



Cisco vWAAS with Cisco Enterprise NFVIS

This section describes vWAAS on Cisco Enterprise Network Functions Virtualization Infrastructure Software (Enterprise NFVIS). It contains the following sections:

- [Cisco Enterprise NFVIS](#)
- [vWAAS with Enterprise NFVIS](#)
- [Unified OVA Package for vWAAS with NFVIS for WAAS Version 6.4.1 and Later](#)
- [Firmware Upgrade for Cisco NFVIS](#)
- [Traffic Interception for vWAAS with NFVIS](#)
- [Upgrade Guidelines for vWAAS with NFVIS](#)

Cisco Enterprise NFVIS

Cisco Enterprise Network Function Virtualization Infrastructure Software (NFVIS) is a Linux-based software hosting layer with embedded KVM hypervisor.

Cisco Enterprise NFVIS contains the following features:

- vWAAS with Cisco Enterprise NFVIS is deployed on the Cisco ENCS 5400-W Series. For more information on the ENCS 5400-W Series, see the chapter [“Cisco vWAAS on Cisco ENCS 5400-W Series”](#).
- Cisco Enterprise Network Functions Virtualization (NFV)—Extends Linux by packaging additional functions for Virtual Network Functions (VNF) that support lifecycle management, monitoring, device programmability, service chaining, and hardware acceleration.

Cisco Enterprise NFV also provides local network management capabilities that enable you to dynamically deploy virtualized network functions such as a virtual router, firewall, WAN acceleration, on a supported Cisco device, eliminating the need to add a physical device for every network function.

- Monitoring—Monitors all parameters of the deployed vWAAS, including memory, storage, and CPU, and monitors memory, storage, and CPU utilization of the vWAAS.
- Traffic verification—Verifies traffic flows through vWAAS by monitoring the Virtualized Network Function (VNF) interface statistics.
- Add-On Capability—Ability to add vCPU, memory, and storage, to modify the networking option and add a virtual interface, to configure the virtual networking port and it to a VLAN.

vWAAS with Enterprise NFVIS

vWAAS with NFVIS enables WAAS to run vWAAS as a standalone virtual machine (VM) on the ENCS 5400-W Series platform, to provide WAN application optimization, and, optionally, application optimization with Akamai Connect.



Caution

For guaranteed performance, the ENCS 5400-W Series, UCS-C Series, UCS-E Series, ENCS 5100, CSP-2100, and ISR configurations listed in the WAAS Sizing Guides and specifically noted in WAAS and vWAAS user guides and WAAS Release Notes are the only devices we recommend for use with vWAAS. Although vWAAS models may be able to operate with other Cisco or third-party hardware, successful performance and scale for those configurations is not guaranteed.

For more information about supported platforms for Cisco Enterprise NFV, see the [Release Notes for Cisco Enterprise Network Function Virtualization Infrastructure Software, Release 3.9.x](#),

Table 9-1 shows the platforms and software versions supported for vWAAS with NFVIS.

Table 9-1 Platforms and Software Versions Supported for vWAAS with NFVIS

PID and Device Type	Minimum WAAS Version	Host Platforms	Minimum Host Version	Disk Type
<ul style="list-style-type: none"> • PID: OE-VWAAS-ENCS • Device Type: OE-VWAAS-ENCS 	<ul style="list-style-type: none"> • 6.4.1 	<ul style="list-style-type: none"> • Cisco ENCS (Enterprise Network Compute System) 	<ul style="list-style-type: none"> • NFVIS 3.7.1 	<ul style="list-style-type: none"> • virtio
<ul style="list-style-type: none"> • PID: OE-VWAAS-KVM • Device Type: OE-VWAAS-KVM 	<ul style="list-style-type: none"> • 6.2.x 	<ul style="list-style-type: none"> • Cisco UCS-E Series 	<ul style="list-style-type: none"> • NFVIS 3.7.1 	<ul style="list-style-type: none"> • virtio

vWAAS with NFVIS on ENCS provides the following capabilities:

- Enterprise Application Optimization—Branch to branch, and branch to data center optimization of application traffic, either within or outside of an IWAN solution. This includes traditional WAAS WAN optimization functions, as well as the deployment of other IWAN solution features that are inherent in IOS-XE platforms.
- XaaS (Everything as a Service) Optimization—For single-sided use cases in cloud deployments, where you have control of one side of the connection: branch to cloud, and data center to cloud (for backup and recovery purposes). Optimizations are applied in a unilateral fashion, without reliance on a peer.
- Service Nodes—A service node is a Cisco WAAS application accelerator that optimizes and accelerates traffic according to the optimization policies configured on the device. It can be a vWAAS instance or a Cisco ENCS appliance.



Note

When upgrading vWAAS, do not upgrade more than five vWAAS nodes at the same time on a single UCS box. Upgrading more than five vWAAS nodes at the same time may cause the vWAAS devices to go offline and to diskless mode.

- vWAAS with NFVIS on ENCS is part of Cisco Intelligent WAN (IWAN)—a suite of components that brings together WAN optimization, performance routing, and security levels of leased lines and MPLS VPN services to the Internet. For more information on Cisco NFVIS and Cisco NFV, see the [Cisco Intelligent WAN - An SD-WAN Solution](#).

Unified OVA Package for vWAAS with NFVIS for WAAS Version 6.4.1 and Later

For vWAAS with NFVIS for WAAS Version 6.4.x, vWAAS is deployed in a RHEL KVM hypervisor on a Cisco ENCS 5400-W Series device.

For vWAAS with NFVIS for WAAS Version 6.4.x and later, Cisco provides a single, unified OVA or NPE OVA package for each hypervisor type, which can be used with all vWAAS models for that hypervisor.



Caution

The ENCS 5400-W Series, UCS-C Series, UCS-E Series, ENCS 5100, CSP-2100, and ISR configurations listed in the WAAS Sizing Guides and specifically noted in WAAS and vWAAS user guides and WAAS Release Notes are the only devices we recommend for use with vWAAS. Although vWAAS models may be able to operate with other Cisco or third-party hardware, successful performance and scale for those configurations is not guaranteed.

For more information about supported platforms for Cisco Enterprise NFV, see the [Release Notes for Cisco Enterprise Network Function Virtualization Infrastructure Software, Release 3.9.x](#),

Each unified OVA package file is a pre-configured virtual machine image that is ready to run on a particular hypervisor. The launch script for each unified OVA package provides the model and other required parameters to launch vWAAS with WAAS in the required configuration.

Here are examples of the unified OVA and NPE OVA package filenames for vWAAS on RHEL KVM:

- OVA—Cisco-KVM-vWAAS-Unified-6.4.1-b-33.tar.gz
- NPE OVA—Cisco-KVM-vWAAS-Unified-6.4.1-b-33-npe.tar.gz

The unified OVA package for vWAAS on RHEL KVM/KVM on CentOS contains the following files.

- Flash disk image
- Data system disk
- Akamai disk
- INSTRUCTIONS.TXT—Describes the procedure for deploying the virtual instance and using the launch.sh file.
- package.mf template file and bootstrap-cfg.xml—These two files work together on the Cisco NFVIS platform with the image_properties.xml file as Day-0 configuration template.
- ezdeploy.sh—The script used to deploy vWAAS on UCS-E.
- exdeploy_qstatus.exp—The dependent file for ezdeploy.sh script image_properties.xmlA VM configuration template file used on the Cisco NFVIS platform.
- launch.sh—The launch script to deploy Cisco vWAAS on Linux KVM.

- `vm_macvtap.xml`—Configuration file for vWAAS deployment using host machine interfaces with the help of the macvtap driver.
- `vm_tap.xml`—Configuration file for vWAAS deployment using virtual bridge or OVS (Open Virtual Switch) present in the host machine.

Firmware Upgrade for Cisco NFVIS

To upgrade the Complex Programmable Logic Device (CPLD) and the Field Programmable Gate Array (FPGA) for Cisco NFVIS to the latest version, follow these steps:

Step 1 Ensure that your system is running the following:

- WAAS Version 6.4.3
- Cisco NFVIS 3.9.1

Step 2 To upgrade the Field Programmable Gate Array (FPGA), use the following CLI EXEC command:

```
ENCS-W# nfvis scp fw-upgrade server-IP RemoteFileDirectory RemoteFileName
```

Example:

```
ENCS-W# nfvis scp fw-upgrade 172.19.156.179 ./ Cisco_ENCS_firmware-3.9.1-3.fwpkg
```



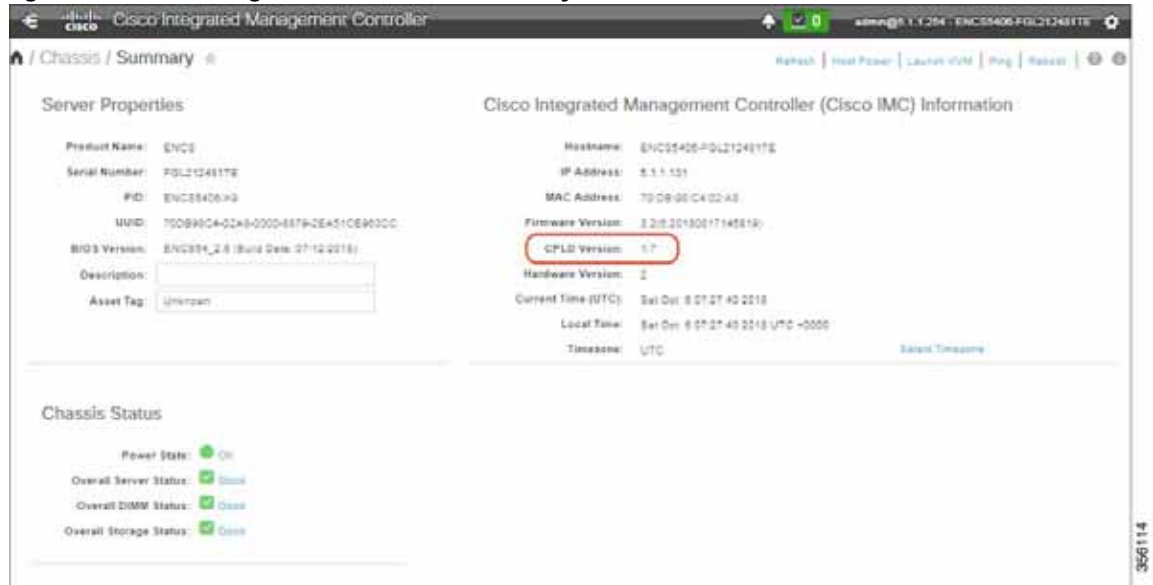
Note After you upgrade the firmware package, you must power-cycle the entire chassis to ensure that the FPGA takes effect.

Step 3 Download the firmware package from the [Cisco Wide Area Application Services \(WAAS\) Software 6.4.3 Download Page](#).

Step 4 To verify the CPLD/FPGA version, use the CIMC GUI or the CLI.

- To verify the CPLD/FPGA version from the CIMC GUI, navigate to Chassis > Summary ([Figure 9-1](#)).

Figure 9-1 Using the CIMC Console to Verify CPLD/FPGA Version



- To verify the CPLD/FPGA version from the CIMC CLI, use the following command:

```
ENCS-W# scope cimc
ENCS-W# /cimc # show firmware detail
Firmware Image Information:
Update Stage: NONE
Update Progress: 0%
Current FW Version: 3.2(6.20180817145819)
FW Image 1 Version: 3.2(6.20180817145819)
FW Image 1 State: RUNNING ACTIVATED
FW Image 2 Version: 3.2(3.20171215104530)
FW Image 2 State: BACKUP INACTIVATED
Boot-loader Version: 3.2(6.20180817145819).36
CPLD Version: 1.7
Hardware Version: 2
```

Traffic Interception for vWAAS with NFVIS

vWAAS with NFVIS on ENCS supports WCCP traffic interception.

The Web Cache Communication Protocol (WCCP) specifies interactions between one or more routers and one or more WAE's, to establish and maintain the transparent redirection of selected types of traffic in real time. The selected traffic is redirected to a group of WAE's with the aim of optimizing resource usage and lowering response times. A WCCP-enabled router and a WAE exchange WCCP protocol packets and negotiate membership of WCCP service groups.

For vWAAS on Cisco ENCS with WCCP, there are two Ethernet Gigabit ports that can be configured to intercept the traffic. With the Network Interception Module card and if the inline interception method is not configured, the ports can be used to intercept the WCCP traffic (configure port channel with LAN and WAN interface).

For detailed information on configuring WCCP, see the chapter “Configuring Traffic Interception” in the [Cisco Wide Area Application Services Configuration Guide](#).

Table 9-2 shows the CLI commands used to configure WCCP traffic interception for vWAAS with NFVIS.

Table 9-2 CLI Commands for WCCP Interception Mode

Mode	Command	Description
Global configuration	interception method wccp	Configures the WCCP traffic interception method.
	wccp access-list	Configures an IP access list on a WAE for inbound WCCP GRE encapsulated traffic.
	wccp flow-redirect	Redirects moved flows.
	wccp router-list	Configures a router list for WCCP Version 2.
	wccp shutdown	Sets the maximum time interval after which the WAE will perform a clean shutdown of the WCCP.
	wccp tcp-promiscuous	Configures the WCCP Version 2 TCP promiscuous mode service.
	wccp tcp-promiscuous service-pair <i>serviceID serviceID+1</i>	Configures the WCCP Version 2 TCP promiscuous mode service and specifies a pair of IDs for the WCCP service on devices configured as application accelerators.
EXEC	show statistics wccp	Displays WCCP statistics for a WAE.
	show wccp clients	Displays which WAEs are seen by which routers.
	show wccp egress	Displays the WCCP egress method—IP forwarding, generic GRE, WCCP GRE, or L2.
	show wccp flows tcp-promiscuous summary	Displays WCCP packet flows and TCP-promiscuous service information.
	show wccp masks tcp promiscuous	Displays WCCP mask assignments and TCP-promiscuous service information.
	show wccp routers [detail]	Displays details of routers seen and not seen by the specified WAE.
	show wccp services [detail]	Displays the configured WCCP services.
	show wccp statistics	Displays WCCP generic routing encapsulation packet-related information.
	show wccp status	Displays the enabled state of WCCP and the configured service IDs.

For more information on these commands, see the [Cisco Wide Area Application Services Command Reference](#).

Upgrade Guidelines for vWAAS with NFVIS

This section contains the following topics:

- [Upgrading to Cisco NFVIS 3.9.1](#)
- [Upgrading to Cisco NFVIS 3.10.1](#)



Note

For upgrade/downgrade guidelines for vWAAS on ENCS 5400-W, see the chapter “Cisco vWAAS on ENCS 5400-W Device,” section [Upgrade/Downgrade Guidelines for vWAAS on ENCS-W](#). For upgrade/downgrade guidelines for vWAAS on CSP 5000-W, see the chapter “Cisco vWAAS on CSP 500-W,” section [Upgrade/Downgrade Guidelines for vWAAS on CSP 5000-W](#).

Upgrading to Cisco NFVIS 3.9.1

For the procedure to upgrade to Cisco Enterprise NFVIS 3.9.1, see the chapter [Upgrading Cisco Enterprise NFVIS](#) in the *Cisco Enterprise Network Function Virtualization Infrastructure Software Configuration Guide, Release 3.9.1*.

Before you begin the upgrade, consider these guidelines:

- Cisco Enterprise NFVIS 3.9.1 is supported for vWAAS for WAAS 6.4.3 and later.



Note

If you are running nfvis-371-waas-641a or 641b on an ENCS 5400-W device—Before upgrading NFVIS, upgrade to WAAS Version 6.4.3. For more information on Cisco NFVIS and ENCS 5400-W devices, see the chapter “Cisco vWAAS on Cisco ENCS 5400-W Series,” section [Upgrade/Downgrade Guidelines for vWAAS on ENCS-W](#).

- [Table 9-3](#) shows the supported upgrade paths for NFVIS 3.9.1.



Note

NFVIS 3.9.1 files are on the [WAAS Software Release 6.4.3 Software Download Page](#)

Table 9-3 Upgrade Paths for Cisco NFVIS 3.9.1

Current NFVIS Version	Upgrade Path
3.7.1	<ol style="list-style-type: none"> 1. Upgrade to NFVIS 3.8.1 2. Upgrade to NFVIS 3.9.1
3.8.1	<ul style="list-style-type: none"> • Upgrade directly to 3.9.1

- *After you upgrade your system from NFVIS 3.7.1 to NFVIS 3.8.1*—NFVIS 3.8.1 automatically upgrades CIMC and BIOS for the ENCS 5400-W platform:
 - CIMC for NFVIS 3.8.1 is automatically upgraded to CIMC Version 3.2.4
 - BIOS for NFVIS 3.8.1 is automatically upgraded to BIOS Version 2.5
- *After you upgrade your system from NFVIS 3.8.1 to NFVIS 3.9.1*—NFVIS 3.9.1 automatically upgrades CIMC and BIOS for the ENCS 5400-W platform.
 - CIMC for NFVIS 3.9.1 is automatically upgraded to CIMC Version 3.2.6
 - BIOS for NFVIS 3.9.1 is automatically upgraded to BIOS Version 2.6
- Each upgrade may take about 90 minutes. Do not interrupt the upgrade process.

Upgrading to Cisco NFVIS 3.10.1

For the procedure to upgrade to Cisco Enterprise NFVIS 3.10.1, see the chapter [Upgrading Cisco Enterprise NFVIS](#) in the *Cisco Enterprise Network Function Virtualization Infrastructure Software Configuration Guide, Release 3.10.1*.

Before you begin the upgrade, consider these guidelines:

- Cisco Enterprise NFVIS 3.10.1 is supported for vWAAS for WAAS 6.4.3a and later.



Note If you are running nfvis-371-waas-641a or 641b on an ENCS 5400-W device—Before upgrading NFVIS, upgrade to WAAS Version 6.4.3. For more information on Cisco NFVIS and ENCS 5400-W devices, see the chapter “Cisco vWAAS on Cisco ENCS 5400-W Series,” section [Upgrade/Downgrade Guidelines for vWAAS on ENCS-W](#).

- [Table 9-4](#) shows the supported upgrade paths for NFVIS 3.10.1.



Note NFVIS 3.10.1 files are on the [WAAS Software Release 6.4.3a Software Download Page](#)

Table 9-4 Upgrade Paths for Cisco NFVIS 3.10.1

Current NFVIS Version	Upgrade Path
3.7.1	<ol style="list-style-type: none"> 1. Upgrade to NFVIS 3.8.1 2. Upgrade to NFVIS 3.9.1 3. Upgrade to NFVIS 3.10.1
3.8.1	<ul style="list-style-type: none"> • Upgrade directly to 3.10.1
3.9.1	<ul style="list-style-type: none"> • Upgrade directly to 3.10.1

- *After you upgrade your system from NFVIS 3.7.1 to NFVIS 3.8.1*—NFVIS 3.8.1 automatically upgrades CIMC and BIOS for the ENCS 5400-W platform:
 - CIMC for NFVIS 3.8.1 is automatically upgraded to CIMC Version 3.2.4
 - BIOS for NFVIS 3.8.1 is automatically upgraded to BIOS Version 2.5
- *After you upgrade your system from NFVIS 3.8.1 to NFVIS 3.9.1*—NFVIS 3.9.1 automatically upgrades CIMC and BIOS for the ENCS 5400-W platform.
 - CIMC for NFVIS 3.9.1 is automatically upgraded to CIMC Version 3.2.6
 - BIOS for NFVIS 3.9.1 is automatically upgraded to BIOS Version 2.6
- *After you upgrade your system from NFVIS 3.9.1 to NFVIS 3.10.1*—NFVIS 3.10.1 automatically upgrades CIMC and BIOS for the ENCS 5400-W platform or CSP 5000-W platform.
 - CIMC for NFVIS 3.9.1 is automatically upgraded to CIMC Version 3.2.6
 - BIOS for NFVIS 3.9.1 is automatically upgraded to BIOS Version 2.6
- Each upgrade may take about 90 minutes. Do not interrupt the upgrade process.