CISCO CATALYST 6500 SERIES AND CISCO 7600 SERIES NETWORK ANALYSIS MODULE 1 AND 2

Second-Generation, High-Performance Network Analysis Modules for Cisco Catalyst 6500 Series and Cisco 7600 Series

Cisco Systems®, the worldwide leader in networking for the Internet, addresses the need for multiservice network management and traffic monitoring in high-capacity switched Ethernet LANs and routed WANs with a new generation of the Network Analysis Module (NAM) for Cisco® Catalyst® 6500 Series switches and Cisco 7600 Series routers. The NAM is an integrated and powerful traffic monitoring service module that occupies a single slot in the chassis and enables network managers to gain application-level visibility into network traffic with the ultimate goal of improving performance, reducing failures, and maximizing returns on network investments.

The second-generation NAMs are available in two hardware versions, NAM-1 and NAM-2, and offer high performance monitoring and crossbar (fabric) connectivity to meet diverse network analysis needs in scalable switching and routing environments running at gigabit speeds. The NAMs come with an embedded, Web-based traffic analyzer, which provides full-scale remote monitoring and troubleshooting capabilities that are accessible through a Web browser.
APPLICATION-LEVEL VISIBILITY BUILT INTO THE NETWORK

The NAMs give network managers visibility into all layers of network traffic by providing application-level Remote Monitoring (RMON) functions based on RMON2 and other advanced Management Information Bases (MIBs). The NAMs add to the built-in Remote Monitoring (mini-RMON) features in Cisco Catalyst 6500 Series switches and Cisco 7600 Series routers that provide port-level traffic statistics at the Media Access Control (MAC) or data link layer. The NAMs provide intelligence to analyze traffic flows for applications, hosts, conversations, and network-based services such as quality of service (QoS) and voice over IP (VoIP).

Integrated Monitoring for LANs and WANs

The NAMs use several data sources from local and remote switches and routers to provide combined visibility into LAN and WAN environments. The NAMs collect data from physical ports, virtual LANs (VLANs), or Cisco EtherChannel® connections using the Switch Port Analyzer (SPAN) feature. For selective monitoring of large amount of traffic or for traffic from WAN interfaces, VLAN access control list (VACL)-based captures can be used to filter traffic before it is sent to NAM. In addition, the NAMs collect and analyze NetFlow Data Export from local and remote devices to provide broad application-level visibility into the network, including remote WAN segments. The NAMs also collect data from remote switches using the remote SPAN (RSPAN) feature of the Cisco Catalyst switches.

FLEXIBLE DEPLOYMENT SCENARIOS

The NAMs can be deployed in the Cisco Catalyst 6500 Series at LAN aggregation points (for example, in the core or distribution layer) for proactive monitoring; at service points (for example, in data centers, server farms, or Cisco CallManager clusters in IP telephony networks) where performance is critical; and at important access points (critical clients, IP phone closets) where quick troubleshooting is required. They can also be deployed in Cisco 7600 Series routers at WAN edges or in Catalyst 6500 Series switches connected to WAN routers. When deployed at remote branch offices, the NAMs provide unique advantage to perform remote troubleshooting and traffic analysis through its Web-based Traffic Analyzer without having to send personnel or to haul large amounts of data to the central site. Figure 1 highlights the deployment of NAMs to enable comprehensive traffic monitoring and analysis for performance monitoring, troubleshooting, and capacity planning.
EASY TO DEPLOY AND USE

The NAMs come with the embedded, Web-based Traffic Analyzer with extensive monitoring and troubleshooting capabilities. Because the NAMs integrate monitoring functions directly into the switch and have complete data collection and data analysis capabilities on board, they are easy to deploy and managers can conveniently access data from anywhere using a Web browser (Figure 2). For security, users can be given role-based access and the Web-browser access can be secured with up to 168-bit encryption.
The NAMs also provide the flexibility to use standards-based external applications using the Simple Network Management Protocol (SNMP). NetScout nGenius Real-Time Monitor, a component of the CiscoWorks LAN Management Solution (LMS), collects data from NAMs across the network and provides reports on traffic flow.

**MAJOR BENEFITS**

- **Increase return on network investment**—The visibility provided by the NAMs enables better utilization of network resources to meet business objectives. They ease deployment of network-based services and help in capacity planning.

- **Reduce productivity loss and revenue loss**—Through proactive monitoring and quick troubleshooting capabilities, the NAMs prevent loss due to network degradation and downtime.

- **Enhance network security**—The NAMs provide investigation and verification capabilities to supplement other security mechanisms such as intrusion detection and firewalls. They can also be used to detect threats by watching anomalies in the network traffic.
FEATURES AND APPLICATIONS

The data collected by the NAMs can be used for several vital management activities, including real-time and historical application monitoring, performance management, fault isolation, troubleshooting, and capacity planning. The NAMs also play an active role in managing differentiated services such as voice.

Real-Time and Historical Application Monitoring

Using RMON, RMON2, several extended RMON MIBs, and NetFlow, the NAMs detect the applications on the network and provide detailed real-time and historical information about how these applications utilize the bandwidth, which hosts access those applications, and which client/server pairs generate the most traffic (Figure 3A and 3B).

**Figure 3A**
Monitoring Applications and Hosts on the Network
PERFORMANCE MANAGEMENT

The NAMs provide valuable information about the delays in server responses to client requests. Using the Application Response Time (ART) MIB, developed by Cisco partner NetScout Systems, the NAMs can identify problems with applications or servers in critical environments such as e-commerce and IP telephony (Figure 4).
Fault Isolation and Troubleshooting

Using the NAMs, network managers 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. The NAMs provide comprehensive views on applications, hosts, voice, quality of service (QoS), and so on, to isolate faults or malfunctions in the network. The NAM Traffic Analyzer can capture and decode packets in real time to aid troubleshooting (Figure 5).
VoIP and QoS Monitoring

The NAMs can analyze voice traffic flows in real time to collect valuable information, including call setup details and voice quality metrics. Network managers can be alerted to voice quality degradation and can isolate potential problems (Figure 6).

The NAMs make the deployment of QoS for voice and other critical services effective by identifying violations of QoS policies. The NAMs support the Differentiated Services Monitoring (DSMON) MIB, which monitors traffic by differentiated services code point (DSCP) allocations defined by QoS policies (Figure 7).
Figure 6
IP Telephony Monitoring

Figure 7
QoS Monitoring Using DSMON
Capacity Planning and Other Extended Applications

The data from the NAMs across the network can be collected by NetScout nGenius Real-Time Monitor, a component of the CiscoWorks LAN Management Solution (LMS) to provide consolidated views of network traffic (Figure 8). The NAMs serve as data sources for several other standards-based applications for a variety of purposes including capacity planning, long-term historical reporting and trending, anomaly-based threat detection, etc.

**Figure 8**
Aggregating data from NAMs across the network using NetScout nGenius Real-Time Monitor

**PRIMARY ADVANTAGES**

• **Integrated with network infrastructure**—The NAMs occupy a single slot within the Cisco Catalyst 6500 Series or Cisco 7600 Series chassis and are deployed, managed, and supported as an integral part of the network infrastructure. They do not interfere with switching and routing functions and have their own processing resources. They are managed as a part of the network device using CiscoWorks management tools.

• **Complete monitoring solution for LAN, WAN, and network-based services**—The NAMs combine the functions of data collection agent and analysis application in one and provide comprehensive monitoring using a variety of data sources including RMON, RMON2 and NetFlow through the embedded Traffic Analyzer.

• **Total cost of ownership savings**—The integrated nature of the NAM solution saves costs in acquiring network device-specific features like mini-RMON, and in maintenance and technical support. The NAM Traffic Analyzer is embedded in the NAM at no extra cost.

• **Extensible, standards-based solution**—The NAMs are compliant with open standards, and can be used with different monitoring applications to meet diverse needs.

• **Secure solution**—The NAM Traffic Analyzer can be deployed with up to 168-bit encryption, and SNMP can be disabled for fortifying external access to the NAM. The NAMs support Secure Shell (SSH) for secured command-line access.
NETWORK MONITORING SOLUTIONS
Cisco Systems offers a wide variety of solutions to provide complete visibility into network infrastructure. The comprehensive Cisco solution includes embedded technologies such as mini-RMON, NetFlow, Service Assurance Agent (SAA), Network-Based Application Recognition (NBAR); NAMs for the Cisco Catalyst 6500 Series and Cisco 7600 Series for value-added traffic analysis, and CiscoWorks network monitoring applications. nGenius Real-Time Monitor, a component of the CiscoWorks LAN Management Solution (LMS), collects mini-RMON data from switches to provide port utilization statistics and uses data from NAMs across the network to provide broad-based analysis and reports on network traffic. Cisco AVVID (Architecture for Voice, Video and Integrated Data) partners extend the Cisco network monitoring solution through a variety of applications that use embedded data sources and NAMs.

TECHNICAL SPECIFICATIONS

NAM-1
- High-performance dual processor architecture, 512 MB RAM
- Two data collection interfaces to backplane: 1 for SPAN/VACL data sources, 1 for NetFlow
- Second generation fabric enabled platform with interface to both bus and crossbar based architectures

NAM-2
- Extra high-performance dual processor architecture with hardware-based packet acceleration, 1 GB RAM
- Gigabit monitoring performance
- Three data collection interfaces to backplane: 2 for SPAN/VACL data sources (can be used independently or together), 1 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 any 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 on the Supervisor Engine

Supported Topologies and Data Sources
- LAN — Switch Port Analyzer (SPAN) or Remote SPAN (RSPAN), VLAN ACL (VACL)-based captures, NetFlow (v1, v5, v6, v7, v8)
- WAN — NetFlow (v1, v5, v6, v7, v8) from local and remote devices, VLAN ACL (VACL)-based captures for FlexWAN/Optical Service Module (OSM) interfaces (Cisco IOS Software only)

Supported Interfaces and Applications
- HTTP/HTTPS with embedded web based NAM Traffic Analyzer
- SNMP v1, v2 with nGenius Real Time Monitor and other standards based applications
NAM Traffic Analyzer

- Embedded in NAM Software Version 2.2 and later for NAM-1/NAM-2
- Web based—Requires Microsoft Internet Explorer 5.0 or Netscape 4.7 (minimum)
- 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/WAN traffic and network-based services

NAM Software Version 3.3

- Supports NAM-1 (part number WS-SVC-NAM-1) and NAM-2 (WS-SVC-NAM-2); does not support first-generation NAM (WS-X6380-NAM)
- Supported with Cisco IOS® Software Release 12.1(13)E or Cisco Catalyst Operating System 7.3(1) minimum on the Supervisor Engine

Supported MIB Groups

The NAMs are standards-compliant and support RMON and RMON2 MIBs, as well as several extensions. The major MIB groups supported in the NAMs are:

- MIB-II (RFC 1213)—All groups except Exterior Gateway Protocol (EGP) and transmission
- RMON (RFC 2819)—All groups
- RMON2 (RFC2021)—All groups
- SMON (RFC2613)—DataSourceCaps and smonStats
- DSMON (RFC 3287)
- HC-RMON (RFC 3273)
- Application Response Time (ART)

Supported Protocols

The NAMs provide RMON2 statistics on several-hundred unique protocols, including those defined in RFC 2896, and several Cisco proprietary protocols. In addition, the NAMs can automatically detect unknown protocols and users have the flexibility to customize the protocol directory.

Examples of Protocols Supported by the NAMs for RMON2 Statistics:

- TCP and UDP over IP including IPv6
- VoIP including SCCP(Skinny), RTP/RTCP, MGCP, SIP
- Mobile IP protocols (Both IP in IP and GRE tunnelling)
- Storage area network (SAN) protocols including Fiber Channel over TCP/IP
- AppleTalk, DECnet, Novell, Microsoft
- Database protocols including Oracle, Sybase
• Bridge and router protocols
• Cisco proprietary protocols
• Unknown protocols by TCP/UDP ports, RPC program numbers, etc

Physical Specifications
• Dimensions (H x W x D): 1.2 x 14.4 x 16 in. (3.0 x 35.6 x 40.6 cm); Occupies any 1 slot in the chassis

Operating Environment
• Operating temperature: 32° F (0° C) to 104° F (40° C)
• Nonoperating and storage temperature: -40° F (-40° C) to 158° F (70° C)
• Operating relative humidity: 10% to 90% (noncondensing)
• Nonoperating relative humidity: 5% to 95% (noncondensing)
• Operating and nonoperating altitude: Sea level to 10,000 ft (3050 m)

Agency Approvals
• Regulatory: CE Marking (89/366/EEC and 73/23/EEC)
• Safety: UL 1950, CAN/CSA-C22.2 No. 950, EN 60950, IEC 60950

ORDERING INFORMATION

<table>
<thead>
<tr>
<th>Cisco Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>WS-SVC-NAM-1</td>
<td>Network Analysis Module-1 for Cisco Catalyst 6500 Series and Cisco 7600 Series</td>
</tr>
<tr>
<td>WS-SVC-NAM-2</td>
<td>Network Analysis Module-2 for Cisco Catalyst 6500 Series and Cisco 7600 Series</td>
</tr>
<tr>
<td>SC-SVC-NAM-3.3</td>
<td>Network Analysis Module Software 3.3</td>
</tr>
</tbody>
</table>

• The use of mini-RMON in Cisco Catalyst 6500 Series and Cisco 7600 Series with NAMs installed does not require the purchase of a separate RMON agent license
• The Application Response Time (ART) MIB and the VoIP monitoring features are included at no extra cost for the NAM-1 and NAM-2. They require purchase of separate licenses (SC6K-NAM-ART-LIC= and SC6K-NAM-VOIP-LIC=} with the first-generation NAM (WS-X 6380-N AM)
• Service Part Numbers for NAM-1 and NAM-2 are CON-xxx-WSSVCNAM1 and CON-xxx-WSSVNUM2 respectively, where “xxx” stands for level of support (for example, xxx= SNT = 8x5x Next Business Day)

MORE INFORMATION
Cisco Systems has more than 200 offices in the following countries and regions. Addresses, phone numbers, and fax numbers are listed on the Cisco Web site at www.cisco.com/go/offices.

Argentina • Australia • Austria • Belgium • Brazil • Bulgaria • Canada • Chile • China PRC • Colombia • Costa Rica • Croatia • Czech Republic • Denmark • Dubai, UAE • Finland • France • Germany • Greece • Hong Kong SAR • Hungary • India • Indonesia • Ireland • Israel • Italy • Japan • Korea • Luxembourg • Malaysia • Mexico • The Netherlands • New Zealand • Norway • Peru • Philippines • Poland • Portugal • Puerto Rico • Romania • Russia • Saudi Arabia • Scotland • Singapore • Slovakia • Slovenia • South Africa • Spain • Sweden • Switzerland • Taiwan • Thailand • Turkey • Ukraine • United Kingdom • United States • Venezuela • Vietnam • Zimbabwe