The console port allows for local CLI access to the platform.
- Secure Shell (SSH). SSH provides remote login and SFTP file transfers. SSH verifies and grants access to login requests by encrypting user ID and passwords. SSH/SFTP is supported over IPv4 and IPv6. SSH is used for remote CLI and NETCONF access to the platform.

List of procedures

Procedures are:

- [Procedure 4, “Logging in through the RJ-45 CONSOLE port”](#)
- [Procedure 5, “Connecting to the CLI”](#)
- [Procedure 6, “Connecting to a NETCONF/YANG shell”](#)
- [Procedure 7, “Connecting to the Ciena Base Virtualization OS shell”](#)
- [Procedure 8, “Modifying the resource profile”](#)
- [Procedure 9, “Increasing the number of cores available to the SVS”](#)

Procedure 4 Logging in through the RJ-45 CONSOLE port

Log in through the RJ-45 CONSOLE port to establish a CLI session through the console port.

Requirements

The following table lists the cable required for the console port connection.

Table 9 Cable required to connect to the console port

Console port	Cable
RJ-45	Null modem cable with a male DB-9 connector on the PC side and a male RJ-45 cable to connect to the RJ-45 connector on the side.

Ensure that the chassis is

- properly grounded and installed
- powered on

Overview

The following table lists the terminal settings to use when configuring the connected terminal.

Table 10 Terminal settings

Terminal setting	Value
Character size	8
Parity	None
Stop bit	1
Control	None

The following table lists the baud for the terminal.

Table 11 Baud

Baud
96000 bps

Note: Configuration changes are immediately saved to the running configuration.

Steps

- 1 Connect the RJ-45 end of the Null modem cable into the CONSOLE port.
- 2 Connect a terminal or PC running terminal emulation software to the CONSOLE port using the recommended cable.
Note: The serial console port does not support connectivity to a modem.
- 3 At the prompt, configure the connected terminal.
- 4 When the login prompt is displayed, press **Enter** and enter the default username and password.

Example

The following command logs in as the default user.

```
login:diag  
Password: ciena123
```

Procedure 5 Connecting to the CLI

Connect to the CLI with an application account when you want to configure D-NFVI software manually.

Overview

For further information about user accounts, refer to [“User accounts” on page 10](#).

Steps

- 1 Connect to the CLI by means of SSH:

```
ssh diag@<device_ip> [-p 830]
```

or

```
ssh user@<device_ip> [-p 830]
```

Procedure 6 Connecting to a NETCONF/YANG shell

Connect to a NETCONF/YANG shell with an application user account when you want to configure D-NFVI software manually.

Overview

The application software account is used to connect to port 830 from a NETCONF/YANG controller.

Steps

- 1 Connect to the NETCONF/YANG shell by means of SSH:
`ssh diag@<device ip> -p 830`

Procedure 7 Connecting to the Ciena Base Virtualization OS shell

Connect to the Ciena Base Virtualization OS shell with an application user account when you want to configure the platform and to view system information.

Overview

The application software account is used to connect to port 830 by using SSH.

Steps

- 1 Connect to the x86 NFV Server Module by means of SSH.
`ssh user@<ip address> -p 830`

Procedure 8 Modifying the resource profile

The CPU resource profile can be changed from the default single core Default Profile to the two core Performance Profile.

Requirements

To change resource profiles you must:

- Stop and delete any currently configured VNF instances. You must delete the instances individually by name. If you attempt to delete multiple instances at once, for example using `no sfs sf`, then the resource allocation may not behave as expected.

Note: Do not delete the stored image. When modifying the resource profile, the VNF is recreated using the existing image on disk which contains configuration and operational data. When restarted, the VNF will be in same state prior to profile change.

Overview

For more information about the two modes of operation, refer to [“CPU resource usage” on page 8](#).

The service only supports a change from the single core Default Profile to the double core Performance Profile and will only be successful if there are no additional CPU cores specified. After you switch to the Performance Profile, you can then increase the number of cores. To do this, follow the [“Increasing the number of cores using the CLI” on page 1](#) procedure. To revert back to default profile, the system needs to be reset to factory default (RTFD).

Steps

- 1 Log in to the device.
- 2 Switch to the desired profile.

```
diag@<host># subsystems subsystem virtual-forwarding-plane cpu-profile profile <performance-profile|default-profile>
```
- 3 Exit out of the configuration terminal.

```
diag@<host># exit
```
- 4 Perform a subsystem restart for the profile change to take effect.

```
R640 > system restart subsystem virtual-forwarding-plane
```

Note: It is recommended that you perform a system restart, not a container restart, for configuration changes to take effect.
- 5 Verify the desired profile is applied.

```
R640 > show subsystems
```

Procedure 9 Increasing the number of cores available to the SVS

Assign additional cores to the SVS to improve performance.

Overview

The CPU core hyperthread number is assigned by the system and is not configurable. When you allocate additional hyperthreads to the SVS by increasing the number of cores, then the sibling of the service-assigned hyperthread is also blocked and not available for VNF use.

Steps

- 1 Log in to the SVS.
- 2 Access the x86 NFV Server Module:

```
module diag-shell module NFV_FRU
```
- 3 Log in to a Base OS user account.
- 4 Enter configuration mode.

```
NFV-FRU > config
```
- 5 Increase number of cores available to the vSwitch.

```
diag@<host># subsystems subsystem virtual-forwarding-  
plane cpu-resource socket 0 cpu num-of-cores 3
```
- 6 Return to the x86 NFV Server Module.

```
diag@<host># exit
```
- 7 Perform a system restart for the change to take effect.

```
NFV-FRU > system restart
```

Note: It is recommended that you perform a system restart, not a container restart, for configuration changes to take effect.
- 8 Verify that the correct number of cores are allocated.

```
NFV-FRU > show subsystems
```

CHAPTER 7

Upgrading the software

This chapter provides instructions for upgrading the software on the x86 Server Module.

Upgrade from 18.06 to 10.5.1 or later

A D-NFVI software upgrade from release 18.06 to 10.5.1 or later is supported without loss of license or VNF configuration. However, there is a minimal impact to traffic during the process.

Pre-upgrade

- Upgrade is only supported from Profile B. Upgrade is not supported from Profile A.
- Before software upgrade, ensure that all the ingress/egress transforms are in compliance to the new SVS Transform capabilities

Post-upgrade

- The following parameters must be manually configured:
 - Hostname configuration
 - Create default VRF for L3 interfaces
 - Create default Cos-to-frame and frame-to-cos maps
 - Create Mgmtbr0 L3 interface (management will still be reachable after upgrade. However, you must configure it to see it displayed in the CLI.
 - Configure the cpu-profile to use the default profile
 - Set the number of CPUs to 1

D-NFVI 10.5.1 or later does not require the inactive standby bank to be protected.

- The inactive standby bank does not include the entire software image.
- The command “software protect” is neither supported nor required in D-NFVI 10.5.1 or later.

Upgrade from 18.06 to SAOS 10.2 or later

A D-NFVI software upgrade from release 18.06 to 10.2 or later is supported without loss of license or VNF configuration. However, there is a minimal impact to traffic during the process.

Pre-upgrade

- Upgrade is only supported from Profile B. Upgrade is not supported from Profile A.
- Before software upgrade, ensure that all the ingress/egress transforms are in compliance to the new SVS Transform capabilities

Post-upgrade

- The following parameters must be manually configured:
 - Hostname configuration
 - Create default VRF for L3 interfaces
 - Create default Cos-to-frame and frame-to-cos maps
 - Create Mgmtbr0 L3 interface (management will still be reachable after upgrade. However, you must configure it to see it displayed in the CLI.
 - Configure the cpu-profile to use the default profile
 - Set the number of CPUs to 1

D-NFVI 10.2 or later does not require the inactive standby bank to be protected.

- The inactive standby bank does not include the entire software image.
- The command “software protect” is neither supported nor required in D-NFVI 10.2 or later.

Upgrade from 17.09 or earlier to 10.2

A D-NFVI software upgrade is not supported from release 17.09 or earlier to 10.2.

List of procedures for upgrading

The following procedures are used to upgrade the software:

- [Procedure 10, “Downloading the software”](#)
- [Procedure 11, “Installing and activating the software”](#)
- [Procedure 12, “Checking the current software version”](#)
- [Procedure 13, “Activating the software”](#)
- [Procedure 14, “Configuring the hostname”](#)
- [Procedure 15, “Creating the default VRF for L3 interfaces”](#)

- [Procedure 16, “Creating the default maps”](#)
- [Procedure 17, “Configuring the CPU profile”](#)
- [Procedure 18, “Setting the number of CPUs”](#)

Procedure 10 Downloading the software

Download the software.

Steps

- 1 From yp-shell, download the software.
`software-download url=<url_to_manifest>`

Example

The following example downloads the software.

```
software-download url=http://192.0.2.2/valimar-snapshot/manifest/dnfvi-10-02-00-0181.yml
```

Procedure 11 Installing and activating the software

Install and activate the software.

Steps

- 1 From yp-shell, install and activate the software.

```
software-install package <package_name>
```

Note: To defer activation, add “defer-activation=true” to the command.

Example

The following example installs and defers activation for the software.

```
software-install defer-activation=true package dnfvi-10-02-00-0181
```

The following example installs and activates the software.

```
software-install package dnfvi-10-02-00-0181
```

Procedure 12 Checking the current software version

Check the current software version.

Steps

- 1 Check the current software version.

```
show software
```

Example

The following example shows an example reply after entering the above command.

```
show software
```

Name	SOFTWARE	STATE
Current operation		idle
RPC Status		idle
Running package version	dnfvi-10-02-00-0193-GA	
Active bootchain	01-02-00-0193	
Standby bootchain	01-00-00-0200	
Components:		
cn_dhcp-ctrl_1		01-02-00-0193
cn_dataplane_1		01-02-00-0193
cn_ui_1		01-02-00-0193
cn_dns_1		01-02-00-0193
cn_telemetry_1		01-02-00-0193
cn_hal_1		01-02-00-0193
xg_xgrade-agent_1		01-02-00-0193
cn_dnfvi_1		01-02-00-0193
cn_system_1		01-02-00-0193
cn_central-logger_1		01-02-00-0193
cn_alarm_1		01-02-00-0193
cn_snmp-agent_1		01-02-00-0193
cn_svcdirectory_1		01-02-00-0193
cn_collectd_1		01-02-00-0193
cn_cnfp_1		01-02-00-0193
cn_ntp_1		01-02-00-0193
cn_feds_1		01-02-00-0193
cn_storage_1		01-02-00-0193
cn_ztp_1		01-02-00-0193
cn_ipservices_1		01-02-00-0193
cn_pkix_1		01-02-00-0193
Available packages:		
dnfvi-10-02-00-0193-GA		activated
dnfvi-18-06-00-0200		installed

Procedure 13 Activating the software

If you deferred activation during installation, use this procedure to activate the software.

Steps

- 1 Activate the software.

```
software-activate package <package_name>
```

Example

The following example activates the dnfvi-10-02-00-0181 package.

```
software-activate package dnfvi-10-02-00-0181
```

Procedure 14 Configuring the hostname

After upgrade, configure the hostname.

Overview

Observe the following:

- Name length is between 1 and 253 characters
- Spaces are permitted.

Steps

- 1 Configure the hostname.

```
system config hostname <name>
```

Procedure 15 Creating the default VRF for L3 interfaces

After upgrade, create the default VRF for L3 interfaces.

Steps

- 1 Create the default VRF for L3 interfaces.

```
vrf default  
exit
```

Procedure 16 Creating the default maps

After upgrade, create the default cos-to-frame and frame-to-cos maps.

Steps

- 1 Create the default cos-to-frame and frame-to-cos maps.

```

cos-to-frame-maps cos-to-frame-map default-c2f map-entry
0 green pcp 0 dei disabled ip-dscp 0 mpls-tc 0
cos-to-frame-maps cos-to-frame-map default-c2f map-entry
8 green pcp 1 dei disabled ip-dscp 8 mpls-tc 1

cos-to-frame-maps cos-to-frame-map default-c2f map-entry
16 green pcp 2 dei disabled ip-dscp 16 mpls-tc 2

cos-to-frame-maps cos-to-frame-map default-c2f map-entry
24 green pcp 3 dei disabled ip-dscp 24 mpls-tc 3

cos-to-frame-maps cos-to-frame-map default-c2f map-entry
32 green pcp 4 dei disabled ip-dscp 32 mpls-tc 4

cos-to-frame-maps cos-to-frame-map default-c2f map-entry
40 green pcp 5 dei disabled ip-dscp 40 mpls-tc 5

cos-to-frame-maps cos-to-frame-map default-c2f map-entry
48 green pcp 6 dei disabled ip-dscp 48 mpls-tc 6

cos-to-frame-maps cos-to-frame-map default-c2f map-entry
56 green pcp 7 dei disabled ip-dscp 56 mpls-tc 7

frame-to-cos-maps frame-to-cos-map default-f2c map-entry
pcp0-dei0-cos0-green pcp 0 dei disabled cos 0 color green

frame-to-cos-maps frame-to-cos-map default-f2c map-entry
pcp1-dei0-cos8-green pcp 1 dei disabled cos 8 color green

frame-to-cos-maps frame-to-cos-map default-f2c map-entry
pcp2-dei0-cos16-green pcp 2 dei disabled cos 16 color
green

frame-to-cos-maps frame-to-cos-map default-f2c map-entry
pcp3-dei0-cos24-green pcp 3 dei disabled cos 24 color
green

frame-to-cos-maps frame-to-cos-map default-f2c map-entry
pcp4-dei0-cos32-green pcp 4 dei disabled cos 32 color
green

frame-to-cos-maps frame-to-cos-map default-f2c map-entry
pcp5-dei0-cos40-green pcp 5 dei disabled cos 40 color
green

frame-to-cos-maps frame-to-cos-map default-f2c map-entry
pcp6-dei0-cos48-green pcp 6 dei disabled cos 48 color
green

```

```
frame-to-cos-maps frame-to-cos-map default-f2c map-entry  
pcp7-dei0-cos56-green pcp 7 dei disabled cos 56 color  
green
```

Procedure 17 Configuring the CPU profile

After upgrade, configure the CPU profile to use the default profile.

Steps

- 1 Configure the CPU profile to use the default profile.

```
subsystems subsystem virtual-forwarding-plane cpu-  
profile profile default-profile
```

Procedure 18 Setting the number of CPUs

After upgrade, set the number of CPUs to 1.

Steps

- 1 Set the number of CPUs to 1.

```
subsystems subsystem virtual-forwarding-plane cpu-  
resource socket 0 cpu num-of-cores 1
```


D-NFVI Software

Installation

Copyright© 2022 Ciena® Corporation. All rights reserved.

D-NFVI 10.7.1

Publication: 323-1955-201

Document status: Standard

Revision A

Document release date: May 2022

CONTACT CIENA

For additional information, office locations, and phone numbers, please visit the Ciena web site at www.ciena.com