



Solution Overview

Scalable Application Delivery Solutions Using Cisco Wide Area Application Services and the Cisco Application Control Engine

IT organizations are employing application acceleration and WAN optimization technologies to facilitate centralization of costly infrastructure while maintaining performance expectations and to improve performance of already centralized applications and services. Cisco Systems® provides an industry-leading robust and scalable application acceleration and WAN optimization solution through the use of Cisco® Wide Area Application Services 4.0 (WAAS) Software and the Cisco Application Control Engine (ACE) for the Cisco Catalyst® 6500 family of multilayer intelligent switches. This document explains how these synergistic technologies combine to provide a highly scalable, reliable, proven, and robust solution for end-to-end network integrated application delivery.

ENTERPRISE APPLICATION DELIVERY

IT organizations and service providers face continual pressure to improve service levels, enhance productivity, and reduce costs across a dynamic network of users, servers, locations, and applications. Cisco enterprise multilayer switches—the Cisco Catalyst 6500 Series Switches—coupled with the Cisco ACE module, provide high performance, scalability, and a broad set of application delivery, manageability, and security features. With support for up to 16 Gbps of total system throughput and up to 4 million concurrent TCP connections, the Cisco ACE module integrates performance and scalability with advanced load-balancing to improve availability and performance of servers and other network devices. The Cisco ACE module can be coupled with the Cisco Wide Area Application Engine (WAE) appliance running Cisco WAAS 4.0 to provide transparent integration into the networking fabric, high scalability, and excellent performance for even the most demanding enterprise environments.

Cisco WAAS 4.0 is a powerful new application acceleration and WAN optimization solution for the enterprise that improves the performance of TCP-based applications operating in a WAN environment. Cisco WAAS overcomes the performance barriers created by the WAN through a sophisticated combination of application acceleration and WAN optimization techniques that mitigate application and transport latency, improve throughput, and minimize WAN bandwidth consumption for TCP-based applications. With Cisco WAAS, enterprises can consolidate costly branch-office servers and storage in centrally managed data centers, while still offering LAN-like service levels for remote users.

Together, Cisco WAAS and the Cisco ACE module provide a high-performance and feature-rich end-to-end application delivery solution with nearly unlimited scalability in the data center. Together, the two provide up to four times the performance and scalability of the nearest competitor.

CISCO WAAS

Cisco WAAS provides best-in-class WAN optimization, application acceleration, and Wide Area File Services (WAFS) technologies. Cisco WAAS overcomes bandwidth and latency limitations associated with TCP/IP and client-server protocols and allows IT organizations to consolidate distributed servers and storage in centrally managed data centers, while offering LAN-like access to remote users. Cisco WAAS provides a comprehensive feature set designed specifically to address these needs in an end-to-end enterprise deployment (Figure 1). These features include the following:

- **Application acceleration**—Optimizations applied to specific application protocols minimize the effects of high latency and low bandwidth. Such optimizations include read-ahead, write-behind, message prediction, safe data caching, preposition, and disconnected mode of operation.
- **Transport optimization**—Transport Flow Optimization (TFO) overcomes the behavioral challenges associated with TCP to improve overall throughput, maximize link use, and minimize the effects of packet loss and congestion.
- **Advanced compression**—Data Redundancy Elimination (DRE) and persistent session-based Lempel-Ziv (LZ) compression reduce the amount of data that needs to traverse a network to nonredundant data, thus providing significant improvement in overall throughput and response times.
- **Network awareness**—Cisco WAAS provides transparent network integration with dynamic autodiscovery of the Cisco WAAS endpoints, support for complex network topologies such as those that include asymmetric routing, and transparency to facilitate compliance with existing network-based features such as quality-of-service (QoS) policies, shaping, policing, Network-Based Application Recognition (NBAR), NetFlow, access control lists (ACLs), and firewall policies.
- **Integration into the physical network fabric**—Cisco WAAS can be deployed as a network module within the award-winning Cisco Integrated Services Router platform to provide low entry and ongoing maintenance and management costs.

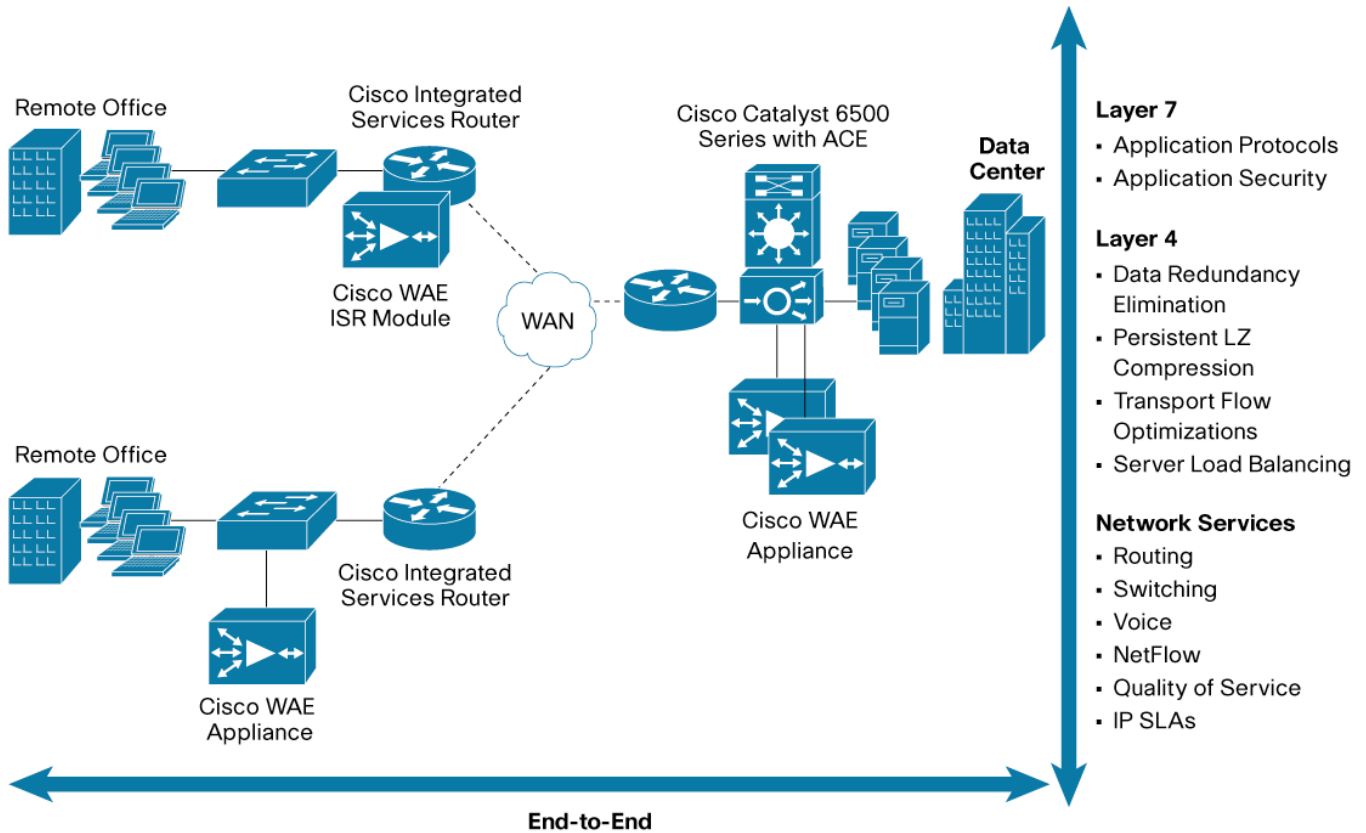
Cisco WAAS can be deployed using appliances in each location that requires optimization or through the use of the router-integrated network module for the Integrated Services Router (ISR) as shown below in figure 1.

Figure 1. Cisco WAE and ISR Network Module



Cisco WAAS provides end-to-end application delivery that is network aware and network integrated. By maintaining network transparency and coherency with existing network features, all layers of the network remain preserved, as shown in figure 2.

Figure 2. Cisco WAAS End-to-End Deployment



CISCO ACE

In the data center, where scalability and throughput are of paramount importance, the Cisco ACE module for the Cisco Catalyst 6500 Series Switches provides greater control over application infrastructure, allowing organizations to deploy and migrate applications and network services, including Cisco WAAS, more quickly. Coupled with advanced server availability and load-balancing functions, Cisco ACE provides a comprehensive solution for scalability and availability for enterprise applications and network devices. Through advanced provisioning and virtualization, Cisco ACE can also simplify the management and operation of data center services while providing the control necessary for secure resource sharing. The Cisco ACE also provides functions such as server TCP offloading, application acceleration, and application-layer security. By delivering up to 16 Gbps of throughput and support for up to 4 million TCP connections, the Cisco ACE solution can handle the largest production environments and be partitioned for sharing across multiple constituents. High availability is provided in a variety of active-active configurations, including across geographically dispersed data centers.

Figure 3. Cisco ACE Module and Cisco Catalyst 6500 Series Switches



Cisco WAAS integrates transparently with the Cisco ACE line card to provide a highly scalable and robust solution for end-to-end application delivery. Unlike other solutions that require cumbersome inline deployment in the data center, Cisco ACE and Cisco WAAS integrate transparently and intelligently to allow IT organizations to integrate end-to-end application delivery technologies in a nondisruptive fashion. By combining the two, enterprise organizations gain the following benefits:

- **End-to-end application delivery**—Organizations gain a comprehensive suite of application acceleration, WAN optimization, server offload, high availability, and security features.
- **Network awareness**—Direct integration into existing crucial business devices such as Cisco Integrated Services Routers and Cisco Catalyst 6500 Series Switches provides physical integration, network transparency, and feature coherency. Network features remain unimpeded, and automatic discovery helps ensure compatibility with the most complex network topologies and scenarios.
- **Scalability**—Support for up to 16 Gbps of throughput and 4 million concurrent TCP connections allows IT organizations to provide a robust application delivery solution for the most demanding environments. Embedded server and network device load balancing provides the transparent scalability necessary to support enterprise workloads.
- **Server offloading**—Secure Sockets Layer (SSL) offloading to reduce the processor overhead associated with security is coupled with TCP connection reuse to reduce the processor overhead associated with TCP connection management.
- **High availability**—Configuration redundancy with interchassis, intrachassis, and interdata center configurations of Cisco ACE modules with up to four modules in a Cisco Catalyst 6500 Series Switches chassis provides failover among load-balanced nodes. Cisco WAEs with Cisco WAAS integrate transparently at the edge of the network as appliances or router-integrated network modules and can be deployed in a high availability fashion using any of the available network interception mechanisms (Web Cache Communication Protocol Version 2 [WCCPv2], policy-based routing [PBR], and physical inline and serial clustering) and can use Cisco ACEs in the data center for high availability, scalability, failover, and load balancing.
- **Virtualization and manageability**—Cisco ACE virtual partitioning isolates departments, customers, and applications, facilitating rapid and low-cost deployment. Role-based access control (RBAC) centralizes control and allows a custom-tailored view of system configuration, performance, and maintenance to improve workflow and manageability.

SUMMARY

Cisco WAAS coupled with Cisco ACE allows large IT organizations to safely consolidate costly infrastructure and improve application performance and scalability for the most demanding high-performance and high-availability environments. The solution provides nondisruptive and transparent integration into the networking fabric using existing network devices while helping ensure that value-added network features such as QoS, security, and monitoring features are fully preserved.

Cisco WAAS and Cisco ACE offer low total cost of ownership (TCO), high application performance, industry-leading scalability and availability, efficient WAN use, and transparent integration with the network, while also providing secure, centralized management and control in an easy-to-implement package.



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