Cisco Wide Area Virtualization Engine

Product Overview

The Cisco® Wide Area Application Virtualization Engine (WAVE) product line consists of cost-effective, cloud-ready, video-enabled solutions for the branch office and the data center (Figure 1). With the industry's broadest product portfolio and flexible deployment models, Cisco Wide Area Application Services (WAAS) cost-effectively addresses the WAN optimization needs of small, medium-sized, and large customers.

Figure 1.   Cisco Wide Area Virtualization Engines

Cisco WAVE Appliances for Branch-Office and Core Deployments

In Cisco WAAS Software Release 5.2 and later, the Cisco WAVE 294, 594, and 8541 can optionally be equipped with solid-state drives (SSDs). SSDs provide more reliable storage than existing hard disk drives (HDDs). Table 1 lists the supported SSD sizes for these platforms.

Table 1.   Cisco WAVE Platforms That Support SSDs with Cisco WAAS 5.2 and Later

Appliance Part Number	Media Description	Quantity of Per Appliance
WAVE-294-K9	200-GB HDD	1
WAVE-294-SSD-K9	200-GB SSD	1
WAVE-594-K9	500-GB HDD or 400-GB SSD	1 or 2 (optional)
WAVE-8541-K9	600-GB HDD or 600-GB SSD	8

For more information, refer to the hardware specifications in Table 3 later in this document.

Benefits include the following:

- Improve employee productivity by enhancing the user experience for important business applications delivered over the WAN.
- Reduce the cost of branch-office operations by centralizing IT resources in the data center and lowering the cost of WAN bandwidth and by hosting Microsoft Windows applications on the Cisco WAVE branch-office appliance.
- Deliver enterprise-class video while reducing WAN bandwidth consumption with the Cisco WAAS video application optimizer or hosted Cisco Application and Content Networking System (ACNS) virtual blade.

- Increase IT agility by reducing the time and resources needed to deliver new IT services to the branch office.
- Simplify branch-office data protection for regulatory compliance purposes.

Cisco WAVE Appliances for the Data Center

Cisco WAVE data center appliances provide the high performance and scalable WAN optimization that data center solutions require. Benefits include:

- User-selectable I/O modules with support for 10 Gigabit Ethernet fiber, 1 Gigabit Ethernet copper, and 1 Gigabit Ethernet fiber
- Flexible deployment models including inline and Web Cache Communication Protocol (WCCP) for high performance, scalability, and network availability
- High performance for video, virtual desktop infrastructure (VDI), and cloud applications as well as traditional enterprise applications; using context-aware data redundancy elimination (DRE), Cisco WAVE appliances can adapt caching behavior on the basis of the characteristics of individual applications, resulting in higher throughput and lower application latency

Main Features

Table 2 summarizes the main features of the Cisco WAVE appliances, and Table 3 summarizes the main features of I/O options modules.

Table 2.   Cisco WAVE Appliances

Platform	Deployment Scenarios and Features
Cisco WAVE 294 Wide Area Virtualization Engine (WAVE-294-K9 or WAVE-294-SSD-K9)	• Excellent for edge deployments at small branch and remote offices • Supports up to 200 TCP connections (upgradable to 400) • Offers 250-GB HDD and 200-GB SSD (SSD) data storage options • Has 2 onboard Gigabit Ethernet ports • Provides 4-port inline I/O module (IOM) bundled by default, with optional upgrade to 8-port inline IOM • Hosts up to 2 virtual blades
Cisco WAVE 594 Wide Area Virtualization Engine (WAVE-594-K9)	• Excellent for edge deployments at small and medium-sized branch offices • Supports up to 750 TCP connections (upgradable to 1300) • Offers 500-GB HDD and 400-GB SSD data storage options (with optional second HDD or SSD for RAID 1 redundancy) • Has 2 onboard Gigabit Ethernet ports • Provides 4-port Gigabit Ethernet copper inline, 8-port Gigabit Ethernet copper inline, or 4-port Gigabit Ethernet SX fiber • Offers optional second power supply for 1 + 1 redundancy • Hosts up to 4 virtual blades
Cisco WAVE 694 Wide Area Virtualization Engine (WAVE-694-K9)	• Excellent for edge deployments at large enterprise branch offices • Excellent for core deployments at small data centers • Supports up to 2500 TCP connections (upgradable to 6000) • Offers 600-GB HDD data storage with RAID 1 redundancy • Has 2 onboard Gigabit Ethernet ports • Offers optional 4-port Gigabit Ethernet copper inline, 8-port Gigabit Ethernet copper inline, or 4-port Gigabit Ethernet SX fiber inline • Offers optional second power supply for 1 + 1 redundancy • Hosts up to 6 virtual blades

Platform	Deployment Scenarios and Features
Cisco WAVE 7541 Wide Area Virtualization Engine (WAVE-7541-K9)	• Excellent for core deployments at medium-sized data centers and large enterprise branch offices • Supports up to 18,000 TCP connections • Offers 2.2-TB HDD data storage with RAID 5 redundancy • Has 2 onboard Gigabit Ethernet ports • Offers optional 8-port Gigabit Ethernet copper inline, 4-port Gigabit Ethernet SX fiber inline, or 2-port 10 Gigabit Ethernet Enhanced Small Form-Factor Pluggable (SFP+)
Cisco WAVE 7571 Wide Area Virtualization Engine (WAVE-7571-K9)	• Excellent for core deployments at large data centers • Supports 60,000 TCP connections • Offers 3.2-TB HDD data storage with RAID 5 redundancy • Has 2 onboard Gigabit Ethernet ports • Offers Optional 8-port Gigabit Ethernet copper inline, 4-port Gigabit Ethernet SX fiber inline, or 2-port 10 Gigabit Ethernet SFP+
Cisco WAVE 8541 Wide Area Virtualization Engine (WAVE-8541-K9)	• Excellent for core deployments at large data centers and for service providers and cloud providers • Supports 150,000 TCP connections • Offers 4.2-TB HDD or SSD data storage with RAID 5 redundancy • Has 2 onboard Gigabit Ethernet ports • Offers optional 8-port Gigabit Ethernet copper inline, 4-port Gigabit Ethernet SX fiber inline, or 2-port 10 Gigabit Ethernet SFP+

Table 3.   I/O Modules for Cisco WAVE Appliances

I/O Module	Features
4-port Gigabit Ethernet copper module (WAVE-INLN-GE-4T)	• Fail-to-wire capability • Support for inline and WCCP deployments
8-port Gigabit Ethernet copper module (WAVE-INLN-GE-8T)	• Fail-to-wire capability • Support for inline and WCCP deployments
4-port Gigabit Ethernet fiber module (WAVE-INLN-GE-4SX)	• Fail-to-wire capability • Support for inline and WCCP deployments
2-port 10 Gigabit Ethernet module WAVE-10GE-2SFP	• Support for Cisco SFP+ short reach (SR) transceivers • Support for WCCP interception only

Hardware Specifications

Table 4 lists the hardware specifications for the Cisco WAVE appliances.

Table 4. Hardware Specifications for Cisco WAVE Appliances

	Cisco WAVE 294	Cisco WAVE 594 and 694	Cisco WAVE 7541 and 7571	Cisco 8541
Hardware Features				
DRAM	4 to 8 GB	• Cisco WAVE 594: 8 to 12 GB • Cisco WAVE 694: 16 to 24 GB	• Cisco WAVE 7541: 24 GB • Cisco WAVE 7571: 48 GB	96 GB
Usable storage	• 250 GB with HDD • 200 GB with SSD	• Cisco WAVE 594: 500 GB with HDD or 400 GB with SSD • Cisco WAVE 694: 600 GB	• Cisco WAVE 7541: 2.2 TB • Cisco WAVE 7571: 3.1 TB	4.2 TB
Maximum data storage	• 1 x 250-GB HDD • 1 x 200-GB SSD[1]	• Cisco WAVE 594: 2 x 500-GB HDD or 400-GB SSD[1] • Cisco WAVE 694: 2 x 600 GB HDD	• Cisco WAVE 7541: 6 x 450 GB HDD • Cisco WAVE 7571: 8 x 450 GB HDD	8 x 600 GB HDD or SSD[1]
RAID support	-	RAID 1 (optional on Cisco WAVE 594)	RAID 5	RAID 5
Virtual blades	Up to 2	Up to 6	Not supported	Not supported
Network interfaces	Two 10/100/1000BASE-T	Two 10/100/1000BASE-T	Two 10/100/1000BASE-T	Two 10/100/1000BASE-T
Power	One 400-watt (W) AC power supply	• One 450W AC power supply • Redundant power available as an option	• Two 650W AC power supplies • 1 + 1 redundancy; hot swappable	• Two 650W AC power supplies • 1 + 1 redundancy; hot swappable
Fan	Five fans	Redundant 40-mm fans; hot swappable	Redundant 40- and 60-mm fans; hot swappable	Redundant 40- and 60-mm fans; hot swappable
Rack units	1 (can be used as a desktop unit as well)	1	2	2
I/O module	4-port Gigabit Ethernet inline bundled (8-port optional)	4-port or 8-port Gigabit Ethernet inline (optional)	2-port 10 Gigabit Ethernet SFP+, 8-port Gigabit Ethernet inline, or 4-port Gigabit Ethernet inline fiber (optional)	2-port 10 Gigabit Ethernet SFP+, 8-port Gigabit Ethernet inline, or 4-port Gigabit Ethernet inline fiber (optional)
Console	USB, mini-USB, and RJ-45 serial console; autodetect	USB, mini-USB, and RJ-45 serial console; autodetect	USB, mini-USB, and RJ-45 serial console; autodetect	USB, mini-USB, and RJ-45 serial console; autodetect
Dimensions				
Height	1.69 in. (42 mm)	1.69 in. (42 mm)	3.42 in. (87 mm)	3.42 in. (87 mm)
Width	16.89 in. (429 mm)	429 mm (16.89 in.)	16.89 in. (429 mm)	16.89 in. (429 mm)
Depth	14.55 in. (370 mm)	20.33 in. (516 mm); includes power-supply handles	24.88 in. (632 mm); includes power supply handles	24.88 in. (632 mm); includes power supply handles
Maximum weight	16.40 lb (7.44 kg)	22.51 lb (10.21 kg)	47.66 lb (21.62 kg)	47.66 lb (21.62 kg)
Shipping dimensions (with packaging)	21.69 x 19.88 x 7.75 in. (55 x 50.5 x 19.7 cm)	26.50 x 21.69 x 7.75 in. (67.3 x 55 x 19.7 cm)	30.75 x 21.69 x 10.19 in. (78 x 55 x 25.9 cm)	30.75 x 21.69 x 10.19 in. (78 x 55 x 25.9 cm)
Shipping weight	22.0 lb (10.0 kg)	28.50 lb (12.93 kg)	53.0 lb (24.0 kg)	53.0 lb (24.0 kg)
Operating Specifications				
Universal input	• Range line voltage: 90 to 132 VAC • 180 to 264 VAC	• Range line voltage: 90 to 132 VAC • 180 to 264 VAC	• Range line voltage: 90 to 132 VAC • 180 to 264 VAC	• Range line voltage: 90 to 132 VAC • 180 to 264 VAC

	Cisco WAVE 294	Cisco WAVE 594 and 694	Cisco WAVE 7541 and 7571	Cisco 8541
Operating temperature	32 to 104°F (0 to 40°C)	32 to 104°F (0 to 40°C)	32 to 104°F (0 to 40°C)	32 to 104°F (0 to 40°C)
Nonoperating temperature	(-22 to 140°F (-30 to 60°C) [2]	(-22 to 140°F (-30 to 60°C) [2]	(-22 to 140°F (-30 to 60°C) [2]	(-22 to 140°F (-30 to 60°C) [2]
Humidity	• Operating: 10 to 90% RH (noncondensing) • Nonoperating: 5 to 95% RH (noncondensing)	• Operating: 10 to 90% RH (noncondensing) • Nonoperating: 5 to 95% RH (noncondensing)	• Operating: 10 to 90% RH (noncondensing) • Nonoperating: 5 to 95% RH (noncondensing)	• Operating: 10 to 90% RH (noncondensing) • Nonoperating: 5 to 95% RH (noncondensing)
Altitude	• Operating: 10,000 ft (3050m) • Nonoperating: 15,000 ft (4572m)	• Operating: 10,000 ft (3050m) • Nonoperating: 15,000 ft (4572m)	• Operating: 10,000 ft (3050m) • Nonoperating: 15,000 ft (4572m)	• Operating: 10,000 ft (3050m) • Nonoperating: 15,000 ft (4572m)
Regulatory Compliance				
Compliance	CE marking			
EMC	47 CFR Part 15 Class A, AS/NZS CISPR22 Class A, CISPR22 Class A, EN 55022 Class A, ICES 003 Class A, VCCI Class A, EN 55024, EN 61000-3-2, EN 61000-3-3, CISPR24, GB9254-2008, KN22 Class A, and KN24 (all platforms)			
Safety	UL 60950-1 Second Edition, 21 CFR 1040, CSA22.2-No. 60950-1 Second Edition, IEC/EN 60950-1 Second Edition, AS/NZS 60950, and GB4943-1995 (all platforms)			

Notes:

1. Existing systems cannot be upgraded to use SSDs. When ordering, SSDs can optionally be added to Cisco WAVE 294, 594, and 8541 when ordering with initial system only. Cisco WAAS Software Release 5.2 or later is required for SSDs.
2. All temperature ratings shown are for sea level to 3281 feet (1000 meters). If operating location is above 3281 feet (1000 meters), deduct 5.4°F (3°C) from the maximum operating temperature for each additional 3281 feet (1000 meters).

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