



3 Keys to unlocking SAP performance

This white paper explores the root causes of WAN performance problems and how three best practices alleviate them, enabling faster SAP performance.



Proven strategies that cut network wait time 50% to 99%

As resource globalization and IT consolidation widen the separation between users and the applications and data on which they depend, enterprise productivity is increasingly dependent upon corporate Wide Area Network (WAN) performance. IT organizations charged with improving WAN performance and user productivity often overlook the true causes—network congestion and latency—and blame the applications and lack of bandwidth.

That's why SAP® teamed with Citrix®, an SAP global technology partner, in the SAP Enterprise Services Community Networking Lab in Palo Alto, California. Together, the companies conducted a series of controlled tests and identified three proven approaches that can improve application performance and reduce network wait time up to 99 percent:

- Web application optimization
- WAN optimization
- Application centralization

Individually, these best practices yielded outstanding results. A combination of all three delivered the best results, mitigating the paralyzing effects of latency and network congestion far more effectively than other approaches.

This white paper will explore the root causes of WAN performance problems and how these three best practices alleviate them, enabling faster SAP performance.

What are the root causes of poor WAN performance for SAP?

The IT consolidation movement simplifies regulatory compliance, reduces support and maintenance costs, and improves security, but it also places a greater burden on the corporate WAN to deliver applications to those who need them. Instead of having local application and file servers in branch offices, users can be hundreds or thousands of miles from the nearest application server.

The increased WAN load intensifies inherent latency and amplifies network congestion, which reduces application responsiveness and user productivity.

Network congestion

When too many applications compete for a limited amount of bandwidth, the network gets congested and application performance declines due to dropped packets, slowed throughput and excessive packet re-transmissions. This is especially damaging to applications that depend on chatty protocols, such as HTTP, CIFS and MAPI, because they communicate with application servers in many small bursts of data. For example, dragging and dropping in Microsoft® Windows® requires tens or hundreds of packet transmissions between the user's computer and the application server. If any of those transmissions are dropped or delayed, the user experiences poor application performance.

“As business processes grow ever more advanced, application delivery and WAN optimization become areas for increasing focus. Citrix clearly delivers significant network performance and security benefits for SAP customers.”

Joerg Nalik, Ph.D., Director,
Partner Solution Management,
SAP Labs

For SAP Portal users, these chatty protocols, HTTP in particular, are roadblocks to higher performance and productivity. What's more, critical applications like SAP face increasing competition for bandwidth from other Web-enabled applications such as VoIP, streaming media and other sources that are growing in popularity.

Latency

Another side effect of IT consolidation is the fact that users are now much farther away from the data and applications they need. Latency, the length of time it takes for a packet to make a roundtrip on a network, increases with the distance data must travel and the number of hops between its origin and destination.

On a Local Area Network (LAN), where latency is typically less than a few milliseconds, even applications that depend on chatty protocols operate at acceptable speeds. But on a corporate WAN, packets have to traverse miles of fiber optic and copper cable—and possibly even satellite links—to get from a datacenter to remote branch offices. As a result, latency can skyrocket, creating frustrating performance problems for SAP users at branch offices.

Bandwidth doesn't pass the test

A common misconception in IT organizations is that more bandwidth will cure network performance problems. In lab tests, this was found to be untrue.

SAP was simulated running on a fast T3 network, such as those commonly found on a LAN, and a 768 kbps network, which is a speed more commonly found in far-reaching WAN connections. When a reasonable 1 percent packet loss was introduced to both networks, the T3 and the 768 kbps both showed similar detrimental effects to response time—yet the 768 kbps network has only 1/50th the bandwidth of a T3.

If bandwidth was the solution many IT professionals think it is, SAP running on the T3 network would have been noticeably faster than on the 768 kbps network.

But if more bandwidth isn't the cure for network performance problems, what is? The next sections describe best practices for delivering business-critical SAP applications in today's extended enterprise environment.

Best practice #1

Provide relief to SAP NetWeaver Servers by offloading burden from Web traffic

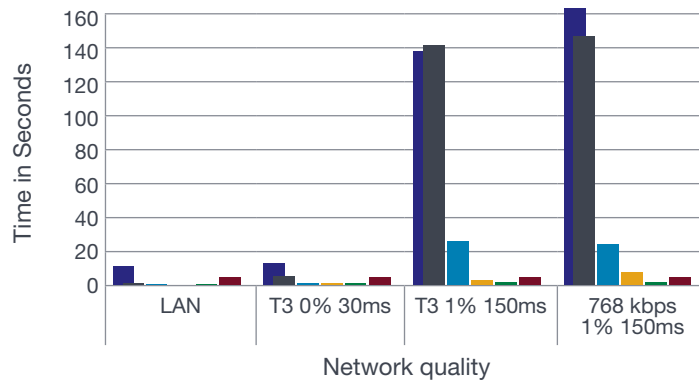
Ensuring the best application performance at branch offices and for mobile users begins at the source: SAP NetWeaver® Portal Server. Offloading generic, CPU-intensive tasks, including SSL encryption/decryption, TCP connection management and data compression enables SAP NetWeaver Portal to support more simultaneous connections and users. Another proven



strategy, caching frequently accessed data, further reduces the burden on SAP NetWeaver. Intelligently distributing application traffic among multiple backend servers enables SAP administrators to maximize server resources, simplify management and lower operating expenses by eliminating or delaying the need to purchase extra SAP servers. As an added benefit, these techniques will also increase performance for other Web-based applications, as well as Web Services and SOA.

Citrix® NetScaler® excels at handling the aforementioned tasks. Lab tests showed that adding one NetScaler appliance in front of an SAP NetWeaver Portal Server improved large file download times across a global user base by about 80 percent. Performance gains were seen both under ideal conditions found on the company LAN and on the lowest-quality 768 kbps network, where NetScaler significantly reduced the time required to download a 5 MB SAP Knowledge Management file.

Graph #1 – Response time reduction for SAP Knowledge Management 5 MB download



- SAP baseline run 1
- SAP baseline run 2
- NetScaler
- Branch Repeater
- NetScaler & Branch Repeater
- Citrix XenApp

Under perfect conditions (0 percent packet loss), a T3 network runs almost as fast as a LAN. But when 1 percent packet loss is added to the test conditions, SAP running on a T3 responds more closely to a 768 kbps WAN connection—which has only 1/50th the bandwidth. The result can dramatically impact user productivity.

Best practice #2

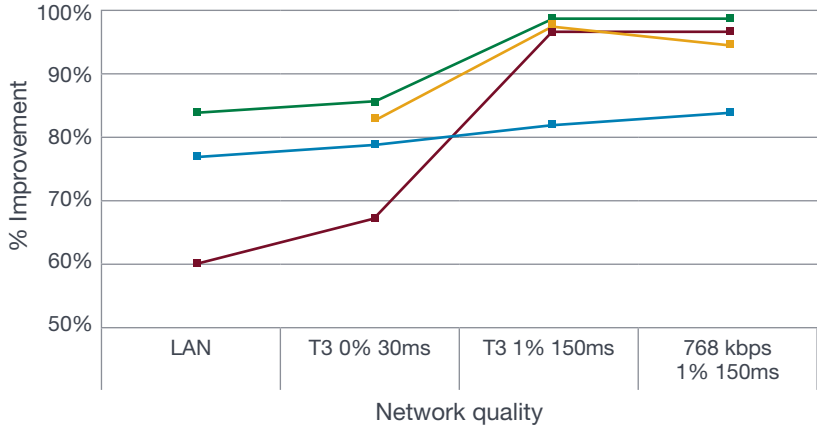
Optimize the WAN

Fine-tuning SAP NetWeaver as described in best practice #1 improves performance enterprise-wide but doesn't completely restore full LAN speed to WAN users. To increase SAP performance across the corporate WAN, it is critical to address network congestion and latency issues simultaneously.

Citrix® Branch Repeater™ intelligently manages data crossing the WAN, optimizing transmission time and minimizing the effects of latency using advanced TCP flow control. It also looks for repetitive patterns within data and, when matches are found, summons copies from a local cache to reduce network congestion and improve application responsiveness.

When Branch Repeater was deployed in addition to NetScaler in the lab environment, the response time to download a 5 MB SAP Knowledge Management file over the 768 kbps network was virtually indistinguishable from response times on a LAN. For smaller data transactions, such as a Web service call, Branch Repeater was able to reduce SAP response time by approximately 50 percent—even with simulated network traffic consuming 97 percent of total capacity.

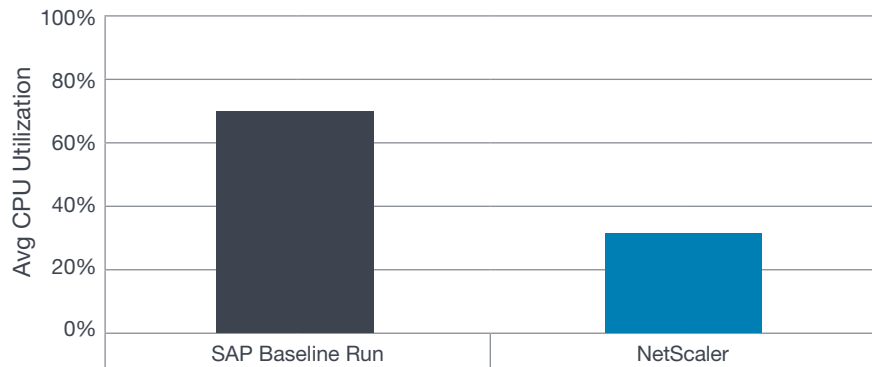
Graph #2 – Response time for SAP Enterprise Web Service with Citrix



- NetScaler
- Branch Repeater
- NetScaler & Branch Repeater
- Citrix XenApp

In lab tests where Citrix optimization and virtualization products were used to combat WAN performance issues, SAP users saw a 60 percent to 99 percent reduction in response times.

Graph #3 – SAP NetWeaver Portal average CPU utilization



In a lab simulation of 500 concurrent users logging onto an SAP NetWeaver Portal, viewing the homepage, then logging off again, simply providing TCP/IP connections consumed 70 percent of available CPU resources. Implementing a NetScaler solution reduces the load to just 30 percent—a 60 percent improvement in resource utilization.

Best practice #3

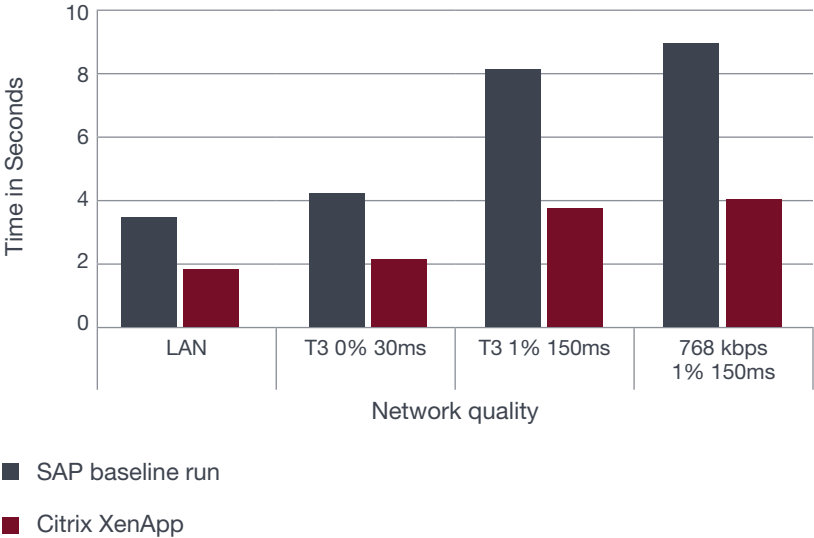
Centralize SAP applications for easier delivery

Instead of transferring massive amounts of data through the corporate WAN every time a remote user wants to run an application transaction, application centralization reduces network congestion by installing the user interface client in the datacenter and transmitting only the display pixels users need to see. A branch office or mobile user can interact with an application running at the datacenter without latency issues, chatty protocols and large data transfers getting in the way of peak performance. The only information that traverses the network is optimized screen output and input from the user’s keyboard and mouse.

Citrix XenApp™ offers application centralization for optimal SAP performance. In the 5 MB SAP Knowledge Management file test, XenApp reduced response times by 60 percent on the LAN and 97 percent on the 768 kbps network line, and achieved LAN-like performance across all tested WAN qualities. In the test of small SOA transactions, the Get-Supplier-ID call from the SAP Procurement module in this case, XenApp yielded response-time reductions between 48 percent and 56 percent.

Moreover, XenApp gives users a consistent user interface no matter what device they use to access their applications. IT organizations gain greater control over applications and data, cutting support costs, improving security and streamlining regulatory compliance.

Graph #4 – Response time improvement via Citrix for SAP Knowledge Management



Application centralization via XenApp improves response times even over a LAN, but more dramatic gains can be realized on slower-speed WANs.

Conclusion

As more IT organizations consolidate applications and data, the more critical WAN performance becomes for enterprise productivity—especially for branch offices and remote users. While additional bandwidth is often viewed as the expedient solution to application performance problems, tests at the SAP Enterprise Networking Lab proved that it has little effect on application performance. It does, however, increase recurring WAN costs.

In order to align IT and business objectives, it is essential to address the root causes of poor WAN performance using cost-effective, proven best practices. Web application optimization techniques take some of the burden off SAP NetWeaver servers, enabling IT organizations to support more simultaneous users without adding extra servers. WAN optimization maximizes available bandwidth and addresses network congestion and latency issues, so branch office and remote users spend less time waiting for applications to respond and can be more productive. Lastly, application centralization techniques—which circumvent chatty protocols and minimize bandwidth usage by transmitting only screen display information, keyboard input and mouse input—can increase SAP user performance and productivity across a wide variety of devices. As an added bonus, application centralization improves security and simplifies compliance.

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