Cisco Catalyst 6500 Series and Cisco 7600 Series Network Analysis Module

The Cisco® Catalyst® 6500 Series and Cisco 7600 Network Analysis Module (NAM) is a powerful integrated monitoring solution that delivers unparalleled insight into network and application traffic to help you improve the performance of your network.

Product Overview

The Cisco Catalyst 6500 Series and Cisco 7600 Series NAM is a powerful integrated network monitoring solution designed to give you more visibility into your network than ever before. It shows you how the network is being used and how your users experience the services the network offers to help you improve network performance. Because Cisco NAM provides visibility for comprehensive performance monitoring and simplified troubleshooting, it is ideally suited for today's dynamic, evolving enterprises.

The innovative design of Cisco NAM combines a rich set of embedded data collection and analysis capabilities with a remotely accessible, Web-based management console, all of which reside on a single blade that is easily installed into the Cisco Catalyst 6500 Series Switch or the Cisco 7600 Series Router. Cisco NAM is available in two hardware versions, NAM-1 and NAM-2 (Figure 1) and offers extensive monitoring capabilities to meet diverse network analysis needs in scalable switching and routing environments. Cisco NAM includes a Traffic Analyzer GUI, which provides quick access to the configuration menus and presents easy-to-read performance reports on data, voice, and video traffic.

Figure 1.   Cisco Catalyst 6500 Series and Cisco 7600 Series Network Analysis Modules, NAM-1 and NAM-2

Applications

### Visibility throughout the Infrastructure

As an integrated services module, Cisco NAM uses a rich set of Catalyst 6500 Series Switch and Cisco 7600 Series Router features to collect both LAN and WAN traffic for analysis. Using the Switched Port Analyzer (SPAN) feature, Cisco NAM can monitor traffic from physical ports, virtual

LANs (VLANs), or Cisco EtherChannel® connections of the local switch or router. Using VLAN access control list (VACL)–based captures, traffic can be filtered before it is sent to Cisco NAM to support the selective monitoring of large amounts of traffic or the gathering of traffic from WAN interfaces. In addition, Cisco NAM can consume NetFlow Data Export (NDE) from local and remote devices to provide both real-time and historical traffic usage data. Cisco NAM can also use the Remote SPAN (RSPAN) or Encapsulated Remote SPAN (ERSPAN) features of the devices to extend troubleshooting to remote parts of the network.

Easy to Deploy and Use

Cisco NAM includes an embedded, Web-based Traffic Analyzer GUI (Figure 2) that can be accessed from any desktop, eliminating the need to send personnel to remote sites or haul large amounts of data to the central site. It delivers a complete view of network and application performance, providing actionable information on voice, video, and data traffic, VLANs, Differentiated Services (DiffServ) configurations, hosts, conversation pairs, application usage, and application response time. To enhance security, role-based access can be assigned and Web-browser access can be secured with up to 168-bit encryption.

Figure 2.   Web-based Traffic Monitoring with the Embedded Cisco NAM Traffic Analyzer
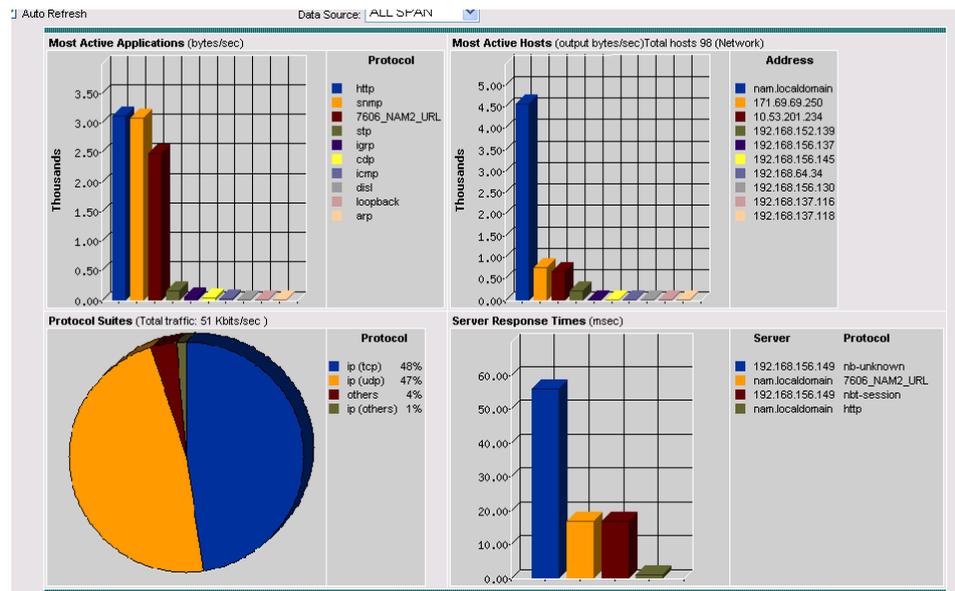
Monitoring the Virtualized Campus

Network virtualization for the campus is a cohesive, extensible architecture to logically partition the network infrastructure. It simplifies network operations and reduces costs while increasing flexibility and agility and enhancing productivity. In today's evolved networking environments, typical campus network designs use a mix of Layer 2 switching technologies at the network edge (access layer) and Layer 3 routing technologies at the network core (distribution and core layers). Thus, network virtualization can be achieved at the network access layer (Layer 2) by means of VLANs and at the network core (Layer 3) by using Generic Routing Encapsulation (GRE) tunnels, Virtual Route Forwarding (VRF)-Lite, and Multiprotocol Label Switching (MPLS)–based Layer 3 VPNs to partition the routed domain and thus achieve scalable end-to-end virtualization.

Cisco NAM monitors traffic flowing through the virtualized campus. For designs using MPLS VPNs, Cisco NAM can identify, monitor, and capture MPLS VPN traffic by VRF. Because Cisco NAM can present detailed "before and after" traffic information, it can ease the deployment of a virtualized

campus design by facilitating the critical planning and management activities required to help ensure a smooth transition.

Flexible Deployment Scenarios

Cisco NAM can be deployed in the Cisco Catalyst 6500 Series at LAN aggregation points (for example, in the core and distribution layers) for proactive monitoring; at service points (for example, in data centers, or Cisco CallManager clusters in IP telephony networks) where performance monitoring is critical; and at important access points (critical clients, IP phone closets) where quick troubleshooting is required. It can also be deployed in Cisco 7600 Series Routers at WAN edges or in Catalyst 6500 Series Switches connected to WAN routers. Figures 3 and 4 highlight two model deployments of Cisco NAM in the campus for performance and voice monitoring.

Figure 3. Deploying Cisco NAMs for Performance Monitoring in the Campus Network
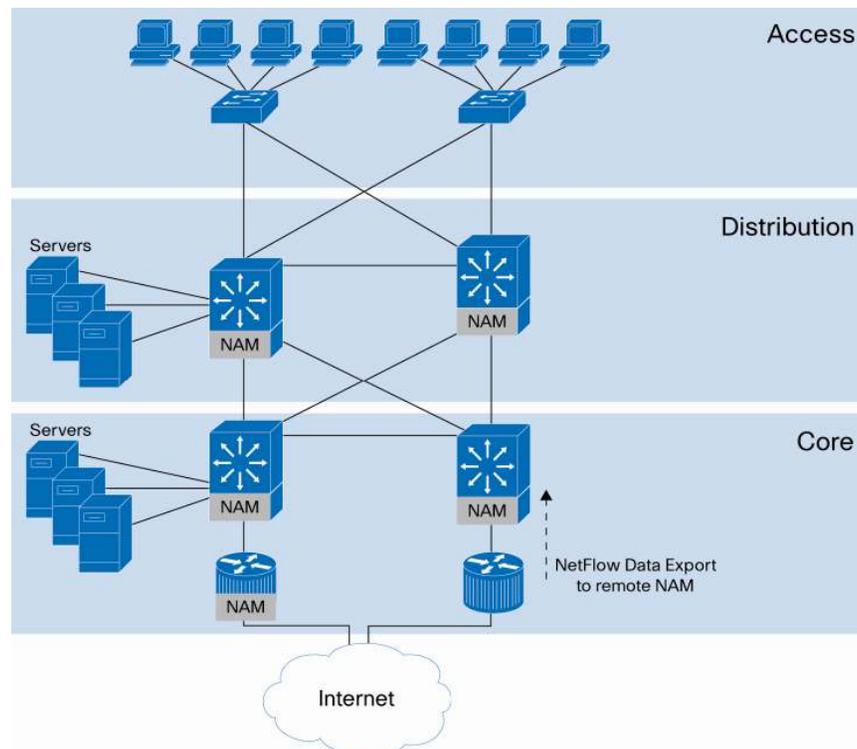
Figure 4. Deploying Cisco NAMs for Voice Monitoring in the Campus Network
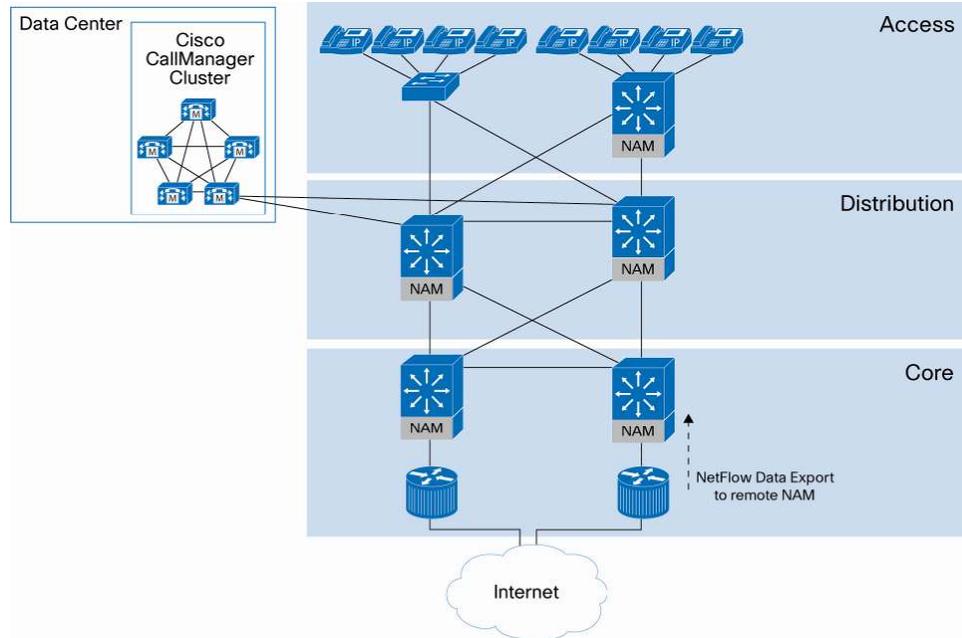
Features and Benefits

Monitoring Network and Application Usage

One of the foundations of Cisco NAM is its ability to look inside a live packet to gather information on applications, hosts, and conversations. Application monitoring identifies every application that has consumed bandwidth and by how much and detects which hosts are using which applications. Host and conversation-pair monitoring provides bandwidth consumption per host and shows you which hosts are talking to each other along with the amount of traffic each host is generating. Monitoring applications, hosts, and conversations can help you proactively spot bottlenecks before your network suffers blows to performance and availability. It can also help you improve the consistency and quality of both individual and overall network services since these metrics reveal usage patterns for users as well as for router and switch, interface, server, and application resources.

Besides delivering a real-time snapshot of bandwidth usage and consumption, Cisco NAM also delivers a continuous historical view of how the bandwidth was used so you can quickly decide when and where to make changes in network resources. Data can also be collected over a select period of time and then analyzed after the event to discover when an anomaly has occurred so it can be quickly resolved (Figure 5).

Figure 5.   Monitoring the Top 10 Hosts on the Network
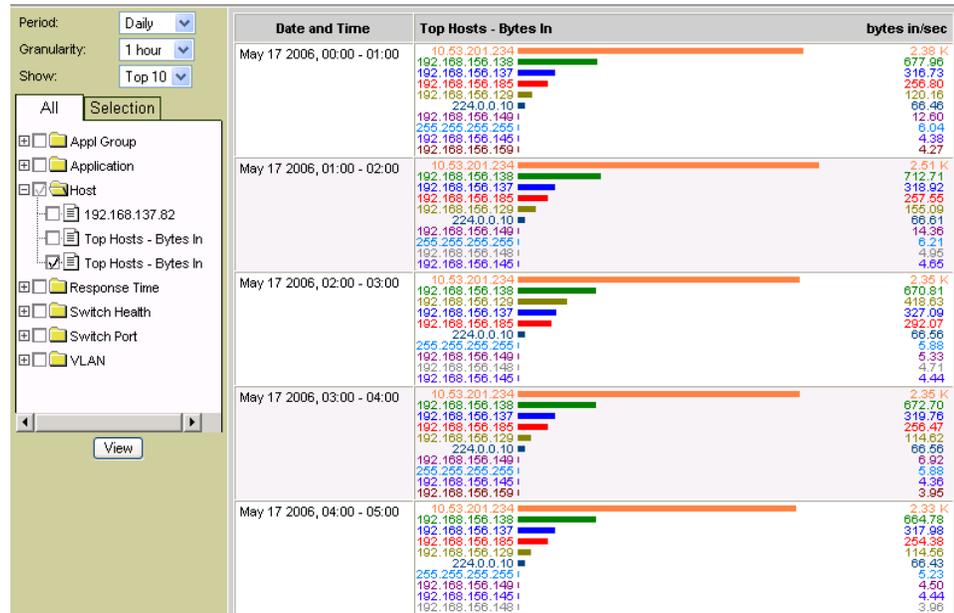
Improving the Reliable and Effective Delivery of Applications

Cisco NAM users can experience a powerful new transaction-based response-time monitoring solution that bridges the chasm between application performance and end-user experience. Passively gathering data on TCP-based client/server requests and acknowledgements, the new response-time monitoring solution of Cisco NAM provides intelligent information on client, server, and application latency to help enterprises assure the reliable delivery of the applications that make up the business. The response-time metrics of Cisco NAM can assist busy IT staff in troubleshooting application performance problems, analyzing application behavior and trends for capacity planning, identifying application consolidation opportunities, performing pre- and postdeployment monitoring of application optimization and acceleration services, and defining and ensuring service levels (Figure 6).

Figure 6.   Application Response-Time Monitoring
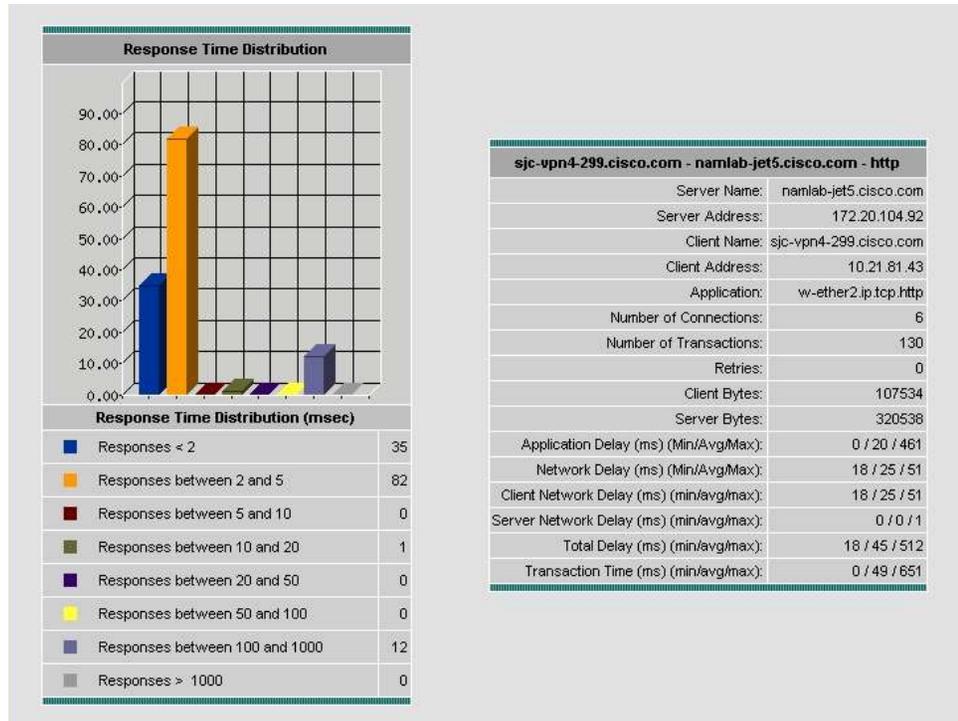
Simplifying Problem Detection and Resolution

With Cisco NAM, you can set thresholds and alarms on various network parameters such as increased utilization, severe application response delays, and voice quality degradation and be alerted to potential problems. When a potential problem area is identified, the packet can be automatically captured and decoded to help resolve the problem before it affects users. Captures can be performed using a Web browser from any desktop, and decodes can be viewed through the Traffic Analyzer GUI while the data is still being captured. The capture and decode capability of Cisco NAM provides depth and insight into data analysis using trigger-based captures, filters, decodes, and a capture analysis toolset to quickly pinpoint and resolve problem areas (Figure 7).

**Figure 7.** Capturing and Decoding Packets with Cisco NAM
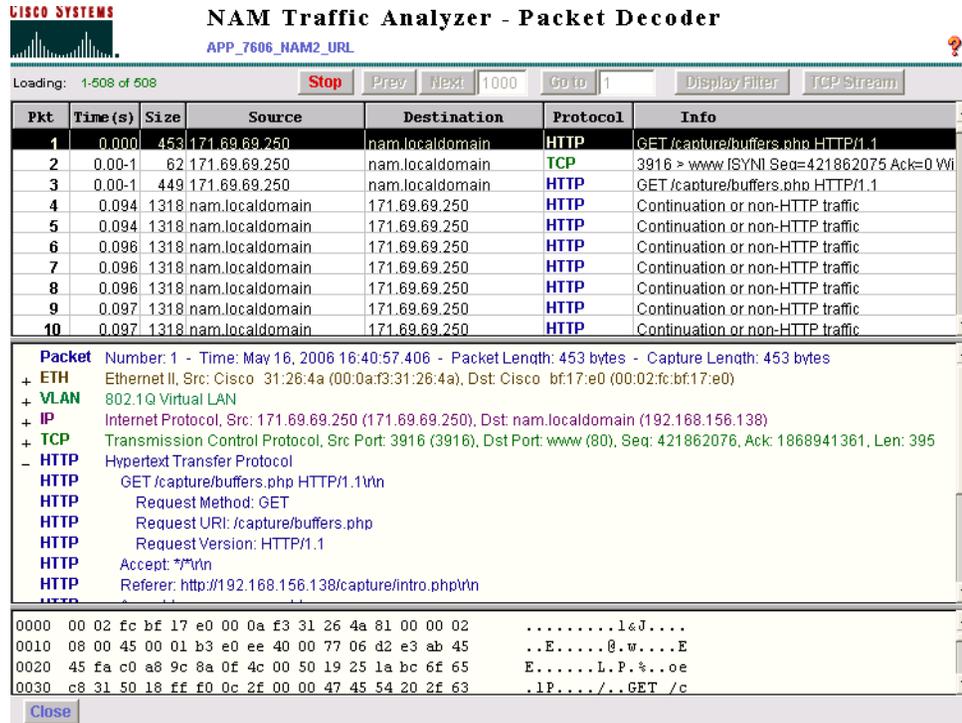
Analyzing VoIP, Video, and Quality of Service

Cisco NAM can analyze voice traffic flows in near real time to collect critical performance information, including call setup details and voice quality metrics, and can generate alerts when voice quality degrades. It can also monitor video packet quality to help assure a high rate of packet delivery so users get the quality they expect and demand.

Cisco NAM supports both the planning and management of quality of service (QoS) deployments for voice and other critical IP-based services. It supports the Differentiated Services Monitoring (DSMON) MIB, which monitors traffic by differentiated services code point (DSCP) allocations defined by QoS policies. Using the Differentiated Services (DiffServ) monitoring capabilities of Cisco NAM, hosts, conversations, and applications participating in each grouping of DiffServ classes can be identified. This information can be used to validate and tune planning assumptions and QoS allocations. It can also be used to detect incorrectly marked or unauthorized traffic (Figure 8).

Figure 8.   QoS Monitoring Using DSMON
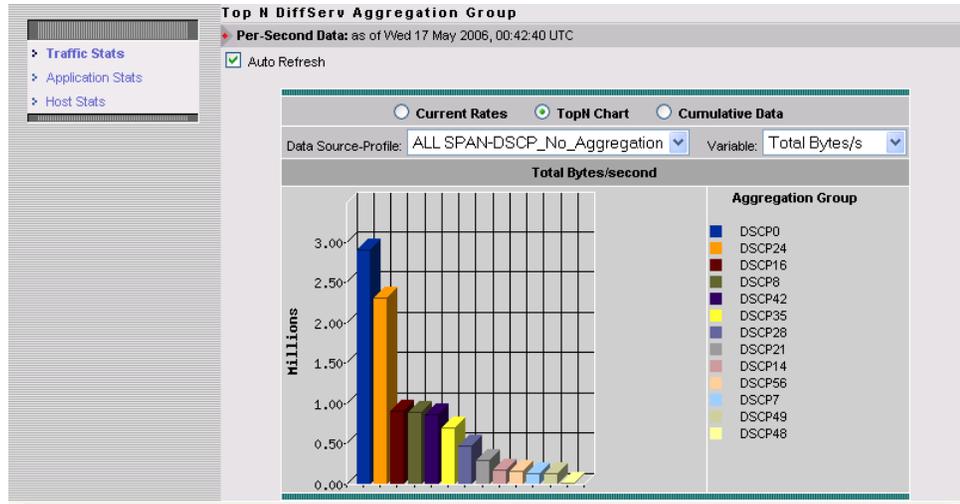
Putting It All Together: Performance Assurance Enterprisewide

Data from Cisco Catalyst 6500 Series and Cisco 7600 Series NAMs and from Cisco Branch Routers Series NAMs deployed across the network can be collected by the Linux-based Cisco Performance Visibility Manager (PVM) software application to provide performance assurance enterprisewide. Cisco PVM collects data from intelligent Cisco instrumentation to provide an intuitive and integrated end-to-end view of network traffic, protocol types, and application and host bandwidth usage. It provides a centralized view of application performance, correlates application response times, localizes the cause of application performance problems, and accounts for the impact of other traffic on application behavior (Figure 9). Both Cisco NAM and Cisco PVM are core components of the Cisco Network Application Performance Analysis Solution, a comprehensive set of tools and services designed to optimize performance and streamline troubleshooting of your applications and network.

Figure 9.   Using Cisco PVM to View Application Response Time Data Collected from Cisco NAMs
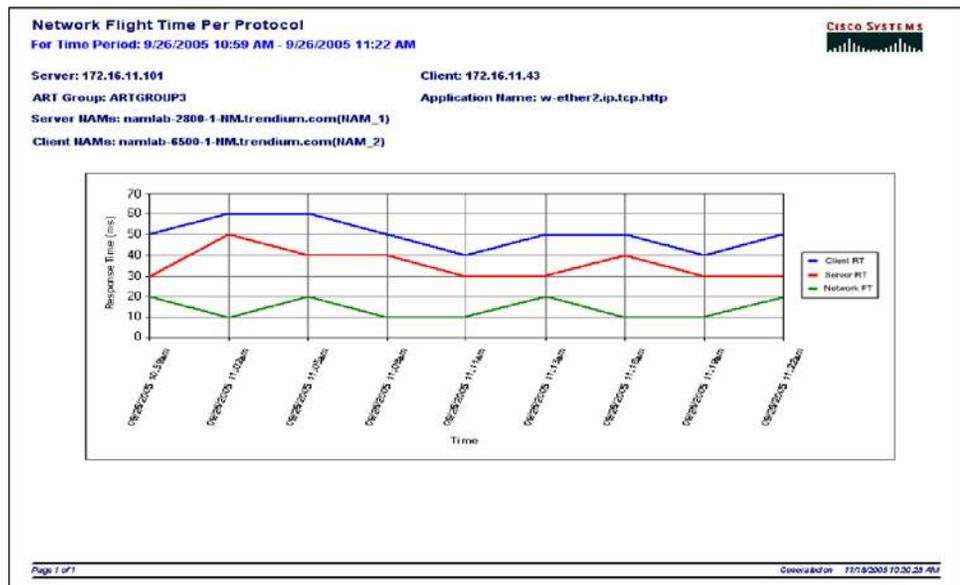
Business Benefits

Most users do not care about how they get the data, whether it is text, voice, or video—so long as they can get it and get it quickly. However, networks that offer limited or no visibility into network

and application usage and the user's experience of the network can lead to downtime and loss of access to important data, making users painfully aware that their data depends on a network. And every little glitch will now be blamed on the network, amplifying the need for performance monitoring.

With Cisco NAM, the key to decision making is the visibility within the network. A well-planned and implemented network monitoring strategy using Cisco NAMs provides users with a consistent and secure high level of network services and increases productivity and revenue. The data that Cisco NAM collects also can be used to maximize return on investment (ROI) and services revenue, verify third-party service agreements, and quantify change and growth—leading to an overall increase in network reliability, security, and effectiveness, as well as cost savings. Table 1 provides an overview of the benefits that Cisco NAM offers:

Table 1.   Benefits of Deploying Cisco NAM

Benefit	Description
Gain visibility into network services and applications that make up the business	Monitor how applications and users use the network and receive services. Improve network performance.
Maximize IT investments and enhance network security	Prevent unauthorized or frivolous use of network resources. Reduce downtime and failures. Complement other Cisco security mechanisms such as intrusion detection systems and firewalls by profiling traffic types and resource usage to help assure the integrity of network traffic.
Right-size the network to reduce network spending	Determine services trends to anticipate the infrastructure changes that will be necessary to support increased demand in services. Correlate network usage with business needs.

Product Specifications

Table 2 provides the specifications for the Cisco Catalyst 6500 Series and Cisco 7600 Series NAM.

Table 2.   Cisco Catalyst 6500 Series and Cisco 7600 Series NAM Specifications

Feature	Description
NAM-1 hardware architecture	High-performance dual processor architecture offering sub-Gigabit Ethernet monitoring performance, 512 MB RAM. Two data-collection interfaces to backplane (one for SPAN/VACL data sources, one for NetFlow). Second-generation fabric-enabled platform with interface to both bus- and crossbar-based architectures
NAM-2 hardware architecture	Extra high-performance dual processor architecture with hardware-based packet acceleration offering up to Gigabit Ethernet monitoring performance, 1 GB RAM. Three data-collection interfaces to backplane (two for SPAN/VACL data sources, which can be used independently or together, and one for NetFlow). Second-generation fabric-enabled platform with interface to both bus- and crossbar-based architectures
Supported platforms	NAM-1 and NAM-2 can be deployed in a slot in Cisco Catalyst 6500 and 6000 Series Switches and Cisco 7600 Series Routers (both bus- and crossbar [fabric]-based architectures); multiple NAMs can be placed in the same chassis. Supported with Cisco IOS® Software or Cisco Catalyst Operating System
Supported topologies and data sources	LAN: Switch Port Analyzer (SPAN), Remote SPAN (RSPAN), VLAN ACL (VACL)-based captures, NetFlow (versions 1, 5, 6, 7, 8, and 9). WAN: NetFlow (versions 1, 5, 6, 7, 8, and 9) from local and remote devices, VACL-based captures for FlexWAN/Optical Service Module (OSM) interfaces (Cisco IOS Software only)
Supported interfaces	HTTP/HTTPS with embedded Web-based Cisco NAM Traffic Analyzer. Simple Network Management Protocol Version 1 (SNMPv1) and v2c, with standards-based applications

NAM Traffic Analyzer	Embedded in Cisco NAM Software 2.2 and later
	Web-based: Requires Microsoft Internet Explorer 6.0 (minimum), Mozilla 1.7 (minimum), or Firefox 1.5 (minimum) Supports both English and Japanese versions of browsers
	Supports Secure Sockets Layer (SSL) security with up to 168-bit encryption
	Role-based user authorization and authentication locally or using TACACS+
	Real-time and historical statistics (up to 100 days) on LAN and WAN traffic and network-based services
Cisco NAM Software 3.6	Supports Cisco NAM-1 (part number WS-SVC-NAM-1) and Cisco NAM-2 (WS-SVC-NAM-2); does not support the first-generation NAM (WS-X6380-NAM). It also supports the Cisco Branch Routers Series NAM (NME-NAM).
	Supported with Cisco IOS Software Release 12.1(13)E (minimum) or Cisco Catalyst Operating System 7.3(1) (minimum)
MIBs	The Cisco NAMs are standards-compliant and support Remote Monitoring (RMON) and RMON2 MIBs, as well as several extensions. Major MIB groups supported in the Cisco NAMs are:
	• MIB-II (RFC 1213) – All groups except Exterior Gateway Protocol (EGP) and transmission
	• RMON (RFC 2819)
	• RMON2 (RFC 2021)
	• SMON (RFC 2613) – DatasourceCaps and smonStats
	• DSMON (RFC 3287)
	• HC-RMON (RFC 3273)
	• Application Response Time
Protocols	Cisco NAM provides RMON2 statistics on hundreds of unique protocols, including those defined in RFC 2896, and several Cisco proprietary protocols
	Automatically detect unknown protocols
	Users have flexibility to customize the protocol directory by defining protocols on a single port or on a range of ports
	Protocols supported include (this list is not all-inclusive):
	• TCP and User Datagram Protocol (UDP) over IP including IPv6
	• HTTP and HTTPS
	• VoIP including Skinny Client Control Protocol (SCCP), Real time Protocol/Real Time Control Protocol (RTP/RTCP), Media Gateway control Protocol (MGCP), and Session Initiation Protocol (SIP)
	• SigTran and Mobile IP protocols
	• Storage area network (SAN) protocols including Fibre Channel over TCP/IP
	• AppleTalk, DECnet, Novell, Microsoft
	• Database protocols, including Oracle and Sybase
	• Peer-to-peer protocols such as Gnutella, Fasttrack, and winmix
	• Bridge and router protocols
	• Cisco proprietary protocols
	• Unknown protocols by TCP/UDP ports, Remote Procedure Call (RPC) program numbers, and so on
Physical dimensions	Dimensions (H x W x D): 1.2 x 14.4 x 16 inches (3.0 x 35.6 x 40.6 centimeters); occupies one slot in the chassis
Operating environment	Operating temperature: 32 to 104ºF (0 to 40ºC)
	Nonoperating and storage temperature: –40 to 158ºF (–40 to 70ºC)
	Operating relative humidity: 10% to 90% (noncondensing)
	Nonoperating relative humidity: 5% to 95% (noncondensing)
	Operating and nonoperating altitude: Sea level to 10,000 feet (3050 meters)
Approvals and compliance	Regulatory: CE Marking (89/366/EEC and 73/23/EEC)
	Safety: UL 1950; CSA-C22.2 No. 950, EN60950, IEC 60950
	EMC: FCC Part 15 (CFR 47) Class A, ICES-003 Class A, EN 55022 Class A, CISPR 22 Class A, AS/NZS CISPR 22 Class A, VCCI Class A, EN 55024, EN300 386, EN 50082-1, EN 61000-3-2, EN 61000-3-3, EN 61000-6-1

Ordering Information

The Cisco Catalyst 6500 Series and Cisco 7600 Series NAM is available for purchase through regular Cisco sales and distribution channels worldwide. To place an order, visit the Cisco Ordering Home Page. To download software, visit the Cisco Software Center. Table 3 provides ordering information for the Cisco NAM.

Table 3.   Ordering Information for Cisco Catalyst 6500 Series and Cisco 7600 Series NAM

Product Name	Part Number
Cisco Catalyst 6500 Series and Cisco 7600 Series Network Analysis Module-1	WS-SVC-NAM-1
Cisco Catalyst 6500 Series and Cisco 7600 Series Network Analysis Module-1 (Spare)	WS-SVC-NAM-1=
Cisco Catalyst 6500 Series and Cisco 7600 Series Network Analysis Module-2	WS-SVC-NAM-2
Cisco Catalyst 6500 Series and Cisco 7600 Series Network Analysis Module-2 (Spare)	WS-SVC-NAM-2=
Cisco Catalyst 6500 Series and Cisco 7600 Series Network Analysis Module Software 3.6	SC-SVC-NAM-3.6

Service and Support

Using the Cisco Lifecycle Services approach, Cisco and its partners provide a broad portfolio of end-to-end services and support that can help increase your network's business value and return on investment. This approach defines the minimum set of activities needed, by technology and by network complexity, to help you successfully deploy and operate Cisco technologies and optimize their performance throughout the lifecycle of your network.

For More Information

For more information about the Cisco Catalyst 6500 Series and Cisco 7600 Series NAM, visit http://www.cisco.com/go/nam, contact your local account representative, or e-mail the Cisco NAM product marketing group at nam-info@cisco.com.

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