# Cisco and Visual Network Systems: Implement an End-to-End Application Performance Management Solution for Managed Services

## What You Will Learn

In today's economy, IT departments are challenged to decide whether to deploy a distributed or a centralized infrastructure. Distributed infrastructure offers the appeal of increased employee productivity and performance, but it requires significantly higher capital expenditures (CapEx) and operating expenses (OpEx). Centralized infrastructure allows IT departments to consolidate application services in one or more data centers, thereby reducing CapEx and OpEx, but it presents performance challenges for remote employees who are held to the same productivity standards as employees closer to the application infrastructure.

Application performance management (APM) is a series of technologies that, when combined, enable managed services providers (MSPs), as well as IT departments that operate in a similar capacity, to understand how their applications are performing, provision the network according to business and application requirements, and optimize applications to help ensure consistent performance. Cisco and Visual Network Systems together provide an industry-leading solution for APM to enable MSPs to more intelligently manage performance of business-critical applications and enhance the investment in network and application fabric that powers today's forward-looking businesses.

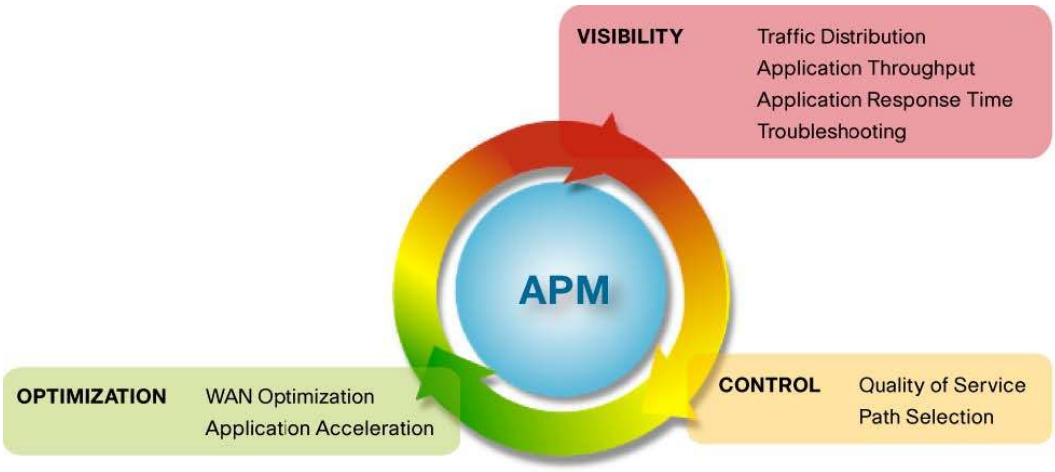
## Application Performance Management

APM is a framework that takes advantage of visibility into application performance and network use to better align networking resources with business and application requirements and improve the performance of applications throughout the network. The benefits of an APM framework are clear: improved network utilization for business-critical applications, better performance for every user regardless of location, and understanding of network performance and utilization dynamics to assist in troubleshooting and enforcing performance service-level agreements (SLAs).

APM consists of three main components, each interoperating with the others to effectively accomplish the task of managing application performance (Figure 1):

- **Visibility:** By taking advantage of network data sources to understand what applications are on the network, how they operate, and how they are performing, IT departments can adjust the network configuration to improve utilization of precious network resources.
- **Control:** With the appropriate visibility, network resources can be provisioned through techniques such as quality of service (QoS) and performance routing (PfR) to help ensure that resources are used according to application performance requirements and business objectives.
- **Optimization:** With an understanding of how applications are performing, optimization techniques such as those provided by WAN optimization and application acceleration can be employed to reduce bandwidth consumption, enable consolidation of infrastructure, overcome the limitations created by latency and loss, and improve application performance for remote users.

**Figure 1.** Application Performance Management Components




Together, Cisco and Visual Network Systems have developed an ecosystem of products that provides visibility, control, and optimization to manage end-to-end application performance.

## Components of Cisco and Visual Network Systems APM Solution

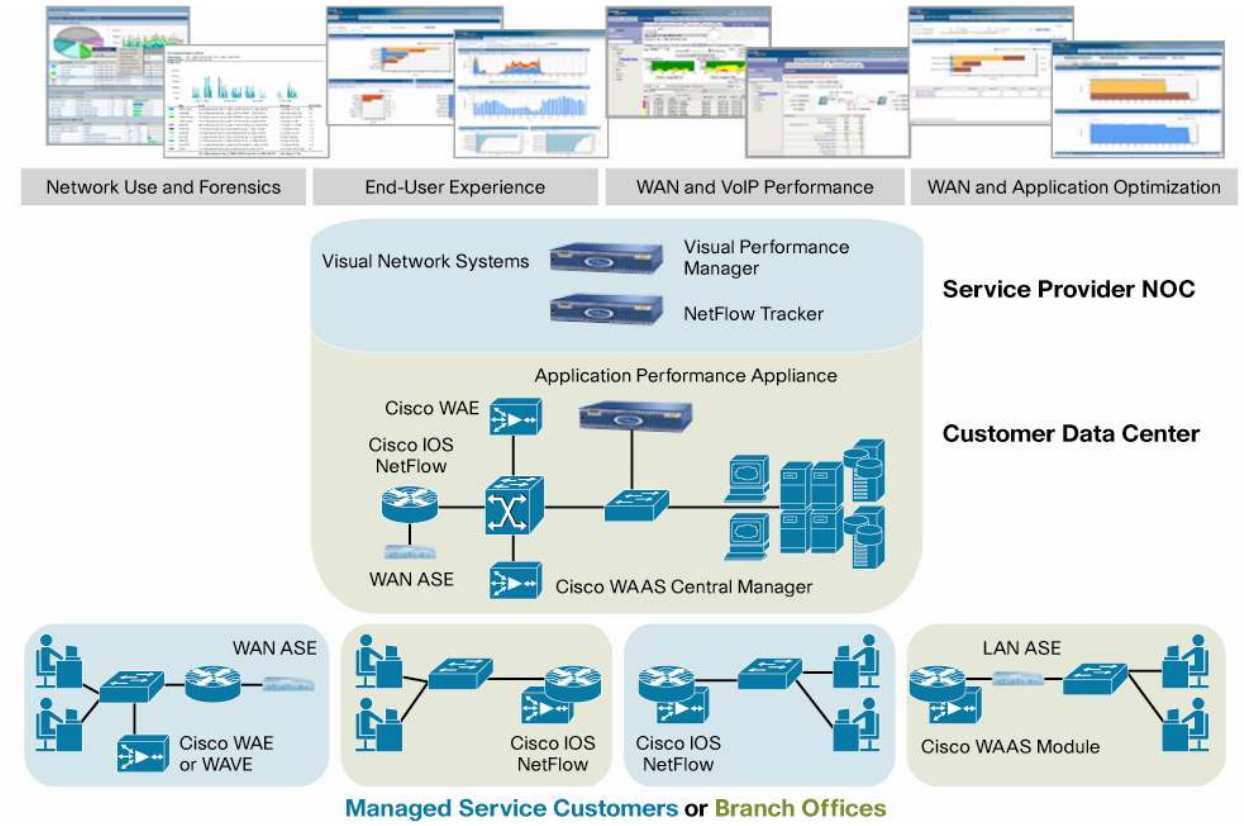
The Cisco and Visual Network Systems APM solution consists of the following components (Figure 2):

- **Visual Network Systems' Visual Performance Manager™:** This unified system provides integrated views and unique data correlation across multiple data sources to provide the visibility necessary for effective management of network, application, and voice-over-IP (VoIP) performance. Supported data sources include the Visual Network Systems' Application Performance Appliance, NetFlow Tracker, and Analysis Service Elements. Depending on the level of visibility required, one or all of these data sources can be integrated into Visual Network Systems' Visual Performance Manager.
- **Visual Network Systems' Application Performance Appliance:** This hardened, purpose-built data acquisition platform integrates with Visual Network Systems' Visual Performance Manager to provide actionable visibility of end-user response times for critical business applications, allowing the organization to optimize the delivery of essential business services. Deployed in the data center, Visual Network Systems' Application Performance Appliance can manage multi-tier application performance and report on actual service delivery with visibility down to the level of individual users and transactions.
- **Visual Network Systems' NetFlow Tracker:** This software-only or appliance-based solution uses NetFlow data collected from routers, switches, and other devices to provide insight into the effect of traffic on network performance. Collecting and keeping "all the flows, all the time," Visual Network Systems' NetFlow Tracker provides unique visibility into what is happening on the network and provides the data needed to make business decisions.
- **Visual Network Systems' Analysis Service Element (ASE):** LAN-or WAN-based probes provide Layer 7 visibility into application network, application, and VoIP performance from a networkwide point of view. Integrated into Visual Network Systems' Visual Performance Manager's scalable, multi-tenant architecture, Visual Network Systems' ASE provides a clear point of demarcation that users can use to determine whether a problem is caused by the application, network, or service provider.
- **Cisco IOS® NetFlow:** This component provides a critical set of services for IP applications, including network traffic accounting, network planning, security, and network monitoring. Cisco IOS NetFlow provides valuable information about network users and applications, peak use times, and traffic routing.

- **Cisco IOS QoS:** This component provides network-integrated classification and resource provisioning capabilities that enforce priority and performance requirements within the network based on business and application needs.
- **Cisco IOS PfR:** This component provides network-integrated path selection based on application performance requirements and network performance metrics.
- **Cisco® Wide Area Application Services (WAAS):** Cisco WAAS is an appliance-based and network-integrated system for overcoming performance limitations created by bandwidth limitations, inefficient application protocols, network latency, and packet loss.

Together, these components allow MSPs, and IT departments that operate similarly to MSPs, to make effective use of resources to improve end-to-end application performance, align network resources with business objectives, understand how applications operate on their networks, and quickly address performance problems when they arise.

**Figure 2.** Main Components of Cisco and Visual Network Systems APM



## Main Benefits of Cisco and Visual Network Systems APM Solution

Table 1 summarizes the benefits of deploying a Cisco and Visual Network Systems solution for APM.

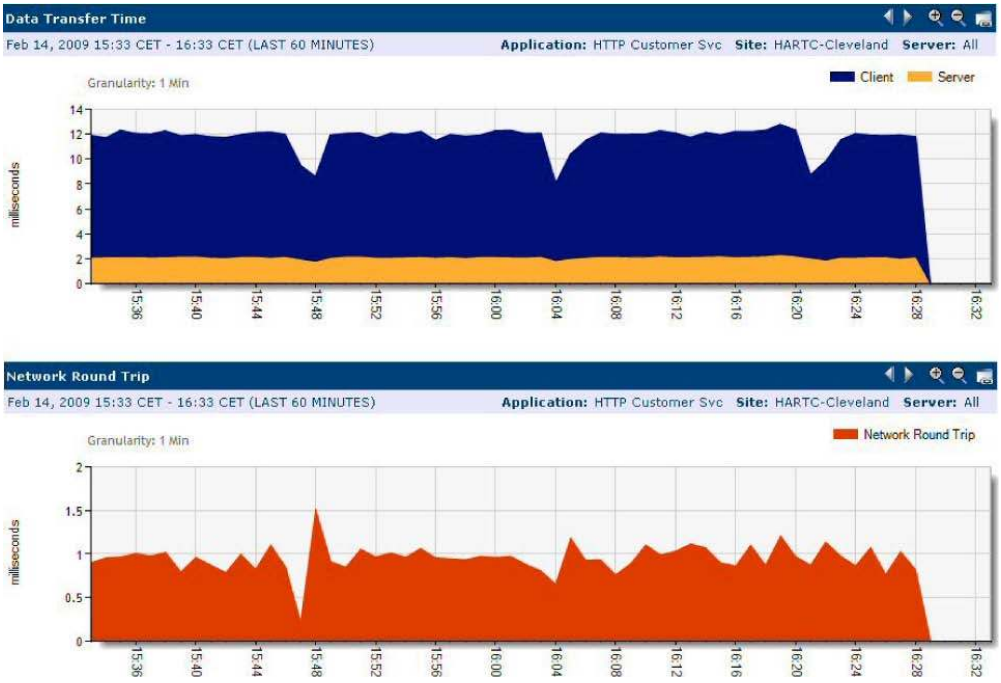
**Table 1.** Main Benefits

| Benefit | Description |
|---|---|
| **Accurately baseline network and application performance** | Using Visual Network Systems' Application Performance Appliance to passively measure network traffic, Visual Network Systems NetFlow Tracker (collecting and mediating NetFlow), and Visual Network Systems' ASE (monitoring WAN traffic and VoIP), organizations can use the Visual Network Systems' Visual Performance Manager to quickly and accurately understand how the network is being used, how applications are performing, VoIP call quality, and where application performance bottlenecks may exist. Additionally performance baselines can be established, and thresholds can be set to trigger alarm conditions when deviation from the baseline is detected. |
| **Determine which applications are good candidates for acceleration** | Application performance metrics are visualized in detail in Visual Network Systems' Visual Performance Manager, highlighting data volume and rate, response-time metrics, and other performance-related statistics. This data helps identify applications that are experiencing performance challenges, including throughput limitations, high response times, and high levels of packet loss, which can indicate that the application or site is a good candidate for deployment of Cisco WAAS to improve application performance. |
| **Apply acceleration to improve application performance and validate benefits against baseline** | Cisco WAAS provides WAN optimization and application acceleration techniques to reduce the effect of factors that limit application performance, including bandwidth constraints, high latency, high packet loss, and chatty protocol behavior. By continuously monitoring application performance through Visual Network Systems' Visual Performance Manager, customers can monitor and report the performance improvement provided by Cisco WAAS, validating the benefits and quantifying the improvement and effect on the business. |
| **Intelligently use available network paths according to application needs** | By taking advantage of the application performance visibility and network baselining capabilities provided by Visual Network Systems, organizations can use Cisco IOS PfR to align application traffic with the appropriate network paths to enhance application performance and increase efficiency. |
| **Help ensure alignment of network resources with application performance requirements** | With an understanding of how applications are using the network, organizations can employ end-to-end QoS from within Cisco IOS Software to align network resources with the performance requirements demanded by the business as well as the applications themselves. |
| **Consolidate costly remote-office infrastructure** | With the network provisioned according to business priority and application requirements, and with acceleration techniques for improving application performance, organizations can confidently begin consolidating costly remote-office infrastructure into centrally managed data centers or MSP hosting facilities. Doing so can dramatically reduce ongoing CapEx and OpEx. |

## Effectively Baseline Your Network and Application Performance

To proactively manage performance, you need to characterize what "normal" performance is (Figure 3). With this information, you can quickly recognize and provide notification when degraded performance is occurring and determine the severity of the degradation; which applications, sites, or end users are affected; and the likely root cause.

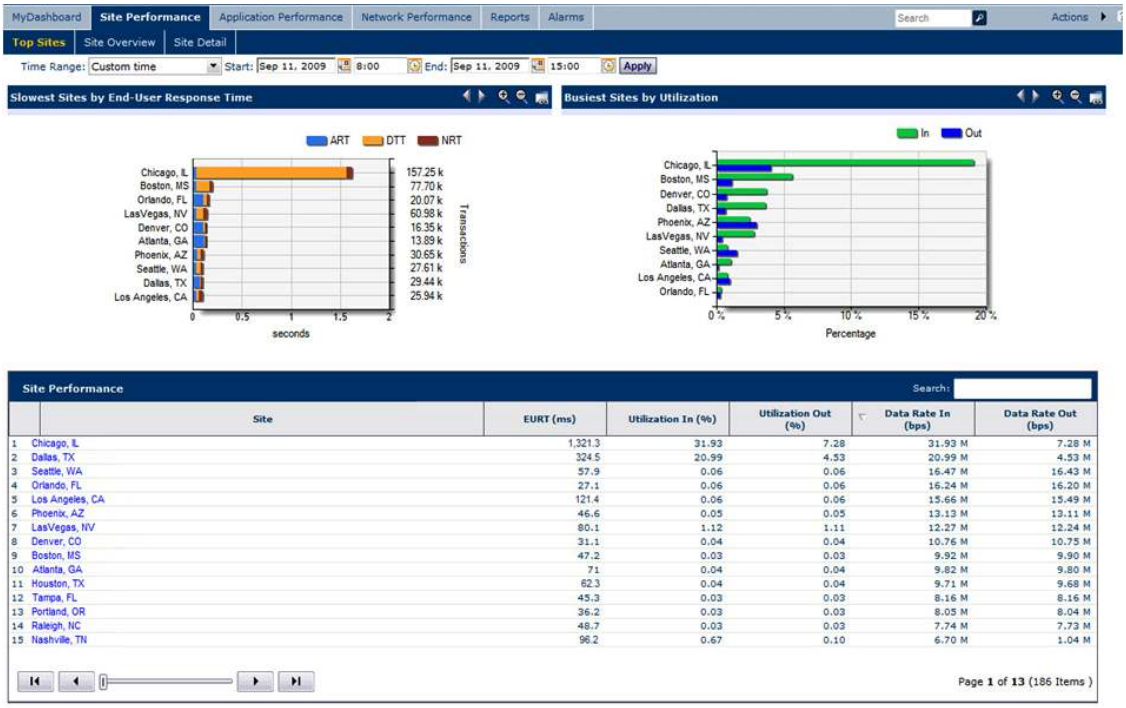
**Figure 3.** What Is Normal Performance?




## Determine Which Applications and Sites Will Benefit from Optimization

By analyzing critical performance metrics and response times experienced by end users for business-critical and customer-facing applications, Visual Network Systems' Visual Performance Manager provides the data that is needed to understand which applications and sites are the best candidates for WAN optimization and application acceleration (Figure 4). This analysis provides a baseline from which the improvements provided by Cisco WAAS can be clearly quantified and visualized.

**Figure 4.** Which Sites and Applications Are Performing Poorly?

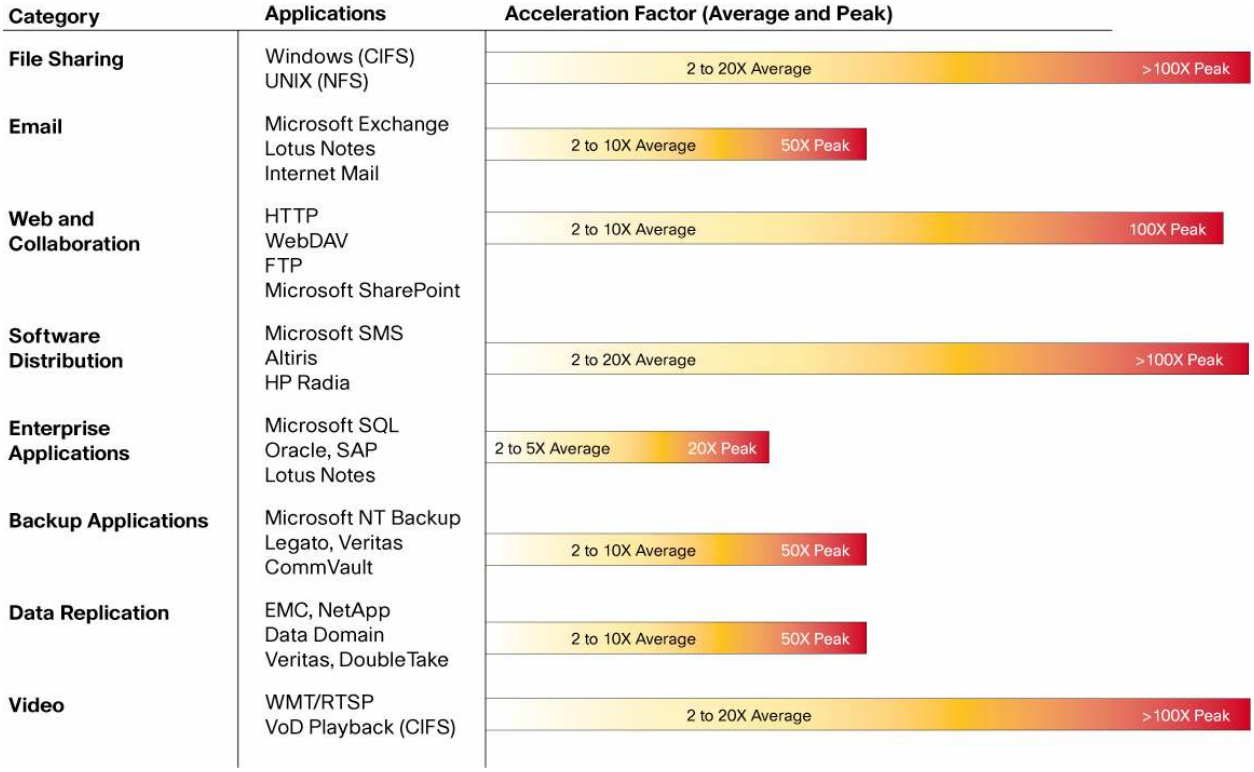


## Apply Optimization and Quantify Performance Improvement

With an understanding of which sites and applications are good candidates for optimization, Cisco WAAS can be deployed in data center and branch-office locations to reduce the negative effect of WAN conditions on the performance of your applications. Cisco WAAS employs powerful WAN optimization techniques (that are application agnostic, providing benefits to essentially any TCP-based application) as well as application acceleration techniques (that are application specific, helping overcome the challenges provided by specific applications and protocols) to overcome WAN conditions and help ensure consistent high-performance access to applications and information for essentially any corporate user.

Cisco WAAS provides optimization for the applications that are critical to your business, and in many cases the improvement is five times or greater (Figure 5).

**Figure 5.** Cisco WAAS Accelerates the Applications You Care About




With Cisco WAAS deployed with Visual Network Systems' Visual Performance Manager, customers can see before-and-after data showing the performance improvement provided by Cisco WAAS. Having the capability to quantify the performance improvement is critical because it provides organizations with tangible data of the improvement and enables genuine calculation of return on investment (ROI). Figures 6 and 7 show how Visual Network Systems' Visual Performance Manager compares the performance of an application before and after Cisco WAAS implementation and measures the effectiveness of various Cisco WAAS optimization and acceleration techniques.

**Figure 6.** Visual Network Systems' Visual Performance Manager Quantifies Cisco WAAS Performance Improvement

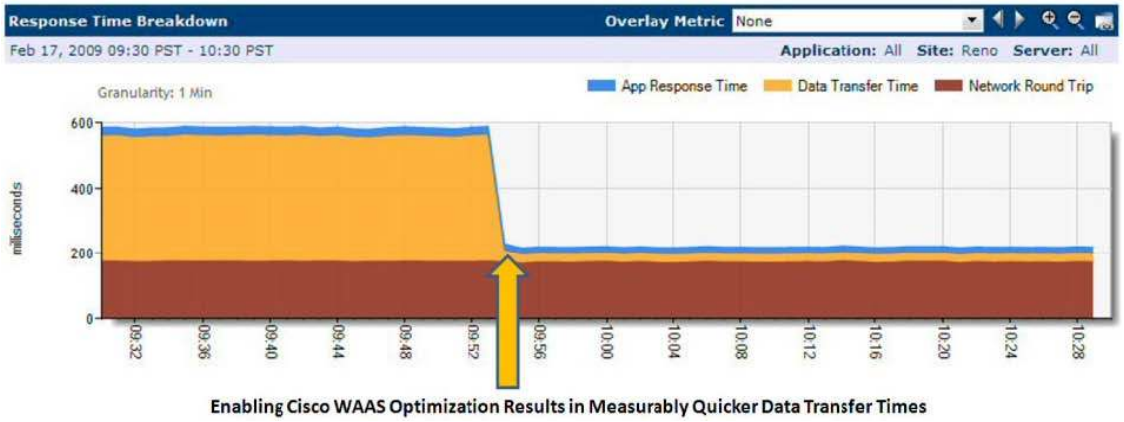
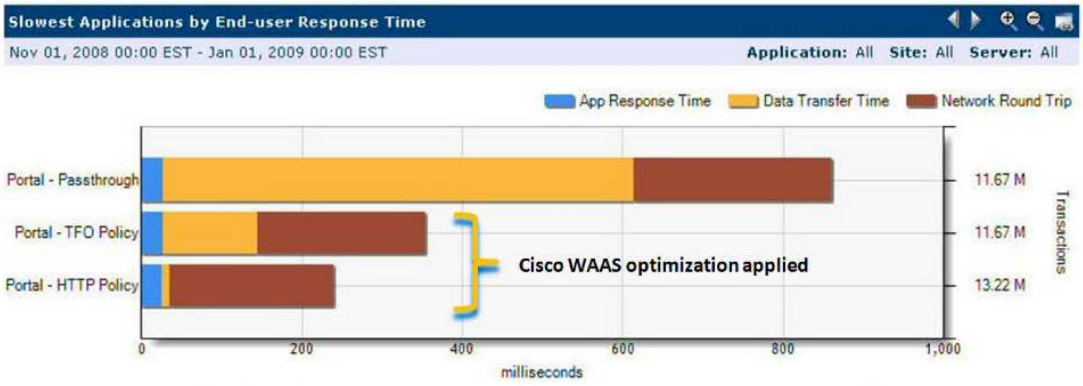



**Figure 7.** Enabling Cisco WAAS Optimization Yields Significant End-User Response-Time Improvements

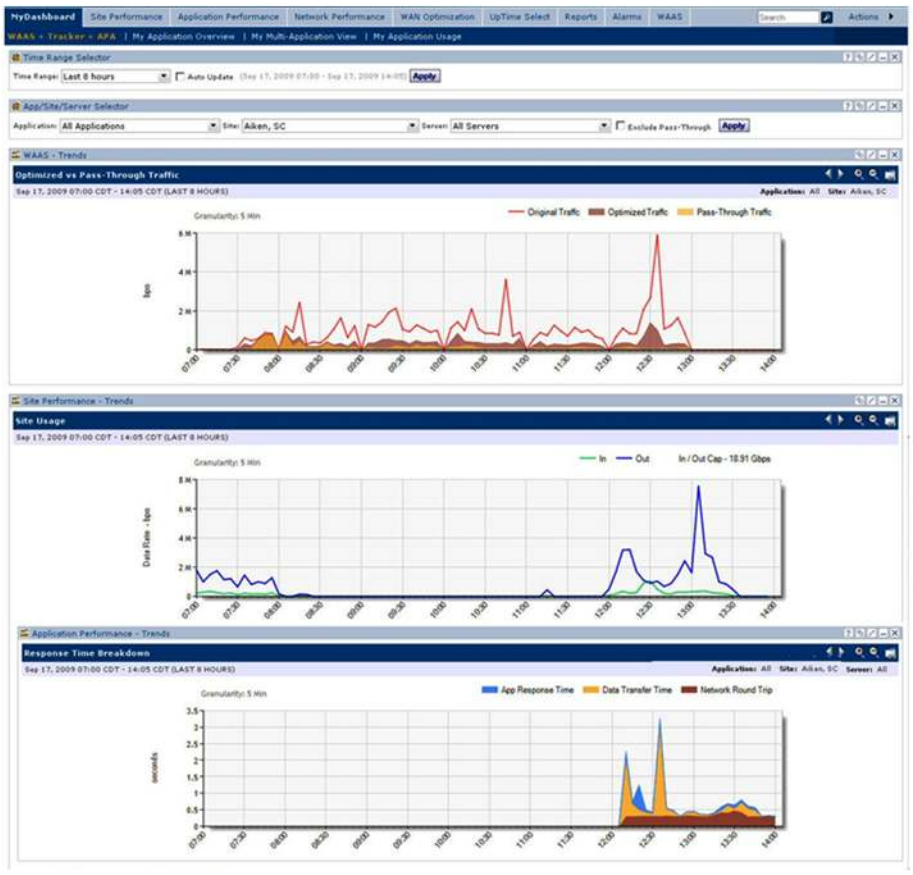



Visual Network Systems' Visual Performance Manager also provides visibility into the improvements in performance, provided by Cisco WAAS, at the enterprise and site level. In Figure 8, Visual Network Systems' Visual Performance Manager shows the sites and applications that are benefiting the most from optimization and identifies areas where Cisco WAAS can provide additional performance gains.

**Figure 8.** Quantify Cisco WAAS Performance Improvement and Identify Areas Where Additional Gains Are Possible


In Figure 9, Visual Network Systems' Visual Performance Manager's custom dashboard capability is used to create correlated views of both use and performance from multiple data sources, including Cisco IOS NetFlow and the Cisco WAAS Central Manager.

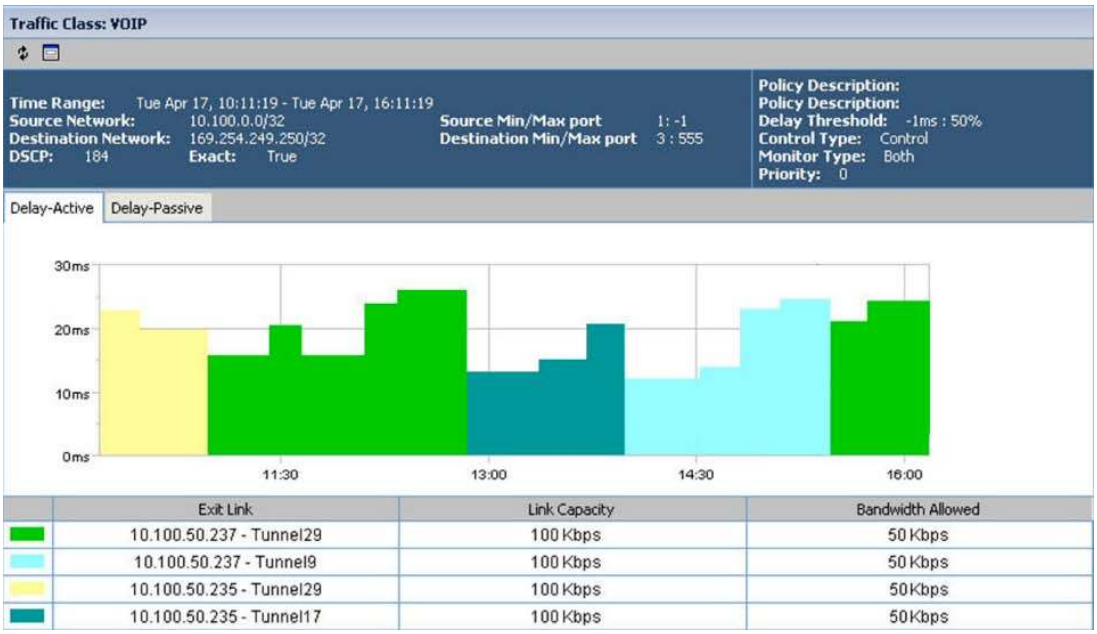
**Figure 9.** User-Defined Dashboard Views Automatically Unify Data from Multiple Sources



### Intelligently Use Network Paths According to Application Needs

Cisco IOS PfR complements Cisco WAAS. Cisco WAAS optimizes TCP sessions, while Cisco IOS PfR can automatically determine which network path has the performance characteristics most closely aligned with various types of traffic. Working in concert, these two technologies deliver optimized sessions over optimal network paths (Figure 10).

**Figure 10.** Cisco IOS PfR and Visual Network Systems' PfR Manager




### Align Network Resources with Business Priorities

With Visual Network Systems' Visual Performance Manager in place for full visibility into application performance and Cisco WAAS to optimize application performance over the network, organizations can take advantage of the QoS capabilities of Cisco IOS Software to align network resources according to the requirements of applications or the corresponding business priority. Cisco IOS QoS provides a foundation that allows a network to handle the multitude of applications and data while helping ensure secure, predictable, measurable, and sometimes guaranteed services to specific applications. QoS helps ensure that your network provides the appropriate level of service for your applications according to the needs of the application and the importance of the application to the company's objectives. Capabilities provided by QoS include:

- **Classification:** Applications are identified accurately based on numerous detection techniques, including advanced methods that take into consideration the actual content traversing the network.
- **Marking:** Differentiated services code point (DSCP) markings are applied to packets according to classification to help ensure consistent handling throughout the customer and MSP networks.
- **Intelligent servicing:** Using numerous queuing and scheduling techniques, traffic can be serviced according to priority or performance requirements.
- **Bandwidth control:** Policing and shaping control bandwidth utilization to provide critical applications with the resources and handling they need, while also helping ensure that recreational or scavenger traffic does not affect applications critical to your business.

### Centralize and Consolidate Costly Remote-Office Infrastructure

One element that contributes dramatically to the improved ROI enabled by the Visual Network Systems and Cisco end-to-end APM solution is the capability to confidently consolidate distributed infrastructure from remote offices into one or more managed data centers. By providing application acceleration and WAN optimization capabilities, Cisco WAAS provides remote users with performance levels similar to those they are accustomed to with local resources deployed onsite. Cisco WAAS provides the capability to move the following devices and services from remote offices and consolidate them within data center locations, where utilization and manageability efficiencies further improve ROI:

- **Server components:** Server hardware can be centralized in the data center, and the number of servers can be reduced through the intelligent acceleration provided by Cisco WAAS. Cost reduction includes server hardware, operating system licenses, and patch management.
- **Application components:** With consolidation of the server infrastructure, applications can be deployed centrally rather than in a distributed manner, while providing performance levels over the WAN similar to those achieved with a distributed infrastructure.
- **Storage components:** Data protection components and external storage can be centralized in the data center on more scalable systems that provide lower cost of operation per megabyte or gigabyte, and the number of elements associated with data protection in the branch office can be reduced.
- **Ongoing administration:** By consolidating remote-office infrastructure in the data center, ongoing costs associated with IT infrastructure management in each remote office are reduced, thereby providing substantial savings when this model is employed throughout the organization.

For those services that cannot be consolidated, Cisco WAAS virtual blades can be employed to locally host infrastructure services such as those that run on Microsoft Windows Server 2008, including read-only domain controller (RODC), Domain Name System (DNS) services, Dynamic Host Configuration Protocol (DHCP) services, and print services.

In addition to enabling centralization of infrastructure, Cisco WAAS enables consolidation of file server and video server resources that have been centralized, reducing the number of servers necessary to support the global workforce. Application acceleration provided by Cisco WAAS provides intelligent protocol management, data caching, and metadata caching. These features allow the network, as the platform, to begin offloading workload from your data center servers when safe to do so. The result for your application infrastructure is a dramatic reduction in server workload, thereby allowing you to reduce the number of data center file and video servers necessary to support a global workforce.

Figure 11 shows how Cisco WAAS safely offloads data center file servers and network-attached storage (NAS) devices, and Figure 12 shows how Cisco WAAS safely offloads data center video servers.

**Figure 11.** Cisco WAAS Safely Offloads Data Center File Servers and NAS Devices

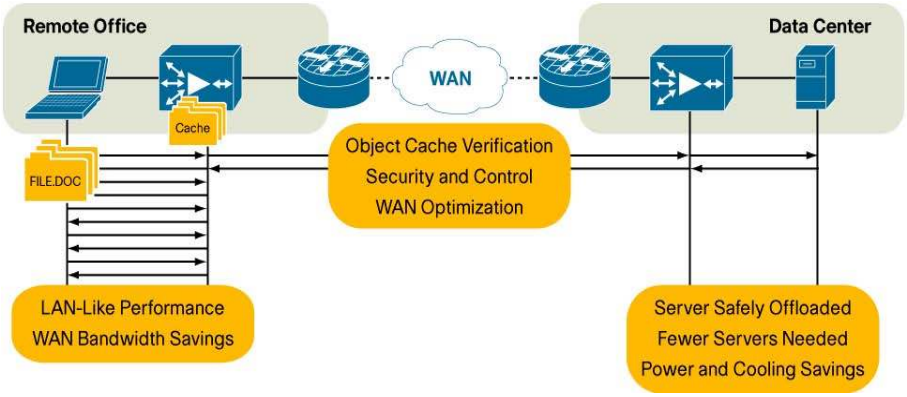
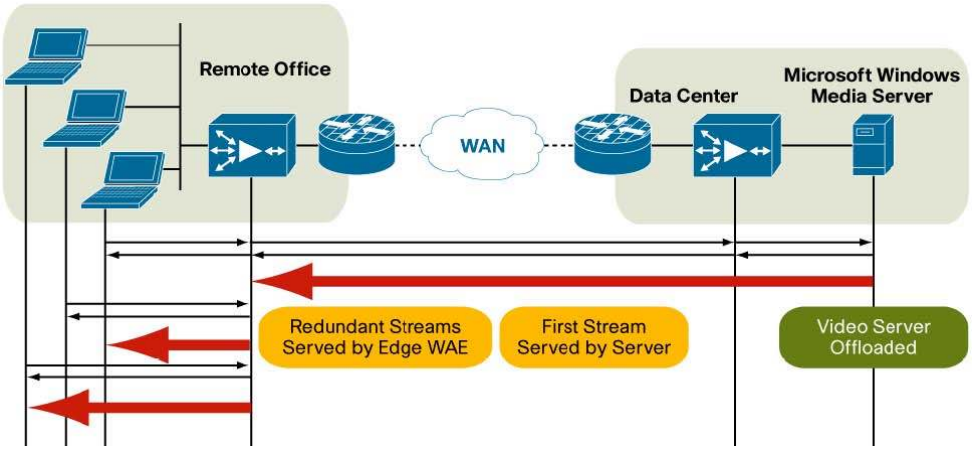



**Figure 12.** Cisco WAAS Safely Offloads Data Center Video Servers




## Conclusion

By taking advantage of APM solutions from Cisco and Visual Network, MSPs and IT departments that operate in a similar manner have full visibility into application performance and can align network resources and control utilization according to business priority and application requirements and accelerate the performance of applications to essentially any user. These technologies provide the foundation for visibility, control, and optimization and enable the organization to employ SLAs based on application performance metrics to help ensure consistent performance throughout the network and provide the information necessary to confidently analyze almost any performance challenge that may arise in the future.

## For More Information

- Visual Network Systems: http://www.visualnetworksystems.com
  - Visual Network Systems' Application Performance Solutions: http://www.visualnetworksystems.com/application-performance-management
- Cisco Systems, Inc.: http://www.cisco.com
  - Cisco WAAS: http://www.cisco.com/go/waas
  - Cisco IOS QoS: http://www.cisco.com/go/qos
  - Cisco IOS PfR: http://www.cisco.com/go/pfr
  - Cisco IOS NetFlow: http://www.cisco.com/go/netflow

## About Visual Network Systems

Visual Network Systems, formerly Fluke Network Systems, provides innovative solutions that support IT professionals responsible for enterprise-wide application, network and VoIP performance. The company's flagship solution, Visual Performance Manager is a unified system that provides enterprise service intelligence to help organizations effectively deliver these services. Its solutions are available directly to enterprises or as part of a managed services offering. Visual Network Systems is headquartered in Colorado Springs, Colorado, and distributes its products in more than 50 countries. More information can be found by visiting Visual Network Systems web site at: http://www.visualnetworksystems.com or by calling (888) 293-5853.

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