

Product Brief

Wide Area Application Architecture and Exchange 2010

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Abstract: Many large organizations are consolidating IT infrastructure into massive data centers to lower costs, but what about application availability and performance? Massive consolidation can lead to single points of failure which could interrupt service of critical applications. ESG believes that this risk should be addressed by building applications on a Wide Area Application Architecture (WAAA) foundation, spreading applications across multiple data centers. [F5 Networks](#) has already built an enterprise-class WAAA implementation for Exchange 2010 to combine consolidation benefits with high performance and availability.

Overview

Over the last few years, IT infrastructure has gone through a profound change IT is increasingly consolidating: first into massive data centers and then further into virtual servers collocated on physical systems. Why is aggregation taking place? CIOs want better control of assets and economies of scale on IT operations. This desire for better control of assets and IT operations is clearly reflected in ESG research.¹ IT professionals ranked “increased use of server virtualization,” “manage data growth,” and “data center consolidation” amongst their highest IT priorities for the next 12-18 months (see Figure 1).

Figure 1. Top IT Initiatives for 2011



Source: Enterprise Strategy Group, 2010.

What about Application Performance and Availability?

The focus on consolidation and control is certainly delivering ROI. In multiple cases, ESG research points to consolidation benefits such as improved hardware optimization, reductions in power/cooling cost, and enhanced IT operations efficiency. In spite of these benefits, however, consolidation alone can also carry a cost. Aggregating IT assets can lead to single points of failure where the loss of a data center, network connection, or server could halt business operations and have a profound impact on sales or corporate reputation.

¹ ESG Research Report, 2011 IT Spending Intentions Survey, January 2011.

Aside from this type of catastrophic outage, application consolidation can also profoundly affect application performance and service level agreements. For example, when e-mail is consolidated into a single large densely-populated data center, every packet of data center network traffic will influence e-mail access and performance for all users. At the application layer, application traffic flows to specific subnets of server clusters, which are transforming into an army of virtual servers. If the network isn't optimized, network and application traffic is sure to be bottlenecked by multiple processor-intensive layer 4-7 operations executed on some overworked piece of hardware. Frustrated remote sales people don't care why they can't access e-mail on the last day of the month—all they know is that they can't send proposals to customers.

What's Needed? Wide Area Application Architecture (WAAA)

Yes, consolidation and virtualization benefits are worth pursuing, but smart CIOs will recognize and address performance and availability risks. With today's network-centric applications, performance and availability protection goes beyond traditional methods like server clusters and RAID-based storage approaches. Rather than redundant components alone, CIOs must think in terms of applications that span multiple data centers and provide fast application access to local and remote users traversing private and public networks alike.

To achieve high availability and performance for critical web-based applications, ESG proposes a new type of design called a Wide Area Application Architecture (WAAA). ESG defines WAAA as:

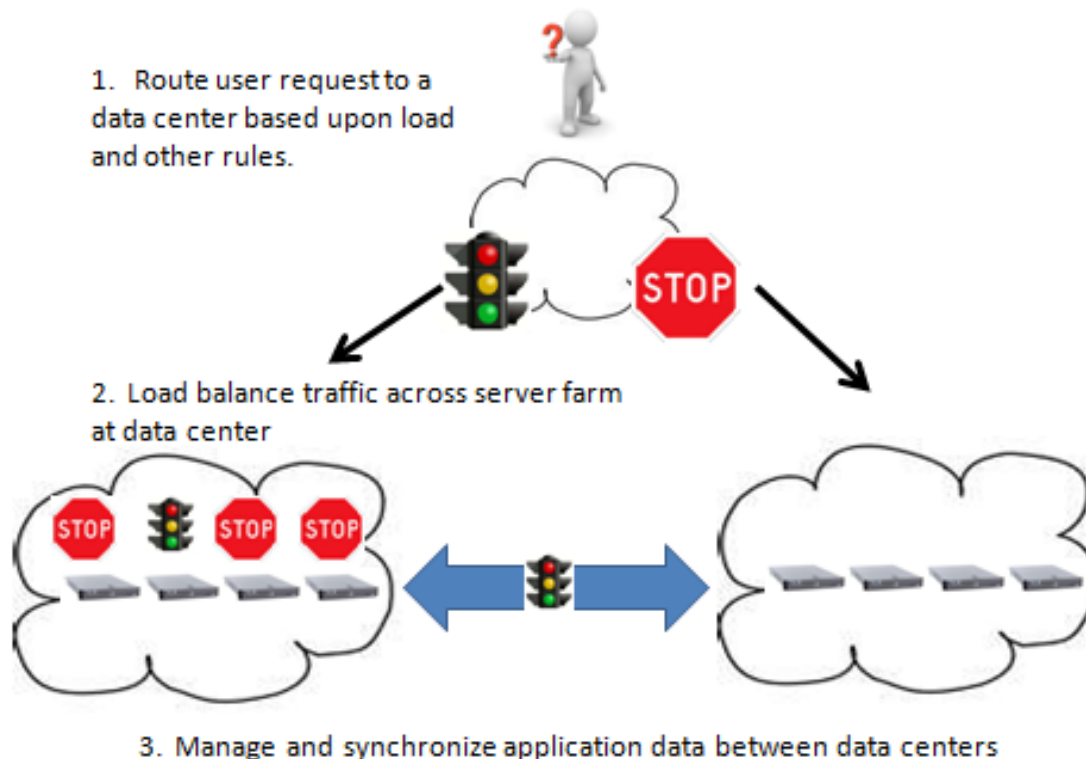
A wide area network architecture built for data center connectivity, high availability, and performance of both networks and web-based applications.

WAAA is different from traditional application architectures in that it:

- **Unifies applications and networks.** Web-based applications are tightly integrated with TCP/IP and network protocols, yet most high-availability solutions deal solely with networks or applications alone. By combining application and network technology, WAAA can manage performance and availability requirements for users (i.e., when a user accesses a web-based application) and the back-end applications themselves (i.e., load-balancing and availability across distributed web-based applications or local instances of application servers).
- **Manages redundant network links.** Today's high volume network data centers should be anchored by multiple network paths connected to a combination of ISP networks. While this can provide for network availability in the event of an ISP network outage, savvy CIOs will take this a step further by load-balancing network traffic across ISPs at the network link level. In this way, a multi-homed network can help enhance performance and not just uptime.
- **Uses WAN optimization for application content replication.** To ensure data consistency and integrity across geographically dispersed web-based applications, WAAA takes advantage of WAN optimization functionality like compression, deduplication, and protocol acceleration to keep all application data up to date.
- **Integrates with server virtualization.** Ultimately, WAAA can help application performance by interoperating directly with server virtualization management tools such as Citrix XenCenter, Microsoft System Center, or VMware vCenter. This is one reason why sophisticated WAAA should include an Application Delivery Controller (ADC) that interoperates with server virtualization management platforms. When an ADC-based WAAA detects an unexpected traffic spike, it can alert the server virtualization management tools to provision new VMs as additional web-based application instances to address the traffic load.

In summary, WAAA is built with both users and applications in mind. When a user accesses a critical application, they are guided toward the application instance that can deliver the highest performance based upon a number of considerations (location, time-of-day, current network load, current application load, etc.). Access requests are then spread across numerous front- and back-end servers to maintain peak performance and route around unavailable resources. At a macro level, WAAA monitors the entire application infrastructure across multiple data centers to ensure overall application health as well as data consistency and integrity (see Figure 2).

Figure 2. WAAA At Work



Source: Enterprise Strategy Group, 2010.

F5 Network's WAAA for Exchange 2010

Microsoft Exchange 2010 introduced a new highly scalable multi-tiered architecture that fits well with corporate IT objectives around IT consolidation and streamlined operations. Many enterprises are also attracted by Exchange 2010's design which reduces storage requirements, offers "anywhere" access for users, enhances communications tools, and improves support for regulatory compliance. Combined with ESG's WAAA architecture, Exchange 2010 can also bolster e-mail availability and performance for local and remote users.

Recently, ESG learned about a specific WAAA implementation for Exchange 2010 provided by application networking leader F5 Networks. Like ESG's model, F5's WAAA for Exchange 2010 provides for:

- **ISP load balancing and availability.** To manage and optimize multi-homed networks, F5's WAAA for Exchange 2010 includes BIG-IP Link Controllers at the network edge. This provides for high availability and performance in and out of corporate data centers across multiple ISP networks.
- **Network load balancing across multiple data centers.** To channel users toward available and lightning fast e-mail resources, F5 optimizes traffic across data centers with BIG-IP Global Traffic Managers. As previously mentioned, BIG-IP Global Traffic Managers look at user characteristics like physical location and data center metrics like the current load on a farm of Exchange Edge Transport and Client Access Servers (CAS), before making the ultimate network access path decisions. BIG-IP Global Traffic Managers actually become part of the e-mail infrastructure itself by using DNS as an engine for distributing users amongst data centers.
- **Local load balancing across multiple servers.** Within each data center, F5 provides traditional server load balancing functionality through its BIG-IP Local Traffic Managers. In an Exchange 2010 environment, this can be used to spread application requests across farms of Exchange CAS, Exchange Edge Transport servers, or Exchange Hub Transport Servers. BIG-IP Local Traffic Managers can also take advantage of built-in WAN Optimization Modules (WOMs) to optimize replication across Exchange Data Availability Groups (DAGs) residing in different data centers.

With these products, F5 can already deliver a true WAAA implementation for Exchange 2010. What's more, additional BIG-IP functionality like SSL acceleration, access policy manager, or even iRules can further improve IT efficiency or business value. F5 Networks is also working with all the major server virtualization vendors for interoperability between BIG-IP and each server virtualization management platform. F5 is also able to work with server virtualization platforms to spin up/spin down VMs based upon network traffic, maintenance windows, or energy cost considerations.

The Bigger Truth

As the old saying goes, it is not wise to throw the baby out with the bath water. In some ways, this is exactly what many enterprises do when consolidating and virtualizing applications into data centers. Yes, IT consolidation can lower costs and ease IT operations, but they can also impact application performance and availability for users.

ESG believes that the WAAA concept addresses this by managing redundant ISP networks, load balancing network traffic across data centers, load balancing local traffic loads across server farms, and maintaining application coherency with WAN optimization-based data replication. In this way, WAAA is a perfect fit for mission-critical web-based applications.

F5's WAAA implementation for Exchange 2010 can be viewed as a reference architecture taking ESG's concept to reality. Using its firmly-established BIG-IP systems as a foundation, F5 has created a real-world WAAA for Exchange 2010 that can help large organizations consolidate resources, improve IT operations, and take advantage of Exchange 2010 functionality while bolstering availability and performance. Smart CIOs will recognize these global benefits and make sure to bring Microsoft and F5 in as a team as they upgrade to Exchange 2010.