# The 2011 Application & Service Delivery Handbook

Part 1: Executive Summary and Challenges

By Dr. Jim Metzler, Ashton Metzler & Associates Distinguished Research Fellow and Co-Founder Webtorials Analyst Division

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# Introduction

# **Executive Summary**

The **2011** Application and Service Delivery Handbook will be published both in its entirety and in a serial fashion. This is the first of the serial publications. One goal of this publication is to describe how the **2011** Application and Service Delivery Handbook differs from previous editions in this series. Another goal of this publication is to identify a set of factors, such as chatty protocols, that have traditionally complicated the task of ensuring acceptable application delivery and to also describe a set of factors, such as the growth in the number of mobile workers, which is beginning to have a major impact on application delivery.

# **Background and Goals**

Webtorials published the first edition of what became an annual series of application delivery handbooks in January 2007. The primary goal of the preceding handbooks was to help IT organizations ensure acceptable application delivery when faced with what is described in the next section of this document as the first generation of application delivery challenges.

Throughout the **2011 Application and Service Delivery Handbook**, the phrase **ensuring acceptable application and service delivery** will refer to ensuring that the applications and services that an enterprise uses:

- Can be effectively managed
- Exhibit acceptable performance
- Incorporate appropriate levels of security
- Are cost effective

At the same time that many IT organizations are still in the process of implementing solutions that respond to the first generation of application delivery challenges, a new generation of challenges is emerging. These challenges are driven in large part by the:

- Implementation of varying forms of virtualization
- Adoption of cloud computing
- Emergence of a sophisticated mobile workforce
- Shifting emphasis and growing sophistication of cyber crime

In part because the ongoing adoption of virtualization and cloud computing has created the concept of everything as a service (XaaS), this year's handbook will include more of a focus on managing and optimizing services. In addition to the concept of XaaS, services as discussed in the handbook will also include business services that involve multiple inter-related applications. To reflect this enhanced focus on services, this year's handbook is entitled the *2011 Application and Service Delivery Handbook*.

The goal of the 2011 Application and Service Delivery Handbook is to help IT organizations ensure acceptable application delivery when faced with both the first generation, as well as the emerging generation of application delivery challenges.

# Foreword to the 2011 Edition

As stated above, IT organizations are now encountering a new generation of application and service delivery challenges. So, while this year's edition of the application delivery handbook builds on the previous edition of the handbook, every section of the 2010 edition of the handbook was modified before being included in this document. For example, on the assumption that a number of the concepts that were described in previous editions of the handbook are by now relatively well understood, the description of those concepts was made more succinct in this year's handbook. In addition, all of the market research that was contained in the previous edition was deleted. To compensate for those changes, the <u>2010</u> <u>Handbook of Application Delivery</u> is still accessible at Webtorials.

Another change is that the section of the 2010 edition of the handbook that was entitled *Managed Service Providers* has been edited to focus on the task of optimizing and securing the Internet. In addition, the content that was contained in the section of the 2010 edition of the handbook that was entitled *Planning* as well as the content that was contained in the section that was entitled *Control* has been significantly reduced in size and included in other sections of the 2011 Application and Service Delivery Handbook.

In order to reflect the breadth of the movement to implement cloud computing, this year's handbook introduces the concept of a Cloud Networking Service (CNS). A CNS is a traditional network service, such as VoIP or optimization, which can now be acquired from a cloud computing service provider. The great interest in cloud computing drove a number of other additions to the handbook. This includes a discussion of cloud balancing – the advantages that it provides, the challenges that it presents and the role that application delivery controllers play in enabling cloud balancing. Because of the great interest in both virtualization and cloud computing, the handbook identifies the management and optimization challenges that are of most interest to IT organizations. The handbook also describes how virtualized application delivery appliances and cloud based optimization and management solutions can help IT organizations respond to these challenges. Given the extremely difficult management challenges associated with both virtualization and cloud computing, the management section of the handbook contains an added emphasis on application performance management and introduces the concept of application performance engineering.

In early 2011 two surveys were given to the subscribers of Webtorials. Throughout this document, the IT professionals who responded to the two surveys will be referred to as **The Survey Respondents**. The results of surveys, such as the two that were given to the subscribers of Webtorials, which asked IT organizations about their plans, are always helpful because they enable IT organizations to see how their own plans fit with broad industry trends. Such survey results are particularly beneficial in the current environment when so much change is occurring.

One of the two surveys asked a broad set of questions relative to application delivery; e.g., how interested are IT organizations in emerging forms of virtualization such as desktop virtualization.

The other survey focused on identifying the optimization and management tasks that are of most interest to IT organizations. With that later goal in mind, The Survey Respondents were given a set of twenty optimization tasks and twenty management tasks and asked to indicate how important it was to their IT organization to get better at these tasks over the next year. Because of the way the questions were worded, the responses highlight the aspects of management and optimization on which IT organizations are currently focused.

When asked about the optimization and management tasks that were important for their IT organization to get better at over the next year, The Survey Respondents were given the following five-point scale:

- 1. Not at all important
- 2. Slightly important
- 3. Moderately important
- 4. Very Important
- 5. Extremely important

The answers to both surveys will be used throughout the **2011 Application and Service Delivery Handbook** to demonstrate the breadth of application delivery challenges currently facing IT organizations.

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# **Application and Service Delivery Challenges**

This section of the handbook discusses some of the primary systemic challenges that are associated with ensuring acceptable application and service delivery. These challenges are grouped into two categories. The first category is the challenges that IT organizations have been responding to for the last several years and is referred to either as the first generation of application delivery challenges or alternatively as the traditional application delivery challenges. The other category is referred to either as the second generation of application and service delivery challenges, or alternatively as the emerging challenges that IT organizations are beginning to encounter.

As described below, an example of a systemic challenge to ensuring acceptable application and service delivery that is discussed in this section of the handbook is the limited focus that many IT organizations place on application performance during application development. More granular challenges to ensuring acceptable application and service delivery (e.g., ensuring acceptable performance of VoIP traffic, optimizing and/or managing in a hybrid cloud computing environment) will be discussed throughout the handbook.

One of the reasons why application and service delivery continues to be an important topic for IT organizations is the fact that approximately seventy five percent of The Survey Respondents indicated that when one of their company's key applications begins to degrade, that the degradation is typically noticed first by the end user and not by the IT organization.

# In the vast majority of instances, end users notice application degradation before the IT organization does.

The fact that it has been true for years that it is typically the end users that first notices application degradation makes it appear as if IT organizations are not getting better at ensuring acceptable application delivery. The reality is that most IT organizations do a better job today at ensuring acceptable application delivery than they did when the first handbook was published in 2007. Unfortunately, as is described below, the application delivery challenges facing IT organizations continue to get more formidable.

To further quantify the criticality of ensuring acceptable application delivery, the Survey Respondents were asked "If it is the end user who typically first notices application degradation, how important is that to senior management?" Their answers are shown in Figure 1.

Having the IT organization notice application degradation before the end user does is important to the vast majority of senior managers.



# **The Traditional Application Delivery Challenges**

# **Limited Focus of Application Development**

The Survey Respondents were asked "When your IT organization is in the process of either developing or acquiring an application, how much attention does it pay to how well that application will perform over the WAN?" Their answers are shown in **Figure 2**.

As is often the case with surveys, the data in **Figure 2** presents a classic good news – bad news situation. The good news is that the data in **Figure 2** indicates that just over a quarter of IT organizations place a significant or very significant emphasis on how an application performs over the WAN during application development or acquisition. The bad news is that almost three quarters of IT organizations don't.

> The vast majority of IT organizations don't have any insight into the performance of an application until after the application is fully developed and deployed.



## **Chatty Protocols and Applications**

The lack of emphasis on an application's performance over the WAN often results in the deployment of chatty applications<sup>1</sup> as illustrated in **Figure 3**.



To exemplify the impact of a chatty protocol or application, let's assume that a given transaction requires 200 application turns. Further assume that the latency on the LAN on which the application was developed was 1 millisecond, but that the round trip delay of the WAN on which the application will be deployed is 100 milliseconds. For simplicity, the delay associated with the data transfer will be ignored and only the delay associated with the application turns will be calculated. In this case, the delay over the LAN is 200 milliseconds, which is generally not noticeable. However, the delay over the WAN is 20 seconds, which is very noticeable.

<sup>&</sup>lt;sup>1</sup> Similar to a chatty protocol, a chatty application requires hundreds of round trips to complete a transaction.

The preceding example also demonstrates the relationship between network delay and application delay.

# A relatively small increase in network delay can result a significant increase in application delay.

The Survey Respondents were asked how important it is for their IT organization over the next year to get better at optimizing the performance of chatty protocols such as CIFS. Their responses are shown in Figure 4.

Optimizing chatty protocols such as CIFS was one of the primary challenges that gave rise to the first generation of WAN optimization products. In spite of the fact that IT organizations have been responding to this challenge for several years, over 80% of The Survey Respondents indicated that over the next year that it is at least moderately important for their organization to get better at optimizing these protocols.



Optimizing chatty protocols was one of a number of first generation application delivery challenges that are still important to IT organizations. For example, over 80% of The Survey Respondents also indicated that over the next year that it is at least moderately important for their organization to get better at optimizing the performance of TCP.

# Responding to the first generation of application delivery challenges is still important to the majority of IT organizations.

## **Myriad Application Types**

As described in the 2010 Application Delivery Handbook<sup>2</sup>, the typical enterprise relies on hundreds of applications of different types, including applications that are business critical, enable other business functions, support communications and collaboration, are IT infrastructure-related (i.e., DNS, DHCP) or are recreational and/or malicious. In addition, an increasing amount of traffic results from social media. In some cases social media traffic is entirely recreational whereas in other cases it represents important, but typically not delay sensitive, business traffic.

Because they make different demands on the network, another way to classify applications is whether the application is real time, transactional or data transfer in orientation. For maximum benefit, this information must be combined with the business criticality of the application. For example, live Internet radio is real time but in virtually all cases it is not critical to the organization's success.

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<sup>&</sup>lt;sup>2</sup> The 2010 Handbook of Application Delivery, page 14

Over the last few years, IT organizations have begun to focus on the management and optimization of a small set of applications and services. The next sub-section of this document highlights one component of that trend - that component is the great interest that IT organizations have in getting better at providing SLAs for one or more business critical applications.

To further illustrate the trend of focusing on a small number of applications, The Survey Respondents were asked two questions. One question was how important it was over the next year for their IT organization to get better at optimizing the performance of specific applications such as SharePoint. The second question was how important it was over the next year for their IT organization to get better at optimizing the performance of a key set of applications that are critical to the success of the business. Their answers are shown Table 1.

Table 1: Importance of Optimizing Key Applications		
	Optimizing Specific Applications such as SharePoint	Optimizing a Key Set of Business Critical Applications
Extremely Important	15.4%	25.9%
Very Important	34.6%	48.1%
Moderately Important	28.8%	16.7%
Slightly Important	13.5%	7.4%
Not at all Important	7.7%	1.9%

The data in **Table 1** demonstrates the importance that IT organizations place on optimizing both a specific application such as SharePoint as well as a small set of applications.

# Over the next year, the most important optimization task facing IT organizations is optimizing a key set of business critical applications.

An example of an application that is time sensitive and important to most businesses is VoIP. Since the first application delivery handbook was published in 2007, a growing percentage of the traffic on the typical enterprise data network is VoIP traffic. To quantify the challenges associated with supporting a range of communications traffic, The Survey Respondents were asked to indicate how important it was over the next year for their IT organization to get better at managing the use of VoIP, traditional video traffic as well as telepresence. Their answers are shown in Table 2.

Table 2: Importance of Managing the Use of Communications Based Traffic			
	VolP	Traditional Video Traffic	Telepresence
Extremely Important	13.4%	6.8%	4.8%
Very Important	33.9%	20.3%	25.6%
Moderately Important	29.9%	29.7%	25.6%
Slightly Important	14.2%	28.0%	24.8%
Not at all Important	8.7%	15.3%	19.2%

The data in **Table 2** shows that almost 50% of The Survey respondents indicated that getting better at managing the use of VoIP traffic is either very or extremely important to their IT

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organization. This is a significant percentage and it is roughly the same percentage that indicated that optimizing specific applications such as SharePoint was either very extremely important. It is, however, notably less than the percentage of respondents who indicated that it was either very or extremely important to optimize a key set of business critical applications (Table 1) or to manage SLAs for one or more business critical applications (Figure 10). The data in Table 2 also shows that in spite of all the discussion in the trade press about the growth in video traffic, that managing video traffic is notably less important to IT organizations than is managing VoIP.

Optimizing the performance of business critical data applications typically involves implementing techniques that will be described in a subsequent section of the handbook; e.g., protocol optimization, compression, de-duplication. While techniques such as these can make a minor difference in the performance of communications traffic, the primary way that IT organizations can ensure acceptable performance for this class of traffic is to identify the traffic and ensure that it is not interfered with by other traffic such as bulk file transfers.

The fact that IT organizations need to treat business critical traffic different than malicious traffic, than recreational traffic, than VoIP traffic leads to a number of conclusions.

# Application delivery is more complex than merely accelerating the performance of all applications.

Successful application delivery requires that IT organizations are able to identify the applications running on the network and are also able to ensure the acceptable performance of the applications relevant to the business while controlling or eliminating applications that are not relevant.

## **Security Vulnerabilities**

In March 2011, IBM published its annual X-Force 2010 Trend and Risk Report<sup>3</sup>. The report documents a 27% increase in security vulnerabilities in 2010 vs. 2009 and stated that "This data points to an expanding threat landscape in which sophisticated attacks are being launched against increasingly complex computing environments." In recognition of what this handbook refers to as the second generation of application delivery challenges, the IBM report dedicated a new section to the security trends and best practices that are associated with mobile devices and cloud computing.

The IBM report also made the following observations:

Cloud Computing

IBM predicts that over time that the market will drive public cloud computing providers to provide access to security capabilities and expertise that is more cost effective than inhouse implementations. IBM also stated that, "This may turn questions about cloud security on their head by making an interest in better security a driver for cloud adoption, rather than an inhibitor."

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<sup>&</sup>lt;sup>3</sup> X-Force 2010 Trend and Risk Report

Mobile Devices

The IBM report documented increases in the volume of vulnerabilities disclosed in mobile devices as well as the disclosure of exploits that target them. Nevertheless, the report concluded that malware is not yet common on the latest generation of mobile devices and that most IT professionals view the data stored on them and how that can be misused or lost as the main security threats associated with these devices.

• Cyber Crime

The IBM report stated that, "2010 is most remembered as a year marked by some of the most high profile, targeted attacks that the industry has ever witnessed. For example, the Stuxnet worm demonstrated that the risk of attacks against highly specialized industrial control systems is not just theoretical. These types of attacks are indicative of the high level of organization and funding behind computer espionage and sabotage that continues to threaten a widening variety of public and private networks."

• Web Applications

The IBM report stated that, "Web applications accounted for nearly half of vulnerabilities disclosed in 2010 -- Web applications continued to be the category of software affected by the largest number of vulnerability disclosures, representing 49 percent in 2010. The majority represented cross site scripting and SQL injection issues."

## **Server Consolidation**

Many companies either already have, or are in the process of, consolidating servers out of branch offices and into centralized data centers. This consolidation typically reduces cost and enables IT organizations to have better control over the company's data.

# While server consolidation produces many benefits, it can also produce some significant performance issues.

Server consolidation typically results in a chatty protocol such as Common Internet File System (CIFS), which was designed to run over the LAN, running over the WAN. As shown in Figure 4, getting better at optimizing the performance of chatty protocols such as CIFS is important to the majority of IT organizations.

## **Data Center Consolidation**

In addition to consolidating servers, many companies are also reducing the number of data centers they support worldwide. This increases the distance between remote users and the applications they need to access.

# One of the effects of data center consolidation is that it results in additional WAN latency for remote users.

The reason why the preceding conclusion is so important is because, as previously discussed, even a small increase in network delay can result in a significant increase in application delay.

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# **Distributed Employees**

The 80/20 rule in place until a few years ago stated that 80% of a company's employees were in a headquarters facility and accessed an application over a high-speed, low latency LAN. The new 80/20 rule states that 80% of a company's employees access applications over a relatively low-speed, high latency WAN.

# In the vast majority of situations, when people access an application they are accessing it over the WAN instead of the LAN.

The preceding discussion of chatty protocols exemplifies one of the challenges associated with accessing an application over a WAN. As that discussion showed, there are protocols and applications that perform in acceptable fashion when run over a LAN but which perform unacceptably when run over a WAN – particularly if the WAN exhibits even moderate levels of latency. The impact of that challenge is exacerbated by the fact that applications are typically developed over a LAN and as previously documented, during the application development process most IT organizations pay little if any attention to how well an application will run over the WAN.

## **Distributed Applications**

Most IT organizations have deployed a form of distributed computing often referred to as *n*-tier *applications*. The browser on the user's device is typically one component of an n-tier application. The typical 4-tier application (**Figure 5**) is also comprised of a Web tier, an application tier and a data base tier which are implemented on a Web server(s), an application server(s) and a database server(s). Until recently, few, if any, of the servers were virtualized.



Distributed applications increase the management complexity in part because each tier of the application is implemented on a separate system from which management data must be gathered. The added complexity also comes from the fact that the networks that support these applications are comprised of a variety of switches, routers, access points, WAN optimization controllers, application delivery controllers, firewalls, intrusion detection systems and intrusion protection systems from which management data must also be gathered.

As previously noted, few, if any, of the servers in the typical n-tier application are virtualized. However, as was also previously noted, virtualization and cloud computing are two of the emerging challenges that are complicating the task of ensuring acceptable application and service delivery. One example of how virtualization and cloud computing complicate application and service delivery is that managing an n-tier application becomes even more complex if one or more of the servers is virtualized and it becomes yet more complex if one or more of the servers is housed by a cloud computing service provider. A further complication that will be discussed in a subsequent sub-section of the handbook is that in the current environment it is common for a Web-based transaction to be supported by as many at ten different servers – most of which are virtualized.

## Complexity

As noted in the preceding paragraph, the traditional distributed application environment is complex in part because there are so many components in the end-to-end flow of a transaction. If any of the components are not available, or are not performing well, the performance of the overall application or service is impacted. In some instances, each component of the application architecture is performing well, but due to the sheer number of components the overall delay builds up to a point where some function, such as a database query, fails. Some of the implications of this complexity on performance management are that:

As the complexity of the environment increases, the number of sources of delay increases and the probability of application degradation increases in a non-linear fashion.

# As the complexity increases the amount of time it takes to find the root cause of degraded application performance increases.

In addition, as was highlighted IBM's X-Force 2010 Trend and Risk Report, as the complexity increases so does the probability of a security intrusion. That follows because as a system becomes more complex there are more components that need to be secured. There are also more components that can be attacked.

# The Emerging Application and Service Delivery Challenges

While some of the emerging challenges described below are relatively new, some of them are the natural extension of the traditional challenges that were described above. For example, the challenges associated with supporting mobile workers are the natural extension of the challenges associated with supporting distributed employees that was previously discussed. In addition, the two new factors that are having the biggest impact on application and service delivery, virtualization and cloud computing will be discussed in subsequent sections of the handbook.

In order to get a snapshot relative to how much of an impact the emerging application and

service delivery challenges will have on IT organizations, The Survey Respondents were asked "How will the ongoing adoption of mobile workers, virtualization and cloud computing impact the difficulty that your organization has with ensuring acceptable application performance?" Their responses are shown in Figure 6.

> At the same time that most IT organizations are still responding to a traditional set of application and service delivery challenges, they are beginning to face a formidable set of new challenges.



## **Growth of Mobile Workers and Mobile Devices**

As previously noted, one of the traditional application delivery challenges was the fact that many employees who had at one time worked in a headquarters facility now work someplace other than a headquarters facility; i.e., a regional, branch or home office. The logical extension of that challenge is that most IT organizations now have to support a work force that is increasingly mobile. There are a number of key concerns relative to supporting mobile workers. One such concern is the number and types of devices that mobile workers use. As recently as a couple of years ago, many IT organizations tried to control the types of devices that their users could utilize; e.g., a blackberry. Now, the majority of IT organizations are in a position where they have to support a large and growing set of mobile devices from a range of vendors. It most cases mobile workers have two mobile devices (i.e., a laptop and a smartphone) and in a growing number of cases, mobile workers have three mobile devices; i.e., a laptop, a smartphone and a tablet.

The security concerns associated with mobile workers was highlighted in IBM's X-Force 2010 Trend and Risk Report. Another key concern relative to supporting mobile workers is how the applications that these workers access has changed. At one time, mobile workers tended to primarily access either recreational applications or applications that are not delay sensitive; e.g., email. However, in the current environment mobile workers also need to access a wide range of business critical applications, many of which are delay sensitive. This shift in the applications accessed by mobile workers was highlighted by SAP's recent announcement<sup>4</sup> that it will leverage its Sybase acquisition to offer access to its business applications to mobile workers. One of the issues associated with supporting mobile workers' access to delay sensitive, business critical applications is that because of the way that TCP functions, even the small amount of packet loss that is often associated with wireless networks results in a dramatic reduction in throughput.

In order to quantify the concern amongst IT organizations about ensuring acceptable application and service delivery to mobile workers, The Survey Respondents were asked how important it is for their IT organization over the next year to get better at improving the performance of

applications used by mobile workers. Their responses are shown in **Figure 7**.

One way to put the data in **Figure 7** into context is to compare it to the data in **Table 2** (The Importance of Managing the Use of Communications Based Traffic). Based on that comparison, it is reasonable to conclude that improving the performance of applications used by mobile workers is less important than managing VoIP traffic, but more important than managing either traditional video or telepresence traffic.

## **Webification of Applications**



The phrase Webification of Applications refers to the growing movement to implement Webbased user interfaces and to utilize Web-specific protocols such as HTTP. There are multiple challenges associated with this class of application. The security challenges associated with this class of application was highlighted in IBM's X-Force 2010 Trend and Risk Report. There are also performance challenges that are somewhat unique to this class of application. For example, unlike CIFS, HTTP is not a chatty protocol. However, HTTP is used to download web pages and it is common for a web page to have fifty or more objects, each of which requires multiple round trips in order to be transferred. Hence, although HTTP is not chatty, downloading a web page may require hundreds of round trips.

<sup>&</sup>lt;sup>4</sup> Wall Street Journal, May 17, 2011, page B7

The Survey Respondents were asked how important it was over the next year for their IT organization to get better at optimizing protocols other than TCP; e.g., HTTP and MAPI. Their answers, which are shown in **Figure 8**, demonstrate that the webification of applications and the number of round trips associated with downloading a web page is a traditional application delivery challenge that is still of interest to IT organizations.

An extension of the traditional problems associated with the webification of applications is that many organizations



currently support Web-based applications that are accessed by customers. In many cases, customers abandon the application, and the company loses revenue, if the application performs badly. Unfortunately, according to recent market research<sup>5</sup>, these Web-based applications have become increasingly complex. One result of that research is depicted in **Table 3**. As shown in that table, the number of hosts for a given user transaction varies around the world, but is typically in the range of six to ten.

Table 3: The Number of Hosts for a Web-Based Transaction		
Measurement City	Number of Hosts per User Transaction	
Hong Kong	6.12	
Beijing	8.69	
London	7.80	
Frankfurt	7.04	
Helsinki	8.58	
Paris	7.08	
New York	10.52	

Typically several of the hosts that support a given Web-based transaction reside in disparate data centers. As a result, the negative impact of the WAN (i.e., variable delay, jitter and packet loss) impacts the Web-based transaction multiple times. The same research referenced above also indicated that whether or not IT organizations are aware of it, public cloud computing is having an impact on how they do business. In particular, that research showed that well over a third of Web-based transactions include at least one object hosted on Amazon EC2.

# Web-based applications present a growing number of management, security and performance challenges.

<sup>&</sup>lt;sup>5</sup> Steve Tack, Compuware, Interop Vegas, May 2011

## **Services Oriented Architectures (SOA) with Web Services**

The movement to a Service-Oriented Architecture (SOA) based on the use of Web servicesbased applications represents another major step in the development of distributed computing. Part of the appeal of an SOA is that:

- Functions are defined as reusable services where a function can be a complex business transaction such as 'Create a mortgage application' or 'Schedule Delivery'. A function can also be a simple capability such as 'Check credit rating' or 'Verify employment'.
- Services neither know nor care about the platform that other services use to perform their function.
- Services are dynamically located and invoked and it is irrelevant whether the services are local or remote to the consumer of the service.

In a Web services-based application, the Web services that comprise the application typically run on servers housed within multiple data centers. As a result, the negative impact of the WAN (i.e., variable delay, jitter and packet loss) impacts the performance of a Web services-based application that it does on the performance of a traditional n-tier application.

## Web 2.0 and Rich Internet Applications

A key component of Web 2.0 is that the content is very dynamic and alive and that as a result people keep coming back to the website. One of the concepts that is typically associated with Web 2.0 is the concept of an application that is the result of aggregating other applications. This concept has become so common that a new term, mashup, has been coined to describe it.

Another industry movement often associated with Web 2.0 is the deployment of Rich Internet Applications (RIA). In a traditional Web application all processing is done on the server, and a new Web page is downloaded each time the user clicks. In contrast, an RIA can be viewed as "a cross between Web applications and traditional desktop applications, transferring some of the processing to a Web client and keeping (some of) the processing on the application server." <sup>6</sup>

The introduction of new technologies tends to further complicate the IT environment and leads to more security vulnerabilities. AJAX is a good example of that. AJAX is actually a group of interrelated web development techniques used on the client-side to create interactive web applications. While the interactive nature of AJAX adds significant value, it also creates some major security vulnerabilities. For example, if they are not properly validated, user inputs and user-generated content in an application can be leveraged to access sensitive data or inject malicious code into a site. According to the AJAX Resource Center<sup>7</sup> the growth in AJAX applications has been accompanied by a significant growth in security flaws and that this growth in security flaws "has the potential to turn AJAX-enabled sites into a time bomb."

## **The Increased Focus on Services**

Just as IT organizations are getting somewhat comfortable with managing the performance of applications; they are being tasked with managing the performance of services. IT professionals use the term service in a variety of ways. Throughout this handbook, the

<sup>&</sup>lt;sup>6</sup> Wikipedia on Rich Internet Applications

<sup>&</sup>lt;sup>7</sup> Ajax Resource Center

definition of the term service will include the key characteristics of the ITIL definition of service<sup>8</sup>. Those characteristics include that a service:

- Is based on the use of Information Technology.
- Supports one or more of the customer's business processes.
- Is comprised of a combination of people, processes and technology.
- Should be defined in a Service Level Agreement (SLA).

In part because the ongoing adoption of virtualization and cloud computing has created the concept of everything as a service (XaaS), the term service as used in this handbook will sometimes refer to services that IT organizations acquired from a public cloud computing provider. These services include storage, compute and applications. Alternatively, the term service as used in this handbook will sometimes refer to business services that involve multiple inter-related applications. As is discussed in a subsequent section of the handbook part of the challenge in supporting effective service delivery is that on a going forward basis, a service will increasingly be supported by an infrastructure that is virtual. In addition, on a going forward basis, a service can be provisioned or moved in a matter of seconds or minutes.

The Survey Respondents were asked to indicate how important it was over the next year for their IT organization to get better at monitoring and managing the services that they acquire from a public cloud computing vendor. Their answers are shown in **Table 4**.

Table 4: Importance of Monitoring and Managing Public Cloud Services			
	Storage Services	<b>Compute Services</b>	Applications
Extremely Important	4.3%	10.6%	7.8%
Very Important	30.4%	21.3%	35.3%
Moderately Important	15.2%	17.0%	23.5%
Slightly Important	17.4%	23.4%	17.6%
Not at all Important	32.6%	27.7%	15.7%

As shown in **Table 4**, 32.6% of The Survey Respondents responded with "not at all important" when asked about the importance of getting better at monitoring and managing storage services that they acquire from a public cloud computing vendor. Vendors who supply storage and compute services are often referred to as being an Infrastructure as a Service (IaaS) vendor.

The 32.6% was the largest percentage to respond with "not at all important" for any of the twenty management tasks that were presented to The Survey Respondents. Given that, it is possible to conclude that monitoring and managing the services obtained from an IaaS vendor is not an important task. However, that conclusion is contradicted by the fact that just over a third of The Survey Respondents indicated that getting better at monitoring and managing storage services acquired from an IaaS vendor was either very or extremely important. A more reasonable conclusion is based on the observation that many companies don't make any use of storage and compute services from an IaaS vendor and the ones that do often make only minor use of such services. Based on that observation, the data in Table 4 suggests that if a company makes significant use of the services provided by an IaaS vendor, then monitoring and managing those services is indeed an important task.

<sup>&</sup>lt;sup>8</sup> ITIL definition of service

The Survey Respondents were also asked to indicate how important it was over the next year for their organization to get better at managing a business service, such as CRM, that is supported by multiple, inter-related applications. Their responses are shown in **Figure 9**.

Getting better at managing a business service that is supported by multiple, inter-related applications is one of the most important tasks facing IT organizations over the next year.



# Internal Service Level Agreements (SLAs)

IT organizations have historically insisted on receiving an SLA for services such as MPLS that they acquire from a service provider. However, IT organizations have been reluctant to offer an SLA internally to their organization's business and functional managers. That situation has changed over the last couple of years and today roughly half of IT organizations provide internal SLAs and that percentage is expected to grow. In the current environment, IT organizations are more likely to offer an SLA for:

- Availability than for performance
- Networks than for applications
- A selected set of WAN links or applications rather than for all of the WAN or all applications

Most IT organizations, however, report that the internal SLAs that they offer are relatively weak and that they often don't have the tools and processes to effectively manage them.

The Survey Respondents were asked how important it is for their IT organization over the next year to get better at effectively managing SLAs for one or more business-critical applications. Their responses are shown in Figure 10.

The data in **Figure 10** leads to two related conclusions. The obvious conclusion is that managing internal SLAs is very important to the majority of IT organizations. The somewhat more subtle conclusion is that managing internal SLAs is difficult or else the majority of IT organizations would already be doing a good job of managing these SLAs and hence would not be striving to get better at the task. Unfortunately, as will be discussed in a subsequent section of the handbook, the movement to utilize public cloud computing services greatly increases the difficulty associated with managing an internal SLA.



## About the Webtorials® Editorial/Analyst Division

The Webtorials<sup>®</sup> Editorial/Analyst Division, a joint venture of industry veterans Steven Taylor and Jim Metzler, is devoted to performing in-depth analysis and research in focused areas such as Metro Ethernet and MPLS, as well as in areas that cross the traditional functional boundaries of IT, such as Unified Communications and Application Delivery. The Editorial/Analyst Division's focus is on providing actionable insight through custom research with a forward looking viewpoint. Through reports that examine industry dynamics from both a demand and a supply perspective, the firm educates the marketplace both on emerging trends and the role that IT products, services and processes play in responding to those trends.

Jim Metzler has a broad background in the IT industry. This includes being a software engineer, an engineering manager for high-speed data services for a major network service provider, a product manager for network hardware, a network manager at two Fortune 500 companies, and the principal of a consulting organization. In addition, he has created software tools for designing customer networks for a major network service provider and directed and performed market research at a major industry analyst firm. Jim's current interests include cloud networking and application delivery.

For more information and for additional Webtorials<sup>®</sup> Editorial/Analyst Division products, please contact Jim Metzler at <u>jim@webtorials.com</u> or Steven Taylor at <u>taylor@webtorials.com</u>.

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#### **Division Cofounders:**

Jim Metzler *jim @webtorials.com* Steven Taylor *taylor @webtorials.com* 

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# UNIFIED PERFORMANCE MANAGEMENT

#### VISIBILITY | CONTROL | OPTIMIZATION

#### COMPLETE WAN OPTIMIZATION

Increase the speed and efficiency of your wide area network.

Exinda's Unified Performance Management (UPM) solution delivers everything you need to manage your application performance and ensure the highest quality user experience.

Point solutions lack inter-communication between the functions of visibility, control, and optimization. This creates contention between these independent solutions, as each function is unaware of the effect its actions has on the other.

Exinda's unique, holistic approach to WAN Optimization eliminates the communication barriers and contention of point solutions, by integrating visibility, control and optimization, into a single, unified solution.

#### LATEST ADVANCES IN UNIFIED PERFORMANCE MANAGEMENT

Exinda's development team is continually adding new features and functionality into our unified performance management solution. It is because of our agile development cycle and constant push to add innovation to our product line that Exinda has become the fastest growing WAN optimization vendor in the world. The following are some of the latest advances in our UPM solution.

#### EDGE CACHE



Exinda Edge Cache will allow you to reduce bandwidth usage, decrease network costs, and accelerate content delivery, improving user experience and productivity.

#### **Edge Cache**

The Exinda Edge Cache<sup>TM</sup> enables single-sided caching of Internetbased content at the network edge, including web objects, videos and software updates, delivering a superior user experience and reducing WAN resource utilization.

Web objects are cached at the network edge when they are first downloaded from the Internet or across WAN links. These objects can then be delivered to the users on subsequent requests over the corporate local area network much faster without needing to download the data over the WAN again, providing a better user experience and increased productivity to the workforce. By caching web objects in the local office, organizations can drive down the network traffic consumed by each office, which directly reduces network costs.

The Exinda Edge Cache enables caching of web objects, video, software update and other content on the WAN. It also offers cache statistics, which provide insight into the amount of repetitive data being off-loaded from the WAN link, how cacheable the network data is, how frequently the cache is being accessed, and by how many hosts, helping organizations to understand the nature of their network traffic over time.

The Exinda Edge Cache can also be aligned with an organization's optimization policies, allowing the administrator to only cache specific content for specific users or groups of users, and to maintain very precise controls over how much WAN bandwidth should be made available for each application traversing the network.

#### APPLICATION PERFORMANCE SCORE



Gain proactive reports on users perception of application performance & responsiveness.

#### **Application Performance Score**

A significant feature of Exinda's WAN Optimization solutions is its ability to provide Application Performance Scores (APS). Exinda's APS provides a single data point to monitor and report on the overall health and performance of an application on your network. With APS, you can set performance thresholds for the applications on your network, and easily monitor if and when the thresholds are met or exceeded. When WAN application performance issues arise, the APS allows you to quickly troubleshoot the problems, by drilling down into individual metrics for the application, including network delay, server delay, jitter and loss, and round trip time, helping you to pinpoint and address the source of the performance issue.

Exinda also allows you to monitor and report on TCP efficiency and health. With Exinda, TCP efficiency reports let you examine how efficiently packets flow through the network, based on the number of dropped packets and retransmitted packets for the application. When combined with Exinda's TCP health monitoring, TCP efficiency reporting gives you a more in-depth view of network and application performance. TCP Health monitoring displays the health of TCP Connections by showing the total number of TCP connections, and how many were aborted, ignored, or refused by the server. With Exinda, you get a simple graphical view of the TCP health of the network, allowing rapid drill down for troubleshooting network and application performance issues.



# **Unified Performance Management**

Network Visibility, Control and Optimization - All in a Single Appliance

# "Unified Performance Management is driven by improving the quality of a user's experience."

- Ed Ryan, Exinda Vice President of Products

## The Best Solution For You.

#### Identify and Improve Application Performance

- Application Performance Measurement technology measures user experience objectively.
- Identify the source of application performance issues Network, Server or Application.
- Apply application performance scoring to more than 2,000 applications.

#### Offer a Superior User Experience

- Dramatically increases user download speeds for internet applications, videos, and software updates.
- Accelerate delivery of content to users at LAN speeds from a web cache with a single appliance.
- · Optimize and accelerate mission critical applications.

#### Real-time and Historical Reporting

- Real time reporting showing all traffic on the network over the last 10-60 seconds.
- Up to 2 years of historical reporting on applications, hosts, conversations, URL's, and performance scores "on appliance".
- Microsoft Active Directory Integration allows you to report on users or groups regardless of IP Address.
- Netflow v9 export, providing in-depth layer 7 details of your network usage and application performance.

#### **Conserve WAN Resources**

- Guarantee bandwidth for critical applications while controlling recreational traffic.
- Byte and Object level caching with dual or single appliances reduces the footprint of traffic on the WAN serving files, software updates, and video to users at LAN speeds.
- Reclaim up to 90% of the bandwidth on your WAN circuits to deliver data more efficiently.

#### Leverage Your Investment

- Exinda is fully scalable supporting WAN circuits from 256k to 10Gbps, and includes mobile client support.
- Exinda auto-discovery limits the operational burden and cost of managing large scale multi-site deployments.
  Exinda's Service Delivery Platform (SDP) is available as an appliance or on a cloud-based management platform, offers a flexible and cost-saving option to manage your network.
- A single appliance delivering visibility, control, and optimization makes it easier and more cost-effective to manage and expand over time.

#### Features & Benefits

#### Visibility

Provides insight into network activity, usage and performance. Gives you the information you need to keep your network operating at peak performance

- Laver 7 Classification
- Heuristic Classification
- URL Classification
- Drill Down Capabilities
- Real Time Monitoring
- Top Talkers/Top Conversation
- Active Directory User ID
- Anonymous Proxy Detection
- Application Performance Score
- Service Level Agreements
- Network Health
- Citrix Published Application
  - Automated PDF Reporting

#### Contro

Maximize network resources to the needs of your organization through comprehensive control over network traffic without placing heavy-handed restrictions on users.

- QoS / Dynamic per IP User
- Bandwidth Manageme
- Traffic-shaping
- Prioritization
- Active Directory Integration

#### Optimization

Rapidly, turn understanding into action that drives network performance, improves the user experience, and optimizes productivity.

- Layer 4 TCP Optimizatio
- Layer 7 Application Acceleration
- Universal Caching
- Compression
- Intelligent Acceleration
- Peer Auto-Discoverv
- SSL Acceleration

Americas +1 877 219 0603 info.americas@exinda.com UK / Europe +44 808 120 1996 info.emea@exinda.com Asia Pacific +61 3 9415 8332 info.apac@exinda.com

IMEA +971 4 295 5049 info.imea@exinda.com



# Next-Generation Application Acceleration



Organizations everywhere face tough challenges in optimizing business application performance. For today's distributed enterprises, centralization and server consolidation can create user response and network capacity problems; business applications are often slow or unpredictable; and bandwidth costs are out of control. Now, IT is expected to deliver even more — including corporate communication videos and cloud delivered software-as-a-service (SaaS) applications — all while containing costs.

To solve these and other application delivery problems, you have to understand how application performance requirements have changed, know which technologies can meet your business demands today and prepare for capacity needs down the road.

# The Foundation: Optimizing Traditional Applications

Rapid growth of files, email, storage and backup systems put an incredible burden on WAN connections and create significant end-user performance issues — unless you can accelerate traffic. Blue Coat's protocol optimization, byte caching, compression and QoS are the technologies required to accelerate remote and branch office access to centralized files, email and backup systems. These technologies offer significant performance benefits by mitigating the latency caused by chatty file protocols, caching data and expanding bandwidth for high-volume transfers. Besides data applications, however, you need specialized technologies to optimize performance of key emerging applications.

# **Next Generation WAN Optimization Requirements**

Many of the latest applications are changing the way we collaborate, educate, and communicate. Video, for instance, is increasingly used for training and live communications, and Cloud delivered SaaS applications are enabling new business processes. However, the traditional acceleration technologies cannot address these newer types of applications.

#### Streaming video and rich media

Delivering high-quality, on-demand or live streaming video requires massive amounts of bandwidth on specialized protocols. For example, a single live stream can be 200KB to 1.5MB and large on-demand files can reach 25MB, 100MB and even 1GB in size. In addition, bandwidth-hungry rich media applications can dominate the entire network and still fail due to insufficient resources.

#### **Cloud Delivered SaaS applications**

SaaS applications, such as Salesforce.com, or SaaS-hosted SAP and SharePoint applications have unique management challenges due to their location and the encryption used to secure them. Because SaaS offerings are located outside of your network they are outside of your control, but still need to be accelerated. They are also encrypted with SSL and use certificates and keys controlled by the SaaS provider and the Web browser – not your organization.

Traditional WAN Optimization technologies would require you to place an appliance on the SaaS provider's network, which is simply not possible. Because SaaS applications rely on HTTP and SSL delivery, you need optimization technologies that can asymmetrically accelerate HTTP and SSL, as well as secure client-side certificate handling so you can decrypt and accelerate the sessions.



# **Next-Generation Acceleration**

The good news is next generation acceleration technologies available today can help you optimize your most critical applications and reclaim bandwidth from non-essential traffic. These new optimization technologies include:

- Video caching, stream splitting and Content Delivery Network (CDN) to enable optimized delivery of business video and minimize the impact of recreational video over the WAN.
- Asymmetric optimizations technologies and external SSL certificate handling that don't require changes to the SaaS infrastructure, like Blue Coat CloudCaching engine.
- URL classification and content filtering with usage and QoS policies to identify and contain recreational content and traffic.
- Integration with web security service to protect Internet-connected branch offices from malware and enable faster SaaS, 100% recreational offload and high availability networking.

#### Figure 1: Performance gains by technology type

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#### Video Optimization

- Scale internal Video 10x 100x 1000x
- Reduce Recreational Video by 30-80% across the distributed enterprise



#### **Cloud Acceleration**

- Accelerate SaaS applications directly to branch offices by 7 93x
- Eliminate back-hauling SaaS/Internet applications over WAN



#### Traditional WAN Optimization

- Accelerate applications by 3x-300x from data center to branch office
- Reduce storage replication and backup bandwidth by up to 90%

# Get the right acceleration strategy

Acceleration requirements have rapidly moved beyond CIFS and MAPI acceleration. Video and SaaS application delivery are IT's challenges today. With the right acceleration strategy, you can gain superior business value from internal and external infrastructure. Find out how Blue Coat can help at www.bluecoat.com

# About Blue Coat

Blue Coat Systems secures and optimizes the flow of information to any user, on any network with leading web security and WAN Optimization solutions. Blue Coat enables the enterprise to tightly align network investments with business objectives, speed decision making and secure business applications for a long-term competitive advantage.



# Software as a Service (SaaS) A Cloud-Ready Network ensures rollout success

#### www.ipanematech.com

Cloud adoption adds complexity to network management. Cloud applications such as SaaS collaboration bring many of the same issues as licensed software, but each IT implementation project can have a larger impact because of its reliance on your WAN. By aligning your network with business and Application Performance Objectives, WAN Governance puts you in control of this complexity and network impact.

WAN Governance improves the IT Governance you already have in place by providing:

- A holistic approach to global visibility, control and optimization of application performance, as opposed to conventional solutions operating as independent agents
- Business continuity and control as SaaS applications are adopted
- Guaranteed application performance for any network architecture
- Network capabilities to absorb enterprise requirements for agility, flexibility and growth
- Next-generation solutions for implementing and managing a cloudready network

Using WAN Governance, your organization can:

- Understand the nature of application traffic
- Control and optimize this traffic
- Guarantee application performance
- Improve users' Quality of Experience
- Simplify network operations
- Control network costs and leverage savings

IT infrastructure directors today find themselves in one of two situations: the business side of their organization is planning for SaaS applications that the VPN will need to support, or existing SaaS applications are underperforming or impacting the performance of other business applications.

VPNs and the tools used to manage them are optimized for traditional private applications residing in data centers, not those stored in the cloud. For example, SaaS collaboration applications, such as Google Apps, Microsoft BPOS/Office 365 and IBM LotusLive, consume much more network bandwidth than many traditional applications. Moving from traditional on-premise collaboration to a SaaS counterpart dramatically changes the way traffic flows across the WAN.

In order to avoid application performance issues and ensure optimal end-user experience, infrastructure directors need to make their VPN "cloud ready." A cloud-ready network (CRN) is a network that provides full application performance visibility and total control of both SaaS and on-premise applications. Ideally, the best time to prepare is prior to your first SaaS implementation, so that the impact of SaaS on your VPN can be mastered from the pilot phase through full enterprise rollout.

With Ipanema for a fraction of the cost per user of your SaaS you can:

- Guarantee the performance of SaaS across the WAN
- Ensure peaceful co-existence of SaaS and existing applications (ERP, CRM...)
- Obtain a dashboard of application performance for all critical applications including SaaS
- Take full advantage of hybrid MPLS + Internet networks
- Shift to WAN governance, plan and grow your network according to business needs









www.ipanematech.com



# Valeo Embraces the Cloud and Maximizes Value

Valeo, one of the world's leading suppliers of components, integrated systems and mod-ules for automotive CO2 emissions reduction, rolled out a hybrid network with MPLS + Internet for its migration from conventional email and collaboration applications to Google Apps.

Valeo's network supports approximately 160 sites worldwide, 52,000 users, and the delivery of applications such as ERP and CATIA.

Using Ipanema's ANS to dynamically manage application performance over their hybrid network, Valeo successfully deployed Google Apps with full Applications Visibility, QoS & Control, and Dynamic WAN Selection.

"With Ipanema, we divided by three the transfer cost of each Gbyte of band-width over our global network," says Alain Meurou, Infrastructure and Network Manager at Valeo.

#### **Return on investment**

Enterprises that have chosen to move to a unified hybrid net-work controlled by ANS typically chose not to upgrade their MPLS bandwidth in favor of the less-expensive Internet bandwidth. Including the price of the deployed ANS solution, typically 1 to  $2 \in$  per user per month , most enterprises were able to obtain a 20% decrease in overall network costs, upgrade available band-width by a factor of three, and adequately prepare for traffic increases over the next three to five years.

#### All-in-One Solution for Guaranteeing Application Performance

Ipanema's Autonomic Networking System (ANS) tightly couples into a single, all-in-one solution.

- QoS & Control
- Application Visibility
- WAN Optimization
- Dynamic WAN Selection (hybrid network unification)

With ANS, all application performance challenges can be managed with a holistic approach over the global network. The autonomic networking solution automates tasks that IT organizations cannot perform with traditional approaches. Orchestrating network traffic in real-time, ANS manages the complexity of the hybrid cloud and guarantees application performance for public and private applications. ANS not only helps to guarantee the performance of SaaS during and after implementation, but the end-user experience for all applications over your WAN, and much more cost effectively.



Since every enterprise is different, IT strategy on whether or not to change network architecture for SaaS collaboration varies from one company to another. You do not necessarily need to change your architecture to make your network "cloud-ready".

All companies, however, must implement a minimum set of capabilities in order to avoid application performance issues during and after SaaS implementation, or to fix issues resulting from a prior SaaS deployment. Companies that use or plan to use a hybrid (MPLS + Internet) network architecture will also want to consider additional capabilities to further optimize their "cloud-ready network" (CRN).



Beyond the Network...

Advertorial

ipanema



# The Fastest Growing Application Networking Company



## **Application Delivery**

- Advanced Application Delivery Controller (ADC)
- New Generation Server Load Balancer (SLB)

## **IPv6** Migration

- Large Scale NAT
- Dual-Stack Lite
- NAT64 & DNS64
- IPv6 ↔ IPv4 (SLB-PT)

## Cloud Computing & Virtualization

- SoftAX & AX-V
- AX Virtual Chassis
- AX Virtualization (Application Delivery Partitions)

#### **Advanced Core Operating System (ACOS)**

#### **AX Series Advantage**

- All inclusive pricing for hardware appliances, no performance or feature licenses
- Most scalable appliances in the market with unique modern 64-bit ACOS, solid-state drives (SSD) and multiple hardware acceleration ASICs
- Faster application inspection with aFleX TCL rules
- aXAPI for custom management

#### **Application Solutions**

The AX Series increases scalability, availability and security for enterprise applications. Visit A10's web site for deployment guides, customer usage scenarios and to participate in the Application Delivery Community.





# Transforming the Internet into a Business-Ready Application Delivery Platform



# Ensuring applications perform to support your business goals

As organizations expand globally, they need to make a variety of business-critical applications available to employees, partners and customers across the globe. Application delivery strategies are increasingly leveraging Cloud based options for hosting enterprise applications on Cloud infrastructure and outsourcing applications via SaaS vendors. Organizations must also be sensitive to the economic pressures driving IT consolidation and centralization initiatives.

Whether delivering applications from behind the firewall, hosting in the cloud, or using a hybrid model, the Internet remains an integral part of application delivery strategy. Though global delivery of enterprise applications over the Internet can provide remote users with essential business capabilities, poor application performance can quickly sour user experience. Business applications must perform quickly, securely, and reliably at all times, or adoption and intended benefits will suffer.

# **Key Challenges in Delivering Applications**

IT organizations often use the public Internet to support globalization efforts because of its lower cost, quick time to deploy, and expansive reach. However, when delivering applications via the Internet to global users, business can face many challenges, including:

- Poor performance due to high latency and chatty protocols (like HTTP & XML)
- Spotty application availability caused by unplanned internet disruptions
- Inadequate application scalability and spiky peak usage
- Growing security threats, including distributed denial of service, cross-site scripting, and SQL injections

These problems can severely undermine application effectiveness and ROI and do not disappear by moving to the Cloud.

# **Akamai's Application Performance Solutions**

Today, thousands of businesses trust Akamai to distribute and accelerate their content, applications, and business processes. Akamai Application Performance Solutions are a portfolio of fully managed services designed to accelerate performance and improve reliability of any application delivered over the Internet, hosted behind the firewall or in the Cloud, with no significant IT infrastructure investment.

Akamai leverages a highly distributed intelligent Internet platform, comprised of tens of thousands of servers, within a single network hop of 90% of the world's Internet users. The Akamai Protocol optimizes application delivery at the routing, transport, and application layers, not only caching content at the Internet's edge, close to end users, for fast delivery, but accelerating dynamic content from the origin to global users. This intelligent Internet platform also extends the security perimeter to the edge of the Internet with modules providing a cloud based Web Application Firewall and DDoS defense.

Application Performance Solutions drive greater adoption through improved performance, higher availability, and an enhanced user experience, ensuring consistent application performance, regardless of user location, and delivers capacity on demand, where and when it's needed. This helps reduce infrastructure costs and support data center consolidation. Examples of applications delivered by Application Performance Solutions include Web-based enterprise applications, Software as a Service (SaaS), applications deployed on IaaS and Paas, Web services, client/server or virtualized applications, live chat, productivity, and administration functions, such as secure file transfers.

To learn more about Akamai Application Performance Solutions, visit www.akamai.com/aps.

## **Application Performance: Your Window to Service Delivery**

Virtually all organizations depend on online services to transact business. For online brokerage, retail companies and others, online services are their business. For insurance companies and manufacturers, online services enable their business. Regardless of your business, you want to deliver a positive customer experience. Satisfied customers come back and customer retention is the foundation of your bottom line. Pressure is mounting on IT departments to deliver on this requirement and, as a result, continually increasing amounts of IT budgets are spent on tools and processes to assure that services are performing.

Keeping customers happy is nothing new. For years, organizations focused on the domains – the network, the databases, the servers – assumed that if all the domains worked so would the service. But that strategy exposed an IT paradox: IT services are more than the sum of their parts. Managing each domain for peak performance is no guarantee of success. The information essential to assuring services include the service delivery pathway - the route through the infrastructure the service takes to reach the customer - and the components in that pathway - the network links, databases and servers that are essential to delivering the service. Tools and teams, dedicated to supporting individual domains, often have a hazy view of which components actually impact specific services. For example, a single server outage may have nothing to do with your critical business service...or it may have everything to do with it. Managing each domain for peak performance without a clear asset-to-service view is not a guarantee that you will stay ahead of calls to the help desk.

#### **Applications as Bellwethers**

Are applications another domain or a service? Actually, it depends. Some applications, such as online trading, are the end-user service. An email application is often an end-user service but can also be an enabling part of an online retail service, thereby putting the application into the role of a domain in a service delivery pathway. What can be said with certainty is that applications are an essential part of any service, and applications, like services, rely on the other domains to function. Consider how Web-based applications rely on the full range of IT infrastructure components to be operational. So, whether your application is the service itself or a service enabler, its performance is linked tightly with your business service delivery and that makes your application performance an open window into your service performance.

The CA Technologies <u>Service Assurance portfolio is built around proactive performance management</u>. On a foundation of <u>CA eHealth® Performance Manager</u> for client-server applications, CA Technologies added and integrated CA Introscope and CA Customer Experience Manager, the <u>CA Application Performance Management</u> (CA APM) solution, to detect, triage and diagnose performance problems in your complex, composite and Web application environments. CA APM supports both Java and .NET applications and provides end-to-end visibility to online transactions. To complete the picture, CA Technologies acquired NetQoS, bringing products like <u>CA NetQoS</u> <u>SuperAgent®</u> and <u>CA NetQoS ReporterAnalyzer™</u> into the fold. CA NetQoS SuperAgent tracks every TCP application packet traversing the network between clients and servers, providing metrics such as network, server and application latency for all applications. CA NetQoS ReporterAnalyzer provides historical, real-time and predictive behavioral views through traffic composition metrics that show how applications tax and compete for network resources. With these detailed application performance metrics, application delivery bottlenecks are quickly pinpointed, root cause established and performance issues corrected, often before user impact. And the ripple effect on business services is all positive.

#### Service Assurance: Application Performance Plus

The CA Technologies Service Assurance portfolio provides a layer of intelligence that leverages data from your existing infrastructure and application performance management tools used to directly manage your IT assets, including <u>Infrastructure Management</u> products like CA Spectrum<sup>®</sup> Infrastructure Manager, CA eHealth Performance Manager and CA NetQoS Performance Center, and CA <u>Application Performance Management</u> products like CA Introscope<sup>®</sup> and CA Customer Experience Manager. Consolidating information from these

performance managers, <u>CA Service Operations Insight (formerly CA Spectrum® Service Assurance)</u> provides the business service analytics, uniquely linking applications to infrastructure to calculate key performance indicators (KPIs) for service delivery and risk.

CA Spectrum Service Assurance creates a single service model, leveraging information from the domain managers, that is updated dynamically as things change, so you know what components – infrastructure or application – are in the pathway of your critical business service and you know if there is a problem that will impact service delivery, even as configurations and virtual machines change. With the CA Technologies Service Assurance portfolio, you can prioritize your efforts, have confidence in the information you have and fix the important things first to minimize customer and business impact. Even better, CA Technologies can show you where a potential problem is chipping away at performance, for example, telling you when a server farm is losing machine power even if it is not yet impacting service. This puts you where you want to be - two steps ahead of your customer.

#### Integration Works at Rooms To Go

Customers that have benefitted from the tight integration in the CA Technologies Service Assurance portfolio have compelling stories to tell. Putting it all together was the key for Rooms To Go. To enhance the customer experience at its 150 showrooms across the U.S., <u>Rooms To Go</u> added CA Technologies software for network, application and virtual system performance management to its existing Service Assurance products to maintain service availability and improve support of its retail and distribution outlets.

Rooms To Go is using the <u>CA NetQoS Performance Center</u>, a key component of the Service Assurance portfolio, and <u>CA Virtual Assurance for Infrastructure Managers</u> to improve the performance of its most business-critical, networked applications and their supporting infrastructure. For example, Rooms To Go uses the two CA Technologies solutions to monitor and manage its point-of-sale (POS) application that provides immediate purchase-related information and fast credit application processing and approvals.

"The CA NetQoS Performance Center and CA Virtual Assurance for Infrastructure Managers will help Rooms To Go be more proactive in ensuring a high level of service across our stores and improving the customer experience as a result," said Jason Hall, Director of IT systems for Rooms To Go. "Combined with our other products from CA Technologies, the CA NetQoS and CA Virtualization Management solutions will give us a more complete understanding of what is happening across our network and virtualized infrastructure and where we need to direct our attention to solve problems faster, prepare for future capacity needs, and optimize application performance."

In addition to monitoring how well the network delivers the POS application to the Rooms To Go showrooms, the CA NetQoS solution will help Rooms To Go understand how application traffic affects network performance, with views into the composition of traffic on every network link, and which applications and users consume bandwidth. Before installing NetQoS, Hall had no visibility into how end users were experiencing application and service performance across the WAN or LAN. "It was purely the end user," he said. "We waited for someone to call. Operationally, that gives the end user the perspective that the systems are slow ... and that we're not doing anything about it." Hall said that adding NetQoS's performance management capabilities to his suite of tools has also helped him solve some service delivery mysteries, particularly with his company's intranet. You can read more on this story on SearchNetworking.com in their June 16, 2010 article by Shamus McGillicuddy titled, "Service delivery management: Integrating IT management tools."

#### Jack Henry & Associates Put Service First

No one doubts the importance of accuracy and high performance when it comes to financial applications. Jack <u>Henry & Associates</u> processes transactions, automates business processes, and manages mission-critical information for more than 8,700 financial institutions and corporate entities, serving around six million end-users who depend on Jack Henry to run business-critical applications and financial processes. Initially, the company had

no consistent means of monitoring end-to-end performance across its network and applications, which made it difficult to safeguard service levels and manage capacity.

"We have to prove every single day that our performance is meeting customer requirements, which, without endto-end monitoring, was challenging," said Josh Bovee, Senior Network Engineer, Jack Henry & Associates. "We needed to focus on application performance from the end-user perspective and create a baseline of how well we were serving those customers so we could understand when performance degraded and what impact things like infrastructure changes might have. We were reliant on getting all the IT groups in the same room, and then putting our heads together until we located the source of the issue. With limited insight into network and application performance metrics, this would often take days."

Realizing they needed to take a more proactive approach to managing its business critical banking applications, Jack Henry looked for a solution that would address its performance management challenges. After struggling for several months with a competitive product, they arranged with CA Technologies for a Proof of Concept with the NetQoS Performance Center, starting with the CA NetQoS SuperAgent. "We started the POC at 8 a.m. and by 1 p.m. we were capturing more meaningful data with SuperAgent than after six months working with the competitive product. SuperAgent was also easier to implement. We didn't need to install an agent on the server or re-architect our infrastructure, which was something we very much wanted to avoid," notes Bovee. Having made the decision to deploy CA NetQoS SuperAgent, the company decided to implement additional modules of the CA NetQoS Performance Center.

Jack Henry now has a finger firmly on the pulse of its customers' business-critical applications, furthering its commitment to industry-leading client satisfaction and retention rates. As a result of their investment in CA Service Assurance solutions, the company is already benefiting from improved service, more cost-effective support and greater business agility. "We now have a great foundation on which to continue to improve our service levels and customer satisfaction," concludes Bovee.

#### CA Technologies Manages Risk to Assure Application and Service Delivery

Service Assurance and risk management is achieved through new, advanced technology that can model the IT assets that comprise services, track service quality (end-user experience), the status of each IT asset (network devices, systems, databases and applications) and calculate each asset's risk to each service dynamically. With this information, you'll know how to proactively fix problems before they impact users.

These capabilities also factor dimensions of risk beyond typical KPIs to include compliance, answering questions such as: "Are my business services at risk because configurations do not meet the gold standard? Do we have the latest security patches deployed on every device?"

Identifying and measuring risk to business services benefits both IT executives and the technical staff who manage the IT environment "hands-on." By understanding risk, IT executives can make more informed decisions about capital and operational investments. Technical staff benefit because they can see the root cause of trends that will impact services in the future and can proactively prevent impact to quality.

CA Technologies Service Assurance is a mature, integrated portfolio that provides end-to-end visibility into business services, applications and transactions linked with top-to-bottom insight over the entire infrastructure. Providing great service in a consistent manner, meeting SLAs and having the agility in your infrastructure to roll out new services quickly and efficiently is just table stakes in today's complex IT environment. No matter what business you are in, service assurance is critical to your success, and CA Technologies can work with you to help you deliver the service your customers demand.

# Software WAN Optimization

"... application performance ... one of the top three inhibitors of cloud adoption" <sup>1</sup>



## Secure Automated Optimized

- Any deployment model:
  - Enterprise
  - Hosted
  - o Cloud
  - Or Any combination
- Any hypervisor & Windows
   Server 2008 R2
- Any number of instances
- Any throughput capacity
- Any security requirement
- Any routing mode
- Any Failover mode
- Automated Management
- Meet cost savings objectives
- Match footprint limitations
- Bundle best of breed applications:
  - Video streaming
  - Directory services
  - Security



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# APPLICATION DELIVERY PERFORMANCE From datacenter and cloud to any user anywhere

#### Maximum Value & Maximum Performance

The **business value** of any application must be measured by its ability to increase business agility, decrease cost through on-demand provisioning and teardown of infrastructure and services, accelerated development, and improved reliability. Solutions must be utility-based, self-service, secure and most importantly, have levels of application performance that improve productivity.

Maximizing the business value of any networked application requires full featured, secure, scalable, high performance WAN Optimization software that allows applications to perform as expected, and can be part of any on demand architecture. Tactical hardware or virtual appliances with limited performance don't measure up.

#### aCelera: Built for Global Performance

aCelera software exceeds the scalability and performance of purpose-built hardware appliances. aCelera WAN Optimization software can support hundreds of thousands of connections and gigabits of throughput. It is built to support global enterprise scalability requirements and is ready for the Internet scale demands of managed services and cloud computing providers.

aCelera software and virtual appliances deliver these performance benefits and advantages without the costs or the friction of hardware appliances or limited scope virtualization. aCelera can easily be scaled on any existing hardware platform or migrated to more powerful platforms and processors when business conditions dictate, leveraging any industry standard management tool.

#### aCelera: Built for Global Deployment

Enterprise and cloud infrastructures are not uniform. aCelera software can be deployed in any heterogeneous mix of hardware, virtualization platforms, storage technologies, networking equipment and service providers supporting any custom or off the shelf application.

Hardware WAN optimization products require more planning and are more labor intensive to install. aCelera software packages are delivered over a network and installed in a data centers, remote sites, or end user PCs in less than 30 minutes. aCelera creates a high performance WAN infrastructure that can span the globe and scale to meet your application and user performance needs.

aCelera can be deployed in any private, public, and hybrid cloud computing environment and is poised to meet ANY future performance, scale and connection demands imposed by any enterprise IT environment, private network, private cloud, public cloud or a hybrid of them all.

#### aCelera software WAN optimization: 60% better 3 year TCO & 50% better scalability

- 1, Clouds and Beyond: Positioning for the Next 20 Years of Enterprise IT, Frank Gens, IDC
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# **Cisco Unified Network Services**

# cisco.

Highly virtualized data center and cloud environments impose enormous complexity on the deployment and management of network services. Provisioning dynamic services and accommodating mobile workloads present challenges for layered services, such as security and application controllers, that traditionally have required in-line deployment and static network topologies. Cisco<sup>®</sup> Unified Network Services meets these challenges with integrated application delivery and security solutions for highly scalable, virtualized data center and cloud environments.

Any Service: Cisco Unified Network Services is a critical component of the Cisco Data Center Business Advantage architecture. It consists of Cisco Application Control Engine (ACE) application controllers, Cisco Wide Area Application Services (WAAS) WAN acceleration products, Cisco Adaptive Security Appliances (ASA) data center security solutions, Cisco Virtual Security Gateway (VSG), Cisco Network



Analysis Module (NAM), and associated management and orchestration solutions.

Any Form Factor: Cisco Unified Network Services provides consistency across physical and virtual services for greater scalability and flexibility. One element of the Cisco Unified Network Services approach is the concept of a virtual service node (VSN), a virtual form factor of a network service running in a virtual machine. Cisco VSG for



Cisco Nexus<sup>®</sup> 1000V Series Switches and Cisco Virtual WAAS (vWAAS) are examples of VSNs that enable service policy creation and management for individual virtual machines and individual applications.

Outstanding Scalability: In addition to virtualization-aware policies and services, Cisco Unified Network Services supports greater data center scalability and cloud deployments, with the services themselves being virtualized. The application and security services can be provisioned and scaled on demand and can be easily configured to support the needs of dynamically deployed and scalable virtual applications.

Integrated Management Model: Cisco Unified Network Services enables consistency of management across different services and across physical and virtual form factors. Cisco Unified Network Services is thus a critical component of a fabric-centered data center architecture that is well integrated with the virtual servers and applications to readily enable scalable public and private cloud environments.

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# EXPAND | VIRTUALLY networks | EVERYWHERE<sup>™</sup>

# EXPAND ENABLES SERVER CONSOLIDATION, THIN-CLIENT COMPUTING AND BANDWIDTH OPTIMIZATION AT RIDLEY INC – DELIVERS SAVINGS OF \$250,000 PER ANNUM

Having initially deployed Expand Networks' Accelerators as part of a bandwidth consolidation project in 2006, Ridley Inc – the leading animal nutrition company - was already aware of the benefits that WAN optimization technology could bring; this initial \$200,000 investment paid for itself through efficiency savings in just over six months.

However, with many of its 42 locations being extremely harsh and dusty environments, Ridley recently embarked on a thin-computing strategy, removing servers and computers from branches and delivering server based computing from a central location in Minnesota.

In order to meet renewed bandwidth requirements and ensure the company's new thin-computing IT initiatives were to succeed, Ridely Inc.re-assessed the company's WAN environment.

Chad Gillick, the IT Manager that led the project at Ridley Inc, explained, "Moving to a thin computing environment could help us streamline processes, increase productivity and reduce costs. However, I knew WAN optimization would be essential to the success of these projects, to ensure the user experience and productivity wouldn't suffer across our distributed network environment."

By investing further in new Expand technology, Ridley has been able to remove expensive desktop and laptop computers at the remote sites and replace with thin client terminals, without costly bandwidth upgrades.

The company chose Expand because of its superior capabilities in accelerating Citrix and web based traffic, and the Accelerators have been deployed in 31 key sites.

Combining compression, byte-level caching, layer 7 QoS and small packets mitigation techniques, Expand's technology enables available bandwidth and real-time interactive TCP traffic to be maximized, extending Ridley existing network infrastructure investments and providing 'virtual bandwidth' capacity to its users.

With substantially faster data transfer speeds over WAN links, Ridley is gaining an estimated 45 minutes of productivity per person, per day. Furthermore, Expand's Wide Area File Services (WAFS) capabilities with QoS have enabled the IT team to tailor traffic flows across the managed network and dynamically manage bandwidth requirements 'on the fly'.

"Without the Expand solution we would have needed a 45mbps connection at the central site that would have cost in the region of \$26,000 per month. With Expand we were able to reduce this to a 9mbps link costing \$4,500, an annual saving of over \$250,000," said Gillick.

He concluded, "On top of this, using Expand as an enabler of server consolidation and thin client computing, we have managed to reduce our technical refresh costs which were running at \$400,000 annually down to \$220,000. We believe we will be reaping the benefits of the Expand solution for many years to come."

#### Enabling Strategic Initiatives

- Virtualization The foundation infrastructure for delivering on all strategic IT initiatives, Expand's technology is unique in its combined ability to be deployed within a virtualized infrastructure and to accelerate and control virtualized traffic out of it. The software can be effectively integrated into virtual server environments, such as VMWare, Citrix XenServer and Microsoft HyperV, and as a truly virtualised solution Expand can also be deployed under extreme conditions such as on aircraft, mobile environments and remote and unattended locations..
- VDI and Thin Computing - Expand accelerates within Virtual Desktop Infrastructure (VDI) and thin computing environments optimizing protocols including Microsoft Terminal Services (RDP), Citrix XenDesktop (ICA) and Sun Sunray (ALP). Unlike competitive offerings, Expand works on the IP layer, this enables Expand to accelerate all IP & uniquely UDP applications over the WAN, applying advanced compression, byte level caching, layer 7 QoS and small packet mitigation techniques.
- Server Consolidation Expand's integrated 'virtual server' technology enables complete server consolidation by replacing the need for an additional branch office file server. Expand's unique "Virtual Branch Server" feature sets also enable to customer to replace features that used to be delivered by a remote server, such as DCHP, DNS and Printing, all within the AOS and not via third party plug-ins like other vendors.
- Satellite With integrated Space Communication
   Protocol Specifications (SCPS) Standard technology,
   Expand helps distributed organizations overcome
   the traditional limited bandwidth, high latency
   obstacles that impede the speed and performance
   of applications and services over satellite links.
   Communication Protocol Standard technology, helps
   distributed organizations overcome the traditional low
   bandwidth, high latency obstacles that impede the
   speed and performance of applications and services
   over satellite links.

# Packet Design

# Network-Wide IP Routing and Netflow Monitoring, History, Modeling & Planning

#### **Optimize IP Networks with Traffic Explorer**

- Monitor and analyze critical traffic dynamics across all IP network links and routes by Class of Service (CoS)
- Strengthen change management with operationally accurate network modeling based on realtime, network-wide routing and traffic state
- Reduce Internet transit costs with IGP/BGP-aware peering and transit routing and traffic analysis
- Analyze network-wide traffic usage, even per MPLS VPN
- Improve network continuity with easy traffic trending
- Perform network-wide traffic capacity planning

#### **Packet Design Overview:**

- Founded in 2003, Packet Design pioneered and is the market-leading provider of routing and traffic analysis solutions
- 500+ global enterprises, Service Providers, and government and military agencies utilize Packet Design solutions to manage their complex IP networks.
- Packet Design solutions offer IT departments significant operational cost savings by increasing the accuracy and efficiency of key IT business processes.

#### **Overview of Traffic Explorer**

Traffic Explorer is the first solution to combine real-time, integrated routing and Netflow traffic monitoring and analysis, with "what-if" modeling and capacity planning capabilities. Unlike previous traffic analysis tools that only provide localized, link by link traffic visibility, Traffic Explorer's knowledge of IP routing enables visibility into network-wide routing and traffic behavior. Powerful "what-if" modeling capabilities empower network managers with new visibility to strengthen change management processes and optimize network infrastructure costs.

Traffic Explorer delivers the industry's only integrated analysis of network-wide routing and traffic dynamics. Standard reports and threshold-based alerts help engineers track significant routing and utilization changes in the network. An interactive topology map and deep, drill-down tabular views allow engineers to quickly perform root cause analysis of important network changes, including the routed path for any flow, network-wide traffic impact of any routing changes or failures, and the number of flows and hops affected. This information helps operators prioritize their response to those situations with the greatest impact on services or applications.



Traffic Explorer provides extensive "what-if" planning features to enhance ongoing network operations best practices. Traffic Explorer lets engineers model changes on the "as running" network, using the actual routed topology and traffic loads. Engineers can simulate a broad range of changes, such as adding or failing routers, interfaces and peerings; moving or changing prefixes, BGP policy configurations, link capacities or traffic loads; even adding new MPLS VPNs. Simulating the effect of these changes on the actual network results in faster, more accurate network operations and optimal use of existing assets, leading to reduced capital and operational costs and enhanced service delivery.

**Proven, Market Leading Solutions:** Based in Palo Alto, Packet Design Inc. is the pioneer and market leader in routing-aware network management solutions. Packet Design is a member of the Cisco Technology Developer Partner program. Find out more at www.packetdesign.com

