

## Cisco NAM 2200 Series Appliances 4.1

The network is the foundation for application delivery. Next-generation networks need to meet the growing challenge of effectively delivering applications and services in complex IT environments, where reliable application performance is vital to business success. New applications need to be successfully deployed. Network resources need to be available and used wisely. Performance degradations need to be identified and resolved before they affect business.

The Cisco® Network Analysis Module (NAM) provides unparalleled visibility into how your network is performing and how your users experience the delivery of applications and services to help you understand and improve application performance. The broad portfolio of Cisco NAMs, which encompasses integrated services modules, self-contained appliances and now a virtual blade, arms you with what you need to manage performance from the branch to the data center.

### Product Overview

Introduced in NAM 4.0, the Cisco® NAM 2200 Series Appliances offer next-generation performance, superior scalability, and maximum deployment flexibility to deliver exceptional performance monitoring throughout your Cisco network.

The design of the Cisco NAM 2200 Series Appliances is founded on the Cisco Common Appliance Model, Cisco's computing-optimized platform, and includes purpose-built hardware to maximize packet processing in high-speed networking environments. The results are robust appliances that provide granular traffic analysis, rich application performance measurements, comprehensive voice quality of experience monitoring, and deep insightful packet captures.

**Figure 1.** Cisco NAM 2220 Appliance



Cisco offers two appliances models, the Cisco NAM 2220 Appliance and the Cisco NAM 2204 Appliance. The Cisco NAM 2220 Appliance includes two 10 Gigabit Ethernet monitoring interfaces and six 146 GB Serial Attached SCSI (SAS) hard disk drives with RAID for multiservices monitoring in high-speed, high-density environments (Figure 1). The Cisco NAM 2220 comes with an option for redundant power. To improve uptime, both the hard disk drives and the power supplies are hot-swappable.

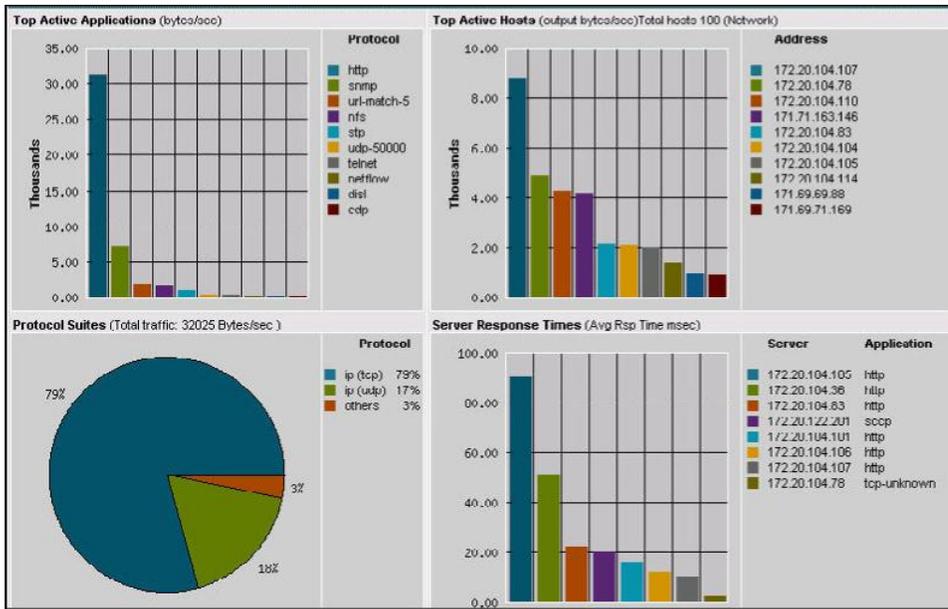
The Cisco NAM 2204 includes four 1 Gigabit Ethernet monitoring interfaces and two 250 GB Serial Advanced Technology Attachment (SATA) hard disk drives to meet diverse performance analysis needs in scalable multigigabit switching and routing deployments (Figure 2).

**Figure 2.** Cisco NAM 2204 Appliance



The Cisco NAM 2200 Series Appliances also include the embedded, web-based Traffic Analyzer GUI, which provides quick access to both configuration menus and easy-to-read performance reports (Figure 3). The GUI 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. To enhance security, role-based access can be assigned and web browser access can be secured with up to 168-bit encryption.

**Figure 3.** Web-Based Performance Monitoring with the Embedded Cisco NAM Traffic Analyzer



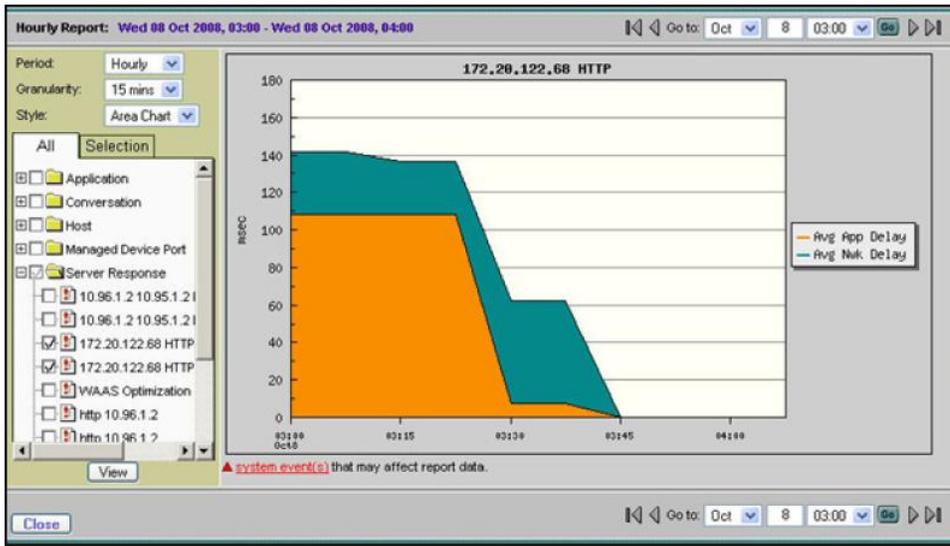
**Features and Benefits**

**Improve the Delivery of Applications and Services with Intelligent Application Performance**

The Cisco NAM 2200 Series Appliances deliver comprehensive intelligent application performance (IAP) measurements to accurately assess the end-user experience. The Cisco NAMs analyze TCP-based client/server requests and acknowledgements to provide transaction-aware response time statistics such as client delay, server delay, network delay, transaction times, and connection status. This data can help you isolate application problems to the network or to the server. It can also help you quickly diagnose the root cause of the delay and thus resolve the problem while minimizing end-user impact.

Figure 4 displays an application response time report for an HTTP application. The report shows how addressing an overloaded server improved the responsiveness of the application.

**Figure 4.** Troubleshooting Application Response Time with IAP



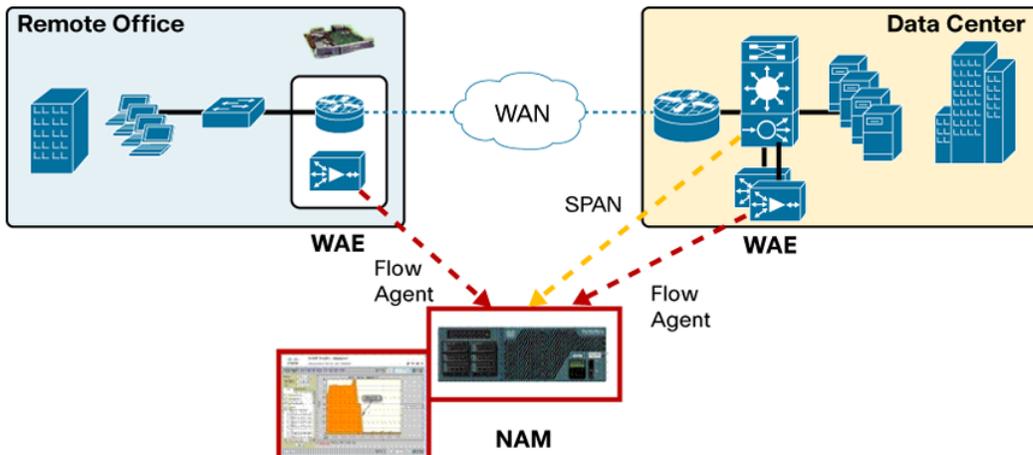
IAP can assist busy IT staff in troubleshooting application performance problems, analyzing application behavior and trends for capacity planning, identifying application consolidation opportunities, defining and helping ensure service levels, and performing pre- and postdeployment monitoring of application optimization and acceleration services.

**Gain Visibility into WAN-Optimized Networks with IAP**

Cisco Wide Area Application Services (WAAS) is a powerful application acceleration and WAN optimization solution that optimizes the performance of TCP-based applications operating in a WAN environment. The optimization allows IT organizations to consolidate costly branch-office servers and storage in centrally managed data centers and to deploy new applications directly from the data center while offering LAN-like application performance for any employee, regardless of location.

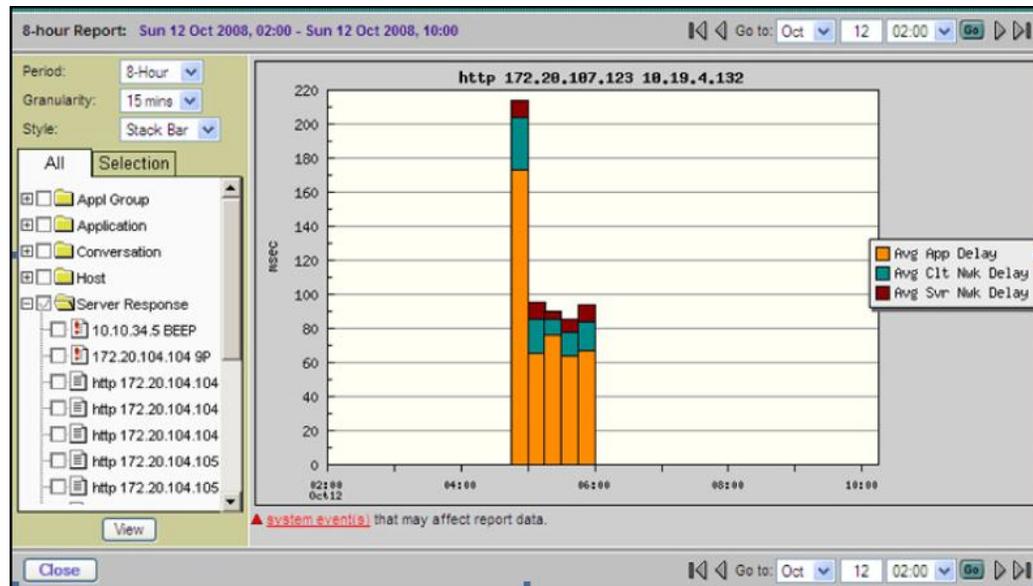
In a WAAS deployment traffic is intercepted by the Wide-Area Application Engine (WAE) devices as an essential part of the optimization process. Traditional monitoring solutions lack the intelligence to understand how this process affects the application flows, thus providing measurements that fail to represent true response time, data transfer time, and other critical performance information. As a complementary component of the Cisco WAAS solution, the Cisco NAM Appliances use the instrumentation built into the WAE devices to gather flow data to accurately quantify the end-to-end application performance improvements, as is demonstrated in Figures 5 and 6.

**Figure 5.** Using the Instrumentation in Cisco WAE Devices to Accurately Measure Application Latency



Additionally, the Cisco NAM Appliances can help assess which applications would benefit the most from deploying WAAS and can provide real-time visibility of ongoing optimization improvements.

**Figure 6.** Viewing Application Performance Improvements of a Cisco WAAS Optimization

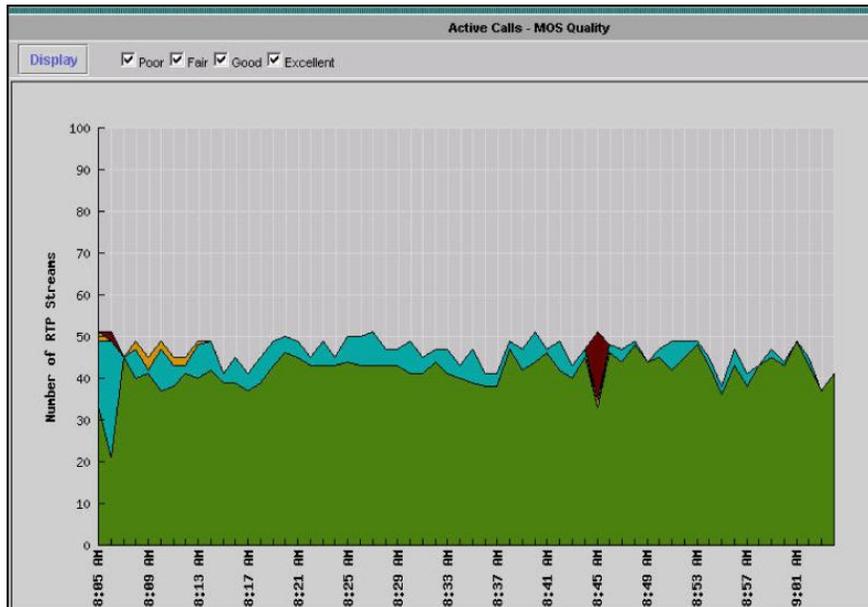


### Enrich Voice Quality with Superior Voice-Quality Monitoring

Voice traffic demands stringent availability and performance requirements. It is extremely sensitive to a number of parameters such as packet loss and jitter that do not affect transactional applications in the same way. Users expect near 100 percent uptime. The Cisco NAM Appliances can analyze voice streams in real time to provide critical performance information, including Mean Opinion Score (MOS), jitter, and packet loss, to increase your agility in identifying and resolving voice degradation issues. And complementing monitoring of voice streams, the Cisco NAMs can also monitor call signaling to derive important measurements like delays in call processing. For enterprisewide voice management, the Cisco NAM Appliances integrate with the Cisco Unified Communications Management Suite of products to help you define and enforce end-to-end service-level objectives to assure the consistent and optimized delivery of voice services.

Figure 7 presents a last 60-minute view of voice quality for active calls. The NAMs allow filtering of the data by quality grade (Poor, Fair, Good, and Excellent) to help enable you to quickly identify anomalous behavior.

**Figure 7.** Monitoring Voice Quality (MOS) for Active Calls

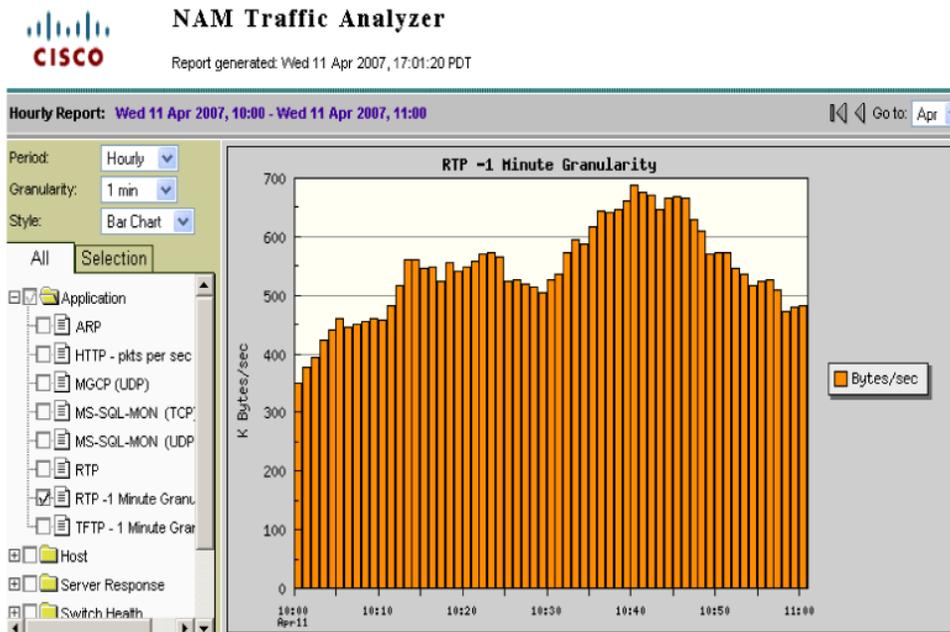


### Monitor Network and Application Usage Using Flow-Based Analytics

One of the cornerstones of the Cisco NAM Appliances is their ability to look inside the live packet to gather information on applications, hosts, and conversations. Understanding which applications, hosts, and conversations are consuming bandwidth and by how much can help you proactively spot bottlenecks before they affect availability and performance. 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, the Cisco NAM Appliances also deliver a continuous historical view of how the bandwidth was used so you can quickly decide when and where to make changes in network resources including applying Cisco acceleration and control mechanisms (Figure 8). 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 immediately resolved.

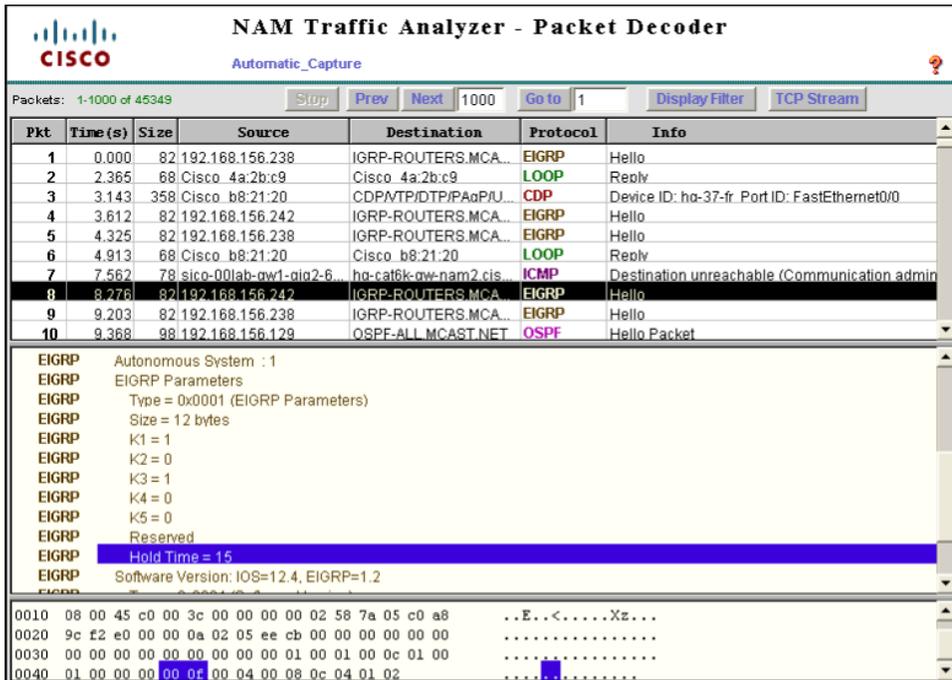
**Figure 8.** Highly Granular Analysis of RTP Traffic on the Network



### Simplify Problem Detection and Resolution with Deep, Insightful Packet Analysis

With the high performance Cisco NAM Appliances, 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 one or more potential problem areas are identified, the packet can be automatically captured and decoded to help resolve the problem. Optionally, you can continuously capture packets to observe the conditions that were present when a problem occurred. 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 the Cisco NAM Appliances 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 9).

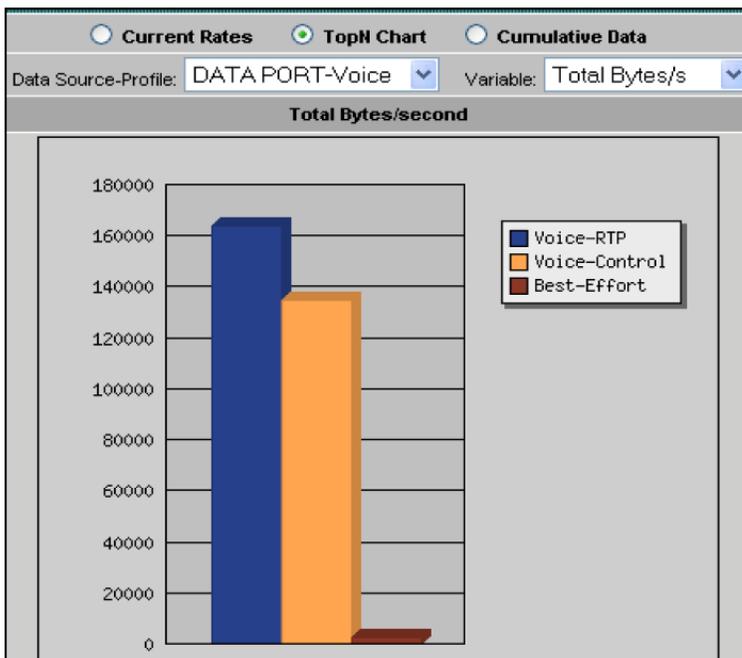
**Figure 9.** Capturing and Decoding Packets with Cisco NAM



**Analyze Quality of Service Using Differentiated Services Monitoring**

The Cisco NAM Appliances support both the planning and management of quality of service deployments for voice, video, 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 quality of service (QoS) policies. Using the Cisco NAM DiffServ monitoring capabilities, you can identify applications, hosts, and conversations participating in each grouping of DiffServ classes (Figure 10). You can use this information to validate and tune planning assumptions and QoS allocations and to detect incorrectly marked or unauthorized traffic.

**Figure 10.** Analyzing QoS Using DSMON



## Bring It All Together Your Way

As flexible advanced Cisco instrumentation, the Cisco NAMs can export computed NAM data to third-party and homegrown applications to meet end-to-end performance reporting needs. For example, for networkwide visibility of application performance in both WAAS and non-WAAS networks, the Cisco NAMs can export response time information to NetQoS SuperAgent. The comprehensive performance overview that NetQoS SuperAgent provides complements the granular performance details that the Cisco NAMs provide to help enable you to see how applications are being delivered enterprisewide yet isolate and resolve delivery problems at their source.

## Deployment

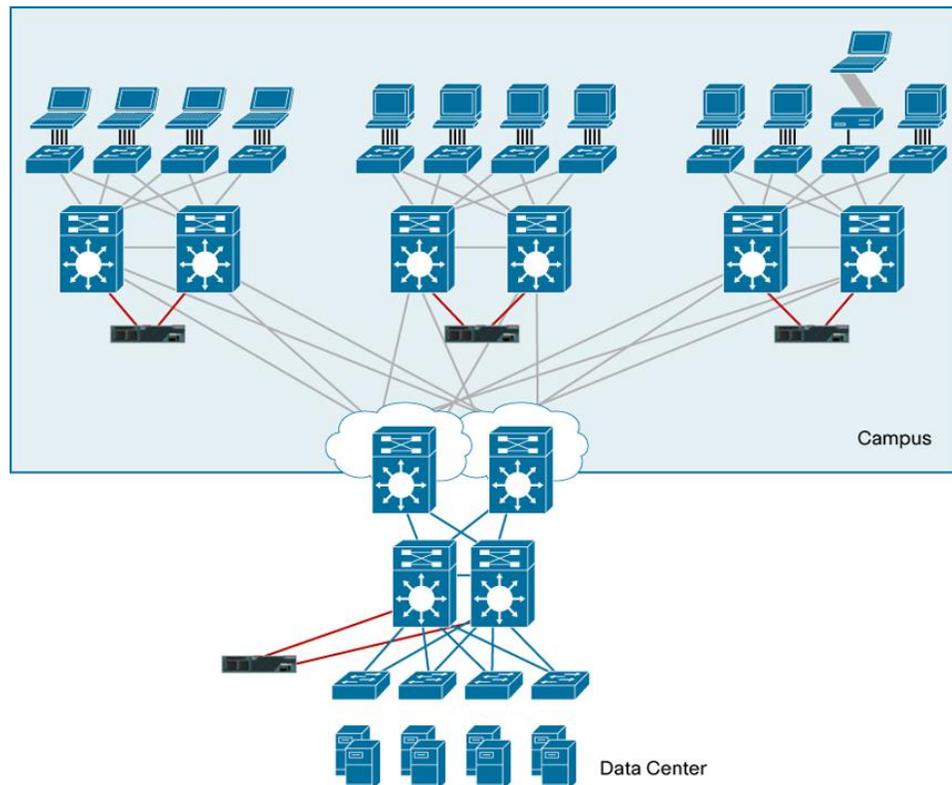
### Deployment Flexibility

The Cisco NAM 2200 Series Appliances are dedicated performance monitoring instrumentation that connect to the Switched Port Analyzer (SPAN) ports of a switch using copper or fiber interface adapters. They can also connect to critical network links using third-party passive inline taps. They can be deployed in multiple places in the network and complement Cisco NAM blades to provide extensive network visibility.

The Cisco NAM Appliances can be deployed at LAN aggregation points, for example, in the campus core and distribution layers, for always-on performance management; at services points, for example, in data centers or Cisco Unified Communications Manager clusters in IP telephony networks, where assuring application delivery is critical; and in important access points, close to servers, key clients, in IP phone closets, where traffic monitoring is essential. They can also be deployed at WAN edges.

Figure 11 depicts a sample Cisco NAM Appliances deployment in the Cisco campus. Whether a NAM 2220 or a NAM 2204 or both are deployed will depend on such factors as performance -- how much traffic is intended to be monitored; scalability -- what and how many NAM services will be enabled; and the type and number of ports to be monitored -- 10 Gigabit Ethernet or a small collection of 1 Gigabit Ethernet links.

**Figure 11.** A Sample Deployment of Cisco NAM 2220 Appliances in the Campus



## Cisco Instrumentation Simplifies Application Visibility

Cisco NAM 2200 Series Appliances use a rich set of Cisco infrastructure features to collect network and application traffic. Using the SPAN feature, Cisco NAMs can monitor traffic from physical ports, virtual LANs (VLANs), or Cisco EtherChannel connections. Using VLAN access control list (VACL)-based captures, traffic can be filtered before it is sent to Cisco NAMs to support the selective monitoring of large amounts of traffic or the gathering of traffic from WAN interfaces. Using NetFlow Data Export (NDE), the Cisco NAMs can provide analysis of real-time and historical traffic usage to obtain a broad view of how the network is performing. They 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. By using the instrumentation built into the Cisco infrastructure, the Cisco NAM Appliances offer more ways to see and understand what's happening on your network.

## Product Specifications

Table 1 provides the specifications for the Cisco NAM 2200 Series Appliances.

**Table 1.** Cisco NAM 2200 Series Appliances Specifications

NAM 2204 Feature	Description
<b>Chassis</b>	1-rack unit (RU) with four-post rack mounting
<b>Processor</b>	Intel E6400 Core 2 Duo
<b>Memory</b>	8 GB SDRAM
<b>Hard disk drive</b>	Two 250 GB SATA server grade
<b>Monitoring ports</b>	Four 1 Gb 10/100/1000BASE-T RJ45 or four 1 Gb SFP including 1000BASE-T, SX LC connector, and LX LC connector
<b>Management port</b>	10/100/1000 RJ-45
<b>Physical dimensions</b>	Dimensions (H x W x D): 1.7 x 17.0 x 20 inches (4.3 x 43.2 x 50.8 centimeters); depth is without bezel or mounting hardware
<b>Power consumption</b>	350W (maximum output, power supply rating)
<b>Heat dissipation</b>	1660 BTU/hour
<b>Weight</b>	35.0 lb (15.9 kg)
<b>Operating environment</b>	Operating temperature: 50 to 95°F (10 to 35°C) Nonoperating and storage temperature: -40 to 158°F (-40 to 70°C) Nonoperating relative humidity: 95% noncondensing at +35°C Operating and nonoperating altitude: 2000m at 40°C
NAM 2220 Feature	Description
<b>Chassis</b>	2 RU with four-post rack mounting
<b>Processor</b>	Two Intel Xeon E5440 Quad Core
<b>Memory</b>	16 GB SDRAM
<b>Hard disk drive</b>	Six 146 GB SAS, hot swappable, RAID1 on two operating system drives
<b>Monitoring ports</b>	Two 10 Gb XFP including 10 Gb 850 nm SR and 10 Gb 1310 nm LR
<b>Management port</b>	10/100/1000 RJ45
<b>Physical dimensions</b>	Dimensions (H x W x D): 3.54 x 17.0 x 20 inches (8.8 x 43.2 x 50.8 centimeters); depth is without bezel or mounting hardware
<b>Power consumption</b>	600W (maximum output power, power supply rating)
<b>Heat dissipation</b>	1200 BTU/hour
<b>Weight</b>	44.7 lb (20.3 kg)
<b>Operating environment</b>	Operating temperature: 50 to 95°F (10 to 35°C) Nonoperating and storage temperature: -40 to 158°F (-40 to 70°C) Nonoperating relative humidity: 50–90% noncondensing at +35°C Operating and nonoperating altitude: 3000m at 40°C

All NAM Appliances	Description
<b>Tested platforms</b>	Tested with Catalyst® 4500 Series, Catalyst 6500 Series, Cisco 7600 Series, and Nexus 7000 Series. Please read the NAM 4.1 Release Notes for any limitations that may apply.
<b>Supported topologies and data sources</b>	LAN: SPAN, RSPAN, 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)/SPA interfaces (Cisco IOS® Software only)
<b>Supported interfaces</b>	HTTP/HTTPS with embedded web-based Cisco NAM Traffic Analyzer Simple Network Management Protocol Version 1 (SNMPv1) and v2c, with standards-based applications
<b>NAM Traffic Analyzer</b>	Embedded in Cisco NAM Software 4.1 Web-based: Requires Microsoft Internet Explorer 7.0 or Firefox 3.0; 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+
<b>MIBs</b>	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: <ul style="list-style-type: none"> <li>• MIB-II (RFC 1213) – All groups except Exterior Gateway Protocol (EGP) and transmission</li> <li>• RMON (RFC 2819)</li> <li>• RMON2 (RFC 2021)</li> <li>• SMON (RFC 2613) – DatasourceCaps and smonStats</li> <li>• DSMON (RFC 3287)</li> <li>• HC-RMON (RFC 3273)</li> <li>• Application Response Time</li> </ul>
<b>Protocols</b>	Cisco NAM provides RMON2 statistics on hundreds of unique protocols, including those defined in RFC 2896 and several Cisco proprietary protocols. Cisco NAM automatically detects 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): <ul style="list-style-type: none"> <li>• TCP and User Datagram Protocol (UDP) over IP including IPv6</li> <li>• HTTP and HTTPS</li> <li>• Voice over IP (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)</li> <li>• SigTran and Mobile IP protocols including GPRS Tunneling Protocol (GTP)</li> <li>• Storage area network (SAN) protocols including Fibre Channel over TCP/IP</li> <li>• AppleTalk, DECnet, Novell, Microsoft</li> <li>• Database protocols, including Oracle and Sybase</li> <li>• Peer-to-peer protocols such as Gnutella, Fasttrack, and winmix</li> <li>• Bridge and router protocols</li> <li>• Cisco proprietary protocols</li> <li>• Unknown protocols by TCP/UDP ports, Remote Procedure Call (RPC) program numbers, and so on</li> </ul>

<b>Approvals and compliance</b>	Regulatory: CE Marking (89/366/EEC and 2006/95/EC) Safety: UL 60950-1 CAN/CSA-C22.2 No. 60950-1 EN60950-1 IEC 60950-1 AS/NZS 60950-1 EMC: 47CFR part 15 Class A (FCC regulations) AS/NZS CISPR22 Class A CNS13438 Class A EN55022 Class A ICES003 Class A VCCI Class A EN50082-1 EN61000-6-1 EN55024 EN61000-3-2 EN61000-3-3 CISPR24
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## Ordering Information

Table 2 provides ordering information for Cisco NAM 2200 Series Appliances. To place an order, visit the [Cisco Ordering Homepage](#).

**Table 2.** Ordering Information for Cisco NAM 2200 Series Appliances

Part Number	Cisco NAM 2204-RJ45 Appliance
NAM2204-RJ45	Cisco NAM 2204 Appliance, four 1 Gb Ethernet, RJ45
NAM-APPL-SW-4.1	Cisco NAM Software 4.1
NAM2204-RAILS=	Rail Kit Four Post Spare
NAM2204-BRKTS=	Rail Kit Two Post Spare
Part Number	Cisco NAM 2204-SFP Appliance
NAM2204-SFP	Cisco NAM 2204 Appliance, four 1 Gb Ethernet, SFP
GLC-T(=)	1000BASE-T SFP (Spare)
GLC-SX-MM(=)	GE SFP, LC Connector SX Transceiver (Spare)
GLC-LH-SM(=)	GE SFP, LC Connector LX/LH Transceiver (Spare)
NAM-APPL-SW-4.1	Cisco NAM Software 4.1
NAM2204-RAILS=	Rail Kit Four Post Spare
NAM2204-BRKTS=	Rail Kit Two Post Spare
Part Number	Cisco NAM 2220 Appliance
NAM2220	Cisco NAM 2220 Appliance, two 10 Gb Ethernet
NAM2220-HDD-6X146G	Hard Disk Drive, six 146 GB
NAM2220-DIMM-16GB	RAM DIMM, 16 GB
NAM2220-AC-PS(=)	AC Power Supply (Spare)
XFP-10GBASE-SR(=)	XFP, 10 GE, Short Range (Spare)
XFP-10GBASE-LR(=)	XFP, 10 GE, Long Range (Spare)
NAM-APPL-SW-4.1	Cisco NAM Software 4.1
NAM2220-RAILS=	Rail Kit Four Post Spare
NAM2220-BRKTS=	Rail Kit Two Post Spare

## 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 Cisco NAM 2200 Series Appliances, visit <http://www.cisco.com/go/nam>, contact your local account representative, or email the Cisco NAM product marketing group at [nam-info@cisco.com](mailto:nam-info@cisco.com).



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