Cisco Application Networking for SAP Solutions

A Foundation for Business Network Transformation through Optimized Application Performance, Availability, Security, and Cost

What You Will Learn

To enable business network transformation, a globally connected real-time business that accelerates innovation across the borderless enterprise, Cisco® now offers Cisco Application Networking for SAP Solutions. As a foundation for transforming the business, this solution is an enterprise network architecture, with best practices and implementation guidance that optimizes the network for application performance, availability, and security and lowers application ownership costs.

This document shows how the solution provides the foundation for business network transformation by addressing the following network challenges for SAP Business Suite and SAP NetWeaver deployments through data center and WAN application optimization services from the Cisco ACE Application Control Engine and Wide Area Application Services (WAAS) Software products:

- Enterprise class high availability for mission-critical applications
- Application response time over limited WAN connections
- Application, server, and network security
- Reduced capital and operational costs for applications, servers, and networking

Tests of this solution showed up to 30 times faster user transactions and 90 percent less bandwidth utilization for SAP deployments when paired with Cisco application networking solutions for specific deployment scenarios. Additional solution benefits include increased application security and availability and reduced server processing utilization.

Business Challenge

The capability to conduct globally connected real-time business in a borderless enterprise is quickly becoming a competitive imperative. In achieving this business network transformation, combined enterprise network and application performance, availability, and security are vital to progress as well as being tightly linked to customer success and profits.

As applications expand to handle new business processes and serve more geographically and organizationally dispersed user populations, service levels and costs are increasingly scrutinized. Further, increased complexity and stifled innovation are sure to affect productivity and disappoint primary constituents.

To achieve expected service levels and costs in this demanding environment, enterprise application deployments are converging and are more likely to run in one location isolated from a second standby site, and serve global users through Web browsers and standard Internet protocols. At the same time, however, the use of a SOA platform opens these applications to connect to third-party Web services around the world, thus distributing computing outside the corporate framework.

This new business environment and associated application architecture intensifies four major IT challenges, each of which can be addressed by a strong enterprise network architecture using Cisco Application Networking for SAP Solutions, aiding in the progress toward business network transformation:

- Network performance for SAP applications: Limited WAN links and inefficient Internet standard protocols and data formats such as HTTP and Extensible Markup Language (XML) affect end-user productivity and increase bandwidth utilization for global users. Further, increased demand on large applications in centralized data centers requires additional application servers to avoid overload on servers that could slow application response time.

- Application availability: Increasing business dependence on fewer but larger applications deployed in a central location requires a more careful examination of combined network and application architecture, including single points of failure and product stability, to achieve availability objectives.

- Network security for SAP applications: Business risk due to security breaches from malicious or innocent end users or SOA Web service requests is significantly increased.

- Application infrastructure ownership costs: The increasing scope of application business logic and geographically and organizationally dispersed users, coupled with higher performance, availability, and security needs, requires a new approach to keep costs in line with diminishing budgets.

Given these significant challenges, it is increasingly important to turn to application-savvy infrastructure vendors, such as Cisco, with solutions that cost-effectively address today's business and IT challenges, a commitment to rigorous feature and system quality testing, global and local-language support 24 hours a day, and a strong history of security expertise (see Table 1).

Table 1.   Application-Savvy Infrastructure Vendor Requirements for Today's Enterprise Application Deployments

Requirements	
• Strong application optimization solutions • Lower application ownership costs • Rigorous feature and system quality testing	• Global and local-language support 24 hours a day • Exceptional security history and experience • Strategic partnerships with application vendors

Equally important is an application infrastructure vendor that partners with leading application vendors, such as SAP, to yield tested, documented, and validated joint architectures that optimize application performance, availability, and security and lower application ownership costs.

Business Benefits

Cisco Application Networking for SAP Solutions offers an optimized network for application performance, availability, security, and costs by providing application optimization services as follows:

- Network performance: Cisco ACE and WAAS application optimization services for high performance:
  ◦ WAN optimization: Provides intelligent caching, compression, and protocol optimization that yields up to 30 times faster transactions and up to 90 percent reduction in bandwidth utilization (see Figures 3 and 4 in the "Testing" section of this document)

- Server offloading: Provides specialized hardware that offers greater processing efficiency for the application optimization services listed in Table 2, freeing up significant application server processing and memory to focus on business logic computations

- Application availability: Cisco ACE application optimization services for high availability:

  - Cross-data center failover switching: Efficiently routes end-user and Web services requests to a failover data center in the event of a primary data center outage

  - Application health monitoring: Continuously and intelligently monitors application availability

  - Server load balancing: Efficiently routes end-user and Web services requests to the best available server

  - Network platform health monitoring: Helps ensure continuity of business operations by mirroring the server connection across pairs of network devices

Table 2.   Services Offloaded from Servers by the Solution

Service	Description
Server Load Balancing	Provides advanced load balancing methods
Secure Sockets Layer (SSL) Termination	Offloads significant resources from application servers
Application Health Monitoring	Improves availability
Traffic Compression	Uses scalable GNU zip function that minimizes bandwidth
Object Caching	Reduces requests to server

- Network security for applications: Cisco ACE application optimization services for optimized data security:

  - SSL termination: Efficiently encrypts and decrypts SSL-enabled traffic, facilitating the use of intrusion detection and prevention solutions before traffic reaches the servers, reducing server CPU utilization, and centralizing certificate management

  - Server access control: Provides access control lists (ACLs) to protect client-to-server and server-to-server traffic from worms and intruders that attack vulnerable open server ports not used by the application

- Application infrastructure ownership cost: Cisco Application Networking for SAP Solutions reduces application capital and operational costs:

  - Server cost reduction: Offloads the application optimization services in Table 2 from servers to cost-effective network devices, freeing up significant server processing and memory needs to focus on business logic computation

  - Networking cost reduction: Provides virtualized application optimization services that can be applied to multiple SAP Business Suite and SAP NetWeaver solutions as well as other enterprise applications (see Figure 1)

  - Operating cost reduction: Provides application optimization services to reduce operating costs as shown in Table 3

Figure 1. Virtualization of Application Optimization Services
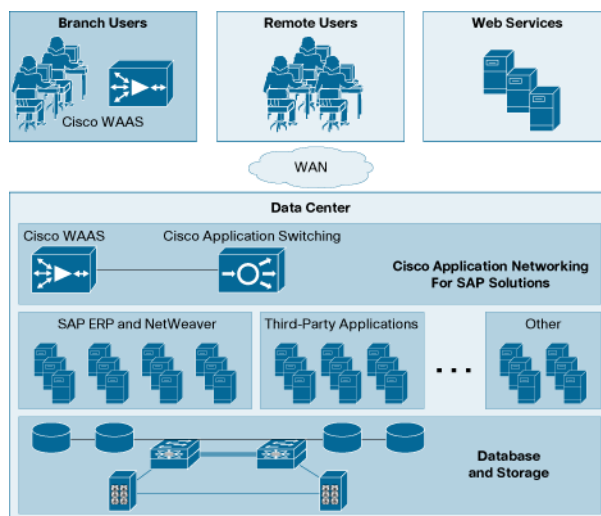
Table 3. Operating Cost Reductions from Application Optimization Services

Cost Reduction	Description
WAN Bandwidth Utilization	Up to 90% bandwidth cost savings
Server Power, Cooling, Space, and Administration	Significant operational cost savings
Application Deployment Administration	Virtualization of application services

Solution

Cisco Application Networking for SAP Solutions combines Cisco WAAS deployed with a Cisco Integrated Services Router (the Cisco WAAS solution), a SAP Certified Integration solution, and Cisco ACE with the SAP Business Suite and SAP NetWeaver architecture to provide optimized performance, availability, security, and cost of ownership.

SAP Business Suite and SAP NetWeaver with the Cisco WAAS Solution

Completion of any SAP solution business transaction involves numerous components of the application architecture, including the client, SAP Business Suite and Enterprise Portal application servers, database servers, storage, and network.

Each transaction typically requires several operations that, when requested by a remote user, travel over the WAN and introduce network delay that slows end-user performance. When network delay is significant due to constrained or overburdened bandwidth, the distance of users to servers, or a high number of operations needed to complete a transaction, end-user performance and bandwidth utilization improvements can be achieved through optimizations provided by the Cisco WAAS solution such as data redundancy elimination (DRE), TCP flow optimization (TFO), and persistent Lempel-Ziv (LZ) compression.

When the Cisco WAAS solution is combined with SAP Enterprise Resource Planning (ERP) and other SAP NetWeaver platform based components, tests show significant round-trip time and bandwidth reduction, as discussed in the "Testing" section later in this document.

SAP Business Suite and SAP NetWeaver with Cisco ACE

Within the SAP Business Suite and SAP NetWeaver architecture, scaling to handle more end users is achieved by the addition of SAP application server instances, which creates the need for load balancing. Cisco ACE offers high performance server load balancing with advanced load distribution methods in addition to SSL termination, server access control, and server health monitoring.

Also, virtualization within Cisco ACE allows a single pair of devices to serve multiple SAP Business Suite applications—such as SAP ERP, SAP Customer Resource Management (CRM), SAP Product Lifecycle Management (PLM), SAP Supply Chain Management (SCM), and SAP Supplier Relationship Management (SRM)—and SAP NetWeaver Enterprise Portal as well as other enterprise applications. Further, if Cisco ACE is already deployed in the data center, additional virtualized contexts can be added to accommodate new SAP applications without the need to order and configure additional equipment.

Additionally, Cisco ACE virtualized contexts can be created using role-based access control (RBAC), which constrains commands and actions for unique application, database, security, and systems management administrators. If the application architecture requires, the device can decrypt SSL traffic for intrusion detection and prevention and then reencrypt traffic to the server with the same server savings as if the SSL were decrypted at the application switch. Because the database is typically a single instance, Cisco ACE is not used at that part of the architecture.

Solution Deployment

The Cisco WAAS solution and Cisco ACE reside in the data center and are arranged to provide application optimization services for multiple SAP Business Suite and SAP NetWeaver deployments as well as other enterprise applications.

Because of their unique location, these solutions can take intelligent action on end-user traffic before it is routed to the SAP application servers, including load balancing, server health monitoring, SSL decryption, and security access control (see Figure 2). Cisco Application Networking for SAP Solutions provides these services cost effectively, reducing server processing and memory needs by up to 50 percent.

Figure 2.   Cisco Application Optimization Services
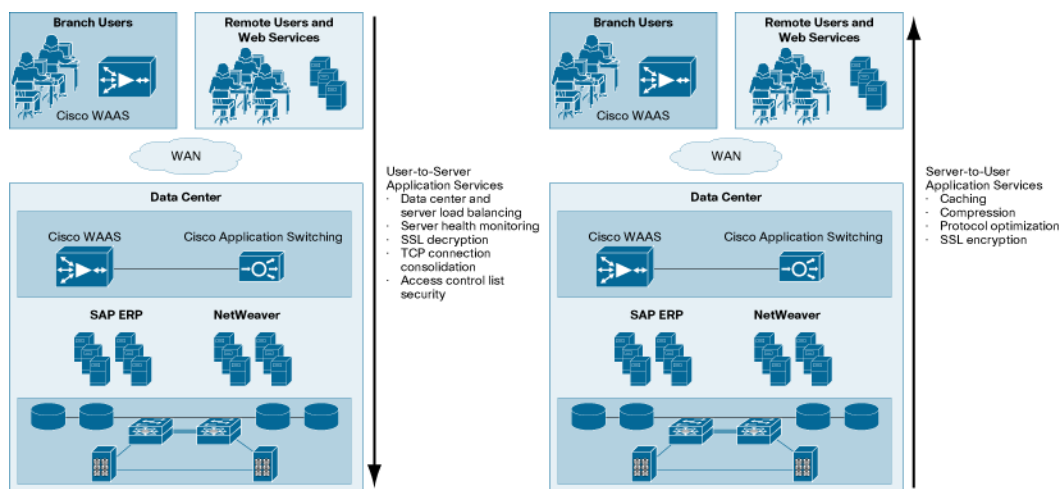
The Cisco WAAS solution also resides in the branch office and is arranged to provide application optimization services for all application users in that location. The branch-office Cisco WAAS solution together with the data center Cisco WAAS solution offers a secured WAN optimization service through the use of intelligent caching, compression, and protocol optimization.

When the SAP application servers respond to end-user requests, the response is efficiently passed across the WAN, with minimal bandwidth utilization and maximum throughput. Commonly accessed information is cached at the Cisco WAAS solution both in the branch office and in the data center, which significantly reduces the burden on the servers and the WAN (see Figure 2).

The recommended best practices and implementation guidance for Cisco Application Networking for SAP Solutions, including specific configurations for each Cisco network solution, can be found in the Cisco Application Networking for SAP Design Guide at http://www.cisco.com/OptimizeSAP.

Cisco ACE can be deployed in the data center as a module in the Cisco Catalyst® 6500 Series Switches or as an appliance, and Cisco WAAS can be deployed in the branch office as a module in a Cisco Integrated Services Router or as an appliance connected to the Cisco Integrated Services Router.

Testing

Cisco, in collaboration with SAP, conducted a series of functional, load, and performance tests, which resulted in the Cisco Application Networking for SAP Solutions architecture, best practices, and implementation guidance.

Cisco WAAS Performance Testing

A total of 16 tests were performed: four user scenarios across two WAN links (see Table 4) created with the Shunra network simulation product, both with and without Cisco WAAS, with HP LoadRunner used to simulate end-user transactions. Summaries of the test results are shown in Table 5 and Figures 3 and 4.

Table 4.   Performance Testing WAN Scenarios

	WAN Speed	Delay (in milliseconds)	Packet Loss
Low Bandwidth, Low Delay	780 Kbps	40 ms	1%
High Bandwidth, High Delay	45 Mbps	300 ms	1%

Table 5.   Performance Testing User Scenarios and Summary Results

Testing	Results
SAP Enterprise Portal Login	**Without Cisco WAAS:** The large number of users logging on and off the SAP Enterprise Portal, where each transaction included the retrieval of many small objects, presented significant congestion on the low-bandwidth link and resulted in an average of more than 140 seconds per transaction.
	With Cisco WAAS: 55% bandwidth usage reduction on this link cleared congestion for average transaction times 4 seconds. (The high-bandwidth WAN link did not introduce congestion, and thus transactions without Cisco WAAS were not delayed as much as on the low-bandwidth link.)
Document Download	**Without Cisco WAAS:** Download of a 5 MB document 10 times by a single user resulted in average transaction times of more than 60 seconds on the low-bandwidth link and even higher on the high-bandwidth link due to the high delay.
	With Cisco WAAS: Transaction speed was increased by 30 times to reduce average transaction time to two seconds, and bandwidth usage dropped almost 90%.
Document Creation and Upload	**Without Cisco WAAS:** This five-step transaction—(1) SAP Enterprise Portal order entry, (2) SAP Enterprise Portal Web services request to composite application, (3) composite application Web services request to ERP, (4) ERP upload of uncompressible 1-MB Acrobat file to composite application, and (5) composite application confirmation to SAP Enterprise Portal—resulted in more than 120-second transaction times for high bandwidth link due to latency.

Testing	Results
	With Cisco WAAS: Transaction speed increased 2.5 times to reduce average transaction time to 51 seconds and bandwidth usage fell 26%. (With low latency, this transaction performed adequately without Cisco WAAS.)
Document Request and Download	**Without Cisco WAAS:** Large numbers of simultaneous users conducting this four-step transaction—(1) composite application Web services request to ERP, (2) ERP Web services request to composite application, (3) uncompressible 3-MB Adobe Acrobat file from composite application to ERP, and (4) ERP transmission of document to composite application—resulted in long average transaction times of 20 seconds and 48 seconds for the low bandwidth and high bandwidth links respectively
	With Cisco WAAS: Transaction speeds increased by more than three times, reducing the average transaction times to six seconds and 14 seconds respectively, and bandwidth usage decreased by 75%

Figure 3. Average Transaction Times
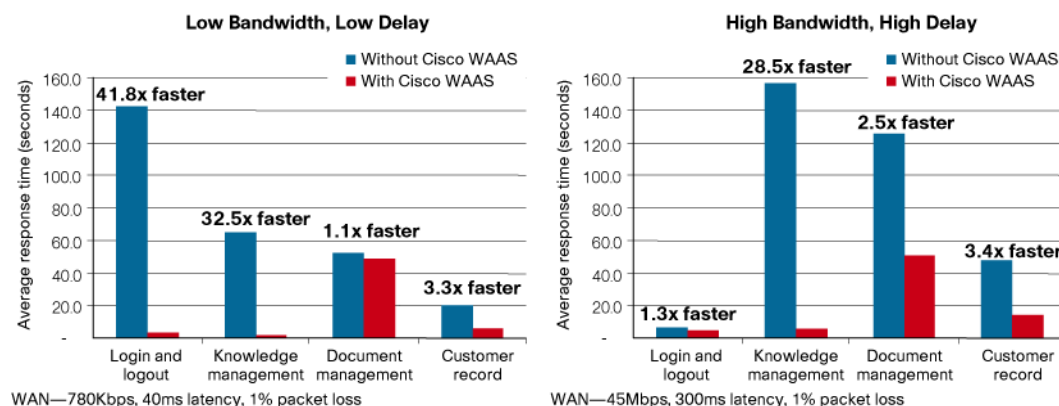
Figure 4. Performance Test Bandwidth Reduction
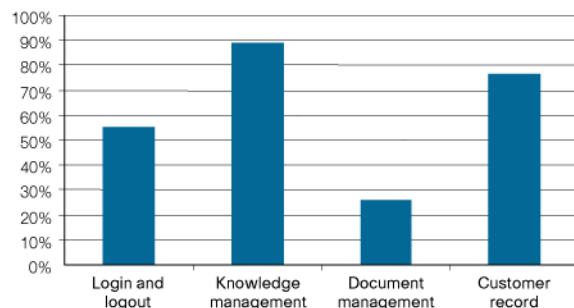
Certification and Statement of Cooperation

Cisco WAAS deployed with a Cisco Integrated Services Router passed the SAP Certified Integration testing conducted at SAP labs in Palo Alto, California.

Cisco and SAP cooperated in all phases of this joint project, including lab setup, solution testing, and solution overview and design guide documentation. Cisco and SAP jointly validate that the lab setup and solution testing represents best efforts in creating a realistic customer deployment and accurate documentation of such deployment.

For More Information

- Cisco Application Networking Services for SAP: http://www.cisco.com/go/OptimizeSAP
- Cisco Application Networking Services: http://www.cisco.com/go/ApplicationServices
- Cisco Application Networking partner portal: http://www.cisco.com/go/OptimizeMyApp
- Cisco application switching product information: http://www.cisco.com/go/dcas
- Cisco WAAS Software product information: http://www.cisco.com/go/waas

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