White Paper

High Performance Networks for Securing and Delivering SAP Applications

Juniper Networks offers a full portfolio of products that ensure a secure, high-performance SAP deployment in the distributed enterprise

Juniper Networks, Inc.
1194 North Mathilda Avenue
Sunnyvale, California 94089
USA
408.745.2000
1.888 JUNIPER
www.juniper.net

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Executive Summary

SAP business applications empower more than 38,000 companies around the world to respond quickly and decisively to dynamic market conditions, helping them achieve and maintain a competitive advantage.

But in today's distributed enterprise where server centralization and data center consolidation are prevalent, SAP applications must contend with the physical limitations imposed by local and wide area network environments, including limited bandwidth, latency, contention for resources, security and others. Users who rely on SAP to do their jobs—local, remote, branch office and mobile alike—find themselves waiting an inordinate amount of time for transactions to complete, leading to plummeting productivity and endless frustration.

Juniper Networks delivers a host of application acceleration and security solutions that accelerate SAP performance over the WAN, improve SAP response times for remote and mobile users, and offload SAP servers while improving security and availability, providing anytime, anywhere access, and ensuring operational continuity.

Introduction

Today the vast majority of business operations—both internal and external—are conducted electronically over a corporate network or the Internet. The mySAP Business Suite delivers a comprehensive set of solutions that allow businesses to compete in such an environment—solutions that address core business processes with customer relationship management (CRM), enterprise resource planning (ERP), supply chain management, human capital management, product lifecycle management, operations, finance and more.

Built upon the NetWeaver Platform and/or the Enterprise Services Architecture, SAP software solutions link all areas of IT including legacy applications and third-party products, merging information from throughout the organization to provide an integrated view of the business in order to pinpoint inefficiencies, identify new opportunities, and develop best practices that optimize business processes and ensure ongoing success.

With widely distributed workforces and a global value chain, most enterprises rely on Web-based versions of SAP to provide their users with universal anytime, anywhere access via a standard browser. Regardless of whether they are working from corporate headquarters in Chicago, a branch office in Singapore or a hotel room in London, the user's location has essentially become irrelevant as the same application is merely a mouse-click away.

However, this trend toward globalization, which in many ways is enabled by SAP's unique software solutions, has also created its share of problems impacting application performance over the network. That's because accompanying this trend is an equally ambitious effort among IT managers to consolidate and centralize their information technology operations. It is certainly a logical response; after all, it's difficult and expensive to maintain local IT staff in countless locations around the world. By consolidating network resources—including application servers—in a single data center, IT managers not only gain centralized control to simplify maintenance, management and upgrades, but also dramatically reduce support and overhead costs while improving regulatory compliance.

As a result, users must access centralized business applications over limited capacity WAN links or the Internet. That means that SAP is now competing for a limited amount of available bandwidth with other applications like email, file services, Web browsing, voice over IP and scores of others, as well as dealing with latency issues imposed by the distance between distributed users and centralized applications.

Compounding the problem is the fact that Web-enabled applications consume at least 10 times more bandwidth than their client-server counterparts, seriously impacting performance, reliability and availability. Performance plummets at remote and branch offices, leaving users frustrated and unproductive. While adding more bandwidth may provide temporary relief, it's not a viable long-term solution, since it imposes significant recurring capital costs and doesn't address the latency issue.

Performance problems aren't confined to the WAN; they extend to the data center as well, where application servers can be easily overwhelmed with requests from throughout the enterprise. One of the benefits of server centralization is the cost savings realized through equipment reduction. However, IT staff must strike a delicate balance between providing sufficient resources to handle peak loads and over-provisioning the data center with excessive and expensive computing power. If anything happens to upset that balance, such as an influx of users or an increase in application activity, resources will become swamped with requests, slowing response times and completely eroding user productivity.

Opening access to SAP for remote and extranet users also poses potentially significant security risks. Since SAP applications routinely deal with sensitive and confidential business data, they have a high need for robust security. And business continuity becomes a critical issue as more users come to rely on the system, and the business struggles to accommodate the expanding workforce from a single, central location.

To realize the full benefits of their SAP deployment, businesses must optimize the performance of their network. To overcome the obstacles posed by the distributed and extended enterprise, IT organizations must neutralize the impact of latency and limited bandwidth on applications, eliminate the complexity and expense of the point products cluttering the data center, and reliably secure operations so that all users—local, remote and mobile—can access centralized SAP applications with confidence.

Juniper Networks can help businesses achieve these objectives. Juniper delivers high-performance network solutions that provide SAP customers with a responsive and trusted infrastructure, allowing them to create competitive differentiation and improve overall business flexibility.

Joint testing conducted by Juniper and SAP in early 2007 at SAP's Enterprise Services Community Networking Lab (ENL) in Palo Alto, California, confirmed the performance benefits that Juniper brings to an SAP environment. The tests, which involved a series of real-world business transactions requiring interaction between multiple application components and data from multiple sources, demonstrated how Juniper significantly enhanced the SAP environment in seven key areas:

- Accelerating performance over the WAN
- Improving response times for remote and mobile users
- Dramatically offloading server capacity
- Increasing security and availability
- Providing secure anytime, anywhere access
- Ensuring operational continuity in downtime situations
- Delivering complete visibility into SAP performance on the network

Accelerating SAP Performance over the WAN

For remote and branch office users, SAP application response times can be negatively impacted by fixed-capacity wide area links and the latency imposed by the distance between end users and centralized SAP application servers in the data center. Fixed-capacity WAN links (whether DSL, T1 or T3) can only accommodate a limited amount of traffic at a time, leaving SAP applications to compete for bandwidth with other applications like email and file sharing that place a high load on the network. Once the traffic is on the WAN, latency (the length of time it takes for the data to actually traverse the link), compounded with the inefficiencies of application protocols, further slows performance and impedes end user productivity.

Juniper's WX/WXC WAN acceleration platforms reduce the amount of traffic on the WAN link, help overcome the effects of latency, and give branch-office SAP users LAN-like performance and response times.

Compression and caching technologies prevent redundant traffic patterns from crossing the WAN, saving valuable bandwidth. Since upwards of 60 percent of all WAN traffic is repetitive, effective bandwidth capacity grows accordingly, providing sufficient space for all mission-critical application traffic without upgrading costly, wide area circuits.

Additionally, TCP and application protocol-specific acceleration reduces the impact of latency on business-critical SAP applications. By eliminating the back and forth, ping-pong behavior exhibited by TCP and HTTP, the WX/WXC platforms significantly accelerate response times for Web-based SAP applications over long distance WAN links.

Thirdly, to mitigate the contention for WAN bandwidth that is typical for long distance wide area links, the WX/WXC platforms offer rich quality of service (QoS) capabilities to enable IT administrators to prioritize mission-critical SAP traffic over other applications. An easy-to-use GUI enables administrators to prioritize SAP transactions without having to know detailed port addresses or other network information.

Recent tests conducted jointly by Juniper and SAP confirmed the impact that the Juniper WX/WXC platforms have on the performance of SAP business applications in a wide area environment. The tests, conducted in SAP laboratories and designed to reflect real-world business scenarios, simulated a variety of different SAP operations.

Tests were run first without the Juniper technologies to establish a baseline. The tests were then run again with the Juniper features enabled to determine the overall benefit. The transactions involved multiple modules and data transfer activities ranging from a few clicks to multiple megabyte documents (for example, retrieval of a multiple megabyte document from the Knowledge Management module).

The test results (Figure 1) show that for data-intensive operations requiring large files to be transferred over domestic and international WAN links, the Juniper WX/WXC platforms produced dramatic improvements in SAP response times.

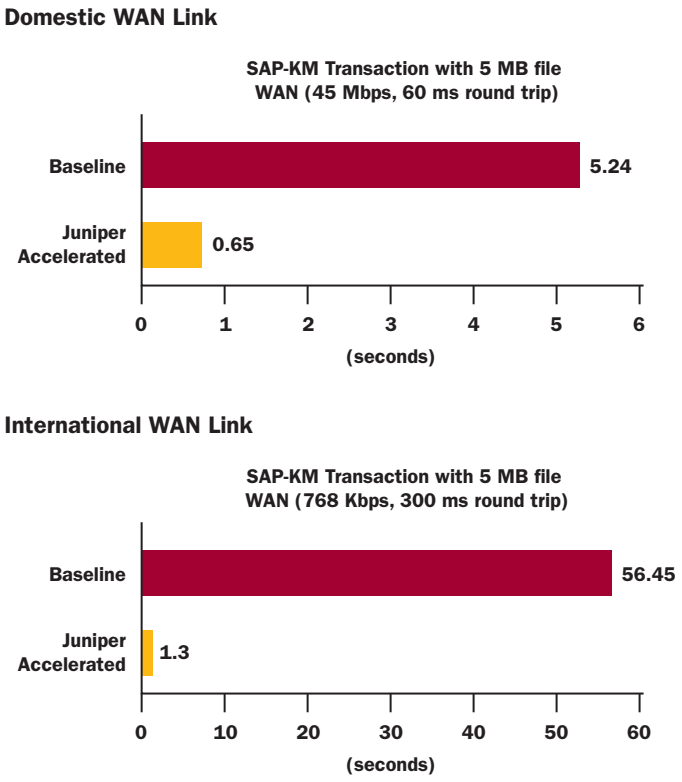


Figure 1 – Joint tests between Juniper Networks and SAP proved that Juniper WAN acceleration technology dramatically improves SAP performance over wide area links.

Improving SAP Performance for Remote and Mobile Users

Remote and mobile users pose their own particular challenges. By accessing centralized SAP applications from hotel rooms, home offices, airports and the like, these users are not behind an IT-managed networking device and therefore cannot benefit from the same technologies deployed in branch offices.

For remote and mobile users, Juniper's DX application front end platforms accelerate the performance of Web-enabled SAP applications through auto-adaptive compression and symmetric caching.

The DX platform's auto-adaptive compression technology employs standards-based Deflate and GZIP algorithms to compress and accelerate all SAP flows, from standard HTTP objects to XML content, over the Web. To provide the fastest possible performance, the DX platform supports mechanisms such as chunking so that content can be displayed as soon as it's available to the browser. A 3G caching capability enables commonly requested objects to be stored in ultra-fast DRAM on the DX platform, which means incoming requests can be served rapidly without ever touching an application server. Finally, the DX platform can also dynamically rewrite content rules in order to make more efficient use of a mobile user's browser cache for rapid SAP page loads.

Joint testing between Juniper and SAP confirmed the benefits provided by the DX platform for remote users accessing centralized Web-based SAP applications. With the Juniper technology enabled, data intensive SAP traffic volumes dropped by 77 percent on a typical DSL internet link, making more efficient use of available bandwidth while improving response times for users (see Figure 2).

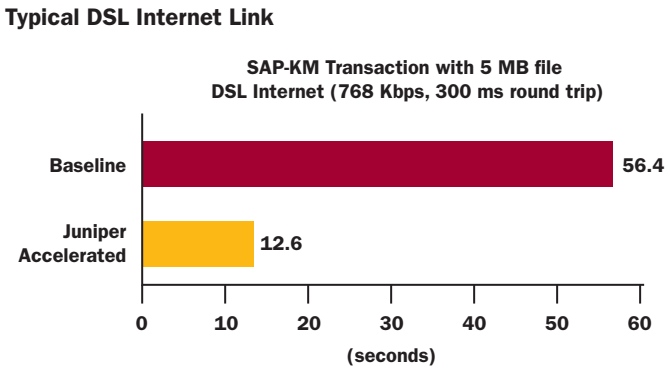


Figure 2 – Joint tests between Juniper Networks and SAP proved that Juniper application front end technology accelerates SAP performance by 77 percent in a DSL Internet environment.

Offloading SAP Servers to Regain Compute Capacity

As the number of users grows, so do the demands on SAP application servers. When faced with this dilemma, businesses are typically left with one option: add more servers, which also means added cost and complexity.

The Juniper DX platforms can return compute capacity to SAP application servers, allowing them to process up to four times the normal number of requests. By relieving application servers of repetitive and CPU-draining tasks such as TCP/IP connection setup/teardown and Secure Sockets Layer (SSL) processing, the Juniper DX platform lets servers do what they do best: serve content, providing maximum utilization of existing server investments.

The joint Juniper/SAP tests confirmed the benefits of the Juniper technologies by relieving SAP application servers from managing hundreds of clients with different SSL keys while still retaining end-to-end SSL from the client to the server. The tests, which simulated 500 clients logging on to an SAP server simultaneously, were conducted once without the Juniper technology to establish a baseline, and again with the Juniper DX offload technologies enabled to determine their impact on processor utilization. Clients were added incrementally and processor utilization was monitored throughout to measure the load that each new user imposed.

The results were impressive. For the baseline tests, processor utilization on the SAP server climbed steadily with each new user, peaking at 70 percent with all 500 clients accessing the SAP NetWeaver portal. With the Juniper DX technologies enabled, processor utilization was cut in half, peaking at just 35 percent with all 500 clients activated—a 50 percent reduction (see Figure 3).

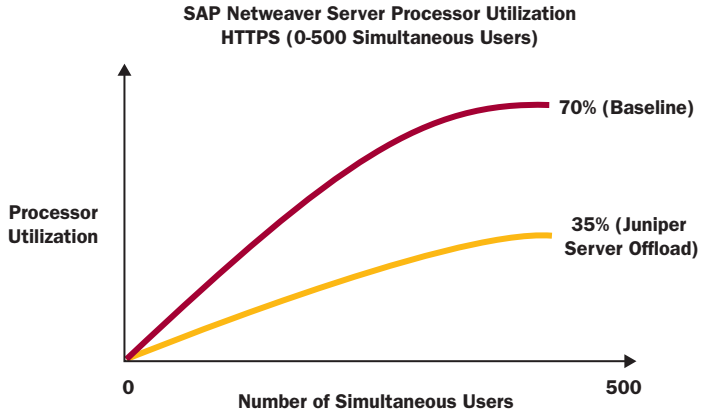


Figure 3 – The Juniper DX platform reduces processor utilization levels by 50 percent for SAP NetWeaver transactions, returning valuable compute capacity to SAP application servers.

Ensuring SAP Availability and Security

Due to the critical nature of information provided by SAP systems, ensuring 24x7 availability of the SAP environment is not only mandatory for the business, it's also needed to meet regulatory compliance.

In order to deliver highly available SAP content from the data center, Juniper DX platforms provide full Layer 7 server load balancing (SLB) functionality for maximum scalability and availability of SAP server farms. Detailed server health checks—ranging from simple Internet Control Message Protocol (ICMP) ping to Layer 7 Hypertext Transfer Protocol (HTTP) content validation—verify that SAP applications are healthy before any requests are sent to a server. In order to scale the DX platform, ActiveN scaling allows up to 64 DX devices to be added to a cluster with automatic workload distribution and N + 1 redundancy.

As SAP applications are exposed to more business partners around the world, they become more vulnerable to outside threats and malicious activities that could compromise their availability. Juniper delivers solutions that protect SAP applications from these external threats, ensuring continued operations and end user satisfaction.

The Juniper DX platform provides complete end-to-end SSL encryption as well as full bi-directional HTTP/S proxy services that can process and rewrite all requests and responses, building a protective wall between end users and SAP servers to shield data center resources from external threats. All users can be authenticated and authorization can be implemented

per request using RADIUS and Lightweight Directory Access Protocol (LDAP) infrastructures. In addition, integrated network security defends against SYN floods and other types of denial of service (DoS) attacks. Finally, full HTTP/S protocol scrubbing identifies and blocks application layer attacks, while secure outbound access protects servers by masking their identity, preventing outside sources from targeting those devices.

At the branch office, SAP users need comprehensive protection from worms, spyware, trojans and other malware that may be flowing around the network. The Juniper SSG platforms provide Unified Threat Management (UTM) in a single device including stateful firewall, IPSec VPN, intrusion prevention, antivirus (including anti-spyware, anti-adware and anti-phishing), anti-spam and Web filtering.

Accessing SAP Anytime, from Anywhere

For most businesses, anytime, anywhere access to critical corporate information provided by SAP applications is absolutely essential. The challenge for IT administrators is balancing access for employees, partners and customers while maintaining a strong security posture around critical SAP assets.

Juniper's Secure Access (SA) platform uses SSL technology that provides secure anytime, anywhere access to SAP applications. These SSL VPN appliances can secure LAN, intranet and extranet access for employees, business partners and customers, mitigating the risks posed by unmanaged devices or untrusted networks by ensuring that users see only what they are allowed to see. Users gain secure access to the SAP NetWeaver portal from just a Web browser, eliminating the need for client software downloads, changes to internal servers, and costly ongoing maintenance and desktop support.

Three different access methods are supported. These methods are selected as part of the user's role, so administrators can enable the appropriate access level on a per-session basis by user, device and network attributes in combination with enterprise security policies. When a user logs in, they pass through a pre-authentication assessment and are then dynamically mapped to the session role that combines established network, device, identity and session policy settings. Granular SAP authorization policies further ensure exact compliance to security strictures, guaranteeing that each user gets just the right level of access to specific SAP applications.

Best-in-class endpoint and host checking provides access only to those users whose endpoints and networks meet certain preconditions. For example, the Juniper SA platform can check the requesting PC's network and device settings, including scanning for malware and verifying operation of endpoint security packages such as personal firewalls and antivirus software. The requestor's IP address, browser type and digital certificates can also be examined before login is allowed, and the results used to grant or deny access to SAP applications.

The recent Juniper/SAP joint testing confirmed full remote access to SAP applications through the Juniper SA platform, verifying complete compatibility with the rich set of SAP user interface (UI) tools such as WebDynpro, as well as integrated technologies such as Adobe Forms and Adobe Flash.

Ensuring Continuity of SAP in Case of Outage

In order to provide the highest uptime for SAP users, most enterprises implement redundant servers front-ended with a server load balancer. Using sophisticated application-specific health checking, the Juniper DX platform not only ensures that SAP application servers are up, running and available, but makes sure that they are delivering the right content as well. By detecting disabled or poorly performing servers and redirecting traffic away from those devices to available servers, application downtime is virtually eliminated.

To meet business continuity requirements, many enterprises employ a distributed architecture where SAP components are implemented across multiple data centers around the world. To make this work properly, end users have to be intelligently directed to the appropriate data center based on availability and response times. For these types of globally distributed environments, the Juniper DX platform offers global server load balancing (GSLB) that allows clients to be connected to the data center best equipped to fulfill their request, regardless of location. The GSLB routing decision algorithms include active/standby status, closest data center, least-loaded data center, or any combination of these and other decision metrics. Acting either as a Domain Name System (DNS) transparent proxy or a full DNS BIND agent, the DX platform can be incorporated into any DNS infrastructure.

In the event of a natural disaster scenario in which corporate offices may be shut down or unavailable, Juniper's SA platform provides users with full, secure access to SAP applications from non-corporate managed PCs through any standard browser. After each session, the SA platform automatically cleans out the local cache in the browser, ensuring that no sensitive corporate data is left behind.

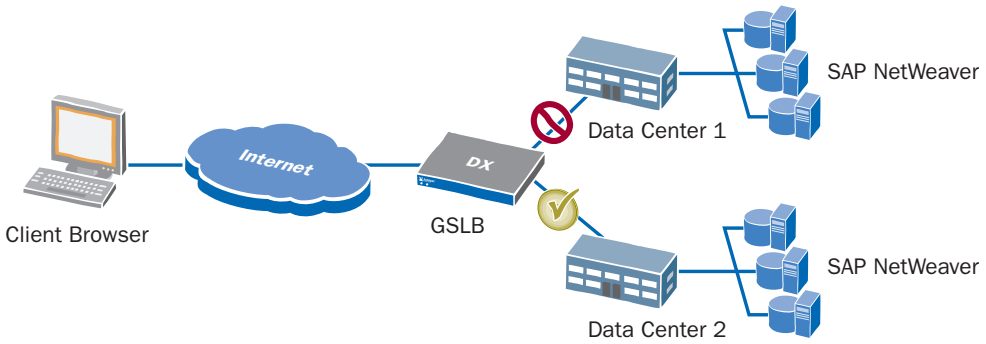


Figure 4 – The DX platform's GSLB feature load balances incoming traffic to geographically dispersed data centers and can re-route requests in case of failures or broken links.

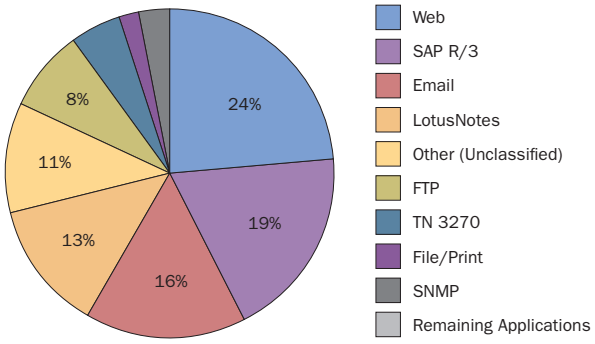
Monitoring and Managing SAP Performance

You can't manage what you can't see. Juniper provides detailed visibility into SAP application performance, both in the data center and across the WAN, helping IT administrators understand precisely how SAP is performing and allowing them to make informed deployment, rollout and troubleshooting decisions.

In the data center, Juniper provides real-time and historical reports that offer a complete overview of SAP application performance (see Figure 5). Through real-time logging, administrators can instantly monitor both server response time and client download time for every object in the SAP response stream.

Figure 5 – Juniper DX platforms provide a real-time view into the performance of Web-based enterprise applications.

For application performance over the WAN, Juniper's sophisticated WAN management software provides reports on how much bandwidth SAP and other applications are consuming, which locations have the most active SAP users, and even what compression levels are being achieved for SAP applications (see Figure 6). For IT administrators, such information is invaluable in setting QoS policies, reallocating bandwidth, and proactively identifying application performance issues before the help desk hears about them.



Application Summary
Percent of traffic To and From WAN by application

Figure 6 – Juniper's WAN management software provides detailed information about how SAP and other applications are performing over wide area links.

To maintain a clean and safe environment, Juniper's application awareness, identification and profiling capabilities identify types and versions of applications and operating systems that may have been added to the network. Armed with this information, administrators can more easily enforce security policies and comply with corporate application usage policies while ensuring that business critical applications such as SAP receive a predictable quality of service.

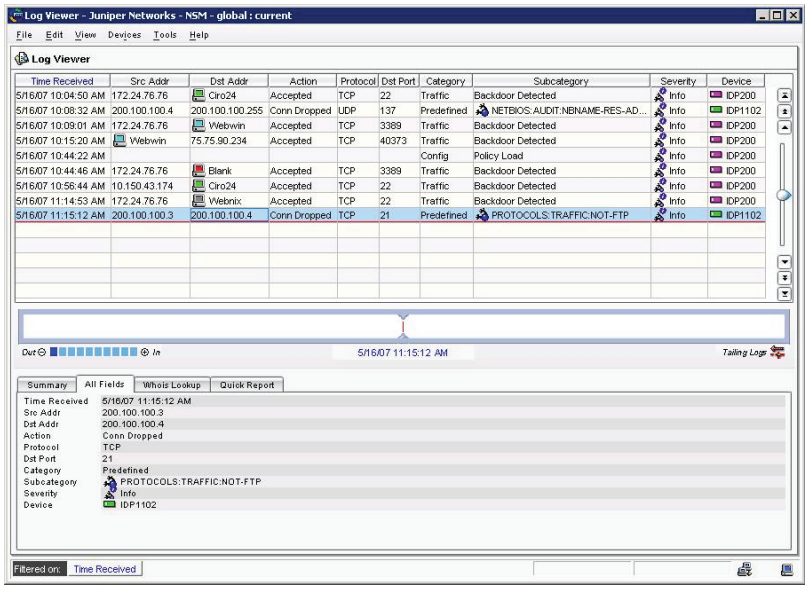
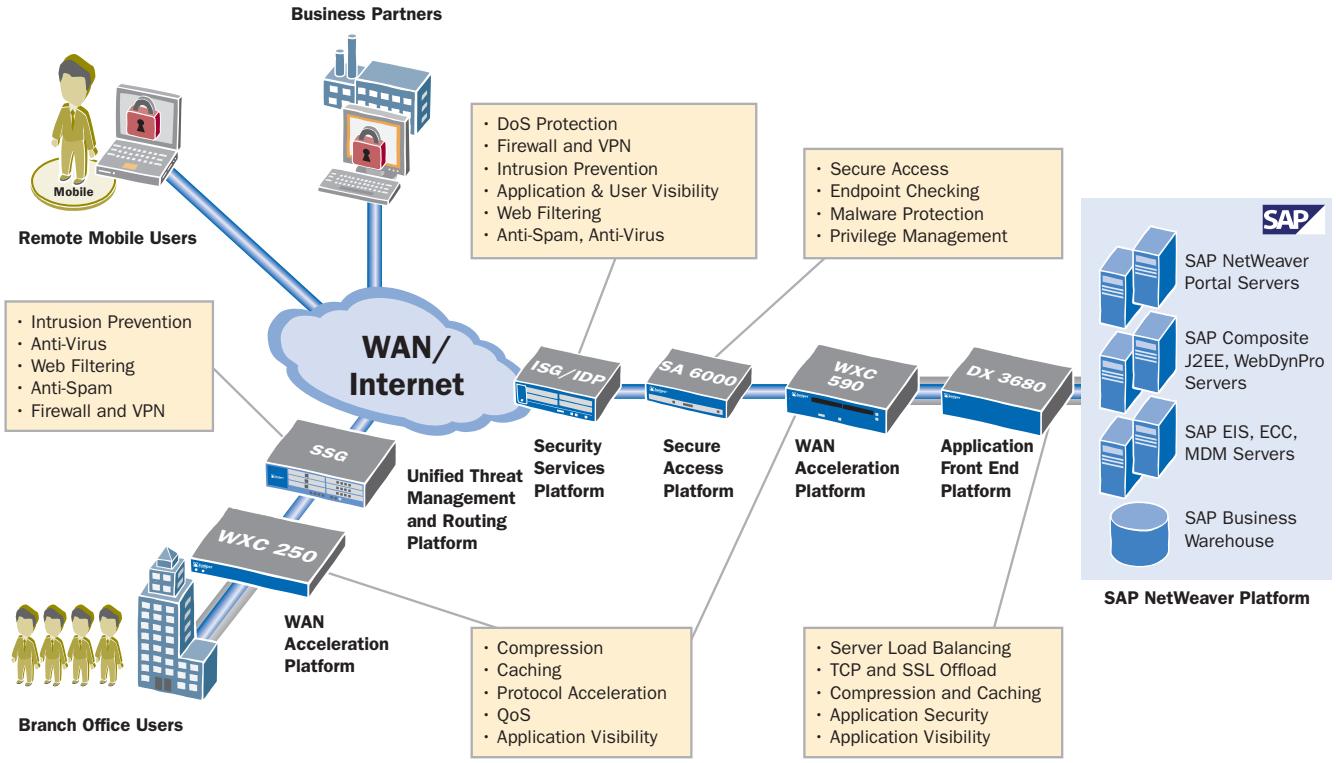


Figure 7 – Juniper IDP products provide visibility into potential application breaches.

Juniper High-Performance Network for Securing and Delivering SAP Applications



Optimize SAP Performance with Juniper Platforms

Juniper Networks, an SAP Software Partner and a charter member of SAP's Enterprise Services Community (ESC), offers a full portfolio of products that ensure a successful and high-performance SAP deployment in a distributed enterprise.

DX

The Juniper DX load balancing and application acceleration platform delivers a complete data center solution for accelerating Web-enabled business applications such as SAP. The DX platform greatly improves the end user experience by delivering Web-based content more quickly. And it satisfies server budget, high-availability and security requirements through a combination of centralized services that include server load balancing, global server load balancing, TCP and SSL session offload, HTTP compression and application security—all on a single device. The DX platform also offers scaling options in both functionality and performance for any business environment.

IDP

The Juniper Intrusion Detection and Prevention (IDP) platforms protect corporate information systems such as SAP against current and emerging threats in the data center at both the application and network layers. Using industry-leading application and user visibility techniques, the Juniper IDP products, which provide zero-hour protection against worms, trojans, spyware, keyloggers and other malware, can be quickly and confidently deployed inline to effectively identify and stop attacks on SAP servers. The IDP platforms also identify rogue servers and applications that may have been unknowingly added to the network.

SA

The Juniper Secure Access (SA) SSL VPN appliances provide privileged secure access to SAP applications for remote employees, partners and customers. Based on SSL, the security protocol found in all standard Web browsers, the SA platform eliminates the need for client-software deployment, changes to internal servers or costly ongoing maintenance and desktop support. Integrated endpoint malware protection dynamically disables threats such as trojan horses, keyloggers, remote controls and monitoring applications. Full compatibility with the SAP WebDynpro user interface, as well as technologies such as Adobe Forms and Adobe Flash, enables remote users to have the same SAP functionality on the road as they have in the office.

SSG

For regional and branch offices that require secure, high-speed LAN/WAN connectivity, the Juniper Secure Services Gateway (SSG) platforms deliver a new class of converged branch networking platforms with the perfect mix of performance and security. The SSG platforms protect SAP traffic flowing in and out of branch offices from worms, spyware, trojans and malware with a complete set of Unified Threat Management (UTM) features that include stateful firewall, IPSec VPN, intrusion prevention, antivirus (including anti-spyware, anti-adware, anti-phishing), anti-spam and Web filtering.

WX/WXC

To optimize the delivery of centralized SAP applications over the WAN, the Juniper WX and WXC WAN application acceleration platforms provide a scalable approach to accelerating application performance, increasing WAN capacity, enabling application prioritization and providing application visibility. Using a combination of industry-leading compression, caching, TCP and protocol-specific acceleration, QoS and traffic prioritization techniques, the WX and WXC platforms deliver LAN-like SAP performance for branch office users.

About Juniper Networks

Juniper Networks develops purpose-built, high-performance IP platforms that enable customers to support a wide variety of services and applications at scale. Service providers, enterprises, governments and research and education institutions rely on Juniper to deliver a portfolio of proven networking, security and application acceleration solutions that solve highly complex, fast-changing problems in the world's most demanding networks. Additional information can be found at www.juniper.net.