Cisco vWAAS on Cisco CSP 5000-W Series

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

This chapter contains the following sections:

Cisco 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). Cisco CSP 5000-W Series contains an embedded KVM CentOS hypervisor, and enables you to monitor and manage the lifecycle of vWAAS on NFVIS.

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

Note   For Cisco vWAAS in Cisco WAAS Version 6.4.3e and later, Cisco devices use the strong password enforcement feature. After initial login, you must change the default password for the Cisco WAAS administrator account, and the NFVIS administrator account for vWAAS on the ENCS 5400-W series and the CSP 5000-W series. For more information, see Strong Password Enforcement, page 7-7 in the chapter "Cisco vWAAS on Cisco ENCS 5400-W Series."

Cisco CSP 5000-W Models Supported for Cisco vWAAS

Three Cisco CSP 5000-W models are supported for Cisco vWAAS:

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

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

Table 8-1   *Cisco CSP 5000-W and Replaced and Supported Models*

Cisco CSP 5000-W Model	Connections	EOS/EOL Cisco WAVE Model Replaced	Supported Cisco 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 and EOL Cisco 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 Cisco CSP 5000-W devices or EOS and EOL Cisco WAVE devices.

Cisco vWAAS on Cisco CSP 5000-W with Akamai Connect

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

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

Table 8-2   *System Requirements for Cisco vWAAS on Cisco CSP 5000-W with Akamai Connect*

Cisco CSP 5000-W Model	Supported Cisco 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

Cisco vWAAS on the Cisco CSP 5000-W platform supports off-path deployment for WCCP and Cisco AppNav traffic interception. However, the Cisco AppNav I/O Module (Cisco AppNav IOM) is not supported on the Cisco CSP 5000-W platform.

Cisco CSP 5000-W Hardware Features and Specifications

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

Note the following details about these three Cisco 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 Cisco NFVIS management.

- We recommend that you use CSP-SFPs (Intel) to connect the Intel X520-DA2 10-Gbps ports on both sides of end-to-end connections.

Table 8-3   *Specifications for Cisco CSP 5000-W Models Used with Cisco vWAAS*

Cisco CSP 5228-W for Cisco 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 10-Gbps 2-port NIC (2x10-GB fiber interfaces) *PCIe Slot 2*—Intel i350 Quad Port 1-GB Adapter	Cisco 12-G Modular RAID controller with 2-GB cache RAID 10	Cisco UCS-220-M5

Cisco CSP 5228-W for Cisco 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 10-Gbps 2-port NIC (2x10 GB fiber interfaces) *PCIe Slot 2*—Intel i350 Quad Port 1-GB Adapter	Cisco 12-G Modular RAID controller with 2-GB cache RAID 10	Cisco UCS-220-M5

Cisco CSP 5436-W for Cisco 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 10-Gbps 2 port NIC (2x10-GB Fiber interfaces) *PCIe Slot 4*—Intel i350 Quad Port 1-GB Adapter	Cisco 12-G Modular RAID controller with 2GB cache RAID 10	Cisco UCS-240-M5

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

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

This section contains the following topics:

- Workflow for Deploying, Registering, and Configuring Cisco vWAAS on Cisco CSP 5000-W, page 8-5
- Installing Cisco vWAAS on a Cisco CSP 5000-W Device, page 8-5
- Configuring a Port Channel and Standby Interface, page 8-5

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

Task	Section or Description
1. Install the Cisco vWAAS on Cisco CSP 5000-W	• Installing Cisco vWAAS on a Cisco CSP 5000-W Device, page 8-5
2. Register the Cisco CSP 5000-W device with the Cisco WAAS Central Manager	• Registering or Deregistering a Cisco CSP 5000-W Device with the Cisco WAAS Central Manager, page 8-9
3. Enable Akamai Connect	• "Cisco vWAAS with Akamai Connect".
4. Check accelerator status	• To confirm that operational status of accelerators is **Running**, use the **show accelerator** EXEC command.
5. Configure WCCP traffic interception	• The "Configuring Traffic Interception" chapter of the *Cisco Wide Area Application Services Configuration Guide*.
6. Configure port channel support	• Configuring a Port Channel and Standby Interface, page 8-5

Installing Cisco vWAAS on a Cisco CSP 5000-W Device

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

To install any of the three supported Cisco vWAAS models on the supported Cisco CSP 5000-W device, perform the following tasks:

- Use the following **show** commands to verify that all hardware details for the CSP 5000-W device are displayed correctly.
  - **show version**: Verifies that the Cisco WAAS version is Version 6.4.3a or later.
  - **show tfo detail**: Verifies the number of Transport Flow Optimization (TFO) connections depending on the Cisco vWAAS model.
  - **show hardware**: Validates the CPU and memory depending on the Cisco vWAAS model.
  - **show inventory**: Validates the PID depending on the Cisco vWAAS model.

Configuring a Port Channel and Standby Interface

This section contains the following topics:

- Configuring a Port Channel Interface, page 8-6
- Configuring a Standby Interface, page 8-8

Configuring a 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: 10 G Ethernet interface

- Virtual 3/0 and 3/1: 10 G 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: 1 G Ethernet interface

Port channeling load balances traffic across 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 only for the purpose of furnishing fault-tolerance.

The following CLI commands are used in the context of port channels:

- 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 an annotated output for the **show running-config interface** command:

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

```
NO-HOSTNAME#show running-config interface
interface Virtual 1/0
 ip address 1.1.1.1 255.255.255.0
 exit
interface Virtual 2/0
 ip address 2.2.2.2 255.255.255.0
 exit
interface Virtual 3/0
 ip address 3.3.3.3 255.255.255.0
 exit
interface Virtual 3/1
 ip address 4.4.4.4 255.255.255.0
 exit
interface Virtual 4/0
 ip address 5.5.5.5 255.255.255.0
 exit
interface Virtual 4/1
 ip address 6.6.6.6 255.255.255.0
 exit
interface Virtual 4/2
 ip address 7.7.7.7 255.255.255.0
 exit
```

Onboard 10G interfaces (X550) — These are the onboard interfaces.

10G interfaces in PCI slot (X520) — This card goes in PCI Slot 1 for both CSP-5228 and CSP-5436

3 * 1G interfaces (I350) — This card goes in Slot 2 for CSP-5228 and Slot 4 for CSP-5436.

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- 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 a Standby Interface

You can create two port channel groups and use them as the active and backup members 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 the frames between the same source and the same destination use the same link.

The following CLI commands are used in the context of a 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 Cisco CSP 5000-W Device with the Cisco WAAS Central Manager

This section contains the following topics:

Registering a Cisco CSP 5000-W Device with the Cisco WAAS Central Manager

To register a Cisco WAAS device or Cisco vWAAS device with the WAAS Central Manager, follow these steps:

Step 1   At the Cisco datacenter CSP 5000-W CLI, enter the Cisco 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 Cisco NFVIS management port cannot be accessed from the Cisco WAAS Central Manager.

Step 2   Use the **cms** command to register the Cisco CSP 5000-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 the **copy running-config startup-config** command, the management service will not be started on reload, and the Cisco WAAS Central Manager will show the node as **Offline**.

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

Figure 8-2   *Cisco OE-CSP Displayed in the WAAS Central Manager Device Listings Window*

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

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

Step 6   You can also use the Cisco 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 Cisco CSP 5000-W Device

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

Step 1 At the Cisco 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 the **copy running-config startup-config** command, the management service will not be started on reload, and the Cisco WAAS Central Manager will show the node as **Offline**.

CLI Commands Used with Cisco vWAAS on Cisco CSP 5000-W

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

Table 8-4   CLI Commands used with Cisco vWAAS on Cisco 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.
privileged-level EXEC	**copy sysreport disk**	Cisco CSP 5000-W logs will be part of the **sysreport** generation for debugging.
	reload	Restarts the Cisco vWAAS VM.
	show hardware	Validates the CPU and memory depending on the Cisco vWAAS model.
	show inventory	Validates the PID depending on the Cisco vWAAS model.
	show running-config interface	Displays a Cisco WAAS device current running configuration on the terminal,
	show tfo detail	Verifies the number of TFO connections depending on the Cisco vWAAS model.
user-level EXEC and privileged-level EXEC	**show version**	Verifies that the Cisco WAAS version is Cisco WAAS Version 6.4.3a or later.
privileged-level EXEC	**shutdown**	Powers off the Cisco CSP 5000-W device.

Upgrade and Downgrade Guidelines for Cisco vWAAS on Cisco CSP 5000-W

Consider the following upgrade and downgrade guidelines:

- For Cisco vWAAS on Cisco CSP 5000-W:

  - Upgrade is supported for the Cisco vWAAS bundled image in Cisco WAAS Version 6.4.3a and later, and the associated Cisco NFVIS version used with Cisco WAAS.

  - Downgrade is not supported for Cisco vWAAS for Cisco WAAS versions earlier than Cisco WAAS 6.4.3a.

  - When there is more than one device type present at the Device Group level, the Cisco WAAS Central Manager supports upgrade and downgrade that is supported for each device type.

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