Cisco Wide Area Application Services and Cisco Nexus Family Switches: Enable the Intelligent Data Center

What You Will Learn

IT departments are facing increasing pressure to accommodate numerous changing business dynamics. The workforce is becoming increasingly global and distributed, while industry regulation and Internet business models promote the need for high availability and data protection, which demand a consolidated infrastructure. Additional pressures are placed on IT to increase the value provided by the organization and the infrastructure they manage, as IT continues to evolve into a business differentiator and an enabler of business expansion. Recognizing these challenges, Cisco provides two complementary technologies, discussed here, that, when deployed together, enable you to not only transform your data center and branch-office architecture, but also transform how your data center and branch-office architectures to position your organization for the future and accelerate the responsiveness of your business.

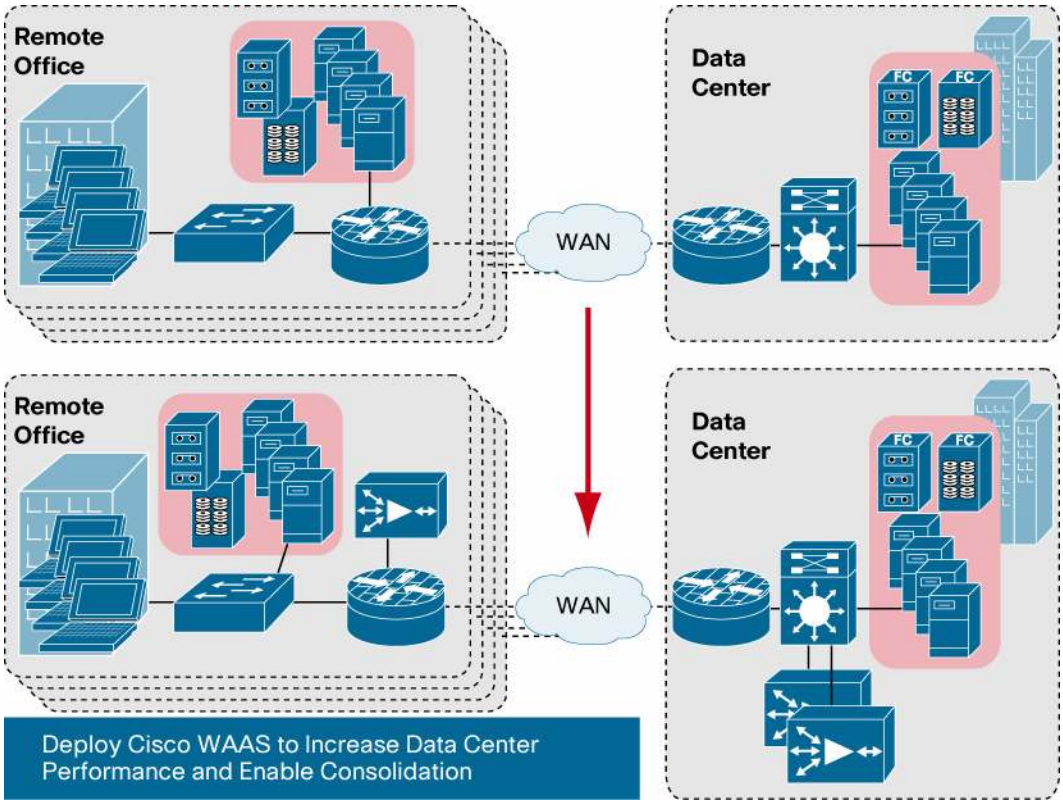
Control Costs and Complexity Through Branch-Office Consolidation

The workforce is increasingly global and distributed, and remote workers require high-performance access to application infrastructure to remain productive, achieve revenue goals, and meet customer satisfaction requirements. These requirements have traditionally caused IT departments to distribute application infrastructure—servers, storage, and data protection components—to the branch offices to help ensure fast access to information. As storage requirements continue to increase and organizations face ever-evolving regulatory compliance requirements, organizations find themselves in a predicament resolved only by either expanding remote-office infrastructure and its security and data protection posture, or by consolidating that infrastructure from the branch offices into one or more data centers.

The challenge in consolidating infrastructure for immediate cost savings, in hardware, software, data protection, and operating expenses, is addressing the performance implications for the remote users. Access to information over a WAN is an order of magnitude slower than access to information over a LAN, due to limited WAN bandwidth, packet loss, and latency. The first step in controlling costs and enabling the intelligent data center is to reduce the effects of the performance boundary found in the WAN while bridging the gap between infrastructure consolidation and application performance. This challenge can be met through deployment of Cisco® Wide Area Application Services (WAAS) Software.

Cisco WAAS is software deployed on either end of a WAN link in both your remote offices and your data center using router-integrated network modules or appliances (Figure 1). Coupling intelligent application-layer acceleration with advanced compression and flow optimization capabilities, Cisco WAAS mitigates the negative effects of WAN conditions to provide remote users with LAN-like access to infrastructure in the data center. This LAN-like access allows IT departments to confidently consolidate servers, storage, and data protection infrastructure in the data center without compromising on the performance expectations that remote users have built based on years of having that infrastructure locally.

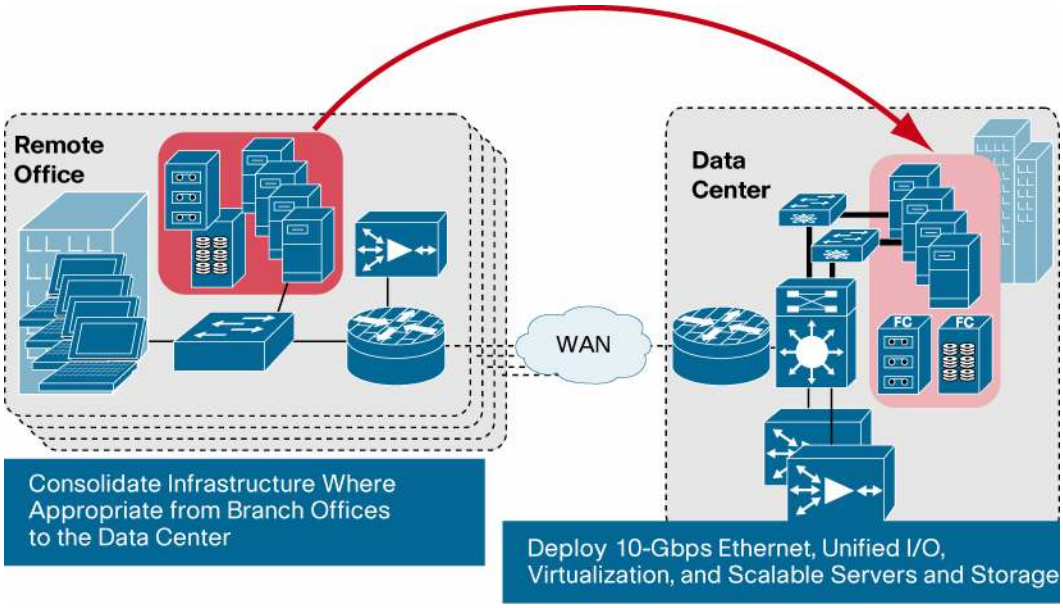
Figure 1. Consolidate Infrastructure in the Data Center with Cisco WAAS



With Cisco WAAS deployed, performance effects of the WAN are mitigated through a series of powerful WAN optimization and application acceleration capabilities, allowing remote users to experience a level of performance similar to that of users local to the application infrastructure in the campus network or data center. With infrastructure consolidated and Cisco WAAS deployed, organizations can centrally deploy new applications for the global network rather than having to distribute and manage remote-office infrastructure.

With Cisco WAAS, infrastructure can be consolidated safely to improve data protection, decrease ongoing management and capital costs, and meet regulatory compliance initiatives, and additionally the performance boundary of the data center is extended to the remote office to help ensure performance consistency, regardless of the location from which the user is accessing information. To help prepare the data center for the oncoming consolidation initiative and to enable better support for next-generation IT initiatives, organizations can also deploy the Cisco Nexus™ Family of switches to take advantage of the performance benefits of 10-Gbps Ethernet and the mobility benefits provided by the virtualization capabilities of the platform, as shown in Figure 2.

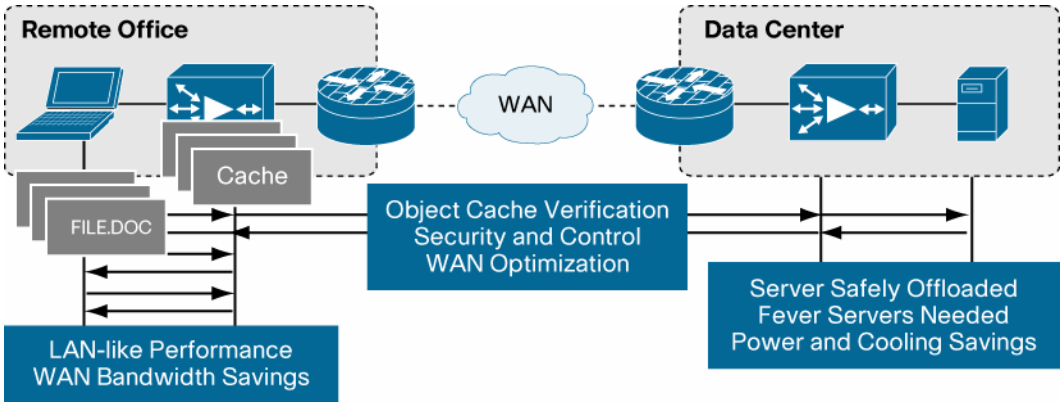
Figure 2. Cisco Nexus Platform Enables Data Center Readiness for Infrastructure Consolidation



Migration to a higher-performance networking platform through the Cisco Nexus Family helps enable existing resources to handle increasing user workloads while providing an architecture to support next-generation IT demands. Cisco WAAS provides a powerful complement in that application acceleration capabilities provided by Cisco WAAS are built to both dramatically improve performance and explicitly offload file server infrastructure in an intelligent manner to improve scalability of existing file server resources. Like the Cisco Nexus platform, Cisco WAAS improves scalability of existing resources and can also extend the longevity of data center file servers.

By employing client-side caching in the remote-office Cisco WAAS devices, file data or metadata can be served directly to requesting users when safe to do so. In this way, many operations that would have otherwise been handled by the file server are handled by Cisco WAAS directly, thereby offloading application processing tasks to the network and reducing the workload that must be handled by the server. With a substantial amount of I/O offloaded from the server to Cisco WAAS, file servers can safely scale to support a larger number of users and storage capacity, which enables greater economies of scale for existing file server and network attached storage (NAS) infrastructure (Figure 3).

Figure 3. Cisco WAAS Intelligently Offloads File Servers



Figures 4 and 5 show file server utilization before and after deployment of Cisco WAAS. Because of the intelligent protocol optimization provided by Cisco WAAS, file server network throughput requirements can be offloaded by 90 percent or more, thereby allowing existing infrastructure to service a broader set of users and significantly extending the longevity of the file server resource.

Figure 4. File Server Utilization Before Cisco WAAS

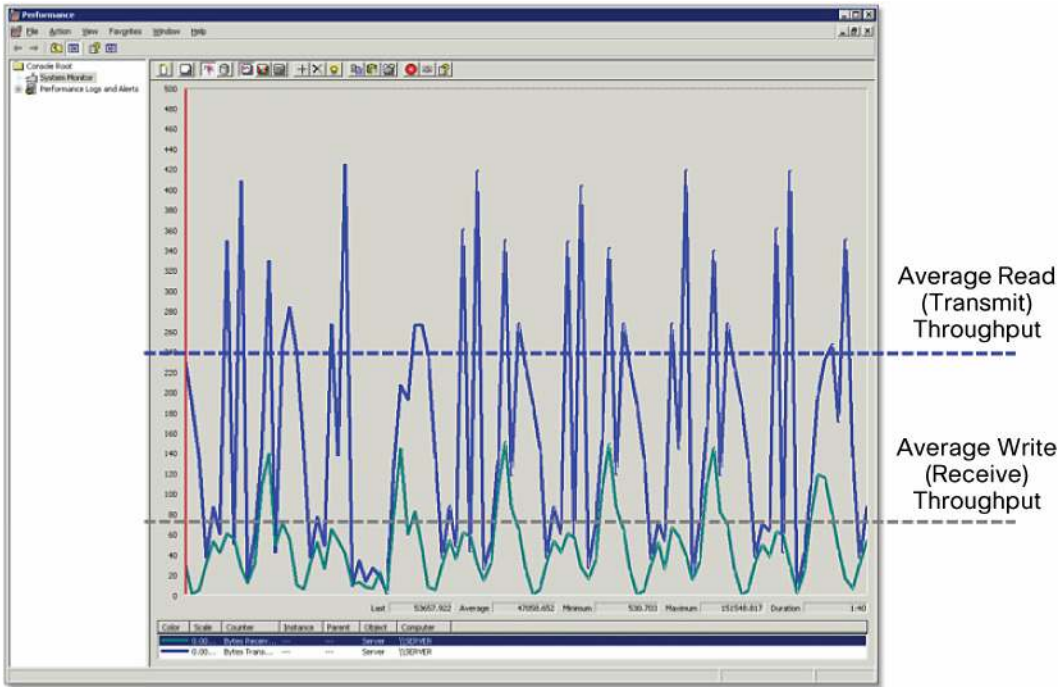
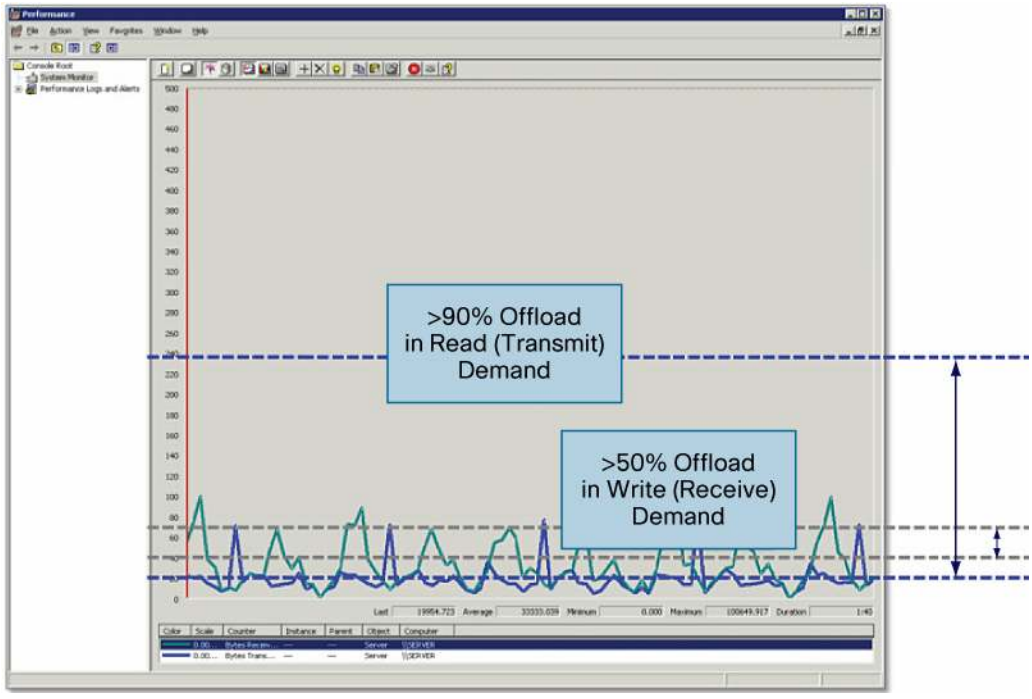


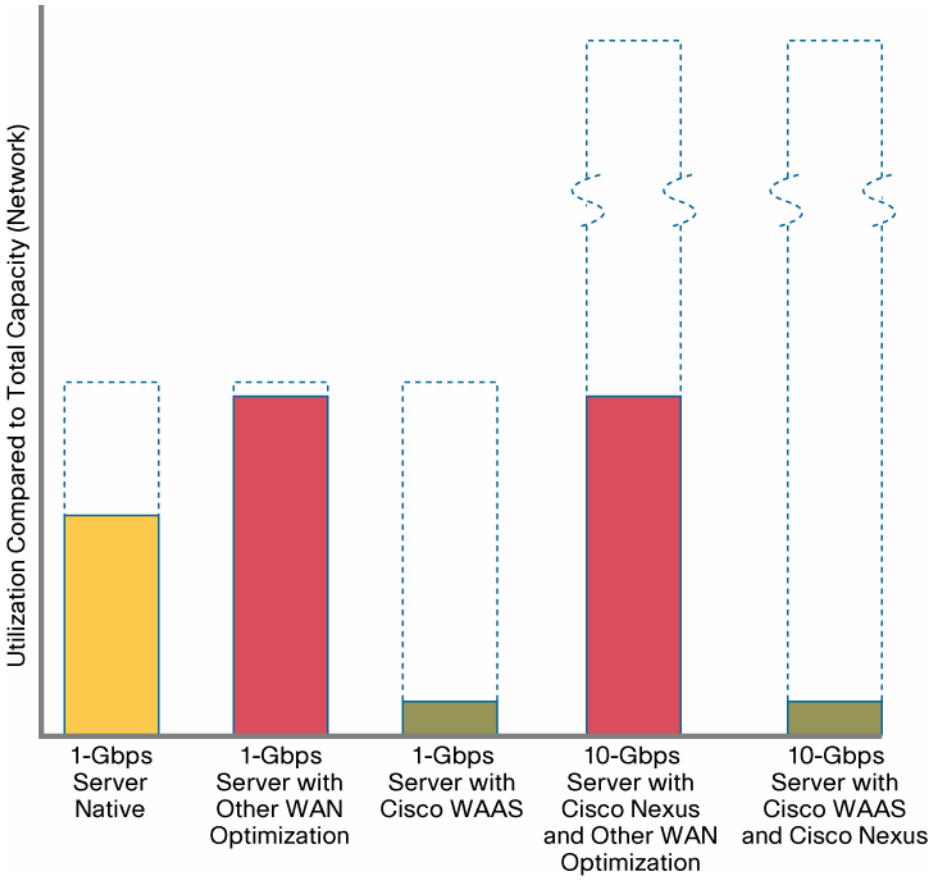
Figure 5. File Server Utilization Reduced by Cisco WAAS



When Cisco WAAS and Cisco Nexus solutions are deployed together, organizations can achieve an exponential increase in the longevity of existing file server resources. The Cisco Nexus platform

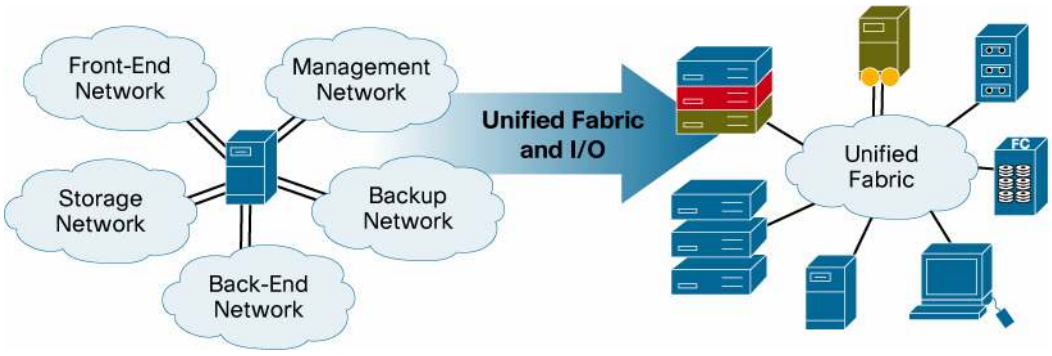
extends longevity by increasing the overall throughput capacity of the file server resource, and Cisco WAAS reduces the workload that must be handled by the file server resources directly. Unlike other WAN optimization solutions, which actually increase the load placed on data center server resources, Cisco WAAS reduces that workload to increase longevity of the resource. Figure 6 shows how the Cisco WAAS and Cisco Nexus solutions, when deployed together, provide an extensible platform that is ready for tomorrow's business needs; the figure also shows how deployment with a WAN optimization solution other than Cisco WAAS actually works against the benefits provided by the Cisco Nexus platform.

Figure 6. Competitive WAN Optimization Solutions Work Against Cisco Nexus Solution Benefits



Additionally, the Cisco Nexus Family provides a platform for server I/O consolidation. Most IT departments are challenged by the task of managing server and application infrastructure connectivity, including connectivity to the management network, backup network, storage network, cluster network (or high-performance computing [HPC] network), and application access network. Connectivity and operating requirements have dictated the need for multiple network interface cards (NICs) and host bust adaptors (HBAs) in servers and other components, which increases cost and dramatically increases complexity in infrastructure management. By using the Cisco Nexus platform for I/O consolidation, IT departments can deploy a unified fabric, thereby reducing the number of I/O interfaces in each server, the number of cable runs for each server, and the ongoing costs associated with administration. Instead, servers can be deployed with a redundant pair of 10 Gigabit Ethernet switches that provide a common transport and appropriate operating characteristics for upper-layer networking services (Figure 7).

Figure 7. Cisco Nexus Platform Enables Unified I/O and Reduces Cost and Complexity



Cisco WAAS enables infrastructure consolidation and performance consistency across the global network, and the Cisco Nexus platform enables consolidation of data center infrastructure and performance scalability. By coupling the two solutions, IT departments are positioning themselves to quickly adapt to future business and application requirements with confidence, knowing that the data center architecture itself is scalable and extensible to meet ongoing demands.

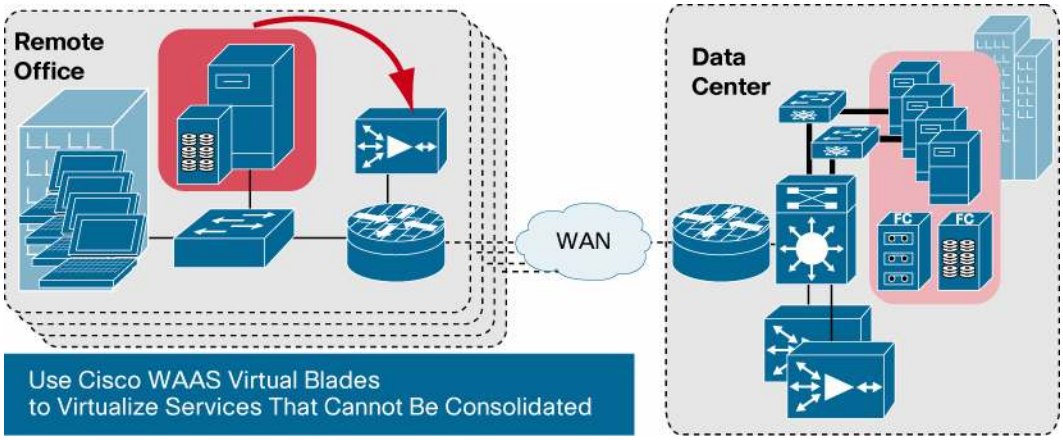
Streamline Data Center Operations Through Virtualization

The next step in enabling the intelligent data center after achieving consolidation, consistent global application performance, and unified I/O is to employ intelligent network-centric virtualization. Network-centric virtualization in the branch office and data center helps further consolidate hardware infrastructure while helping ensure efficient use of resources. By using network-centric virtualization, IT departments can rapidly deploy critical infrastructure services to branch-office locations and gain the freedom and mobility necessary to move applications rapidly within the data center to support business objectives

Branch-office users rely not only on the performance of the applications they use to be productive and fulfill the requirements of their daily work, but also on critical infrastructure services that enable them to find applications and gain access to the network. Traditionally these infrastructure services have been deployed on servers in each remote location, which caused administrative difficulty, data protection concerns, and additional cost. In responding to initiatives to consolidate costly remote-office infrastructure, many IT departments have come to realize that certain services in the remote office are not good candidates for consolidation, simply because these services may require higher levels of availability than can be provided by the WAN.

To provide organizations with the benefits of consolidation, even for those infrastructure services that cannot be removed from the branch office, Cisco WAAS provides a network-centric branch-office virtualization platform called virtual blades that allows IT departments to rapidly deploy infrastructure services, including capabilities provided by Windows Server on WAAS (WoW), in the branch office, or consolidate distributed branch-office servers on the branch-office Cisco WAAS device. With branch-office servers collapsed into virtual blades on the local Cisco WAAS device, fewer physical devices remain in each branch office, leading to lower power consumption, cooling requirements, and overall operational expenditure (Figure 8).

Figure 8. Cisco WAAS Enables Consolidation of Critical Branch-Office Services



Cisco WAAS virtual blades allow organizations to gain the benefits of branch-office consolidation, including reduced power and cooling costs and better data protection, while providing support necessary to:

- Establish network connectivity: Through deployment of WoW, employees gain access to the network through local Dynamic Host Configuration Protocol (DHCP) instances and can find other network-connected entities and resources through Domain Name Server (DNS) capabilities.
- Locally provide authentication, authorization, and resource location: Through deployment of WoW, employees have a local instance of Microsoft Active Directory in the branch office to handle user login, authentication, and authorization. This feature enables rapid network access and fast service to resources managed by Microsoft Active Directory
- Host distributed applications: Through Virtual Blades, Cisco WAAS allows IT departments to flexibly host distributed applications in the branch office while receiving the benefits of reduced branch-office infrastructure and management.

In the data center, the Cisco Nexus Family is central to a data center virtualization strategy. The Cisco Nexus 7000 Series Switches provide high-density, high-performance network connectivity to allow cost-effective consolidation and virtualization of network services without compromising network operating characteristics. The zero-service-loss architecture of the Cisco Nexus 7000 Series also helps ensure that these network services can be safely consolidated and virtualized without undue risk to overall system availability. Additionally, the Cisco Nexus 7000 Series provides hypervisor-like switch virtualization capabilities through the Cisco NX-OS operating system, allowing the Cisco Nexus 7000 Series to operate as a number of completely discrete virtual switches, each with independent configuration and operating characteristics, thereby reducing disruption due to configuration changes or failures.

Confidently Deploy New Applications and Video

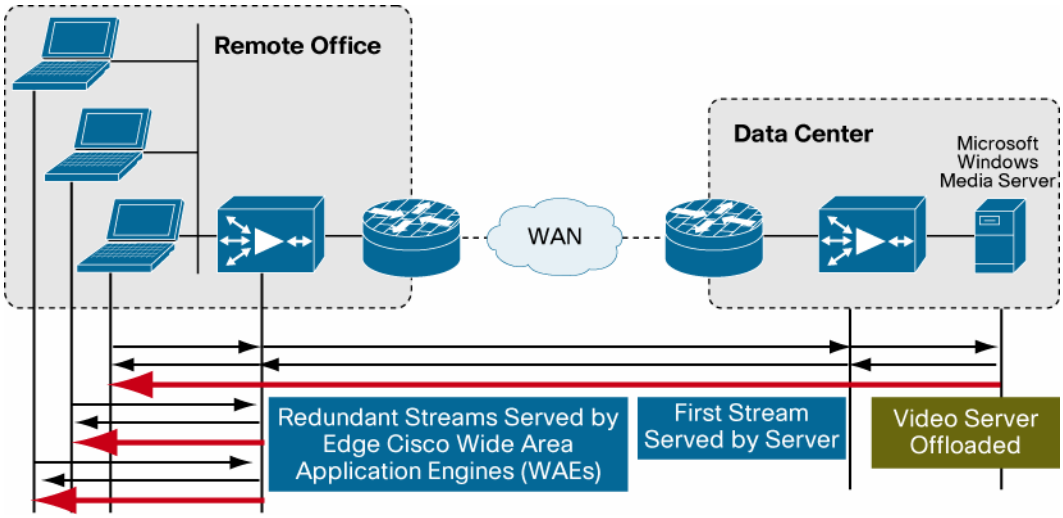
Deployment of Cisco WAAS and Cisco Nexus switches helps transform your data center architecture into an extensible platform that offers high performance for the global network, consolidation to reduce ongoing administration and expenditures, and scalability to meet continuously changing business objectives and performance requirements. With an intelligent data center deployed, IT departments can confidently deploy new applications and business video to accelerate business responsiveness and enable real-time collaboration.

As applications continue to evolve, IT departments are finding that the burden on the network continues to increase as the applications become more powerful, intuitive, and interactive for the employee. Standardization on common low-layer application protocols such as HTTP and XML, known to be self-describing but also inefficient, further increases network bandwidth requirements, placing strain on network resources. Additionally, these applications, and more specifically the experience while working with the applications, can be hindered now more than ever by performance-limiting factors such as latency and packet loss. As described previously, the Cisco Nexus platform provides the scalable, high-performance architecture necessary as the foundation to meet the requirements of these changing applications and business requirements in the data center. With the Cisco Nexus platform deployed with Cisco WAAS to eliminate the data center performance boundary and extend high-performance access to the global network, IT departments can now deploy new applications confidently, and remote employees can confidently use them without concern about performance.

Similarly, business video can be deployed globally to streamline business processes. From simple one-way training videos, to video-on-demand (VoD), to corporate videocasting of messages from the CEO or interactive collaboration and unified communications, video is a significant consumer of network resources and is enabled by deployment of the Cisco Nexus platform. The Cisco Nexus platform provides the performance and scale necessary to rapidly deliver video through the data center to the global network, and Cisco WAAS helps ensure high-performance delivery of business video from the data center to employees without regard to the location in the global network in which the video resides. With a high-performance network architecture supporting video, organizations gain a competitive advantage in that information can be distributed in real time, employees can be updated on the latest product developments or initiatives, and people can work more closely than ever before through unified communications.

Cisco WAAS provides capabilities for video services similar to those provided for file services to help reduce the workload managed by data center video servers. By employing stream-splitting capabilities for Microsoft Windows Media in the branch office, a single stream over the network can service a large number of users in a remote-branch office, thereby reducing the amount of bandwidth required on the WAN and the workload that must be managed by the data center video servers. Figure 9 shows how Cisco WAAS can increase the scalability of data center video servers while helping ensure consistent playback performance for remote-office workers, enabling IT departments to more confidently deploy video solutions.

Figure 9. Cisco WAAS Enables Confident Deployment of Video



Conclusion

IT departments are challenged to meet today's business demands, including infrastructure consolidation for cost savings, improved data protection, consistent global application performance, and service-level agreements (SLAs) for performance, scalability, and availability. Together, Cisco WAAS and the Cisco Nexus platform enable a transformation of the data center that both meets the disparate business demands and positions IT departments to meet the next wave of challenges that will inevitably place more demands on the network.

For More Information

For more information, please visit:

- http://www.cisco.com/go/waas for information on Cisco Wide Area Application Services
- http://www.cisco.com/go/nexus for information on Data Center Switches and the Cisco Nexus product lines.

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Printed in USA C22-525305-01 01/10