

Cisco Wide Area Application Services

Product Overview

Cisco® Wide Area Application Services (WAAS) currently provides the industry's most scalable, highest-performance WAN optimization solution. Cisco WAAS can improve the end-user experience and reduce bandwidth for applications, including Microsoft Exchange, Citrix XenApp and XenDesktop, SAP, IBM Lotus Notes, NetApp SnapMirror, HTTP and Secure HTTP (HTTPS), cloud, and file applications.

Cisco WAAS can enable organizations to implement important business initiatives, including:

- Highly secure, scalable, enterprise-wide, bring-your-own-device (BYOD) solutions
- High-performance virtual desktop infrastructure (VDI) and Cisco Virtual Experience Infrastructure (Cisco VXI™) solutions
- Live and on-demand media applications such as webcasting, e-learning, and digital signage
- High-performance public and private cloud services and software-as-a-service (SaaS) applications
- Improved application performance and end-user experience for applications, including web, email, VDI, file, and cloud applications
- Reduced WAN bandwidth requirements and deferral of expensive bandwidth upgrades
- A reduced branch-office footprint through server and service consolidation
- Data center consolidation, virtualization, and automation

Cisco WAAS Leadership

Cisco is the leader in WAN optimization, as confirmed by IT professionals from both Nemertes Research and IT Brand Pulse, for leadership in overall market, price, performance, reliability, service and support, and innovation. In addition, the Cisco AppNav® Module for WAAS won the 2012 Best of Interop award (Figure 1).

Figure 1. Cisco AppNav for WAAS Wins 2012 Best of Interop Award



WAAS Portfolio

WAAS offers numerous benefits that distinguish it from other WAN optimization products. It provides the most choices for WAN optimization with the broadest portfolio on the market today.

Appliance-Based WAN Optimization Solutions

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 2). WAAS cost-effectively addresses the WAN optimization needs of small-sized, medium-sized, and enterprise customers.

Figure 2. Cisco Wide Area Virtualization Engines



Software-Based WAN Optimization Solutions

Cisco ISR-WAAS is a full-featured WAAS accelerator that runs natively on Cisco 4000 Series Integrated Services Routers (ISR). ISR-WAAS also contains AppNav™ for intelligent flow redirection. ISR WAAS includes an EZConfig program for a single command that enables ISR-WAAS on the 4000 Series ISR (Figure 3).

Figure 3. Cisco 4000 Series ISR



WAAS on the ISR Generation 2 (ISR G2) platform provides router-integrated, on-demand WAN optimization for branch offices. Cisco Services-Ready Engine (SRE) Modules on the ISR G2 platform decouple software services from the underlying hardware. They can deliver WAN optimization as an on-demand service as required by business objectives and IT budget. This approach makes better use of existing investments while offering business agility.

Cisco Virtual WAAS (vWAAS) is a virtual appliance that accelerates business applications delivered from private and virtual private cloud infrastructure, helping to ensure an optimal user experience. vWAAS allows cloud providers to rapidly create WAN optimization services with little network configuration or disruption. vWAAS can be enabled:

- At the branch, utilizing Cisco Unified Computing System™ (Cisco UCS®) E-Series Servers and E-Series Network Compute Engines on both the ISR G2 and 4000 Series ISR
- At the data center, utilizing a Cisco UCS server

WAVE Appliances for Branch-Office and Core Deployments

In WAAS Software Release 5.2 and later, the WAVE 294, 594, 694, 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-694-K9	600-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:

- Improved employee productivity by enhancing the user experience for important business applications delivered over the WAN
- Reduced 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 WAVE branch-office appliance
- Increased IT agility by reducing the time and resources needed to deliver new IT services to the branch office
- Simplified branch-office data protection for regulatory compliance purposes

Cisco WAVE Appliances for the Data Center

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), our 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 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) 	<ul style="list-style-type: none"> • 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 a 4-port inline I/O module (IOM) bundled by default, with an optional upgrade to an 8-port inline IOM
Cisco WAVE 594 Wide Area Virtualization Engine (WAVE-594-K9) 	<ul style="list-style-type: none"> • 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 an 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
Cisco WAVE 694 Wide Area Virtualization Engine (WAVE-694-K9) 	<ul style="list-style-type: none"> • 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
Cisco WAVE 7541 Wide Area Virtualization Engine (WAVE-7541-K9) 	<ul style="list-style-type: none"> • 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) 	<ul style="list-style-type: none"> • 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) 	<ul style="list-style-type: none"> • 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) 	<ul style="list-style-type: none"> • Fail-to-wire capability • Support for inline and WCCP deployments
8-port Gigabit Ethernet copper module (WAVE-INLN-GE-8T) 	<ul style="list-style-type: none"> • Fail-to-wire capability • Support for inline and WCCP deployments
4-port Gigabit Ethernet fiber module (WAVE-INLN-GE-4SX) 	<ul style="list-style-type: none"> • Fail-to-wire capability • Support for inline and WCCP deployments
2-port 10 Gigabit Ethernet module WAVE-10GE-2SFP 	<ul style="list-style-type: none"> • Support for SFP+ short-reach (SR) transceivers • Support for WCCP interception only

Hardware Specifications

Table 4 lists the hardware specifications for the WAVE appliances.

Table 4. Hardware Specifications for WAVE Appliances

	WAVE 294	WAVE 594 and 694	WAVE 7541 and 7571	WAVE 8541
Hardware Features				
DRAM	4 to 8 GB	<ul style="list-style-type: none"> • WAVE 594: 8 to 12 GB • WAVE 694: 16 to 24 GB 	<ul style="list-style-type: none"> • WAVE 7541: 24 GB • WAVE 7571: 48 GB 	96 GB
Usable storage	<ul style="list-style-type: none"> • 250 GB with HDD • 200 GB with SSD 	<ul style="list-style-type: none"> • WAVE 594: 500 GB with HDD or 400 GB with SSD • WAVE 694: 600 GB 	<ul style="list-style-type: none"> • WAVE 7541: 2.2 TB • WAVE 7571: 3.1 TB 	4.2 TB
Maximum data storage	<ul style="list-style-type: none"> • 1 x 250-GB HDD • 1 x 200-GB SSD¹ 	<ul style="list-style-type: none"> • WAVE 594: 2 x 500-GB HDD or 400-GB SSD¹ • WAVE 694: 2 x 600-GB HDD 	<ul style="list-style-type: none"> • WAVE 7541: 6 x 450-GB HDD • 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
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 AC power supply	<ul style="list-style-type: none"> • One 450-Watt AC power supply • Redundant power available as an option 	<ul style="list-style-type: none"> • Two 650-Watt AC power supplies • 1 + 1 redundancy; hot-swappable 	<ul style="list-style-type: none"> • Two 650-Watt 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

	WAVE 294	WAVE 594 and 694	WAVE 7541 and 7571	WAVE 8541
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; auto-detect	USB, mini-USB, and RJ-45 serial console; auto-detect	USB, mini-USB, and RJ-45 serial console; auto-detect	USB, mini-USB, and RJ-45 serial console; auto-detect
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)	16.89 in. (429 mm)	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 lbs (7.44 kg)	22.51 lbs (10.21 kg)	47.66 lbs (21.62 kg)	47.66 lbs (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 lbs (10.0 kg)	28.50 lbs (12.93 kg)	53.0 lbs (24.0 kg)	53.0 lbs (24.0 kg)
Operating Specifications				
Universal input	<ul style="list-style-type: none"> Range line voltage: 90 to 132 VAC 180 to 264 VAC 	<ul style="list-style-type: none"> Range line voltage: 90 to 132 VAC 180 to 264 VAC 	<ul style="list-style-type: none"> Range line voltage: 90 to 132 VAC 180 to 264 VAC 	<ul style="list-style-type: none"> Range line voltage: 90 to 132 VAC 180 to 264 VAC
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)
Non-operating 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	<ul style="list-style-type: none"> Operating: 10 to 90% RH (noncondensing) Non-operating: 5 to 95% RH (noncondensing) 	<ul style="list-style-type: none"> Operating: 10 to 90% RH (noncondensing) Non-operating: 5 to 95% RH (noncondensing) 	<ul style="list-style-type: none"> Operating: 10 to 90% RH (noncondensing) Non-operating: 5 to 95% RH (noncondensing) 	<ul style="list-style-type: none"> Operating: 10 to 90% RH (noncondensing) Non-operating: 5 to 95% RH (noncondensing)
Altitude	<ul style="list-style-type: none"> Operating: 10,000 ft (3050 m) Non-operating: 15,000 ft (4572 m) 	<ul style="list-style-type: none"> Operating: 10,000 ft (3050 m) Non-operating: 15,000 ft (4572 m) 	<ul style="list-style-type: none"> Operating: 10,000 ft (3050 m) Non-operating: 15,000 ft (4572 m) 	<ul style="list-style-type: none"> Operating: 10,000 ft (3050 m) Non-operating: 15,000 ft (4572 m)
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)			

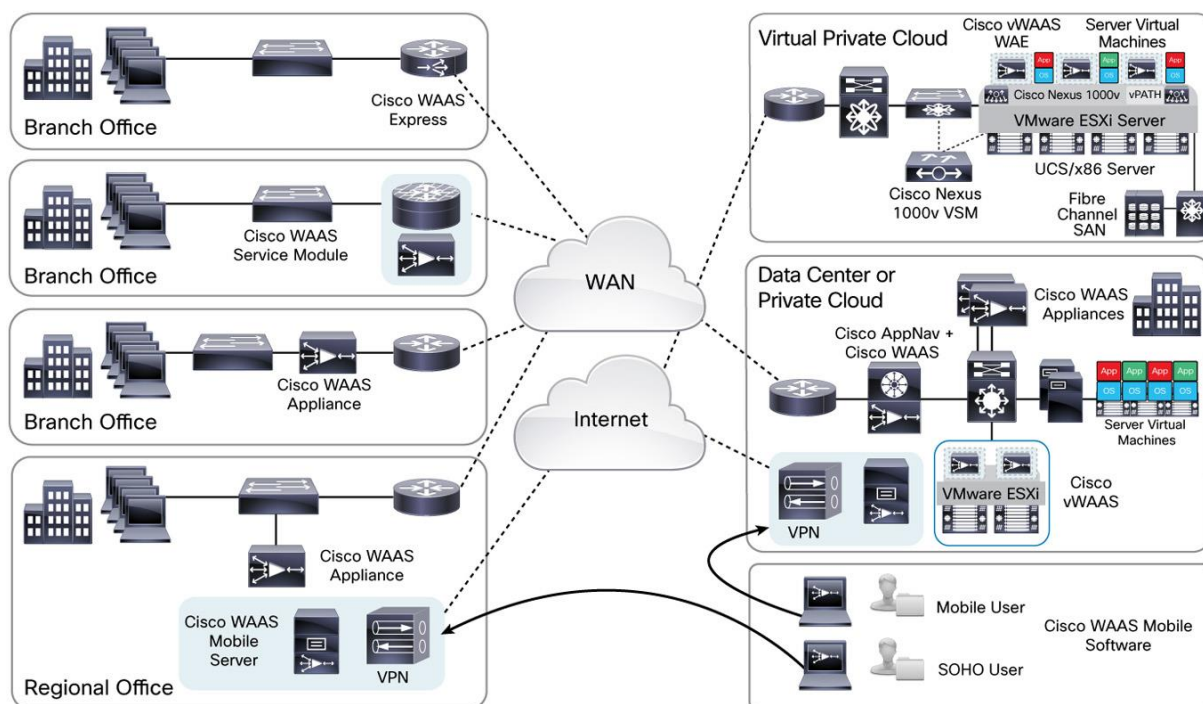
Notes:

- Existing systems cannot be upgraded to use SSDs. When ordering, SSDs can optionally be added to WAVE 294, 594, and 8541 products when ordering with the initial system only. WAAS Software Release 5.2 or later is required for SSDs.
- All temperature ratings shown are for sea level to 3281 feet (1000 meters). If the 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).

Cisco AppNav technology

Cisco AppNav helps customers virtualize WAN optimization resources in the data center by pooling them into one elastic resource in a manner that is policy-based and on demand, with exceptionally low-latency performance. Customers can add capacity or dedicate capacity to specific applications or geographies based on business requirements, with no change to existing network configurations or topologies. AppNav integrates transparently into any physical or virtual network infrastructure, providing significant investment protection for existing network designs. AppNav for WAAS provides flexible deployment options, as shown in Figure 4.

Figure 4. Cisco WAAS Deployment Options for Branch-Office and Mobile Employees



Cisco WAAS Central Manager

HTML 5 user-friendly interfaces provide detailed visibility into application performance, pass-through traffic, and the control and monitoring of specific context-aware devices, including clusters.

Akamai Connect

Cisco and Akamai have partnered to deliver Akamai Connect, a fully integrated solution that combines best-in-class WAN optimization and intelligent object caching technology directly into the Cisco Integrated Services Routers with Application Experience (ISR-AX) at the branch, to accelerate HTTP/S applications, video and content while maximizing enterprise network bandwidth.

For more information about Akamai Connect, please refer to the Akamai Connect datasheet.

<http://www.cisco.com/c/en/us/solutions/collateral/enterprise-networks/intelligent-wan-akamai/datasheet-c78-734173.html>

Network Services Integration Provides Transparent, Highly Secure, and Reliable Application Performance

The transparent architecture of WAAS can enable integration into the network and preservation of existing network services, thereby making WAN acceleration easy to deploy and operate:

- Network transparency and preservation of IP and TCP header information allow for ease of operation and interoperability with network services such as quality of service (QoS), NetFlow, access control lists (ACLs), firewalls, Cisco Performance Routing (PfR), and IP service-level agreements (SLAs).
- WAAS offers automatic discovery of optimization devices, simplifying operations for all types of WAN architectures (including Multiprotocol Label Switching [MPLS], hierarchical networks, and hub-and-spoke topologies).
- WAAS integrates with all Cisco firewalls—including Cisco IOS Firewall, Cisco PIX[®] Firewall Software, Cisco ASA 5500 Series Enterprise Firewall Edition, and Cisco Catalyst[®] 6500 Series Firewall Services Module—to provide an industry-leading solution that gives customers full stateful firewall inspection and network virus-scanning capabilities for accelerated traffic.
- For inline deployments, WAAS offers a low-latency, voice-over-IP (VoIP), traffic-bypass feature that has been stress-tested with Cisco VoIP test beds.

Features and Benefits

WAAS also offers a proven, end-to-end architectural approach with Cisco Validated Designs to reduce total cost of ownership (TCO) and ease deployment challenges.

WAAS is currently the only WAN optimization solution that has published jointly validated designs with major application vendors such as Oracle, SAP, Microsoft, and IBM. Validated designs assist Cisco customers by offering best practices to successfully incorporate IT infrastructure such as Cisco switches, routers, security devices, and servers, thus significantly reducing the risk of deploying WAN optimization to accelerate these applications. Coupled with award-winning Cisco global support and advanced services, WAAS gives customers a significant set of resources to help ensure full network integration while reducing maintenance costs and deployment time.

For example, with Microsoft, Cisco has developed an optimized branch-office architecture that uses WAAS to optimize performance of centralized applications such as Microsoft Exchange, SharePoint, and file services. The WAAS optimization for Microsoft Windows protocol was developed with Microsoft, and the relevant intellectual property rights (IPRs) are licensed from Microsoft.

Table 5 summarizes the main features and benefits of WAAS.

Table 5. Main Features and Benefits of Cisco WAAS

<p>Benefit: WAN optimization</p> <ul style="list-style-type: none">• Eliminate or defer expensive WAN bandwidth upgrades
<p>Features</p> <ul style="list-style-type: none">• Transport flow optimization (TFO): TFO improves application packet flow under unfavorable WAN conditions such as packet loss and small initial windows while helping to ensure fairness.• Data redundancy elimination (DRE): DRE is an advanced form of network compression that uses a bidirectional database to store previously seen TCP traffic and replace redundant patterns with very small signatures. DRE can provide up to 100:1 compression depending on the data being examined.• Adaptive, persistent, session-based compression: This type of compression can provide up to an additional 5:1 compression.
<p>Benefit: Application acceleration:</p> <ul style="list-style-type: none">• Improve employee productivity

- Consolidate branch-office servers
- Centralize branch-office IT resources such as storage and backup tapes, and reduce operating costs

Features

- **Protocol acceleration:** Application-specific latency is reduced through a variety of application-layer techniques such as read-ahead, operation prediction, connection reuse, message multiplexing, pipelining, and parallelization, resulting in LAN-like performance despite deployment over a WAN.
- **Application optimizers:** Protocol-specific acceleration is available for Microsoft Windows file sharing (Server Message Block [SMB]); Microsoft Exchange (Messaging API [MAPI] and MAPI over SSL); encrypted MAPI (EMAPI), HTTP, and HTTPS applications such as Oracle, SAP, and Microsoft SharePoint and Outlook Web Access (OWA); Microsoft Windows print services; UNIX Network File System (NFS); and Citrix ICA. These features improve end-user application response times, significantly improving employee productivity.
- **Content prepositioning:** You can use centralized policy-based file distribution and prepositioning can be used to push files to edge WAAS devices, accelerating software patch distribution and file access for all users.

Benefit: Ease of initial and ongoing deployment

Features

- **Network transparency:** WAAS preserves all existing network services.
- **Client, server, and application transparency:** No modifications to clients, servers, or applications are needed.
- **Automatic peer discovery:** WAAS devices automatically discover peers, reducing the number of configuration steps.
- **Quickstart wizard:** Use of the wizard eliminates many configuration steps. The wizard includes defaults for faster deployment.
- **Management and monitoring:** Intuitive workflow-based management and real-time monitoring are provided. Diagnostic and troubleshooting tools help reduce mean time to resolution (MTTR).
- **EZ Config for Cisco 4000 Series ISRs:** The EZConfig program is a single command-line interface (CLI) command that launches an interactive mode for enabling ISR -WAAS on the Cisco 4000 Series ISR platform. The program walks you through a series of questions and enables the corresponding Cisco AppNav Controller, container, interface, and connected application configurations.

Benefit: Flexible deployment options for cloud computing

Features

For private and virtual private cloud environments:

- **Agility:** Implement agile virtual machine—based deployments on standard x86 servers, such as Cisco Unified Computing System (Cisco UCS) servers.
- **Application-specific WAN optimization:** Use Cisco Nexus® 1000V Series port profiles to create value-added WAN optimization services on a per-application basis in your catalog of cloud services (for example, use vWAAS only for Microsoft SharePoint or Exchange) for optimized delivery to remote branch-office users.
- **Flexible scale-out of WAAS deployment:** Using policy-based configuration in the Cisco Nexus 1000V Series Switch, you can associate vWAAS services with application server virtual machines as they are instantiated or moved in response to dynamic application load demand in the cloud. This capability helps enables cloud providers to offer rapid delivery of WAN optimization services with little network configuration or disruption to achieve a cloud consumption and delivery model.
- **AppNav-XE on the Cisco 4000 Series ISR, Cisco Cloud Services Router 1000V Series (Cisco CSR 1000V Series) and Cisco ASR 1000 Series Aggregation Services Routers:** As a part of Cisco IOS-XE Software, the AppNav-XE component is made up of a distribution unit called the Cisco AppNav Controller and service nodes.

Advantages of using the AppNav-XE component:

- It can intelligently redirect new flows based on the load on each service node. This includes the loads of individual Layer 7 application accelerators.
- For flows that do not require any optimization, service nodes can inform the AppNav Controller to directly pass through the packets, thereby reducing the latency, resource utilization, and usage.
- The AppNav-XE component supports Virtual Route Forwarding (VRF) so that VRF information is preserved when traffic returns from a service node.
- For special applications such as MAPI (Exchange) and VDI (Citrix), the AppNav-XE component helps ensures that flows from the same client and destined to the same server and server port are redirected to the same service node.
- You can use an AppNav Controller group to optimize asymmetric flows. An asymmetric flow occurs when the traffic in one direction goes through one AppNav Controller and the return traffic goes through a different AppNav Controller, but both AppNav Controllers redirect the traffic to the same service node.
- Inter-router high availability, where, if one router goes down, the traffic can be re-routed to a different router within the AppNav Controller group, keeping the traffic flows uninterrupted.
- Intra-router high availability of the AppNav Controller on Cisco ASR 1000 Series platforms that have dual RP route processors or dual Cisco FabricPaths. This means that if the active RP route processor fails, the standby route processor RP takes over; or if the active FP FabricPath fails, the standby FP FabricPath takes over and the flows continue uninterrupted. The intra-router high-availability feature is available only on Cisco ASR 1000 Series platforms.

For public cloud environments

- **Accelerated SaaS applications:** Cisco WAAS accelerates SaaS applications, such as Salesforce.com, delivered from the public SaaS cloud. SaaS applications are typically HTTPS-based and can be configured in an easy and scalable manner. In addition, WAAS Mobile can be used to accelerate access to hosted infrastructure-as-a-service (IaaS) applications delivered from public cloud platforms, such as Amazon.com, to remote mobile users.
- **Cloud-agnostic:** vWAAS can be deployed in public clouds with the Cisco Nexus 1000V Series to obtain benefits similar to those for private clouds. The vWAAS solution is public-cloud-agnostic.

Benefits: Delivery of high-quality live and on-demand video

- Eliminate the need for expensive WAN bandwidth upgrades
- Avoid complex configuration
- Centralize branch-office video servers

Features

- **Easy-to-deploy live video with edge-stream splitting:** Automated edge-stream splitting helps ensure that only one video stream is downloaded over the WAN, regardless of the number of users in the branch office who are viewing that stream.
- **Recorded video on demand (VoD):** VoD files can be published using prepositioning on edge WAAS devices.
- **Server offload:** Live and on-demand video features offer server-offload capabilities that can enable up to a 10-tenfold reduction in the number of data center video servers.

Benefits: Locally hosted branch-office IT services

- Reduce the branch-office device footprint
- Deploy branch-office IT services with flexibility and agility

Features

- **WAAS Central Manager:** This workflow-based tool manages central configuration, provisioning, real-time monitoring, fault management, logging, and customized reporting with the capability to create scheduled reports for WAAS devices, vWAAS, ISR-WAAS and ISR routers running Cisco WAAS Express (WAASX) within a WAAS topology.
- **Comprehensive statistics:** Comprehensive logs, reports, graphs, and statistics for Cisco WAE device functions help IT administrators optimize system performance and troubleshooting.
- **Monitoring, reporting, traps, and alerts:** Real-time monitoring of connections, Simple Network Management Protocol (SNMP) Versions 2c and 3, Simple Mail Transport Protocol (SMTP) authentication, and syslog are supported.
- **Centralized software upgrades:** Administrators can remotely schedule upgrades or version rollbacks.
- **Application performance management:** NetQoS SuperAgent and WAAS together uniquely provide accurate reports about end-to-end application response time and WAN bandwidth utilization and usage.
- **Easy integration with software distribution tools:** Tools include Short Message Service (SMS), LANDesk, Altiris, and BigFix solutions.
- **XML application programming interface (API):** The XML API can be used to integrate WAAS Central Manager into customers' network management and monitoring systems.

Benefits: Scalability and high availability

Features

- **Out-of-path deployment:** WAAS can be deployed using Web Cache Communication Protocol Version 2 (WCCPV2) for high-availability clustering and N + 1 load balancing for up to 32 WAAS devices within a WCCPV2 service group. Cisco Policy-Based Routing (PBR) is also supported as a deployment mechanism.
- **Physical inline interception:** WAAS appliances can be deployed transparently using a 4-port network interface card (NIC) with fail-to-wire capability should a failure occur, helping to ensure that network connectivity is not lost. The inline option provides high scalability and active-active failover through daisy-chain clustering.
- **Configuration backup and restore:** If hardware failure occurs, the re-provisioning and restore process can be handled remotely using WAAS Central Manager.
- **Redundant WAN link support:** WAAS supports environments with redundant WAN links, redundant routers, and asymmetric routing to improve high availability and optimization efficiency.
- **Cisco AppNav technology:** AppNav helps customers to virtualize WAN optimization resources by pooling them into one elastic resource in a manner that is policy-based and on demand, with exceptionally low-latency performance. Customers can add capacity or dedicate capacity to specific applications or geographies based on business requirements, with no change to existing network configurations or topologies. AppNav integrates transparently into any physical or virtual network infrastructure, providing significant investment protection for existing network designs.

Benefits: Security

Features

- **Data-at-rest encryption:** All data on the WAAS disk is secured with 256-bit Advanced Encryption Standard (AES) encryption and automatic key management.
- **Data-in-flight security:** Cisco firewalls perform stateful inspection of accelerated traffic.
- **Acceleration of SSL applications:** Existing enterprise security architecture is preserved when accelerating SSL applications.
- **Data access security:** All security-related protocol commands are delegated to the file server and the domain controller. No additional domain security or user configuration is necessary.
- **Management access security:** The WAAS Central Manager offers authentication, authorization, and accounting (AAA) integration with external authentication providers such as Microsoft Active Directory, RADIUS, and TACACS+, and it supports role-based access control (RBAC) to help ensure security.
- **Network security:** WAAS and Cisco firewalls secure accelerated traffic with stateful firewall inspection and network virus scanning using Cisco IOS Intrusion Prevention System (IPS). No other vendor currently preserves security for accelerated traffic.

Licensing

WAAS offers the following licenses based on feature capabilities:

- **Cisco WAAS Transport License:** This license provides the WAN optimization features of WAAS, including DRE, Lempel-Ziv (LZ) compression, and TFO, optimizing application delivery to the branch office. (Transport license is offered for Cisco SRE deployments only.)
- **Cisco WAAS Enterprise License:** This license provides transport license functions plus application-specific accelerations for protocols, including MAPI, HTTP, SSL, NFS, ICA, and Microsoft Windows print services, to facilitate application acceleration, WAN optimization, and IT consolidation. (An optional license for SRE, this license also ships with each WAVE hardware platform.)
- **ISR-AX license for ISR G2 and 4000 Series ISRs:** This license provides a combination of licenses, including the Data License with Application Visibility and Control (AVC), and Right to Use (RTU) for WAAS (Enterprise license), and vWAAS for ISR G2 and 4000 Series ISRs.

For details about models, pricing, and sizing, contact your local Cisco account representative.

Ordering Information

For ordering information, contact your local Cisco account representative.

Upgrade from Previous WAAS Software Versions

Customers who have an active Software Application Support plus Upgrades (SASU) contract in place can upgrade from previous WAAS Software versions to WAAS Software Version 5.3 at no additional cost.

Web Cache Communication Protocol (WCCP) Support

WCCP is a free Cisco IOS Software feature that runs on the following platforms:

- Routers such as the Cisco 1800, 2800, and 3800 Series ISRs; second-generation Cisco 1900, 2900, and 3900 Series ISRs; Cisco Nexus 7000 Series Switches; and Cisco ASR 1000 Series Routers
- Switches such as Cisco Catalyst 3750, 4500, and 6500 Series Switches and Cisco Nexus 7000 Series Switches

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For More Information

For more information about WAAS Software Version 5.3, visit <http://www.cisco.com/go/waas> or contact your local Cisco account representative.



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