A Guide to WAN Application Delivery for the SME Market

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Today's small-to-medium sized enterprises (SME) are undergoing the same IT evolution as their large enterprise counterparts, only on a smaller scale. For SMEs, WAN reliability, flexible scalability, performance and ease of management are as essential to their WAN infrastructure as they are to a large enterprise. SMEs are able to achieve efficiencies and competitive advantages through the adoption of affordable, yet feature-rich WAN optimization technologies. On the other hand, without suitable technology, they will be competitively disadvantaged. Therefore, choosing the appropriate WAN Optimization solution is critical to ensure efficient WAN infrastructure to meet today's requirements, while also ensuring the right path for tomorrow's business needs.

WAN application delivery needs for SMEs

Until recently, WAN solutions such as multi-homing had been cost prohibitive for SMEs. Today, advanced WAN Optimization Services with link load balancing and failover capabilities are not only affordable, but the integration and consolidation of WAN and/or ISP link load balancing and failover, VPN, and firewall provides SMEs with very affordable out-of-the-box solutions.

For larger enterprise organizations, integrating "big brand" networking gear is commonplace. However, for SMEs, "big brand" equates to big bucks, with enterprise-specific features that they can't use. Rather, deploying products that are built with the explicit features, performance, reliability and scalability created specifically for the SME market is the answer.

In general, businesses of all sizes are inclined to purchase "big brand" products. However, "value" vendors that offer products within the same category can provide the optimal performance, features, reliability and security that SMEs need, with the same functional benefits and affordability.

For the large enterprise, "big brand" products come with a high Total Cost of Ownership (TCO). Ecessa can help SMEs lower their TCO, and create high-performance and scalable WAN infrastructure. Ecessa products have price/performance value for SMEs. Our services are designed for SME businesses for dramatically less than the price of "big brand" vendors with features that only large enterprises might use.

There are other vendors that offer WAN optimization products. However, Ecessa's services have the best price/performance value when it comes to rich features, scalability, high-availability, performance, security and ease-of-management – at an affordable price to meet the needs of small-to-medium sized enterprises.

Critical applications delivered over the WAN

It has only been within the last few years that businesses have utilized separate systems and services to communicate and transact business with customers, partners and employees. Now, through the widespread adoption of the Internet, the real power of networking is being unleashed, and applications are being developed to harness the growth of the Internet. Traditional applications such as order processing, billing and customer management have been integrated into complete supply-chain web applications. These web applications unify and streamline business processes from previously monolithic client/server applications. This is good news for small-to-medium sized businesses (SME), as web-based applications offer the potential to reduce the need for expensive hardware and quicken time-to-market.

However, organizations that deploy web-based applications are facing many challenges. For example, when an application is delivered over the WAN and/or ISP link, it is not uncommon that the link cannot handle the increased traffic load effectively. The source of these varied problems is continually associated with high traffic volumes, limited bandwidth resources and ISP outages. Despite existing budgets for IT-related equipment and services, web applications may not deliver the expected improvements in performance, scalability and efficiency when delivered over the WAN.

The diversity of today's workforce and the increase in remote branch offices, road-warriors and telecommuters

are a direct result of the benefits of the Internet. The Internet and the web in particular, have made it possible through the use of diverse technologies to enable secure access to business applications. It is important to point out that the successful delivery of applications over the Internet depends upon the flexibility of the WAN infrastructure.

IT WAN Infrastructure

To conduct e-business and electronic commerce, transaction-based applications are delivered over the Internet (WAN). The management and operations of WAN links can be complex and expensive. A typical site connected to the Internet will use a routers or modems to connect to an Internet Service Providers (ISP) over a WAN link, which pass traffic through to firewalls, which ultimately direct users to the appropriate servers. If just one of these components in the process fails, a worst case scenario would be that the entire site may be taken down. What typically happens is a user request will take longer than expected, or a customer transaction will not go through.

The Internet was not developed with the demands of modern commerce in mind. With today's use of the Internet, Internet delays can cost a business revenue and loss of employee productivity. Even if web-based applications are developed with this in mind, the Internet can be a bottleneck. In addition to WAN links that may be over-loaded, other events can cause applications to fail when going over the WAN, such as network hardware failure, human error and natural disasters such as earthquakes and hurricanes. Also, the Internet does not distinguish between a critical business transaction and a general web page, and does not assign guaranteed quality of service for applications. With an unlimited IT budget for WAN and datacenter infrastructure, and personnel to manage and monitor your IT infrastructure, you might be ok, but for most organizations an unlimited budget is unreasonable.

WAN application delivery solutions

WAN application delivery solutions were built to address the challenges associated with WAN infrastructure complexity, performance, scalability and security. These solutions are quite diverse, and may be known as Application Delivery Controllers (ADC), Global Load Balancers (GLB), WAN Link Controllers, Dual WAN Routers, Multi-homing Switches, WAN Optimization Services and other names. In order to avoid confusion, this paper will refer to WAN application delivery solutions, as specialized WAN Optimization Services that have link load balancing and failover capabilities. Today's WAN Optimization Services actually evolved from load balancers that were first introduced in the late 1990s.

WAN Optimization Services provide the ability to direct Internet traffic to the best performing, most accessible WAN and/or ISP links. Should one of the links become inaccessible due to a bottleneck or failure, the WAN Optimization Services will take that link out of service, and automatically re-direct traffic to other functioning links. This process is virtually seamless to the user.

During the past few years, WAN application delivery has emerged as one of the most important technologies in solving the problem of performance and accessibility for applications delivered over the Internet. In addition, by using various link load balancing algorithms, a WAN Optimization Service can distribute users to links that offer the best performance.

WAN Optimization Categories

WAN Optimization Services - These services intelligently distribute user traffic among multiple, diverse WAN and/or ISP links. Advanced services include WAN and ISP link aggregation, automated inbound and outbound load balancing and failover, WAN Virtualization, multi-site failover and fallback, traffic shaping and application prioritization, VPN load balancing and redundancy, and built-in VPN and firewall technology.

WAN Accelerators - These products accelerate applications with caching, compression, WAFS, protocol optimization, QoS and traffic shaping and other content and application specific acceleration methods.

WAN Geographical Load Balancing – These products utilize global redirection technologies and health checking to keep users connected. They distribute traffic based on various perimeters such as geography, round trip time, site availability, Hops, etc.

Through bundling (aggregating) multiple, diverse Internet links from one or more ISPs, WAN Optimization

Services reduce the need to purchase multiple and expensive high-speed links. This enables organizations to increase bandwidth by using cost-effective links without compromising up-time. In addition to managing scalability and redundancy, WAN Optimization Services cost-effectively utilize all available WAN bandwidth through intelligent link load balancing, with features such as cost-based and other quality-of-service routing. WAN Optimization Services provide controls for how bandwidth is used to support applications. This allows you to take advantage of the most cost-effective ISP rates, while ensuring appropriate levels of bandwidth are available for specific applications.
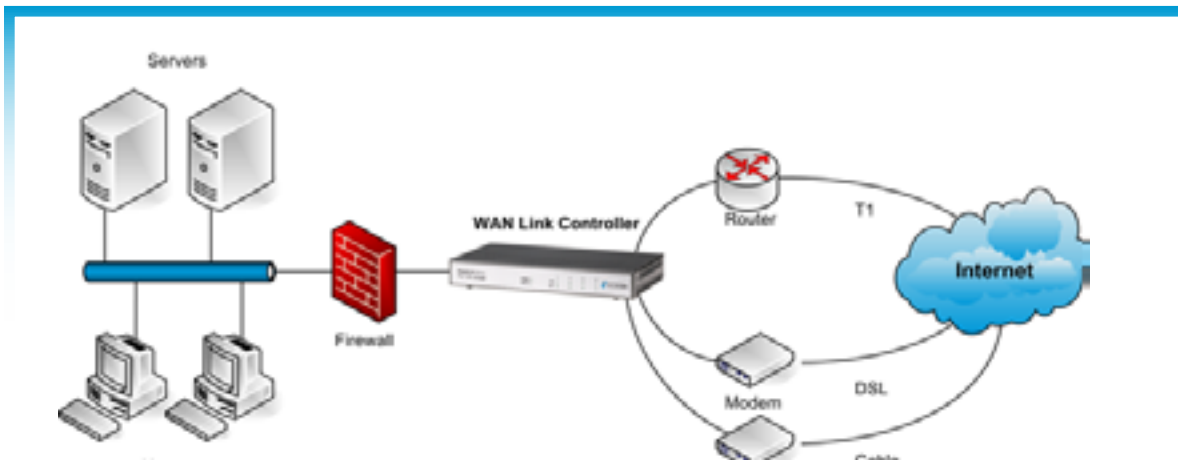
WAN Optimization Services allow organizations to choose the WAN link performance/cost ratio that best fits their needs, provide complete service provider independence, and eliminate the complexity of network protocols such as border gateway protocol (BGP). An advanced WAN Optimization Service will use both inbound and outbound bandwidth aggregation to combine two or more Internet connections, and provide critical applications with access to the total available combined pool of bandwidth. A WAN Optimization Service uses link load balancing to route Internet sessions from congested links, to links with more available bandwidth. They also provide automatic failover of Internet sessions from failed links to functional connections to eliminate a single-point-of-failure. For example, if you have a T1 line (1.5 Mbps), and need additional bandwidth, you would typically have to upgrade to a T3 line (45 Mbps). However, this may be significantly more bandwidth than you require, and will be a significant increase in cost.

This same scenario can be accomplished with two 768 Kbps DSL links that can be combined for a total aggregated bandwidth equivalent to a T1 - at a fraction of the cost. You can also add additional lower speed links such as xDSL, cable, wireless, and others, with a relatively small increase in cost that can more closely match your needs. In addition to receiving more cost-effective bandwidth, you are dramatically increasing the reliability of your WAN network due to the new levels of redundancy through the aggregation of multiple Internet links.

WAN Optimization Services use various techniques to direct traffic load between two or more WAN and/or ISP links, to optimize resource utilization and improve application delivery. They are typically independent of WAN technologies, and fully compatible with xDSL, cable, wireless, T1, E1, T3, E3, satellite, and other link types. This flexibility allows you to mix and match connectivity to best fit your needs.

What to look for in a WAN Optimization Service

The functionality listed below is the criteria that a small-to-medium sized enterprise should look for when choosing a WAN application delivery solution for their needs.

High Availability (Hot Standby) - Since all outbound and inbound traffic must pass through the WAN Optimization Service's micro-appliance, should it fail, the entire site will be inaccessible. To address this, some vendors support redundant configurations. Usually, a standby (or redundant) configuration is supported - sometimes referred to as HA (High Availability). Most sites utilize at least one HA pair - as it would be risky to

deploy multiple WAN links for redundancy and scalability, only to lose the entire site due to a micro-appliance hardware failure. Should one of the micro-appliances go down, the monitoring service will send notify the administrator.

Outbound Load Balancing and Failover – the WAN Optimization Service should provide both inbound and outbound bandwidth load balancing and failover. The user defines weights (bandwidth capacity) based on the bandwidth of each WAN link. When a session is generated from the LAN, the micro-appliance computes which link has the most available bandwidth and routes traffic from that session over that particular WAN link. The device typically allows the selection of two link load balancing algorithms:

1. Symmetrical round robin - routes sessions to all links in a round robin manner.

2. Intelligent (weighted) load balancing - computes a ratio between the weight (bandwidth capacity) of the different WAN links, and then routes sessions accordingly. That is, the faster the link, the more sessions that will be sent over that link, in order to make the most efficient use of all the bandwidth available. Additionally, an intelligent link load balancing solution will examine the amount of real-time traffic on each link, compared to the amount of available bandwidth resources left, and choose the best path for the next session's most optimal route for performance.

Inbound Load Balancing and Failover - is accomplished by the micro-appliance acting as the authoritative DNS server for the domain. The appliance advertises all available WAN links to the DNS caching servers which in turn resolve the domain names to queries in a round robin format. In this manner, all externally initiated sessions are load balanced over all available links. Since the appliance is resident at the domain site and is able to directly monitor the link status, failed links are removed from the DNS tables immediately upon failure. By setting the host name record Time-to-Live (TTL) to a short period (i.e. 30 seconds), the DNS caching servers will flush their address tables and will update them from the appliance regularly, and thus be informed when a link fails.

Cost-effective - A quality WAN Optimization Service should deliver easy and affordable WAN/ISP link aggregation, inbound and outbound load-balancing, failover, and WAN Virtualization. You may use two, three or however many WAN links and ISPs you need. This allows you to leverage low-cost links, eliminate link congestion and bottlenecks, and use the service's traffic shaping and application prioritization features to guarantee minimum bandwidth to specific applications.

You can take advantage of the cost of a consumer ADSL link, and get business connectivity at that price. Not only can you get the flexible capacity – you can also buy cost-effective links from multiple ISPs, so that if one link goes down, you can automatically switch over to the other links.

WAN and ISP failover - When a WAN Optimization Service detects a link failure it should automatically update the DNS record for your domain so that the server requests are sent to the IP address of your alternate server or server cluster. WAN Optimization Services should also provide for device failover through its active/passive failover capability. This eliminates the chance of the WAN link controller being the single-point-of-failure.

Disaster Recovery/Site Failover - Many businesses need to redirect Internet traffic to a disaster recovery site should a catastrophe disrupt a main site. WAN Optimization Services have in effect, reduced the cost to ensure that site failover and fallback occur automatically, reliably, making this functionality practical and affordable even for the smallest businesses.

Traffic Shaping and Application Prioritization – Traffic shaping includes the ability to prioritize network traffic to ensure that adequate bandwidth is always available to specific bandwidth-intensive applications, especially during periods of congestion. Rules determine bandwidth minimums and maximums for specific types of traffic and use load balancing and automatic failover to direct this traffic to links with sufficient bandwidth. WAN Optimization Services should provide traffic shaping and application prioritization support for traffic based on defined rules.

Performance - Performance of applications over the WAN directly affects response time. This includes not only total average transaction time, but assures that users located at performance-challenged sites (such as branch offices) still receive the acceptable level of performance. Performance is an important criterion for any piece of networking equipment, but it is critical for WAN Optimization Service, because datacenters are central points of aggregation. As such, the micro-appliance should support extremely high volumes of traffic transmitted to and from sites. A simple definition of performance is how many bits-per-second the device can support. While this is extremely important, in the case of a micro-appliance, other key measures of performance include how many

WAN links, number of supported concurrent sessions, number of domain names and number of hosts within each domain.

Security - More advanced WAN Optimization Services include built-in firewalling and security features to provide added security and lower the cost of support, maintenance and overall infrastructure complexity through device consolidation.

WAN Virtualization - WAN Optimization Services can support WAN Virtualization to bond multiple network links into a single high-bandwidth channel to ensure high-availability for applications. If one link goes down or degrades in performance, traffic is automatically directed to the best working links without interruption. WAN Virtualization is a form of load balancing which allows for stateful failover of traffic to the best performing links to ensure critical applications avoid problems that occur when they are stopped on one link and restarted over another link. WAN Virtualization ensures that critical applications avoid failures, and are never adversely affected, even after brief disruptions.

Summary

The complexity associated with managing WAN infrastructure for small-to-medium sized enterprises has brought with it many new challenges that today's IT staff must meet. Organizations that deliver critical applications for datacenters, remote offices, customers and partners usually rely on more than just a single ISP or WAN link. For virtually any organization today, computer networks are tightly integrated into the business processes. These organizations are using the network to conduct business and communicate with customers, vendors, partners and external employees beyond their LAN, and the WAN is having an ever increasing role in supporting the automation of business applications such as order fulfillment and communications using email and VoIP. Compound this with the reality that today's business demands immediate and secure access has never been more of a concern, yet many sites today still lack the required WAN infrastructure to deliver the appropriate reliability, performance and security, and the need for an intelligent solution to manage multiple Internet connections becomes a top priority for most SME businesses in today's market.

For SMEs, the complexity and dynamic nature of e-commerce and critical business applications running over the Internet are the major causes of poor performance and unplanned downtime. SMEs are becoming increasingly aware of the need to ensure the quality delivery of their business applications. However, acquiring more devices, more complexity and more single capability solutions is not the answer. Optimizing the delivery of applications between end-users and the headquarters (datacenter), with ease of management, faster access to applications and security within a cohesive platform is required.