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A Smarter Approach to WAN Optimization

Take Charge of Your Network and Applications with Unified Performance Management

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Executive Summary

Organizations rely heavily upon their network and applications to drive day-to-day operations and support employees and customers. With more remote and mobile users dependent on the wide area network (WAN) and more Web-based applications coming online every day, the amount of traffic crossing organizations' networks is growing exponentially. When bandwidth congestion and network issues are allowed to impede the performance of critical applications, productivity suffers and the entire organization may be put at risk.

Network managers and administrators face the daunting task of effectively monitoring and managing network resources and bandwidth while meeting user expectations for consistently fast access to applications running on the WAN. At the same time, most IT departments also have the mandate to reduce operating costs and do more with less.

This white paper will demonstrate how organizations can overcome these challenges by implementing a Unified Performance Management (UPM) solution that addresses the three key requirements of application performance management: visibility, control and optimization. Unified Performance Management evolved from the concept of Unified Threat Management, or UTM, which describes a network firewall solution that incorporates many advanced features in a single box including e-mail spam filtering, anti-virus capabilities, intrusion detection and content filtering.

With Unified Performance Management, the core capabilities needed to effectively manage the WAN and ensure optimal application performance are incorporated into a single network appliance. These capabilities include real-time monitoring, reporting, traffic control, optimization and acceleration – all integrated and accessible through a common interface and centralized management platform.

By providing a comprehensive solution for improving application performance, Unified Performance Management can positively impact the bottom line. UPM enables organizations to lower network operating costs, defer expensive bandwidth upgrades and increase productivity by reducing the time employees spend waiting for slow applications to respond. In customer-facing situations, UPM helps ensure customer loyalty and profitability by delivering the reliable access to online applications and services needed to attract and retain customers.

"On average, 37% of network capacity has been occupied by traffic that is not business-critical."

Aberdeen Group,
"Application Performance Management: Getting IT on the C-Level Agenda", March 2009

"Business performance starts to decline when mission-critical applications reach the baseline of 5.1 seconds of response time delay."

Aberdeen Group,
"The Performance of Web Applications: Customers are Won or Lost in One Second", November 2008

Trends Affecting Today's Networks

There are several recent information technology and business trends that have put pressure on network capacity, creating application delivery challenges.

Centralization of Applications and Data Centers

In many organizations, network applications are being centralized to the data center environment to eliminate the need for servers at branch office locations and IT staff to maintain them. Data centers are also being consolidated to reduce hardware and network operating costs, increase data security and meet regulatory compliance.

With server consolidation, data center consolidation and server virtualization, network congestion and application latency increase as data has further to travel from the data center to the branch office. Transactions and data requests that previously would have been handled over the branch local area network (LAN) are now being processed over the WAN. This means that more network traffic than ever before is competing for the link between the data center and the branch office.

To further complicate matters, many enterprise applications that were originally designed for use on a LAN are now being used across the WAN. These applications may be bandwidth-intensive and may not perform well on the WAN due to network latency and congestion.

Highly Mobile Workforce

Today's workforce is increasingly on the move. Sales road warriors, traveling technical staff, corporate trainers, executives and employees who work from home all need reliable access to applications at anytime and from anywhere. Many organizations struggle to ensure sufficient WAN capacity to keep pace with the rising number of mobile users who demand the same fast application response times as when they are in the office.

A Growing Number of Online Applications

Organizations must deliver a highly diverse set of applications over the network which puts strain on available bandwidth. Today, line of business applications including voice over IP (VoIP) and Web services are dependent upon the network. Organizations continue to add more applications to their networks. By some estimates, a typical company adds 84 new Web-enabled applications each year. Organizations often overlook the impact that these additional applications will have on already overburdened data connections.

Organizations have invested heavily in Web-based applications such as CRM, ERP and VoIP because they promise to allow enterprises to do business more efficiently and reduce operating costs. However, if the network fails to deliver these applications in a consistent and rapid manner, end users become frustrated, productivity suffers and the organization's return on investment may be sub par.

Increasing Recreational Internet Traffic

Just as business applications are increasing in number year over year, so too are recreational Internet applications and traffic. Popular social networking sites such as Facebook, MySpace and LinkedIn, as well as peer-to-peer (P2P) file sharing applications like BitTorrent, Limewire and Kazaa, are now competing with business applications for available bandwidth. Instant messaging and streaming media such as video clips viewed on YouTube place additional strain on networks that are already under pressure to deliver business applications. Network managers and administrators need a way to detect and control recreational traffic so that application performance is preserved.

All of these factors translate into a massive increase in the volume of traffic passing over the network and between remote locations and the data center. In the next section, we'll look at the impact this increasing traffic has on application performance and the steps organizations commonly take to address application delivery challenges.

Type of Recreational Internet Traffic	Occurrence of Recreational Internet Traffic
Streaming Video	75%
Internet Radio/ Streaming Radio	73%
Instant Messaging	73%
File Sharing (P2P)	63%
Online Gaming	58%

Ashton, Metzler & Associates, Application Delivery Handbook, January 2007

"Organizations are increasingly looking to be more proactive in managing application performance and their IT departments are being tasked with a new challenge: how to identify and resolve potential performance issues before they impact end-user productivity."

Aberdeen Group,
"Application Performance Management: Getting IT on the C-Level Agenda",
March 2009

Application Delivery Challenges

When network capacity fails to meet growing demand, the effects can reverberate across the enterprise, affecting both business and IT operations.

Unfortunately, the effect of poorly performing networks is typically observed first by end users who complain of slow or inconsistent application performance in remote offices. The fact that the burden falls on the end user is due to poor visibility into network activity and usage. While IT staff may have some rudimentary tools in place to monitor the volume of network traffic, they rarely know which applications are consuming the majority of their bandwidth. This information is critical for IT to identify network capacity issues before the help desk phone rings with complaints about the network being sluggish.

Without the ability to accurately measure application response times to see if performance is degrading, network managers cannot determine the root cause of poor application performance, nor can they proactively address the issue before it impacts the end user community.

In addition to unproductive end users waiting for slow applications to respond, overtaxed and poorly performing networks also impact IT operations. Many IT organizations struggle with data coherency and slow backup issues. Often an organization's backup process involves dropped packets which corrupts the data and threatens business continuity. With high latency on the links, organizations may also be unable to complete scheduled backups within their allotted off-peak time.

Short-sighted Tactics for Addressing Poor Application Performance

Lacking network visibility or the ability to anticipate application performance issues before they arise, IT departments are often left scrambling to deal with the issue as quickly as possible. Some organizations will attempt to solve this problem by simply adding more bandwidth. Unfortunately, throwing more bandwidth at the problem is a temporary, partial and expensive solution. Additional bandwidth may mask the worst symptoms of a poorly performing network for awhile, but it does nothing to treat the underlying problem itself. Organizations must find ways to cure performance issues such as the effects of latency, repetitive data transfers, protocol inefficiencies or bandwidth being siphoned away by non-business traffic.

Another approach some organizations will take is application acceleration. They will invest in solutions that accelerate everything on the network including unwanted and unproductive traffic. Just like adding more bandwidth, this approach is ultimately short-sighted. While accelerating all traffic, including the good and the bad, may appear to work for a time, eventually the link will be maxed out again and the organization will be back to square one. Greedy P2P applications, for example, will continue to consume as much bandwidth as is made available, squeezing out more important business applications. Without network visibility and the means to control traffic, application acceleration is as irresponsible as blindfolding oneself, taking the wheel and hitting the gas pedal.

In the following section, we will discuss how Unified Performance Management goes beyond short-sighted tactics to provide a long-term strategy for optimizing application performance.

Unified Performance Management

A Unified Performance Management solution brings visibility, control and optimization together in a comprehensive, tightly integrated and centrally managed system. Many organizations may already rely on a patchwork of point solutions for limited network visibility, reporting, control, optimization and acceleration. However, this piecemeal approach lacks cohesiveness and can actually increase network operating costs and management burdens because the different point solutions lack interoperability or a centralized management interface.

By incorporating the three key capabilities needed for application performance management – visibility, control and optimization – in a single box, UPM allows network managers to spend their time optimizing the network and ensuring consistent application response times instead of managing the various point solutions themselves.

Components of a Unified Performance Management Solution

Working together, the core components of Unified Performance Management provide a closed-loop system for monitoring, managing and continually optimizing applications on the network:

Visibility

The first step toward effective application performance management is understanding exactly what is happening on the network. A UPM solution provides deep visibility into network activity, usage and performance, giving network managers the intelligence, knowledge and foresight needed to keep the network and the applications that depend upon it operating at peak performance.

Control

UPM includes a broad set of network management capabilities that allow managers to maximize network resources and control traffic without placing heavy-handed restrictions on users.

Optimization

Equipped with a 360-degree view of the network and the means to control it, network managers can now turn understanding into action by implementing policies and network changes that drive real application performance, improve the user experience and optimize productivity.

In the next sections, we'll look at each of these three key components in more detail.

Visibility

When IT staff struggle with poor application performance, they often wish they had the ability to scan their network to see all of the applications that are flowing across the WAN in order to control or block unwanted traffic. Without this degree of visibility into network activity and bandwidth utilization, network managers are essentially blindfolded and have no way to effectively address performance issues.

Enhanced network visibility is the foundation of Unified Performance Management. With a UPM solution in place, network managers and IT staff can essentially give their network a CAT scan. UPM combines real-time network visibility with sophisticated analysis and reporting to provide multiple cross-sectional views of the network that help IT identify bottlenecks and accurately diagnose performance issues. The result is a highly detailed multidimensional view of the network that can be used to guide all traffic control, optimization and capacity planning activities.

Application visibility allows IT staff to visualize all traffic on the network at the application layer (Layer 7). Using an advanced application classification engine, the UPM solution can identify and classify all peer-to-peer traffic, URLs, applications, Sip call information and more. At a glance, network managers and administrators can instantly see:

- Top applications for inbound traffic
- Outbound traffic by user
- Percentage of bandwidth being used by traffic type
- Top URLs in and out of Internet link

IT staff can drill down to identify recreational traffic including evasive applications and view bandwidth utilization down to the individual user level through integration with Microsoft® Active Directory. Real-time monitoring and historical statistics help IT staff understand what applications are running on the network and how much bandwidth each application is consuming.

Sample Application Visibility Report

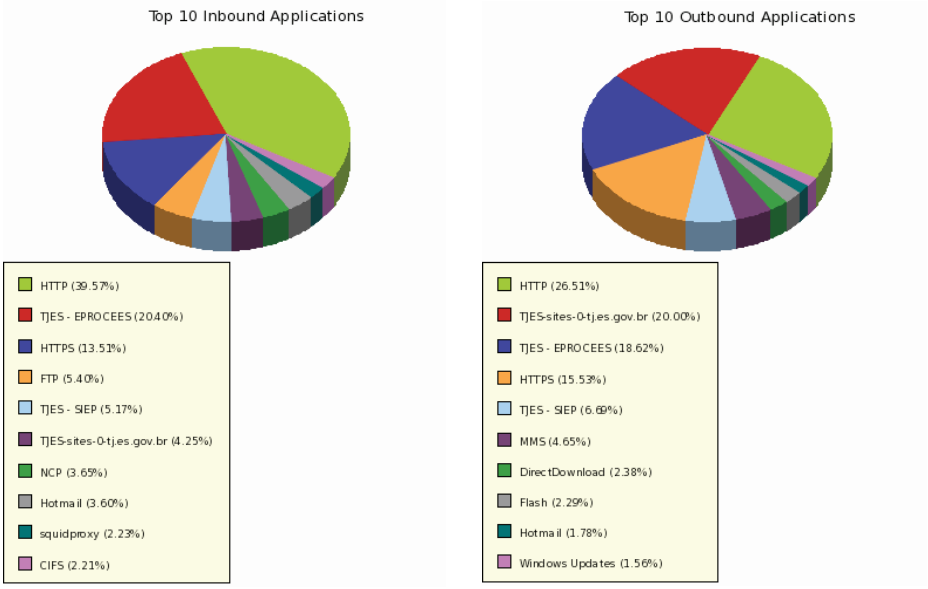

Figure 1 – This graphic detail from a sample report lists the top inbound and outbound applications on the network. Graphical reports can be automatically emailed in PDF format on a daily basis to key IT personnel or business executives.

"Seventy-one percent (71%) of Industry Average organizations do not have the ability to measure application response times for every transaction."

"The inability to measure the business impact of issues with application performance is one of the top challenges with application performance management."

Aberdeen Group,
"Application Performance Management: Getting IT on the C-Level Agenda", March 2009

Application Response Measurement

One of the most important elements of network visibility is application response measurement, which allows IT staff to objectively measure and quantify application performance from the end users' perspective. By capturing metrics on how long end users are waiting for a given application to respond, application response measurement helps network managers fine-tune Quality of Service (QoS) policies and pinpoint whether an application performance issue is network or server related. Without these measurements, IT staff have no clear way of knowing if application response times are improving or degrading. The ability to generate reports on application response times may also be critical for IT to obtain management buy-in for bandwidth upgrades or other network investments.

Equipped with this deep knowledge of network activity and usage, network managers can make informed decisions for setting effective policies, controlling traffic and optimizing network resources.

Control

It is one thing to be able to see what is happening across the network and another to be able to actually do something about it. With UPM, network managers not only get visibility into why applications are performing slowly, but they also get advanced control capabilities that allow them to proactively address performance issues such as mis-configurations, congestion and bottlenecks.

UPM includes sophisticated WAN controls that allow IT staff to create network polices to prioritize the most critical applications, fair-share network resources, throttle recreational traffic or block some types of unwanted traffic altogether.

Policy-based Traffic Management

Organizations can develop policies to precisely control bandwidth availability by limiting or eliminating unwanted network traffic such as P2P or other recreational traffic. In such a way, organizations can prevent low-priority traffic from interfering with the performance of the WAN or impeding response times for critical applications.

Fair Sharing

With this tool, network administrators can easily allocate specific amounts or percentages of bandwidth to individual users, user groups or sub-nets to ensure that no single user or host can monopolize bandwidth.

Evasive Application Traffic Detection

Many P2P and file sharing applications are evasive. They may mask their behavior on the network or masquerade as other more legitimate applications. Using Layer 7 application signatures, behavior monitoring and advanced heuristics, UPM enables IT staff to detect and control all applications on the network including those that are designed to be evasive.

Adaptive Response

This advanced control mechanism allows IT staff to set policies that allow the network to automatically adapt to changing traffic conditions without requiring manual intervention. This low-touch approach allows network administrators to set alerts, notifications and execute custom scripts that automatically change the behavior of the network based on user-defined events and triggers.

The Importance of a Global Management Solution

In order for organizations to make the most of UPM control capabilities, network administrators must have a global management tool for managing the UPM appliance or multiple appliances distributed throughout the network. Ideally, network managers should be able to gain secure, password-protected access to this global management tool using only a standard Web browser and Internet connection.

The global management interface provides full visibility into how applications are performing over the WAN via customized, user-friendly, graphical reports. The interface equips network managers and IT staff with critical information such as network utilization, top applications and top URLs accessed. With this information, network managers can control network policies to fully optimize the network, regardless of the number of remote sites. The management interface, which may be hosted at the customer site or accessed in a software as a service model (SaaS), also includes self-management capabilities for centrally installing, configuring, patching and monitoring UPM appliances.

A global management interface puts all UPM visibility, control and optimization capabilities at the network administrator's fingertips. It also offers significant cost savings by reducing network operating costs, simplifying common network control and optimization tasks and lowering total cost of ownership (TCO).

Optimization

WAN optimization is the holy grail for network managers. As such, it is perhaps not surprising that some organizations attempt to skip directly to this final phase without first ensuring that they have adequate network visibility and control. The most common example of this reactive short-cutting is when organizations invest prematurely in solutions that accelerate all network traffic including unwanted recreational traffic. As we saw above, this short-sighted tactic fails to address the root cause of application performance issues.

Before organizations even begin to think about application acceleration, they must first take actions to remove redundant data from the network, deliver content locally in the branches using caching, eliminate the effects of latency on applications and accelerate TCP.

WAN memory optimization, for example, identifies repetitive traffic patterns and stores or caches them for local delivery rather than sending this repetitive traffic across the WAN again and again. With less repetitive data traversing the network, application data can travel more quickly. For example, a 55 megabyte file that takes 6 minutes to download over a T1 line can be accelerated and downloaded in just 22 seconds using WAN memory optimization. Traffic compression is another element of real network optimization which gets to the root cause of performance issues rather than merely masking their symptoms.

WAN Capacity Improvements

Figure 2 – Application response improvements achieved by reducing the amount of data on the WAN using compression, WAN memory and TCP acceleration.

Looking at the top bar in the chart above, we can see that HTTP traffic can typically be reduced by 60 percent using compression, WAN memory & TCP acceleration. A peak reduction of 98% can be achieved for environments with highly repetitive data or multiple concurrent flows of repetitive data.

Application Response Time Improvements

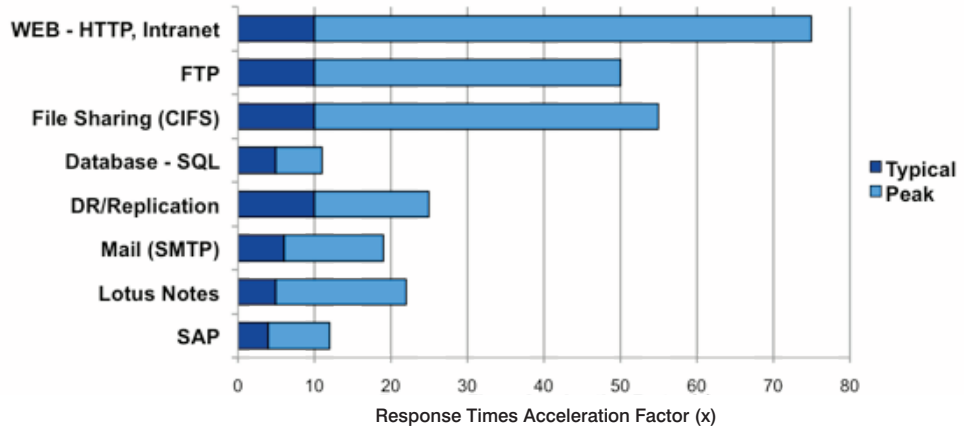

Figure 3 – This chart shows application response time improvements. The dark blue bar shows that HTTP traffic can be typically improved by a factor of 10x. In environments with highly repetitive data patterns, the peak improvement can be a factor of 75x.

As the charts above show, network managers can make significant improvements in network and application performance without application acceleration. This is not to suggest that application acceleration does not have its place, but many network managers rush to invest in acceleration without first addressing other critical areas of network optimization.

Once network managers have turned information into action by establishing network policies to classify and prioritize network traffic, limit recreational traffic and provide bandwidth guarantees based on the business criticality of applications, they are ready to look at the intelligent acceleration capabilities of UPM.

Intelligent acceleration allows IT staff to selectively speed up both TCP and CIFS applications so end users enjoy quicker application response. With UPM, only the traffic deemed important to the business is accelerated, which is in marked contrast to "dumb" acceleration solutions that speed up everything on the network including unwanted traffic.

Summing Up

Unified Performance Management provides organizations with a more effective and strategic way to ensure that applications are continually optimized and that there is sufficient network capacity to meet current and future demands. UPM provides a comprehensive, tightly integrated solution for addressing network visibility, control and optimization – all within a single affordable technology investment. By deploying UPM on the WAN, organizations instantly gain the ability to:

1. See and understand exactly what is happening across the network so IT staff can detect recreational traffic, mis-configured or misbehaving services and users who are consuming more than their fair share of bandwidth. With real-time visibility into network activity and rich historical reporting and trend analysis, network managers can make informed decisions about what traffic to control, optimize or accelerate in order to ensure application performance. Visibility also supports effective capacity planning.

2. Equipped with a 360-degree view of the network, organizations can apply policies to control unwanted or aggressive traffic on the network, as well as prioritize bandwidth resources for important business applications.

3. Lastly, organizations can use UPM to turn information into action by optimizing their network and applications with caching, WAN memory optimization, TCP acceleration and packet shaping. Optimization may include intelligent application acceleration to increase the performance of bulky applications such as Windows File Sharing and Email.

Unified Performance Management is a wise investment because the initial cost of entry is minor compared to the long-term productivity gains and operating efficiencies gained. In real-world customer implementations, UPM solutions have been shown to improve network efficiencies by up to a factor of 100, while enabling organizations to defer costly bandwidth upgrades for a significant period of time. By implementing UPM as a key infrastructure component, organizations gain the strategic ability to continually monitor, control and optimize their WAN to maximize application performance and make the most of their network capacity.

About Exinda

Exinda is a global provider of WAN optimization and application acceleration products. Exinda has helped over 2,000 organizations worldwide reduce network operating costs and ensure consistent application performance over the WAN. The Exinda Unified Performance Management (UPM) solution encompasses application visibility, control, optimization and intelligent acceleration – all within a single network appliance that is affordable and easy to manage.

Founded in 2002, Exinda is headquartered in Boston, Massachusetts with regional offices in Canada and the United Kingdom. Research and Development is centralized in Melbourne, Australia.

To learn more about Exinda's award-winning solutions for enterprise, education and service provider clients, contact your local reseller or visit www.exinda.com.

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