CHAPTER **8**

Cisco vWAAS on Cisco CSP 5000-W Series

This chapter describes Cisco vWAAS on the Cisco Cloud Services Platform, W Series appliance, the Cisco CSP 5000-W Series appliances.

This chapter contains the following sections:

vWAAS on Cisco CSP 5000-W Series

This section contains the following topics:

About the Cisco CSP 5000-W Series

The Cisco Cloud Services Platform for WAAS (CSP-W) is a Cisco open x86 hardware platform for deployment of Cisco datacenter network functions virtualization (VNFs). The Cisco CSP 5000-W Series contains an embedded KVM CentOS hypervisor, and enables you to deploy, monitor, and manage the life cycle of vWAAS on NFVIS.

The Cisco 5000-W Series enables you to quickly deploy any Cisco network virtual service through a simple, built-in, native web user interface (WebUI), CLI, or Representational State Transfer (REST) API.

vWAAS Models Supported on CSP 5000-W

Three CSP 5000-W models are used with vWAAS:

- CSP 5228-W (12,000 connections)—For vWAAS-12000
- CSP 5228-W (50,000 connections)—For vWAAS-50000
- CSP 5436-W (150,000 connections)—vWAAS-150000

These CSP 5000-W models replace three End-of-Sale/End-of-Life (EOS/EOL) WAVE models. Table 8-1 shows the corresponding CSP-W and EOS/EOL WAVE models, the supported vWAAS models, and the UCS model used with CSP-W.

Table 8-1   CSP 5000-W, EOS/EOL WAVE Models, and Supported vWAAS and UCS Models

CSP 5000-W Model	Connections	EOS/EOL WAVE Model Replaced	Supported vWAAS Model
CSP 5228-W	12,000	WAVE-7541	vWAAS-12000
CSP 5228-W	50,000	WAVE-7571	vWAAS-50000
CSP 5436-W	150,000	WAVE-8541	vWAAS-150000

For more information on the EOS/EOL WAVE models, see the *End-of-Sale and End-of-Life Announcement for the Cisco WAVE 294, 594, 694, 7541, 7571 and 8541*.

Note   There is no Product Returns and Replacement (RMA) process for CSP 5000-W devices or EOS/EOL WAVE devices.

vWAAS on CSP 5000-W with Akamai Connect

Consider the following guidelines for vWAAS on CSP 5000-W with Akamai Connect:

- As shown in Table 8-2, a fourth disk is required for vWAAS on CSP 5000-W with Akamai Connect caching.
- CSP 5000-W devices have fixed resources, so the memory on each device remains the same with or without Akamai Connect enabled.

Table 8-2   Memory and Disk Requirements for vWAAS on CSP 5000-W with Akamai Connect

CSP 5000-W Model	Supported vWAAS Model	Memory Requirement		Fourth Disk Requirement When Akamai is Enabled
		Without Akamai	Without Akamai	
CSP 5228-W	vWAAS-12000	18 GB	18 GB	750 GB
CSP 5228-W	vWAAS-50000	48 GB	48 GB	850 GB
CSP 5436-W	vWAAS-150000	96 GB	96 GB	1500 GB

Traffic Interception Methods

vWAAS on the CSP 5000-W platform supports off-path deployment for WCCP and AppNav traffic interception. However, the AppNav IOM module is not supported on the CSP-W platform.

CSP 5000-W Hardware Features and Specifications

Table 8-3 shows the specifications for each CSP 5000-W model used with vWAAS.

Note the following about these three CSP 5000-W models:

- The dedicated management port on the device is used for CIMC connectivity
- The first port on the four-port 1 G (I350) card is used for NFVIS management only and not for data traffic.
- Intel SFP+ is required for connecting the Intel X520-DA2 10 Gbps two-port NIC (2x10 GB Fiber interfaces).
- vWAAS on CSP-W uses CIMC Version 4.0.
- vWAAS on CSP-W uses NFVIS Version 3.10.1.

Table 8-3   Specifications for CSP-W Models Used with vWAAS

CSP 5228-W for vWAAS 12000

CPU	CPU Speed	Connections	Memory	Storage	Network Interface Card	RAID	Hardware Platform
16 core	2.2 GHz	12,000	52 GB	1.5 TB	*PCIe Slot 1*—Intel X520-DA2 10Gbps 2 port NIC (2x10 GB Fiber interfaces) *PCIe Slot 2*—Intel i350 Quad Port 1 GB Adapter	Cisco 12G Modular RAID controller with 2GB cache RAID 10	UCS-220-M5

CSP 5228-W for vWAAS 50000

CPU	CPU Speed	Connections	Memory	Storage	Network Interface Card	RAID	Hardware Platform
20 core	2.2 GHz	50,000	76 GB	2.3 TB	*PCIe Slot 1*—Intel X520-DA2 10Gbps 2 port NIC (2x10 GB Fiber Interfaces) *PCIe Slot 2*—Intel i350 Quad Port 1 GB Adapter	Cisco 12G Modular RAID controller with 2GB cache RAID 10	UCS-220-M5

CSP 5436-W for vWAAS-15000

CPU	CPU Speed	Connections	Memory	Storage	Network Interface Card	RAID	Hardware Platform
28 core	3.0 GHz	150,000	100 GB	4.5 TB	*PCIe Slot 1*—Intel X520-DA2 10Gbps 2 port NIC (2x10 GB Fiber interfaces) *PCIe Slot 4*—Intel i350 Quad Port 1 GB Adapter	Cisco 12G Modular RAID controller with 2GB cache RAID 10	UCS-240-M5

For more information on RAID configuration, see the *Cisco UCS Servers RAID Guide*.

Deploying, Registering, and Configuring vWAAS on CSP 5000-W

This section contains the following topics:

- Workflow for Deploying, Registering, and Configuring vWAAS on CSP 5000-W
- Installing vWAAS on a CSP 5000-W Device
- Configuring Port Channel and Standby Interface
- Registering or Deregistering a CSP 5000-W Device with the WAAS CM

Workflow for Deploying, Registering, and Configuring vWAAS on CSP 5000-W

Task	Section or Description
1. Install the vWAAS on CSP 5000-W	• Installing vWAAS on a CSP 5000-W Device
2. Map the interfaces from NFVIS to WAAS	• Installing vWAAS on a CSP 5000-W Device
3. Register the CSP 5000-W device with the WAAS CM	• Registering or Deregistering a CSP 5000-W Device with the WAAS CM
4. Enable Akamai Connect	• For more information on how to enable Akamai Connect, see Cisco vWAAS with Akamai Connect.
5. Check accelerator status	• To confirm that operational status of accelerators is **Running**, use the **show accelerator** EXEC command.
6. Configure WCCP traffic interception	• For more information on WCCP traffic interception, see the "Configuring Traffic Interception" chapter of the *Cisco Wide Area Application Services Configuration Guide*.
7. Configure port channel support	• Configuring Port Channel and Standby Interface

Installing vWAAS on a CSP 5000-W Device

To install any of the three supported vWAAS models on the supported CSP 5000-W device:

Note   CSP 5000-W is a bundled solution and is shipped with a pre-installed image

- Use the following **show** commands to verify that all hardware details for the CSP 5000-W device are displayed correctly.
  - **show version**—Verify that the WAAS version is Version 6.4.3a or later.
  - **show tfo detail**—Verify the number of TFO connections depending on the vWAAS model.
  - **show hardware**—Validate the CPU and memory depending on the vWAAS model.
  - **show inventory**—Validate the PID depending on the vWAAS model.
- *For the CSP 5228-W models:*
  - The system displays a prompt to select vWAAS-12000 or vWAAS-50000.
  - After you make a selection, the vWAAS installation proceeds automatically.
  - Allow about 60 minutes for vWAAS installation on a CSP 5228-W model.
- *For the CSP 5436-W model:*
  - The vWAAS is deployed on the CSP 5436-W and a login prompt for the vWAAS-150000 is displayed.
- For all CSP 5000-W models, eager zero thick provisioning is used, for optimal performance.
- NFVIS provides management access to the first port of the Intel i350 PCIe card.

Deploying vWAAS on the CSP 5000-W Platform

Before You Begin

- Verify that the specified CSP 5000-W Series chassis (CSP 5228-W or CSP 5436-W) is already installed and powered up.

To install vWAAS with NFVIS on a CSP 5000-W Series device on your WAAS system, follow these steps:

Step 1   Copy the vWAAS bundled image file—an ISO file that contains the NFVIS 3.10.1 image (file format "Cisco_NFVIS...") and WAAS 6.4.3a image (file format "WAAS-APPLIANCE...")—on your laptop.

For how to upgrade to NFVIS 3.10.1, see the chapter "Cisco vWAAS with Cisco Enterprise NFVIS," section Upgrading to Cisco NFVIS 3.10.1.

Step 2   Connect your laptop's Ethernet port to the CSP 5000-W device's Cisco Integrated Management Controller (CIMC) port.

Step 3   Configure your laptop with a static IP address; for example, 192.168.1.3.

> **Note**   By default, the IP address on the ENCS device's CIMC port is configured as 192.168.1.2.

Step 4   Open your web browser and enter **https://192.168.1.2**.

The CIMC console login page appears.

Step 5   Log in with your user name and password.

Default user name is **admin**.

Default password is **Cisco123**.

Step 6   Click **Login**.

> **Note**   The Change Password dialog box appears the first time, only, that you log into the CIMC console. Change the password as needed and click **Save**.

Step 7   The CIMC Home page is displayed.

Step 8   Navigate to **Home** > **Compute** > **BIOS** > **Configure Boot Order**.

The Configure Boot Order dialog box appears.

Step 9   At the Device Types listing, select **CD/DVD Linux Virtual CD/DVD**.

Click **Add**.

Step 10   At the Device Type listing, select **HDD**.

Click **Add**.

Step 11   Using the **Up** and **Down** options, set the boot order sequence.

Step 12   **CD/DVD Linux Virtual CD/DVD** must be the first listing in the boot order.

Step 13   To complete the boot order setup, click **Apply**.

Step 14   Launch the KVM console. You can launch the KVM console from CIMC Home page or the Remote Management area.

Step 15   *At the KVM console:*

After the KVM console is initialized, map the vWAAS bundled image through the **Server** > **Remote Presence** > **Virtual Media** tab on the KVM console.

Step 16   To load the mapped image, at the KVM Console Power tab, use the **Power Cycle System [cold boot]** option to power off and then power on the device.

> **Note**   When the server reboots, the KVM Console will automatically install the Cisco Enterpirse NFVIS from the virtual CD/DVD drive. The entire installation may take 30 minutes to one hour to complete.

Step 17   With the installation running in the background, use your laptop to connect via SSH to the CIMC default IP (192.168.1.2).

Step 18   After the installation is successful, the CSP 5000-W device reboots.

Step 19   The CSP 5000-W device boots up and displays options to install vWAAS. Depending on your CSP 5000-W model, one of the following choices is displayed:

- For CSP 5228-W—vWAAS-12000 or vWAAS-50000
- For CSP 5436-W—vWAAS-150000 is automatically selected for CSP 5436-W.

Step 20   After installation is complete, the Cisco WAAS login prompt appears.

Step 21   The new OE-CSP device will be displayed in the WAAS Central Manager **Devices** > **All Devices** listing table.

Step 22   You can view detailed information on the new OE-CSP device by navigating to **Devices** > *DeviceName* > **Dashboard**.

Configuring Port Channel and Standby Interface

This section contains the following topics:

- Configuring Port Channel Interface
- Configuring Standby Interface

Configuring Port Channel Interface

To provide increased bandwidth and redundancy, a port channel bundles individual interfaces within these NIC modules:

- Virtual 1/0 and 2/0—10G Ethernet interface
- Virtual 3/0 and 3/1—10G fiber interface

  For fiber connectivity, Intel SFP+ is required for connecting the Intel X520-DA2 10 Gbps two-port NIC (2x10 GB Fiber interfaces).

- Virtual 4/0, 4/1, and 4/2—1G copper interface

Port channeling also load balances traffic across these physical interfaces. The port channel stays operational as long as at least one physical interface within the port channel is operational.

You create a port channel by bundling compatible interfaces. You can configure and run either static port channels or ports channels running the Link Aggregation Control Protocol (LACP).Standby provides aggregation of several physical links into a logical one but for the purpose of furnishing fault-tolerance only.

The following CLI commands are used with Port Channel

- To create a port channel:

```
CSP-APPLIANCE#config
CSP-APPLIANCE(config)#interface portchannel 1
CSP-APPLIANCE(config-if)#ip address <addr> <mask>
CSP-APPLIANCE(config-if)#exit
```

- To remove a port channel:

```
CSP-APPLIANCE#config
CSP-APPLIANCE(config)#interface portchannel 1
CSP-APPLIANCE(config-if)#no ip address <addr> <mask>
CSP-APPLIANCE(config-if)#exit
CSP-APPLIANCE(config)#no interface portchannel 1
```

- To configure a port channel group for a network interface, use the **(config-if) channel-group** command:

```
CSP-APPLIANCE(config)# interface GigabitEthernet 1/0
CSP-APPLIANCE(config-if)# channel-group 1
```

- To show the running configuration:

```
interface PortChannel 1
 ip address <addr>  <netmask>
 exit
!
interface Virtual 4/0
 channel-group 1
 exit
interface Virtual 4/1
 channel-group 1
 exit
interface Virtual 4/2
 channel-group 1
 exit
```

- Figure 8-1 shows annotated output for the **show running-config interface** command:

Figure 8-1   WAAS CLI show running-config Annotated Output

- To show Port Channel or Standby Interface statistics:

```
CSP-5228#sh interface standby 1
Interface Standby 1 (2 member interface(s)):
        Virtual 3/0 (active) (primary) (in use)
        Virtual 3/2 (active)
--------------------
Ethernet Address                    : 52:54:00:42:4f:a6
Internet Address                    : 2.93.82.20
Netmask                             : 255.255.255.240
IPv6 Enabled                        : No
Admin State                         : Up
Operation State                     : Running
Maximum Transfer Unit Size          : 1500
Input Errors                        : 0
Input Packets Dropped               : 0
Packets Received                    : 94939473
Output Errors                       : 0
Output Packets Dropped              : 0
Load Interval                       : 30
Input Throughput                    : 0 bits/sec, 0 packets/sec
Output Throughput                   : 0 bits/sec, 0 packets/sec
Packets Sent                        : 93430587

Interception Statistics
CSP-5228#
CSP-5228#sh interface portChannel 1
Interface PortChannel 1 (3 member interface(s)):
        Virtual 3/0 (active)
        Virtual 3/1 (active)
        Virtual 3/2 (active)
--------------------
Ethernet Address                    : 52:54:00:42:4f:aa
Internet Address                    : 22.22.22.2
Netmask                             : 255.255.255.0
IPv6 Enabled                        : No
Admin State                         : Up
```

```
Operation State                    : Down
Maximum Transfer Unit Size         : 1500
Input Errors                       : 0
Input Packets Dropped              : 0
Packets Received                   : 21568
Output Errors                      : 0
Output Packets Dropped             : 0
Load Interval                      : 30
Input Throughput                   : 2290669644 bits/sec, 159 packets/sec
Output Throughput                  : 2290649224 bits/sec, 0 packets/sec
Packets Sent                       : 41
CSP-5228#
```

Configuring Standby Interface

You can create two port channel groups and use them as the active and backup member of a standby group.The Standby interface has two modes:

- Active-backup mode—Implements the Standby interface and provides fault tolerance. Only one server interface in the bond is active. A different server interface becomes active only if the active server interface fails.

- SRC-DST-IP-PORT mode—Provides load balancing and fault tolerance. In this mode, all frames between the same source and the same destination use the same link.

The following CLI commands are used with Standby Interface:

- To create a Standby Interface:

```
CSP-APPLIANCE#config
CSP-APPLIANCE(config)#interface Standby 1
CSP-APPLIANCE(config-if)#ip address <addr> <mask>
CSP-APPLIANCE(config-if)#exit
```

- To remove a Standby Interface:

```
CSP-APPLIANCE#config
CSP-APPLIANCE(config)#interface Standby 1
CSP-APPLIANCE(config-if)#no ip address <addr> <mask>
CSP-APPLIANCE(config-if)#exit
CSP-APPLIANCE(config)#no interface Standby 1
```

- To show the running configuration:

```
interface Standby 1
 ip address <addr>   <netmask>
 exit
!
interface Virtual 1/0
 standby 1 primary
 exit
interface Virtual 2/0
 standby 1
 exit
```

- To show Port Channel or Standby Interface statistics:

```
CSP-5228#sh interface standby 1
Interface Standby 1 (2 member interface(s)):
        Virtual 3/0 (active) (primary) (in use)
        Virtual 3/2 (active)
---------------------
Ethernet Address                   : 52:54:00:42:4f:a6
```

```
Internet Address                    : 2.93.82.20
Netmask                             : 255.255.255.240
IPv6 Enabled                        : No
Admin State                         : Up
Operation State                     : Running
Maximum Transfer Unit Size          : 1500
Input Errors                        : 0
Input Packets Dropped               : 0
Packets Received                    : 94939473
Output Errors                       : 0
Output Packets Dropped              : 0
Load Interval                       : 30
Input Throughput                    : 0 bits/sec, 0 packets/sec
Output Throughput                   : 0 bits/sec, 0 packets/sec
Packets Sent                        : 93430587

Interception Statistics
CSP-5228#
CSP-5228#sh interface portChannel 1
Interface PortChannel 1 (3 member interface(s)):
        Virtual 3/0 (active)
        Virtual 3/1 (active)
        Virtual 3/2 (active)
--------------------
Ethernet Address                    : 52:54:00:42:4f:aa
Internet Address                    : 22.22.22.2
Netmask                             : 255.255.255.0
IPv6 Enabled                        : No
Admin State                         : Up
Operation State                     : Down
Maximum Transfer Unit Size          : 1500
Input Errors                        : 0
Input Packets Dropped               : 0
Packets Received                    : 21568
Output Errors                       : 0
Output Packets Dropped              : 0
Load Interval                       : 30
Input Throughput                    : 2290669644 bits/sec, 159 packets/sec
Output Throughput                   : 2290649224 bits/sec, 0 packets/sec
Packets Sent                        : 41
CSP-5228#
```

- To configure an interface to be a standby for another interface, use the **(config-if) standby** command:

```
CSP-APPLIANCE# configure
CSP-APPLIANCE# interface standby 1
CSP-APPLIANCE(config-if)#
```

Registering or Deregistering a CSP 5000-W Device with the WAAS CM

This section contains the following topics:

- Registering a CSP 5000-W Device with the WAAS CM
- Deregistering a CSP 5000-W Device

Registering a CSP 5000-W Device with the WAAS CM

To register the WAAS appliance or vWAAS model with the WAAS Central Manager (CM), follow these steps:

Step 1   At the datacenter CSP 5000-W CLI, enter the WAAS Central Manager IP address, for example: 10.78.99.141.

```
DC-CSP-WAE(config)#central-manager address 10.78.99.141
DC-CSP-WAE(config)#
DC-CSP-WAE(config)#end
DC-CSP-WAE#show running-config | i central
central-manager address 10.78.99.141
```

> **Note**   The IP address configured in the NFVIS management port cannot be accessed from the Central Manager.

Step 2   Use the **cms** command to register the CSP-W device:

```
DC-CSP-WAE(config)#cms enable
Registering WAAS Application Engine...
Sending  device registration request to Central Manager with address 10.78.99.141
Please wait, initializing CMS tables
Successfully initialized CMS tables
Registration complete.
```

Step 3   Use the **copy running-config startup-config** command to preserve the running configuration.

> **Note**   If you do not use this commend, the management service will not be started on reload, and the WAAS Central Manager will show the node as Offline.

Step 4   After the device is registered, it is displayed in the WAAS Central Manager as OE-CSP (Figure 8-2).

Figure 8-2   *CSP 5000-W Device Displayed in Central Manager Device Listings Page*

Step 5   To view the CSP 5000-W device in the dashboard, navigate to **Devices** > *device-name* > **Dashboard**.

The Device Dashboard window is displayed. Information displayed for the device includes including device model, IP address, interception method, and device-specific charts.

Step 6   You can also use the CSP 5000-W CLI to view device information:

```
DC-CSP-WAE#show cms info
Device registration information :
Device Id                      = 1769435
Device registered as           = WAAS Application Engine
Current WAAS Central Manager   = 10.78.99.142
Registered with WAAS Central Manager = 10.78.99.142
Status                         = Online
Time of last config-sync       = Fri Jun  3 14:41:26 2018
```

```
CMS services information :
Service cms_ce is running
```

Deregistering a CSP 5000-W Device

To deregister a CSP 5000-W device, follow these steps.

Step 1   At the datacenter CSP 5000-W CLI, use the **cms deregister** command to deregister the device.

```
DC-CSP-WAE#cms deregister

Deregistering WAE device from Central Manager will result in loss of data on encrypted
file systems.

If secure store is initialized and open, clear secure store.

If encrypted MAPI is enabled, windows-domain encryption-service identities will be
disabled. The passwords must be re-entered again the next time the WAE joins
a central manager.

Do you really want to continue (yes|no) [no]?yes
```

Step 2   Click **yes** to initiate the deregistering process. The system displays the following status messages.

```
Disabling management service.
management services are already disabled.
Sending de-registration request to CM
SSMGR RETURNING: 7 (Success)
Removing cms database tables.
Re-initializing SSL managed store and restarting SSL accelerator.
Deregistration complete. Save current cli configuration using 'copy running-config
startup-config' command because CMS service has been disabled.
```

Step 3   Use the **copy running-config startup-config** command to preserve the running configuration.

Note   If you do not use this command, the management service will not be started on reload, and the
WAAS Central Manager will show the node as Offline.

CLI Commands Used with vWAAS on CSP 5000-W

Table 8-4 shows the commands used with vWAAS on CSP 5000-W.

Table 8-4   *Commands used with vWAAS on CSP 5000-W*

Mode	Command	Description
Global Configuration	(config) interface PortChannel	Configures a port-channel interface.
Interface Configuration	(config-if) channel-group	Configures the port channel group for a network interface.
EXEC	copy sysreport disk	The CSP 5000-W logs will be part of the sysreport generation for debugging.
	reload	Restarts the VM.
	show hardware	Validate the CPU and memory depending on the vWAAS model.
	show inventory	Validate the PID depending on the vWAAS model.
	show running-config interface	Displays a WAAS device current running configuration on the terminal,
	show tfo detail	Verify the number of TFO connections depending on the vWAAS model
	show version	Verify that the WAAS version is Version 6.4.3a or later.
	shutdown	Powers off the CSP 5000-W device.

Upgrade/Downgrade Guidelines for vWAAS on CSP 5000-W

Consider the following upgrade and downgrade guidelines:

- For vWAAS on CSP 5000-W:
  - Upgrade is supported for the vWAAS bundled image for WAAS Version 6.4.3a and later, and the associated NFVIS version used with WAAS.
  - Downgrade is not supported for vWAAS for WAAS versions earlier than WAAS 6.4.3a.
  - When there is more than one device type present in the Device Group level, the Central Manager supports upgrade and downgrade that is supported for each device type.

Note   CSP 5000-W devices run with specific vWAAS and NFVIS versions. We advise that you upgrade vWAAS and NFVIS together; do not upgrade each of these separately. For more information, see the chapter "Cisco vWAAS with Cisco Enterprise NFVIS, section Upgrade Guidelines for vWAAS with NFVIS.