WAN optimization for Oracle applications

White paper

Executive summary
Enterprises implementing Oracle applications over WANs must manage performance, security, and data integrity over many topologies. This paper examines IT administrators’ challenges to not only ensure the security of Oracle data over WANs, but also to provide the required performance for these applications to be effective. Finally, the paper proposes a solution for Oracle applications that integrates security and performance optimization into one centrally managed package.

Introduction
Without question, Oracle software is at the heart of many enterprise computing infrastructures worldwide. Businesses rely on Oracle for transaction processing, customer relationship management, enterprise resource planning, data mining, and more. The software has grown over the years from a centrally located, SQL database to a distributed business platform for the enterprise. Oracle applications have expanded from LAN campus installations to enable remote office, mobile user, and extranet partner access. As offsite connections to the Oracle platform become more critical to business productivity and profit, companies are seeing a dramatic increase in WAN traffic generated by Oracle applications. With the increase in Oracle data over WANs, IT administrators constantly struggle to balance the performance and security of these applications with the need to increase functionality for an ever-broadening user base.

The challenges of Oracle access across the enterprise WAN
Users can take many paths to an Oracle enterprise application. Mobile users on laptops can connect over public Internet networks; and PDA and smartphone users can log in to the network over 3G or CDMA cellular phone carriers. Business partners can use private leased-line WAN connections. Even remote offices may have a multitude of different entry points to the Oracle application repository. IT administrators must accommodate all of these connection types. Moreover, not all users are created equal. Some users may require access to a full complement of Oracle applications, while others may need only a simple connection to the data center. To be effective and efficient, the IT infrastructure must address each user’s requirements.

Unfortunately, many enterprises experience Oracle WAN problems after the applications’ initial testing and rollout phases. For example, an order entry system that tested well on the campus LAN and remotely over common carrier lines from a laptop can experience performance and data integrity problems when accessed over a cellular network. An increase in peak users can grind a formerly well-tuned application to a halt, regardless of the connection types. As a result, many IT organizations continually refine, upgrade, and monitor Oracle WAN performance and make adjustments accordingly. Many find
themselves continually reconfiguring WAN hardware, buying additional equipment, or restricting application features – an expensive and time-consuming effort.¹

Latency and bandwidth restraints

“When organizations, regardless of size, began pushing big applications over a WAN, latency was introduced. This became exceedingly challenging for small to mid-sized enterprises that lacked the budget for big WAN links but wanted to take advantage of web-based applications, especially for remote branch environments,” Sandra Kay Miller writes in Processor.²

But even large enterprises are finding latency to be an issue as they push Oracle beyond these high-performance WAN links to mobile environments. Latency and bandwidth are two of the chief bottlenecks to optimum Oracle application performance over WANs. In a worst-case scenario, high latency may cause some Oracle applications to time out and disconnect the user. More common, however, are latency delays that frustrate the user and hamper productivity. In most cases, these situations are unacceptable to many businesses, especially when they directly affect customers and business partners.

While some latency issues can be traced to the application itself, most are a result of insufficient bandwidth or intermittent connections. Each WAN connection topology presents its own set of bandwidth management and optimization challenges. Leased-line WANs may suffer congestion during peak usage periods even though initial provisioning seemed adequate. Remote offices over common carriers are subject to outages and slowdowns beyond enterprise IT control. Wireless and cellular networks may impose arbitrary bandwidth restrictions or deliver vastly disparate connection speeds depending on the location. Finally, application feature creep and the gradual increase in user demands on the WAN may degrade performance imperceptibly until they cause critical congestion. As a result, many companies find themselves addressing mobile, common carrier, and leased-line optimization with multiple products, increasing risk of incompatibilities and escalating management costs.

Security concerns

Because Oracle data is usually associated with business-critical operations, security of the data over the WAN should be a chief concern for Oracle enterprises. Most at risk for security breaches are PDAs, smartphones, wireless laptops, and remote locations. Many rely on Secure Socket Layer (SSL) security for data transmission, but few realize that once the encapsulated data is unpacked at the edge of the enterprise, this data at rest is totally unencrypted. Wireless 802.11 Ethernet, particularly in open environments such as airports, coffee shops, and home networks, is notoriously vulnerable to attack. [For a more complete discussion of mobile security and optimization issues, see the Circadence® white paper “Optimizing Connections for Mobile Workers.”]


Enterprises also struggle with applying uniform security measures across these dissimilar platforms to protect Oracle data. Even legacy networks within the corporate firewall may require specialized attention. Also, corporate and regulatory requirements may mandate that select users on the LAN, such as R&D professionals or key health care administrators, have individual, highly secured connections to their applications. Implementing and managing this myriad of security requirements over so many topologies and platforms require many corporations to deploy and integrate products from multiple vendors.

Data integrity and reliable connections
While leased-line WAN connections are highly reliable, both cellular and wireless Ethernet networks that may access Oracle applications are susceptible to unexpected dropouts and transmission errors. Advanced error correction and buffering solutions have improved reliability for both technologies over the last few years, but dropouts and lost connections remain common. Oracle applications, particularly data synchronization functions and transaction processing, are especially susceptible to restarts and potential data corruptions in such environments.

When wireless devices hand over signals, the original connection is cut, and a new signal is established. Most of the time, this handover – through buffering of data – is accomplished seamlessly, but many times the signal is lost entirely. Similar drops can occur when workers using Oracle applications over wireless Ethernet move from one access point to another. In such cases, long data transmissions may need to restart entirely to assure data integrity. Oracle applications may time out and need to be restarted. In some cases, data is corrupted on the mobile device or on the enterprise database server before it is checked to be committed.

Oracle WAN management
WAN optimization and security for Oracle applications may require the careful integration of multi-vendor products, as well as necessitate separate and distinct balancing of general WAN optimization against Oracle-specific traffic requirements. Under these circumstances, IT administrators have no centralized control over either security or the WAN itself. Each optimization and security component would have its own point-product management. In addition, administrators may have the unpleasant task of managing mobile, wireless Ethernet, and leased-line WAN optimizations separately for each Oracle application. While optimizing Oracle WAN applications using Quality of Service (QoS) between enterprise switches is routinely accomplished, this scenario does not assure application priority over other networks.

The Circadence-Oracle solution
Founded in 1993, Circadence focuses on developing products for WAN security and performance. The Circadence MVO™ 1200 WAN Optimization suite, the core of the company’s technology, can be deployed in software, hardware, and integrated application configurations. The Circadence MVO 1200 WAN Optimization suite provides optimal bandwidth, resilient WAN connections, and U.S. Department of Defense (DoD)-
grade security as a foundation for building enterprise-wide Oracle applications over WANs.

The technology used in the Circadence MVO 1200 WAN Optimization suite is Circadence’s patented optimization protocol. The algorithms in Circadence’s protocol offer the dual functions of providing accelerated and uninterrupted WAN connections. In addition, Circadence has worked closely with government and defense clients to incorporate sophisticated security features into its optimization protocol.

Circadence performance

In independent tests, a leading enterprise Oracle database application developer recently quantified throughput gains when using Circadence MVO products with mobile and wireless laptop devices. Using a mobile field service test scenario, the vendor ran a suite of field service applications over standard and Circadence MVO-enabled wireless connections. The application test bed performed a new customer service request, a service request update, and four other field application operations. To simulate real-world network traffic conditions, the test bed also introduced network congestion to simulate zero to moderate (50-percent) to high (95-percent) network utilization. The results were consistent. Throughput using Circadence MVO was double that of a standard connection in a zero network utilization environment. When operating in a moderately congested environment, Circadence MVO performance was 108-percent better than a standard wireless connection. Even in highly congested simulations, Circadence MVO-enabled connections provided 110-percent higher throughput than a standard wireless network.

In addition, the vendor ran the same tests using other WAN optimization and acceleration products. In the tests, a hardware switch platform, two hardware optimizers, and the Circadence MVO Appliance were tested in the following areas over a WAN:

- System login
- Data synchronization
- Navigation
- Oracle form use and updates
- Information updates
- Logout

Figure 1
Within the Circadence MVO 1200 WAN Optimization suite, Circadence offers Virtual Circadence MVO with support for Oracle Virtual Machine (VM). Oracle VM connections are accelerated up to 100 times and provide the same government-grade security as other Circadence MVO products. VM connections, of course, are subject to the same bandwidth and latency issues as other WAN applications, so native support of Oracle VM provides the best possible acceleration and reliable connection for Oracle VM applications.

Point-to-point security and resilience
Circadence has a long history of working with the most demanding security-conscious customers. The algorithms deployed in the Circadence protocol meet or exceed the standards of the DoD for providing secure connections. The Circadence MVO Appliance is certified for use at classified government installations. In addition, Circadence MVO connections are secured from point-to-point, unlike SSL security that is shed at the gateway server decryption point. Oracle applications can use SSL, however, in conjunction with the Circadence MVO 1200 WAN Optimization suite to provide an even greater layer of protection. Tests confirm that no degradation in acceleration occurs when SSL is used in tandem with Circadence MVO. When securing Oracle applications on an internal LAN using Circadence MVO products, the same point-to-point encryption is applied in addition to optimizing the application’s performance across the network.

The Circadence MVO 1200 WAN Optimization suite also includes Link Resilience™, a method of maintaining connectivity over severely degraded or interrupted connections. With Link Resilience, Oracle applications can continue functioning across cellular and wireless network handoffs, and even transparently maintain viability during interruptions of service. This feature provides a high level of data integrity and application stability above and beyond acceleration.
Flexible Oracle WAN optimization

Unlike many WAN optimization products, Circadence MVO is available as a VM application and desktop and mobile client software. Oracle application administrators choose where to deploy Circadence MVO products without disrupting their current network infrastructure or Oracle configurations. Existing network switches, connections, and applications remain intact.

To accelerate and secure WAN connections for Oracle applications, the Circadence MVO 1200 WAN Optimization suite includes:

- **Circadence MVO Software suite** – This software package supports Windows and Linux, and is portable to almost any POSIX-compliant operating system.
- **Circadence MVO Appliance** – This hardware solution not only centralizes Circadence MVO connections, but also ensures survivability during denial-of-service attacks. The Circadence MVO Appliance is DoD-certified for classified installations.
- **Virtual Circadence MVO** – This solution provides support for Oracle VM, VMware, Microsoft Virtual Server, Xen, and other virtualization solutions, and can serve as a virtual gateway.
- **Circadence MVO Mobile** – Circadence MVO optimization is available for Windows Mobile, Symbian, and Mobile Linux devices on secure digital (SD), USB, and compact flash (CF) cards.
- **Circadence MVO Windows Client** – Operating as agent software on a Windows PC or server, this Circadence MVO client can connect to any other Circadence MVO component. The software requires slim resources and is transparent to the user.

Centralized Oracle WAN management

Because all Circadence MVO products work together, regardless of configuration or location in the enterprise, one central web-based interface is used to configure parameters, monitor performance, and set priorities. The Circadence MVO 1200 WAN Optimization suite provides device and environment-independent QoS guarantees, so desktop agents, virtual machines, or the Circadence MVO Appliance can all address priorities from one interface. Legacy systems can be upgraded to QoS without being replaced. In addition, QoS priorities can be set by application or by user across the entire WAN. Because Circadence MVO products use Circadence’s patented optimization protocol, DoD-grade security is built into every Circadence MVO connection, regardless of the endpoint in the network – from server to PDA to desktop. Installing or monitoring additional security software for WAN connections is not needed, and the security is uniform throughout the Circadence MVO environment.

Conclusion

As enterprises move Oracle applications farther into the field, IT administrators face significant challenges in optimizing WANs for remote users. While initial testing of applications may yield acceptable performance, the unavoidable reliance on public and cellular networks makes consistent performance unpredictable. Central management of WAN optimization for Oracle applications yields the best results. Therefore, administrators and WAN users can benefit from the adaptable, flexible, and stable Circadence MVO 1200 WAN Optimization suite. The Circadence MVO 1200 WAN
Optimization suite is flexible enough to deploy in virtually any environment and is the least disruptive to existing networks, making it easier to manage and far less costly than point solutions.

About Circadence
Since 1993, Circadence has leveraged the power of advanced technologies to pioneer smarter, faster, and more cost-effective solutions for improving IT performance. What started with an innovative platform for making massively multiplayer online games run faster has quickly grown into the most capable suite of optimization solutions available. Based in Boulder, Colorado, Circadence continues to expand today’s possibilities with tomorrow’s technologies – addressing new, growing concerns with dynamic, high-performance solutions. Only Circadence offers the most capable IT innovation solutions available – proven to outperform some of the world’s most demanding challenges. For more information on Circadence, visit www.circadence.com.

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