



Introduction to Cisco vWAAS

This chapter provides an overview of the Cisco Virtual Wide Area Applications Services (vWAAS) solution and describes the main features that enable Cisco vWAAS to overcome the most common challenges in transporting data over a wide area network.

This chapter contains the following sections:

- [About Cisco vWAAS, page 1-1](#)
- [Cisco vWAAS and Cisco WAAS Interoperability, page 1-4](#)
- [OVA Package Files for Cisco vWAAS and Cisco vCM Models, page 1-4](#)
- [Cisco vWAAS and Cisco vCM Model Profiles, page 1-5](#)
- [Cisco vWAAS and Cisco vCM Sizing Guidelines for Cisco WAAS Version 6.4.3x, page 1-7](#)
- [Cisco vWAAS Resizing for WAAS Version 6.4.1a and Later, page 1-12](#)
- [DRE Disk, Object Cache, and Akamai Connect Cache Capacity, page 1-21](#)
- [Cisco Hardware Platforms Supported for Cisco vWAAS, page 1-23](#)
- [Hypervisors Supported for Cisco vWAAS and Cisco vCM, page 1-31](#)
- [Cloud Platforms Supported for Cisco vWAAS, page 1-35](#)

About Cisco vWAAS

Cisco vWAAS is a virtual appliance, for both enterprises and service providers, which accelerates business applications delivered from private and virtual private cloud infrastructure. Cisco vWAAS enables you to rapidly create WAN optimization services with minimal network configuration or disruption. Cisco vWAAS can be deployed in the physical data center and in private clouds and virtual private clouds offered by service providers.

Cisco vWAAS service is associated with application server virtual machines as they are instantiated or moved. This approach helps enable cloud providers to offer rapid delivery of WAN optimization services with little network configuration or disruption in cloud-based environments.

Cisco vWAAS enables migration of business applications to the cloud, reducing the negative effect on the performance of cloud-based application delivery to end users. It enables service providers to offer an excellent application experience over the WAN as a value-added service in their catalogs of cloud services.

Cisco Integrated Services Router-Cisco Wide Area Application Services (Cisco ISR-Cisco WAAS) is the specific implementation of vWAAS running in a Cisco IOS-XE software container on a Cisco ISR 4000 Series router (ISR-4321, ISR-4331, ISR-4351, ISR-4431, ISR-4451, ISR-4461). In this context, *container* refers to the hypervisor that runs virtualized applications on a Cisco ISR 4000 Series router.

**Note**

Cisco ISR-4461 is supported for Cisco vWAAS in Cisco WAAS 6.4.1b and later.

Table 1-1 shows the hypervisors supported for Cisco vWAAS. For more information on each of these hypervisors, see [Hypervisors Supported for Cisco vWAAS and Cisco vCM, page 1-31](#) and in the chapters listed in Table 1-1.

Table 1-1 Hypervisors Supported for Cisco vWAAS

Hypervisor	For More Information:
Cisco ISR-WAAS	Chapter 3, “ Cisco vWAAS on Cisco ISR-WAAS ”
VMware vSphere ESXi	Chapter 4, “ Cisco vWAAS on VMware ESXi ”
Microsoft HyperV	Chapter 5, “ Cisco vWAAS on Microsoft Hyper-V ”
RHEL KVM	Chapter 6, “ Cisco vWAAS on RHEL KVM, KVM on CentOS, and KVM in SUSE Linux ”
KVM on CentOS	Chapter 6, “ Cisco vWAAS on RHEL KVM, KVM on CentOS, and KVM in SUSE Linux ”
KVM in SUSE Linux	Chapter 6, “ Cisco vWAAS on RHEL KVM, KVM on CentOS, and KVM in SUSE Linux ”
Cisco Enterprise NFVIS	Chapter 9, “ Cisco vWAAS with Cisco Enterprise NFVIS ”

Cisco vWAAS supports WAN optimization in a cloud environment where Cisco physical WAN Automation Engine (Cisco WAE) devices cannot usually be deployed. Virtualization also provides various benefits such as elasticity, ease of maintenance, and a reduction of branch office and data center footprint.

The following hardware and cloud platforms are supported for Cisco vWAAS. For more information on each of these supported platforms, see [Cisco Hardware Platforms Supported for Cisco vWAAS, page 1-23](#).

- Hardware platforms
 - Cisco Unified Computing System (UCS)
 - Cisco UCS E-Series Servers
 - Cisco UCS E-Series Network Compute Engines (NCEs)
 - Cisco ISR-4000 Series
 - Cisco ENCS 5400-W Series
 - Cisco CSP 5000-W Series
- Cloud Computing Systems
 - Microsoft Azure Cloud
 - OpenStack

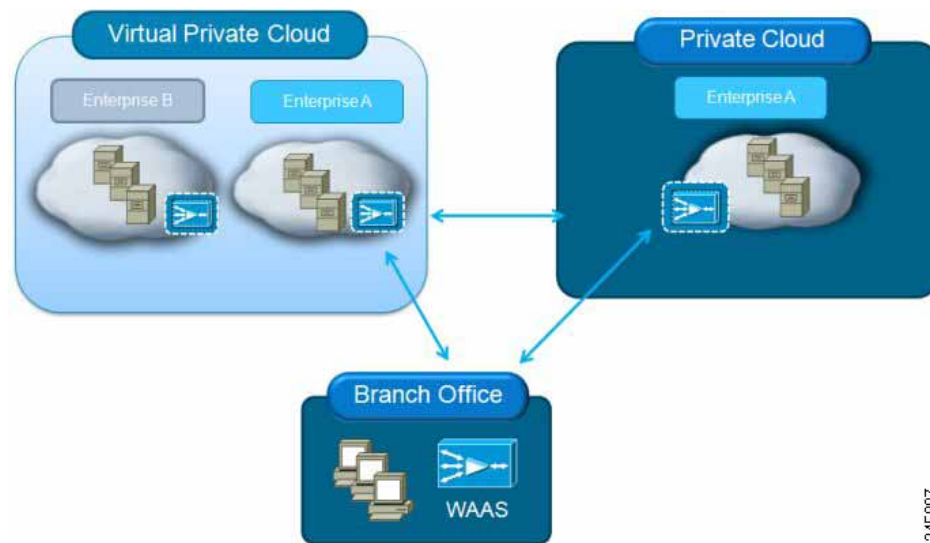
For details on the interoperability of the hypervisors and platforms supported for Cisco vWAAS, see [Table 1-20](#).

As shown in [Figure 1-1](#), you can enable Cisco vWAAS at the branch or data center or both:

- At the branch: With Cisco ENCS 5400 Series, Cisco Unified Computing System (UCS) E-Series servers and E-Series Network Compute Engines (NCEs), on either the Cisco 4000 Series ISRs or Cisco ISR G2 branch router.
- At the data center: With Cisco UCS server.

Cisco vWAAS supports on-demand provisioning and teardown, which reduces the branch office and data center footprint. Cisco vWAAS software follows the VMware ESXi standard as the preferred platform to deploy data center applications and services.

Figure 1-1 Cisco vWAAS in Virtual Private Cloud at WAN Edge, in Branch Office and Data Center



Benefits of Cisco vWAAS

The following are some of the benefits of deploying Cisco vWAAS on your system:

- On-demand orchestration of WAN optimization
- Fault tolerance with virtual machine (VM) mobility awareness
- Lower operating expenses for customers who are migrating their applications to the cloud
- Private and virtual private cloud environments:
 - Use Cisco vWAAS to create value-added WAN optimization services on a per-application basis, for optimized delivery to remote branch-office users.
 - Associate Cisco vWAAS services with application server VMs as they are moved in response to dynamic load demand in the cloud, to offer rapid delivery of WAN optimization services with minimal network configuration or disruption.
- Public cloud environments:
 - Deploy Cisco vWAAS in public clouds with the Cisco Nexus 1000V Series to obtain benefits similar to those that Cisco vWAAS produces in private cloud environments.

Cisco vWAAS and Cisco WAAS Interoperability

Consider the following guidelines when using Cisco vWAAS with Cisco WAAS:

- For Cisco vWAAS in Cisco WAAS Version 6.1.x and later: The Cisco vWAAS and Cisco vCM devices require *both* virtual (network) interfaces to be present, but both need not be active. If only one virtual interface is active, the Cisco vWAAS and Cisco vCM devices will not be operational after power up
- Cisco WAAS Central Manager interoperability: In a mixed-version Cisco WAAS network, the Cisco WAAS Central Manager must be running the latest version of the Cisco WAAS software, and associated Cisco WAAS devices must be running Version 5.1.x or later.
- Cisco WAAS system interoperability: Cisco WAAS Version 5.2.1 is not supported running in a mixed version Cisco WAAS network in which another Cisco WAAS device is running a software version earlier than Version 5.1.x. Directly upgrading a device from a version earlier than Version 5.5.3 to 5.2.1 is not supported.

OVA Package Files for Cisco vWAAS and Cisco vCM Models

Table 1-2 shows the OVA and NPE OVA file for each Cisco vWAAS model:

Table 1-2 OVA Package Files for Cisco vWAAS Models

Cisco vWAAS Model	OVA Filename	NPE OVA Filename
vWAAS-150	vWAAS-150.ova	Cisco-WAAS-vWAAS-150-npe.ova
vWAAS-200	vWAAS-200.ova	Cisco-WAAS-vWAAS-200-npe.ova
vWAAS-750	vWAAS-750.ova	Cisco-WAAS-vWAAS-750-npe.ova
vWAAS-1300	vWAAS-1300.ova	Cisco-WAAS-vWAAS-1300-npe.ova
vWAAS-2500	vWAAS-2500.ova	Cisco-WAAS-vWAAS-2500-npe.ova
vWAAS-6000	vWAAS-6000.ova	Cisco-WAAS-vWAAS-6000-npe.ova
vWAAS-12000	vWAAS-12000.ova	Cisco-WAAS-vWAAS-12000-npe.ova
vWAAS-50000	vWAAS-50000.ova	Cisco-WAAS-vWAAS-50000-npe.ova

Table 1-3 shows the OVA and NPE OVA file for each Cisco vCM model (all the models are available with Cisco WAAS version 4.3.1 and later, except when noted otherwise):

Table 1-3 OVA Package Files for Cisco vCM Models

Cisco vCM Model	OVA Filename	NPE OVA Filename
vCM-100N	vCM-100N.ova	Cisco-WAAS-vCM-100N-npe.ova
vCM-500N	vCM-500N.ova	Cisco-WAAS-vCM-500N-npe.ova
vCM-1000N	vCM-1000N.ova	Cisco-WAAS-vCM-1000N-npe.ova
vCM-2000N	vCM-2000N.ova	Cisco-WAAS-vCM-2000N-npe.ova

Cisco vWAAS and Cisco vCM Model Profiles

This section contains the following topics:

- [Cisco vWAAS Models: CPUs, Memory, and Disk Storage](#), page 1-5
- [VMware VMFS Block Size and Cisco vWAAS Disk Size](#), page 1-6
- [Cisco vCM Models: Managed Nodes, vCPUs, Memory, and Disk Storage](#), page 1-6

Cisco vWAAS Models: CPUs, Memory, and Disk Storage

This section contains the following topics:

- [Operating Guidelines for Cisco vWAAS CPUs, Memory and Disk Storage](#), page 1-5
- [Cisco vWAAS Memory and Disk Storage Information for Akamai Connect and Cisco ENCS 5400-W](#), page 1-5

Operating Guidelines for Cisco vWAAS CPUs, Memory and Disk Storage

For the following Cisco vWAAS models, follow these operating guidelines for CPU, memory, and disk storage:

- When using Cisco vWAAS in Cisco WAAS Version 6.4.x or later, we recommend that you select **vWAAS Re-sized** during installation. [Table 1-17](#) shows the resizing capability for Cisco vWAAS in Cisco WAAS Version 6.4.1a and later.
- When Cisco vWAAS-6000, 1300, 12000, or 50000 are used with Akamai Connect and when connections are more than 70 percent of Transport Flow Optimization (TFO), the response time will be on the higher side. Adding CPUs to these models when used with Akamai Connect may improve response time.

Cisco vWAAS Memory and Disk Storage Information for Akamai Connect and Cisco ENCS 5400-W

[Table 1-4](#) shows where to find additional memory and disk storage information for Akamai Connect and Cisco ENCS 5400-W, by Cisco vWAAS model.

Table 1-4 For More Information on Specific Cisco vWAAS Models

Cisco vWAAS Model	For more information:
vWAAS-150	<ul style="list-style-type: none"> • See Cisco vWAAS-150 with Akamai Connect in the chapter “Cisco vWAAS with Akamai Connect”.
vWAAS-6000-R	<ul style="list-style-type: none"> • See the chapter “Cisco vWAAS on Cisco ENCS 5400-W Series”. • See Cisco vWAAS Bundled Image Upgrade for ENCS 5400 Series, with RMA Process for Cisco EOS/EOL WAVE Devices.
vWAAS-12000 and vWAAS-50000	<ul style="list-style-type: none"> • See Akamai Connect Cache Engine on Cisco Mid-End and High-End Platforms in the chapter “Cisco vWAAS with Akamai Connect”.

Cisco vWAAS Model	For more information:
vWAAS models with Akamai Connect	<ul style="list-style-type: none"> See Cisco vWAAS with Akamai Connect Hardware Requirements in the chapter “Cisco vWAAS with Akamai Connect.”
vWAAS models on Cisco ENCS 5400 Series	<ul style="list-style-type: none"> See the chapter “Cisco vWAAS on Cisco ENCS 5400-W Series”. See Cisco vWAAS Bundled Image Upgrade for ENCS 5400 Series, with RMA Process for Cisco EOS/EOL WAVE Devices.

VMware VMFS Block Size and Cisco vWAAS Disk Size

[Table 1-5](#) shows the VMware Virtual Machine File System (VMFS) block size and associated vWAAS maximum disk file size. For more information on VMware and Cisco vWAAS interoperability, see [Table 1-20](#).

Table 1-5 VMware VMFS Block Size and Cisco vWAAS Maximum File Size

VMFS Block Size	Cisco vWAAS Maximum Disk File Size
1 MB	256 GB
2 MB	512 GB
4 MB	1024 GB
8 MB	2046 GB



Note

For Cisco vWAAS models that have a disk size that is larger than 256 GB, a VMFS block size that is larger than 1 MB is required.

Cisco vCM Models: Managed Nodes, vCPUs, Memory, and Disk Storage

[Table 1-6](#) shows the number of managed nodes and disk storage for each vCM model, as well as the required and recommended number of vCPUs and the required and recommended memory capacity.



Note

Cisco vCM installation packages are configured with the minimal required amounts of CPU and memory resources to accommodate the various hypervisor setups. These minimal requirements are sufficient for initial setup and a limited number of nodes.

However, as the number of managed devices on your system increases, the Cisco WAAS Central Manager service can experience intermittent restarts or flapping: device states when under resource shortage. To remedy this, configure the recommended values for number of CPUs and memory, as shown in [Table 1-6](#).

Table 1-6 Cisco vCM Models: Managed Nodes, vCPUs, Memory, and Disk Storage

Cisco vCM Model	Managed Nodes	Required vCPUs	Recommended vCPUs	Required Memory	Recommended Memory	Disk Storage
vCM-100	100	2	2	2 GB	3 GB	250 GB
vCM-500	500	2	4	2 GB	5 GB	300 GB
vCM-1000	1000	2	6	4 GB	8 GB	400 GB
vCM-2000	2000	4	8	8 GB	16 GB	600 GB

Cisco vWAAS and Cisco vCM Sizing Guidelines for Cisco WAAS Version 6.4.3x

This section contains the following topics:

- [Cisco vCM on VMware ESXi Sizing Guidelines, page 1-7](#)
- [Cisco vWAAS on Microsoft Hyper-V Sizing Guidelines, page 1-8](#)
- [Cisco vCM on RHEL KVM Sizing Guidelines, page 1-11](#)



Note

Cisco vWAAS installation packages are configured with the minimal required amounts of CPU and memory resources to accommodate the various hypervisor setups. These minimal requirements are sufficient for initial setup and a limited number of nodes.

However, as the number of managed devices on your system increases, the Central Manager service can experience intermittent restarts or flapping: device states when under resource shortage. To remedy this, please configure the recommended values for number of CPUs and memory shown in this section.

Cisco vCM on VMware ESXi Sizing Guidelines

This section contains the following topics:

- [Cisco vCM on VMware ESXi: Central Manager Mode Sizing Guidelines, page 1-7](#)
- [Cisco vCM on VMware ESXi: Virtual Hardware Requirements, page 1-8](#)
- [Cisco vCM on VMware ESXi: Hardware Requirements, page 1-8](#)

Cisco vCM on VMware ESXi: Central Manager Mode Sizing Guidelines

Table 1-7 Cisco vCM Sizing Guidelines: Central Manager Mode

vCM Model	Number of Nodes (WAAS Devices Only)	Number of Nodes (WAAS and Other Devices)	Number of Managed Appnav Clusters
vCM-100	100	80	25
vCM-500N	500	500	125
vCM-1000N	1000	1000	250
vCM-2000N	2000	2000	300

**Note**

In [Table 1-7](#), the **Number of Nodes (WAAS and Other Devices)** column: In cases when the WAAS Central Manager manages WAAS devices the total number of managed devices can be reduced by 20% compared to management of only WAAS devices.

Cisco vCM on VMware ESXi: Virtual Hardware Requirements

Table 1-8 Cisco vCM on VMware ESXi: Virtual Hardware Requirements

vCM Model	Required Number of vCPUs	Recommended Number of vCPUs	Required Virtual Memory	Recommended Virtual Memory	Number of Virtual Disks	Virtual Disk Datastore
vCM-100	2	2	2 GB	3 GB	2	254
vCM-500N	2	4	2 GB	5 GB	2	304
vCM-1000N	2	6	4 GB	8 GB	2	404
vCM-2000N	4	8	8 GB	16 GB	2	604

Cisco vCM on VMware ESXi: Hardware Requirements

Table 1-9 Cisco vCM on VMware ESXi: Hardware Requirements

Cisco vCM Model	Cisco Hardware	CPU Clock Speed	Disk
vCM-100	UCS C210 M2	2.6 GHz	HDD-7.2K RPM
vCM-500N	UCS C210 M2	2.6 GHz	HDD-7.2K RPM
vCM-1000N	UCS C210 M2	2.6 GHz	HDD-7.2K RPM
vCM-2000N	UCS C210 M2	2.6 GHz	HDD-7.2K RPM

Cisco vWAAS on Microsoft Hyper-V Sizing Guidelines

This section contains the following topics:

- [Cisco vWAAS on Microsoft Hyper-V: Connections Sizing Guidelines, page 1-9](#)
- [Cisco vWAAS on Microsoft Hyper-v: Bandwidth, Throughput, Disk, and Cache Sizing Guidelines, page 1-9](#)
- [Cisco vWAAS on Microsoft Hyper-v: Virtual Hardware Requirements, page 1-11](#)
- [Cisco vWAAS on Microsoft Hyper-v: Hardware Requirements, page 1-11](#)

Cisco vWAAS on Microsoft Hyper-V: Connections Sizing Guidelines

Table 1-10 Cisco vWAAS on Microsoft Hyper-V Connections Sizing Guidelines

Cisco vWAAS Model	Optimized TCP Connections	Optimized CIFS/SMB Connections	Optimized SSL Connections	Optimized MAPI Connections	Optimized Encrypted MAPI (EMAPI) Connections	Akamai Connect Optimized TCP Connections
vWAAS-150	150	150	150	45	45	150
vWAAS-200	200	200	200	60	60	200
vWAAS-750	750	750	750	225	225	750
vWAAS-1300	1,300	1,300	1,300	390	390	1,300
vWAAS-2500	2,500	2,500	2,500	750	750	2,500
vWAAS-6000	6,000	6,000	6,000	1,800	1,800	6,000
vWAAS-12000	12,000	12,000	12,000	3,600	3,600	12,000
vWAAS-50000	50,000	50,000	50,000	15,000	15,000	50,000

Consider the following guidelines for connections sizing for Cisco vWAAS on Microsoft Hyper-V, as shown in [Table 1-10](#):

- For the **Optimized TCP Connections** column: Any system will optimize up to the maximum of its capacity until overload conditions arise. During overload conditions, new connections will not be optimized. Existing connections will be optimized to the greatest degree possible by the system. Should you need scalability beyond the capacity of a single device, multiple devices can be deployed.
- For the **Optimized SSL Connections** columns: These connections, when used, are part of the overall connection limit for the device.
- For the **Optimized MAPI Connections** and **Optimized Encrypted MAPI (EMAPI) Connections** columns: MAPI/EMAPI numbers represent the number of concurrent clients.
- For the **Akamai Connect Optimized TCP Connections** column:
 - Any system will optimize up to the maximum of its capacity until overload conditions arise. During overload conditions, new connections will not be optimized. Existing connections will be optimized to the greatest degree possible by the system. Should you need scalability beyond the capacity of a single device, multiple devices can be deployed.
 - Connections per second (CPS) is approximately 20% of the TFO limit. If the CPS exceeds this some traffic will end up in pass through and not optimized.

Cisco vWAAS on Microsoft Hyper-v: Bandwidth, Throughput, Disk, and Cache Sizing Guidelines

Table 1-11 Cisco vWAAS on Microsoft Hyper-V Sizing Guidelines

Cisco vWAAS Model	Target WAN Bandwidth	Optimized LAN Throughput	DRE Disk Capacity	Default SMB AO Object Cache Capacity	Default Akamai Connect Cache Capacity	Akamai Connect Target WAN Bandwidth
vWAAS-150	15 Mbps	75 Mbps	52 GB	---	80 GB	---
vWAAS-200	20 Mbps	300 Mbps	50 GB	72 GB	100 GB	---
vWAAS-750	50 Mbps	500 Mbps	95 GB	108 GB	250 GB	---

Cisco vWAAS Model	Target WAN Bandwidth	Optimized LAN Throughput	DRE Disk Capacity	Default SMB AO Object Cache Capacity	Default Akamai Connect Cache Capacity	Akamai Connect Target WAN Bandwidth
vWAAS-1300	80 Mbps	500 Mbps	140 GB	108 GB	300 GB	---
vWAAS-2500	150 Mbps	750 Mbps	230 GB	108 GB	350 GB	---
vWAAS-6000	150 Mbps	800 Mbps	320 GB	108 GB	350 GB	---
vWAAS-12000	310 Mbps	1,600 Mbps	450 GB	202 GB	750 GB	---
vWAAS-50000	380 Mbps	2,000 Mbps	1,000 GB	203 GB	850 GB	---

Consider the following guidelines for bandwidth, throughput, DRE disk, object cache, and Akamai Connect sizing for Cisco vWAAS on Microsoft Hyper-V, as shown in [Table 1-11](#).

- For the **Target WAN Bandwidth** column: Target WAN bandwidth is not limited in software or by any other system limit, but is rather provided as guidance for deployment sizing purposes. Target WAN bandwidth is a measure of the optimized/compressed throughput WAAS can support, this value is taken at approximately 50 to 70% compression.
- For the **Optimized LAN Throughput** column: Maximum LAN Throughput is the theoretical maximum throughput the WAAS device can deliver on the LAN side. This number is measured at 99% compression in a dual-sided scenario with TFO, DRE, or LZ and no WAN condition between the WAAS devices.



Note Your specific results are highly dependent on the type of traffic, compression values, WAN conditions, and how much and the type of “work” the WAAS device is doing (such as TFO, DRE, LZ, AO).

Also, if you are using an appliance with a 2- or 4-port port-channel, or a 10 G port, it is possible to scale beyond 1 Gbps of throughput. The same is true for Cisco vWAAS if you have a 10 G NIC in your ESXi or Hyper-V host, you can scale beyond 1 Gbps. Actual results depend on the use case.

- For the **Default SMB AO Object Cache Capacity** column: SMB Object cache is not available on the Cisco vWAAS-150 and 200 models in Cisco WAAS Version 6.2.1. However the space is there to be reallocated toward Akamai Connect if desired.
- For the **Default Akamai Connect Cache Capacity** column: The SMB Object Cache and Akamai Connect Cache can be modified to skew toward SMB, Akamai, or a 50/50 split. For more information, see the Cisco WAAS information on resizing Cisco vWAAS on NFVIS, see the [Cisco Wide Area Application Services Configuration Guide](#).
- For the **Akamai Connect Target WAN Bandwidth** column:
 - Target WAN bandwidth is not limited in software or by any other system limit, but is rather provided as guidance for deployment sizing purposes. Target WAN bandwidth is a measure of the optimized/compressed throughput WAAS can support, this value is taken at approximately 50 - 70% compression.
 - Akamai Connect for Cisco vWAAS-1300:
 - Hardware: Cisco UCS-EN120S-M2/K9
 - CPU Clock Speed: 1.799 GHz
 - Disk Type: SATA and selected platform test coverage

Cisco vWAAS on Microsoft Hyper-v: Virtual Hardware Requirements

Table 1-12 Cisco vWAAS on Hyper-V: Virtual Hardware Requirements

Cisco vWAAS Model	Number of vCPUs	Virtual Memory	Number of Virtual Disks	Virtual Disk Datastore
vWAAS-150	1	3 GB	3	168 GB
vWAAS-200	1	3 GB	4	267.2 GB
vWAAS-750	2	4 GB	4	508.2 GB
vWAAS-1300	2	6 GB	4	610.2 GB
vWAAS-2500	4	8 GB	4	762.2 GB
vWAAS-6000	4	11 GB	4	915 GB
vWAAS-12000	4	12 GB	3	766.2 GB
vWAAS-50000	8	48 GB	3	1,552 GB

Cisco vWAAS on Microsoft Hyper-v: Hardware Requirements

Table 1-13 Cisco vWAAS on Hyper-V: Hardware Requirements

Cisco vWAAS Model	Cisco Hardware	CPU Clock Speed	Disk	Interface
vWAAS-150	ISR-4321 and UCS-EN140N-M2/K9	1.7 GHz	SSD	1 GE
vWAAS-200	ISR-3945E and UCS-E140S-M2/K9	1.8 GHz	HDD -7.2K RPM	1 GE
vWAAS-750	ISR-3945E and UCS-E140S-M2/K9	1.8 GHz	HDD -7.2K RPM	1 GE
vWAAS-1300	ISR-3945E and UCS-E140S-M2/K9	1.8 GHz	HDD -7.2K RPM	1 GE
vWAAS-2500	ISR-4451 and UCS-E140S-M2/K9	1.8 GHz	HDD -7.2K RPM	1 GE
vWAAS-6000	ISR-4451 and UCS-E140S-M2/K9	1.8 GHz	HDD -7.2K RPM	1 GE
vWAAS-12000	UCSC-C240-M3S	3.5 GHz	HDD -7.2K RPM	10 GE
vWAAS-50000	UCSC-C240-M3S	3.5 GHz	HDD -7.2K RPM	10 GE

Cisco vCM on RHEL KVM Sizing Guidelines

This section contains the following topics:

- [Cisco vCM on RHEL KVM: Central Manager Mode Sizing Guidelines, page 1-12](#)
- [Cisco vCM on RHEL KVM: Virtual Hardware Requirements, page 1-12](#)
- [Cisco vCM on RHEL KVM: Hardware Requirements, page 1-12](#)

Cisco vCM on RHEL KVM: Central Manager Mode Sizing Guidelines

Table 1-14 vCM Sizing Guidelines: Central Manager Mode

Cisco vCM Model	Number of Nodes (Cisco WAAS Devices Only)	Number of Nodes (Cisco WAAS and Other Devices)	Number of Managed Cisco AppNav Clusters
vCM-100	100	80	25
vCM-500N	500	500	125
vCM-1000N	1000	1000	250
vCM-2000N	2000	2000	300



Note

In [Table 1-14](#), the **Number of Nodes (WAAS and Other Devices)** column: In cases when the Cisco WAAS Central Manager manages Cisco WAAS devices the total number of managed devices can be reduced by 20% compared to management of only Cisco WAAS devices.

Cisco vCM on RHEL KVM: Virtual Hardware Requirements

Table 1-15 Cisco vCM on ESXi: Virtual Hardware Requirements

Cisco vCM Model	Required Number of vCPUs	Recommended Number of vCPUs	Required Virtual Memory	Recommended Virtual Memory	Number of Virtual Disks	Virtual Disk Datastore
vCM-100	2	2	2 GB	3 GB	3	250 GB
vCM-500N	2	4	2 GB	5 GB	3	300 GB
vCM-1000N	2	6	4 GB	8 GB	3	400 GB
vCM-2000N	4	8	8 GB	16 GB	3	600 GB

Cisco vCM on RHEL KVM: Hardware Requirements

Table 1-16 Cisco vCM on ESXi: Hardware Requirements

Cisco vCM Model	Cisco Hardware	CPU Clock Speed	Disk
vCM-100	UCS C210 M2	2.6 GHz	HDD-7.2K RPM
vCM-500N	UCS C210 M2	2.6 GHz	HDD-7.2K RPM
vCM-1000N	UCS C210 M2	2.6 GHz	HDD-7.2K RPM
vCM-2000N	UCS C210 M2	2.6 GHz	HDD-7.2K RPM

Cisco vWAAS Resizing for WAAS Version 6.4.1a and Later

This section contains the following topics:

- [About Cisco vWAAS Resizing, page 1-13](#)
- [Operating Guidelines for vWAAS Resizing, page 1-13](#)

- [Original and Resized Cisco vWAAS Specifications for Cisco WAAS Version 6.4.1a and Later, page 1-13](#)
- [Resizing Guidelines: Upgrading to Cisco WAAS Version 6.4.1a and Later, page 1-14](#)
- [Resizing Guidelines: Installing Cisco WAAS 6.4.1a, page 1-16](#)
- [Resizing Guidelines by Hypervisor for Cisco WAAS 6.4.1b and Later, page 1-17](#)

About Cisco vWAAS Resizing

Cisco vWAAS in Cisco WAAS Version 6.4.1a and later requires additional resources. Resizing Cisco vWAAS on the recommended platforms enables Cisco vWAAS to scale to optimized TCP connections for the associated device, and to reduce CPU and RAM utilization.

Therefore, we highly recommend the following actions:

- Resize CPU and memory resources, as shown in [Table 1-17](#).
- Resize the DRE object cache and Akamai Connect Cache, as shown in [Table 1-19](#).
- For optimum performance, use the SSD disk with the UCS models listed in [Table 1-17](#).

Operating Guidelines for vWAAS Resizing

Consider the following operating guidelines for vWAAS resizing:

- Only vWAAS models can be resized. Cisco ISR-WAAS and Cisco vCM cannot be resized.
- Although optional, we highly recommend that you resize CPU and memory resources for Cisco vWAAS models on all hypervisors. For Cisco vWAAS in Cisco WAAS 6.4.1b and later, options are provided during Cisco vWAAS deployment for you to select either original or resized resources.
- For Cisco vWAAS in Cisco WAAS Version 6.4.1b: You cannot deploy Cisco vWAAS-12000 or Cisco vWAAS-50000 in Microsoft Hyper-V with the original resources. For a successful deployment of Cisco vWAAS 12000 or Cisco vWAAS-50000 in Microsoft Hyper-V with original resources, do a new deployment with WAAS Version 6.4.1 or earlier, and then perform the bin upgrade to Cisco WAAS Version 6.4.1b.

Original and Resized Cisco vWAAS Specifications for Cisco WAAS Version 6.4.1a and Later

- [Table 1-17](#) shows the original and resized Cisco vWAAS CPU and memory specifications, as well as tested clock speed and minimum recommended platform.
- [Table 1-19](#) shows the default and resized DRE disk capacity, object cache capacity, and Akamai Connect cache capacity, by Cisco vWAAS model.

Table 1-17 Resized Cisco vWAAS Specifications for Cisco WAAS Version 6.4.1a and Later

Cisco vWAAS Model	Original CPU	Resized CPU	Tested CPU Clock Speed	Original Memory	Resized Memory	Minimum Recommended Cisco Platform
vWAAS-150 (earliest supported version: Cisco WAAS 6.1.x)	1 CPU	2 CPUs	1.7 GHz	3 GB	4 GB	UCS-E140N-M2
vWAAS-200	1 CPU	2 CPUs	1.8 GHz	3 GB	4 GB	UCS-E140S-M2
vWAAS-750	2 CPUs	4 CPUs	1.8 GHz	4 GB	8 GB	UCS-E140S-M2
vWAAS-1300	2 CPUs	4 CPUs	1.9 GHz	6 GB	12 GB	UCS-E160S-M3
vWAAS-2500	4 CPUs	6 CPUs	1.9 GHz	8 GB	16 GB	UCS-E160S-M3
vWAAS-6000	4 CPUs	8 CPUs	2.0 GHz	11 GB	24 GB	UCS-E180D-M3
vWAAS-6000R (earliest supported version: Cisco WAAS 6.4.x)	4 CPUs	8 CPUs	2.0 GHz	11 GB	24 GB	UCS-E180D-M3
vWAAS-12000	4 CPUs	12 CPUs	2.6 GHz	12 GB	48 GB	UCS-C220 or UCS-C240
vWAAS-50000	8 CPUs	16 CPUs	2.6 GHz	48 GB	72 GB	UCS-C220 or UCS-C240
vWAAS-150000 (earliest supported version: Cisco WAAS 6.4.1a)	24 CPUs	---	3.0 Ghz	96 GB	---	UCS C220 M5 For more information, see the Cisco UCS C220 M5 Rack Server Data Sheet .

Resizing Guidelines: Upgrading to Cisco WAAS Version 6.4.1a and Later

This section contains the following procedures:

- [Upgrading to Cisco WAAS Version 6.4.1a and Later with Existing CPU and Memory, page 1-14](#)
- [Upgrading to Cisco WAAS Version 6.4.1a and Later with Resized CPU and Memory, page 1-15](#)

Upgrading to Cisco WAAS Version 6.4.1a and Later with Existing CPU and Memory

This section contains the following topics:

- [Using the Cisco WAAS CLI to Perform an Upgrade with Existing CPU Memory, page 1-14](#)
- [Using the Cisco WAAS Central Manager to Perform an Upgrade with Existing CPU and Memory, page 1-15](#)

Using the Cisco WAAS CLI to Perform an Upgrade with Existing CPU Memory

During the upgrade, if the vCPU and memory resources are undersized, you will be prompted to resize these Cisco vWAAS parameters before the upgrade.

You can continue the upgrade procedure and retain the existing vWAAS resources.



Note

For Cisco vWAAS in Cisco WAAS 6.4.1a only: After the upgrade, undersized-resource alarms are displayed for vCPU and memory for the vWAAS device. Use the **show alarms** command to display information about these undersized alarms for the vWAAS model.

Using the Cisco WAAS Central Manager to Perform an Upgrade with Existing CPU and Memory

During the upgrade, if the vCPU and memory resources are undersized, informational note is displayed in the **Upgrade** window, but there will not be a prompt to resize these Cisco vWAAS parameters before the upgrade.

You can continue the upgrade procedure and retain the existing Cisco vWAAS resources.



Note

For Cisco vWAAS in Cisco WAAS 6.4.1a only: After the upgrade, undersized-resource alarms are listed for vCPU and memory for the Cisco vWAAS device. Use the **show alarms** command to display information about these undersized alarms for the Cisco vWAAS model.

Upgrading to Cisco WAAS Version 6.4.1a and Later with Resized CPU and Memory

This section contains the following topics:

- [Using the Cisco WAAS CLI to Perform an Upgrade with Resized CPU and Memory, page 1-15](#)
- [Using the Cisco WAAS Central Manager to Perform an Upgrade with Resized CPU and Memory, page 1-16](#)

Using the Cisco WAAS CLI to Perform an Upgrade with Resized CPU and Memory

Before you begin:

During the upgrade, if the vCPU and memory resources are undersized, you will be prompted to resize these Cisco vWAAS parameters before the upgrade. You can then cancel the upgrade procedure, resize the specific resources, and restart the upgrade procedure.

To perform an upgrade with resized CPU and memory using the Cisco WAAS CLI, follow these steps:

-
- Step 1** After shutting down the vWAAS instance, manually increase the vCPU and memory, from the hypervisor, to meet your specifications.
- To change settings in VMware ESXi: Choose **Edit Settings...** > **Hardware**.
 - To change settings in Microsoft Hyper-V: Choose **Virtual Machine** > **Settings...** > **Hardware**.
 - To change settings in RHEL KVM/CentOS:
 1. Open **Virtual Manager**.
 2. Choose **Virtual Machine** > **CPUs**.
 3. Choose **Virtual Machine** > **Memory**.
 - To change settings in Cisco NFVIS, for the Cisco vBranch solution:
 1. Choose **VM Life Cycle** > **Image Repository** > **Profiles** and add another profile with: resized CPU, memory, and same disk size.
 2. Choose **VM Life Cycle** > **Deploy** > **VM Details** and select the resized profile created.

3. Click **Deploy**.

Note **If you use the Route Manager Debugging (RMD) process with vBranch:** To ensure that the RMD process will start successfully in vBranch deployment, you must manually connect both the interfaces before starting the vWAAS.

- To change settings Microsoft Azure:
 - a. Choose **Deployments > Microsoft Template Overview > Custom Deployment**,
 - b. Choose **Home > Virtual Machines > vWAAS Instance > Size**.

Step 2 Restart the device. With the resized vCPU and memory, the host should have sufficient resources for a successful upgrade.



Note The resources will not change automatically in subsequent upgrades and downgrades of the system change; you must manually change resources as needed for your system.

Using the Cisco WAAS Central Manager to Perform an Upgrade with Resized CPU and Memory

Consider these guidelines as you perform an upgrade with resized CPU and memory using the Cisco WAAS Central Manager:

- During the upgrade, if the vCPU and memory resources are undersized, an informational note is displayed on the **Upgrade** window, but there will not be a prompt to resize these Cisco vWAAS parameters before the upgrade.
 - You cannot cancel the upgrade procedure, in process, from the Cisco WAAS Central Manager. In this scenario, wait until the is complete, change resources as needed, and perform the upgrade.



Note The resources will not change automatically in subsequent upgrades and downgrades of the system change; you must manually change resources as needed for your system.

Resizing Guidelines: Installing Cisco WAAS 6.4.1a

This section contains the following topics:

- [New Installation with Existing CPU and Memory, page 1-16](#)
- [New Installation with Resized CPU and Memory, page 1-17](#)

New Installation with Existing CPU and Memory

1. Install the Cisco vWAAS OVA with a Cisco WAAS version earlier than Cisco WAAS Version 6.4.1a, which, by default, will deploy with resized resource.
2. Upgrade to Cisco WAAS Version 6.4.1a and retain existing CPU and memory resources.

3. After installation is complete, there will be undersized-resource alarms for CPU and memory for the Cisco vWAAS device. You use the **show alarms** command to display information about undersized alarms for the Cisco vWAAS model.
4. After resources are upgraded, there will not be any automatic change in resources for subsequent upgrades/downgrades of the system.

New Installation with Resized CPU and Memory

1. Install the Cisco vWAAS OVA with Cisco WAAS Version 6.4.1a.
2. The host should have sufficient resources of resized CPU and resized memory for a successful deployment.
3. After resources are upgraded, there will not be any automatic change in resources for subsequent upgrades/downgrades of the system.

Resizing Guidelines by Hypervisor for Cisco WAAS 6.4.1b and Later

This section contains the following topics:

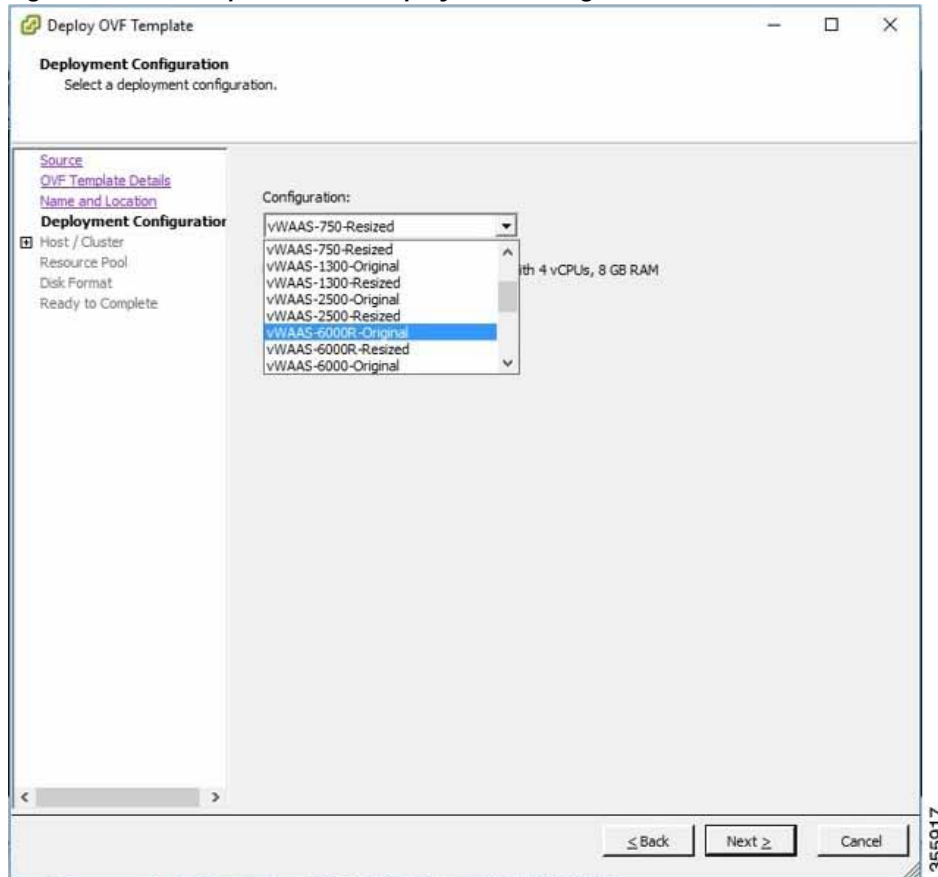
- [Resizing for Cisco vWAAS on VMware ESXi, page 1-17](#)
- [Resizing for Cisco vWAAS on Microsoft Hyper-V, page 1-18](#)
- [Resizing for Cisco vWAAS on RHEL CentOS or SUSE Linux, page 1-19](#)
- [Resizing for Cisco vWAAS on NFVIS, page 1-21](#)

Resizing for Cisco vWAAS on VMware ESXi

To resize CPU and memory for Cisco vWAAS on VMware ESXi, follow these steps:

-
- Step 1** From the vSphere Client, choose **Deploy OVF Template > Deployment Configuration** ([Figure 1-2](#)).

Figure 1-2 vSphere Client Deployment Configuration Window



Step 2 From the **Configuration** drop-down list, choose the Cisco vWAAS model for this hypervisor (Figure 1-2).

For example, if the model you want to choose is Cisco vWAAS-6000, you can either choose **vWAAS-6000-Original** or **vWAAS-6000-Resized**.

Resizing for Cisco vWAAS on Microsoft Hyper-V

To resize CPU and memory for Cisco vWAAS on Microsoft Hyper-V, follow these steps:

Step 1 Log in to the Cisco WAAS Installer for Microsoft Hyper-V, which displays a list of supported Cisco WAAS models (Figure 1-3).

Figure 1-3 Cisco vWAAS and Cisco vCM Resources for Cisco vWAAS on Hyper-V

```

PS C:\Users\Administrator\Desktop\platform-hv\6.4.3-b555\Cisco-HyperV-vWAAS-unified-6.4.3-b555> .\deploy-cisco-waas-scv
m.ps1

----- Cisco WAAS Installer for Hyper-V -----

WAAS supports below models
S.No  Model                Original Resources    Resized Resources
      Model                vCPU  MEMORY             vCPU  MEMORY
-----
1.    vWAAS-150             1      3GB                2      4GB
2.    vWAAS-200             1      3GB                2      4GB
3.    vWAAS-750             2      4GB                4      8GB
4.    vWAAS-1300           2      6GB                4      12GB
5.    vWAAS-2500           4      8GB                6      16GB
6.    vWAAS-6000R          4      11GB               8      24GB
7.    vWAAS-6000           4      11GB               8      24GB
8.    vWAAS-12000         4      12GB               12     48GB
9.    vWAAS-50000         8      48GB               16     72GB
10.   vCM-100N              2      2GB                NA     NA
11.   vCM-500N              2      2GB                NA     NA
12.   vCM-1000N            2      4GB                NA     NA
13.   vCM-2000N            4      8GB                NA     NA

Enter vWAAS/vCM model number to install[1]: 7
Do you want to install vWAAS-6000 with re-sized resources[y/n]: y

Script: C:\Users\Administrator\Desktop\platform-hv\6.4.3-b555\Cisco-HyperV-vWAAS-unified-6.4.3-b555
Loading System Center Virtual Machine Manager Powershell Module...
Powershell module loaded.

```

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- Step 2** At the **Enter vWAAS/vCM model to install** prompt, enter the line number for the model that you want to install. For example, from the listing shown in [Figure 1-3](#), entering **7** will select vWAAS-6000.
- Step 3** At the **Do you want to install vWAAS-6000 with resized resources [y/n]** prompt, enter **Y** to select resized resources.
- Step 4** After you select **Y**, the system displays the associated script, for example:

```

Script: C:\Users\Administrator\Desktop\platform-hv\6.4.3-b555\Cisco-HyperV-vWAAS-unified-6.4.3-b555
Loading System Center Virtual Machine Manager Powershell Module...
Powershell module loaded.

```

Resizing for Cisco vWAAS on RHEL CentOS or SUSE Linux

To resize CPU and memory for Cisco vWAAS on RHEL CentOS or on SUSE Linux, follow these steps:

- Step 1** In the **root@localhost** window, enter the resizing launch script:
- ```
[root@localhost]# ./launch.sh nresized macvtap br-ex br-ext1
```
- Step 2** The system displays original and resized resources for each Cisco vWAAS model ([Figure 1-4](#)):

Figure 1-4 Cisco vWAAS and Cisco vCM Resources on CentOS or SUSE Linux

```
[root@localhost]# ./launch.sh nresized macvtap br-ex br-ext1
```

|     |             | ORIGINAL RESOURCES |        | RESIZED RESOURCES |        |
|-----|-------------|--------------------|--------|-------------------|--------|
| SNO | MODEL NAME  | CPU                | MEMORY | CPU               | MEMORY |
| 1.  | vWAAS 150   | 1                  | 4GB    | 2                 | 4GB    |
| 2.  | vWAAS 200   | 1                  | 4GB    | 2                 | 4GB    |
| 3.  | vWAAS 750   | 2                  | 4GB    | 4                 | 8GB    |
| 4.  | vWAAS 1300  | 2                  | 6GB    | 4                 | 12GB   |
| 5.  | vWAAS 2500  | 4                  | 8GB    | 6                 | 16GB   |
| 6.  | vWAAS 6000R | 4                  | 11GB   | 8                 | 24GB   |
| 7.  | vWAAS 6000  | 4                  | 11GB   | 8                 | 24GB   |
| 8.  | vWAAS 12000 | 4                  | 12GB   | 12                | 48GB   |
| 9.  | vWAAS 50000 | 8                  | 48GB   | 16                | 72GB   |
| 10. | vCM 100N    | 2                  | 2GB    | NA                | NA     |
| 11. | vCM 500N    | 2                  | 2GB    | NA                | NA     |
| 12. | vCM 1000N   | 2                  | 4GB    | NA                | NA     |
| 13. | vCM 2000N   | 4                  | 8GB    | NA                | NA     |

```
Select the model type :2
[root@localhost msannare]#

root@localhost msannare]# ./ezdeploy.sh
```

|     |             | ORIGINAL RESOURCES |        | RESIZED RESOURCES |        |
|-----|-------------|--------------------|--------|-------------------|--------|
| SNO | MODEL NAME  | CPU                | MEMORY | CPU               | MEMORY |
| 1.  | vWAAS 150   | 1                  | 4GB    | 2                 | 4GB    |
| 2.  | vWAAS 200   | 1                  | 4GB    | 2                 | 4GB    |
| 3.  | vWAAS 750   | 2                  | 4GB    | 4                 | 8GB    |
| 4.  | vWAAS 1300  | 2                  | 6GB    | 4                 | 12GB   |
| 5.  | vWAAS 2500  | 4                  | 8GB    | 6                 | 16GB   |
| 6.  | vWAAS 6000R | 4                  | 11GB   | 8                 | 24GB   |
| 7.  | vWAAS 6000  | 4                  | 11GB   | 8                 | 24GB   |

```
Select the model type :
[root@localhost]#
```

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- Step 3** At the **Select the model type** prompt, enter the line number of the model type for your system. For example, clicking **7** will select vWAAS-6000.

The system displays the following message:

```
Do you want to install vWAAS-6000 with resized resources [y/n]
Enter Y to select resized resources.
```

- Step 4** Launch the **EzDeploy** script:

```
[root@localhost]# ./ezdeploy.sh
```

The **EzDeploy** script also displays both the original and resized resources, as shown in [Figure 1-4](#).

- Step 5** The system deploys the selected model, with resized resources.

## Resizing for Cisco vWAAS on NFVIS

To resize Cisco vWAAS on Cisco NFVIS, install the Cisco vWAAS OVA with Cisco WAAS Version 6.4.1b. [Figure 1-5](#) shows the NFVIS profiles listing for original and resized Cisco vWAAS resources.

**Figure 1-5** Cisco vWAAS Profiles Listing on Cisco vWAAS on NFVIS

| Image Name                                | State  | Type  | Version    | Storage Location | Action |
|-------------------------------------------|--------|-------|------------|------------------|--------|
| Cisco-KVM-vWAAS-Unified-6.4.1b-b29.tar.gz | ACTIVE | vWAAS | 6.4.1b-b29 | Internal         |        |

Showing 1 to 1 of 1 entries

Profiles

| Profile             | CPU | Memory (MB) | Disk (MB) | Source Image                              | Action |
|---------------------|-----|-------------|-----------|-------------------------------------------|--------|
| vWAAS-1300-Original | 2   | 6144        | 614400    | Cisco-KVM-vWAAS-Unified-6.4.1b-b29.tar.gz |        |
| vWAAS-1300-Resized  | 4   | 12288       | 614400    | Cisco-KVM-vWAAS-Unified-6.4.1b-b29.tar.gz |        |
| vWAAS-150-Original  | 1   | 4096        | 163840    | Cisco-KVM-vWAAS-Unified-6.4.1b-b29.tar.gz |        |
| vWAAS-150-Resized   | 2   | 4096        | 163840    | Cisco-KVM-vWAAS-Unified-6.4.1b-b29.tar.gz |        |
| vWAAS-200-Original  | 1   | 4096        | 266240    | Cisco-KVM-vWAAS-Unified-6.4.1b-b29.tar.gz |        |

Showing 1 to 5 of 14 entries

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For information on resizing Cisco vWAAS on NFVIS, see the [Cisco Enterprise Network Function Virtualization Infrastructure Configuration Guide](#).

## DRE Disk, Object Cache, and Akamai Connect Cache Capacity

This section contains the following topics:

- [DRE Disk, Default Object Cache, and Default Akamai Connect Cache, by Cisco WAVE Model, page 1-21](#)
- [Default and Resized DRE Disk, Object Cache, and Akamai Connect Cache Capacity, by Cisco vWAAS Model, page 1-22](#)

### DRE Disk, Default Object Cache, and Default Akamai Connect Cache, by Cisco WAVE Model

[Table 1-18](#) shows the DRE disk, default object cache, and default Akamai Connect cache, by Cisco WAVE model.

**Table 1-18** DRE Disk, Default OC, and Default Akamai Connect Cache by Cisco WAVE Model

| Cisco WAVE Model | DRE Disk Capacity | Default Object Cache Capacity | Default Akamai Connect Cache Capacity |
|------------------|-------------------|-------------------------------|---------------------------------------|
| WAVE 294-4G      | 40 GB             | 102 GB                        | 59 GB                                 |
| WAVE 294-4G-SSD  | 40 GB             | 57 GB                         | 55 GB                                 |
| WAVE 294-8G      | 55 GB             | 77 GB                         | 65 GB                                 |
| WAVE 294-8G-SSD  | 55 GB             | 46 GB                         | 47 GB                                 |
| WAVE 594-8G      | 80 GB             | 143 GB                        | 200 GB                                |
| WAVE 594-8G-SSD  | 80 GB             | 125 GB                        | 125 GB                                |

## Default and Resized DRE Disk, Object Cache, and Akamai Connect Cache Capacity, by Cisco vWAAS Model

Table 1-19 shows the default and resized DRE disk capacity, object cache capacity, and Akamai Connect cache capacity, by Cisco vWAAS model.

**Table 1-19** Default and Resized DRE, OC, and Akamai Connect Cache, by Cisco vWAAS Model

| Cisco vWAAS Model   | DRE Disk Capacity | Default Object Cache Capacity | Default Akamai Connect Cache Capacity |
|---------------------|-------------------|-------------------------------|---------------------------------------|
| vWAAS-150           | 52.3 GB           | 52 GB                         | 30 GB                                 |
| vWAAS-150 Resized   | 51.25 GB          | 52 GB                         | 30 GB                                 |
| vWAAS-200           | 52.23 GB          | 82 GB                         | 100 GB                                |
| vWAAS-200 Resized   | 51.25 GB          | 82 GB                         | 100 GB                                |
| vWAAS-750           | 96.75 GB          | 122 GB                        | 250 GB                                |
| vWAAS-750 Resized   | 92.75 GB          | 122 GB                        | 250 GB                                |
| vWAAS-1300          | 140 GB            | 122 GB                        | 300 GB                                |
| vWAAS-1300 Resized  | 136.25 GB         | 122 GB                        | 300 GB                                |
| vWAAS-2500          | 238 GB            | 122 GB                        | 350 GB                                |
| vWAAS-2500 Resized  | 223.25 GB         | 122 GB                        | 350 GB                                |
| vWAAS-6000          | 320 GB            | 122 GB                        | 400 GB                                |
| vWAAS-6000 Resized  | 302.05 GB         | 122 GB                        | 400 GB                                |
| vWAAS-6000R         | 320 GB            | 122 GB                        | 350 GB                                |
| vWAAS-6000R Resized | 302.05 GB         | 122 GB                        | 350 GB                                |
| vWAAS-12000         | 450 GB            | 226 GB                        | 750 GB                                |
| vWAAS-12000 Resized | 407.25 GB         | 226 GB                        | 750 GB                                |
| vWAAS-50000         | 1000 GB           | 227 GB                        | 850 GB                                |
| vWAAS-50000 Resized | 1000 GB           | 227 GB                        | 850 GB                                |
| vWAAS-150000        | 1.95 T            | 700 GB                        | 1500 GB                               |

# Cisco Hardware Platforms Supported for Cisco vWAAS

This section contains the following topics:

- [Platforms Supported for Cisco vWAAS, by Hypervisor Type, page 1-23](#)
- [Components for Deploying Cisco vWAAS, by Hypervisor Type, page 1-24](#)
- [Components for Managing Cisco vWAAS, by Hypervisor Type, page 1-25](#)
- [Cisco UCS E-Series Servers and NCEs, page 1-26](#)
- [Cisco Enterprise Network Computer System 5400-W Series, page 1-29](#)

## Platforms Supported for Cisco vWAAS, by Hypervisor Type

For each hypervisor used with Cisco vWAAS, [Table 1-20](#) shows the types of platforms supported for Cisco vWAAS, including minimum Cisco WAAS version, host platform, and disk type.



Note

Cisco ISR-4321 with IOS-XE 16.9.x is supported for Cisco vWAAS in Cisco WAAS Version 6.4.1b and later.

**Table 1-20** Platforms Supported for Cisco vWAAS, by Hypervisor Type

| Hypervisor     | PID and Device Type                                                                                                      | Earliest Supported Cisco WAAS Version                                                                                              | Host Platforms                                                                                                                                                                                                                                                         | Earliest Supported Host Version                                | Disk Type                                                                      |
|----------------|--------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|--------------------------------------------------------------------------------|
| Cisco ISR-WAAS | <ul style="list-style-type: none"> <li>• PID: <b>OE-VWAAS-KVM</b></li> <li>• Device Type: <b>ISR-WAAS</b></li> </ul>     | <ul style="list-style-type: none"> <li>• 6.4.1b (ISR-4461)</li> <li>• 5.4.1</li> <li>• 5.2.1 (ISR-4451)</li> </ul>                 | <ul style="list-style-type: none"> <li>• ISR-4461 (vWAAS-750, 1300, 2500)</li> <li>• ISR-4451 (vWAAS-750, 1300, 2500)</li> <li>• ISR-4431 (vWAAS-750, 1300)</li> <li>• ISR-4351 (vWAAS-750)</li> <li>• ISR-4331 (vWAAS-750)</li> <li>• ISR-4321 (vWAAS-200)</li> </ul> | <ul style="list-style-type: none"> <li>• IOS-XE 3.9</li> </ul> | <ul style="list-style-type: none"> <li>• ISR-SSD</li> <li>• NIM-SSD</li> </ul> |
| Cisco NFVIS    | <ul style="list-style-type: none"> <li>• PID: <b>OE-VWAAS-KVM</b></li> <li>• Device Type: <b>OE-VWAAS-KVM</b></li> </ul> | <ul style="list-style-type: none"> <li>• 6.2.x (Cisco UCS-E Series)</li> <li>• 6.4.1 (Cisco ENCS 5400 Series and Cisco)</li> </ul> | <ul style="list-style-type: none"> <li>• Cisco ENCS (Enterprise Network Compute System) 5400 Series</li> <li>• Cisco UCS-E Series</li> </ul>                                                                                                                           | <ul style="list-style-type: none"> <li>• NFV FC2</li> </ul>    | <ul style="list-style-type: none"> <li>• virtio</li> </ul>                     |

| Hypervisor          | PID and Device Type                                                                                                                  | Earliest Supported Cisco WAAS Version                      | Host Platforms                                                                                                         | Earliest Supported Host Version                                                            | Disk Type                                                  |
|---------------------|--------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|------------------------------------------------------------|
| VMware vSphere ESXi | <ul style="list-style-type: none"> <li>• PID: <b>OE-VWAAS-ESX</b></li> <li>• Device Type: <b>OE-VWAAS-ESX</b></li> </ul>             | <ul style="list-style-type: none"> <li>• 5.0.3g</li> </ul> | <ul style="list-style-type: none"> <li>• Cisco UCS (Unified Computing System)</li> <li>• Cisco UCS-E Series</li> </ul> | <ul style="list-style-type: none"> <li>• ESXi 5.0</li> </ul>                               | <ul style="list-style-type: none"> <li>• VMDK</li> </ul>   |
| Microsoft Hyper-V   | <ul style="list-style-type: none"> <li>• PID: <b>OE-VWAAS-HYPERV</b></li> <li>• Device Type: <b>OE-VWAAS-HYPERV</b></li> </ul>       | <ul style="list-style-type: none"> <li>• 6.1.x</li> </ul>  | <ul style="list-style-type: none"> <li>• Cisco UCS</li> <li>• Cisco UCS-E Series</li> </ul>                            | <ul style="list-style-type: none"> <li>• Microsoft Windows 2008 R2</li> </ul>              | <ul style="list-style-type: none"> <li>• VHD</li> </ul>    |
| RHEL KVM            | <ul style="list-style-type: none"> <li>• PID: <b>OE-VWAAS-KVM</b></li> <li>• Device Type: <b>OE-VWAAS-KVM</b></li> </ul>             | <ul style="list-style-type: none"> <li>• 6.2.x</li> </ul>  | <ul style="list-style-type: none"> <li>• Cisco UCS</li> <li>• Cisco UCS-E Series</li> </ul>                            | <ul style="list-style-type: none"> <li>• RHEL CentOS 7.1</li> </ul>                        | <ul style="list-style-type: none"> <li>• virtio</li> </ul> |
| SUSE Linux          | <ul style="list-style-type: none"> <li>• PID: <b>OE-VWAAS-GEN-LINUX</b></li> <li>• Device Type: <b>OE-VWAAS-GEN-LINUX</b></li> </ul> | <ul style="list-style-type: none"> <li>• 6.4.1b</li> </ul> | <ul style="list-style-type: none"> <li>• Cisco UCS</li> <li>• Cisco UCS-E Series</li> </ul>                            | <ul style="list-style-type: none"> <li>• SUSE Linux Enterprise Server (SLES) 12</li> </ul> | <ul style="list-style-type: none"> <li>• virtio</li> </ul> |
| Microsoft Azure     | <ul style="list-style-type: none"> <li>• PID: <b>OE-VWAAS-AZURE</b></li> <li>• Device Type: <b>OE-VWAAS-AZURE</b></li> </ul>         | <ul style="list-style-type: none"> <li>• 6.2.x</li> </ul>  | <ul style="list-style-type: none"> <li>• Microsoft Azure cloud</li> </ul>                                              | <ul style="list-style-type: none"> <li>• N/A</li> </ul>                                    | <ul style="list-style-type: none"> <li>• VHD</li> </ul>    |
| OpenStack           | <ul style="list-style-type: none"> <li>• PID: <b>OE-VWAAS-OPENSTACK</b></li> <li>• Device Type: <b>OE-VWAAS-OPENSTACK</b></li> </ul> | <ul style="list-style-type: none"> <li>• 6.4.1b</li> </ul> | <ul style="list-style-type: none"> <li>• OpenStack cloud</li> </ul>                                                    | <ul style="list-style-type: none"> <li>• OpenStack Mitaka</li> </ul>                       | <ul style="list-style-type: none"> <li>• virtio</li> </ul> |

## Components for Deploying Cisco vWAAS, by Hypervisor Type

For each hypervisor used with Cisco vWAAS, [Table 1-21](#) shows the components used to deploy Cisco vWAAS, including package format, deployment tool, preconfiguration tool (if needed), and network driver.

**Table 1-21** Components for Deploying Cisco vWAAS, by Hypervisor Type

| Hypervisor          | Package Format                                          | Deployment Tool                                                                   | Preconfiguration Tool                                                     | Network Driver                                                 |
|---------------------|---------------------------------------------------------|-----------------------------------------------------------------------------------|---------------------------------------------------------------------------|----------------------------------------------------------------|
| Cisco ISR-WAAS      | <ul style="list-style-type: none"> <li>• OVA</li> </ul> | <ul style="list-style-type: none"> <li>• Ezconfig</li> </ul>                      | <ul style="list-style-type: none"> <li>• onep</li> </ul>                  | <ul style="list-style-type: none"> <li>• virtio_net</li> </ul> |
| Cisco NFVIS         | <ul style="list-style-type: none"> <li>• TAR</li> </ul> | <ul style="list-style-type: none"> <li>• NFVIS</li> </ul>                         | <ul style="list-style-type: none"> <li>• Bootstrap Day0 config</li> </ul> | <ul style="list-style-type: none"> <li>• virtio_net</li> </ul> |
| VMware vSphere ESXi | <ul style="list-style-type: none"> <li>• OVA</li> </ul> | <ul style="list-style-type: none"> <li>• —</li> </ul>                             | <ul style="list-style-type: none"> <li>• —</li> </ul>                     | <ul style="list-style-type: none"> <li>• vmxnet3</li> </ul>    |
| Microsoft HyperV    | <ul style="list-style-type: none"> <li>• Zip</li> </ul> | <ul style="list-style-type: none"> <li>• Powershell script</li> </ul>             | <ul style="list-style-type: none"> <li>• —</li> </ul>                     | <ul style="list-style-type: none"> <li>• netvsc</li> </ul>     |
| RHEL KVM            | <ul style="list-style-type: none"> <li>• TAR</li> </ul> | <ul style="list-style-type: none"> <li>• EZdeploy</li> <li>• launch.sh</li> </ul> | <ul style="list-style-type: none"> <li>• —</li> </ul>                     | <ul style="list-style-type: none"> <li>• virtio_net</li> </ul> |



| Hypervisor      | Package Format  | Deployment Tool                    | Preconfiguration Tool | Network Driver |
|-----------------|-----------------|------------------------------------|-----------------------|----------------|
| SUSE Linux      | • TAR           | • EZdeploy<br>• launch.sh          | • ---                 | • virtio_net   |
| Microsoft Azure | • JSON template | • ---                              | • ---                 | • netvsc       |
| OpenStack       | • TAR           | • OpenStack portal<br>(Horizon U1) | • ---                 | • virtio_net   |



Note

Cisco Virtual Interface Cards (VICs) are not qualified for Cisco vWAAS.

## Components for Managing Cisco vWAAS, by Hypervisor Type

For each hypervisor used with Cisco vWAAS, [Table 1-22](#) shows the components used to manage Cisco vWAAS, including Cisco vCM model, Cisco vWAAS model, number of instances supported, and traffic interception method used.

**Table 1-22** Components for Managing Cisco vWAAS, by Hypervisor Type

| Hypervisor          | Cisco vCM Models Supported | Cisco vWAAS Models Supported                          | Number of Instances Supported | Traffic Interception Method                                    |
|---------------------|----------------------------|-------------------------------------------------------|-------------------------------|----------------------------------------------------------------|
| Cisco ISR-WAAS      | • N/A                      | • vWAAS-200, 750, 1300, 2500                          | • 1                           | • AppNav-XE                                                    |
| Cisco NFVIS         | • N/A                      | • vWAAS-200, 750, 1300, 2500, 6000                    | • 1                           | • WCCP<br>• APPNav-XE<br>• Inline (with WAAS v6.2.1 and later) |
| VMware vSphere ESXi | • vCM-100, 500, 1000, 2000 | • vWAAS-150, 200, 750, 1300, 2500, 6000, 12000, 50000 | • many                        | • WCCP<br>• APPNav-XE                                          |
| Microsoft HyperV    | • vCM-100, 500, 1000, 2000 | • vWAAS-150, 200, 750, 1300, 2500, 6000, 12000, 50000 | • many                        | • WCCP<br>• APPNav-XE                                          |
| RHEL KVM            | • vCM-100, 500, 1000, 2000 | • vWAAS-150, 200, 750, 1300, 2500, 6000, 12000, 50000 | • many                        | • WCCP<br>• APPNav-XE<br>• Inline (with WAAS v6.2.1 and later) |
| SUSE Linux          | • vCM-100, 500, 1000, 2000 | • vWAAS-150, 200, 750, 1300, 2500, 6000, 12000, 50000 | • many                        | • WCCP<br>• APPNav-XE                                          |

| Hypervisor      | Cisco vCM Models Supported | Cisco vWAAS Models Supported                          | Number of Instances Supported | Traffic Interception Method                |
|-----------------|----------------------------|-------------------------------------------------------|-------------------------------|--------------------------------------------|
| Microsoft Azure | • N/A                      | • vWAAS-200, 750, 1300, 2500, 6000, 12000             | • 1                           | • Routed mode (with WAAS v6.2.1 and later) |
| OpenStack       | • vCM-100, 500, 1000, 2000 | • vWAAS-150, 200, 750, 1300, 2500, 6000, 12000, 50000 | • many                        | • WCCP<br>• APPNav-XE                      |

## Cisco UCS E-Series Servers and NCEs

This section has the following topics:

- [Cisco vWAAS and Cisco UCS E-Series Interoperability, page 1-26](#)
- [Cisco vWAAS and Cisco UCS E-Series Memory Guidelines and Requirements, page 1-27](#)

### Cisco vWAAS and Cisco UCS E-Series Interoperability

Cisco UCS E-Series servers and Cisco UCS E-Series Network Compute Engines (NCEs) provide platforms for Cisco vWAAS and Cisco ISR routers. [Table 1-23](#) shows the supported operating systems, hypervisors, Cisco ISR routers, and the minimum version of Cisco IOS-XE used.

**Table 1-23** Cisco vWAAS and Cisco UCS E-Series Interoperability

| Cisco UCS E-Series   | Supported Operating Systems for vWAAS                                                                                                                                                                                                    | Supported Hypervisors for vWAAS                                                                                                                                                                                                                                                                                                                                                                                   | Supported Cisco ISR Routers for vWAAS                                                                                                               | Minimum IOS -XE Version                                                                          |
|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| UCS E-Series Servers | <ul style="list-style-type: none"> <li>Microsoft Windows Server 2008 R2, 2012, and 2012 R2</li> <li>Red Hat Enterprise Linux (RHEL) 7.1 and later</li> <li>Linux CentOS (Community Enterprise Operating System) 7.1 and later</li> </ul> | <ul style="list-style-type: none"> <li>Microsoft Hyper-V 2008 R2, 2012, and 2012 R2</li> <li>VMware vSphere ESXi 5.5 and 6.0 (vWAAS in WAAS Versions 6.4.3b and earlier)</li> <li>VMware vSphere ESXi 6.7 (vWAAS in WAAS Version 6.4.3c and later)</li> <li>RHEL KVM or CentOS 7.1 (vWAAS in WAAS Version 6.4.3b and earlier)</li> <li>RHEL KVM or CentOS 7.2 (vWAAS in WAAS Version 6.4.3c and later)</li> </ul> | <ul style="list-style-type: none"> <li>ISR-4331</li> <li>ISR-4351</li> <li>ISR-4451</li> <li>ISR-4461</li> </ul>                                    | <ul style="list-style-type: none"> <li>3.10</li> </ul>                                           |
| UCS E-Series NCEs    | <ul style="list-style-type: none"> <li>Microsoft Windows Server (2012 R2)</li> <li>RHEL 7.1 and later</li> <li>Linux CentOS 7.1 and later</li> </ul>                                                                                     | <ul style="list-style-type: none"> <li>Microsoft Hyper-V 2012 R2</li> <li>VMware vSphere ESXi 5.5 and 6.0 (vWAAS in WAAS Versions 6.4.3b and earlier)</li> <li>VMware vSphere ESXi 6.7 (vWAAS in WAAS Version 6.4.3c and later)</li> <li>RHEL KVM or CentOS 7.1 (vWAAS in WAAS Version 6.4.3b and earlier)</li> <li>RHEL KVM or CentOS 7.2 (vWAAS in WAAS Version 6.4.3c and later)</li> </ul>                    | <ul style="list-style-type: none"> <li>ISR-432</li> <li>ISR-4331</li> <li>ISR-4351</li> <li>ISR-4431</li> <li>ISR-4451</li> <li>ISR-4461</li> </ul> | <ul style="list-style-type: none"> <li>3.10 (UCS-EN120S)</li> <li>3.15.1 (UCS-EN140N)</li> </ul> |

## Cisco vWAAS and Cisco UCS E-Series Memory Guidelines and Requirements

Table 1-24 shows memory and disk storage capacity for Cisco UCS E-Servers NCEs. When calculating memory requirements for your Cisco vWAAS system, include the following parameters:

- A minimum of 2 GB of memory is needed for VMware v5.0, v5.1, or v6.0.
- A minimum of 4 GB of memory is needed for VMware v5.5.
- You must also allocate memory overhead for vCPU memory. The amount is dependent on the number of vCPUs for your system: 1, 2, 4, or 8 vCPUs.

For information on vCPUs, ESXi server datastore memory, and disk space by Cisco vWAAS model and vCM model, see Table 4-4 and Table 4-5 in Chapter 4, “Cisco vWAAS on VMware ESXi”.

### Example 1:

A deployment of vWAAS-750 on the UCS-E140S, using VMware v6.0: Cisco UCS-E140S has a default value of 8 GB memory (which can be expanded to 48 GB).

- Cisco vWAAS-750 requires 6 GB memory + VMware v6.0 requires 2 GB memory = 6 GB memory, which is below the default memory capacity of the UCS-E140S.
- You can deploy Cisco vWAAS-750 on the Cisco UCS-E140S without adding additional memory to the Cisco UCS-E140S DRAM.

Example 2:

A deployment of vWAAS-1300 on the UCS-E140S, using VMware v6.0: Cisco UCS-E140S has a default value of 8 GB DRAM, (which can be expanded to 48 GB).

- Cisco vWAAS-1300 requires 6 GB memory + VMware v6.0 requires 2 GB DRAM = 8 GB memory, which equals the memory capacity of UCS-E140S.
- To deploy Cisco vWAAS-1300 on the Cisco UCS-E140S, you must add additional memory to the Cisco UCS-E140S memory.



**Note**

For Cisco vWAAS datastore, you can use either SAN storage or local storage on the VMware ESXi server. NAC Appliance Server (NAS) should only be used in nonproduction scenarios, such as test purposes.

**Table 1-24 Memory and Disk Storage for Cisco UCS E-Servers NCEs**

| Cisco UCS E-Series Server (E) or NCE (EN)         | Memory                          | Disk Storage                                                                                                                                                                                                                                      |
|---------------------------------------------------|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| UCS-E140S<br>(single-wide blade)                  | Default: 8 GB<br>Maximum: 16 GB | Up to two of the following: <ul style="list-style-type: none"> <li>• 7200-RPM SATA: 1 TB</li> <li>• 10,000-RPM SAS: 900 GB</li> <li>• 10,000-RPM SAS SED: 600 GB</li> <li>• SAS SSD SLC: 200 GB</li> <li>• SAS SSD eMLC: 200 or 400 GB</li> </ul> |
| UCS-EN120S<br>(single-wide blade)                 | Default: 4 GB<br>Maximum: 16 GB | Up to two of the following: <ul style="list-style-type: none"> <li>• 7200-RPM SATA: 500 GB</li> <li>• 7200-RPM SATA: 1 TB</li> <li>• 10,000-RPM SAS: 900 GB</li> </ul>                                                                            |
| UCS-E140DP<br>(double-wide blade with PCIe cards) | Default: 8 GB<br>Maximum: 48 GB | Up to two of the following: <ul style="list-style-type: none"> <li>• 7200-RPM SATA: 1 TB</li> <li>• 10,000-RPM SAS: 900 GB</li> <li>• 10,000-RPM SAS SED: 600 GB</li> <li>• SAS SSD SLC: 200 GB</li> <li>• SAS SSD eMLC: 200 or 400 GB</li> </ul> |

| Cisco UCS E-Series Server (E) or NCE (EN)         | Memory                          | Disk Storage                                                                                                                                                                                                                                                                          |
|---------------------------------------------------|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| UCS-E140D<br>(double-wide blade)                  | Default: 8 GB<br>Maximum: 48 GB | Up to three of the following: <ul style="list-style-type: none"> <li>• 7200-RPM SATA: 1 TB</li> <li>• 10,000-RPM SAS: 900 GB</li> <li>• 10,000-RPM SAS SED: 600 GB</li> <li>• SAS SSD SLC: 200 GB</li> <li>• SAS SSD eMLC: 200 or 400 GB</li> </ul>                                   |
| UCS-EN40N<br>(Network Interface Module)           | —                               | One of the following mSATA SSD drives: <ul style="list-style-type: none"> <li>• mSATA SSD drive: 50 GB</li> <li>• mSATA SSD drive: 100 GB</li> <li>• mSATA SSD drive: 200 GB</li> </ul>                                                                                               |
| UCS-E160DP<br>(double-wide blade with PCIe cards) | Default: 8 GB<br>Maximum: 48 GB | Up to two of the following: <ul style="list-style-type: none"> <li>• 7200-RPM SATA: 1 TB</li> <li>• 10,000-RPM SAS: 900 GB</li> <li>• 10,000-RPM SAS SED: 600 GB</li> <li>• SAS SSD SLC: 200 GB</li> <li>• SAS SSD eMLC: 200 or 400 GB</li> </ul>                                     |
| UCS-E160D<br>(double-wide blade)                  | Default: 8 GB<br>Maximum: 96 GB | Up to three of the following: <ul style="list-style-type: none"> <li>• 7200-RPM SATA: 1 TB</li> <li>• 10,000-RPM SAS: 900 GB</li> <li>• 10,000-RPM SAS SED: 600 GB</li> <li>• SAS SSD SLC: 200 GB</li> <li>• SAS SSD eMLC: 200 or 400 GB</li> </ul>                                   |
| UCS-E180D<br>(double-wide blade)                  | Default: 8 GB<br>Maximum: 96GB  | Up to three of the following: <ul style="list-style-type: none"> <li>• 7200-RPM SATA: 1 TB</li> <li>• 10,000-RPM SAS: 1.8 TB</li> <li>• 10,000-RPM SAS: 900 GB</li> <li>• 10,000-RPM SAS SED: 600 GB</li> <li>• SAS SSD SLC: 200 GB</li> <li>• SAS SSD eMLC: 200 or 400 GB</li> </ul> |

## Cisco Enterprise Network Computer System 5400-W Series

This section contains the following topics:

- [About the Cisco Enterprise Network Compute System 5400-W Series, page 1-30](#)
- [Cisco ENCS 5400 Series Hardware Features and Specifications, page 1-30](#)

## About the Cisco Enterprise Network Compute System 5400-W Series

The Cisco Enterprise Network Compute System (ENCS) 5400-W Series is designed for the Cisco Enterprise Network Functions Virtualization (NFV) solution, and is available for Cisco vWAAS in Cisco WAAS Version 6.4.1 and later.

The Cisco ENCS 5400-W Series: ENCS 5406-W, 5408-W, and 5412-W, is an x86 hybrid platform is designed for the Cisco Enterprise NFV solution, for branch deployment and for hosting WAAS applications. These high-performance units achieves this goal by providing the infrastructure to deploy virtualized network functions while acting as a server that addresses processing, workload, and storage challenges.



**Note** Cisco vWAAS is designed to run in appliance mode or as a Virtualized Network Function (VNF) in three Cisco ENCS 5400-W series models: Cisco ENCS 5406-W, Cisco ENCS 5408-W, Cisco ENCS 5412-W, and three Cisco PIDs: ENCS 5406-K9, ENCS 5408-K9, ENCS 5412-K9.

For more information on the Cisco ENCS 5400 Series, see the [Cisco 5000 Enterprise Network Compute System Data Sheet](#).

For information on vWAAS with NFVIS on the ENCS 5400-W Series, see the chapter “[Cisco vWAAS with Cisco Enterprise NFVIS](#)”.

## Cisco ENCS 5400 Series Hardware Features and Specifications

[Table 1-25](#) shows specifications that apply to all three Cisco ENCS 5400-W Series models. For further information, see the [Cisco 5000 Enterprise Network Compute System Data Sheet](#).

**Table 1-25** Cisco ENCS 5400 Series Features and Specifications

| Cisco ENCS 5400 Feature/Specification | Description                                                                                                                                                                                                                                                                                                                                                 |
|---------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Cisco vWAAS models supported          | One of the following configurations: <ul style="list-style-type: none"> <li>ENCS-5406/K9 supports vWAAS 200 and vWAAS-750</li> <li>ENCS-5408/K9 supports vWAAS-1300</li> <li>ENCS-5412/K9 supports vWAAS-2500 and vWAAS-6000-R</li> </ul>                                                                                                                   |
| CPU                                   | One of the following specifications: <ul style="list-style-type: none"> <li>ENCS-5406/K9:<br/>Intel Xeon Processor D-1528 (6 core, 1.9 GHz, and 9 MB cache)</li> <li>ENCS-5408/K9:<br/>Intel Xeon Processor D-1548 (8 core, 2.0 GHz, and 12 MB cache)</li> <li>ENCS-5412/K9:<br/>Intel Xeon Processor D-1557 (12 core, 1.5 GHz, and 18 MB cache)</li> </ul> |
| BIOS                                  | Version 2.4                                                                                                                                                                                                                                                                                                                                                 |
| Cisco NFVIS on KVM hypervisor         | KVM hypervisor Version 3.10.0-327.el7.x86_64                                                                                                                                                                                                                                                                                                                |
| CIMC                                  | Version 3.2                                                                                                                                                                                                                                                                                                                                                 |
| Network Controller                    | Intel FTX710-AM2                                                                                                                                                                                                                                                                                                                                            |

| Cisco ENCS 5400 Feature/Specification | Description                                                                                                                                                                                                                                                   |
|---------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| WAN Ethernet port                     | Intel i350 dual port                                                                                                                                                                                                                                          |
| DIMM                                  | Two DDR4 dual in-line memory module (DIMM) slots, for ENCS models with the following capacities: <ul style="list-style-type: none"> <li>ENCS 5406-W: 16 GB</li> <li>ENCS-5408-W: 16 GB</li> <li>ENCS-5412-W: 32 GB</li> </ul>                                 |
| Gigabit Ethernet ports                | Two Gigabit Ethernet ports: For each RJ45 port, there is a corresponding fiber optic port. At a given time, you can use either the RJ45 connection or the corresponding fiber optic port.                                                                     |
| NIM                                   | One Network Interface Module (NIM) expansion slot: You can install a NIM in the NIM slot, or if the slot is not needed, you can remove the NIM from the NIM module. Each ENCS 5400 model supports one NIM slot, for a Cisco 4-port 1-G fail-to-wire NIM card. |
| Management Controller                 | Ethernet management port for Cisco Integrated Management Controller (CIMC), which monitors the health of the entire system.                                                                                                                                   |
| HDD Storage                           | Although there are two hot-swappable HDD slots, we do not recommend HDD storage for the ENCS 5400 Series.                                                                                                                                                     |
| SSD Storage                           | <ul style="list-style-type: none"> <li>No RAID and one 960 GB SSD</li> <li>RAID-1 and two SSDs (960 GB SSD)</li> </ul>                                                                                                                                        |
| Offload Capabilities                  | Optional crypto module to provide offload capabilities to optimize CPU resources such as VM-VM traffic and to maintain open software support.                                                                                                                 |

## Hypervisors Supported for Cisco vWAAS and Cisco vCM

This section contains the following topics:

- [About Hypervisors Supported for Cisco vWAAS and Cisco vCM, page 1-31](#)
- [Hypervisor OVA Packages for Cisco vWAAS, page 1-32](#)

## About Hypervisors Supported for Cisco vWAAS and Cisco vCM

Here is an overview of the hypervisors that are supported for Cisco vWAAS and Cisco vCM.

- **Cisco ISR-WAAS**

Cisco ISR-WAAS is the specific implementation of vWAAS running in a Cisco IOS-XE software container on a Cisco ISR 4000 Series router (ISR-4321, ISR-4331, ISR-4351, ISR-4431, ISR-4451, ISR-4461). In this context, *container* refers to the hypervisor that runs virtualized applications on a Cisco ISR 4000 Series router.



**Note** Cisco ISR-4461 is supported for Cisco vWAAS in Cisco WAAS 6.4.1b and later.

For more information, see Chapter 3, “[Cisco vWAAS on Cisco ISR-WAAS](#)”.

- **VMware ESXi**

Cisco vWAAS for VMware ESXi provides cloud-based application delivery service over the WAN in ESX-based or ESXi-based environments. Cisco vWAAS on VMware vSphere ESXi is delivered as an OVA file. The vSphere client takes the OVA file for a specified vWAAS model, and deploys an instance of that vWAAS model.

For more information, see Chapter 4, “[Cisco vWAAS on VMware ESXi](#)”.

- **Microsoft Hyper-V**

Microsoft Hyper-V, which is available for vWAAS in WAAS Version 6.1.x and later, provides virtualization services through hypervisor-based emulations.

Cisco vWAAS on Microsoft Hyper-V extends Cisco networking benefits to Microsoft Windows Server Hyper-V deployments.

Microsoft HyperV, Chapter 5, “[Cisco vWAAS on Microsoft Hyper-V](#)”.

- **RHEL KVM and KVM CentOS**

Cisco vWAAS on Red Hat Enterprise Linux Kernel-based Virtual Machine (RHEL KVM) is a virtual WAAS appliance that runs on a RHEL KVM hypervisor. Cisco vWAAS on RHEL KVM extends the capabilities of ISR-WAAS and vWAAS running on the Cisco UCS E-Series Servers.

- Cisco vWAAS on RHEL KVM is available for vWAAS with WAAS Version 6.2.1 and later,
- Cisco vWAAS on KVM on CentOS (Linux Community Enterprise Operating System) is available for vWAAS with WAAS Version 6.2.3x and later.




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**Note** Cisco vWAAS on RHEL KVM can also be deployed as a tar archive (tar.gz) to deploy Cisco vWAAS on Cisco Network Functions Virtualization Infrastructure Software (NFVIS). The Cisco NFVIS portal is used to select the tar.gz file to deploy Cisco vWAAS.

---

For more information, see Chapter 6, “[Cisco vWAAS on RHEL KVM, KVM on CentOS, and KVM in SUSE Linux](#)”.

- **Cisco Enterprise NFVIS**

Cisco Enterprise NFVIS offers flexibility and choice in deployment and platform options for the Cisco Enterprise NFV solution. By virtualizing and abstracting the network services from the underlying hardware, NFVIS allows virtual network functions (VNFs) to be managed independently and to be provisioned dynamically.

- For Cisco vWAAS in WAAS Version 5.x to 6.2.x: Cisco NFVIS is available for Cisco vWAAS running on Cisco UCS E-Series Servers.
- For Cisco vWAAS in WAAS Version 6.4.1 and later: Cisco NFVIS is available for Cisco vWAAS running on Cisco UCS E-Series Servers and the Cisco ENCS 5400 Series.

For more information, see Chapter 9, “[Cisco vWAAS with Cisco Enterprise NFVIS](#)”.

## Hypervisor OVA Packages for Cisco vWAAS

This section contains the following topics:

- [Hypervisor OVA Package Format for Cisco vWAAS in Cisco WAAS Versions 5.x to 6.2.x, page 1-33](#)
- [Hypervisor-Wise Unified OVA Package Format for Cisco vWAAS in Cisco WAAS Version 6.4.x and Later, page 1-33](#)



## Hypervisor OVA Package Format for Cisco vWAAS in Cisco WAAS Versions 5.x to 6.2.x

For Cisco vWAAS in Cisco WAAS Versions 5.x to 6.2.x, Cisco provides an OVA package for an NPE and non-NPE version for each Cisco vWAAS model connection profile.

For a listing of hypervisor-wise NPE and non-NPE OVA files for Cisco vWAAS or Cisco vCM, see the [Cisco Wide Area Application Services \(WAAS\) Download Software page](#) and select the Cisco WAAS software version used with your Cisco vWAAS instance.

[Table 1-26](#) shows the file formats for hypervisors supported for Cisco vWAAS and Cisco vCM, in Cisco WAAS Version 5.x to 6.2.x.

**Table 1-26** File Formats for OVA Packages for Cisco vWAAS and Cisco vCM in WAAS Versions 5.x to 6.2.x

| Cisco vWAAS or vCM | Hypervisor Support | File Format | NPE File Format | Sample Image and NPE Image Filename Formats                                                                                                    |
|--------------------|--------------------|-------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| vWAAS              | VMware ESXi        | .ova        | .ova            | Cisco-vWAAS-750-6.2.3d-b-68.ova<br>Cisco-vWAAS-750-6.2.3d-npe-b-68.ova                                                                         |
|                    | Microsoft Hyper-V  | .zip        | .zip            | Hv-Cisco-vWAAS-750-6.2.3d-b-68.zip<br>Hv-Cisco-vWAAS-750-6.2.3d-npe-b-68.zip                                                                   |
|                    | RHEL KVM           | .tar.gz     | .tar.gz         | Cisco-KVM-vWAAS-750-6.2.3d-b-68.tar.gz<br>Cisco-KVM-vWAAS-750-6.2.3d-b-68-npe.tar.gz                                                           |
| vCM                | VMware ESXi        | .ova        | .ova            | <ul style="list-style-type: none"> <li>Cisco-vCM-100N-6.2.3d-b-68.ova</li> <li>Cisco-vCM-100N-6.2.3d-npe-b-68.ova</li> </ul>                   |
|                    | Microsoft Hyper-V  | N/A         | .zip            | <ul style="list-style-type: none"> <li>Hv-Cisco-100N-6.2.3d-b-68.zip</li> <li>Hv-Cisco-100N-6.2.3d-npe-b-68.zip</li> </ul>                     |
|                    | RHEL KVM           | .tar.gz     | .tar.gz         | <ul style="list-style-type: none"> <li>Cisco-KVM-vCM-100N-6.2.3d-b-68.tar.gz</li> <li>Cisco-KVM-vCM-100N-6.2.3d-npe-b-68-npe.tar-gz</li> </ul> |

## Hypervisor-Wise Unified OVA Package Format for Cisco vWAAS in Cisco WAAS Version 6.4.x and Later

For Cisco vWAAS in Cisco WAAS Version 6.4.x and later, Cisco provides a single unified OVA package, one each for the NPE and non-NPE version of the Cisco WAAS image for all the Cisco vWAAS and Cisco vCM models for that hypervisor ([Table 1-27](#)). Each unified OVA package file provides an option to select a Cisco vWAAS or Cisco vCM model and other required parameters to launch Cisco vWAAS or Cisco vCM in Cisco WAAS in the required configuration.



### Note

On VMware ESXi, the OVA deployment for Cisco vWAAS in Cisco WAAS Version 6.4.1 and later must be done only through VMware vCenter.

For a listing of hypervisor-wise NPE and non-NPE OVA files for Cisco vWAAS or Cisco vCM, see the [Cisco Wide Area Application Services \(WAAS\) Download Software page](#) and select the Cisco WAAS software version for your Cisco vWAAS instance.

**Table 1-27 Supported Unified OVA Files for Cisco vWAAS and vCM in WAAS Version 6.4.x and Later, by Hypervisor**

| Hypervisor or Appliance | Cisco Unified OVA Filename Format                                                                                                                    | Supported Cisco vWAAS Models                                                                                                                                                                                                                       | Supported Cisco vCM Models                                                                                     |
|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|
| Cisco ISR-WAAS          | <ul style="list-style-type: none"> <li>ISR-WAAS-6.4.3c-b-42.ova</li> <li>ISR-WAAS-6.4.3c-b-42-npe.ova</li> </ul>                                     | <ul style="list-style-type: none"> <li>vWAAS-200</li> <li>WAAS-750</li> <li>vWAAS-1300</li> <li>vWAAS-2500</li> </ul>                                                                                                                              | <ul style="list-style-type: none"> <li>N/A</li> </ul>                                                          |
| VMware ESXi             | <ul style="list-style-type: none"> <li>Cisco-WAAS-Unified-6.4.3c-b-42.tar</li> <li>Cisco-WAAS-Unified-6.4.3c-npe-b-42.tar</li> </ul>                 | <ul style="list-style-type: none"> <li>vWAAS-150</li> <li>vWAAS-200</li> <li>vWAAS-750</li> <li>vWAAS-1300</li> <li>vWAAS-2500</li> <li>vWAAS-6000</li> <li>vWAAS-6000R</li> <li>vWAAS-12000</li> <li>vWAAS-50000</li> <li>vWAAS-150000</li> </ul> | <ul style="list-style-type: none"> <li>vCM-100</li> <li>vCM-500</li> <li>vCM-1000</li> <li>vCM-2000</li> </ul> |
| Microsoft Hyper-V       | <ul style="list-style-type: none"> <li>Cisco-HyperV-vWAAS-unified-6.4.3c-b-42.tar</li> <li>Cisco-HyperV-vWAAS-unified-6.4.3c-b-42-npe.tar</li> </ul> | <ul style="list-style-type: none"> <li>vWAAS-150</li> <li>vWAAS- 200</li> <li>vWAAS-750</li> <li>vWAAS-1300</li> <li>vWAAS-2500</li> <li>vWAAS-6000</li> <li>vWAAS-6000R</li> <li>vWAAS-12000</li> <li>vWAAS-50000</li> </ul>                      | <ul style="list-style-type: none"> <li>vCM-100</li> <li>vCM-500</li> <li>vCM-1000</li> <li>vCM-2000</li> </ul> |
| KVM CentOS              | <ul style="list-style-type: none"> <li>Cisco-KVM-vWAAS-Unified-6.4.3c-b-42.tar.</li> <li>Cisco-KVM-vWAAS-Unified-6.4.3c-b-42-npe.tar</li> </ul>      | <ul style="list-style-type: none"> <li>vWAAS-150</li> <li>vWAAS- 200</li> <li>vWAAS-750</li> <li>vWAAS-1300</li> <li>vWAAS-2500</li> <li>vWAAS-6000</li> <li>vWAAS-6000R</li> <li>vWAAS-12000</li> <li>vWAAS-50000</li> </ul>                      | <ul style="list-style-type: none"> <li>vCM-100</li> <li>vCM-500</li> <li>vCM-1000</li> <li>vCM-2000</li> </ul> |

| Hypervisor or Appliance | Cisco Unified OVA Filename Format                                                                                                                                       | Supported Cisco vWAAS Models                                                                                                                                                      | Supported Cisco vCM Models                            |
|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|
| Cisco ENCS 5400-W       | <ul style="list-style-type: none"> <li>Cisco_NFVIS_3.11.1-FC7_WAAS-APPLIANCE-6.4.3c-b42.iso</li> <li>Cisco_NFVIS_3.11.1-FC7_WAASNPE-APPLIANCE-6.4.3c-b42.iso</li> </ul> | <ul style="list-style-type: none"> <li>vWAAS-200</li> <li>WAAS-750</li> <li>vWAAS-1300</li> <li>vWAAS-2500</li> <li>vWAAS-6000R</li> </ul>                                        | <ul style="list-style-type: none"> <li>N/A</li> </ul> |
| Cisco NFVIS vBranch     | <ul style="list-style-type: none"> <li>Cisco-KVM-vWAAS-Unified-6.4.3c-b-42.tar</li> <li>Cisco-KVM-vWAAS-Unified-6.4.3c-b-42-npe.tar</li> </ul>                          | <ul style="list-style-type: none"> <li>vWAAS-150</li> <li>vWAAS-200</li> <li>WAAS-750</li> <li>vWAAS-1300</li> <li>vWAAS-2500</li> <li>vWAAS-6000</li> <li>vWAAS-6000R</li> </ul> | <ul style="list-style-type: none"> <li>N/A</li> </ul> |

## Cloud Platforms Supported for Cisco vWAAS

Cisco vWAAS supports the following cloud computing platforms:

- Microsoft Azure: Used with Cisco vCM and Cisco vWAAS models supported on Microsoft Hyper-V. Cisco vWAAS in Azure is supported for Cisco vWAAS in Cisco WAAS Version 6.2.1x and later.
- OpenStack: Used with Cisco vCM and Cisco vWAAS models supported on Linux KVM on CentOS, Cisco vWAAS in OpenStack is supported for Cisco vWAAS in Cisco WAAS Version 6.4.1b and later.

For more information, see the chapter [“Cisco vWAAS in Cloud Computing Systems”](#).

