User Guide for the Cisco Network Analysis Module Traffic Analyzer, 4.0

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User Guide for the Cisco Network Analysis Module Traffic Analyzer, 4.0

CONTENTS

About This Guide

Revised: November 13, 2008, OL-14964-03

This guide describes how to use Cisco Network Analysis Module Traffic Analyzer 4.0 (NAM 4.0) software. This preface has the following sections:

NAM 4.0 software supports the following NAM models (SKU):

- NAM2220
- NAM2204-RJ45
- NAM2204-SFP
- WS-SVC-NAM-1
- WS-SVC-NAM-1-250S
- WS-SVC-NAM-2
- WS-SVC-NAM-2-250S
- NME-NAM-80S
- NME-NAM-120S
- NM-NAM

Throughout this guide we use NAM SKUs to indicate a specific NAM model and the following general references:

- A reference to a *NAM-1 or NAM-2 device* indicates any of the following modules:
  - WS-SVC-NAM-1
  - WS-SVC-NAM-1-250S
  - WS-SVC-NAM-2
  - WS-SVC-NAM-2-250S
- A reference to *an NME-NAM device* indicates any of the following modules:
  - NME-NAM

- NME-NAM-80S
- NME-NAM-120S

Chapter Overview

This user guide contains the following chapters and appendices:

- Chapter 1, "Overview of the NAM Traffic Analyzer" provides an overview of the NAM Traffic Analyzer, describes the GUI, and provides information about how to use various components of the NAM Traffic Analyzer.
- Chapter 2, "User and System Administration" provides information about performing user and system administration tasks and generating diagnostic information for obtaining technical assistance.
- Chapter 3, "Setting Up the Application" provides information about setting up the NAM Traffic Analyzer applications.
- Chapter 4, "Monitoring Data" provides information about options for viewing and monitoring various types data.
- Chapter 5, "Creating and Viewing Reports" provides information about the NAM Traffic Analyzer reports function which allows you to store and retrieve short and medium-term historical data about the network traffic monitored by the NAM.
- Chapter 6, "Capturing and Decoding Packet Data" provides information about how to set up multiple buffers for capturing, filtering, and decoding packet data, manage the data in a file control system, and display the contents of the packets.
- Chapter 7, "Viewing Alarms" provides information about how to set up alarms to warn of predefined conditions based on a rising data threshold, a falling data threshold, or both. You can set thresholds for the NAM MIB, NAM voice-monitoring, and switch thresholds.
- Appendix A, "Troubleshooting," provides information about how to troubleshoot some common issues you might encounter while using the NAM Traffic Analyzer.
- Appendix B, "Supported MIB Objects," provides information about the MIB objects supported in the NAM Traffic Analyzer.

Audience

This guide is designed for network administrators who are responsible for setting up and configuring Network Analysis Modules (NAMs) to monitor traffic and diagnose emerging problems on network segments. As a network administrator, you should be familiar with:

- Basic concepts and terminology used in internetworking.
- Network topology and protocols.
- Basic UNIX commands or basic Windows operations.

Conventions

This document uses the following conventions:

Item	Convention
Commands and keywords	**boldface** font
Variables for which you supply values	*italic* font
Displayed session and system information	`screen` font
Information you enter	**`boldface screen`** `font`
Variables you enter	*`italic screen`* font
Menu items and button names	**boldface** font
Selecting a menu item in paragraphs	**Option > Network Preferences**
Selecting a menu item in tables	Option > Network Preferences

Note Means *reader take note*. Notes contain helpful suggestions or references to material not covered in the publication.

Caution Means *reader be careful*. In this situation, you might do something that could result in equipment damage or loss of data.

Notices

The following notices pertain to this software license.

OpenSSL/Open SSL Project

This product includes software developed by the OpenSSL Project for use in the OpenSSL Toolkit (http://www.openssl.org/).

This product includes cryptographic software written by Eric Young (eay@cryptsoft.com).

This product includes software written by Tim Hudson (tjh@cryptsoft.com).

License Issues

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OpenSSL License:

Original SSLeay License:

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http://www.cisco.com/en/US/docs/general/whatsnew/whatsnew.html

Subscribe to the *What's New in Cisco Product Documentation* as a Really Simple Syndication (RSS) feed and set content to be delivered directly to your desktop using a reader application. The RSS feeds are a free service and Cisco currently supports RSS Version 2.0.

CHAPTER 1

Overview of the NAM Traffic Analyzer

These topics provide information about using the various components of the NAM Traffic Analyzer:

- Introducing the NAM Traffic Analyzer, page 1-1
- A Closer Look at Some User Interface Components, page 1-3
- Common Navigation and Control Elements, page 1-3
- Getting Started, page 1-6

Introducing the NAM Traffic Analyzer

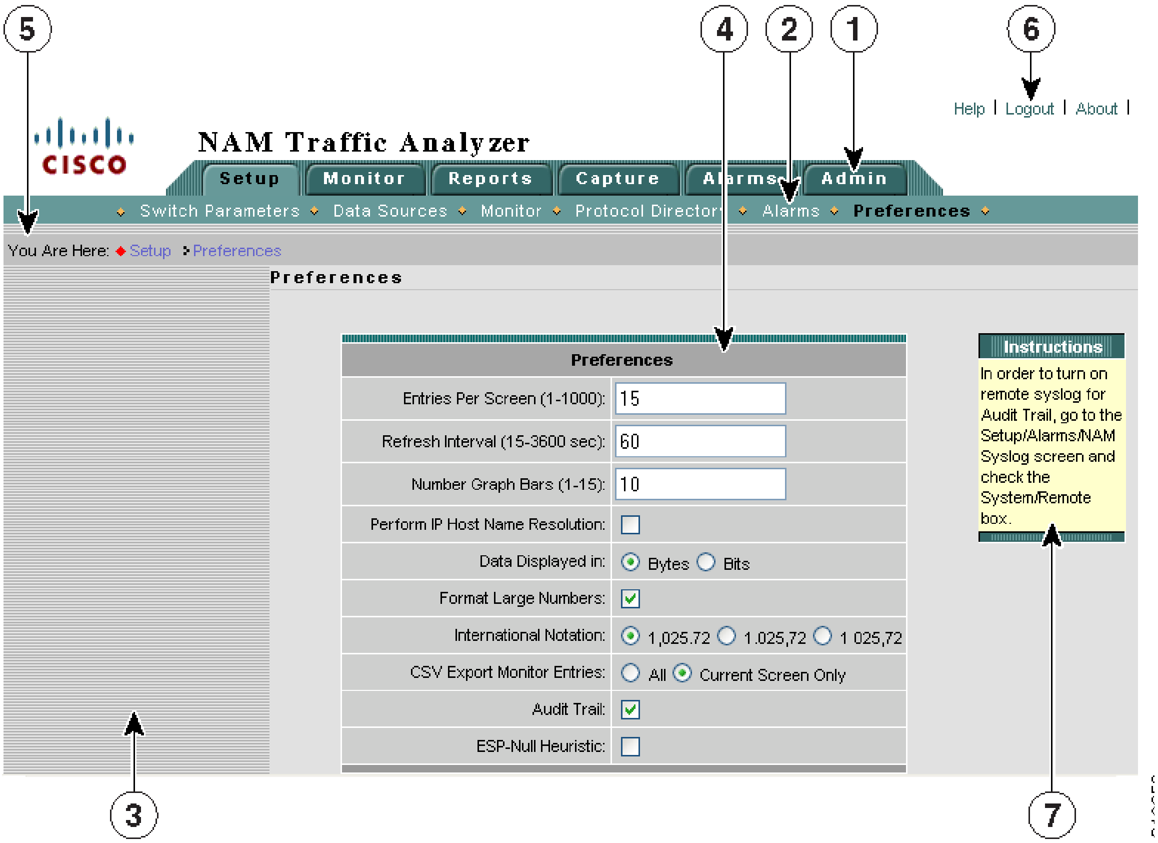
The Cisco Network Analysis Module (NAM) is an integrated module that enables network managers to understand, manage, and improve how applications and services are delivered to end-users. The NAM offers flow-based traffic analysis of applications, hosts, and conversations, performance-based measurements on application, server, and network latency, quality of experience metrics for network-based services such as voice over IP (VoIP) and video, and problem analysis using deep, insightful packet captures. The Cisco NAM includes an embedded, web-based Traffic Analyzer GUI that provides quick access to the configuration menus and presents easy-to-read performance reports on Web, voice, and video traffic.

Using the NAM Graphical User Interface

The Cisco NAM Traffic Analyzer supports browser-based access to the NAM graphical user interface (GUI). To access the NAM GUI, enter a machine name and its domain or an IP address in your browser address field. The NAM GUI prompts you for your user name and password. After you enter your user name and password, click **Login** to access the NAM GUI.

Figure 1-1 shows an example of the NAM Traffic Analyzer GUI.

Figure 1-1 NAM Traffic Analyzer GUI



Preferences

Entries Per Screen (1-1000): 15

Refresh Interval (15-3600 sec): 60

Number Graph Bars (1-15): 10

Perform IP Host Name Resolution: □

Data Displayed in: ● Bytes ○ Bits

Format Large Numbers: ☑

International Notation: ● 1,025.72 ○ 1.025,72 ○ 1 025,72

CSV Export Monitor Entries: ○ All ● Current Screen Only

Audit Trail: ☑

ESP-Null Heuristic: □

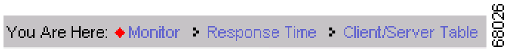
In order to turn on remote syslog for Audit Trail, go to the Setup/Alarms/NAM Syslog screen and check the System/Remote box.

1	Tabs for accessing main functions; tabs are displayed in every window in user interface (except in the detail pop-up windows).	**5**	Context line that shows path to the current function. Click any link in this area to go back to the associated window.
2	Options associated with each tab; functions change in each tab depending on context.	**6**	Toolbar to access global functions such as online help, logging out, learning more about the application.
3	Content Menu shows links to functions from the current window. Click any link in the menu to go to the corresponding window.	**7**	Instruction box provides helpful information about how to use this GUI window.
4	Content area where graphs, tables, dialog boxes, charts, and instruction boxes are displayed.		

Note All times in the Traffic Analyzer are typically displayed in 24-hour clock format. For example, 3:00 p.m. is displayed as 15:00.

A Closer Look at Some User Interface Components

Context Line

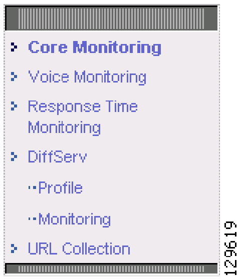

You Are Here: ◆Monitor › Response Time › Client/Server Table
68026

The Context line shows where you are in the hierarchy of operations. In this case, you would be viewing the Response Time Client/Server Table.

You can click:

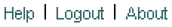
- **Response Time** to return to the Response Time Server Table.
- **Monitor** to return to the Monitor Overview window.

Contents



The contents (present in only some windows) displays options that are subordinate to the options within the individual tabs. The example above displays after you click **Setup** > **Monitor**.

Toolbar



The toolbar is displayed in the upper right corner of every window of the user interface.

- Click **Logout** to log out of the NAM Traffic Analyzer.
- Click **Help** for context-sensitive information (information relevant to the current function). Help is displayed in a separate browser window.
- Click **About** to see information about the NAM Traffic Analyzer.

Common Navigation and Control Elements

Common Navigation and Control Elements (Table 1-1) describes the common navigation and control elements in the user interface.

Table 1-1 Common Navigation and Control Elements

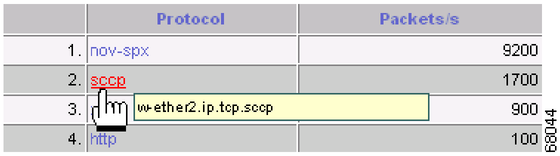
Element	Description
Start	Starts an action.
Stop	Stops an action, such as the active capturing of packets.
Pause	Temporarily suspends an action.
Create	Creates a new record, user, capture, filter, and so on.
Delete	Deletes a record, user, capture, filter, and so on.
Edit	Edits a record, user, capture, filter, and so on.
Go	Jumps to a group of records, beginning at a specific line number.
Prev	Displays the previous group of records.
Next	Displays the next group of records
Filter	Displays information based on different criteria (for example, IP address versus protocol).
Apply	Applies changes; current window continues to display.
Submit	Applies changes; goes to different window.
Reset	Resets (clears) any changes you made in a dialog box.
Close	Closes the window.
Address ▽	Sorts the column information in descending order.
Test	Tests a function (such as read and write access to the router).
Report	Creates a report for the selected variable.
Real-Time	Displays real-time statistics for the selected variable.
Capture	Captures the packets to the buffer.

Table 1-1 Common Navigation and Control Elements (continued)

Element	Description
↗	Exports the data on the screen to a **.csv** text file. If you want to export more data, you must increase the rows per page setting for the table. The default setting is 15 rows per page.
📄	Exports the data on the screen to a PDF file.
🖨	Opens a printer friendly window of the data on the screen. You can print the window using the Print command from your web browser. If you want to print more data, you must increase the rows per page setting for the table. The default setting is 15 rows per page.
❓	Starts the online help.

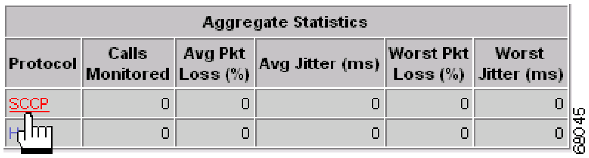
In addition to the common navigation and control elements, you can use these navigation aids:

Pop-up help—To expand abbreviated protocol encapsulation information in some links, move your mouse over the link. The full protocol encapsulation name is displayed.



	Protocol	Packets/s
1.	nov-spx	9200
2.	sccp	1700
3.	w-ether2.ip.tcp.sccp	900
4.	http	100

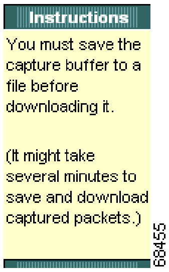
Links—Slide your mouse over text. If the text color changes from blue to red, and the cursor changes to a pointing finger, the text is a link.



Aggregate Statistics

Protocol	Calls Monitored	Avg Pkt Loss (%)	Avg Jitter (ms)	Worst Pkt Loss (%)	Worst Jitter (ms)
SCCP	0	0	0	0	0
H	0	0	0	0	0

Instructions box—Some windows contain an instructions box in the content area that explains what you are expected to do.



Instructions

You must save the capture buffer to a file before downloading it.

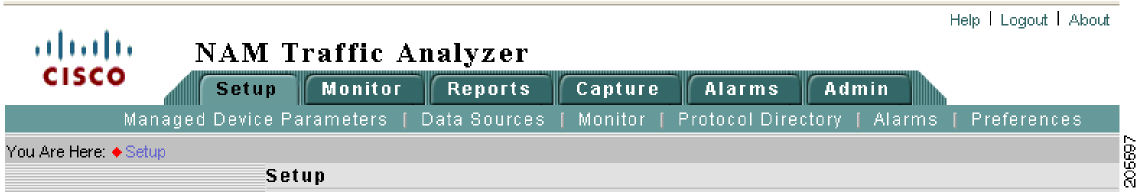
(It might take several minutes to save and download captured packets.)

Getting Started

To use the NAM Traffic Analyzer effectively, you must perform a specific sequence of tasks:

Step 1 Use the Setup tab (Figure 1-2) to configure and enable monitoring collections on the NAM. For more information, see Chapter 3, "Setting Up the Application."

Figure 1-2 Setup Tab



These options are available from the Setup tab.

- Chassis Parameters—To verify there is connectivity between the NAM-1 or NAM-2 device and the switch.
- Router Parameters—To set up the parameters to be used by the NAM to communicate with the router

Note The Router Parameters options are for NM-NAM or NME-NAM devices only.

- Managed Device Parameters—To set up the parameters to be used by the NAM appliance to communicate with the managed device, a switch or router to which you connect the NAM appliance to receive and monitor traffic.

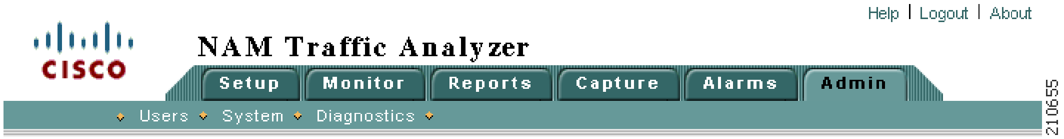
Note The Managed Device Parameters options are for Cisco 2200 Series NAM appliances only. NAM appliances are the following SKUs: NAM2220, NAM2204-RJ45, and NAM2204-SFP.

- Data Sources—To specify the network traffic to be collected from the switch or router to this NAM for monitoring. Also used to create NetFlow data sources.
- Monitor—To specify the types of traffic statistics to be collected and monitored.
- Protocol Directory—To specify protocol groups and URL-based protocols.
- Alarms—To set up alarm conditions and thresholds.
- Preferences—To establish global preferences for *all* NAM Traffic Analyzer users. These preferences determine how data displays are formatted.

Step 2 Use the **Admin** tab (Figure 1-3) to create, edit, or delete NAM Traffic Analyzer accounts. You must have the required permissions to perform these tasks.

For more information, see Chapter 2, "User and System Administration."

Figure 1-3 Admin Tab



These options are available from the Admin tab.

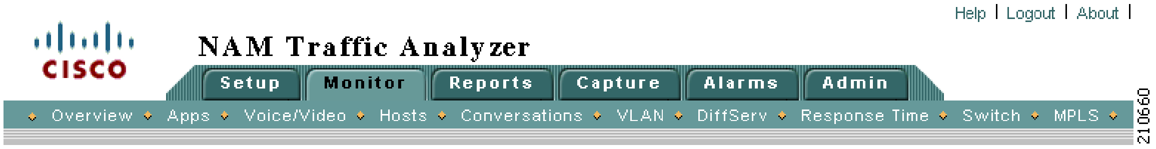
- Users—To add, delete, and edit NAM Traffic Analyzer users and TACACS+ authentication and authorization.
- System—To establish system and network parameters and NAM community string settings.
- Diagnostics—To generate information used for troubleshooting NAM problems.

Step 3 Use the Monitor tab(Figure 1-4), Reports tab(Figure 1-5), Capture tab(Figure 1-6), and Alarms tab(Figure 1-7) in any sequence to set up real-time data displays, capture data using specific criteria, and configure notifications.

Monitor Tab

The Monitor tab provides tools for configuring specific monitoring collections on the NAM except for capture buffers and alarms. Examples include conversation collections, protocol collections, and voice collections. For more information, see Chapter 4, "Monitoring Data."

Figure 1-4 Monitor Tab



These options are available from the Monitor tab.

- Overview—To see several types of statistics, including most active applications, most active hosts, protocol suites, and server response times.
- Apps—To see the distribution of packets and bytes based on the application protocol.
- Voice/Video—To view troubleshooting data collected from any enabled voice protocols on the NAM (including SCCP, SIP, H.323 and MGCP).
- Hosts—To view results from any active hosts collections in the RMON1 and RMON2 host tables per network host.
- Conversations—To view conversations data collected per pairs of network hosts.
- VLAN—To view VLAN data collected on the NAM based on VLAN ID or priority.

Note VLAN data is not available on NM-NAM or NME-NAM devices.

- DiffServ—To view the distribution of packets and bytes based on the Differentiated Services (DiffServ) data collected on the NAM.
- Response Time—To view client-server application response times.
- Switch—To view various data collected per switch port.

- Router—To view router interface statistics, health and NBAR.

Note NME-NAM devices have an Interface Stats option used to view various data collected per router interface.

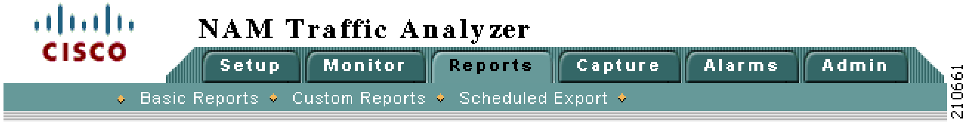
- MPLS—To view traffic statistics per MPLS tag.

Note MPLS data is not available on NM-NAM or NME-NAM devices.

Reports Tab

Use the **Reports** function (Figure 1-5) to store and retrieve short- and medium-term historical data about the network traffic monitored by the NAM. For more information, see Chapter 5, "Creating and Viewing Reports."

Figure 1-5 Reports Tab



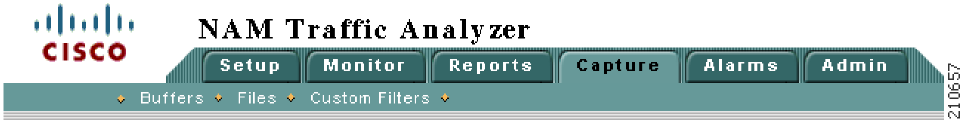
These options are available from the Reports tab:

- Basic Reports—To set up and view reports
- Custom Reports—To set up and view multiple basic reports
- Scheduled Export—To set up a report to be generated and exported automatically

Capture Tab

The Capture tab (Figure 1-6) provides windows to set up and display capture buffer data. For more information, see Chapter 6, "Capturing and Decoding Packet Data."

Figure 1-6 Capture Tab



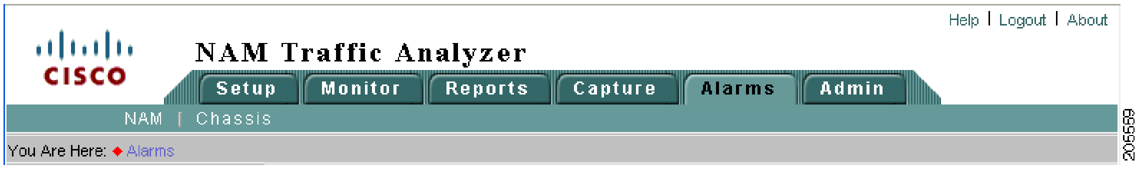
These options are available from the Capture tab:

- Buffers—Set up and manage capture buffers (including capture filters); start and stop captures; view and decode captured packets.
- Files—Save packets in capture buffers to files; decode and download files.
- Custom Filters—Customized capture and display filters.

Alarms Tab

The Alarms tab (Figure 1-7) provides mechanisms for displaying alarms generated from thresholds established in the Setup tab. For more information, see Chapter 7, "Viewing Alarms."

Figure 1-7 Alarms Tab



These options are available from the Alarms tab:

- NAM—To display all threshold events for NAM MIB thresholds and NAM voice-monitoring thresholds.
- Chassis—To display the RMON logTable from the switch mini-RMON MIB.

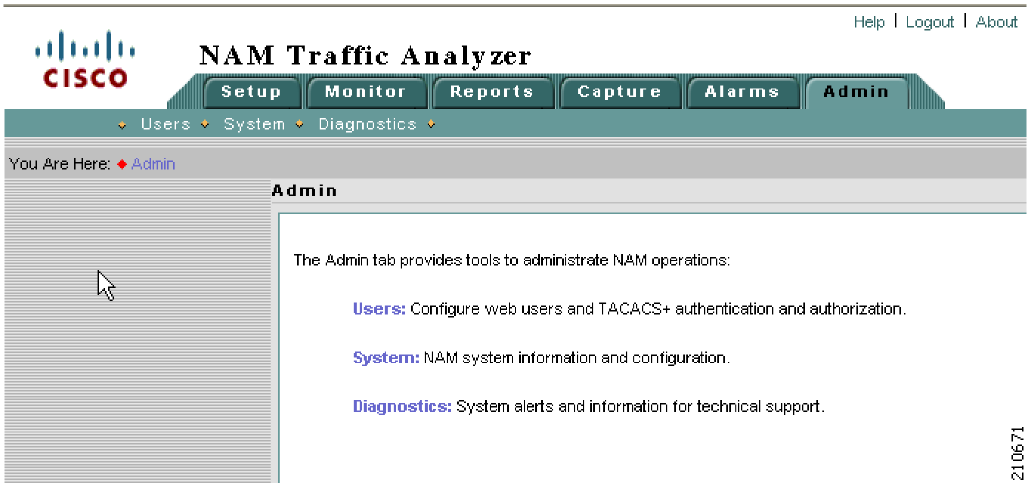
Note The Chassis option is not available on NM-NAM or NME-NAM devices.

CHAPTER 2

User and System Administration

This chapter provides information about performing user and system administration tasks and generating diagnostic information for obtaining technical assistance. The top-level Admin window displays after you click the **Admin** tab on the NAM GUI. Figure 2-1 shows the top-level Admin window.

Figure 2-1 Top-Level Admin Window



The Admin tab provides tools to administrate NAM operations:

Users: Configure web users and TACACS+ authentication and authorization.

System: NAM system information and configuration.

Diagnostics: System alerts and information for technical support.

This chapter has the following major sections:

- User Administration, page 2-1, describes how you configure either a local database or provide information for a TACACS+ database for user authentication and authorization. This section also describes the current user session window.
- System Administration, page 2-9, describes menu options that enable you to perform system administrative tasks and manage the NAM.
- Diagnostics, page 2-22, describes menu options that help you diagnose and troubleshoot problems.

User Administration

When you first install the NAM Traffic Analyzer, you use the NAM command-line interface (CLI) to enable the HTTP server and establish a username and password to access the NAM for the first time.

After setting up the initial user accounts, you can create additional accounts, enabling or disabling different levels of access independently for each user. You do this by assigning privileges that correspond to tasks each user can perform, such as configuring RMON collections, configuring system parameters, viewing RMON data, and so on.

Table 2-1 provides information about User Privileges and describes each privilege.

Table 2-1 User Privileges

Privilege	Access Level
Account Mgmt	Enables a user to create, delete, and edit user accounts.
System Config	Enables a user to edit basic NAM system parameters such as IP address, gateway, HTTP port, and so on.
Capture	Enables a user to perform packet captures and manage capture buffers Use the NAM Traffic Analyzer protocol decode.
Alarm Config	Enables a user to create, delete, and edit alarms on the switch/router and NAM.
Collection Config	Enables a user to create, delete, and edit the following: • Collections and reports • Protocol directory entries • Protocol groups • URL-based applications
Collection View	Enables a user to view monitoring data and reports (granted to all users).

For additional information about creating and editing users, see Creating a New User, page 2-4 and Editing a User, page 2-5.

Recovering Passwords

You can recover passwords by using CLI commands on the switch or router. A user with appropriate privileges can reset the NAM CLI and passwords to the factory default state.

For information on resetting the NAM passwords on 6500 Series NAMs, see *Catalyst 6500 Series Switch and Cisco 7600 Series Internet Router Network Analysis Module Installation and Configuration Note:*

> http://www.cisco.com/en/US/docs/net_mgmt/network_analysis_module_software/4.0/switch/configuration/guide/swconfig.html

For information on resetting the NAM passwords on NM-NAM devices, see the *Network Analysis Module (NM-NAM)* feature module.

> http://www.cisco.com/en/US/docs/ios/12_3/12_3x/12_3xd/feature/guide/nm_nam.html#wp1060820

For information on resetting the NAM passwords on NME-NAM devices, see the *Network Analysis Module (NME-NAM) Installation and Configuration Note.*

> http://www.cisco.com/en/US/docs/net_mgmt/network_analysis_module_software/4.0/branch_router/configuration/guide/BR_incfg.html#wp1314123

For information on resetting the NAM passwords on a Cisco NAM 2200 Series Appliance, see the *Installation and Configuration Guide for the NAM 2204 Appliance* or the *Installation and Configuration Guide for the NAM 2220 Appliance*

http://www.cisco.com/en/US/docs/net_mgmt/network_analysis_module_appliance/2204/installation/guide/instcfg.html

http://www.cisco.com/en/US/docs/net_mgmt/network_analysis_module_appliance/2220/installation/guide/instcfg.html

If you have forgotten NAM Traffic Analyzer administrator password, you can recover it using one of these methods:

- If other users have account management permission, delete the user for whom you have forgotten the password; then create a new one by logging in as that other user by clicking the Admin tab, then clicking **Users**.
- If no other local users are configured other than the user for whom you have forgotten the password, use the NAM **rmwebusers** CLI command; then enable http or https to prompt for the creation of a NAM Traffic Analyzer user.

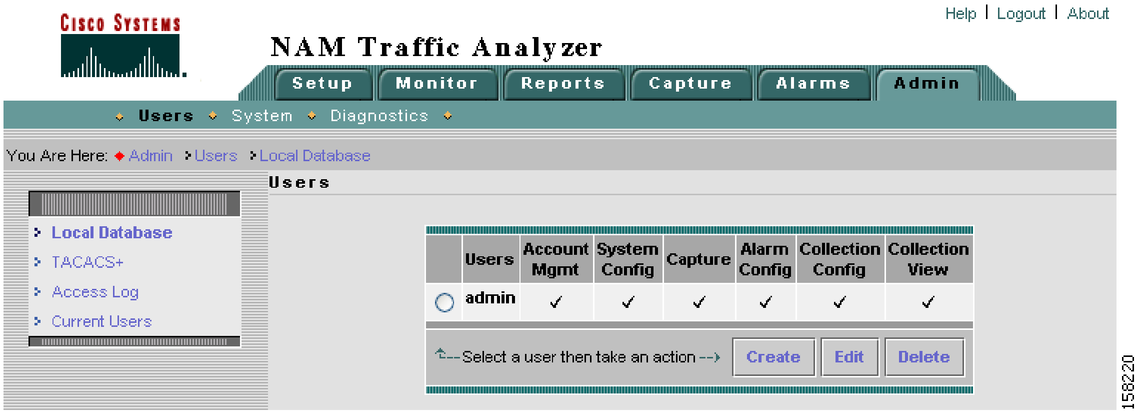
Changing Predefined NAM User Accounts on the Switch or Router

The predefined root and guest NAM user accounts (accessible through either a switch or router **session** command or a Telnet login to the NAM CLI) are static and independent of the NAM Traffic Analyzer. You cannot change these static accounts nor can you add other CLI-based users with the NAM Traffic Analyzer.

User Administration GUI

The User Administration GUI enables you to manage users. Figure 2-2 shows the top-level User Admin GUI window.

Figure 2-2 User Admin GUI



	Users	Account Mgmt	System Config	Capture	Alarm Config	Collection Config	Collection View
○	admin	✓	✓	✓	✓	✓	✓

↑--Select a user then take an action -->

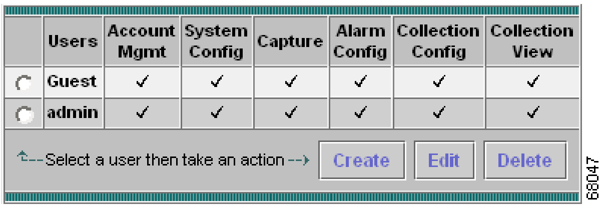
Creating a New User

To create a new user:

Step 1 Choose **Admin** > **Users**.

The GUI displays the users in the local database, as shown in Figure 2-3. Checks indicate the privileges each user has for the functions listed.

Figure 2-3 Users Table

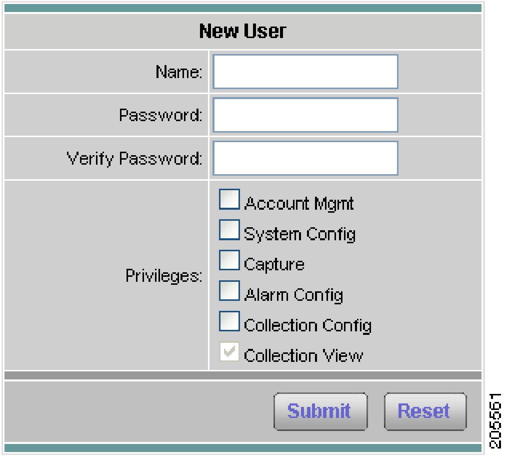


	Users	Account Mgmt	System Config	Capture	Alarm Config	Collection Config	Collection View
○	Guest	✓	✓	✓	✓	✓	✓
○	admin	✓	✓	✓	✓	✓	✓

Step 2 Click **Create**.

The GUI displays the New User Dialog Box (Figure 2-4).

Figure 2-4 New User Dialog Box



New User

Name:

Password:

Verify Password:

Privileges:
- □ Account Mgmt
- □ System Config
- □ Capture
- □ Alarm Config
- □ Collection Config
- ☑ Collection View

Step 3 Enter the information required to create new user and select each privilege to grant to the user. See Table 2-1 for an explanation of user privileges. Table 2-2 describes the fields in the New User Dialog Box.

Table 2-2 New User Dialog Box

Field	Description	Usage Notes
Name	The account name	Enter the user's account name.
Password Verify Password	The account password	Enter a password that adheres to your site security policies.
Privileges	Privileges associated with this account	Select each privilege to grant to the user.

Usernames and passwords cannot exceed 32 characters, can be alphanumeric, and can contain special characters except the following:

- Greater than (<)
- Less than (>)
- Comma (,)
- Period (.)
- Double quote (")
- Single quote (')

Step 4 Click **Submit** to create the user or **Reset** to clear the dialog of any characters you entered.

Editing a User

To edit a user's configuration:

Step 1 Choose **Admin** > **Users**.

The Users table displays.

Step 2 Select the username.

Step 3 Click **Edit**.

Step 4 In the Modify Users dialog box, change whatever information is necessary. See the New User Dialog Box (Figure 2-4) for a description of each field.

Click **Submit** to save your changes, or click **Reset** to clear the dialog of any characters you entered and restore the previous settings.

Deleting a User

To delete a user:

Step 1 Choose the **Admin** > **Users**.

The Users table displays.

Step 2 Select the username.

Step 3 Click **Delete**.

Note If you delete user accounts while users are logged in, they remain logged in and retain their privileges. The session remains in effect until they log out. Deleting an account or changing permissions in mid-session affects only future sessions. To force off a user who is logged in, restart the NAM.

Establishing TACACS+ Authentication and Authorization

Terminal Access Controller Access Control System (TACACS) is an authentication protocol that provides remote access authentication, authorization, and related services such as event logging. With TACACS, user passwords and privileges are administered in a central database instead of an individual switch or router to provide scalability.

TACACS+ is a Cisco Systems enhancement that provides additional support for authentication and authorization.

When a user logs into the NAM Traffic Analyzer, TACACS+ determines if the username and password are valid and what the access privileges are.

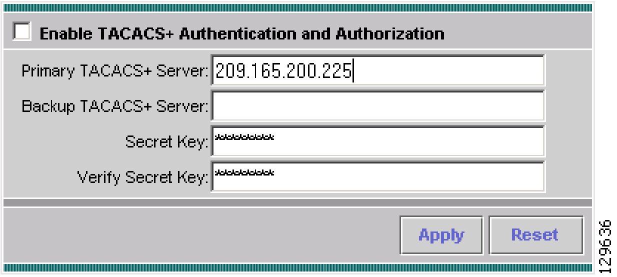
To establish TACACS+ authentication and authorization:

Step 1 Choose **Admin** > **Users**.

Step 2 In the content menu, click **TACACS+**.

The TACACS+ Authentication and Authorization Dialog Box (Figure 2-5) displays.

Figure 2-5 TACACS+ Authentication and Authorization Dialog Box



☐ Enable TACACS+ Authentication and Authorization

Primary TACACS+ Server: 209.165.200.225

Backup TACACS+ Server:

Secret Key: ********

Verify Secret Key: ********

Step 3 Enter or select the appropriate information in the TACACS+ Authentication and Authorization Dialog Box (Table 2-3).

Table 2-3 TACACS+ Authentication and Authorization Dialog Box

Field	Usage Notes
Enable TACACS+ Authentication and Authorization	Determines whether TACACS+ authentication and authorization is enabled. • To enable, select the check box. • To disable, clear the check box.
Primary TACACS+ Server	Enter the IP address of the primary server.
Backup TACACS+ Server	Enter the IP address of the backup server (optional). **Note** If the primary server does not respond after 30 seconds, the backup server will be contacted.
Secret Key	Enter the TACACS+ password.
Verify Secret Key	Reenter the TACACS+ password.

Step 4 Do one of the following:

- To save the changes, click **Apply**.
- To cancel, click **Reset**.

Tip If you cannot log into the NAM Traffic Analyzer with TACACS+ configured, verify that you entered the correct TACACS+ server name and secret key. For more information, see the "Username and Password Issues" section on page A-2.

Configuring a TACACS+ Server to Support NAM Authentication and Authorization

In addition to enabling the TACACS+ option from the Admin tab, you must configure your TACACS+ server so that it can authenticate and authorize NAM Traffic Analyzer users.

Note Configuration methods vary depending on the type of TACACS+ server you use.

Configuring a Cisco ACS TACACS+ Server

For Windows NT and 2000 Systems

To configure a Cisco ACS TACACS+ server:

Step 1 Log into the ACS server.

Step 2 Click **Network Configuration**.

Step 3 Click **Add Entry**.

Step 4 For the Network Access Server, enter the NAM hostname and IP address.

Step 5 Enter the secret key.

Note The secret key must be the same as the one configured on the NAM.

Step 6 In the Authenticate Using field, select **TACACS+**.

Step 7 Click **Submit/Restart**.

Adding a NAM User or User Group

To add a NAM user or user group:

Step 1 Click **User Setup**.

Step 2 Enter the user login name.

Step 3 Click **Add/Edit**.

Step 4 Enter the user data.

Step 5 Select **User Setup**.

Step 6 Enter a user password.

Step 7 If necessary, assign a user group.

Step 8 In the TACACS+ settings:

a. Select **Shell**.

b. Select **IOS Command**.

c. Select **Permit**.

d. Select **Command**.

e. Enter **web**.

f. In the Arguments field, enter:

```
permit capture
permit system
permit collection
permit account
permit alarm
permit view
```

Step 9 In Unlisted Arguments, select **Deny**.

Configuring a Generic TACACS+ Server

To configure a generic TACACS+ server:

Step 1 Specify the NAM IP address as a Remote Access Server.

Step 2 Configure a secret key for the TACACS+ server to communicate with the NAM.

Note The secret key must be the same as the one configured on the NAM.

Step 3 For each user or group to be allowed access to the NAM, configure the following TACACS+ parameters:

Parameter	Enter
service	**shell**
cmd	**web**
cmd-arg	One or more the following: **accountmgmt** **system** **capture** **alarm** **collection** **view**
password authentication method—Password Authentication Protocol (PAP)	**pap**

Viewing the Current User Sessions Table

The Current User Sessions table is a record of the users who are logged into the application. The user session times out after 30 minutes of inactivity. After a user session times out, that row is removed from the table.

To view the current user sessions table:

Step 1 Choose **Admin** > **Users**.

Step 2 In the contents, click **Current Users**.

The Current User Sessions Table (Table 2-4) displays.

Table 2-4 Current User Sessions Table

Field	Description
User ID	The user ID used to log in to the NAM.
From	The name of the machine the user logged in from.
Login Time	The time the user logged in.
Last Activity	The time stamp of the last user activity.

System Administration

The System option of the Admin tab provides access to the following functions:

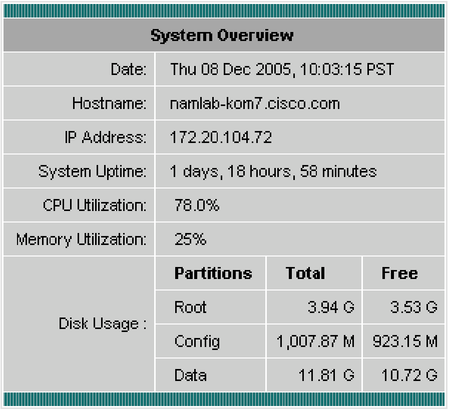
- System Resources, page 2-10
- Setting and Viewing Network Parameters, page 2-11

- Setting and Viewing the NAM SNMP System Group, page 2-12
- NAM System Time, page 2-14
- E-Mail Configuration, page 2-15
- FTP Configuration, page 2-16
- Capture Data Storage, page 2-17
- Web Publication, page 2-21
- Response Time Export, page 2-22

System Resources

Choose **Admin** > **System** to view the System Overview window as shown in Figure 2-6.

Figure 2-6 System Overview Window



System Overview

Date:	Thu 08 Dec 2005, 10:03:15 PST
Hostname:	namlab-kom7.cisco.com
IP Address:	172.20.104.72
System Uptime:	1 days, 18 hours, 58 minutes
CPU Utilization:	78.0%
Memory Utilization:	25%

Disk Usage :

Partitions	Total	Free
Root	3.94 G	3.53 G
Config	1,007.87 M	923.15 M
Data	11.81 G	10.72 G

Table 2-5 describes the fields of the System Overview window.

Table 2-5 System Overview

Field	Description
Date	Current date and time synchronized with the switch, router, or NTP server.
Hostname	NAM hostname.
IP Address	NAM IP address.
System Uptime	Length of time the host has been running uninterrupted.
CPU Utilization	Percentage of CPU resources being consumed by the NAM.
Memory Utilization	Percentage of memory resources being consumed by the NAM.
Disk Usage	Shows disk partitions with their total and free space.

Setting and Viewing Network Parameters

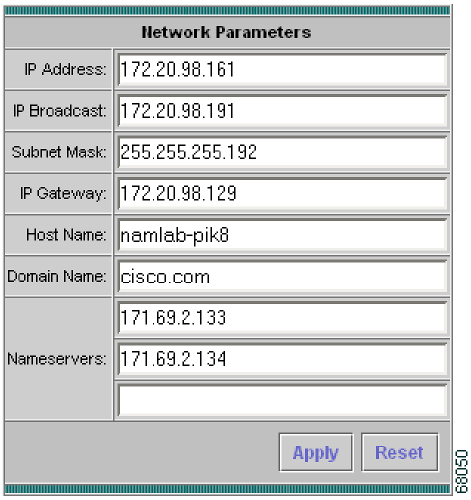
To view and set network parameters:

Step 1 Choose **Admin** > **System**.

Step 2 In the contents, click **Network Parameters**.

The Network Parameters Dialog Box (Figure 2-7) displays.

Figure 2-7 Network Parameters Dialog Box



Network Parameters

IP Address:	172.20.98.161
IP Broadcast:	172.20.98.191
Subnet Mask:	255.255.255.192
IP Gateway:	172.20.98.129
Host Name:	namlab-pik8
Domain Name:	cisco.com
Nameservers:	171.69.2.133 171.69.2.134

Step 3 Enter or change the information in the Network Parameters Dialog Box (Table 2-6):

Note NAM 4.0 does not support using IPv6 for the network parameter IP address.

Table 2-6 Network Parameters Dialog Box

Field	Description
IP Address	NAM IP address.
IP Broadcast	NAM broadcast address.
Subnet Mask	NAM subnet mask.
IP Gateway	NAM IP gateway address.
Host Name	NAM host name.
Domain name	NAM domain name.
Nameservers	NAM nameserver address or addresses.

Step 4 Do one of the following:

- To save the changes, click **Apply**.
- To cancel the changes, click **Reset**.

Setting and Viewing the NAM SNMP System Group

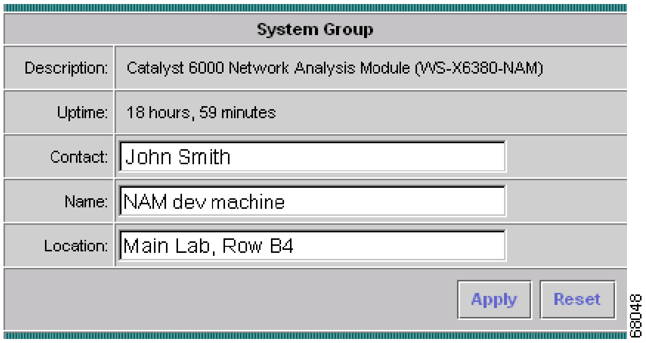
To view and set the NAM SNMP system group:

Step 1 Choose **Admin** > **System**.

Step 2 In the contents, click **NAM SNMP**.

At the top of the window, the SNMP System Group Dialog Box (Figure 2-8) and NAM Community Strings Dialog Box (Figure 2-9) are displays.

Figure 2-8 SNMP System Group Dialog Box



System Group

Description: Catalyst 6000 Network Analysis Module (WS-X6380-NAM)

Uptime: 18 hours, 59 minutes

Contact: John Smith

Name: NAM dev machine

Location: Main Lab, Row B4

Step 3 Enter or change the information in the System SNMP Dialog Box (Table 2-7).

Table 2-7 System SNMP Dialog Box

Field	Description
Contact	The name of the person responsible for the NAM.
Name	The name of the NAM.
Location	The physical location of the switch or router in which the NAM is installed.

Step 4 Do one of the following:

- To save the changes, click **Apply**.
- To cancel the changes, click **Reset**.

Working with NAM Community Strings

You use community strings so that other applications can send SNMP get and set requests to the NAM, set up collections, poll data, and so on.

Creating NAM Community Strings

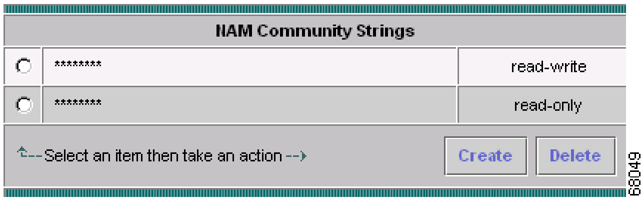
To create the NAM community strings:

Step 1 Choose **Admin** > **System**.

Step 2 In the contents, click **NAM SNMP**.

At the bottom of the window, the NAM Community Strings Dialog Box displays (Figure 2-9).

Figure 2-9 NAM Community Strings Dialog Box



NAM Community Strings

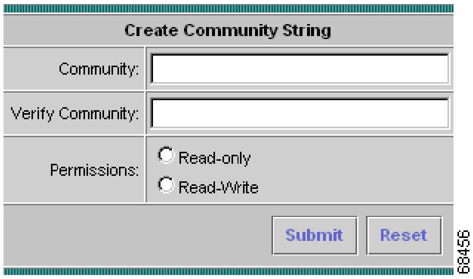
○	********	read-write
○	********	read-only

↰--Select an item then take an action -->

Step 3 Select an entry, then click **Create**.

The Create Community String Dialog Box (Figure 2-10) displays.

Figure 2-10 Create Community String Dialog Box



Create Community String

Community:

Verify Community:

Permissions: ○ Read-only ○ Read-Write

Step 4 Enter the community string (use a meaningful name).

Step 5 Enter the community string again in the Verify Community field.

Step 6 Assign read-only or read-write permissions using the following criteria:

- Read-only allows only read access to SNMP MIB variables (get).
- Read-write allows full read and write access to SNMP MIB variables (get and set).

Step 7 Do one of the following:

- To make the changes, click **Submit**.
- To cancel, click **Reset**.

Deleting NAM Community Strings

To delete the NAM community strings:

Step 1 Choose **Admin** > **System**.

Step 2 In the contents, click **NAM SNMP**.

At the bottom of the window, the NAM Community Strings Dialog Box (Figure 2-9) displays.

Step 3 Select an entry, then click **Delete**.

Caution Deleting the NAM community strings blocks SNMP requests to the NAM from outside SNMP agents.

The community string is deleted.

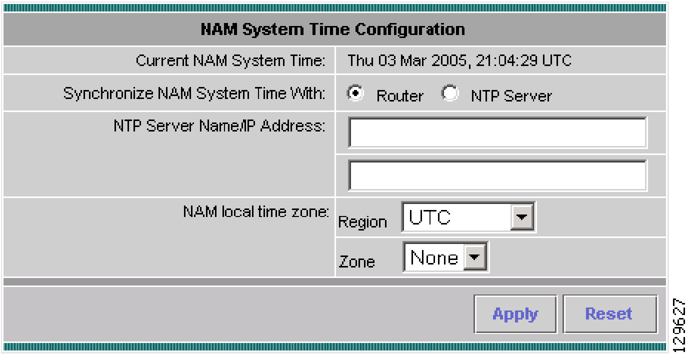
NAM System Time

The NAM gets the UTC (GMT) time from one of two sources—the switch, router, or an NTP server. You can configure the NAM system time by using one of the following methods:

- Synchronizing the NAM System Time with the Switch or Router, page 2-14
- Configuring the NAM System Time with an NTP Server, page 2-15

After the NAM system time has been configured, you can set the local time zone using the NAM System Time configuration screen. Figure 2-11 shows the NAM System Time Configuration Screen.

Figure 2-11 NAM System Time Configuration Screen



NAM System Time Configuration

Current NAM System Time: Thu 03 Mar 2005, 21:04:29 UTC

Synchronize NAM System Time With: ● Router ○ NTP Server

NTP Server Name/IP Address:

NAM local time zone: Region UTC

Zone None

Synchronizing the NAM System Time with the Switch or Router

Step 1 Click the Switch or Router radio button.

Step 2 Select the Region and local time zone from the lists.

Step 3 Do one of the following:

- To save the changes click **Apply**.
- To leave the configuration unchanged, click **Reset**.

Configuring the NAM System Time with an NTP Server

To configure the NAM system time with an NTP server:

Step 1 Click the NTP Server radio button.

Step 2 Enter up to two NTP server names or IP address in the NTP server name/IP Address text boxes.

Step 3 Select the Region and local time zone from the lists.

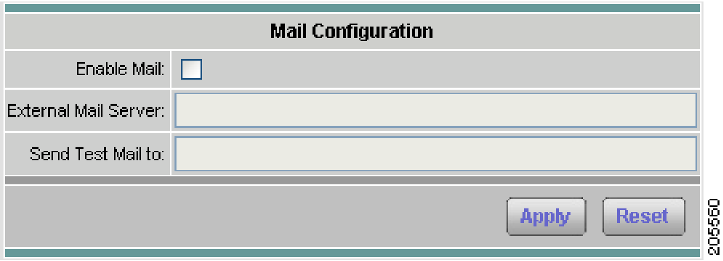
Step 4 Do one of the following:

- To save the changes click **Apply**.
- To leave the configuration unchanged, click **Reset**.

E-Mail Configuration

You can configure the NAM to provide E-Mail notification of alarms and to E-Mail reports. Figure 2-12 shows the Mail Configuration Window. For information about how to configure a report to send using E-Mail, see Table 5-18, Scheduled Exports Window Options, in section Scheduled Exports, page 5-27.

Figure 2-12 Mail Configuration Window



The following procedure describes how to configure the NAM for E-Mail notifications.

Step 1 Choose **Admin** > **System**.

Step 2 Click **E-Mail Configuration**.

The Mail Configuration Window (Figure 2-12) displays. Table 2-8 describes the Mail Configuration Options.

Table 2-8 Mail Configuration Options

Field	Description
Enable Mail	Enables E-Mail of reports and notification of alarms
External Mail Server	Distinguished name of external mail server
Send Test Mail	List E-Mail addresses for up to three E-Mail recipients

Step 3 Check **Enable EMail**.

Step 4 Enter the distinguished name of the **External Mail Server**.

Step 5 Click **Apply** to save your modifications, or click **Reset** to clear the dialog of any characters you entered or restore the previous settings.

FTP Configuration

You can configure the NAM to provide FTP notification of alarms and to EMail reports. Figure 2-13 shows the FTP Configuration Window. For information about how to configure a report to be transferred using FTP, see Table 5-18, Scheduled Exports Window Options, in section Scheduled Exports, page 5-27.

Figure 2-13 FTP Configuration Window

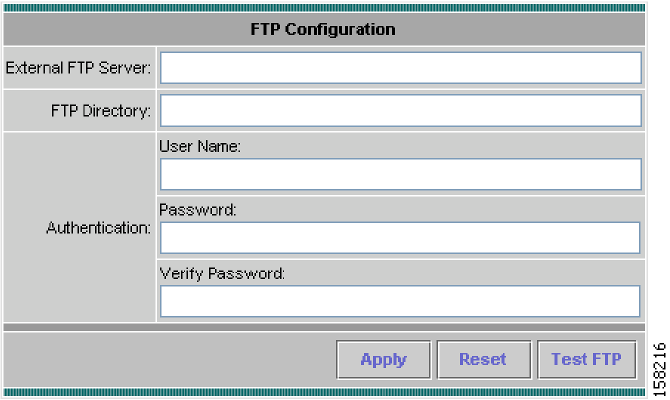


Table 2-9 describes the fields used for FTP configuration.

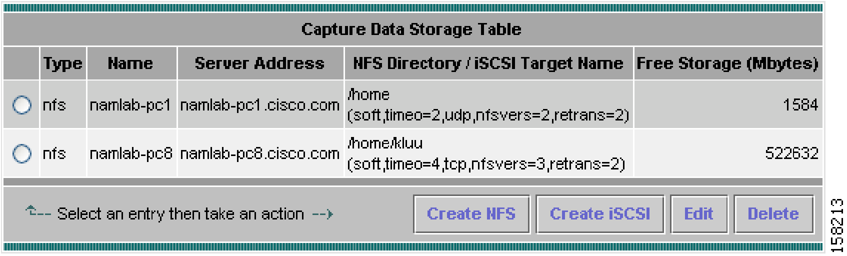
Table 2-9 FTP Configuration Options

Field	Description
External FTP Server	Host name or IP address of FTP server
FTP Directory	Full directory pathname of location to store FTP files
Authentication	User name and password fields used to for authentication with external FTP server.

Capture Data Storage

Use the Capture Data Storage option to set up remote file systems to store capture data. You must set up the capture data storage locations prior to setting up data captures. Choose **Admin** > **Capture Data Storage** to open the Capture Data Storage window(shown in Figure 2-14).

Figure 2-14 Capture Data Storage Window



Capture Data Storage Table

	Type	Name	Server Address	NFS Directory / iSCSI Target Name	Free Storage (Mbytes)
○	nfs	namlab-pc1	namlab-pc1.cisco.com	/home (soft,timeo=2,udp,nfsvers=2,retrans=2)	1584
○	nfs	namlab-pc8	namlab-pc8.cisco.com	/home/kluu (soft,timeo=4,tcp,nfsvers=3,retrans=2)	522632

This section provides the following:

- Creating NFS Storage Locations, page 2-17
- Editing NFS Storage Locations, page 2-19
- Creating iSCSI Storage Locations, page 2-19
- Editing iSCSI Storage Locations, page 2-20

Creating NFS Storage Locations

The NFS server must be configured properly to allow NAM to write data to it. The NAM accesses the NFS directories with UID=80 (www) and UID=0 (root). The NFS directories must be fully accessible by these UIDs.

One way to do this is to use the NFS option *all_squash* to map these UIDs to `anonuid=<userID>`, where < userID> is a local user ID with full access rights to the NFS directories.

Configuring the NFS Server

The following example shows how to set up an NFS directory (**/home/SomeUserName**) in a Linux server for a NAM (at IP address 1.1.1.2) to store capture data. To setup an NFS server directory to store capture data:

Step 1 Locate a UID that has read and write access to the target NFS directory.

For example, if the target NFS directory is **/home/SomeUserName**, open the **/etc/password** file and search for a user entry that contains something like the following:

```
SomeUserName:x:503:503::/home/SomeUserName:/bin/tcsh
```

In this example, the UID is 503.

Step 2 Edit the **/etc/exports** file and add a line like the following:

```
/home/SomeUserName   1.1.1.2/255.255.255.255(rw,all_squash,anonuid=503)
```

Step 3 Activate the change:

```
/usr/bin/exportfs -a
```

Note If the NFS directory contains subdirectories that are not writable by the NAM, these subdirectories will not be listed in NAM capture screens.

Configuring the NFS Storage Location on the NAM

The following procedure describes how to create an NFS storage location by specifying a remote file system partition.

Step 1 Choose **Admin** > **Capture Data Storage**.

The Capture Data Storage window (Figure 2-14) displays and lists any capture data storage locations already configured.

Step 2 Click **Create NFS**.

Step 3 Enter the requested parameters in the New NFS Storage window.

Table 2-10 describes the NFS Storage location parameters.

Table 2-10 NFS Storage Location Parameters

Field	Description
Name	Name of the remote file system entry
Server	DNS name of the remote file system entry
Directory	Pathname of the remote file system partition
Basic NFS Options	Each fields shows a default value. If you need to use values other than those available in the menus, use Advanced NFS Options.
Protocol	Choose TCP or UDP
Timeout	You can set the timeout to a value from 0.1 seconds to 1.0 seconds
NFS Version	Choose from NFS versions 1-4
Retries	Choose from 1-5 retries
Advanced NFS Options	This field contains the default values for creating an NFS storage location. You can edit the text to use NFS options that are outside the ranges in the pull-down menus of the Basic NFS Options.

Step 4 Click **Submit** to create the NFS storage location. Otherwise click **Reset** to remove your entries or **Cancel** to cancel the change.

Editing NFS Storage Locations

The following procedure describes how to edit an existing NFS storage location.

Note If you have set up capture sessions that use the NFS file system entry you want to edit (or modify), you must delete those capture sessions before editing the NFS file system entry. You can find active capture buffers by clicking **Capture > Buffers**, then choose each capture that is *running* and click **Status**. If the capture is using the filesystem to be edited, click **Clear**.

Step 1 Choose **Admin** > **Capture Data Storage**.

The Capture Data Storage window (Figure 2-14) displays and lists any capture data storage locations already configured.

Step 2 Click to select the NFS storage location you want to modify and click **Edit**.

The Edit Remote Storage Entry window displays the parameters of the select NFS storage location.

Step 3 Modify the parameters as desired.

Table 2-10 describes the NFS Storage location parameters.

Step 4 Click **Submit** to change the parameters of the NFS storage location. Otherwise click **Reset** to remove all of the entries, or click **Cancel** to cancel the change.

Creating iSCSI Storage Locations

The following procedure describes how to create an iSCSI storage location for storing NAM capture data.

Step 1 Choose **Admin** > **Capture Data Storage**.

The Capture Data Storage window (Figure 2-14) displays and lists any capture data storage locations already configured.

Step 2 Click **Create iSCSI**.

Step 3 Enter the requested parameters in the New iSCSI Storage window.

Table 2-11 describes the iSCSI Storage location parameters.

Table 2-11 iSCSI Storage Location Parameters

Field	Description
Name	Name of the remote storage entry
Server	DNS host name or IP address of the iSCSI server.

Table 2-11 iSCSI Storage Location Parameters

Field	Description
Target Name	iSCSI target name configured on the remote iSCSI server
Format Disk:	Check **Format a new partition** to cause the NAM to format the iSCSI target into a single Linux partition. Check **Use existing partition#** when the remote iSCSI target disk has already been formatted and has a partition table.

Step 4 Click **Submit** to create the iSCSI storage location. Otherwise click **Reset** to remove your entries or **Cancel** to cancel the change.

Note Before the new iSCSI storage entry takes effect, you must reboot the NAM system.

Editing iSCSI Storage Locations

The following procedure describes how to edit an existing NFS storage location.

Note If you have set up capture sessions that use the iSCSI file system entry you want to edit (or modify), you must delete those capture sessions before editing the iSCSI file system entry. You can find active capture buffers by clicking **Capture > Buffers**, then choose each capture the is *running* and click **Status**. If the capture is using the filesystem to be edited, click **Clear**.

Step 1 Choose **Admin** > **Capture Data Storage**.

The Capture Data Storage window (Figure 2-14) displays and lists any capture data storage locations already configured.

Step 2 Click to select the iSCSI storage location you want to modify and click **Edit**.

The selected iSCSI storage location parameters window displays

Step 3 Modify the parameters as desired.

Table 2-11 describes the iSCSI storage location parameters.

Step 4 Click **Submit** to change the iSCSI storage location parameters. Otherwise click **Reset** to remove your entries or **Cancel** to cancel the change.

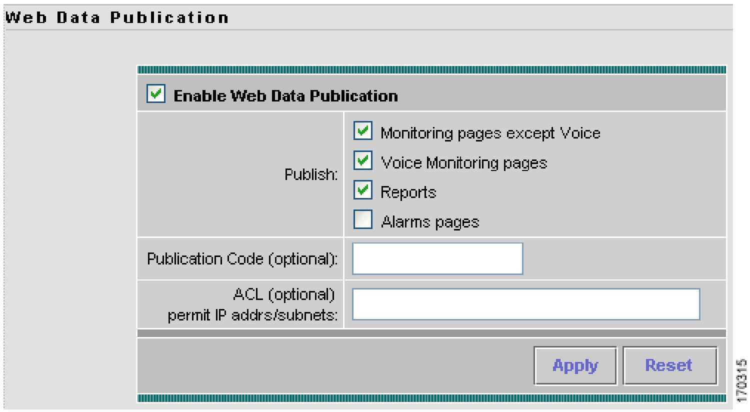
Note Before the changes to the iSCSI storage entry take effect, you must reboot the NAM system.

Web Publication

Web publication allows general web users and web sites to access (or link to) selected NAM monitor and report screens without a login session.

Web publication can be open or restricted using Access Control List (ACL) and/or publication code. The publication code, if required, must be present in the URL address or cookie to enable access to published data. Figure 2-15 shows the Web Data Publication Window.

Figure 2-15 Web Data Publication Window



Web Data Publication

☑ Enable Web Data Publication

Publish:
☑ Monitoring pages except Voice
☑ Voice Monitoring pages
☑ Reports
□ Alarms pages

Publication Code (optional):

ACL (optional) permit IP addrs/subnets:

To enable web publishing:

Step 1 Choose **Admin** > **System**.

Step 2 In the System menu, click **Web Publishing**.

Step 3 Check each item you want to make available for web publishing.

Table 2-12, Web Data Publication Properties, describes the fields of the Enable Web Publishing window.

Table 2-12 Web Data Publication Properties

Field	Description
Monitoring pages except Voice	Check to publish all Monitor screens except Voice
Voice Monitoring pages	Check to publish Voice Monitoring screens
Reports	Check to publish all reports
Alarms pages	Check to publish NAM and Switch Alarms pages
Publication Code	Pass code required in a URL's cookie to access the published page. For example, a publication code set to *abc123* could access the published **Monitor > PortStat** window: http://<nam-hostname>/monitor/sup/ether/supetherstats.php?sortCol=utilization&publicationcode=abc123
ACL permit IP addrs/subnets	No entry provides open access to all. Enter IP addresses or subnets to permit only those IP addresses or subnets access to web publications.

Step 4 Click **Apply** to enable web publishing or **Reset** to clear the dialog of any characters you entered.

Response Time Export

You can enable response time data export to an external reporting console such as NetQoS SuperAgent. This window works in conjunction with the **Setup** > **Data Sources** > **WAAS--Devices** > **Add/Config** window. After you enable Response Time Export there, the **Export Passthru to External Console** option appears on the Add/Config WAAS Device window.

To enable the NAM to export response time data to an external console:

Step 1 From the NAM GUI, choose **Admin** > **System** > **Response Time Export**.

The Export window displays.

Step 2 Enter the IP address of the external reporting console in the IP Address field.

Step 3 Optionally, enter the UDP port number of the external console.

Step 4 Click **Export** to enable the NAM to export data.

Step 5 Optionally, click **Export Non-WAAS** Traffic.

This enables the export of SPAN and other data as well as WAAS traffic.

Step 6 Click **Apply** to enable traffic export.

Diagnostics

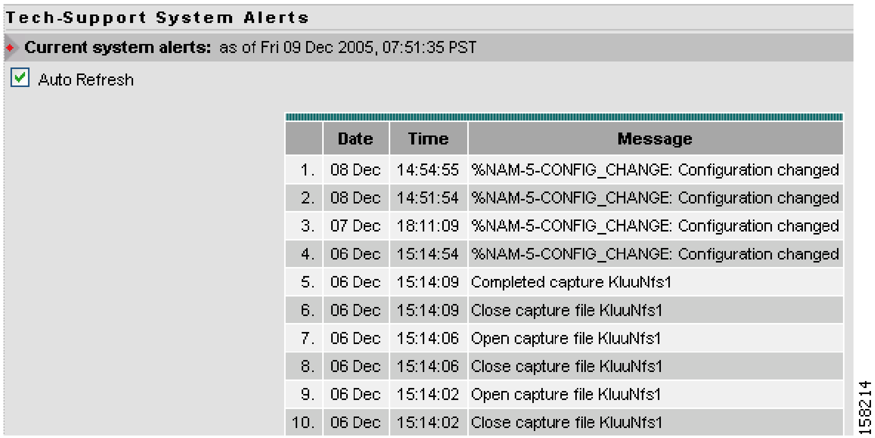
The Diagnostics option of the **Admin** tab provides tools to aid in troubleshooting. You can use these tools when you have a problem that might require assistance from the Cisco Technical Assistance Center (TAC). There are options for:

- Viewing System Alerts, page 2-22
- Viewing the Audit Trail, page 2-23
- Monitor and Capture Configuration Information, page 2-24
- Viewing Technical Support, page 2-25

Viewing System Alerts

You can view any failures or problems that the NAM Traffic Analyzer has detected during normal operations. To view System Alerts, choose **Admin** > **Diagnostics**. System Alerts is the default window. Figure 2-16 shows the System Alerts Window.

Figure 2-16 System Alerts Window



Tech-Support System Alerts

Current system alerts: as of Fri 09 Dec 2005, 07:51:35 PST

☑ Auto Refresh

	Date	Time	Message
1.	08 Dec	14:54:55	%NAM-5-CONFIG_CHANGE: Configuration changed
2.	08 Dec	14:51:54	%NAM-5-CONFIG_CHANGE: Configuration changed
3.	07 Dec	18:11:09	%NAM-5-CONFIG_CHANGE: Configuration changed
4.	06 Dec	15:14:54	%NAM-5-CONFIG_CHANGE: Configuration changed
5.	06 Dec	15:14:09	Completed capture KluuNfs1
6.	06 Dec	15:14:09	Close capture file KluuNfs1
7.	06 Dec	15:14:06	Open capture file KluuNfs1
8.	06 Dec	15:14:06	Close capture file KluuNfs1
9.	06 Dec	15:14:02	Open capture file KluuNfs1
10.	06 Dec	15:14:02	Close capture file KluuNfs1

Each alert includes a date, the time the alert occurred, and a message describing the alert. The NAM displays up to one thousand (1,000) of the most-recent alerts. If more than 1,000 alerts have occurred, you need to use the NAM CLI command **show tech support** to see all of the alerts.

If you notice an alert condition and troubleshoot and attempt to solve the condition causing the alert, you might want to click **Clear** to remove the list of alerts to see if additional alerts occur.

Viewing the Audit Trail

The Audit Trail option displays a listing of recent critical activities that have been recorded in an internal **syslog** log file. Syslog messages can also be sent to an external log.

The following user activities are logged in the audit trail:

- All CLI commands
- User logins (including failed attempts)
- Unauthorized access attempts
- SPAN changes
- NDE data source changes
- Enabling and disabling data collections
- Creating and deleting reports
- Starting and stopping captures
- Adding and deleting users

Each log entry will contain the following:

- User ID
- Time stamp
- IP address (in case of remote web access)
- Activity description

To access the audit trail window:

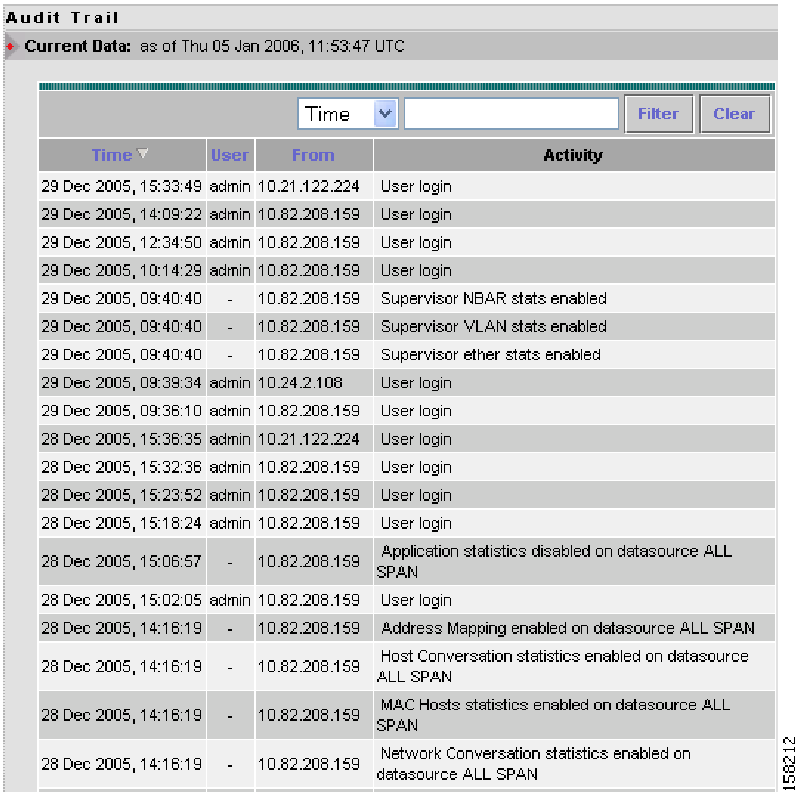
Step 1 Choose **Admin** > **Diagnostics.**

Step 2 Click **Audit Trail**.

The Audit Trail Window (Figure 2-17) displays.

The Audit Trail window provides a way to view the user access log and filter entries based on time, user, (IP address) from or activity. The internal log files are rotated after reaching certain size limit.

Figure 2-17 Audit Trail Window



Audit Trail

Current Data: as of Thu 05 Jan 2006, 11:53:47 UTC

Time ▽	User	From	Activity
29 Dec 2005, 15:33:49	admin	10.21.122.224	User login
29 Dec 2005, 14:09:22	admin	10.82.208.159	User login
29 Dec 2005, 12:34:50	admin	10.82.208.159	User login
29 Dec 2005, 10:14:29	admin	10.82.208.159	User login
29 Dec 2005, 09:40:40	-	10.82.208.159	Supervisor NBAR stats enabled
29 Dec 2005, 09:40:40	-	10.82.208.159	Supervisor VLAN stats enabled
29 Dec 2005, 09:40:40	-	10.82.208.159	Supervisor ether stats enabled
29 Dec 2005, 09:39:34	admin	10.24.2.108	User login
29 Dec 2005, 09:36:10	admin	10.82.208.159	User login
28 Dec 2005, 15:36:35	admin	10.21.122.224	User login
28 Dec 2005, 15:32:36	admin	10.82.208.159	User login
28 Dec 2005, 15:23:52	admin	10.82.208.159	User login
28 Dec 2005, 15:18:24	admin	10.82.208.159	User login
28 Dec 2005, 15:06:57	-	10.82.208.159	Application statistics disabled on datasource ALL SPAN
28 Dec 2005, 15:02:05	admin	10.82.208.159	User login
28 Dec 2005, 14:16:19	-	10.82.208.159	Address Mapping enabled on datasource ALL SPAN
28 Dec 2005, 14:16:19	-	10.82.208.159	Host Conversation statistics enabled on datasource ALL SPAN
28 Dec 2005, 14:16:19	-	10.82.208.159	MAC Hosts statistics enabled on datasource ALL SPAN
28 Dec 2005, 14:16:19	-	10.82.208.159	Network Conversation statistics enabled on datasource ALL SPAN

Monitor and Capture Configuration Information

The Monitor and Capture Configuration window contains information about NAM data collections configured by NAM Traffic Analyzer and other management applications. To view the Monitoring and Capturing Configuration information window:

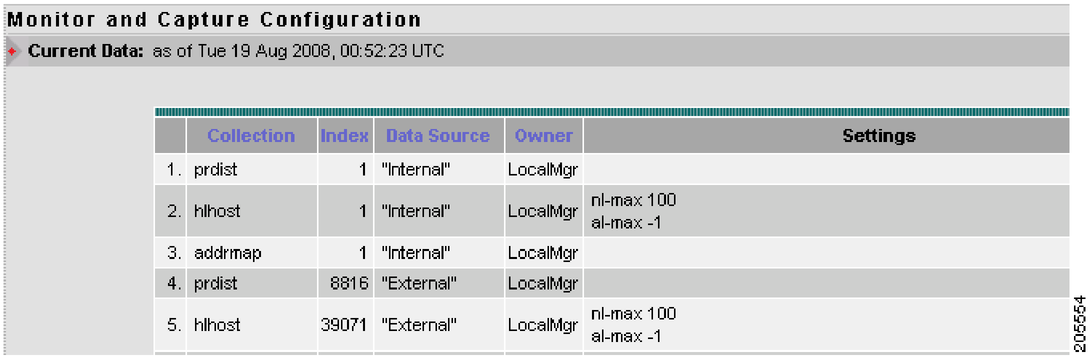
Step 1 Choose **Admin** > **Diagnostics**.

Step 2 In the contents menu, click **Monitor and Capture Configuration**.

The NAM displays the Monitor and Capture Configuration Window (Figure 2-18). Each line in the Monitor and Capture Configuration window represents an internal configuration statement for NAM collections, captures, filters, data sources, and alarms. Your configuration might have dozens of statements like these.

Note This information does not mean much to the casual user, but it is valuable when you consult with Cisco TAC personnel or when you require technical support.

Figure 2-18 Monitor and Capture Configuration Window



Monitor and Capture Configuration

Current Data: as of Tue 19 Aug 2008, 00:52:23 UTC

	Collection	Index	Data Source	Owner	Settings
1.	prdist	1	"Internal"	LocalMgr	
2.	hlhost	1	"Internal"	LocalMgr	nl-max 100 al-max -1
3.	addrmap	1	"Internal"	LocalMgr	
4.	prdist	8816	"External"	LocalMgr	
5.	hlhost	39071	"External"	LocalMgr	nl-max 100 al-max -1

Step 3 To save the information, choose **File > Save As...** from your browser menu.

Step 4 Select an output destination, filename, and format, then click **Save**.

If the name LocalMgr is displayed in the Owner column, the collection was configured by the NAM Traffic Analyzer.

Viewing Technical Support

The NAM syslog records NAM system alerts that contain event descriptions and date and timestamps, indicating unexpected or potentially noteworthy conditions. This feature generates a potentially extensive display of the results of various internal system troubleshooting commands and system logs.

This information is unlikely to be meaningful to the average user. It is intended to be used by the Cisco TAC for debugging purposes. You are not expected to understand this information; instead, you should save the information and attach it to an email message to the Cisco TAC.

Before you can view the Tech-Support page, you must enable the System Config user privilege on the **Admin** > **Users** page. For more information on editing user privileges, see the "Editing a User" section on page 2-5.

Note You can also view this information from the NAM CLI. For information on using the NAM CLI, see *Cisco Network Analysis Module Command Reference*, for NM-NAM or NME-NAM devices, the *Network Analysis Module (NM-NAM or NME-NAM)* feature module.

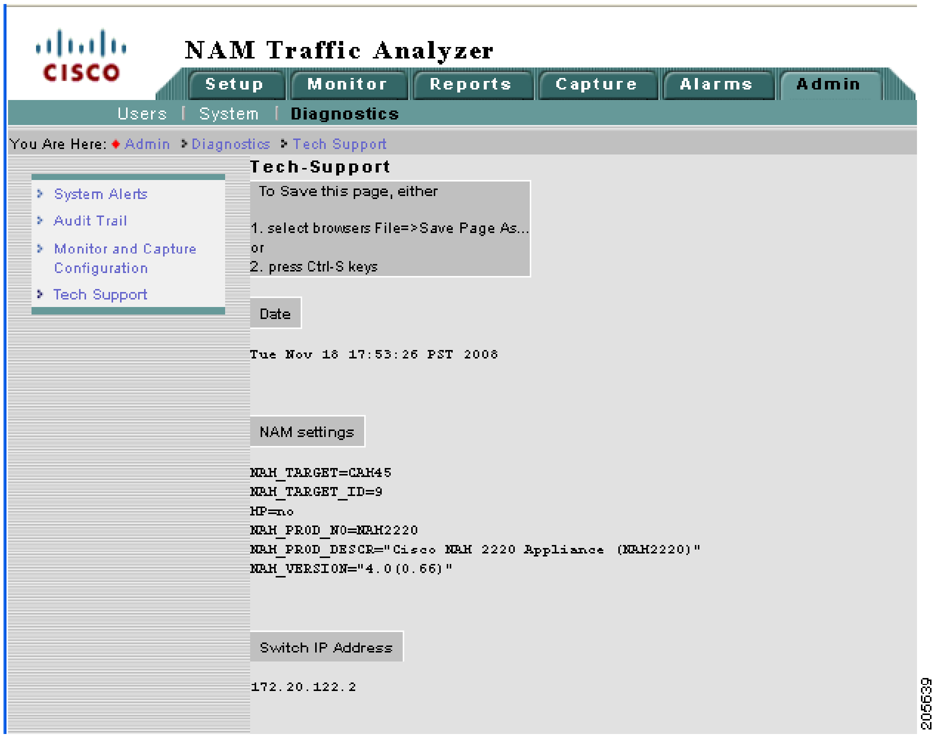
To view tech support:

Step 1 Choose **Admin** > **Diagnostics**.

Step 2 In the contents, click **Tech Support**.

After a few minutes, extensive diagnostic information is generated and displayed in the Diagnostics Tech Support Window (Figure 2-19).

Figure 2-19 Diagnostics Tech Support Window


NAM Traffic Analyzer
Setup
Monitor
Reports
Capture
Alarms
Admin
Users | System | Diagnostics
You Are Here: Admin > Diagnostics > Tech Support
System Alerts
Audit Trail
Monitor and Capture Configuration
Tech Support
205639

Tech-Support

To Save this page, either

1. select browsers File=>Save Page As...
or
2. press Ctrl-S keys

Date

```
Tue Nov 18 17:53:26 PST 2008
```

NAM settings

```
NAM_TARGET=CAM45
NAM_TARGET_ID=9
HP=no
NAM_PROD_NO=NAM2220
NAM_PROD_DESCR="Cisco NAM 2220 Appliance (NAM2220)"
NAM_VERSION="4.0(0.66)"
```

Switch IP Address

```
172.20.122.2
```

Step 3 To save the information, select **File>Save As...** from the browser menu.

If you are using Internet Explorer, you can click the **Save This Page** button at the top of the page to download the Tech-Support page as a text file.

Step 4 Select an output destination, filename, and file format, then click **Save**.

Downloading Core Files

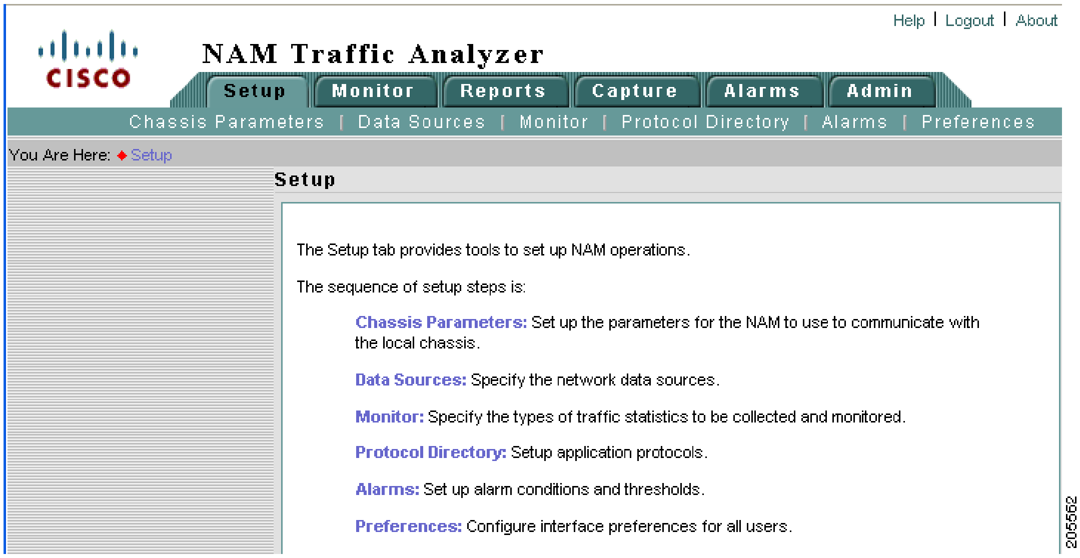
To download core files from the Tech-Support page, scroll down to the Core Files section and click on the filename.

CHAPTER 3

Setting Up the Application

Use the Setup window, Figure 3-1, to set up and configure the NAM application. Set up the NAM application in the sequence shown.

Figure 3-1 Setup Window



The Setup tab provides tools to set up NAM operations.

The sequence of setup steps is:

Chassis Parameters: Set up the parameters for the NAM to use to communicate with the local chassis.

Data Sources: Specify the network data sources.

Monitor: Specify the types of traffic statistics to be collected and monitored.

Protocol Directory: Setup application protocols.

Alarms: Set up alarm conditions and thresholds.

Preferences: Configure interface preferences for all users.

Note The Setup window does not support IPv6 except for the setting of alarm events and thresholds.

This chapter contains the following sections:

- Chassis Parameters, page 3-2
- Router Parameters, page 3-8
- Managed Device Parameters, page 3-9
- Data Sources, page 3-10
- Monitoring, page 3-47
- Protocol Directory, page 3-62
- Setting Up Alarm Events and Thresholds, page 3-74
- Setting Global Preferences, page 3-87

Chassis Parameters

From the Chassis Parameter window, you can view the switch system information, enable and disable NBAR, enable and disable port stats (mini-Rmon), and configure switch login configuration.

- Viewing the Switch Information, page 3-2
- Setting Up NBAR Protocol Discovery, page 3-3
- Enabling and Disabling Port Stats (Mini-RMON), page 3-5
- Configuring Switch Login, page 3-8

Viewing the Switch Information

Note This section applies to WS-SVC-NAM-1 and WS-SVC-NAM-2 devices only.

To view the Switch Information, Table 3-1, choose **Setup** > **Chassis Parameters**.

Table 3-1 Switch Information

Field	Description
SNMP Test information	Displays the IP address of the NAM and the switch that the SNMP test occurred on.
Name	Name of the switch.
Hardware	Hardware description of the switch.
Supervisor Software Version	Current software version of the Supervisor.
System Uptime	Total time the switch has been running.
Location	Physical location of the switch.
Contact	Contact name of the network administrator for the switch.
SNMP read from switch	SNMP read test result.
SNMP write to switch	SNMP write test result.
Mini-RMON on switch	For Catalyst OS devices, displays the status if Mini-RMON is enabled (Available) or not (Unavailable) For Cisco IOS devices, displays the status if there are any ports with Mini-RMON configured (Available) or not (Unavailable).
NBAR on switch	Displays if NBAR is available on the switch.
VLAN Traffic Statistics on Switch	Displays if VLAN data is Available or Unavailable. **Note** Catalyst 6500 Series switches require a Supervisor 2 or MSFC2 card.

Table 3-1 Switch Information (continued)

Field	Description
NetFlow Status	For Catalyst OS devices, if *remote* NetFlow is configured on the switch, Remote export to <address> on port <number> displays. If *local* NetFlow is configured on the switch, Local export to module(s) <mod number> displays. For Catalyst 6500 Series devices running Cisco IOS, if NetFlow is configured on the switch, Remote export to NAM <address> on port <number> displays, otherwise the status will display Configuration unknown.

Setting Up NBAR Protocol Discovery

Note NBAR is supported only on switches with the Catalyst 6500 Supervisor Engine 32 Programmable Intelligent Services Accelerator (PISA) running IOS 12.2(18)ZY (or later).

From the Chassis Parameter window, you can view the NBAR Status information and enable or disable NBAR on all interfaces.

To set up NBAR protocol discovery:

Step 1 Choose **Setup** > **Chassis Parameters** > **NBAR Protocol Discovery**.

Note If your switch does not support NBAR, a message displays indicating that NBAR is not supported on your switch.

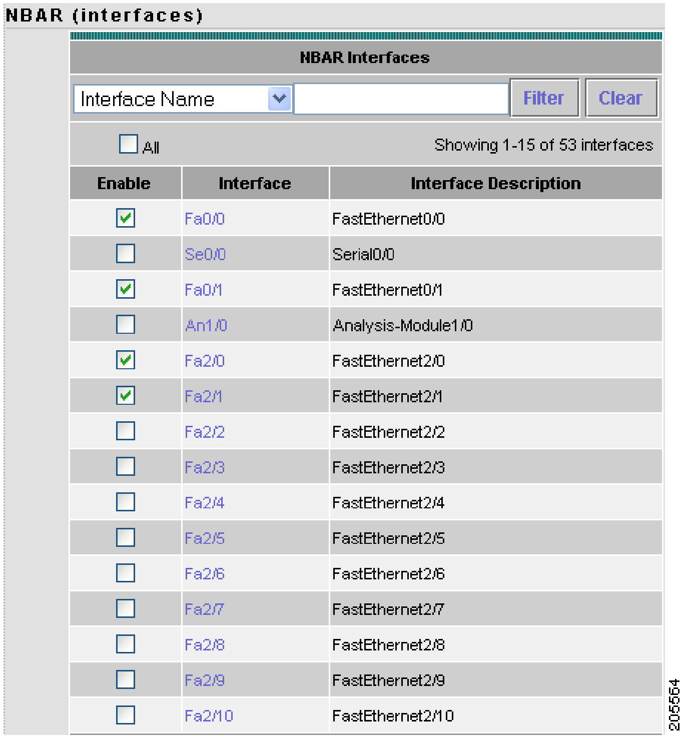
The NBAR Status window appears with the following options:

- **Details**—Click to display the NBAR Interface Details.
- **Save**—Click to save the device's running configuration.
- **Enable**—Click to enable NBAR on all available interfaces.
- **Disable**—Click to disable NBAR on all interfaces.

Note The Save button is only available on switches running Cisco IOS. Changes occur immediately on switches running Catalyst OS.

The NBAR Interfaces window displays. Figure 3-2 shows an example of the NBAR Interfaces window.

Figure 3-2 NBAR Interfaces Window



NBAR (interfaces)

NBAR Interfaces

Interface Name ▾ | Filter | Clear

□ All — Showing 1-15 of 53 interfaces

Enable	Interface	Interface Description
☑	Fa0/0	FastEthernet0/0
□	Se0/0	Serial0/0
☑	Fa0/1	FastEthernet0/1
□	An1/0	Analysis-Module1/0
☑	Fa2/0	FastEthernet2/0
☑	Fa2/1	FastEthernet2/1
□	Fa2/2	FastEthernet2/2
□	Fa2/3	FastEthernet2/3
□	Fa2/4	FastEthernet2/4
□	Fa2/5	FastEthernet2/5
□	Fa2/6	FastEthernet2/6
□	Fa2/7	FastEthernet2/7
□	Fa2/8	FastEthernet2/8
□	Fa2/9	FastEthernet2/9
□	Fa2/10	FastEthernet2/10

205564

The NBAR Interfaces window lists known interfaces by name and type. Check its check box to enable an interface.

You must enable the NBAR Interfaces feature for the NAM to provide information about ethernet ports on the **Monitor** > **NBAR** window. Select the ports you want to enable, then click **Submit** to turn on NBAR for those ports.

The **All** check box affects only the ports displayed on the current screen. Click the **All** check box to select all ports displayed on the current window. Clear the **All** check box to deselect all ports displayed on the current window. The **Reset** button resets the any changes you might have made to the NBAR window and it reverts to its previous settings.

To view details on an individual Port Stat, click on the **Port Name**. A Port Statistics detail window displays with the following information:

- Alias—User defined port name
- Description—Description of the port
- Type—Type of port
- Mtu—Maximum packet size, in bytes, that the port can handle
- Speed—Speed of the port in bits per second
- Physical Address—Physical address of the port in the switch
- Operational Status—Current operational status of the port
- Admin Status—Current administrative status of the port

Tip To view data for a specific Interface (NBAR) Details table, enter the port name or port type in the text box, then click **Filter**.

Note The Save button is only available on switches running Cisco IOS. Changes occur immediately on switches running Catalyst OS.

Table 3-2 NBAR Interface Details

Field / Operation	Description
NBAR Enabled	Check indicates that NBAR is enabled.
Interface	Name of the interface. Depending on the IOS running on the Supervisor, port names are displayed differently. Earlier versions of CatOS displayed port names as 2/1 and 3/1 meaning module 2, port 1 and module 3 port 1. Newer versions of IOS software display a port name as Gi2/1 to represent a Gigabit port on module 2 port 1. In the Virtual Switch software (VSS), a port name might be displayed as Gi1/2/1to represent a Gigabit port on switch 1, module2, port 1.
Interface Description	Description of the interface.

Tip To view data for a specific interface name or interface type in the Interface Details table, enter the interface name or interface type in the text box, then click **Filter**. To clear the Filter text box, click **Clear**.

Enabling and Disabling Port Stats (Mini-RMON)

Note This section applies to WS-SVC-NAM-1 and WS-SVC-NAM-2 devices only.

You must enable the Mini-Rmon switch feature for the NAM to provide information about ethernet ports on the **Monitor > Port Stats** window. Select the ports you want to enable, then click **Submit** to turn on Mini-Rmon for those ports. Click the **All** check box to select or deselect the ports displayed on the current screen.

The **Reset** button resets the any changes you might have made to the Mini-RMON ports window and it reverts to its previous settings.

Note Disabling all ports will also affect any reports and alarms that exist for those ports. For devices running Catalyst OS, disabling all ports will also disable other applications that are using Mini-RMON. For devices running Cisco IOS, only the monitor owner ports will be disabled.

To enable and disable interfaces or view Port Stats details:

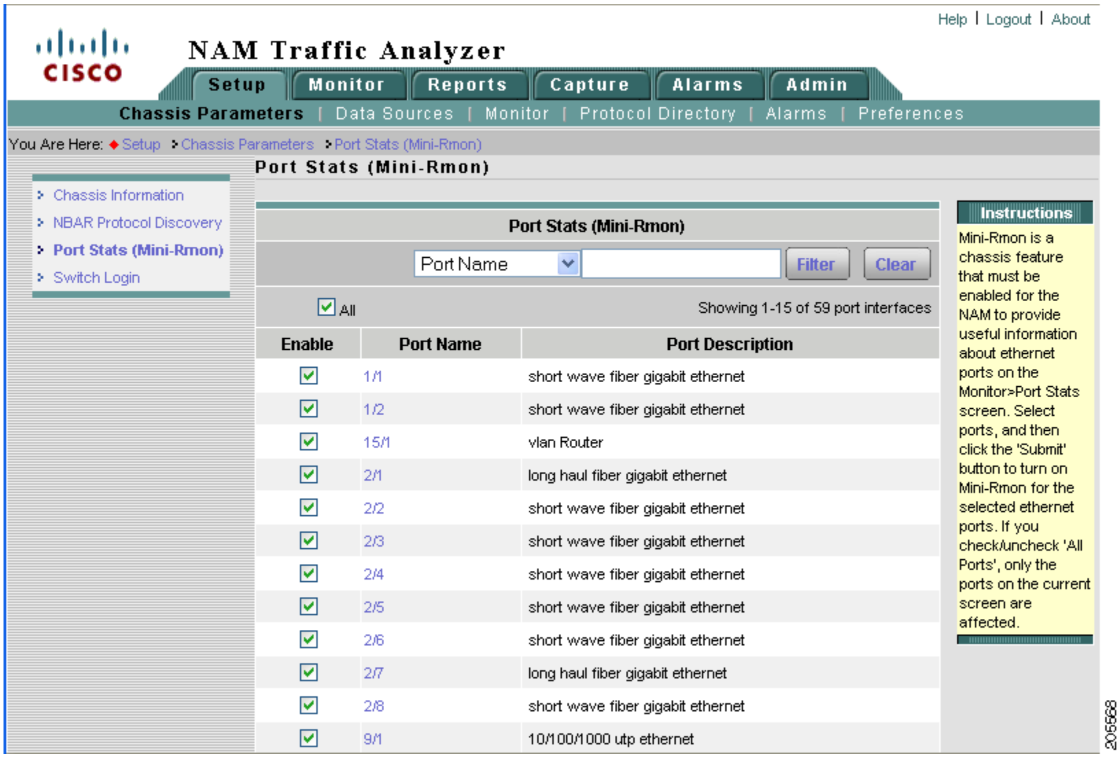
Step 1 Click **Setup** > **Chassis Parameters**.

The Switch Information, Table 3-1, displays.

Step 2 From the contents, click **Port Stats (Mini-RMON)**.

The Port Stats (Mini-RMON) window displays listing known ports and their type. Figure 3-3 shows an example of the top portion of the Port Statistics (Mini-RMON) window.

Figure 3-3 Port Stats (Mini-RMON) Window



Showing 1-15 of 59 port interfaces

Enable	Port Name	Port Description
☑	1/1	short wave fiber gigabit ethernet
☑	1/2	short wave fiber gigabit ethernet
☑	15/1	vlan Router
☑	2/1	long haul fiber gigabit ethernet
☑	2/2	short wave fiber gigabit ethernet
☑	2/3	short wave fiber gigabit ethernet
☑	2/4	short wave fiber gigabit ethernet
☑	2/5	short wave fiber gigabit ethernet
☑	2/6	short wave fiber gigabit ethernet
☑	2/7	long haul fiber gigabit ethernet
☑	2/8	short wave fiber gigabit ethernet
☑	9/1	10/100/1000 utp ethernet

Mini-Rmon is a chassis feature that must be enabled for the NAM to provide useful information about ethernet ports on the Monitor>Port Stats screen. Select ports, and then click the 'Submit' button to turn on Mini-Rmon for the selected ethernet ports. If you check/uncheck 'All Ports', only the ports on the current screen are affected.

Port Stats (Mini-RMON) Details

Table 3-3 describes the fields of the Port Stats (Mini-RMON) window.

Table 3-3 Port Stats (Mini-RMON) Details

Field	Description
Mini-RMON Enabled	Indicates with a check mark if Mini-RMON is enabled on the port.
Port Name	Name of the port. Depending on the IOS running on the Supervisor, port names are displayed differently. Earlier versions of CatOS displayed port names as 2/1 and 3/1 meaning module 2, port 1 and module 3 port 1. Newer versions of IOS software display a port name as Gi2/1 to represent a Gigabit port on module 2 port 1. In the VSS, a port name might be displayed as Gi1/2/1to represent a Gigabit port on switch 1, module2, port 1.
Port Description	Description of the port.

Step 3 Click the **Enable** checkbox to enable a port, or click a checked checkbox to disable a port, then click **Submit**.

After you make changes to this window, click **Submit** to apply the changes, then click **Save** to save the changes to the start-up configuration.

The **Refresh** button causes the NAM to update the switch configuration information with the current configuration. The **All** check box affects only the ports listed on this window. The **Reset** button resets the any changes you might have made to the Mini-RMON ports window and it reverts to its previous settings.

Step 4 To view details on an individual Port Stat, click on the **Port Name**.

A Port Statistics detail window displays with the following information:

- Alias—User defined port name
- Description—Description of the port
- Type—Type of port
- Mtu—Maximum packet size, in bytes, that the port can handle
- Speed—Speed of the port in bits per second
- Physical Address—Physical address of the port in the switch
- Operational Status—Current operational status of the port
- Admin Status—Current administrative status of the port

Tip To view data for a specific port name or port type in the Port Stats (Mini-RMON) Details table, enter the port name or port type in the text box, then click **Filter**.

Configuring Switch Login

The NAM uses switch login information to log in to switches to monitor MPLS. You must provide a user name, password (if required), and login method, either telnet or SSH. Table 3-4 describes the fields and functions of the Switch Login Configuration window.

Note If you are not using MPLS in your network, switch login configuration is not required.

Table 3-4 Switch Login Configuration

Field	Description
User Name	User name of a switch administrator
Password Verify Password	Password of the switch administrator (if one is required)
Verify Password	Verify password of the switch administrator (if one is required)
Login Method	Choose either telnet or SSH
Test Login	Performs a test login with current switch login configuration or with newly entered configuration even if not applied
Apply	Click to set or modify switch login configuration
Reset	Removes switch login configuration entered but not applied and restores previously saved configuration
Clear	Removes switch login configuration from the database

Router Parameters

From the Router Parameter window you can view the router information and set up NBAR Protocol Discovery.

- Applying Router System Information
- Setting Up NBAR Protocol Discovery

Applying Router System Information

This section describes how to set router parameters.

Note This section applies only to NM-NAM or NME-NAM devices.

Step 1 Choose **Setup** > **Router Parameters**.

The Router System Information displays as shown in Table 3-5.

Table 3-5 Router System Information

Field	Description
Name	Name of the router.
Hardware	Hardware description of the router.
Router Software Version	Current software version of the router.
System Uptime	Total time the switch has been running.
Location	Physical location of the router.
Contact	Name of the network administrator for the router.
Router IP Address	IP address of the router.
SNMP Read-Write Community String	Name of the SNMP read-write community string configured on the router
Verify String	Verify the SNMP community string.

Step 2 Enter the following information:

- Router IP Address
- SNMP Read Community String
- Verify String

Managed Device Parameters

From the Managed Device Parameters window, you can set up and view managed device information, enable and disable port stats (mini-Rmon), enable and disable NBAR, and configure managed device login configuration.

Note This section applies only to the Cisco NAM 2200 Series appliance.

To view or set up managed device parameters,

Step 1 Click **Setup** > **Managed Device Parameters**.

The Managed Device Parameters window appears. The Managed Device Information displays the following from the appliance’s configuration:

- Managed Device Name
- Hardware type
- Managed Device Software Version
- System Uptime
- Location
- Contact Person

Step 2 Enter the Managed Device IP address in the Managed Device IP Address field.

Enter the same IP address that was configured on the managed device.

Step 3 Enter the SNMP Read-Write Community String.

Enter the same read-write community string that was configured on the managed device or the NAM cannot communicate via SNMP with the managed device.

Step 4 Enter the SNMP Read-Write Community String again in the Verify String field.

Step 5 Click **Apply** to store the information, or click **Reset** to clear the dialog of any characters you entered or restore the previous settings.

Note It is a good idea to click **Test Connectivity** to test the configuration you have entered or modified.

Data Sources

There are several versions of the Cisco NAM:

- WS-SVC-NAM-1
- WS-SVC-NAM-1-250S
- WS-SVC-NAM-2
- WS-SVC-NAM-2-250S
- NME-NAM
  - NME-NAM
  - NME-NAM-80S
  - NME-NAM-120S
- NM-NAM
- Cisco NAM 2200 Series Appliances
  - Cisco NAM 2204 Appliance
  - Cisco NAM 2220 Appliance

The NME-NAM device has two Gigabit Ethernet ports—an internal interface and an external interface. The NM-NAM device has two FastEthernet data ports—an internal interface and an external interface. One of the two interfaces must be selected as the NAM management port for IP traffic (such as HTTP and SNMP). The NAM can monitor traffic for analysis on the internal interface, the external interface, or both simultaneously. A typical configuration is to monitor LAN and WAN traffic on the internal interface. However, the external interface can be used to monitor LAN traffic.

Depending on the IOS running on the Supervisor, port names are displayed differently. Earlier versions of CatOS displayed port names as 2/1 and 3/1 meaning module 2, port 1 and module 3 port 1. Newer versions of IOS software display a port name as Gi2/1 to represent a Gigabit port on module 2 port 1. In the VSS, a port name might be displayed as Gi1/2/1to represent a Gigabit port on switch 1, module2, port 1.

The following information describes how to set up NetFlow and SPAN sessions for the WS-SVC-NAM-1 and WS-SVC-NAM 2 devices.

WS-SVC-NAM-1 devices can have only one active SPAN session. You can select a switch port, VLAN, or EtherChannel as the SPAN source; however, you may select only one SPAN type. WS-SVC-NAM-2 devices and switch software support *two* SPAN destination ports.

Before you can monitor data, you must direct specific traffic flowing through a switch to the NAM for monitoring purposes. Use the methods described in the Methods of Directing Traffic table (Table 3-6).

Table 3-6 Methods of Directing Traffic

Method	**Usage Notes**
Switch SPAN	You can direct a set of physical ports, a set of VLANs, or a set of EtherChannels to the NAM. Selecting an EtherChannel as a SPAN source it is the same as selecting all physical ports comprising the EtherChannel as the SPAN source. There might be limited visibility into MPLS-tagged traffic unless a specific MPLS data source has been defined. For example, when viewing MPLS-tagged traffic in the *All SPAN* data source, many statistics such as host and conversations will not be available. These statistics are available when viewing the data using the appropriate MPLS data source. **Note** This method does not apply to NM-NAM or NME-NAM devices.
Switch Remote SPAN (RSPAN)	You can monitor packet streams from remote switches, assuming that all traffic from a remote switch arrives at the local switch on a designated RSPAN VLAN. Use the RSPAN VLAN as the SPAN source for the NAM. There might be limited visibility into MPLS-tagged traffic unless a specific MPLS data source has been defined. For example, when viewing MPLS-tagged traffic in the *All SPAN* data source, many statistics such as host and conversations will not be available. These statistics are available when viewing the data using the appropriate MPLS data source. **Note** This method does not apply to NM-NAM or NME-NAM devices.
NetFlow Data Export (NDE)	You can monitor NDE records directly from remote switches or routers. You must configure the NDE source to the NAM from a local switch or remote router, using the switch CLI. SPAN and NDE sources can be in effect simultaneously.

SPAN Sessions

Note This section applies to WS-SVC-NAM-1 and WS-SVC-NAM-2 devices only.

Table 3-7, SPAN Sources, describes the streams of traffic you can use as SPAN data sources.

Table 3-7 SPAN Sources

SPAN Source	One of the following:
Any set of physical ports	• NAM Traffic Analyzer • Switch CLI • Supervisor portCopyTable (SNMP)
Any EtherChannel	• NAM Traffic Analyzer • Switch CLI • Supervisor portCopyTable (SNMP)
Any set of VLANs configured on the local switch	• NAM Traffic Analyzer • Switch CLI • Supervisor portCopyTable (SNMP)
Packets from a remote switch arriving via RSPAN **Note** You can select only one RSPAN VLAN as a SPAN source.	• NAM Traffic Analyzer • Switch CLI • Supervisor portCopyTable (SNMP) *and* • Configuration on remote switch

You can also use locally generated NDE records (the NDE source) as a packet stream to populate NAM collections. You can activate only a subset of the NAM collection types defined in the NDE Collection Types Table, Table 3-8, on the NDE source.

Note These are the only collection types for which monitoring is supported on the NDE source; NDE records have insufficient information to implement other collection types.

Table 3-8 NDE Collection Types Table

Collection Type	Source
Protocol	RMON2 protocol distribution table.
Host	RMON2 nlHost and alHost tables.
Conversation	RMON2 nlMatrix and alMatrix tables.
DiffServ stat	DSMON statistics table for remote switches and routers.
DiffServ apps	DSMON applications table for remote switches and routers.
DiffServ hosts	DSMON host table for remote switches and routers.

Table 3-9 Active SPAN Sessions Dialog

Column	Description
Monitor Session	Monitor session of the SPAN. **Note** For switches running Cisco IOS software only.
Type	Type of SPAN source
Source - Direction	Source of the SPAN session and direction of the SPAN traffic. For port SPAN types, the source displays the port name and source status *after* you SPAN it—down, testing, or dormant. When creating a SPAN session, you can select all ports regardless of their state. See Table 3-10 for a description of the possible SPAN states. **Note** For switches running Cisco IOS software only.
Dest. Port	Destination port of the SPAN session.
Dest. Module	Destination module of the SPAN session.
Status	Status of the SPAN session: Active—Traffic at the SPAN source is being copied to the SPAN destination Inactive—Traffic at the SPAN source will not be copied to the SPAN destination Unknown—A mixture of both active and inactive status
Create	Click to create a SPAN session.
Save	Saves the current active SPAN session in the running-configuration to the startup-configuration for switches running Cisco IOS software only.
Add Dest. Port 1	Click to add NAM Port 1 to the selected SPAN session as a SPAN destination. **Note** This button is labeled **Add Dest. Port** on the NAM-1.
Add Dest. Port 2	Click to add NAM Port 2 to the selected SPAN session as a SPAN destination. **Note** This option is not available on the NAM-1.
Edit	Click to edit the selected SPAN session.
Delete	Click to delete the selected SPAN session.

Note IOS supports only two SPAN sessions, but each SPAN session can have more than one destination. The **Add Dest. Port 1** and **Add Dest. Port 2** buttons enable you to make the NAM dataport an additional destination to an existing local SPAN session.

Table 3-10 lists the possible SPAN states. The SPAN state displays in parenthesis in the Source - Direction column.

Table 3-10 Possible SPAN States

State	Description
Active	SPAN source is valid and traffic from the source is being copied to the SPAN destination
NotInService	SPAN source might be valid, but traffic that appears at the source will not be copied to the SPAN destination
NotReady	The SPAN source might be valid, but traffic that appears at the source will not be copied to the SPAN destination
CreateAndGo	The SPAN source might be valid, but the SPAN source is being added to the SPAN session
CreateAndWait	The SPAN source might be valid, and the SPAN source is being added to the SPAN session
Destroy	The SPAN source is being removed from the SPAN session.

Creating a SPAN Session

Note This section does not apply to NM-NAM or NME-NAM devices.

Creating a SPAN session on a switch running Catalyst OS software and a switch running Cisco IOS software are different. The following procedure applies to switches running both Catalyst OS and Cisco IOS software unless otherwise stated.

Step 1 Choose **Setup** > **Data Sources**.

The Active SPAN Sessions Dialog (Table 3-9) displays. The SPAN session directed to the NAM is selected by default, otherwise the first radio button is selected.

Step 2 Click **Create**.

The Create SPAN Session Dialog (Table 3-11) displays. Switch Port is the default for the SPAN Type.

Step 3 Select the appropriate information.

Table 3-11 Create SPAN Session Dialog

Field	Description
Monitor Session	Monitor session of the SPAN. **Note** For switches running Cisco IOS or Catalyst OS 8.4 (and later) software only.
SPAN Type	• SwitchPort • VLAN • EtherChannel • RSPAN VLAN **Note** You can have only one RSPAN VLAN source per SPAN session.

Table 3-11 Create SPAN Session Dialog

Field	Description
Switch Module List	Lists all modules on the switch other than NAMs and Switch Fabric Modules.
SPAN Destination Interface	The NAM interface to which you want to send data.
SPAN Traffic Direction	• Rx • Tx • Both **Note** Not applicable to RSPAN VLAN SPAN types.
Available Sources	SPAN sources that are available for the selected SPAN type.
Add	Adds the selected SPAN source.
Remove	Removes the selected SPAN source.
Remove All	Removes all the SPAN sources.
Selected Sources	SPAN sources selected.
Refresh	Causes the NAM to update the switch configuration information with current configuration.
Submit	Creates the SPAN configuration; saves the configuration.

Step 4 To create the SPAN session, click **Submit**.

The Active SPAN Sessions window displays and the SPAN session is saved for switches running Catalyst OS software only.

Step 5 To save the current active SPAN session in the running-configuration to the startup-configuration for switches running Cisco IOS software only, click **Save** in the active SPAN session window.

Note For switches running Cisco IOS software, *all* pending running-configuration changes will be saved to the startup-configuration.

Editing a SPAN Session

You can only edit SPAN sessions that have been directed to the NAM.

Note This section does not apply to NM-NAM or NME-NAM devices.

To edit a SPAN session:

Step 1 Click **Setup** > **Data Sources**.

The Active SPAN Sessions dialog box displays.

Step 2 Select the SPAN session to edit, then click **Edit**.

The Edit SPAN Session Dialog Box, Table 3-12, displays.

Step 3 Make the appropriate changes.

Table 3-12 Edit SPAN Session Dialog Box

Field	Description
Monitor Session	Monitor session of the SPAN.
SPAN Type	Type of SPAN session.
Switch Module List	Lists all modules on the switch other than NAMs and Switch Fabric Modules.
SPAN Destination interface	The NAM interface to which you want to send data.
SPAN Traffic Direction	Direction of the SPAN traffic. **Note** You cannot edit the SPAN direction on switches running Catalyst OS software. For such switches, all SPAN sources in a SPAN session must be in only one direction.
Available Sources	SPAN sources available for the selected SPAN type.
Add	Adds the selected SPAN source
Remove	Removes the selected SPAN source.
Remove All	Removes all the SPAN sources.
Selected Sources	SPAN sources selected.
Refresh	Causes the NAM to update the switch configuration information with current configuration.
Submit	Saves changes.
Reset	Clears all changes since previous Submit.

Deleting a SPAN Session

Note This section does not apply to NM-NAM or NME-NAM devices.

To delete a SPAN session, select it from the Active SPAN Session dialog box, then click **Delete**.

Use this anchored frame for wider illustrations that align with left edge of text block.

VLAN Data Sources

Note This section applies only to Cisco 2200 Series NAM appliances.

Unlike NAM-1 and NAM-2 devices where you can choose VLAN data sources from a drop-down menu, you must create VLAN data sources for the Cisco 2200 Series NAM appliance to monitor.

Figure 3-4 shows an example of the available VLAN Data Sources window.

You must create the VLAN data sources here first or they will not be available in the **Data Source** drop-down menu on the **Setup** > **Monitor** > **Core Monitoring** window.

To create a VLAN data source:

Step 1 Choose **Setup** > **Data Sources**.

The Active SPAN Sessions Dialog displays.

Step 2 Click **VLANs**.

The VLAN Data Sources window displays any VLAN data sources that have already been created.

Step 3 Click **Create**.

The VLAN Data Source window displays. This window lists available VLANs. The VLANs with check marks have data sources created. Figure 3-4 shows an example of the VLAN Data Source window.

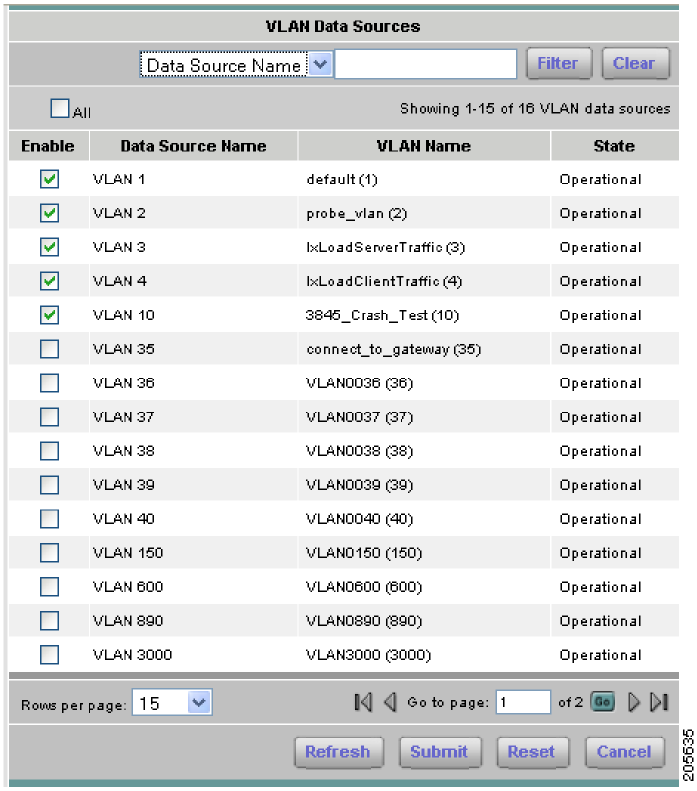
The NAM appliance detects the available VLANs after you set up the IP address and Community String of the *managed device* on the **Setup** > **Managed Device Parameters** window.

Step 4 You can use the pull-down menu to choose either VLAN ID or VLAN Data Source name, then enter a string in the Filter field, and click **Filter** to find a specific VLAN data source. You can also click a check box to choose a specific VLAN ID.

Click **Refresh** to refresh the database of the device to which the appliance is connected.

Click **Submit** to create or delete VLAN data sources, depending on the data source you checked.

Figure 3-4 Available VLANs



VLAN Data Sources

☐ All

Showing 1-15 of 16 VLAN data sources

Enable	Data Source Name	VLAN Name	State
☑	VLAN 1	default (1)	Operational
☑	VLAN 2	probe_vlan (2)	Operational
☑	VLAN 3	IxLoadServerTraffic (3)	Operational
☑	VLAN 4	IxLoadClientTraffic (4)	Operational
☑	VLAN 10	3845_Crash_Test (10)	Operational
☐	VLAN 35	connect_to_gateway (35)	Operational
☐	VLAN 36	VLAN0036 (36)	Operational
☐	VLAN 37	VLAN0037 (37)	Operational
☐	VLAN 38	VLAN0038 (38)	Operational
☐	VLAN 39	VLAN0039 (39)	Operational
☐	VLAN 40	VLAN0040 (40)	Operational
☐	VLAN 150	VLAN0150 (150)	Operational
☐	VLAN 600	VLAN0600 (600)	Operational
☐	VLAN 890	VLAN0890 (890)	Operational
☐	VLAN 3000	VLAN3000 (3000)	Operational

Deleting a VLAN Data Source

To delete a VLAN data source:

Step 1 Choose **Setup** > **Data Sources**.

The Active SPAN Sessions Dialog displays.

Step 2 Click **VLANs**.

The VLAN Data Sources window displays and lists VLAN data sources available on the NAM appliance.

Figure 3-4, Available VLANs, shows an example of the VLAN Data Sources window.

Step 3 Click the check box of a VLAN data source. hen click **Delete**.

Understanding NetFlow Interfaces

To use a managed device as an NDE data source for the NAM, you must configure the managed device itself to export NDE packets to UDP port 3000 on the NAM. You might need to configure the device itself on a per-interface basis. An NDE device is identified by its IP address. By default the switch's local supervisor engine is always available as an NDE device.

You can define additional NDE devices by specifying the IP addresses and (optionally) the community strings. Community strings are used to upload convenient text strings for interfaces on the managed devices that are monitored in NetFlow records.

Distinguishing among different interfaces on the remote NDE devices is a feature in this release that allows you to arbitrarily bundle groups of interfaces on each remote NDE device into a conceptual data source instead of simply grouping all flows into the same collections.

If you try to distinguish every interface on every managed device (potentially in both directions separately), this action could result in a large, unmanageable number of data sources. By using conceptual data sources, you have complete flexibility to group all interfaces in all directions into a single conceptual data source.

You could also choose to create a separate conceptual data source for each interface on the device. In general, you can combine any number of “simple flow paths” to form a conceptual data source. Each simple flow path can consist of a single interface in the input direction, the output direction, or both directions.

The following restrictions apply to creating conceptual data sources and assigning flow paths to them.

- Any interface that is specified as an input interface for a flow path cannot be specified as an input interface in another conceptual data source for the same device. It also cannot be specified as a bidirectional interface in another flow path for the same conceptual data source.
- Any interface that is specified as an output interface for a flow path cannot be specified as an output interface in another conceptual data source for the same device. It also cannot be specified as a bidirectional interface in another flow path for the same conceptual data source.
- Any interface that has been specified as a bidirectional interface for a flow path cannot be specified as a bidirectional interface in another conceptual data source for the same device. It also cannot be specified as an input or output interface in another flow path for the same conceptual data source.

Understanding NetFlow Flow Records

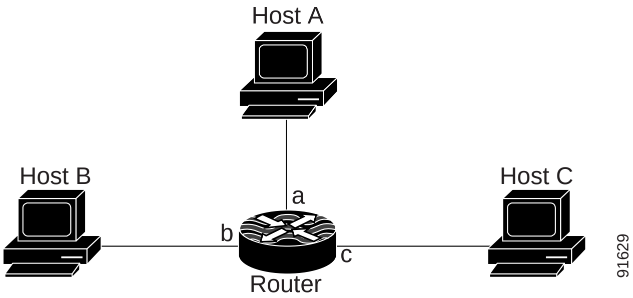
An NDE packet contains multiple flow records. Each flow record has two fields:

- Input SNMP ifIndex
- Output SNMP ifIndex

Note This information might not be available because of NDE feature incompatibility with your Cisco IOS or Catalyst OS version or because of an NDE flow-mask configuration. For more information on flow-mask compatibility, see the "NDE Flow Masks and V8 Aggregation Caches" section on page 4-5.

In most cases, turning on NetFlow on an interface populates the NetFlow cache in the device with flows that are in the *input* direction of the interface. As a result, the input SNMP ifIndex field in the flow record has the ifIndex of the interface on which NetFlow was turned on. Sample NetFlow Network, Figure 3-5, shows a sample network configuration with a NetFlow router.

Figure 3-5 Sample NetFlow Network



The Reporting Flow Records table (Table 3-13) lists the reported flows if NetFlow is enabled on interface a.

Table 3-13 Reporting Flow Records

Input Interface	Output Interface	Are Flows Reported?
a	b	Yes
a	c	Yes
b	c	No
b	a	No
c	a	No
c	b	No

Configuring NetFlow on Devices

The configuration commands for NetFlow devices to export NDE packets to the NAM are platform and device specific. The example configuration commands provided here are the ones most commonly found for devices running Cisco IOS or Catalyst OS. For more detailed information, see your device documentation.

For Devices Running Cisco IOS

Step 1 Select the interface on which you wish to turn on routed flow cache.

```
Prompt#configure terminal
Prompt(config)# interface <type slot/port>

Prompt(config-if)# ip route-cache flow
```

Step 2 Export routed flow cache entries to UDP port 3000 of the NAM.

```
Prompt(config)# ip flow-export destination <NAM IP address> 3000
```

For Devices Supporting Multi-Layer Switching Cache Running Cisco IOS

Step 1 Select the version of NDE.

```
Prompt(config)# mls nde sender version <version-number>
```

Note The NAM supports NDE versions 1, 5, 6, 7, 8, and 9 aggregation caches.

Step 2 Select NDE flow mask.

```
Prompt(config)# mls flow ip full
```

Step 3 Enable NetFlow export.

```
Prompt(config)# mls nde sender
```

Step 4 Export NetFlow to UDP port 3000 of the NAM.

```
Prompt(config)# ip flow-export destination <NAM IP address> 3000
```

For Devices Supporting NDE v8 Aggregations Running Cisco IOS

Step 1 Select a v8 aggregation.

```
Prompt(config)# ip flow-aggregation cache <aggregation-type>
```

Where *aggregation-type* can be:

- destination-prefix
- source-prefix
- protocol-port
- prefix

Step 2 Enable the aggregation cache.

```
Prompt(config-flow-cache)# enable
```

Step 3 Export the flow entries in the aggregation cache to NAM UDP port 3000.

```
Prompt(config-flow-cache)#export destination <NAM address> 3000
```

For Devices Running Catalyst OS

Step 1 Select the version of NDE.

```
Prompt>(enable) set mls nde version <nde-version-number>
```

Note The NAM supports NDE versions 1, 5, 6, 7, 8, and 9 aggregation caches.

Step 2 Select NDE flow mask to be full.

```
Prompt>(enable) set mls flow full
```

Step 3 Enable NDE export.

```
Prompt>(enable) set mls nde enable
```

Step 4 Export NDE packets to UPD port 3000 of the NAM.

```
Prompt>(enable) set mls nde <NAM address> 3000
```

For Devices That Support NDE Export From Bridged-Flows Statistics

Step 1 Enable bridged-flows statistics on the VLANs.

```
Prompt>(enable) set mls bridged-flow-statistics enable <vlan-list>
```

Step 2 Export the NDE packets to UPD port 3000 of the NAM

```
Prompt>(enable) set mls nde <NAM address> 3000
```

For NAMs Located in a Device Slot

If the NAM is located in one of the device slots, the device can be set up to export NDE packets to the NAM.

Step 1 Select the version of NDE.

```
Prompt>(enable) set mls nde version <nde-version-number>
```

Step 2 Select NDE flow mask to be full.

```
Prompt>(enable) sel mls nde full
```

Step 3 Enable NDE export.

```
Prompt>(enable) set mls nde enable
```

Step 4 Export the NDE packets to the NAM.

```
Prompt>(enable) set snmp extendedrmon netflow enable <NAM-slot>
```

Configuring VACL on a WAN Interface

Because WAN interfaces do not support the SPAN function, you must use the switch CLI to manually configure a VACL in order to monitor WAN traffic with the NAM. This feature only works for IP traffic over the WAN interface.

VACL can also be used of there is no available SPAN session to direct traffic to the NAM. In this case, a VACL can be set up in place of a SPAN for monitoring VLAN traffic.

The following example shows how to configure a VACL on an ATM WAN interface and forward both ingress and egress traffic to the NAM. These commands are for switches running Cisco IOS version 12.1(13)E1 or higher. For LAN VACLs on Catalyst OS, the security Access Control List (ACL) feature can be used to achieve the same result. For more information on using these features, see your accompanying switch documentation.

```
Cat6509#config terminal
Cat6509(config)# access-list 100 permit ip any any
Cat6509(config)# vlan access-map wan 100
Cat6509(config-access-map)# match ip address 100
Cat6509(config-access-map)# action forward capture
Cat6509(config-access-map)# exit
Cat6509(config)# vlan filter wan interface AM6/0/0.1
Cat6509(config)# analysis module 3 data-port 1 capture allowed-vlan 1-4094
Cat6509(config)# analysis module 3 data-port 1 capture
Cat6509(config)# exit
```

To monitor egress traffic only, get the VLAN ID that is associated with the WAN interface by using the following command:

```
Cat6509#show cwan vlan
Hidden      VLAN    swidb->i_number    Interface
1017        94                         ATM6/0/0.1
```

Once you have the VLAN ID, configure the NAM data port using the following command:

```
Cat6509(config)# analysis module 3 data-port 1 capture allowed-vlan 1017
```

To monitor ingress traffic only, replace the VLAN number in the capture configuration with the native VLAN ID that carries the ingress traffic. For example, if VLAN 1 carries the ingress traffic, you would use the following command:

```
Cat6509(config)# analysis module 3 data-port 1 capture allowed-vlan 1
```

Configuring VACL on a LAN VLAN

For VLAN Traffic monitoring on a LAN, traffic can be sent to the NAM by using the SPAN feature of the switch. However, in some instances when the traffic being spanned exceeds the monitoring capability of the NAM, you might want to pre-filter the LAN traffic before it is forwarded. This can be done by using VACL.

The following example shows how to configure VACL for LAN VLAN interfaces. In this example, all traffic directed to the server 172.20.122.226 on VLAN 1 is captured and forwarded to the NAM located in slot 3.

```
Cat6509#config terminal
Cat6509#(config)#access-list 100 permit ip any any
Cat6509#(config)#access-list 110 permit ip any host 172.20.122.226
Cat6509#(config)#vlan access-map lan 100
Cat6509#(config-access-map)match ip address 110
Cat6509#(config-access-map)#action forward capture
Cat6509#(config-access-map)#exit
Cat6509#(config)#vlan access-map lan 200
Cat6509#(config-access-map)#match ip address 100
Cat6509#(config-access-map)#action forward
Cat6509#(config-access-map)#exit
Cat6509#(config)#vlan filter lan vlan-list 1
Cat6509#(config)#analysis module 3 data-port 1 capture allowed-vlan 1
Cat6509#(config)#analysis module 3 data-port 1 capture
Cat6509#(config)#exit
```

Managing NetFlow Devices

Before you can monitor NetFlow data, you must add the NetFlow devices to be monitored. The remote NDE device must also be configured to export NDE packets to the NAM. For more information on configuring NetFlow on devices, see the "Configuring NetFlow on Devices" section on page 3-19 or your accompanying device documentation. The following topics help you set up and manage the devices used for NetFlow monitoring:

- Adding NetFlow Devices, page 3-23
- Editing NetFlow Devices, page 3-24
- Deleting NetFlow Devices, page 3-24
- Testing NetFlow Devices, page 3-25
- Creating Custom Data Sources, page 3-25
- Using the Listening Mode, page 3-27

Adding NetFlow Devices

After you add a NetFlow device, NetFlow data sources are automatically created for that device. You can use the Listening Mode to verify that NDE packets are active on these data sources. For more information on using the Listening Mode, see the "Using the Listening Mode" section on page 3-27.

To create a device:

Step 1 Click **Setup** > **Data Sources**.

The Active SPAN Sessions table displays.

Note For NM-NAM or NME-NAM devices, the Netflow Devices table displays.

Step 2 In the contents, click **Netflow --Devices**.

The NetFlow Devices table displays.

Step 3 Click **Add**.

The New Device dialog box appears.

Step 4 Enter the device name and community string, then do one of the following:

- To save the changes, click **OK**.
- To clear the entries in the dialog box, click **Reset**,
- To leave the entries unchanged, click **Cancel**.

Editing NetFlow Devices

Note You cannot edit the local switch.

To edit a NetFlow device:

Step 1 Click the Setup tab.

Step 2 Click **Data Sources**.

The Active SPAN Sessions table displays.

Step 3 In the contents, click **Devices**.

The NetFlow Devices table displays.

Step 4 Select the device you wish to edit from the table and click **Edit**.

The Edit Device window appears.

Step 5 Make the desired changes and do one of the following:

- To save the changes, click **OK**.
- To restore the original entries, click **Reset**,
- To leave the configuration unchanged, click **Cancel**.

Deleting NetFlow Devices

To delete a NetFlow device:

Step 1 Click **Setup** > **Data Sources**.

The Active SPAN Sessions table displays.

Step 2 In the contents, click **Devices**.

The NetFlow Devices table displays.

Step 3 Select the device you wish to delete from the Devices dialog box, then click **Delete**.

Note All custom NetFlow data sources that are related to the device will be deleted.

Testing NetFlow Devices

You can test the SNMP community strings for the devices in the Devices table. To test a device, select it from the Devices table, then click **Test**. The Device System Information Dialog Box (Table 3-14) displays.

Table 3-14 Device System Information Dialog Box

Field	Description
Name	Name of the device.
Hardware	Hardware description of the device.
Device Software Version	The current software version running on the device.
System Uptime	Total time the device has been running since the last reboot.
Location	Location of the device.
Contact	Contact information for the device.
SNMP read from device	SNMP read test result. For the local device only.

If the device is sending NetFlow Version 9 (V9) and the NAM has received the NDE templates, then a V9 Templates button appears below the Device System Information window.

Note NetFlow V9 templates do not appear in all NDE packets. When there are no templates, the **V9 Templates** button does not appear.

To view the NetFlow V9 templates, click the **V9 Templates** button. For more information, see Table 3-17 in Using the Listening Mode.

Creating Custom Data Sources

A NetFlow data sources are automatically learned when you create a device in the Devices section. For more information on creating NetFlow devices, see the “Adding NetFlow Devices” section on page 3-23. This option allows you to create custom data sources on NetFlow devices with specific interface information.

To create a custom data source:

Step 1 Click **Setup** > **Data Sources**.

Step 2 From the contents menu, choose **Custom Data Sources**.

The NetFlow Data Sources table displays.

Step 3 Click **Create**.

The following table shows the wizard used to create or edit a NetFlow data source.

	Wizard Page	References
Step 1	Device Selection	"Selecting a NetFlow Device" section on page 3-26
Step 2	Interface Selection	"Selecting the Interfaces" section on page 3-26
Step 3	Summary	"Verifying NetFlow Data Source Information" section on page 3-27

Selecting a NetFlow Device

To select a NetFlow device:

Step 1 Select the NetFlow device from the list.

Step 2 Enter the data source name. If none is entered, a default name will be created.

Step 3 Click **Next**.

Selecting the Interfaces

To select an interface:

Step 1 Select the data flow direction.

Step 2 Select the interfaces you want to add from the Available Interfaces section.

Tip Use Ctrl+Click to select multiple interfaces.

If no interfaces are listed, manually enter them in the Interface Index text box.

Step 3 Click **Add**.

The selected interfaces are displayed in the Selected Interfaces section.

- To remove interfaces, select them from the Selected Interfaces section, then click **Remove**.
- To remove all interfaces from the Selected Interfaces section, click **Remove All**.

Step 4 Click **Next**.

Special (0) Interface

NDE packets sometimes have NetFlow records reporting either (or both) input if-index and output if-index fields as being 0. This could be a result of one or more of the following reasons:

- Flows are terminated at the device.
- Configurations of the device.
- Unsupported NetFlow feature of the platform at the device.

For more information, see the accompanying documentation for your NetFlow device.

Verifying NetFlow Data Source Information

To verify NetFlow data source information:

Step 1 Verify the information is correct.

Step 2 Do one of the following:

- To save the configuration, click **Finish**.
- To cancel any changes and go back to the NetFlow Data Sources table, click **Cancel**.

Editing a Custom Data Source

To edit a custom data source:

Step 1 Choose **Setup** > **Data Sources**.

Step 2 Click **Custom Data Sources**.

The NetFlow Data Sources table displays.

Step 3 Select the data source you wish to edit, then click **Edit**.

The wizard used to edit NetFlow data sources displays.

Step 4 Make the desired changes and do one of the following:

- To accept the changes, click **Finish**.
- To cancel the changes, click **Cancel**.

Deleting a Custom Data Source

To delete a data source, select it from the NetFlow Data Source table, then click **Delete**.

Note You cannot delete the default data sources.

Using the Listening Mode

The Listening Mode of the NAM allows you to view the IP addresses of devices sending NDE packets to the NAM, the number of NDE packets, and time that the last NDE packet was received. The NetFlow Listening Mode table only lists devices that the NAM currently receives NDE packets from.

To use listening mode:

Step 1 Choose **Setup** > **Data Sources.**

Step 2 In the contents, click **Listening Mode.**

The NetFlow Listening Mode Table (Table 3-15) displays.

Table 3-15 NetFlow Listening Mode Table

Field	Description
Start Time	The timestamp of when the Start button was clicked.
Address	IP address of the learned device.
# Received NDE Packets	Number of NetFlow data export (NDE) packets received.
Last Packet Received	Time stamp the last NDE packet was received.

Step 3 Click **Start**.

Step 4 To clear the table and stop monitoring, click **Stop**.

Note Learning will automatically be disabled after 1 hour.

Viewing Details from the NetFlow Listening Mode Table

Select the device from the table, then click **Details**.

The Device Details Window (Table 3-16) displays.

Table 3-16 Device Details Window

Field	Description
Device Added	Indicates if the device was added to the NAM device table.
Interfaces Reported in NDE Packets	Lists the interfaces that NDE packets were seen on. For example: Special (0) (Output) (1) (Input/Output) (2) (Input/Output **Note** Protocol-Prefix NDE packets do not have interfaces information.

If the device is sending NetFlow Version 9 (V9) and the NAM has received the NDE templates, then a V9 Templates button appears below the Device Details window. For more information, see:

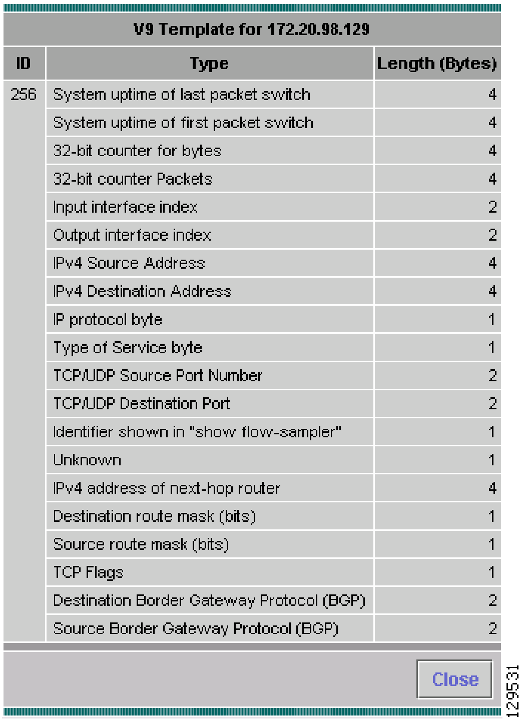
http://www.cisco.com/en/US/products/sw/iosswrel/ps5187/products_feature_guide09186a00801b0696.html

Note NetFlow V9 templates do not appear in all NDE packets. If there are no templates, the **V9 Templates** button does not appear.

To view the NetFlow V9 templates, click the **V9 Templates** button.

The V9 Templates Window (Figure 3-6) displays (see example below).

Figure 3-6 V9 Templates Window



V9 Template for 172.20.98.129

ID	Type	Length (Bytes)
256	System uptime of last packet switch	4
	System uptime of first packet switch	4
	32-bit counter for bytes	4
	32-bit counter Packets	4
	Input interface index	2
	Output interface index	2
	IPv4 Source Address	4
	IPv4 Destination Address	4
	IP protocol byte	1
	Type of Service byte	1
	TCP/UDP Source Port Number	2
	TCP/UDP Destination Port	2
	Identifier shown in "show flow-sampler"	1
	Unknown	1
	IPv4 address of next-hop router	4
	Destination route mask (bits)	1
	Source route mask (bits)	1
	TCP Flags	1
	Destination Border Gateway Protocol (BGP)	2
	Source Border Gateway Protocol (BGP)	2

The V9 Templates Table (Table 3-17) describes the template data.

Table 3-17 V9 Templates Table

Field	Description
Type	Type of template data.
Length (Bytes)	Length of template data in bytes.

Adding a Device To Monitor

To add a device to monitor:

Step 1 Select the device from the table, then click **Add**.

The New Device Window displays.

Step 2 Enter the device information and click OK.

The new device is added to the NetFlow Devices table.

Testing the Router Community Strings

For NM-NAM or NME-NAM Devices Only

Before the router can send information to the NAM using SNMP, the router community strings set in the NAM Traffic Analyzer must match the community strings set on the actual router. The Router Parameters dialog box displays the router name, hardware, Supervisor engine software version, system uptime, location, and contact information.

The local router IP address and the SNMP community string must be configured so that the NAM can communicate with the local router.

To set the community strings on the router, use the router CLI. For information on using the CLI, see the documentation that accompanied your device.

Caution The router community string you enter must match the read-write community strings on the router. Otherwise you cannot communicate with the router.

To test router community strings:

Step 1 Choose **Setup** > **Router Parameters**.

The Router Parameters dialog box displays.

Step 2 Click **Test**.

The Router Community String Test dialog box displays.

Setting Up an Interface

Note This section applies to NM-NAM or NME-NAM devices only.

Before you can view traffic statistics and the TopN traffic for applications, hosts, and conversations, you must first set up the interfaces.

Click in the check box to enable Netflow NDE on the selected interface and all of its sub-interfaces. A NAM NDE datasource will be created for each enabled sub-interface, and hosts, conversations and application NDE data sources will also be created. This action populates the **Monitor > Router** detail window with the hosts, conversations and application statistics.

In the case of parent interfaces with sub-interfaces, only the leaf child will be enabled. For example, ATM2/0.1-atm-subif has child ATM2/0.1-aal5-layer. Only the aal5-layer will be enabled. NDE will only be seen on this child interface.

Note Depending on the IOS running on the Supervisor, port names are displayed differently. Earlier versions of CatOS displayed port names as 2/1 and 3/1 meaning module 2, port 1 and module 3 port 1. Newer versions of IOS software display a port name as Gi2/1 to represent a Gigabit port on module 2 port 1. In the VSS, a port name might be displayed as Gi1/2/1to represent a Gigabit port on switch 1, module2, port 1.

To set up interfaces to enable you to view traffic statistics:

Step 1 Choose **Setup** > **Data Sources**.

NAM 4.0 supports up to 1,500 datasources.

Step 2 Click **Interfaces** in the content menu.

The Interfaces window displays.

Router interfaces and SNMP Read/Write Community strings must also be configured. See Router Parameters, page 3-8 for more information.

Step 3 Check the **Enable** check box for each interface you want to enable.

Understanding Wide Area Application Services

Cisco wide area application services (WAAS) optimizes the performance of TCP-based applications operating in a wide area network (WAN) environment and preserves and strengthens branch security. The WAAS solution consists of a set of devices called Wide Area Application Engines (WAEs) that work together to optimize WAN traffic over your network.

When client and server applications attempt to communicate with each other, the network devices intercepts and redirects this traffic to the WAEs to act on behalf of the client application and the destination server.

WAE flow agents provide information about packet streams traversing through both LAN and WAN interfaces of WAAS WAEs. Traffic of interest can include specific servers and types of transaction being exported. NAM processes the data exported from WAAS flow agents and performs application response time calculations and enters the data into reports you set up.

The WAEs examine the traffic and using built-in application policies to determine whether to optimize the traffic or allow it to pass through your network not optimized.

You can use the WAAS Central Manager GUI to centrally configure and monitor the WAEs and application policies in your network. You can also use the WAAS Central Manager GUI to create new application policies so that the WAAS system will optimize custom applications and less common applications.

Cisco WAAS helps enterprises to meet the following objectives:

- Provide branch office employees with LAN-like access to information and applications across a geographically distributed network.
- Migrate application and file servers from branch offices into centrally managed data centers.
- Minimize unnecessary WAN bandwidth consumption through the use of advanced compression algorithms.
- Provide print services to branch office users. WAAS allows you to configure a WAE as a print server so you do not need to deploy a dedicated system to fulfill print requests.
- Improve application performance over the WAN by addressing the following common issues:
  - Low data rates (constrained bandwidth)
  - Slow delivery of frames (high network latency)
  - Higher rates of packet loss (low reliability)

For more information about WAAS and configuring the WAAS components, see the document:

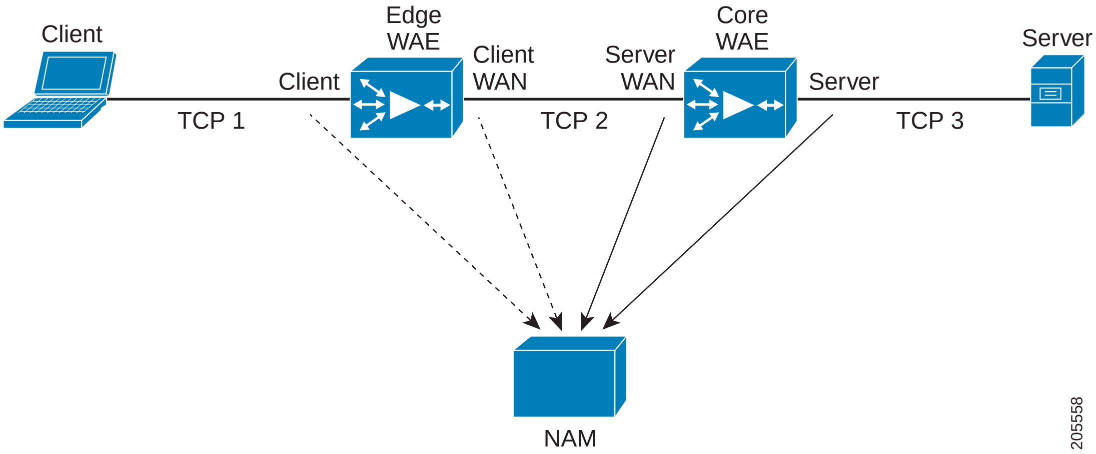
Cisco Wide Area Application Services Configuration Guide, OL-16376-01
http://www.cisco.com/en/US/docs/app_ntwk_services/waas/waas/v4019/configuration/guide/waas4cfg.html

ART Monitoring from WAAS Data Sources

The NAM processes the TCP flow data exported from WAAS Flow Agents and performs application response time (ART) calculations and reports. You use the NAM GUI to create a WAAS data source to monitor WAAS traffic statistics. In addition to ART, NAM monitors and reports other traffic statistics of the WAAS data sources including application, host, and conversation information.

The NAM provides different ART metrics by collecting data at different points as packets flow along their paths. The NAM provides five different collection points, four represented by a WAAS data source. Figure 3-7 shows an example of the data collection points. In Figure 3-6, the solid line represents data exported from a WAAS device and/or directly monitored traffic like SPAN. The broken line represents data exported from a WAAS device only.

Figure 3-7 WAAS Data Sources (Data Collection Points)



You can use the NAM GUI to configure data sources at the following locations in the network:

- Client—This setting configures the WAE device to export the original (LAN side) TCP flows originated from its clients to NAM for monitoring. To monitor this point, configure a Client data source.
- Client WAN— This setting configures the WAE device to export the optimized (WAN side) TCP flows originated from its clients to NAM for monitoring. To monitor this point, configure a Client WAN data source.
- Server WAN—This setting configures the WAE device to export the optimized (WAN side) TCP flows from its servers to NAM for monitoring. To monitor this point, configure a Server WAN data source.
- Server—This setting configures the WAE device to export the original (LAN side) TCP flows from its servers to NAM for monitoring. To monitor this point, configure a Server data source.

You can also configure a data source to use Export Passthrough data. For more information about configuring WAAS data sources, see Configuring WAAS Data Sources, page 3-35.

Monitoring Client Data Sources

By monitoring the TCP connections between the client and the WAE device (Client segment in Figure 3-7), you can measure the following ART metrics:

- Total Delay (TD) as experienced by the client
- Total Transaction Time as experienced by the client
- Bandwidth usage (bytes/packets) before optimization
- Number of transactions and connections.
- Network Delay broken down into two segments: client-edge and edge-server

Monitoring WAN Data Sources

By monitoring the TCP connections between the edge and core WAE devices (Client WAN and Server WAN segments in Figure 3-7), you can measure the following:

- Bandwidth usage (bytes/packets) after optimization
- Network Delay of the WAN segment

Monitoring Server Data Sources

By monitoring the TCP connections between the core WAE devices and the servers (Server segment in Figure 3-7), you can measure the following ART metrics:

- Application (Server) Delay (without proxy acceleration/caching server)
- Network Delay between the core WAE device and the servers

Note NAM measures Network Delay (ND) by monitoring the TCP three-way handshake between the devices.

Managing WAAS Devices

Before you can monitor WAAS traffic, you must first configure the WAAS device to export WAAS flow record data to the NAM using the WAAS command-line interface (CLI) **flow monitor** command like the following:

flow monitor tcpstat-v1 host <*nam IP address*>

flow monitor tcpstat-v1 enable

After you enable flow export to the NAM using WAAS CLI commands like those above, WAAS devices will be detected and automatically added to the NAM's WAAS device list.

You must then configure which WAAS segments you want to monitor as WAAS data sources: Client, Client WAN, Server WAN, and/or Server. See Configuring WAAS Data Sources, page 3-35, for more detailed information.

You can also use the Central Manager (CM) to centrally to issue WAAS CLI commands to configure a large number of WAEs at one time.

Note In addition to configuring the WAAS devices, you must specify which application servers you want to monitor among the servers being optimized by WAAS devices. See Managing a WAAS Monitored Server, page 3-38, for more detailed information.

For more information about WAAS and configuring the WAAS components, see the document:

Cisco Wide Area Application Services Configuration Guide, OL-16376-01
http://www.cisco.com/en/US/docs/app_ntwk_services/waas/waas/v4019/configuration/guide/waas4cfg.html

This section contains the following topics:

- Adding a WAAS Device, page 3-34
- Configuring WAAS Data Sources, page 3-35
- Deleting a WAAS Data Source, page 3-37

Adding a WAAS Device

Note This step is not usually necessary because export-enabled WAAS devices are detected and added automatically. See Managing WAAS Devices, page 3-33, for more information about how to enable WAAS export to the NAM.

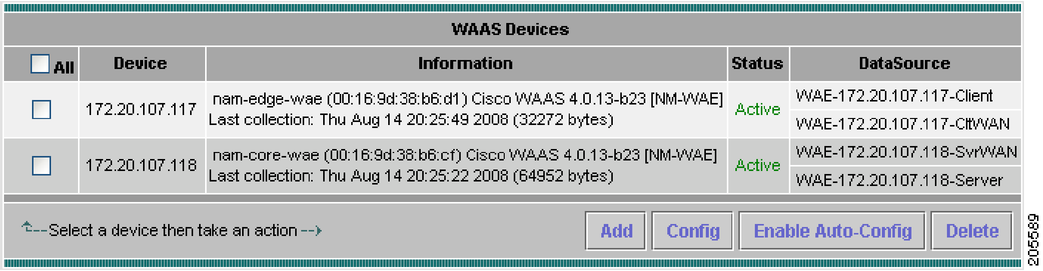
To manually add a WAAS device to the list of devices monitored by the NAM:

Step 1 Click **Setup** > **Data Sources**.

Step 2 From the contents menu, choose **WAAS** > **Devices**.

The WAAS Custom Data Sources table displays. Figure 3-8 shows an example of the WAAS Custom Data Source table.

Figure 3-8 WAAS Custom Data Sources Table



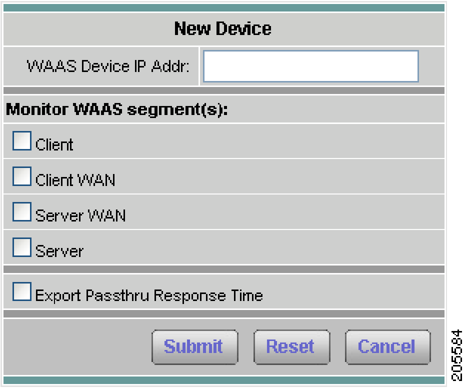
WAAS Devices

□ All	Device	Information	Status	DataSource
□	172.20.107.117	nam-edge-wae (00:16:9d:38:b6:d1) Cisco WAAS 4.0.13-b23 [NM-WAE] Last collection: Thu Aug 14 20:25:49 2008 (32272 bytes)	Active	WAE-172.20.107.117-Client WAE-172.20.107.117-CltWAN
□	172.20.107.118	nam-core-wae (00:16:9d:38:b6:cf) Cisco WAAS 4.0.13-b23 [NM-WAE] Last collection: Thu Aug 14 20:25:22 2008 (64952 bytes)	Active	WAE-172.20.107.118-SvrWAN WAE-172.20.107.118-Server

Step 3 Click **Add**.

The New Device dialog box displays. Figure 3-9 shows an example of the Add New WAAS Device window.

Figure 3-9 Add New WAAS Device



New Device

WAAS Device IP Addr:

Monitor WAAS segment(s):

□ Client

□ Client WAN

□ Server WAN

□ Server

□ Export Passthru Response Time

Step 4 Enter the device IP address in the Device field, and click to choose the type of WAAS data sources from this device to monitor.

See Configuring WAAS Data Sources, page 3-35, for more information.

Step 5 Click **Submit** to add the new WAAS custom data source.

Configuring WAAS Data Sources

The NAM uses WAAS data sources to monitor traffic collected from different WAAS segments: Client, Client WAN, Server WAN, and Server. Each WAAS segment is represented by a data source. You can set up the NAM to monitor and report other traffic statistics of the WAAS data sources such as application, host, and conversation information in addition to the monitored ART metrics.

To configure a WAAS device's custom data source:

Step 1 Click **Setup** > **Data Sources**.

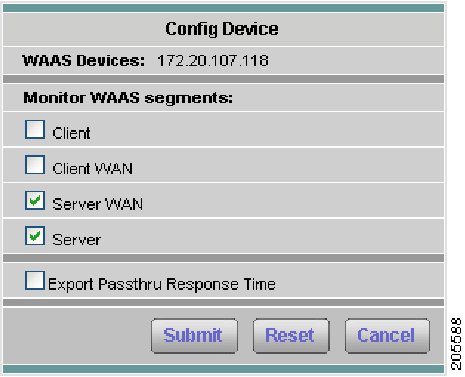
Step 2 From the contents menu, choose **WAAS -- Devices**.

The WAAS Device table displays.

Step 3 Choose the WAAS device you want to modify, then click **Config**.

The Config Device dialog box displays the WAAS device IP address and the WAAS segments previously set to monitor. Figure 3-10 shows an example of the Configure WAAS Device window.

Figure 3-10 Configure WAAS Device



Config Device

WAAS Devices: 172.20.107.118

Monitor WAAS segments:

□ Client

□ Client WAN

☑ Server WAN

☑ Server

□ Export Passthru Response Time

You can configure the WAAS data sources to monitor the following WAAS segments as shown in Figure 3-7, WAAS Data Sources (Data Collection Points):

- Client—This setting configures the WAE device to export the original (LAN side) TCP flows originated from its clients to NAM for monitoring.
- Client WAN— This setting configures the WAE device to export the optimized (WAN side) TCP flows originated from its clients to NAM for monitoring.
- Server WAN—This setting configures the WAE device to export the optimized (WAN side) TCP flows from its servers to NAM for monitoring.
- Server—This setting configures the WAE device to export the original (LAN side) TCP flows from its servers to NAM for monitoring.

Table 3-18, WAAS Data Source Configurations, lists six different deployment scenarios you might consider to monitor the optimized traffic on your WAAS network. Scenario #1 is typical when using NAM-1 and NAM-2 blades. Scenario #2 is typical when using NM-NAM and NME-NAM devices.

Table 3-18 WAAS Data Source Configurations

	Deployment Scenario	Edge WAE Data Source	Core WAE Data Source
1	• Clients in the edge (branch) • Servers in the core (data center) • NAM in the core	Client	Server Server WAN
2	• Clients in the edge (branch) • Servers in the core (data center) • NAM in the edge	Client Client WAN	Server
3	• Servers in the edge (branch) • Clients in the core (data center) • NAM in the core	Server	Client Client WAN
4	• Servers in the edge (branch) • Clients in the core (data center) • NAM in the edge	Server Server WAN	Client

Table 3-18 WAAS Data Source Configurations

	Deployment Scenario	Edge WAE Data Source	Core WAE Data Source
5	• Clients and servers in the edge (branch) and the core (data center) • NAM in the core	Client Server	Client Server Client WAN Server WAN
6	• Clients and servers in the edge (branch) and the core (data center) • NAM in the edge	Client Server Client WAN Server WAN	Client Server

SPAN data sources might take the place of the WAE Server data sources listed in Table 3-18. For example, if you already configure SPAN to monitor the server LAN traffic, its not necessary to enable the Server data source on the WAE device.

Note The following step is optional and applies only when the NAM is configured to export data to an External Response Time Reporting Console, such as the NetQos Super Agent.

Step 4 To export WAAS pass-through data to the External Response Time Reporting Console, click **Export Passthru to External Console**.

Note WAAS pass-through data is not analyzed by the NAM.

See Response Time Export, page 2-22, for more information.

Deleting a WAAS Data Source

To delete a WAAS custom data source:

Step 1 Click **Setup** > **Data Sources**.

Step 2 From the contents menu, choose **WAAS** > **Devices**.

The WAAS Custom Data Sources table displays.

Step 3 Choose the WAAS custom data source you want to delete, then click **Delete**.

A dialog box displays the device address and asks if you are sure you want to delete the device.

Auto-Config New WAAS Devices

If you have numerous WAE devices, you can setup the NAM to configure newly discovered WAE devices using a pre-defined configuration template using the NAM Auto Config option.

Note If most of your WAE devices are edge WAE, you might want to set the auto config to be that of the edge device, then manually configure the data center WAE. For example, select the Client segment for monitoring.

To configure WAAS auto-config:

Step 1 Click **Setup** > **Data Sources**.

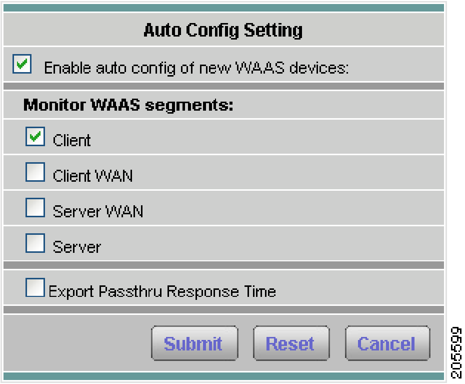
Step 2 From the contents menu, choose **WAAS -- Devices**.

The WAAS Device table displays. Figure 3-8 shows an example of the WAAS Custom Data Source table.

Step 3 Click **Auto-Config**.

The Auto-Config Setting window displays. Figure 3-11 shows an example of the WAAS Device Auto Config Setting window.

Figure 3-11 WAAS Device Auto Config Setting Window



Auto Config Setting

☑ Enable auto config of new WAAS devices:

Monitor WAAS segments:

☑ Client

□ Client WAN

□ Server WAN

□ Server

□ Export Passthru Response Time

Step 4 Click the Enable Auto Config check box and specify the configuration to be applied to newly discovered WAE devices. See Configuring WAAS Data Sources, page 3-35, for more information.

Note After a WAAS device is auto configured, you can manually override its auto-configuration by selecting the device and click Config to reconfigure the device.

Managing a WAAS Monitored Server

WAAS monitored servers specify the servers a NAM monitors. To enable WAAS monitoring, you must list the servers to be monitored by the NAM using the WAAS device's flow monitoring.

Note The NAM is unable to monitor WAAS traffic until you set up WAAS monitored servers. The NAM displays status of WAAS devices as *pending* until you set up WAAS monitored servers.

This section contains the following topics:

- Adding a WAAS Monitored Server, page 3-39
- Deleting a WAAS Monitored Server, page 3-39

Adding a WAAS Monitored Server

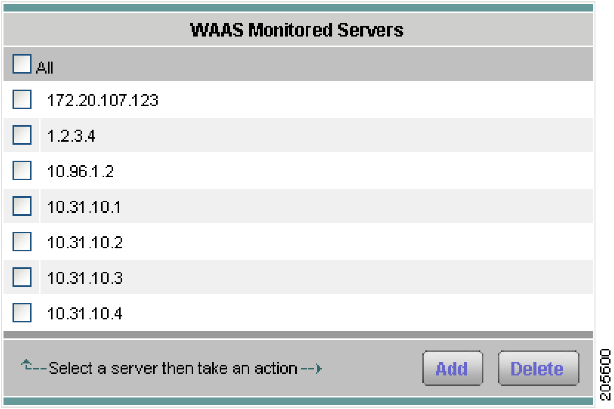
To add a WAAS monitored server:

Step 1 Click **Setup** > **Data Sources**.

Step 2 From the contents menu, choose **WAAS** > **Monitored Servers**.

The WAAS Monitored Servers table displays. Figure 3-12 shows an example of the WAAS Monitored Servers table.

Figure 3-12 WAAS Monitored Servers Table



WAAS Monitored Servers

□ All

□ 172.20.107.123

□ 1.2.3.4

□ 10.96.1.2

□ 10.31.10.1

□ 10.31.10.2

□ 10.31.10.3

□ 10.31.10.4

Step 3 Click **Add**.

The New Device dialog box displays.

Step 4 Enter the server IP address in the Server Address field.

Step 5 Click **Submit**.

Deleting a WAAS Monitored Server

To delete a WAAS monitored server data source:

Step 1 Click **Setup** > **Data Sources**.

Step 2 From the contents menu, choose **WAAS** > **Monitored Servers**.

The WAAS Monitored Servers table displays any WAAS monitored servers.

Step 3 Select the monitored WAAS server to delete, then click **Delete**.

A confirmation dialog displays to ensure you want to delete the selected WAAS monitored server.

Step 4 Click **OK** to delete the WAAS monitored server.

MPLS Data Sources

When data packets containing MPLS labels are spanned to the NAM, the traffic can be monitored by the tag inside the data packets. This feature is especially useful in a network that deploys MPLS/VPN where traffic from each VPN can be uniquely identified by a combination of MPLS labels. When the NAM encounters stacked MPLS labels, only the relevant inner-most label (the bottom tag in the label stack) is used for monitoring.

To enable RMON monitoring for MPLS, you must first configure an MPLS data source. To enable MPLS traffic monitoring, you must create a form of virtual interface that can be tied to a particular MPLS tag. After setting up the custom MPLS data source, you can enable monitoring of the following:

- Applications per MPLS tag
- Hosts per MPLS tag
- Host conversation per MPLS tag

This section contains the following topics:

- Automatic Discovery of MPLS VPN Labels, page 3-40
- Setting Up Layer 3 VRF Data Sources, page 3-41
- Setting Up Layer 2 Virtual Circuit Data Sources, page 3-42
- Setting Up MPLS Label Data Sources, page 3-43
- Creating a VRF/VC Configuration File, page 3-44
- Importing a VRF/VC Configuration File, page 3-44
- Exporting a VRF/VC Configuration File, page 3-45
- Importing Log, page 3-45

Automatic Discovery of MPLS VPN Labels

In an MPLS VPN environment, the NAM can monitor traffic using either VPN routing/forwarding (VRF) table name or virtual circuit (VC) ID configured at the switch. This higher level of abstraction hides the underlying label associations.

The VRF and VC information can only be obtained from the switch CLI. This requires you to provide the switch login credentials, username and password, and whether to access the switch CLI through **telnet** or **ssh**. Enable mode password is not required.

After the VRF, VC, and the associated labels are discovered, you can reference the VRF or VC using either the VRF name or VC ID directly without any knowledge of the underlying labels using the NAM monitoring functions.

The labels associated with each VRF or VC are allocated dynamically by the switch. As a result, the labels will not be persistent when the switch is rebooted or a supervisor switch-over occurred. The NAM will have to re-discover VRF and VC information from the switch under these situations. A manual refresh feature is also provided for on-demand refresh.

Setting Up Layer 3 VRF Data Sources

To set up layer 3 VPN routing/forwarding (VRF) table (L3 VRF) data sources:

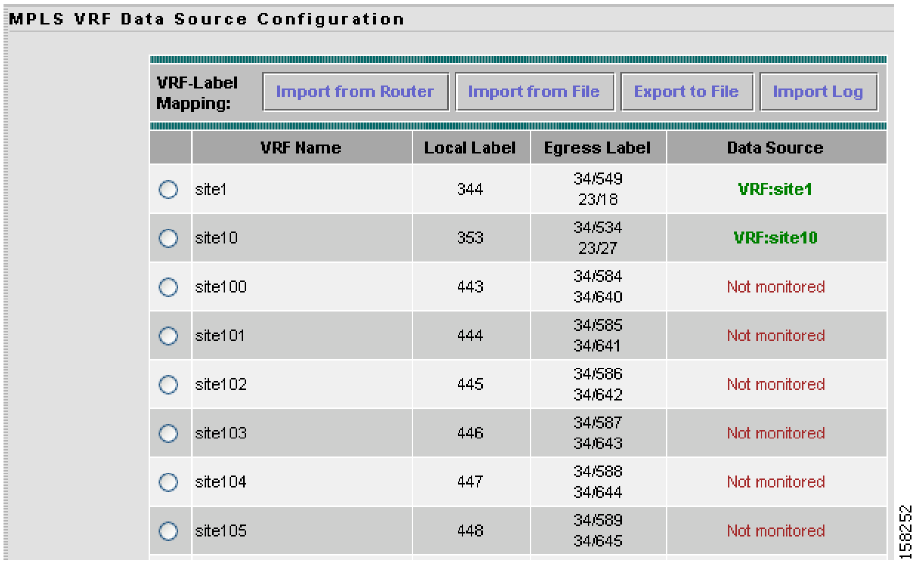
Step 1 Click **Setup** > **Data Sources**.

The Active SPAN Sessions table displays.

Step 2 In the contents, click **L3 VRF**.

The MPLS VRF Data Source Configuration window displays shown in Figure 3-13.

Figure 3-13 MPLS VRF Data Source Configuration Window



MPLS VRF Data Source Configuration

	VRF Name	Local Label	Egress Label	Data Source
○	site1	344	34/549 23/18	VRF:site1
○	site10	353	34/534 23/27	VRF:site10
○	site100	443	34/584 34/640	Not monitored
○	site101	444	34/585 34/641	Not monitored
○	site102	445	34/586 34/642	Not monitored
○	site103	446	34/587 34/643	Not monitored
○	site104	447	34/588 34/644	Not monitored
○	site105	448	34/589 34/645	Not monitored

Step 3 If VRF information is not displayed or if some VRF information is missing, click **Import from Router** to refresh the list.

If the list is still empty after clicking **Import from Router**, the NAM failed to automatically import VRF configuration from the router. In this case, perform Step 4. If the VRF information is available, proceed to Step 5.

If the NAM failed to automatically import VRF configuration from the router, click **Import Log**. The MPLS Import log contains information that might help you diagnose the problem in the connection. See Importing Log, page 3-45, for more information about the Import Log.

Step 4 If necessary, create a text file containing the VRF information and click **Import from File**.

After clicking **Import from File**, the Import VRF/VC Configuration window displays enabling you to specify the location from which to import the VRF/VC configuration file. The VRF/VC configuration file might be on your local machine or at a remote URL.

See Creating a VRF/VC Configuration File, page 3-44, for information about how to create the text VRF/VC configuration file.

Step 5 Choose any VRF data source, then click **Create DataSrc**.

Creating or deleting a NAM data source does not affect the switch configuration.

Setting Up Layer 2 Virtual Circuit Data Sources

To set up layer 2 (L2) virtual circuit data sources:

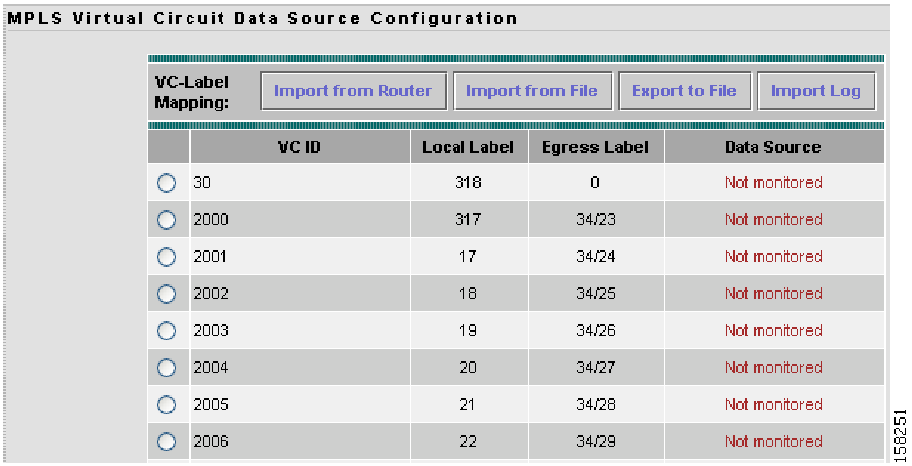
Step 1 Choose **Setup** > **Data Sources**.

The Active SPAN Sessions table displays.

Step 2 In the contents, click **L2 Virtual Circuit**.

The MPLS Virtual Circuit Data Source Configuration window displays shown in Figure 3-14.

Figure 3-14 MPLS Virtual Circuit Data Source Configuration Window



MPLS Virtual Circuit Data Source Configuration

	VC ID	Local Label	Egress Label	Data Source
○	30	318	0	Not monitored
○	2000	317	34/23	Not monitored
○	2001	17	34/24	Not monitored
○	2002	18	34/25	Not monitored
○	2003	19	34/26	Not monitored
○	2004	20	34/27	Not monitored
○	2005	21	34/28	Not monitored
○	2006	22	34/29	Not monitored

Step 3 If VC information is not displayed or if some VC information is missing, click **Import from Router** to refresh the list.

If the list is still empty after clicking **Import from Router**, the NAM failed to automatically import VC configuration from the router. In this case, perform Step 4. If the VRF information is available, proceed to Step 5.

If the NAM failed to automatically import VC configuration from the router, click **Import Log**. The MPLS Import log contains information that might help you diagnose the problem in the connection. See Importing Log, page 3-45, for more information about the Import Log.

Step 4 If necessary, create a text file containing the VC information and click **Import from File**.

After clicking **Import from File**, the Import VRF/VC Configuration window displays enabling you to specify the location from which to import the VRF/VC configuration file. The VRF/VC configuration file might be on your local machine or at a remote URL.

See Creating a VRF/VC Configuration File, page 3-44, for information about how to create the text VRF/VC configuration file.

Step 5 Choose any VC data source, then click **Create DataSrc**.

Creating or deleting a NAM data source does not affect the switch configuration.

Setting Up MPLS Label Data Sources

To set up MPLS Label data sources:

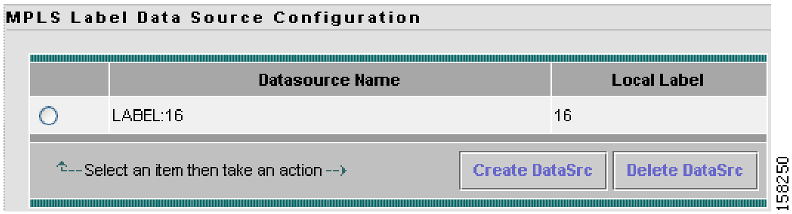
Step 1 Choose **Setup** > **Data Sources**.

The Active SPAN Sessions table displays.

Step 2 In the contents, click **Label**.

The MPLS Label Data Source Configuration window displays shown in Figure 3-15.

Figure 3-15 MPLS Label Data Source Configuration Window



MPLS Label Data Source Configuration

	Datasource Name	Local Label
○	LABEL:16	16

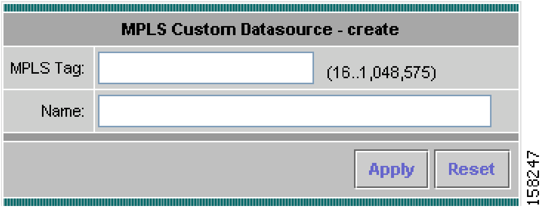
Step 3 Click **Create DataSrc**.

A dialog box asks you to select a VRF or VC first.

Step 4 Click **OK**.

The Create MPLS Custom Datasource window displays as shown in Figure 3-16.

Figure 3-16 Create MPLS Custom Datasource Window



MPLS Custom Datasource - create

MPLS Tag: (16..1,048,575)

Name:

Step 5 Enter an MPLS tag number in the **MPLS Tag** field.

The tag number must match the value in the packets, as only those will be represented in the data-source. You need to know the tag number from the router configuration. The NAM will assign a name based on the MPLS tag number you provide.

Step 6 Accept the name the NAM assigns based on the MPLS tag number, or enter a name you prefer in the Name field.

You can use the name field to identify the MPLS tag value, the VRF tunnel name, or something else (such as VPN-San_Jose-RTP).

Step 7 Click **Apply**.

Creating a VRF/VC Configuration File

The VRF/VC configuration file contains text information about the VRFs and VCs configured at the router. Each configuration line contains four fields separated by a space. Table 3-19 describes the format of a configuration line.

Table 3-19 VRF/VC Configuration Lines

Field	Description
Comment line	Begins with the # character
Type	VRF or VC
Name	Name of the VRF or VC ID
Local label	The local label for the VRF or VC
Egress label	The out going label stack with the format outer label/inner label. If there is more than one label, each label stack is separated by a comma with *no spaces* between stack labels.

The following is an example of the VRF/VC configuration file:

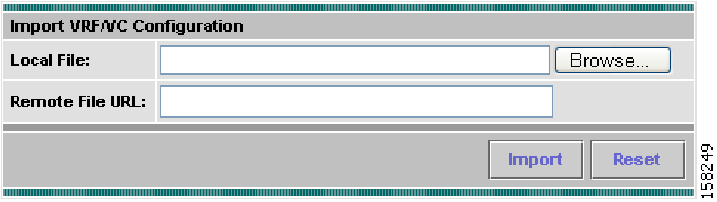
```
# MPLS configuration file
# Autogenerated at 2006-04-26 19:43
VRF customer_A 114 0
VRF customer_B 600 204/500,204/308
VC 201 111 204/309
VC 202 120 204/310
VC 203 121 204/311
VC 204 122 204/312
VC 205 123 204/313
VC 206 124 204/314
VC 207 125 204/315
VC 208 126 204/319
VC 209 127 204/317
VC 210 128 204/318
```

Importing a VRF/VC Configuration File

If you have a text file that contains the known VRF/VC configuration, you can import the configuration by clicking **Import from File**. You might have created this file by using the **Export to File** button. Figure 3-17 shows the Importing VRF/VC Configuration File window.

Click **Browse** to locate the configuration file you want to import, or enter the URL of a remote file, then click **Import**.

Figure 3-17 Importing VRF/VC Configuration File Window



Import VRF/VC Configuration

Local File:

Remote File URL:

Exporting a VRF/VC Configuration File

After you have the desired MPLS configuration on the NAM, you can export the configuration to a file to serve as a backup. Creating a backup file enables you reload the configuration if the configuration is lost or if you want to revert to an earlier configuration. Click **Export to File** to export your MPLS VRF/VC datasource configuration.

Importing Log

After you import the VRF/VC data source configuration from the router or VRF/VC datasource configuration file, you can view the log of the MPLS import by clicking **Import Log**. The MPLS Import log contains a listing of occurrences in the connection and can be useful in troubleshooting. The log might show an invalid user name or password, no connection to the switch, command-line parsing errors, or other problems that might have occurred. An MPLS import log should contain the message: *VRF/VC update successful*.

ERSPAN

This section describes how to configure Encapsulated Remote Switched Port Analyzer (ERSPAN) of the Catalyst 6500 switch or Cisco 7600 series router as a NAM data source. You configure ERSPAN as a NAM data source from the Catalyst 6500 switch or Cisco 7600 series router command line interface, not the NAM GUI.

There are two ways to configure ERSPAN so that the NAM receives the data:

- Sending ERSPAN Data to Layer 3 Interface, page 3-45
- Sending ERSPAN Data Directly to the NAM Management Interface, page 3-46

Sending ERSPAN Data to Layer 3 Interface

To send the data to a layer 3 interface on the Switch housing the NAM, configure the ERSPAN source session. The ERSPAN destination session then sends the traffic to a NAM data-port. After performing this configuration, you can select the DATA PORT X data source to analyze the ERSPAN traffic.

Note Because this method does not affect NAM performance or accessibility, Cisco recommends this method.

Sample Configuration of ERSPAN Source

```
monitor session 1 type erspan-source
   no shut
```

```
source interface Fa 3/47
destination
    erspan-id N
        ip address aa.bb.cc.dd
        origin ip address ee.ff.gg.hh
```

Where:

- *erspan-id N* is the ERSPAN ID
- *aa.bb.cc.dd* is the IP address of the destination switch (loopback address or any routable IP address)
- *ee.ff.gg.hh* is the source IP address of the ERSPAN traffic

Sample Configuration of ERSPAN Destination

```
monitor session 1 type erspan-destination
  no shut
destination analysis-module 2 data-port 2
source
    erspan-id N
    ip address aa.bb.cc.dd
```

Where:

- erspan-id *N* matches the ERSPAN ID at the source switch
- *aa.bb.cc.dd* is the IP address defined at the destination

You can now connect to the NAM to monitor and capture traffic of the Data Port 2 data source.

Sending ERSPAN Data Directly to the NAM Management Interface

To send the data directly to the NAM management IP address (management-port), configure the ERSPAN source session. No ERSPAN destination session configuration is required. After performing this configuration on the Catalyst 6500 switch or Cisco 7600 series router, the ERSPAN data source should appear on the NAM GUI and can then be selected to analyze the ERSPAN traffic.

Note This method affects NAM performance and accessibility.

Sample Configuration

```
monitor session 1 type erspan-source
no shut
source interface Fa3/47
    destination
        erspan-id  Y
        ip address aa.bb.cc.dd
        origin ip address ee.ff.gg.hh
```

Where:

- Interface fa3/47 is a local interface on the erspan-source switch to be monitored
- *Y* is any valid span session number
- *aa.bb.cc.dd* is the management IP address of the NAM
- *ee.ff.gg.hh* is the source IP address of the ERSPAN traffic

Monitoring

Before you can monitor data, you must set up the data collections in the Monitor option of the Setup tab. For information on data collections, see the "Overview of Data Collection and Data Sources" section on page 4-2. There are options to set up the following:

- Monitoring Core Data, page 3-47
- Monitoring Voice Data, page 3-50
- Monitoring RTP Stream Traffic, page 3-51
- Monitoring Response Time Data, page 3-53
- Monitoring DiffServ Data, page 3-57
- Setting Up the DiffServ Profile, page 3-58
- Monitoring URL Collection Data, page 3-59

Monitoring Core Data

You can enable or disable individual core data collections on each available data source. The following core collections are available:

- Application Statistics—Enables the monitoring of application protocols observed on the data source.
- Host Statistics (Network and Application layers)—Enables the monitoring of network-layer host activity.
- Host Statistics (MAC layer)—Enables the monitoring of MAC-layer hosts activity. Also enables monitoring of broadcast and multicast counts for host detail windows.
- Conversation Statistics (Network and Application layers)—Enables the monitoring of pairs of network-layer hosts that are exchanging packets.
- Conversation Statistics (MAC layer)—Enables the monitoring of pairs of MAC-layer hosts that are exchanging packets.
- VLAN Traffic Statistics—Enables the monitoring of traffic distribution on different VLANs for the data source.
- VLAN Priority (CoS) Statistics—Enables the monitoring of traffic distribution using different values of the 802.1p priority field.
- Network-to-MAC Address Correlation—Enables the monitoring of MAC-level statistics which are shown in host detail windows. Without this collection, a MAC station cannot be associated with a particular network host.
- TCP/UDP Port Table—Enables the monitoring of server ports on a particular data source such as a VLAN, a physical port on the NAM, or a set of NDE flow records sent to the NAM.
- Switch engine module (Supervisor) records received by the NAM. You can select any combination of Port statistics, VLAN statistics, and NBAR statistics.
- Router engine module records (Router) received by the NAM. You can select any combination of Interface statistics and NBAR statistics.

Note MAC and VLAN collections are not available on NM-NAM or NME-NAM devices.

Note For better overall system performance, enable only the collections you want to monitor.

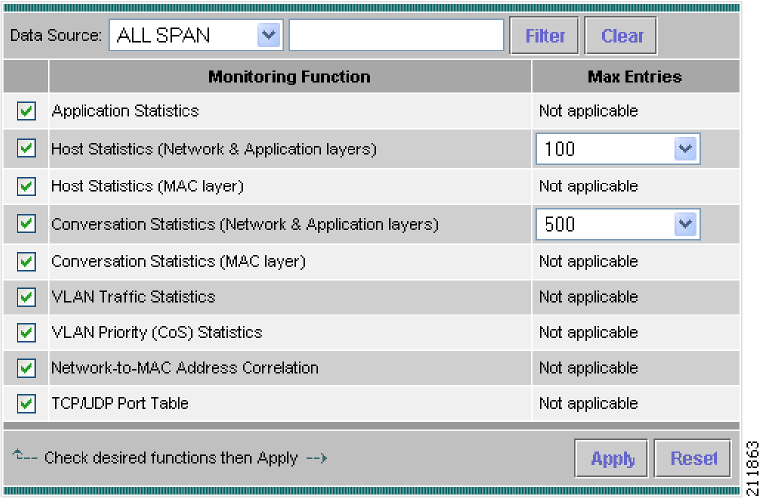
Note You must disable all reports for the collections you want to turn off. If you turn off collections that have reports running on them, the collections will automatically be turned on except for voice reports. For more information on disabling reports, see the "Disabling Reports" section on page 5-24.

To set up core monitoring functions:

Step 1 Choose **Setup** > **Monitor**.

The Core Monitoring Functions Dialog Box (Figure 3-18) displays.

Figure 3-18 Core Monitoring Functions Dialog Box



Data Source: ALL SPAN

	Monitoring Function	Max Entries
☑	Application Statistics	Not applicable
☑	Host Statistics (Network & Application layers)	100
☑	Host Statistics (MAC layer)	Not applicable
☑	Conversation Statistics (Network & Application layers)	500
☑	Conversation Statistics (MAC layer)	Not applicable
☑	VLAN Traffic Statistics	Not applicable
☑	VLAN Priority (CoS) Statistics	Not applicable
☑	Network-to-MAC Address Correlation	Not applicable
☑	TCP/UDP Port Table	Not applicable

Step 2 Select the collection data source from the Data Source drop-down menu.

To turn on core monitoring for the router, select Router from the Data Source drop-down menu. For routers, the following Data Sources are available:

- Internal
- External
- NETFLOW
- Router

To turn on core monitoring data for the switch or managed device, choose Supervisor from the drop-down menu. For switches and appliances, the following Data Sources are available:

- ALL SPAN
- VLANs
- NETFLOW
- NDE
- Supervisor

You can enter a partial name of a data source and click **Filter** to find data sources that match. Click **Clear** to return to the entire list of data sources.

Step 3 Select the check boxes to enable any combination of the following specific core monitoring functions:

- Application Statistics
- Host Statistics (Network and Application layers)
- Host Statistics (MAC layer)
- Conversation Statistics ((Network and Application layers)
- Conversation Statistics (MAC layer)
- VLAN Traffic Statistics
- VLAN Priority (CoS) Statistics
- Network-to-MAC Address Correlation
- TCP/UDP Port Table

Step 4 Select the maximum number of entries from the Max Entries lists.

Step 5 Click **Apply** to save your changes, or click **Reset** to cancel.

Enabling Mini-RMON Collection

Note This section does not apply to NM-NAM or NME-NAM devices.

Enabling Mini-RMON on the switch Supervisor allows you to monitor port statistics data from each switch port. You must enable Mini-RMON in privileged mode from the CLI. To enable Mini-RMON, do one of the following:

For Switches Running Catalyst OS

Enter the **set snmp rmon enable** command.

For Switches Running Cisco IOS Software

You must enable Mini-RMON on each individual interface.

Enter the following commands:

```
Supervisor name(config) # interface interface-name
Supervisor name(config-if) # rmon collection stats collection-control-index owner monitor
Supervisor name(config-if) # end
```

where:

- The interface-name is the name of the interface on which you are enabling Mini-RMON.
- The collection-control-index is any arbitrary number that has not yet been used.

Monitoring Voice Data

After you setup the NAM to monitor voice data, use the Monitor tab to view the collected voice data. For more information on viewing the voice data, see Viewing Voice and Video Data, page 4-23.

Note Voice monitoring features are supported with Cisco IP telephony devices only.

To set up voice monitoring:

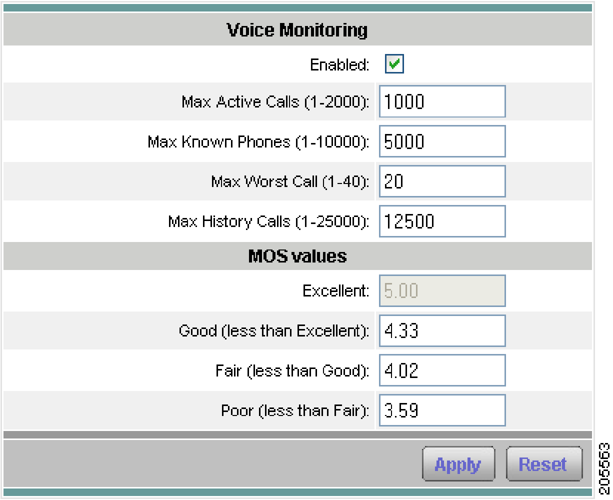
Step 1 Choose **Setup** > **Monitor**.

The Core Monitoring Functions table displays.

Step 2 In the contents, click **Voice Monitoring**.

The Voice Monitor Setup Window(Table 3-20) displays. Figure 3-19 shows an example of the Voice Monitoring Setup Window.

Figure 3-19 Voice Monitoring Setup Window



Voice Monitoring

Enabled:	☑
Max Active Calls (1-2000):	1000
Max Known Phones (1-10000):	5000
Max Worst Call (1-40):	20
Max History Calls (1-25000):	12500

MOS values

Excellent:	5.00
Good (less than Excellent):	4.33
Fair (less than Good):	4.02
Poor (less than Fair):	3.59

Step 3 Check the Enabled check box.

Step 4 Accept the default MOS Score value range or modify the values as you prefer.

Table 3-20 Voice Monitor Setup Window

Field	Description
Voice Monitoring	
Enabled	Enables voice monitoring
Max Active Calls	Maximum number of active calls to monitor
Max Known Phones	Maximum number of phones to monitor
Max Worst Call	Maximum number of worst calls to monitor. Up to 40; this is due to the number of alarm threshold crossed and the alarms they generate
Max History Calls	Maximum number of calls to store in the call archive

Table 3-20 Voice Monitor Setup Window

Field	Description
MOS Values	
Excellent	Highest quality MOS score (5.0 being highest). The default value is 5.00.
Good	Quality less than excellent; MOS score ranges from this setting to less than excellent. The default value is 4.33.
Fair	Quality less than good; MOS score ranges from this setting to less than good. The default value is 4.02.
Poor	Quality less than excellent; MOS score ranges from this setting to less than fair. The default value is 3.59.

Table 3-21, Maximum and Default Voice/Video and RTP Stream Parameters per Platform, provides the maximum numbers allowed for various voice, video, and RTP streams depending on the NAM platform. The default values for each parameter are in parenthesis.

Table 3-21 Maximum and Default Voice/Video and RTP Stream Parameters per Platform

Field	2220 Appliance	2204 Appliance	NAM-2(x)	NAM-1(x)	NME-NAM
RTP Streams	4,000 (2000)	1,500 (750)	800 (400)	400 (200)	100 (50)
Max Active Calls	2,000 (1,000)	750 (375)	400 (200)	200 (100)	50 (25)
Known Phones	10,000 (5,000)	3,500 (1,750)	2,000 (1,000)	1,000 (500)	250 (125)
Phone History	25,000 (12,500)	7,000 (3,500)	5,000 (2,500)	2,500 (1,250)	600 (300)

Note To report jitter and packet loss for the SCCP protocol, you must enable CDR on Cisco Unified CallManager. For more information on Cisco Unified CallManager, see the Cisco Unified CallManager documentation.
http://www.cisco.com/en/US/products/sw/voicesw/ps556/tsd_products_support_series_home.html

Step 5 Click **Apply** to save your changes, or click **Reset** to cancel and revert to the previous settings.

Monitoring RTP Stream Traffic

The NAM enables you to identify and monitor all RTP stream traffic among all SPANed traffic without having to know the signalling traffic used in negotiating the RTP channels. When RTP Stream Monitoring is enabled, the NAM:

- Identifies all RTP streams among the SPANed traffic
- Monitors the identified RTP traffic
- Sends **syslog** alarm messages for RTP streams that violate the packet loss thresholds

By default, the NAM can monitor up to 30 concurrent RTP streams, but you can set up the NAM to monitor from 1 to 4,000 streams. See Setting Up Voice/Video Stream Thresholds, page 3-80 for more information about how to set up NAM RTP Stream packet loss thresholds for the following:

- Number of Consecutive Packets Loss threshold

  The valid threshold value is 1 to 10 inclusive. Each RTP packet has an RTP header that contains a sequence number. The sequence number increments by one for each RTP packet received in the same RTP stream. A gap in the sequence numbers identifies a packet loss. If the gap in sequence numbers jump is more than the threshold, the NAM raises an alarm condition.

- Packet Loss (10^{-6}) threshold

  This value is accumulative per-million packet loss rate from 1 to 100 inclusive. Every time NAM detects a packet loss (sequence gap) event, the NAM calculates the per-million packet loss rate. If the computed per-million packet loss rate crosses this threshold, the NAM raises an alarm condition.

You can set up these thresholds at **Setup** > **Alarms** > **NAM RTP Stream Thresholds**.

You can define filter entries to narrow down to the subset of RTP streams so the NAM monitors only those RTP streams matching the filter criteria. For example, a filter to set up the NAM to monitor RTP streams from the subnet 209.165.201.0 to host 1.1.1.1 would be:

```
source = 209.165.201.0
source mask = 255.255.255.0
destination = 1.1.1.1
destination mask = 255.255.255.255
```

To set up RTP Stream monitoring:

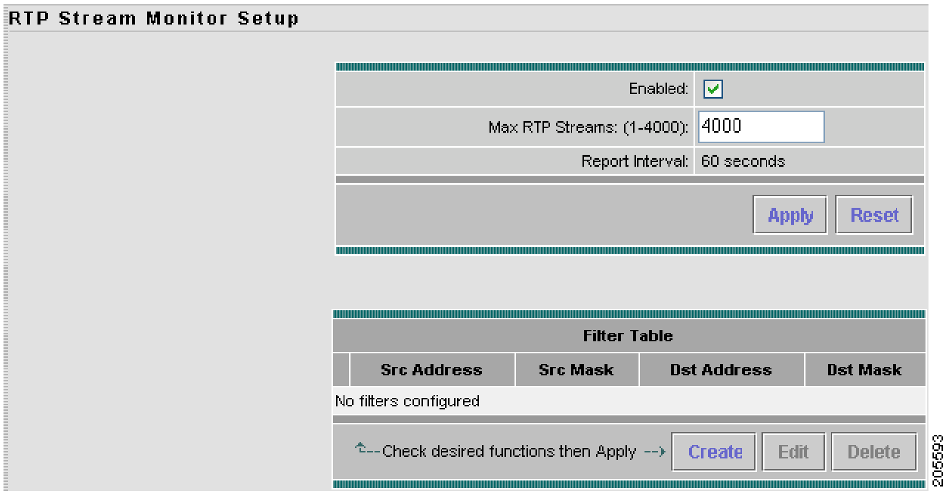
Step 1 Choose **Setup** > **Monitor**.

The Core Monitoring Functions table displays.

Step 2 In the contents, click **RTP Stream Monitoring**.

The RTP Stream Setup window displays with two distinct areas. Figure 3-20 shows an example of the RTP Stream Monitoring Setup window.

Figure 3-20 RTP Stream Monitoring Setup Window



RTP Stream Monitor Setup

Enabled: ☑

Max RTP Streams: (1-4000): 4000

Report Interval: 60 seconds

Filter Table

Src Address	Src Mask	Dst Address	Dst Mask
No filters configured			

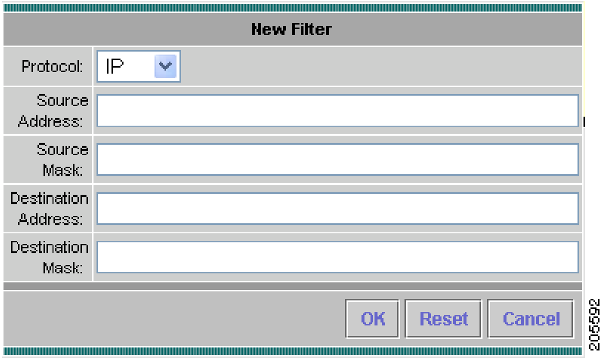
Step 3 Click the Enabled check box to enable RTP stream monitoring.

Step 4 Enter the maximum number of RTP streams to monitor (up to 4,000).

Step 5 In the Filter Table area, click Create to enter filtering data.

The New Filter window (Figure 3-21) appears with fields for you to enter both the source and destination IP address and address mask for the RTP streams to monitor.

Figure 3-21 Setup RTP Stream Monitoring New Filter Window


New Filter

Protocol: IP

Source Address:

Source Mask:

Destination Address:

Destination Mask:

Step 6 Choose the protocol to monitor from the pull-down menu, IP or IPv6.

Step 7 Enter the source and destination address information and click **OK**, or click **Cancel** to abort.

Click **Reset** to clear all fields of the New Filter dialog box.

Step 8 Click **Apply** to begin monitoring.

Click **Reset** to clear the values you might have modified to their previous set values.

Monitoring Response Time Data

You can monitor response time to collect the response time between a client and a server. You can enable or disable response time monitoring on individual collection data sources. When you enable response time monitoring, the application supplies the default collection parameters.

The response time monitoring option is on by default; however to monitor response time data, you must enable response time monitoring in the NAM Traffic Analyzer application.

These topics help you set up and manage response time monitoring:

- Setting Up Response Time Configuration, page 3-54
- Setting Up Response Time Data Monitoring, page 3-55
- Creating a Response Time Monitoring Collection, page 3-56
- Editing a Response Time Monitoring Collection, page 3-56
- Deleting Response Time Data Collections, page 3-57

Setting Up Response Time Configuration

To configure the timing parameters (or *buckets*) for response time data collections:

Step 1 Choose **Setup** > **Monitor**.

The Core Monitoring Functions table displays.

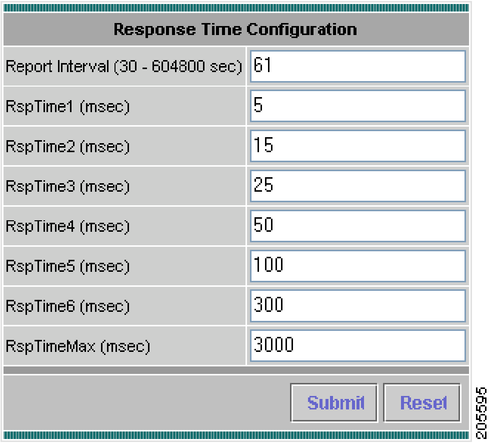
Step 2 In the contents, click **Response Time - Configuration**.

The Response Time Monitoring Setup, Collection Configuration window displays. See Figure 3-22, Response Time Configuration Window. The settings you make on this window comprise the time distribution in milliseconds for the detailed Server Application Response Time data collection.

Table 3-22 lists the time settings for the Response Time Configuration window.

Note These settings apply globally for all ART collections, including those you create using SNMP. The method you use last overrides previous settings. So if you change the settings using the GUI, those settings will override the settings made using SNMP, and vice versa.

Figure 3-22 Response Time Configuration Window



Response Time Configuration

Report Interval (30 - 604800 sec)	61
RspTime1 (msec)	5
RspTime2 (msec)	15
RspTime3 (msec)	25
RspTime4 (msec)	50
RspTime5 (msec)	100
RspTime6 (msec)	300
RspTimeMax (msec)	3000

Table 3-22 Response Time Configuration Window

Field	Description	Usage Notes
Report Interval (sec)	Number of seconds between reports	Enter a number in seconds. The default is 300.
RspTime1 (msec)	Upper response time limit for the first bucket	Enter a number in milliseconds. The default is 5.
RspTime2 (msec)	Upper response time limit for the second bucket	Enter a number in milliseconds. The default is 10.
RspTime3 (msec)	Upper response time limit for the third bucket	Enter a number in milliseconds. The default is 50.
RspTime4 (msec)	Upper response time limit for the fourth bucket	Enter a number in milliseconds. The default is 100.

Table 3-22 Response Time Configuration Window (continued)

Field	Description	Usage Notes
RspTime5 (msec)	Upper response time limit for the fifth bucket	Enter a number in milliseconds. The default is 200.
RspTime6 (msec)	Upper response time limit for the sixth bucket	Enter a number in milliseconds. The default is 500.
RspTimeMax (msec)	The maximum interval that the NAM waits for a server response to a client request	Enter a number in milliseconds. The default is 1000.

Step 3 Accept the default settings or change the settings to the values you want to monitor. Click **Submit** to save your changes, or click **Reset** to cancel.

Setting Up Response Time Data Monitoring

To configure response time monitoring:

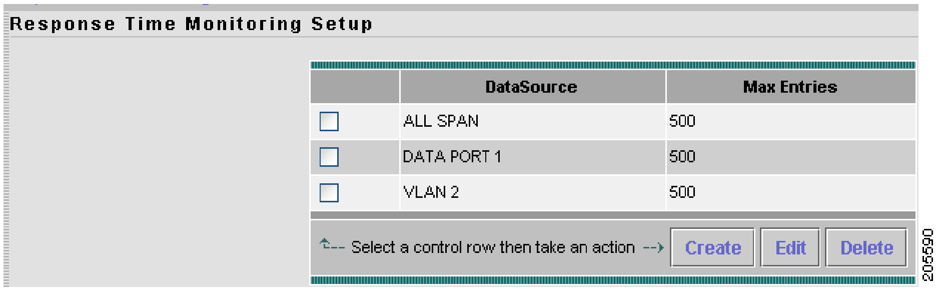
Step 1 Choose **Setup** > **Monitor**.

The Core Monitoring Functions table displays.

Step 2 In the contents, click **Response Time - Monitoring**.

The Response Time Monitoring Setup table displays any data sources you might have already set up for response time monitoring as shown in Figure 3-23, Response Time Monitoring Setup.

Figure 3-23 Response Time Monitoring Setup



Response Time Monitoring Setup

	DataSource	Max Entries
□	ALL SPAN	500
□	DATA PORT 1	500
□	VLAN 2	500

Click **Create** to add another data source for which you want to monitor response time data. Check a data source and click **Edit** to modify the data source. Check a data source and click **Delete** to remove the data source.

Creating a Response Time Monitoring Collection

To create a response time monitoring collection:

Step 1 Choose **Setup** > **Monitor**.

The Core Monitoring Functions table displays.

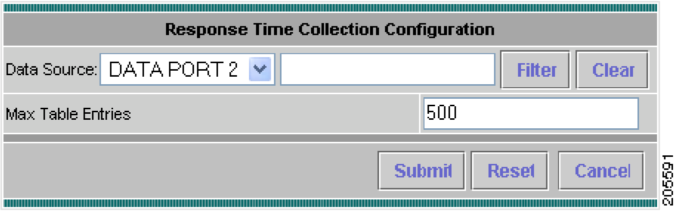
Step 2 In the contents, click **Response Time - Monitoring**.

The Response Time Monitoring Setup table displays any data sources you might have already set up for response time monitoring as shown in Figure 3-23, Response Time Monitoring Setup.

Step 3 Click **Create**.

The Response Time Monitoring Setup, Collection Configuration window displays as shown in Figure 3-24.

Figure 3-24 Response Time Monitoring Setup, Collection Configuration



Response Time Collection Configuration

Data Source: DATA PORT 2

Max Table Entries: 500

Step 4 Choose a data source from the drop-down menu, or enter a partial name in the empty field and click **Filter** to locate a specific data source from its partial name.

NAM 4.0 will build a table of response time data based on the number of entries you specify in Max. Table Entries and the timings you configured in Setting Up Response Time Configuration, page 3-54.

Step 5 Modify the number of table entries, or accept the default of 500 table entries and click **Submit**.

The new data source is listed as a Data Source when the Response Time Monitoring Setup window displays.

Editing a Response Time Monitoring Collection

To edit a response time monitoring collection:

Step 1 Choose **Setup** > **Monitor**.

The Core Monitoring Functions table displays.

Step 2 In the contents, click **Response Time - Monitoring**.

The Response Time Monitoring Setup table displays any data sources you might have already set up for response time monitoring as shown in Figure 3-23, Response Time Monitoring Setup.

Step 3 Check the data source you want to modify and click **Edit**.

The Response Time Monitoring Setup, Collection Configuration window displays as shown in Figure 3-24.

Step 4 Make the changes you want to the data source collection, then click **Submit**.

The modified data source displays as a Data Source when the Response Time Monitoring Setup window displays.

Deleting Response Time Data Collections

To delete one or more response time data collections:

Step 1 Choose **Setup** > **Monitor**.

The Core Monitoring Functions table displays.

Step 2 In the contents, click **Response Time - Monitoring**.

The Response Time Monitoring Setup table displays any data sources you might have already set up for response time monitoring.

Step 3 Check one or more of the data source collections listed, then click **Delete**.

Monitoring DiffServ Data

Differentiated services monitoring (DSMON or DiffServ) is designed to monitor the network traffic usage of differentiated services code point (DSCP) values.

To monitor DiffServ data, you must configure at least one aggregation profile and one or more aggregation groups associated with each profile. For more information on configuring an aggregation profile, see the "Creating a DiffServ Profile" section on page 3-58.

To set up monitoring of differentiated services:

Step 1 Choose **Setup** > **Monitor**.

The Core Monitoring Functions table displays.

Step 2 In the contents under DiffServ, click **Monitoring**.

The DiffServ Monitor Setup Dialog Box (Table 3-23) displays.

You can enter a partial name of a data source and click **Filter** to find data sources that match. Click **Clear** to return to the entire list of data sources.

Step 3 Select the appropriate information.

Table 3-23 DiffServ Monitor Setup Dialog Box

Element	Description	Usage Notes
Data Source List	Lists the data sources available.	Select the data source from the list.
DiffServ Profile List	Lists the user defined DiffServ profiles available.	Select the user-defined DiffServ profile from the list.
Traffic Statistics	Shows basic DSCP traffic distribution.	Select to enable or deselect to disable.

Table 3-23 DiffServ Monitor Setup Dialog Box (continued)

Element	Description	Usage Notes
Application Statistics	Shows DSCP traffic distribution by application protocol.	Select to enable or deselect to disable. Select the maximum number of entries from the Max Entries list.
IP Host Statistics	Shows DSCP traffic distribution by host.	Select to enable or deselect to disable. Select the maximum number of entries from the Max Entries list.

Step 4 Click **Apply** to save your changes, or click **Reset** to cancel.

Setting Up the DiffServ Profile

A DiffServ profile is a set of aggregation groups that can be monitored as a whole. After you create the proper profile(s), you can enable DiffServ collection. For more information on setting up DiffServ collections, see the "Monitoring DiffServ Data" section on page 3-57.

These topics help you set up and manage the DiffServ profile:

- Creating a DiffServ Profile, page 3-58
- Editing a DiffServ Profile, page 3-59
- Deleting a DiffServ Profile, page 3-59

Creating a DiffServ Profile

To create a DiffServ profile:

Step 1 Choose **Setup** > **Monitor**.

The Core Monitoring Functions table displays.

Step 2 In the contents under DiffServ, click **Profile**.

The DiffServ Monitor Profile Dialog Box displays.

Step 3 Click **Create**.

The DiffServ Profile Setup Dialog Box (Table 3-24) displays.

Step 4 Select the appropriate information.

Table 3-24 DiffServ Profile Setup Dialog Box

Element	Description	Usage Notes
Template List	Templates for creating a differentiated services profile.	Select the template from the list. Select NONE if you are not using a template.
Profile Name text box	Name of the profile.	Enter the name of the profile you are creating. The maximum is 64 characters.

Table 3-24 DiffServ Profile Setup Dialog Box (continued)

Element	Description	Usage Notes
DSCP Value column	DSCP numbers from 0 to 63.	—
Group Description text boxes	Name of the aggregation group for each DSCP value.	Enter the name of the aggregation group for each DSCP value. The maximum is 64 characters.

Step 5 Click **Submit** to save your changes, or click **Reset** to cancel.

Editing a DiffServ Profile

To edit a DiffServ profile:

Step 1 Choose **Setup** > **Monitor**.

The Core Monitoring Functions table displays.

Step 2 In the contents under DiffServ, click **Profile**.

The DiffServ Monitor Profile Table displays.

Step 3 Select the profile to edit, then click **Edit**.

The DiffServ Profile Setup Dialog Box (Table 3-24) displays.

Step 4 Make the necessary changes, then click **Submit** to save your changes, or click **Reset** to cancel.

Deleting a DiffServ Profile

To delete one or more DiffServ profiles, simply select the profiles from the DiffServ Monitor Profile table, then click **Delete**.

Monitoring URL Collection Data

The URL collection listens to HTTP traffic (TCP port 80) on a selected datasource and collects URLs. Only one collection on a single datasource can be enabled at a time.

A URL, for example: **http://host.domain.com/intro?id=123**, consists of a host part (**host.domain.com**), a path part (**intro**), and an arguments part (**?id=123**).

The collection can be configured to collect all parts or it can configured to collect only some of the parts and ignore others.

This section contains the following sections:

- Enabling a URL Collection
- Changing a URL Collection
- Disabling a URL Collection

Enabling a URL Collection

To enable a URL collection:

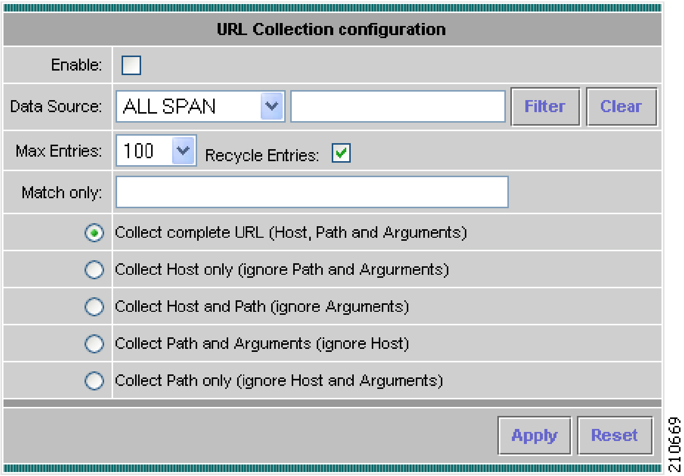
Step 1 Choose **Setup** > **Monitor.**

The Core Monitoring Functions table displays.

Step 2 Click **URL Collection**.

The URL Collection Configuration Dialog Box (Figure 3-25) displays.

Figure 3-25 URL Collection Configuration Dialog Box



URL Collection configuration

Enable: □

Data Source: ALL SPAN

Max Entries: 100 Recycle Entries: ☑

Match only:

● Collect complete URL (Host, Path and Arguments)

○ Collect Host only (ignore Path and Argurments)

○ Collect Host and Path (ignore Arguments)

○ Collect Path and Arguments (ignore Host)

○ Collect Path only (ignore Host and Arguments)

Step 3 Click the Enable check box to initiate URL Collection.

Step 4 Provide the information described in the URL Collection Configuration Dialog Box (Table 3-25).

You can enter a partial name of a data source and click **Filter** to find data sources that match. Click **Clear** to return to the entire list of data sources.

Note Depending on which radio button option is collected, the format of the URL varies. For example, the leading *http:* part is only present if the *host* part is collected. Keep this variable in mind, when configuring a *match only* expression.

:

Table 3-25 URL Collection Configuration Dialog Box

Element	Description	Usage Notes
Datasource	Identifies type of traffic incoming from the application.	Select one of the options from the drop down box.

Table 3-25 URL Collection Configuration Dialog Box (continued)

Element	Description	Usage Notes
Max Entries	Maximum number of URLS to collect.	Select one of the following options from the drop down box: • 100 • 500 • 1000
Match only	The application URL to match.	Optional parameter to limit collection of URLs that match the regular expression of this field.

Step 5 Click the Recycle Entries check box to recycle entries.

Step 6 Click the check box for one of the following:

- Collect complete URL (Host, Path and Arguments)
- Collect Host only (ignore Path and Arguments)
- Collect Host and Path (ignore Arguments)
- Collect Path and Arguments (ignore Host)
- Collect Path only (ignore Host and Arguments)

Step 7 Click **Apply** to save your changes, or click **Reset** to cancel.

Changing a URL Collection

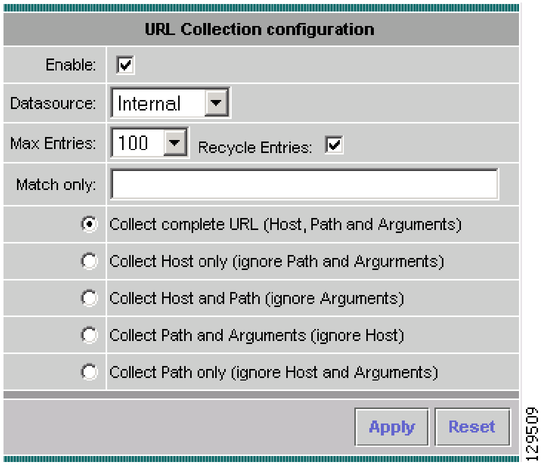
To change a URL collection:

Step 1 Choose **Setup** > **Monitor**.

Step 2 Select **URL Collection**.

The URL Collection Configuration Dialog Box (Figure 3-26) displays.

Figure 3-26 URL Collection Configuration Dialog Box



URL Collection configuration

Enable: ☑

Datasource: Internal

Max Entries: 100 Recycle Entries: ☑

Match only:

● Collect complete URL (Host, Path and Arguments)

○ Collect Host only (ignore Path and Argurments)

○ Collect Host and Path (ignore Arguments)

○ Collect Path and Arguments (ignore Host)

○ Collect Path only (ignore Host and Arguments)

Step 3 Change the information as described in the URL Collection Configuration Dialog Box (Table 3-25).

Note Changing any parameters and applying the changes flushes the collected URLs and restarts the collection process.

Step 4 Click **Apply** to save your changes, or click **Reset** to cancel.

Disabling a URL Collection

To disable a URL collection:

Step 1 Choose **Setup** > **Monitor**.

Step 2 Click **URL Collection**.

Step 3 Uncheck the Enabled check box.

Step 4 Click **Apply**.

Protocol Directory

The NAM contains a default set of protocols to be monitored. You can edit and delete protocols from the RMON2 protocol directory table on the NAM.

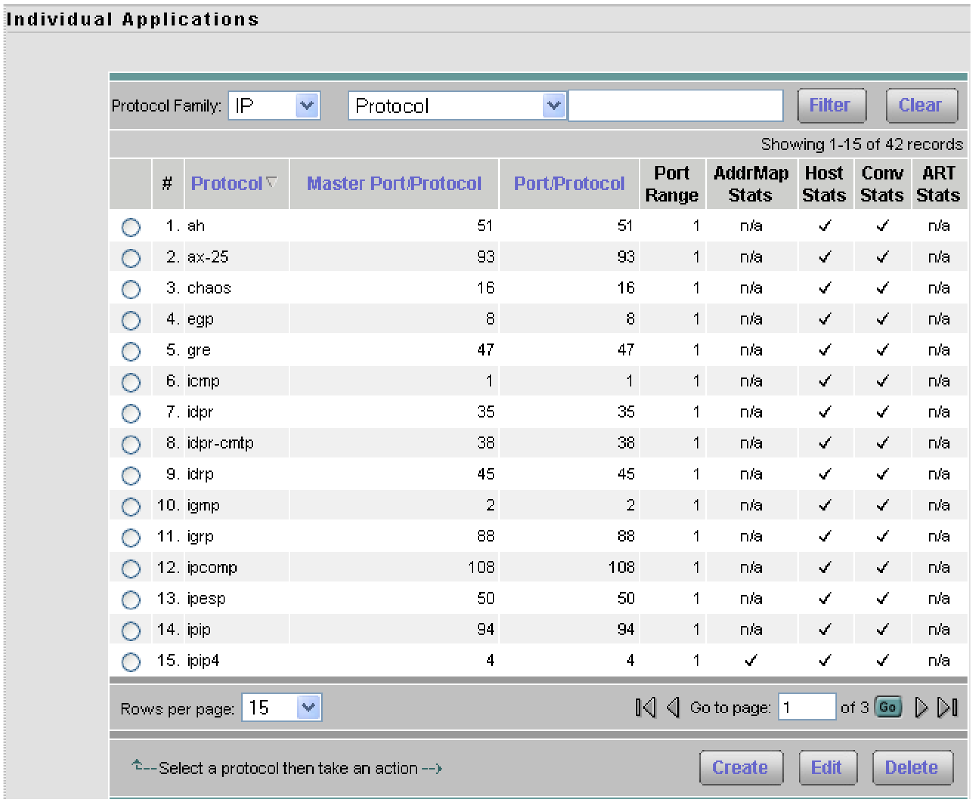
These topics enable you to manage the protocol directory:

- Individual Applications, page 3-63
- Setting Up Application Groups, page 3-67
- Setting Up Autolearned Protocols, page 3-69
- Setting Up URL-Based Applications, page 3-70

Individual Applications

The Individual Applications window (Figure 3-27) lists protocols that have been set up for this NAM. To view the Individual Applications window, click **Setup** > **Protocol Directory** > **Individual Applications**. Use this window to view, add proprietary protocols, and to edit the settings for well-known protocols.

Figure 3-27 Protocol Directory Table



Individual Applications

Protocol Family: IP   Protocol

Showing 1-15 of 42 records

	#	Protocol	Master Port/Protocol	Port/Protocol	Port Range	AddrMap Stats	Host Stats	Conv Stats	ART Stats
○	1.	ah	51	51	1	n/a	✓	✓	n/a
○	2.	ax-25	93	93	1	n/a	✓	✓	n/a
○	3.	chaos	16	16	1	n/a	✓	✓	n/a
○	4.	egp	8	8	1	n/a	✓	✓	n/a
○	5.	gre	47	47	1	n/a	✓	✓	n/a
○	6.	icmp	1	1	1	n/a	✓	✓	n/a
○	7.	idpr	35	35	1	n/a	✓	✓	n/a
○	8.	idpr-cmtp	38	38	1	n/a	✓	✓	n/a
○	9.	idrp	45	45	1	n/a	✓	✓	n/a
○	10.	igmp	2	2	1	n/a	✓	✓	n/a
○	11.	igrp	88	88	1	n/a	✓	✓	n/a
○	12.	ipcomp	108	108	1	n/a	✓	✓	n/a
○	13.	ipesp	50	50	1	n/a	✓	✓	n/a
○	14.	ipip	94	94	1	n/a	✓	✓	n/a
○	15.	ipip4	4	4	1	✓	✓	✓	n/a

Rows per page: 15   Go to page: 1 of 3

This section provides the following sections:

- Creating a New Protocol, page 3-63
- Editing a Protocol, page 3-65
- Deleting a Protocol, page 3-66

Creating a New Protocol

You can create additional protocol ports to enable the NAM to handle additional protocol traffic for standard protocols.

To create a new protocol:

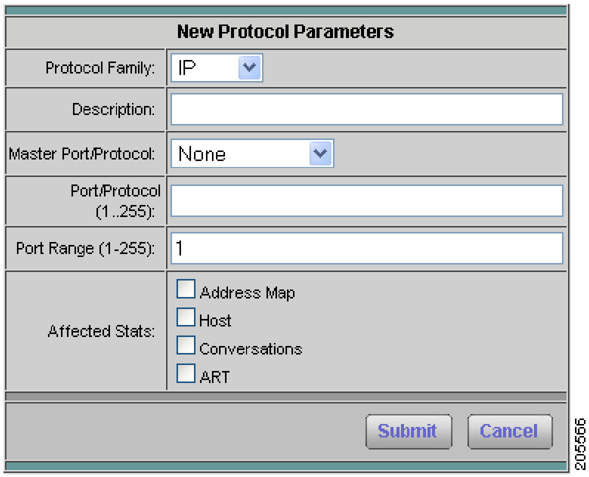
Step 1 Choose **Setup** > **Protocol Directory**.

The Protocol Directory Table (Figure 3-27) displays.

Step 2 Click **Create**.

The New Protocol Parameters window (Figure 3-28) displays.

Figure 3-28 New Protocol Parameters Window



New Protocol Parameters

Protocol Family:	IP
Description:	
Master Port/Protocol:	None
Port/Protocol (1..255):	
Port Range (1-255):	1
Affected Stats:	□ Address Map □ Host □ Conversations □ ART

Table 3-26 describes the fields of the New Protocol Parameters Dialog.

Table 3-26 New Protocol Parameters Dialog

Field	Description
Protocol Family	Use the pull-down menu to choose a protocol: • IP • TCP • UDP • STCP
Description	Description of the protocol you create
Master Port/Protocol	Standard protocol port depending on the protocol family you choose
Port/Protocol	Arbitrary port you assign to handle the additional ports for the protocol family. This protocol number must be unique so it does not conflict with standard protocol/port assignments. • The range is 1-255 for IP • The range is 1-65535 for TCP, UDP, and SCTP.
Port Range	Range of ports for the protocol you create
Affected Stats	• Address Map • Host • Conversations • ART **Note** You must choose a type of Affected Stats for the traffic type you want to monitor.

Step 3 Use the pull-down menu to choose a Protocol Family.

Choose the protocol for the type of traffic you want to create the additional protocol to handle.

Step 4 Enter a description of the protocol you create.

Step 5 Use the pull-down menu to choose the master port for the type of traffic you want the new protocl to handle.

If you select a Master Port/Protocol, this extends the master protocol to cover the port/protocol you assign as well. Traffic on the port/protocol you create is treated as though it were traffic on the Master Port/Protocol. In this case, you cannot edit the Description or Affected Stats.

If you do not choose a Master Port/Protocol (None), the protocol you create is an independent protocol. You must still provide values for the Description and Affected Stats.

Step 6 Enter an integer to use as the beginning port number for the protocol you want to create.

The range is 1-255 for IP and 1-65535 for TCP, UDP, and SCTP.

Step 7 Enter the number of ports you want to create to assign to the protocol you create.

If you assign the new protocol to port 239, for example, and enter a range of four (4), the protocol you create will use ports 239, 240, 241, and 242 to handle traffic for the new protocol.

Step 8 For Affected Stats, check the type of statistics for the traffic you want to monitor.

Step 9 Click **Submit** to create the new protocol ports, or click **Cancel** to clear the dialog of any characters you entered or restore the previous settings.

Tip To view the full protocol name, move the cursor over the protocol name in the Protocol column of the Protocol Directory table.

Editing a Protocol

We recommend that you do not change any settings in the NAM protocol directory. Changing the default settings might cause unexpected behavior in SNMP-based management applications such as NetScout nGenius Real-Time Monitor. However, advanced users might want to monitor proprietary protocols or alter the normal settings for well-known protocols.

To edit a protocol:

Step 1 Choose **Setup** > **Protocol Directory**.

The Protocol Directory table displays.

Step 2 Select the protocol to edit, then click **Edit**.

The Edit Protocol Dialog Box(Table 3-27) displays.

Step 3 Make the necessary changes.

Table 3-27 Edit Protocol Dialog Box

Field	Description	Usage Notes
Name	The name of the protocol.	
Currently displayed as	Protocol name as it appears in the Protocol Directory table.	
Port Range	Port Range for this protocol	
Encapsulation	Protocol encapsulation type.	
Affected Stats	The statistics that can be collected for the protocol: • Address Map • Hosts • Conversations • ART	A statistic is grayed out if it is not available for the protocol.

Step 4 Do one of the following:

- To accept the changes, click **Submit**.
- To leave the configuration unchanged, click **Cancel**.
- To delete the protocol, click **Delete**.

Tip

- You can display the Edit Protocol dialog box for a specific protocol by clicking on the protocol name in the Protocol Directory table.
- To view the full protocol name, move the cursor over the protocol name in the Protocol column of the Protocol Directory table.

Deleting a Protocol

To delete a protocol, simply select it from the Protocol Directory table, then click **Delete**.

Tip You can also delete a protocol from the Edit Protocol Directory dialog box. Select the protocol, then click **Delete**.

Setting Up Encapsulation

Using Encapsulation Configuration gives you increased flexibility when trying to monitor (such as counting or grouping) different types of application traffic. Encapsulation Configuration enables you to configure how you want the NAM to handle IP tunnel encapsulations.

You can use the NAM to set up the way you monitor different types of encapsulation in network traffic for the following protocols:

- IPIP4—IP in IP tunneling
- GREIP—IP over GRE tunneling
- IPESP—IP with Encapsulating Security Payload

When set to IGNORE, the default mode, the NAM uses *application-based* counting. The encapsulation type is ignored, and the NAM counts all application traffic but ignores tunneled traffic. When you turn on Encapsulation Configuration for one or more protocols, you enable the NAM to count separately for *tunnel-based* counting in addition to application-based counting. When you turn off Encapsulation Configuration for one or more protocols, the NAM uses *tunnel-based* counting, and all traffic over the specified protocol is counted as the tunnel protocol. Figure 3-29 shows the Encapsulation Configuration dialog box.

To configure encapsulation:

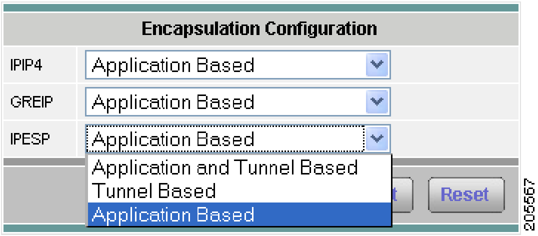
Step 1 Choose **Setup** > **Protocol Directory**.

The Protocol Directory table appears.

Step 2 Select **Encapsulations** from the Content menu.

The Individual Applications Encapsulation Configuration window displays.

Figure 3-29 Encapsulation Configuration



Encapsulation Configuration

IPIP4: Application Based
GREIP: Application Based
IPESP: Application Based

Step 3 Use the pull-down menu to choose the type of Encapsulation Configuration you want for each protocol.

Step 4 Click **Submit** to change the Encapsulation Configuration.

Click **Reset** to revert to the previous settings since the last **Submit**.

Setting Up Application Groups

An application group is a set of application protocols that can be monitored as a whole. The following topics help you set up and manage the application group:

- Creating an Application Group, page 3-67
- Editing an Application Group, page 3-68
- Deleting an Application Group, page 3-68

Creating an Application Group

To create an application group:

Step 1 Choose **Setup** > **Protocol Directory**.

The Protocol Directory table displays.

Step 2 Select **Application Groups** from the Content menu.

Step 3 Click **Create**.

The New Application Group Dialog Box (Table 3-28) displays.

Step 4 Enter the *application group name*.

Step 5 Select the appropriate information.

Table 3-28 New Application Group Dialog Box

Element	Description	Usage Notes
Application Group Name	Group Name	Enter the group name.
Encapsulation	Encapsulation of the application.	Select the encapsulation from the drop down box.
Application Filter	Options to filter or clear.	Enter the name of the protocol you are filtering. The maximum is 64 characters.
Application	List of applications	Select an application and click **Add**. Applications appear in the Selected Applications box.

Step 6 Click **Submit** to save your changes, or click **Reset** to cancel.

Editing an Application Group

To edit an application group:

Step 1 Choose **Setup** > **Protocol Directory**.

The Individual Applications window displays.

Step 2 Select Application Groups from the Content menu.

The Application Groups window displays.

Step 3 Select the application group to edit, then click **Edit**.

The Application Groups Edit window displays.

Step 4 Make the necessary changes, then click **Submit** to save your changes, or click **Reset** to cancel.

Deleting an Application Group

To delete one or more application groups, simply select the profiles from the Application Groups table, then click **Delete**.

Setting Up Autolearned Protocols

The Autolearned Protocols Preferences window allows you to configure the NAM to automatically learn application information. You can set the following preferences:

- Number of protocols to be learned (100 - 500)
- Number of TCP ports to be learned (0 - 65535)
- Number of UDP ports to be learned (0 - 65535)
- Range of TCP ports NOT to be learned (1 - 65535)
- Range of UDP ports NOT to be learned (1 - 65535)

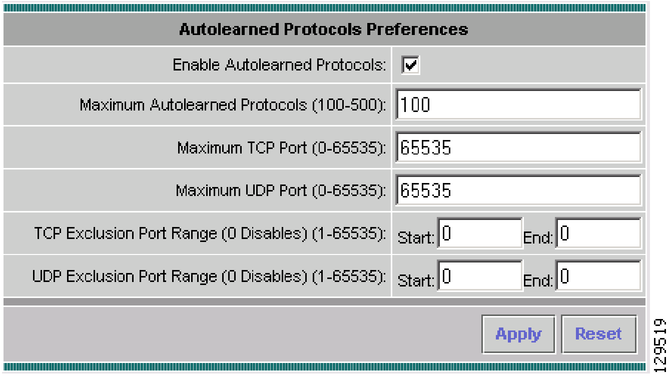
To set up Autolearned Protocol preferences:

Step 1 Choose **Setup** > **Protocol Directory**.

Step 2 Click **Autolearned Applications**.

The Autolearned Protocols Preferences Dialog Box (Figure 3-30) displays.

Figure 3-30 Autolearned Protocols Preferences Dialog Box



Autolearned Protocols Preferences

Enable Autolearned Protocols: ☑

Maximum Autolearned Protocols (100-500): 100

Maximum TCP Port (0-65535): 65535

Maximum UDP Port (0-65535): 65535

TCP Exclusion Port Range (0 Disables) (1-65535): Start: 0 End: 0

UDP Exclusion Port Range (0 Disables) (1-65535): Start: 0 End: 0

Step 3 Enter or change the information described in the Autolearned Protocols Preferences Dialog Box (Table 3-29).

Table 3-29 Autolearned Protocols Preferences Dialog Box

Field	Description	Usage Notes
Enable Autolearned Protocols	Enables the Autolearned Protocols feature.	Click checkbox to enable.
Maximum Autolearned Protocols	The maximum number of protocols that can be autolearned.	Enter a number from 100 to 500. The default is 100.
Maximum TCP Port	The maximum number of TCP ports that can be autolearned.	Enter a number from 0 to 65535.
Maximum UDP Port	The maximum number of UDP ports that can be autolearned.	Enter a number from 0 to 65535.
TCP Exclusion Port Range	Specifies range of TCP ports to be excluded.	Enter a number from 0 to 65535. (0 Disables)

Table 3-29 Autolearned Protocols Preferences Dialog Box (continued)

Field	Description	Usage Notes
Start	Specifies start of TCP ports to be excluded.	
End	Specifies end of TCP ports to be excluded.	
UDP Exclusion Port Range:	Specifies range of UDP ports to be excluded.	Enter a number from 0 to 65535. (0 Disables)
Start	Specifies start of UDP ports to be excluded.	
End	Specifies start of UDP ports to be excluded.	

Step 4 Click **Apply** to save your changes, or click **Reset** to cancel.

Setting Up URL-Based Applications

URL-based applications are extensions to the protocol directory. When the URL in an HTTP request (a URL on TCP port 80) matches the criteria of a URL-based application, the traffic is classified as that protocol.

A URL-based application can be used the same way as any other protocol in the protocol directory. For example, a URL-based application can be used in collections, captures, and reports.

An incoming URL is matched against the criteria of the configured URL-based application, in the order of the index, until a match is found. When a match is found, the remaining URL-based applications are not considered.

This section contains the following sections:

- Creating a URL-Based Application
- Editing a URL-Based Application
- Deleting a URL-based Application

Creating a URL-Based Application

A URL consists of the following parts:

- a host
- a path
- an argument

For example, in the URL **http://host.domain.com/intro?id=123**:

- the *host* part is **host.domain.com**
- the *path* part is **/intro**
- the *argument* part is **?id=123**

In the configuration of an URL-based application, the path part and the argument path are combined and called the *path part*.

Note The match strings of the URL-based applications are POSIX limited regular expressions.

Note A maximum of 64 URL-based applications can be defined.

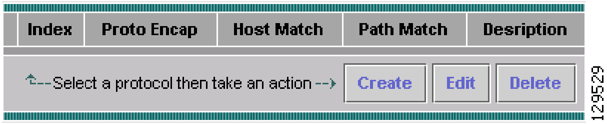
To set up URL-based applications:

Step 1 Choose **Setup** > **Protocol Directory**.

Step 2 Click **URL-Based Applications** in the TOC.

The URL Matches Dialog Box (Figure 3-31) displays.

Figure 3-31 URL Matches Dialog Box



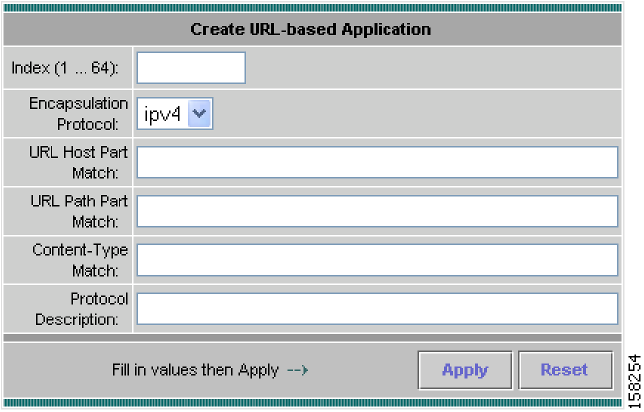
Index	Proto Encap	Host Match	Path Match	Desription

↖--Select a protocol then take an action -->

Step 3 Click **Create**.

The Create URL Match Entry Dialog Box (Figure 3-32) displays.

Figure 3-32 Create URL Match Entry Dialog Box



Create URL-based Application

Index (1 ... 64):	
Encapsulation Protocol:	ipv4
URL Host Part Match:	
URL Path Part Match:	
Content-Type Match:	
Protocol Description:	

Fill in values then Apply -->

Step 4 Enter the information described in the URL Match Entry Dialog Box (Table 3-30).

RFC 2895 specifies rules for creating a protocol name. In accordance with these rules, only the following characters are allowed:

- A through Z
- a through z
- 0 through 9
- dash (-)

- underbar (_)
- asterisk (*)
- plus (+)

Note All other characters are changed to a dash (-).

Table 3-30 URL Match Entry Dialog Box

Field	Description	Usage Notes
Index	URL Matches are executed in order of the Index	Enter a number from 1 to 64. To change an index, the entry needs to be deleted and recreated with the new index value.
Encapsulation Protocol	The protocol that encapsulates the URL	Select IPv4 or IPv6 from the drop down box.
URL Host Part Match	POSIX regular expression that the host part is matched against	For example: **domain.com**.
URL Path Part Match	POSIX regular expression that the path and argument part of a URL is matched against	For example: **/intro?id**.
Content Type Match	Content-Type in HTTP headers that identify the data type the message; also known as MIME types	For example: application/octet-stream, text/html, or image/gif
Protocol Description	Name of the URL based application	For example: **url-match-domain-com**.

Step 5 Click **Apply** to save your changes, or click **Reset** to cancel.

Editing a URL-Based Application

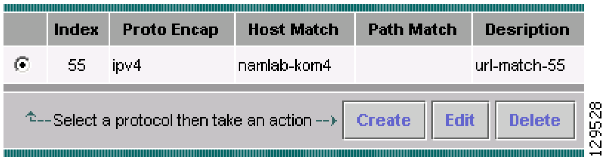
To edit URL-based applications:

Step 1 Choose **Setup** > **Protocol Directory**.

Step 2 Click **URL-Based Applications** in the TOC.

The URL Matches Dialog Box (Figure 3-33) displays.

Figure 3-33 URL Matches Dialog Box



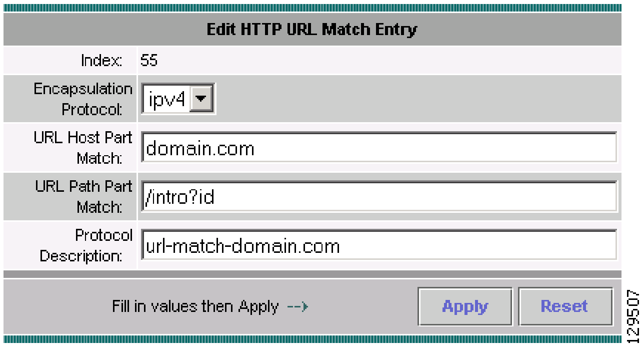
	Index	Proto Encap	Host Match	Path Match	Desription
●	55	ipv4	namlab-kom4		url-match-55

Step 3 Select a URL and click **Edit**.

The Edit URL Match Entry Dialog Box (Figure 3-34) displays.

Note When editing a URL-based application, the index can not be changed. To change the index (to change the order of execution) delete the URL-based application and recreate it.

Figure 3-34 Edit URL Match Entry Dialog Box



Edit HTTP URL Match Entry

Index:	55
Encapsulation Protocol:	ipv4
URL Host Part Match:	domain.com
URL Path Part Match:	/intro?id
Protocol Description:	url-match-domain.com

Change the information as described in the URL Match Entry Dialog Box (Table 3-30).

Step 4 Click **Apply** to save your changes, or click **Reset** to cancel.

Deleting a URL-based Application

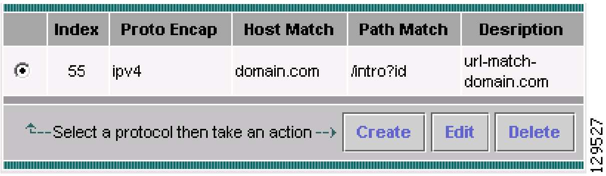
To delete a URL-based application:

Step 1 Choose **Setup** > **Protocol Directory**.

Step 2 Click **URL-Based Applications** in the TOC.

The URL Matches Dialog Box (Figure 3-35) displays.

Figure 3-35 URL Matches Dialog Box



	Index	Proto Encap	Host Match	Path Match	Desription
◉	55	ipv4	domain.com	/intro?id	url-match-domain.com

Step 3 Choose a URL and click **Delete**.

Setting Up Alarm Events and Thresholds

You can set up alarm thresholds by defining threshold conditions for the following monitored variables on the NAM:

- Response times
- Server-client response times
- DiffServ host statistics
- DiffServ traffic statistics
- DiffServ application statistics
- Voice protocols
- Mini-RMON MIB on the switch
- Network layer statistics
- MAC layer statistics
- Application statistics

Note MAC layer and Mini-RMON statistics do not apply on NM-NAM or NME-NAM devices.

These topics help you set up and manage alarm threshold settings:

- Setting Up Alarm Events, page 3-75
- Setting Alarm Thresholds, page 3-76
- Setting Up Voice/Video Stream Thresholds, page 3-80
- Setting Up the NAM Syslog, page 3-82
- Setting Chassis or Managed Device Thresholds, page 3-83
- Setting NAM Trap Destinations, page 3-86
- Setting NAM Alarm Mail, page 3-87

Setting Up Alarm Events

Use this window to set up the alarm events, then use these events to set up the alarms you want to use. These events are also used for the Capture Trigger events. After creating events, go to the **Setup > Alarm Events** to see a list of the events you created. There you select which event you wish to be associated with that alarm. See Setting Alarm Thresholds, page 3-76.

You do not need to set up logs and traps before you set up Alarm Event. Logs and traps are part of the event parameters and specify what the NAM should do after an alarm is triggered.

To create an alarm event:

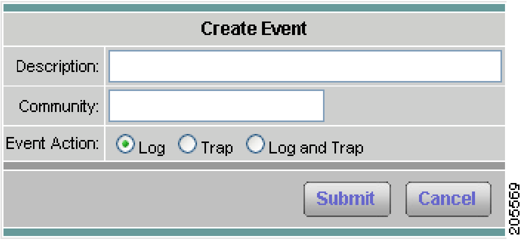
Step 1 Choose **Setup** > **Alarms**.

The Alarm Events table displays any configured Alarm Events.

Step 2 Click **Create**.

The Create Alarm Events Dialog displays, as shown in Figure 3-36.

Figure 3-36 Create Alarm Events Dialog



Create Event

Description:

Community:

Event Action: ● Log ○ Trap ○ Log and Trap

Step 3 Enter a description of the Alarm Event.

Enter up to 128 characters that describe this Alarm Event. This description displays on automatic captures you might configure.

Step 4 In the Community field, enter the community string for the SNMP community to which traps are sent. This community string must match a trap community string set in the NAM traps.

Step 5 Choose an event action.

Choose **Log** to log the event and display it in the Alarms tab. Choose **Trap** to send the event to traps processing. Choose **Log and Trap** to log the event and send it to trap processing.

Step 6 Click **Submit**.

The Alarm Events table displays the newly configured Alarm Event in its list.

Editing Alarm Events

To edit an alarm event:

Step 1 Choose **Setup** > **Alarms**.

The Alarm Events table displays any configured Alarm Events.

Step 2 Choose the alarm event you want to modify, and click **Edit**.

Deleting Alarm Events

To delete an alarm event:

Step 1 Choose **Setup** > **Alarms**.

The Alarm Events table displays any configured Alarm Events.

Step 2 Choose the alarm event you want to remove, and click **Delete**.

Setting Alarm Thresholds

You use the NAM GUI to set up alarm thresholds for MIB variables with values that trigger alarms. To view currently set alarm thresholds:

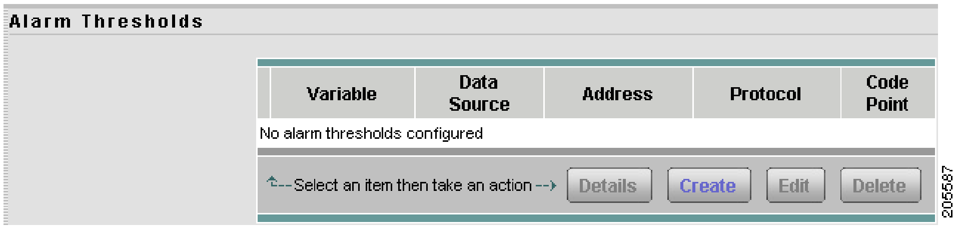
Step 1 Click **Setup** > **Alarms**.

The Alarm Events table displays any configured Alarm Events.

Step 2 In the content menu, click **Alarm Thresholds**.

The Alarm Thresholds table displays any currently setup alarm thresholds. Figure 3-37 shows an example of the Alarm Thresholds table.

Figure 3-37 Alarm Thresholds



Alarm Thresholds

Variable	Data Source	Address	Protocol	Code Point
No alarm thresholds configured				

Select an item then take an action -->

Step 3 Click **Create** to set up an alarm threshold.

Alarm Thresholds - Selecting a Variable

After you click Create on the Alarm Thresholds window, you must set up alarm threshold variable properties. To set up an alarm threshold variable:

Step 1 Click **Setup** > **Alarms**.

The Alarm Events table displays any configured Alarm Events.

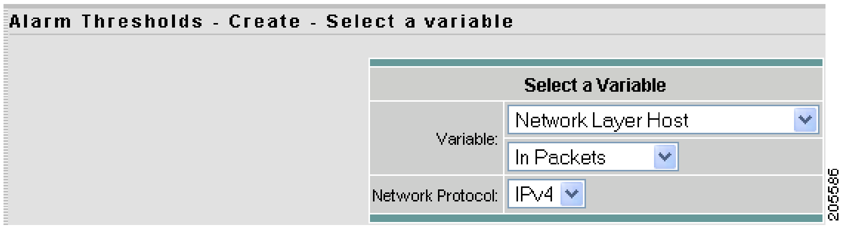
Step 2 In the content menu, click **Alarm Thresholds**.

The Alarm Thresholds table displays any currently setup alarm thresholds. Figure 3-37 shows an example of the Alarm Thresholds table.

Step 3 Click **Create**.

The Alarm Thresholds - Create - Select a Variable window displays. Figure 3-38 shows an example of the Alarm Thresholds - Create - Select a Variable window.

Figure 3-38 Alarm Thresholds - Create - Select a Variable



Alarm Thresholds - Create - Select a variable

Select a Variable

Variable: Network Layer Host; In Packets

Network Protocol: IPv4

Step 4 From the Variable pull-down list, choose one of the following variables:

You can choose from among the following:

- Network Layer Host
- Network Layer Conversations
- MAC Layer Hosts
- MAC Layer Conversations
- Application Statistics
- Server Response Times
- Server-Client Response Times
- DiffServ Traffic Stats
- DiffServ Host Stats
- DiffServ Application Stats

Step 5 From the pull-down menu, choose the type of packets or bytes:

You can choose from among the following:

- In Packets
- Out Packets
- In Bytes
- Out Bytes

Step 6 For Network Protocol, use the pull-down menu to choose IPv4 (default) or IPv6.

Step 7 Click **Next**.

Alarm Thresholds - Selecting Parameters

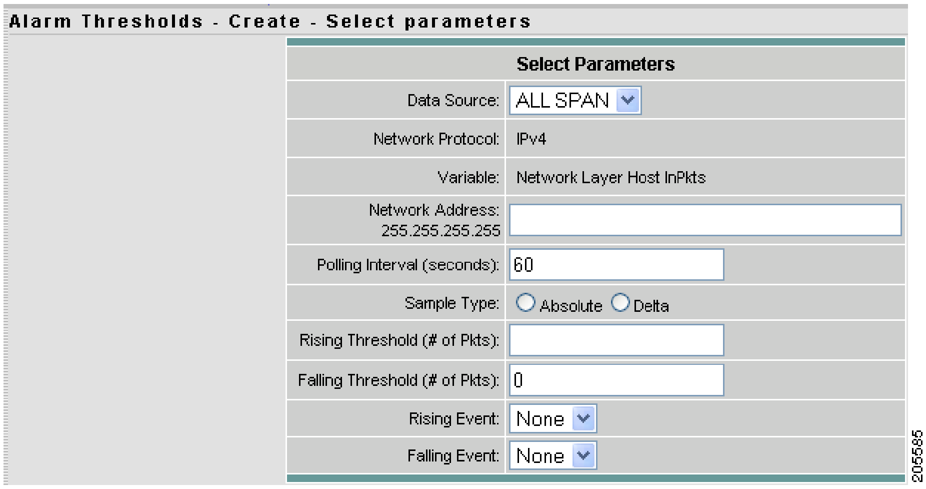
After you click **Next** in the Alarm Thresholds - Create - Select a Variable window, you must set up the parameters for the alarm threshold variable.

To set up an alarm threshold variable parameters:

Step 1 From the Alarm Thresholds - Create - Select a Variable window, click **Next**.

Figure 3-37 shows an example of the Alarm Thresholds table. The Alarm Thresholds - Create - Select Parameters window displays. Figure 3-39 shows an example of the Alarm Thresholds - Create - Select Parameters window.

Figure 3-39 Alarm Thresholds - Create - Select Parameters



Alarm Thresholds - Create - Select parameters

Select Parameters

Data Source:	ALL SPAN
Network Protocol:	IPv4
Variable:	Network Layer Host InPkts
Network Address: 255.255.255.255	
Polling Interval (seconds):	60
Sample Type:	○ Absolute ○ Delta
Rising Threshold (# of Pkts):	
Falling Threshold (# of Pkts):	0
Rising Event:	None
Falling Event:	None

Table 3-31 lists and describes the parameters for Alarm Thresholds - Create - Select Parameters window.

Table 3-31 Alarm Thresholds - Create - Select Parameters

Field	Description	Usage Notes
Data Source	Available data sources on the NAM.	Select the data source from the list.
Network Protocol	Selected protocol to be monitored.	This is the network protocol you chose in Step 5.
Variable	Selected variable to be monitored.	This is the variable you chose in Step 3.
Network Address	Network address of host.	For network-layer host variables only.
Polling Interval	Interval in seconds for the sampling period.	Enter the number of seconds for the polling interval duration.
Sample Type	Type of sampling to be done.	• Click **Absolute** for an alarm to be triggered by an absolute value that is reached. • Click the **Delta** for an alarm to be triggered by a change in the data rate.
Rising Threshold	Number of packets that triggers the alarm. For response time alarms, it is the number of msec.	Enter a whole number (an integer)
Falling Threshold	Number of packets that triggers the alarm. For response time alarms, it is the number of msec.	Enter a whole number (an integer)

Table 3-31 Alarm Thresholds - Create - Select Parameters

Field	Description	Usage Notes
Rising Event	Alarm threshold as defined in the RMON1 MIB.	Use the pull-down menu to select a rising threshold event.
Falling Event		Use the pull-down menu to select a falling threshold event.

Step 2 Enter the desired parameters for the alarm threshold you are creating.

Step 3 Click **Finish** to accept your changes, or click **Cancel** to cancel.

Viewing Alarm Details from the NAM MIB Thresholds Table

To view details of a specific alarm from the NAM MIB Thresholds table, select the radio button, then click **Details**. The Alarms Details Table(Table 3-32) displays.

Table 3-32 Alarm Details Table

Field	Description
Variable	Monitored variable.
Data Source	Data source being monitored.
Address	Destination and source address of the hose.
Interval (seconds)	Interval of the sampling period.
Sample Type	Sample type of the alarm—absolute or delta.
Rising Threshold	The number of rising packets or octets that triggers the alarm.
Falling Threshold	The number of falling packets or octets that triggers the alarm.
Alarm Action	Action to be taken when the alarm is triggered.
Community	SNMP community where traps are sent.
Trigger Set	None, Start or Stop. Start indicates a capture process would start when this alarm is triggered. Stop means a capture process would stop when this alarm is triggered. None means no capture trigger is set for this alarm. See Using Alarm-Triggered Captures for information about how to use the alarm-triggered capture feature.

Editing an Alarm Threshold

To edit an alarm threshold:

Step 1 Choose **Setup** > **Alarms**.

The Thresholds table displays.

Step 2 Select the alarm to edit, then click **Edit**.

The Edit Event dialog box displays.

Step 3 Make the necessary changes.

Step 4 Click **Finish** to save your changes, or click **Cancel** to cancel the edit.

Deleting a NAM MIB Threshold

To delete a NAM MIB threshold, simply select it from the Alarms table, then click **Delete**.

Step 5 Click **Apply** to save your changes, or click **Reset** to leave the configuration unchanged.

Setting Up Voice/Video Stream Thresholds

You can set up the NAM to monitor voice and video streams to display packet loss statistics based on the RTP sequence number. When you set up the RTP stream thresholds and enable alarms, an EMail alarm message is sent to those configured under **Admin > System > EMail Configuration**. See E-Mail Configuration, page 2-15 for information about how to configure EMail.

Step 1 Choose **Setup** > **Alarms**.

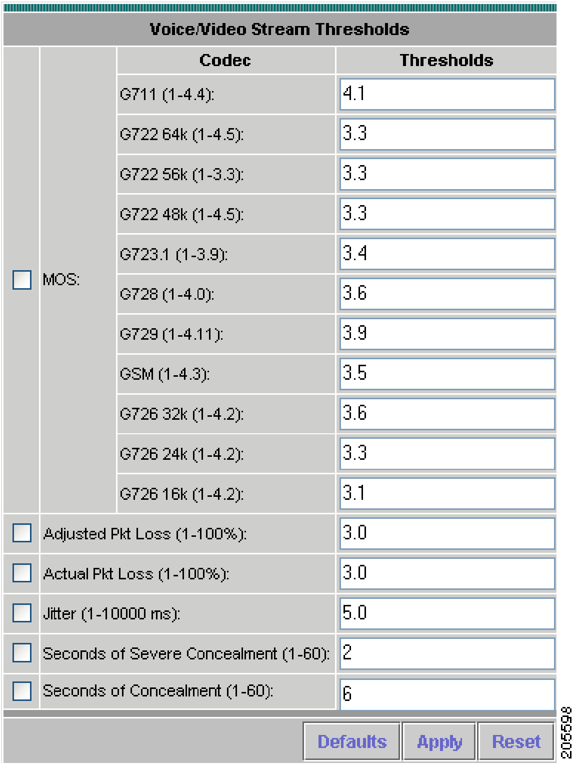
The Alarm Events table displays.

Step 2 In the content menu, click **Voice/Video Stream Thresholds**.

The Voice/Video Stream Thresholds window displays as shown in Figure 3-40.

Note The values in the Voice/Video Thresholds, even if unchecked, are the thresholds used when you view the different menu options of the **Monitor** > **Voice/Video** windows.

Figure 3-40 Setup Voice/Video Stream Thresholds Window



Voice/Video Stream Thresholds

	Codec	Thresholds
□ MOS:	G711 (1-4.4):	4.1
	G722 64k (1-4.5):	3.3
	G722 56k (1-3.3):	3.3
	G722 48k (1-4.5):	3.3
	G723.1 (1-3.9):	3.4
	G728 (1-4.0):	3.6
	G729 (1-4.11):	3.9
	GSM (1-4.3):	3.5
	G726 32k (1-4.2):	3.6
	G726 24k (1-4.2):	3.3
	G726 16k (1-4.2):	3.1
□ Adjusted Pkt Loss (1-100%):		3.0
□ Actual Pkt Loss (1-100%):		3.0
□ Jitter (1-10000 ms):		5.0
□ Seconds of Severe Concealment (1-60):		2
□ Seconds of Concealment (1-60):		6

Table 3-33 describes the fields of the Voice/Video Stream Thresholds window.

Table 3-33 Voice/Video Stream Thresholds

Field	Description
MOS	Click the MOS check box to enable an alarm when the NAM detects MOS quality above the thresholds for each codec listed.
Adjusted Pkt Loss	Click the Adjusted Packet Loss check box to enable an alarm when the NAM detects Adjusted Packet Loss to be more than the value set here.
Actual Pkt Loss	Click the Actual Packet Loss check box to enable an alarm when the NAM detects Actual Packet Loss to be more than the value set here.
Jitter	Click the Jitter check box to enable an alarm when the NAM detects SoC to be more than the value set here.
Total SSC	Click the **Total SSC** check box to enable alarms when the NAM detects SSC to be more than the value set here.
Seconds of Concealment (SoC)	Click the Seconds of Concealment check box to enable alarms when the NAM detects SoC to be more than the value set here.

Step 3 Choose the type or types of threshold for which you want to enable an alarm.

Step 4 Click **Apply** to set the voice/video stream thresholds, click **Defaults** to reset the thresholds to their default value, or click **Reset** to remove any changes you might have made.

Setting Up the NAM Syslog

NAM syslogs are created for alarm threshold events, voice threshold events, or system alerts. The NAM maintains two syslog files, one for logging RMON threshold events (for MIB and voice threshold events) and one for logging local NAM system alerts.

You can specify whether syslog messages should be logged locally on the NAM, on a remote host, or both. You can use the NAM Traffic Analyzer to view the local NAM syslogs.

For information on viewing the **syslog**, see Chapter 7, "Viewing Alarms." You can use a standard text editor to view **syslog** on remote hosts.

To set up the NAM syslog:

Step 1 Choose **Setup** > **Alarms**.

The Alarm Events table displays.

Step 2 In the content menu, click **NAM Syslog**.

The NAM Alarms Syslog Dialog Box (Table 3-34) displays.

Step 3 Make the necessary changes.

Table 3-34 NAM Alarms Syslog Dialog Box

Field	Usage Notes
Alarm Thresholds	• Select **Local** to log messages on your local system. • Select **Remote** to log messages on a remote system.
Voice/Video Stream Thresholds	• Select **Local** to log voice/video threshold syslogs on your local system. • Select **Remote** to log voice/video threshold syslogs on a remote system.
RTP Stream	• Select **Local** to log RTP Stream threshold syslogs on your local system. • Select **Remote** to log RTP Stream threshold syslogs on a remote system.
System	• Select **Local** to log system alert syslogs on your local system. • Select **Remote** to log system alert syslogs on a remote system. • Select **Debug** to log debug messages from the application to the syslog.
Remote Server Names	Enter the IP address or DNS name of up to 5 remote systems where syslog messages are logged. Each address you enter receives syslog messages from all three alarms (Alarm Thresholds, Voice/Video Stream Thresholds, and System).

Step 4 Click **Apply** to save your changes, or click **Reset** to cancel.

Setting Chassis or Managed Device Thresholds

Note This section does not apply to NME-NAM devices.

You can configure RMON thresholds in the switch Mini-RMON MIB. You can specify only variables from the etherStatsTable in the Mini-RMON MIB to monitor for threshold-crossing conditions.

These topics help you set up and manage switch thresholds:

- Creating Chassis or Managed Device Thresholds, page 3-83
- Editing Chassis or Managed Device Thresholds, page 3-85
- Deleting Chassis or Managed Device Thresholds, page 3-86

Creating Chassis or Managed Device Thresholds

To create chassis or managed device thresholds:

Step 1 Choose **Setup** > **Alarms**.

The Thresholds table displays.

Step 2 In the contents, click **Chassis Thresholds** or **Managed Device Thresholds**.

The Chassis Threshold table displays.

Step 3 Click **Create**.

The New Chassis Thresholds (Table 3-35) displays.

Table 3-35 New Chassis Alarm Dialog Box

Field	Description	Usage Notes
Data Source List	Data source from the switch.	—
Variable	The following variables are available: • Broadcast Pkts • Collisions • CRC Align Errors • Drop Events • Fragments • Jabbers • Multicast Pkts • Bytes • Oversize Pkts • Packets • Pkts size 64 Bytes • Pkts 65 to 127 Bytes • Pkts 128 to 255 Bytes • Pkts 256 to 511 Bytes • Pkts 512 to 1023 Bytes • Pkts 1024 to 1518 Bytes • Undersize Pkts	—
Interval (seconds)	Length of time, in seconds, for the sampling period to last.	Enter a decimal number.
Sample Type	Type of sampling to be done.	• Click **Absolute** for an alarm to be triggered by an absolute value that is reached. • Click **Delta** for an alarm to be triggered by a change in the data rate.
Rising Threshold	Number of packets/octets that trigger the alarm.	Enter a number (an integer)
Falling Threshold	Number of packets/octets that trigger the alarm.	Enter a number (an integer)
Alarm Description	Description of the alarm.	Must not exceed 128 characters.

Table 3-35 New Chassis Alarm Dialog Box (continued)

Field	Description	Usage Notes
Alarm Action	Action to be taken when the alarm is triggered.	• Click **Log** to log the event and display it in the Alarms tab. • Click **Trap** to send the event to traps. • Click **Log and Trap** to log the event and send it to traps.
Community	SNMP community where traps are sent.	This community string must match the traps community string set on the switch.

Step 4 Click **Submit** to save your changes, or click **Reset** to reset any entries you might have made.

Note If the switch is running a Catalyst operating system image, the switch alarm configuration is automatically stored. If the switch is running a Cisco IOS image, you can save the alarm configuration to NVRAM.

Editing Chassis or Managed Device Thresholds

Note This section does not apply to NM-NAM or NME-NAM devices.

To edit chassis thresholds or managed device thresholds:

Step 1 Choose **Setup** > **Alarms**.

The Thresholds table displays.

Step 2 In the content menu, click **Chassis Thresholds** or **Chassis Thresholds**.

The Switch Threshold Alarms dialog box displays.

Step 3 Select the alarm to edit, then click **Edit**.

The Edit Alarm dialog box displays.

Step 4 Make the necessary changes, then click **Submit** to save your changes, or click **Reset** to cancel and leave the configuration unchanged.

Deleting Chassis or Managed Device Thresholds

Note This section does not apply to NM-NAM or NME-NAM devices.

To delete an existing chassis threshold or managed device threshold, select it from the Chassis Threshold Alarms table, then click **Delete**.

Setting NAM Trap Destinations

Traps are used to store alarms triggered by threshold crossing events. When an alarm is triggered, you can trap the event and send it to a separate host.

These topics help you set up and manage NAM traps:

- Creating a NAM Trap Destination, page 3-86
- Editing a NAM Trap Destination, page 3-86
- Deleting a NAM Trap Destination, page 3-87

Creating a NAM Trap Destination

To create a NAM trap destination:

Step 1 Choose **Setup** > **Alarms**.

The NAM MIB Thresholds table displays.

Step 2 In the content, click **NAM Trap Destinations**.

The Traps dialog box displays.

Step 3 Click **Create**.

The Create Trap Dialog Box (Table 3-36) displays.

Step 4 Enter the appropriate information.

Table 3-36 Create Trap Dialog Box

Field	Description
Community	The community string of the *alarm* community string set in the NAM MIB Thresholds.
IP Address	The IP address to which the trap is sent if the alarm and trap community strings match.
UDP Port	The UDP port number.

Step 5 Click **Submit** to save your changes, or click **Reset** to cancel and leave the configuration unchanged.

Editing a NAM Trap Destination

To edit a NAM trap destination:

Step 1 Choose **Setup** > **Alarms**.

The Thresholds table displays

Step 2 In the contents, click **NAM Traps**.

The Traps dialog box displays.

Step 3 Select the trap to edit, then click **Edit**.

The Edit Trap dialog box displays.

Step 4 Make the necessary changes.

Step 5 Click **Submit** to save your changes, or click **Reset** to remove any entry.

Deleting a NAM Trap Destination

To delete an existing trap, simply select it from the Traps table, then click **Delete**.

Setting NAM Alarm Mail

Note NAM alarm mail is sent as a result of NAM alarms, not router or switch alarms.

You can configure the NAM to send Email to one or more addresses in the case of a NAM alarm. To configure Email alarms:

Step 1 Choose **Setup** > **Alarms**.

Step 2 From the content menu, click **NAM Alarm Mail**.

The Alarm Mail Configuration dialog box displays.

Step 3 In the **Mail Alarm to** field, enter one or more Email addresses to receive the NAM alarm mail.

Use an Email address such as *jdoe@cisco.com*. Use a space to separate multiple Email addresses.

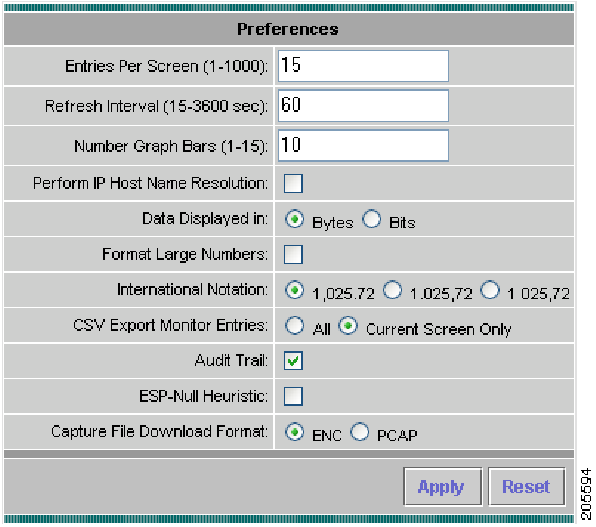
Setting Global Preferences

Global preferences settings apply to all users of the NAM and determine how data displays are formatted. To set up global preferences.

Step 1 Choose **Setup** > **Preferences**.

The Preferences Dialog Box (Figure 3-41) displays.

Figure 3-41 Preferences Dialog Box



Preferences

Entries Per Screen (1-1000): 15

Refresh Interval (15-3600 sec): 60

Number Graph Bars (1-15): 10

Perform IP Host Name Resolution: □

Data Displayed in: ● Bytes ○ Bits

Format Large Numbers: □

International Notation: ● 1,025.72 ○ 1.025,72 ○ 1 025,72

CSV Export Monitor Entries: ○ All ● Current Screen Only

Audit Trail: ☑

ESP-Null Heuristic: □

Capture File Download Format: ● ENC ○ PCAP

Step 2 Enter or change the information described in the Preferences Dialog Box (Table 3-37).

Table 3-37 Preferences Dialog Box

Field	Description	Usage Notes
Entries Per Screen	The number of rows to display in tabular screens.	Enter a number from 1 to 100. The default is 15.
Refresh Interval	The number of seconds between monitor display refreshes.	Enter a number from 15 to 3600. The default is 60.
Number Graph Bars	The number of graph bars to display in TopN displays and charts.	Enter a number from 1 to 15. The default is 10.
Perform IP Host Name Resolution	Display DNS names, if available.	Select to enable or deselect to disable. Enabled by default. **Note** Enabling IP host name resolution without configuring nameservers might result in slow response times.
Data Displayed in	Option to display data in bits or bytes.	Select Bytes or Bits. Default is bytes.
Format Large Numbers	Display large integer values in appropriate units with prefixes such as Kilo (K), Mega (M), Giga (G) and Tera (T.)	Check box to format large numbers. If this box is unchecked, large numbers are not formatted. The default is unchecked.
International Notation	You have the option to print numbers in the following format: 1,025.72 1.025,72 1 025,72	Default is 1,025.72

Table 3-37 Preferences Dialog Box (continued)

Field	Description	Usage Notes
CSV Export Monitor Entries	Provides the option to CSVexport all entries in a particular monitor table or just the current entries displayed on a particular window.	Default is Current Window Only.
Audit Trail	Check box to enable or disable the audit trail.	Enables the recording of critical user activities to an internal log file. By default, the audit trail is enabled. See also: • Viewing the Audit Trail, page 2-23, for information about audit trail entries • Setting Up the NAM Syslog, page 3-82, for information about setting up remote file storage
ESP-Null Heuristic	Enables NAM to detect ESP-null encryption and parse content as described in Internet RFC 2410.	Enabling ESP-Null Heuristic forces the NAM to check all packets with an ESP header to see if it could be using Null encryption. The ESP-Null Heuristic feature adds processing overhead, so it is disabled by default.
Capture File Download Format	Check ENC or PCAP.	<to be supplied>

Step 3 Click **Apply** to save your changes, or click **Reset** to cancel.

CHAPTER 4

Monitoring Data

The Monitor tab provides options for viewing various types of monitored data. There are options for:

Note NAM 4.0 supports IPv6 for all monitoring functionality except monitoring response time and RTP stream analysis.

Overview of Data Collection and Data Sources

All statistics and monitoring data produced by the NAM are generated by various types of *collections*. A collection operates on a stream of packets and produces output based on the input stream. In most cases, a collection corresponds directly to MIB tables such as RMON or SMON.

The Collection Definitions table (Table 4-1) defines the different collection types.

Table 4-1 Collection Definitions

Collection	Definition	Corresponds
Host	Examines a stream of packets; produces a table of all network addresses observed in those packets (also known as the collection data). Each entry records the total number of packets and bytes sent and received by that host and the number of non-unicast packets sent by that host.	RMON2 nlHostTable (the actual implementation of the collection).
Protocol	Examines a stream of packets; produces a table of all protocols observed in those packets. Each entry indicates the number of packets and bytes observed for that protocol.	RMON protocolDistStatsTable (the actual implementation of the collection).
Capture	Examines a stream of packets; produces a table of actual packet data (the captureBufferEntries). Each entry contains an exact copy of the data observed in the packet.	RMON1 bufferTable, filterTable, and channelTable variables.
Voice (proprietary)	Examines a stream of packets; produces tables of data for IP telephony-related protocols: • All IP phones observed in the packet stream. • Individual calls observed in the packet stream. • Statistics (such as jitter and packet loss) for each phone and call entry are recorded. • The worst-quality calls that were observed (determined by several characteristics).	—

The stream of packets on which a collection operates is called the *collection data source*. It might be different for each collection. The data produced by a collection is called the *collection data*.

Note The collection data is usually in the form of SNMP tables (except in voice collections).

The NAM can support simultaneous combinations of different collections, each operating on different collection data sources.

- The number of potential simultaneous collections is limited only by CPU and memory resources.
- The collection data sources are limited by the SPAN sources. For more information on SPAN sources, see the "Data Sources" section on page 3-10.
- NAM 4.0 can support a maximum of at least 1,500 data sources.

Configuring Multiple Collections

You can configure multiple collections (such as host, conversation, protocol, ART, and voice) simultaneously on the NAM. Collections are always configured on separate data sources.

Associated with each collection is a specific collection data source that might or might not correspond directly with the SPAN/VACL traffic stream that was configured. Examples of collection data sources include:

- All packets in the SPAN/VACL traffic stream regardless of the port/VLAN or origin (ALL SPAN).
- All packets in the SPAN/VACL traffic stream on a specific VLAN (VLAN x).
- All packets in the SPAN/VACL traffic stream that were configured to arrive on a specific NAM data port (DATA PORT 1 or DATA PORT 2).
- NetFlow Data Export (NDE) records received by the NAM from either the local Supervisor engine module or other remote NDE sources such as remote routers. (Available only on NAM-1 and NAM-2.)
- Switch engine module (Supervisor) records received by the NAM. You can select any combination of Port statistics, VLAN statistics, and NBAR statistics. (Available only on NAM-1 and -NAM-2.)
- Router engine module records (Router) received by the NAM. You can select any combination of Interface statistics and NBAR statistics. (Available only on the NME-NAM.)

Note Data sources persist across all Monitor windows. For example, if you select VLAN2 as a data source, then go to another Monitor window, VLAN2 will be displayed there if it is configured for that collection. If the previously selected data source is not configured for collection on the new Monitor window, the NAM displays the default data source for that window.

Individual collection instances process only those packets in the traffic streams that correspond to their configured data sources. For example, a host collection configured with a data source of VLAN 12 will not be populated with any received NDE flow records. Nor will it be populated with packets in the SPAN/VACL traffic stream that are not tagged for VLAN 12.

Similarly, a conversation collection configured with a data source specifying NDE records from a remote router will not be populated with any packets arriving in the SPAN/VACL traffic stream.

Scenario

You have configured the SPAN/VACL traffic stream source to include VLANs 1, 2, and 3. You now want to start an application collection that counts the packets and bytes monitored for each application protocol within these three VLANs.

You must specify a collection data source for this collection. The data source could be VLAN 1, VLAN 2, or VLAN 3.

If you configure the data source as VLAN 2, the collection generates statistics for those packets received on VLAN 2. However, if you were to specify VLAN 10 as the collection data source, even if VLAN 10 were a valid VLAN ID, the collection would never get populated with data because VLAN 10 was not configured as part of the SPAN/VACL traffic stream.

Note The SPAN/VACL traffic stream represents the aggregate sum of all traffic being sent to the NAM for monitoring as a result of SPAN or VACL configuration on the local Supervisor engine module. In addition to the SPAN/VACL traffic stream, one or more NDE traffic streams might be received from the local Supervisor engine module or remote switches and routers. The data source configured for a specific collection instance must correspond to traffic that appears on one of these traffic streams, or else the collection statistics will not get populated.

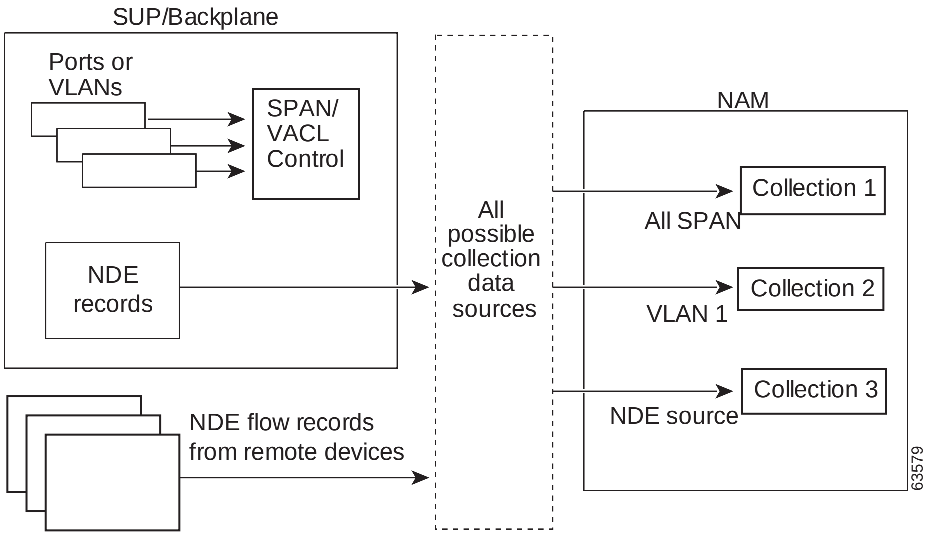
Each possible collection data source is represented as an ifEntry in the NAM ifTable (MIB-II). The Data Collection Sources table (Table 4-2) describes the valid collection data sources.

Table 4-2 Data Collection Sources

Collection Data Source	Limitations
All SPAN (aggregate SPAN/VACL traffic stream)	If no SPAN or VACL traffic sources are configured, the collection is not populated with data.
Specific VLAN ID	If the VLAN was not configured as part of the SPAN/VACL traffic stream, the collection is not populated with data.
NDE data source	The export parameters must be configured on the device that will export the records to the NAM; otherwise, the collection is not populated with data. Monitoring is limited to a subset of NAM collection types.

The SPAN, VACL, NDE Traffic Streams and Collection Data Sources illustration (Figure 4-1) shows the relationships between SPAN and NDE data sources and collection data sources.

Figure 4-1 SPAN, VACL, NDE Traffic Streams and Collection Data Sources



You can view real-time data from collections that were configured on the NAM. For more information on setting up collections on the NAM, see the "Configuring Capture Settings" section on page 6-3.

Protocol Auto Discovery

Traffic Analyzer can automatically discover up to 100 unknown protocols. The protocols are displayed according to the parent type and an identifier.

The Auto-Discovered Protocol Types table (Table 4-3) lists the type of protocols that can be automatically discovered and how they are displayed.

Table 4-3 Auto-Discovered Protocol Types

Protocol Type	Displays As...
Ether2	ether2-*ether-type number*
SNAP	snap-*ether-type number*
IP	ip-*protocol type number*
TCP	tcp-*port number*
UDP	udp-*port number*
SUNRPC	sunrpc-*program number*

Note The automatically discovered protocols are not saved in NVRAM and are lost when the NAM is rebooted. To save an auto-discovered protocol, you can enter it manually into the Protocol Directory. For more information, see the "Creating a New Protocol" section on page 3-63. You can also clear the auto-discovered protocols without rebooting by entering the command no monitor protocol auto-learned in the NAM CLI.

NDE Flow Masks and V8 Aggregation Caches

Depending on the flow mask or aggregation configured at the device, some data fields might not be available in the NDE data structure. As a result, some windows will not display data for a NetFlow data source or will display specific conditions. The Flow Mask and Aggregation Window Conditions table (Table 4-4) lists the display conditions for the windows under the Monitor tab and the flow-mask or aggregation that causes them.

Table 4-4 Flow Mask and Aggregation Window Conditions

Flow Mask or Aggregation Cache	Window Conditions
Full flow mask	Supported in all windows.
Destination only flow mask	• **Monitor** > **Apps** displays "Others" only, and the detail pop-up window does not have data. • **Monitor** > **Hosts** displays 0.0.0.0 and the detail pop-up window does not have data. • **Monitor** > **Conversations** displays 0.0.0.0 for some hosts and the detail pop-up window does not have data.
Destination-Source flow mask	• **Monitor** > **Apps** displays "Others" only, and the detail pop-up window does not have data. • **Monitor** > **Hosts** has data, but the detail pop-up window does not. • **Monitor** > **Conversations** has data, but the detail pop-up window does not.

Table 4-4 Flow Mask and Aggregation Window Conditions (continued)

Flow Mask or Aggregation Cache	Window Conditions
V8-Protocol-Port-Aggregation	• **Monitor** > **Apps** has data, and the detail pop-up window displays 0.0.0.0 only. • **Monitor** > **Host** displays 0.0.0.0 only. • **Monitor** > **Conversations** displays 0.0.0.0 to 0.0.0.0 only. • There is no data for custom NetFlow data sources that are set up for specific interfaces. • There is no DiffServ except TOS 0 and DSCP 0. • **Setup** > **Data Sources** > **NetFlow Listening Mode** detail pop-up window does not have interfaces information.
V8-Destination-Prefix-Aggregation	• **Monitor** > **Apps** displays “Others” only. • **Monitor** > **Host** displays data with subnets and 0.0.0.0. The detail pop-up window does not have data. • **Monitor** > **Conversations** displays data with 0.0.0.0 to subnets, and 0.0.0.0 to 0.0.0.0. The detail pop-up window does not have data. • There is no DiffServ except TOS 0 and DSCP 0. • There is support for NetFlow custom data sources that are set up for specific interfaces.
V8-Prefix-Aggregation	• **Monitor** > **Apps** displays “Others” only. • **Monitor** > **Host** displays data with subnets and 0.0.0.0. The detail pop-up window does not have data. • **Monitor** > **Conversations** displays data and 0.0.0.0 to 0.0.0.0. The detail pop-up window does not have data. • There is no DiffServ except TOS 0 and DSCP 0. • There is support for NetFlow custom data sources that are set up for specific interfaces.
V8-Source-Prefix-Aggregation	• **Monitor** > **Apps** displays “Others” only. • **Monitor** > **Host** displays data with subnets and 0.0.0.0. The detail pop-up window does not have data. • **Monitor** > **Conversations** displays data with subnets to 0.0.0.0, and 0.0.0.0 to 0.0.0.0. The detail pop-up window does not have data. • There is no DiffServ except TOS 0 and DSCP 0. • There is support for NetFlow custom data sources that are set up for specific interfaces.
V8-AS-Aggregation	Not supported.

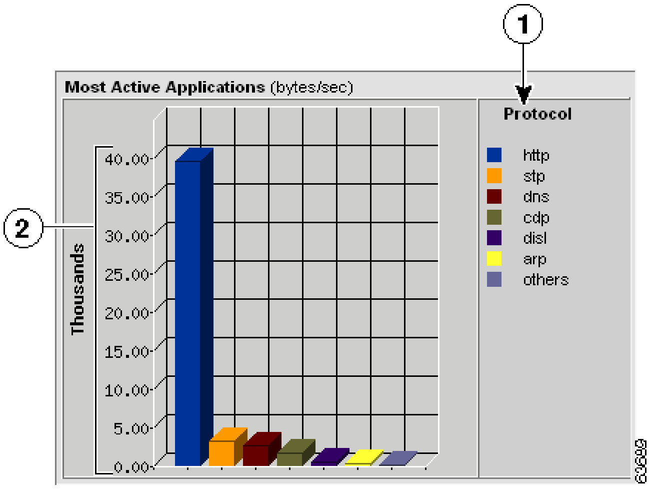
Viewing the Monitor Overview Charts

The Monitor Overview charts allow you to take a quick look, in graphical format, at the TopN protocol suites, active hosts, active applications, and application response times monitored on your network. To view the Monitor Overview charts, click the Monitor tab.

The following charts are displayed:

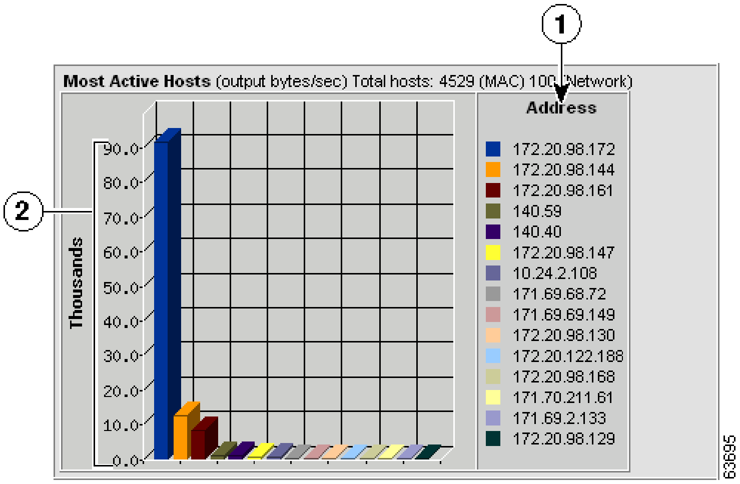
- Most Active Applications Chart (Figure 4-2)
- Most Active Hosts Chart (Figure 4-3)
- Server Response Times Chart (Figure 4-4)
- Protocol Suites Chart (Figure 4-5)

Figure 4-2 ***Most Active Applications Chart***



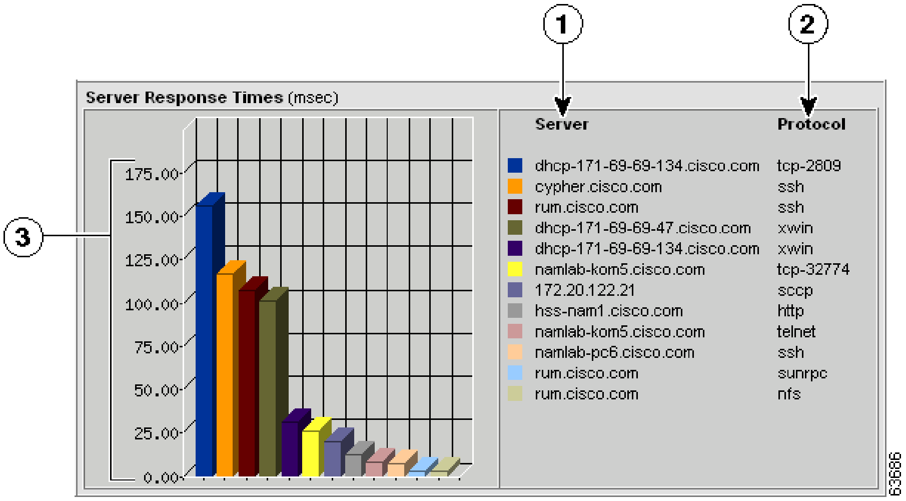
1	Top N protocols sorted by color.	**2**	Number of bytes collected per second for each protocol.

Figure 4-3 ***Most Active Hosts Chart***



1	Top N network addresses sorted by color.	**2**	Number of bytes collected per second for each address.

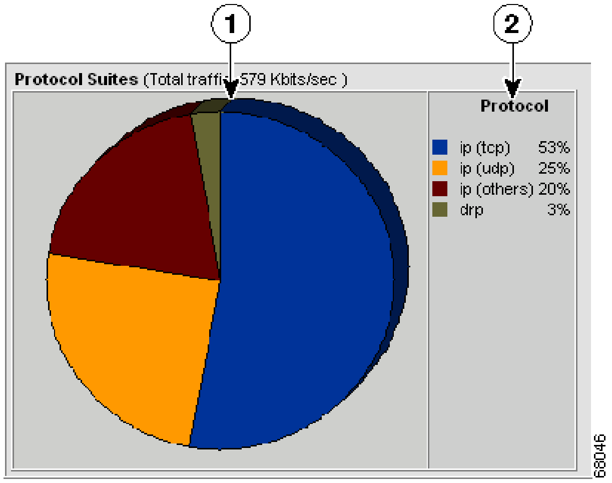
Figure 4-4 Server Response Times Chart



Server	Protocol
dhcp-171-69-69-134.cisco.com	tcp-2809
cypher.cisco.com	ssh
rum.cisco.com	ssh
dhcp-171-69-69-47.cisco.com	xwin
dhcp-171-69-69-134.cisco.com	xwin
namlab-kom5.cisco.com	tcp-32774
172.20.122.21	sccp
hss-nam1.cisco.com	http
namlab-kom5.cisco.com	telnet
namlab-pc6.cisco.com	ssh
rum.cisco.com	sunrpc
rum.cisco.com	nfs

1	Top N servers sorted by color	**3**	Server response time
2	Protocol used by the server		

Figure 4-5 Protocol Suites Chart



Protocol	
ip (tcp)	53%
ip (udp)	25%
ip (others)	20%
drp	3%

1	Pie chart showing network protocol usage.	**2**	Top N network protocols.

Data Source Persistence

When you view a monitor window with drop down data source lists, the NAM saves the selected data source. When you next view a monitor window with a drop down data source list, the NAM displays the previously saved data source. If no data source has been previously viewed and saved, the NAM displays the default data source. If you go to a different monitor window, and no collection has been configured with the saved data source, the default data source displays.

Viewing Individual Applications Data

To view the distribution of packets and bytes based on the application protocol, click **Monitor** > **Apps**. The Applications table displays with three radio buttons on top.

You can select a radio button for:

- Viewing the Application Groups Current Rates Table, page 4-14
- Viewing the Top N Application Group Chart, page 4-16
- Viewing the Application Groups Cumulative Data Table, page 4-17

Viewing the Applications Current Rates Table

The Applications Current Rates table enables you to view the number of packets and bytes collected for each application protocol. The data displayed is the number of packets and bytes collected per second over the last time interval. For information on setting the time interval, see the "Setting Global Preferences" section on page 3-87.

Note Auto learned or user defined protocols are not listed in the table.

To view the Applications Current Rates table:

Step 1 Click the Current Rates table radio button.

The Applications Current Rates Table (Table 4-5) displays.

Table 4-5 Applications Current Rates Table

Field	Description
Protocol	Name of the application protocol.
Packets/s	Number of packets collected per second.
Bytes/s	Number of bytes collected per second.

Step 2 Choose the data source to monitor from the Data Source list.

Step 3 To view data for a specific protocol, enter the protocol name in the Protocol text box, then click **Filter**.

Any matching protocols are displayed.

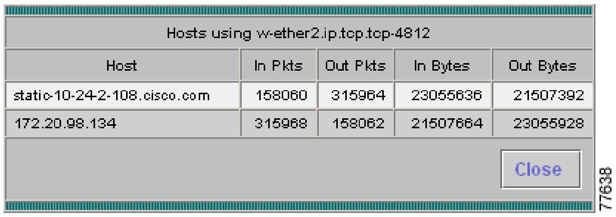
Tip

- To view the full protocol name, move the cursor over the protocol name in the Protocol column of the Protocol Directory table.
- To sort a table variable by percentage of the total, click on the column header. The variable is listed in descending order according to the percentage of the total.

Displaying Details from the Applications Table

To view details for a specific application protocol, select the protocol and click Details, or click on the protocol name in the Protocol column. The Application Group Window (Figure 4-10) displays, showing all network hosts using this protocol. The displayed data is specific to the selected data source.

Figure 4-6 Application Protocol Detail Window



Hosts using w-ether2.ip.tcp.tcp-4812

Host	In Pkts	Out Pkts	In Bytes	Out Bytes
static-10-24-2-108.cisco.com	158060	315964	23055636	21507392
172.20.98.134	315968	158062	21507664	23055928

The Applications Protocol Detail Window displays the following information.

Table 4-6 Application Protocol Detail Table

Field	Description
Description	Full name and description of the protocol.
Host	The hostname of the computer using the application protocol.
In Pkts	Number of packets the host received for the specified protocol.
Out Pkts	Number of packets the host transmitted for the specified protocol.
In Bytes	Number of bytes the host received for the specified protocol.
Out Bytes	Number of bytes the host transmitted for the specified protocol.

Capturing Application Protocol Data from the Application Table

You can capture data for a specific application protocol directly from the Application table.

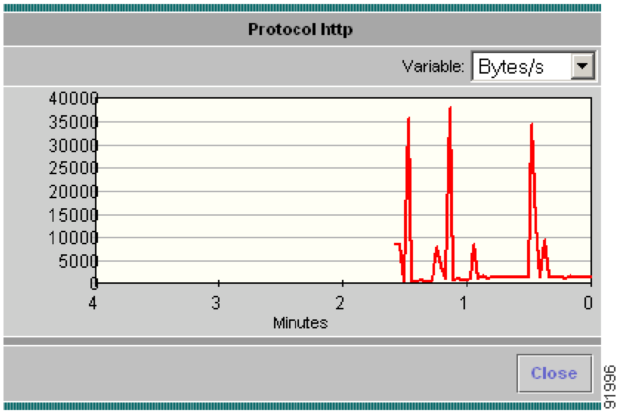
Choose the protocol from the table, then click **Capture**. The Packet Browser displays. For more information on viewing packets using the Packet Browser, see the "Viewing Detailed Protocol Decode Information" section on page 6-14.

If a capture is already running, a message window displays. Click **Yes** to stop the current capture or **No** to disregard your selection.

Viewing Real-Time Data from the Application Table

You can view real-time data in a graphical format for a specific application protocol. Choose the protocol from the table, then click **Real-Time**. The Real-Time Graph (Figure 4-7) displays.

Figure 4-7 Real-Time Graph


Protocol http

Variable: Bytes/s

Viewing Reports from the Applications Table

You can view reports directly from the Applications table. Choose the application protocol for which to view a report, then click **Report**. The Basic Reports graph displays. If a report is not configured, one will be created based on the selected application and data source.

For more information on viewing and creating reports, see Chapter 5, "Creating and Viewing Reports."

Viewing the Top N Applications Chart

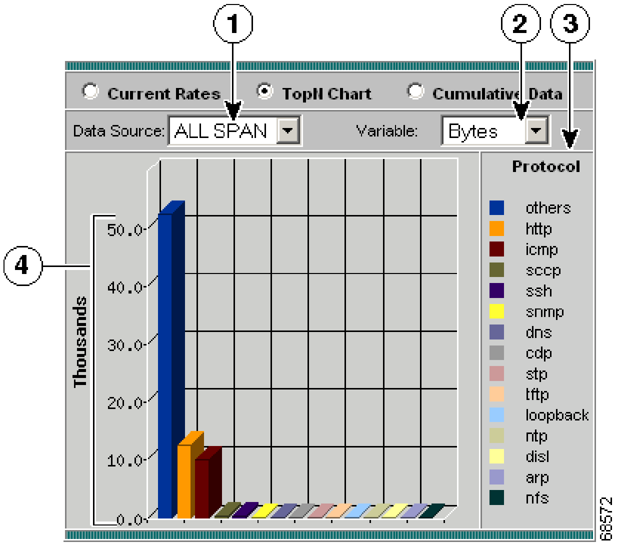
The TopN Applications Chart enables you to view the number of packets and bytes collected for the Top N application protocols in a graphical format. The data displayed is the number of packets and bytes collected per second over the last time interval. For information on setting the time interval, see the "Setting Global Preferences" section on page 3-87.

To view the TopN Applications chart:

Step 1 Click the TopN Chart radio button.

The TopN Application Group Chart (Figure 4-8) displays.

Figure 4-8 TopN Applications Chart



○ Current Rates ● TopN Chart ○ Cumulative Data

Data Source: ALL SPAN

Variable: Bytes

1	Data Source list.	**3**	Top N application protocols.
2	Variable list.	**4**	Number of bytes or packets collected per second on each Top N protocol.

Step 2 Choose the data source to monitor from the Data Source list.

Step 3 Choose one of the following from the Variable list:

- Packets—Displays the number of packets per second monitored.
- Bytes—Displays the number of bytes per second monitored.

Tip

- To turn off auto refresh, deselect the Auto Refresh check box.
- To view the full protocol name, move the cursor over the protocol name.

Viewing the Applications Cumulative Data Table

The Applications Cumulative Data Table enables you to view the number of packets and bytes collected for each application protocol. The data displayed is the total number of packets and bytes collected since the collection was created or since the NAM was restarted.

To view the Applications Cumulative Data table:

Step 1 Click the Cumulative Data radio button.

The Application Group Cumulative Data Table (Table 4-11) displays.

Table 4-7 Applications Cumulative Data Table

Field	Description
Protocol Name	Name of the monitored protocol.
Packets	Total number of packets collected over the last time interval.
Bytes	Total number of bytes collected over the last time interval.

Step 2 Choose the data source to be monitored from the Data Source list.

Step 3 To refresh the table, click **Refresh**.

Step 4 To view data for a specific protocol, enter the protocol name in the Protocol text box, then click **Filter**.

Any matching protocols are displayed.

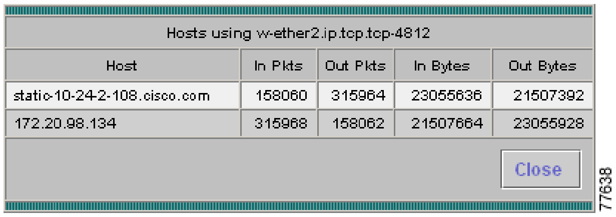
Tip

- To view the full encapsulated protocol name, move the cursor over the protocol name in the Protocol column of the Protocol Directory table.
- To sort a table variable by percentage of the total, click on the column header. The variable is listed in descending order according to the percentage of the total.

Displaying Details from the Applications Table

To view details for a specific application protocol, click on the protocol name in the Protocol column. The Protocol Detail Window(Figure 4-9) displays.

Figure 4-9 Protocol Detail Window



Hosts using w-ether2.ip.tcp.tcp-4812

Host	In Pkts	Out Pkts	In Bytes	Out Bytes
static-10-24-2-108.cisco.com	158060	315964	23055636	21507392
172.20.98.134	315968	158062	21507664	23055928

The Protocol Detail Window displays the following information:

Table 4-8 Protocol Detail Table

Field	Description
Host	The hostname of the computer using the application protocol.
In Pkts	Number of packets the host received for the specified protocol.
Out Pkts	Number of packets the host transmitted for the specified protocol.
In Bytes	Number of bytes the host received for the specified protocol.
Out Bytes	Number of bytes the host transmitted for the specified protocol.

Viewing Application Groups

To view the distribution of packets and bytes based on the application group, click the Monitor tab, then click **Apps** and select **Application Groups** from the Contents Menu. The Applications Group table displays with three radio buttons on top.

You can select a radio button for:

- Viewing the Application Groups Current Rates Table, page 4-14
- Viewing the Top N Application Group Chart, page 4-16
- Viewing the Application Groups Cumulative Data Table, page 4-17

Viewing the Application Groups Current Rates Table

The Application Groups Current Rates table enables you to view the number of packets and bytes collected for each application group. The data displayed is the number of packets and bytes or bits collected per second over the last time interval. For information on setting the time interval, see the "Setting Global Preferences" section on page 3-87.

To view the Application Groups Current Rates table:

Step 1 Click the Current Rates table radio button.

The Application Groups Current Rates Table (Table 4-9) displays.

Table 4-9 Application Groups Current Rates Table

Field	Description
Application Groups	Name of the application group.
Packets/s	Number of packets collected per second.
Bytes/s	Number of bytes collected per second.
Bits/s	Number of bits collected per second.

Step 2 Choose the data source to monitor from the Data Source list.

Step 3 To view data for a specific protocol group, enter the group name in the text box, then click **Filter**.

Any matching groups are displayed.

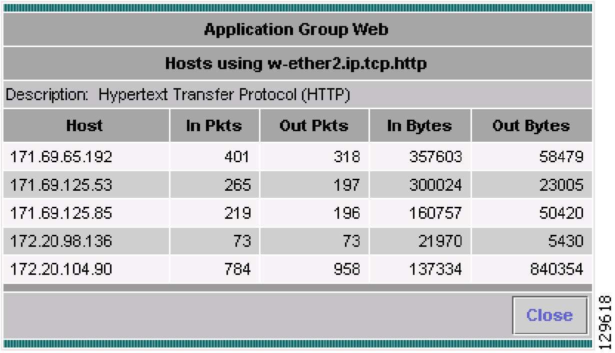
Tip

- To view the application list for a particular protocol group, click the + sign in front of the group name.
- To sort a table variable by percentage of the total, click on the column header. The variable is listed in descending order according to the percentage of the total.

Displaying Details from the Application Group Table

To view details for a specific application group, select the application group and click Details. The Application Group Window (Figure 4-10) displays, showing all applications in this group and the network hosts using those particular applications. The displayed data is specific to the selected data source.

Figure 4-10 Application Group Window



Application Group Web

Hosts using w-ether2.ip.tcp.http

Description: Hypertext Transfer Protocol (HTTP)

Host	In Pkts	Out Pkts	In Bytes	Out Bytes
171.69.65.192	401	318	357603	58479
171.69.125.53	265	197	300024	23005
171.69.125.85	219	196	160757	50420
172.20.98.136	73	73	21970	5430
172.20.104.90	784	958	137334	840354

The Applications Group Detail Window displays the information listed in Table 4-10.

Table 4-10 Application Group Detail Window Fields

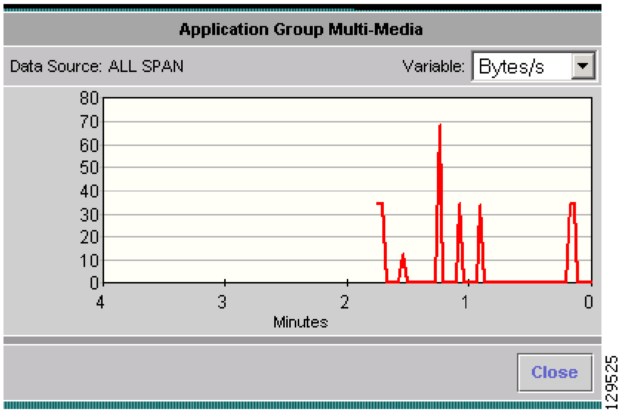
Field	Description
Description	Full name and description of each application in that group.
Host	The hostname of the computer using the application group.
In Pkts	Number of packets the host received for the specified group.
Out Pkts	Number of packets the host transmitted for the specified group.
In Bytes	Number of bytes the host received for the specified group.
Out Bytes	Number of bytes the host transmitted for the specified group.

Viewing Real-Time Data from the Application Group Table

You can view real-time data in a graphical format for a specific application protocol.

Choose the protocol from the table, then click **Real-Time**. The Real-Time Graph(Figure 4-11) displays.

Figure 4-11 Real-Time Graph


Application Group Multi-Media

Data Source: ALL SPAN

Variable: Bytes/s

Viewing Reports from the Application Group Table

You can view reports directly from the Applications table. Choose the application protocol for which to view a report, then click **Report**. The Basic Reports graph displays. If a report is not configured, one will be created based on the selected application and data source.

For more information on viewing and creating reports, see Chapter 5, "Creating and Viewing Reports."

Viewing the Top N Application Group Chart

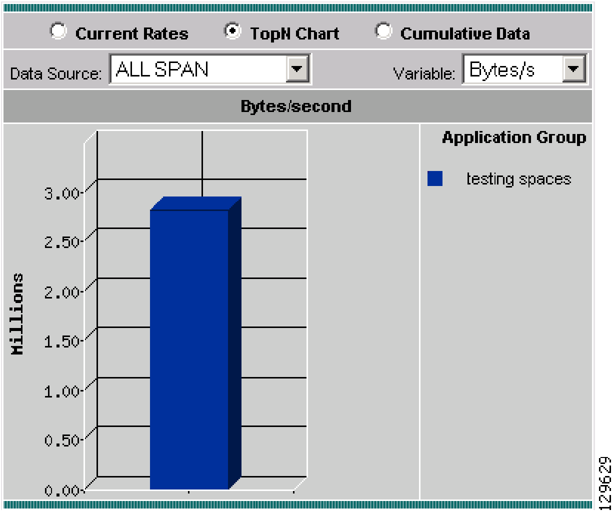
The TopN Applications Chart enables you to view the number of packets and bytes collected for the Top N application protocols in a graphical format. The data displayed is the number of packets and bytes collected per second over the last time interval. For information on setting the time interval, see the "Setting Global Preferences" section on page 3-87.

To view the TopN Applications chart:

Step 1 Click the TopN Chart radio button.

The TopN Application Group Chart (Figure 4-12) displays.

Figure 4-12 TopN Application Group Chart



Step 2 Choose the data source to monitor from the Data Source list.

Step 3 Choose one of the following from the Variable list:

- Packets—Displays the number of packets per second monitored.
- Bytes—Displays the number of bytes per second monitored.

Tip

- To turn off auto refresh, deselect the Auto Refresh check box.
- To view the full protocol name, move the cursor over the protocol name.

Viewing the Application Groups Cumulative Data Table

The Applications Groups Cumulative Data table enables you to view the number of packets and bytes collected for each application group. The data displayed is the total number of packets and bytes collected since the collection was created or since the NAM was restarted.

To view the Applications Groups Cumulative Data table:

Step 1 Click the Cumulative Data radio button.

The Application Group Cumulative Data Table (Table 4-11) displays.

Table 4-11 Application Group Cumulative Data Table

Field	Description
Group Name	Name of the monitored group.
Packets	Total number of packets collected over the last time interval.
Bytes	Total number of bytes collected over the last time interval.

Step 2 Choose the data source to be monitored from the Data Source list.

Step 3 To refresh the table, click **Refresh**.

Step 4 To view data for a specific group, enter the group name in the Group text box, then click **Filter**.

Any matching groups are displayed.

Tip To sort a table variable by percentage of the total, click on the column header. The variable is listed in descending order according to the percentage of the total.

Viewing Collected URLs

This section contains the following sections:

- Viewing Collected URLs
- Filtering a URL Collection List
- Creating a URL-based Application from a Collected URL

Viewing Collected URLs

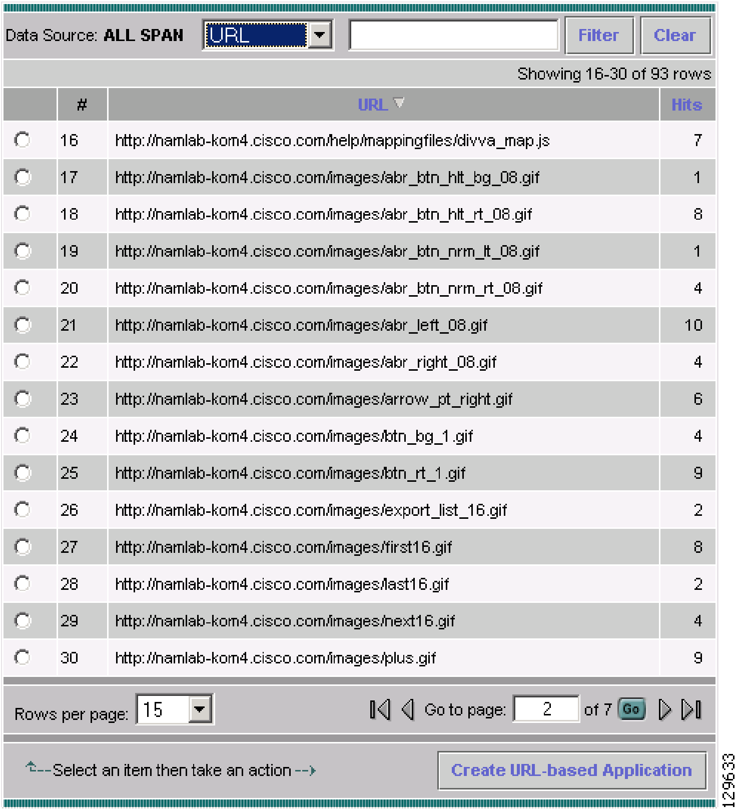
To view collected URLs:

Step 1 Click **Monitor** > **Apps**.

Step 2 Click **URLs** in the TOC.

The URLs Window (Figure 4-13) displays with the collected URLs.

Figure 4-13 URLs Window



Data Source: **ALL SPAN** URL ▾ Filter Clear

Showing 16-30 of 93 rows

	#	URL ▽	Hits
○	16	http://namlab-kom4.cisco.com/help/mappingfiles/divva_map.js	7
○	17	http://namlab-kom4.cisco.com/images/abr_btn_hlt_bg_08.gif	1
○	18	http://namlab-kom4.cisco.com/images/abr_btn_hlt_rt_08.gif	8
○	19	http://namlab-kom4.cisco.com/images/abr_btn_nrm_lt_08.gif	1
○	20	http://namlab-kom4.cisco.com/images/abr_btn_nrm_rt_08.gif	4
○	21	http://namlab-kom4.cisco.com/images/abr_left_08.gif	10
○	22	http://namlab-kom4.cisco.com/images/abr_right_08.gif	4
○	23	http://namlab-kom4.cisco.com/images/arrow_pt_right.gif	6
○	24	http://namlab-kom4.cisco.com/images/btn_bg_1.gif	4
○	25	http://namlab-kom4.cisco.com/images/btn_rt_1.gif	9
○	26	http://namlab-kom4.cisco.com/images/export_list_16.gif	2
○	27	http://namlab-kom4.cisco.com/images/first16.gif	8
○	28	http://namlab-kom4.cisco.com/images/last16.gif	2
○	29	http://namlab-kom4.cisco.com/images/next16.gif	4
○	30	http://namlab-kom4.cisco.com/images/plus.gif	9

Rows per page: 15 ▾ Go to page: 2 of 7 Go

↰--Select an item then take an action --> Create URL-based Application

Table 4-12 URLs Table

Field	Description
Index	URL index
URL	Name of URL
Hits	Number of hits

Note Only one URL collection can be active at one time. The data source is for information only.

Filtering a URL Collection List

To filter a URL collection list:

Step 1 From the drop-down list in the URLs Window (Figure 4-13), select which part of the URL to filter:

- **URL**—You can filter on any part of the URL

- **Host**—This filter applies only to the host part of collected URLs.
- **Path—**This filter applies only to the path part of the collected URLs
- **Arguments—**This filter applies only to the argument part of the collected URLs.

Step 2 Enter filter string.

Step 3 Click **Filter** to apply the filter.

Note To remove any display filter and show all URLs collected, click **Clear**.

Creating a URL-based Application from a Collected URL

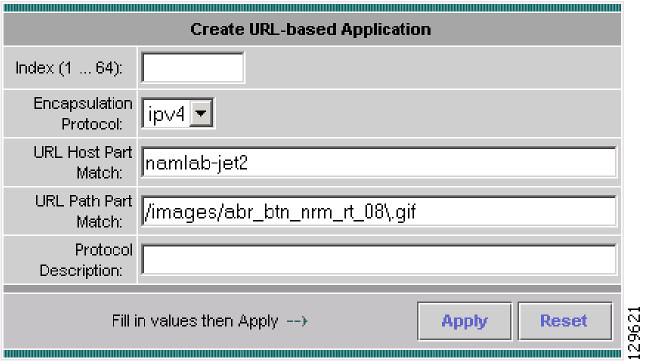
To create a URL-based application from a collected URL:

Step 1 From the list of URLs shown in the Create URL-based Application window, click a radio button to select a row in the URL list.

Step 2 Click **Create URL-based Application**.

The Create URL-based Application window (Figure 4-14) displays.

Figure 4-14 Create URL-based Application



Create URL-based Application

Index (1 ... 64):	
Encapsulation Protocol:	ipv4
URL Host Part Match:	namlab-jet2
URL Path Part Match:	/images/abr_btn_nrm_rt_08\.gif
Protocol Description:	

Fill in values then Apply -->

Step 3 Enter a value in the fields for Index and Protocol Description.

For information about appropriate values for the Index and Protocol Description fields, see Creating a URL-Based Application, page 3-70.

Step 4 Click **Apply.**

Viewing the TCP/UDP Port Table

The TCP/UDP Port Table displays with three radio buttons; one for current rates (the default view), one for TopN Chart, and one for Cumulative Data.

You can select a radio button for:

- Viewing the TCP/UDP Port Table Current Rates, page 4-21
- Viewing the TCP/UDP Port Table TopN Chart, page 4-21
- Viewing the TCP/UDP Port Table Cumulative Data, page 4-22

Viewing the TCP/UDP Port Table Current Rates

To view the TCP/UDP Port Table current rates, click **Monitor** > **Apps** > **TCP/UDP Port Table**.

The TCP/UDP Port Table Current Rates table enables you to view the current rates of data transfer for the various TCP and UDP server ports. Table 4-13 lists the statistics shown in the TCP/UDP Port Table Current Rates table.

Table 4-13 TCP/UDP Port Table Current Rates

Field	Description
Server Port	All server ports currently in use.
Application	Application in use on each port. **Note** In some cases, the Application field might be blank. This usually happens with TCP/UDP ports that are used dynamically rather than static or well-known ports. When the NAM determines that the same port was used for more than one application, from that point on the NAM displays the Application field as blank.
Packets In/s	Packets in per second
Packets Out/s	Packets out per second
Bytes In/s	Bytes in per second
Bytes Out/s	Bytes out per second

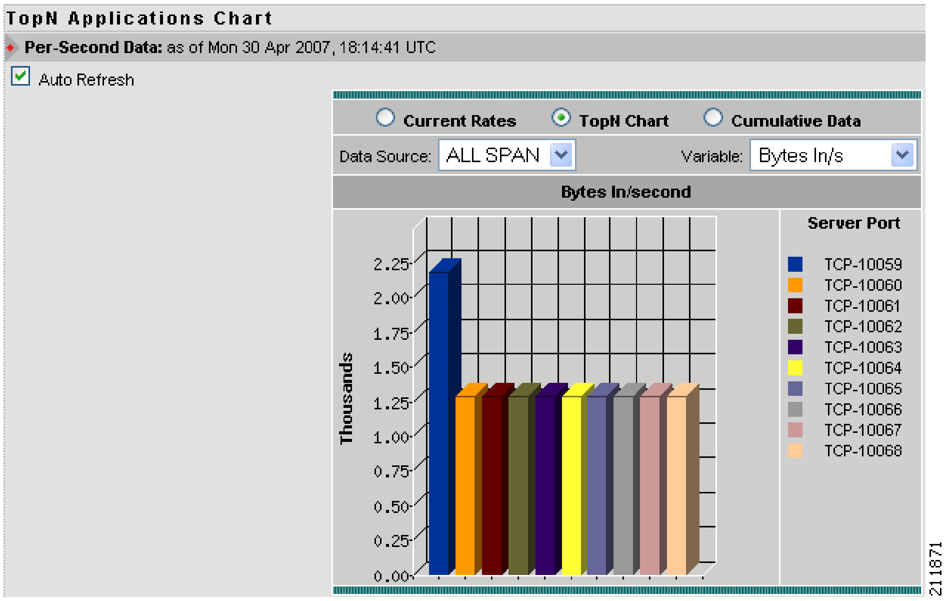
Viewing the TCP/UDP Port Table TopN Chart

To view the TCP/UDP Port Table TopN Chart, click **Monitor** > **Applications** > **TCP/UDP Port Table**, then click the TopN button. The TCP/UDP Port Table TopN Chart shows a graphical chart of the most active TCP and UDP ports currently being used.

You can select to show the chart based on different Data Sources or to select a different variable such as packets or bytes in or out per second.

Figure 4-15 shows an example of the TCP/UDP Port Table TopN Chart.

Figure 4-15 TCP/UDP Port Table TopN Chart



TopN Applications Chart

Per-Second Data: as of Mon 30 Apr 2007, 18:14:41 UTC

☑ Auto Refresh

○ Current Rates ● TopN Chart ○ Cumulative Data

Data Source: ALL SPAN

Variable: Bytes In/s

Viewing the TCP/UDP Port Table Cumulative Data

The TCP/UDP Port Table Cumulative Data table enables you to view the number of packets and bytes collected for each server port. The data displayed is the total number of packets and bytes collected since the collection was created or since the NAM was restarted.

To view the TCP/UDP Port Table Cumulative Data table:

Step 1 Click the Cumulative Data radio button.

The TCP/UDP Table Cumulative Data Table (Table 4-14) displays.

Table 4-14 TCP/UDP Table Cumulative Data Table

Field	Description
Server Port	All server ports currently in use
Application	Application in use on each port
Packets In	Total number of packets received
Packets Out	Total number of packets sent
Bytes In	Total number of bytes received
Bytes Out	Total number of bytes sent

Step 2 Choose the data source to be monitored from the Data Source list.

Step 3 To refresh the table, click **Refresh**.

Step 4 To view data for a specific group, enter the group name in the Group text box, then click **Filter**.

The GUI displays any matching groups.

Tip To sort a table variable by percentage of the total, click on the column header. The variable is listed in descending order according to the percentage of the total.

Viewing Voice and Video Data

You can use the NAM Traffic Analyzer to view data collected from any enabled voice and video protocols on the NAM. This enables you to troubleshoot and identify potential problems within your voice and video network.

This section is organized to match the menu options of the **Monitor** > **Voice/Video** portion of the NAM GUI.

- Active Calls, page 4-23
  - MOS Quality Chart, page 4-23
  - Alarm Threshold Chart, page 4-24
  - Active Calls Table, page 4-25
- Terminated Calls, page 4-27
  - Overview, page 4-27
  - Worst N Calls, page 4-28
- Viewing Known Phones, page 4-29
- Viewing RTP Stream Traffic, page 4-31

Active Calls

The Voice Quality menu options provide an overview of voice quality and the worst calls.

- MOS Quality Chart, page 4-23
- Alarm Threshold Chart, page 4-24
- Active Calls Table, page 4-25

MOS Quality Chart

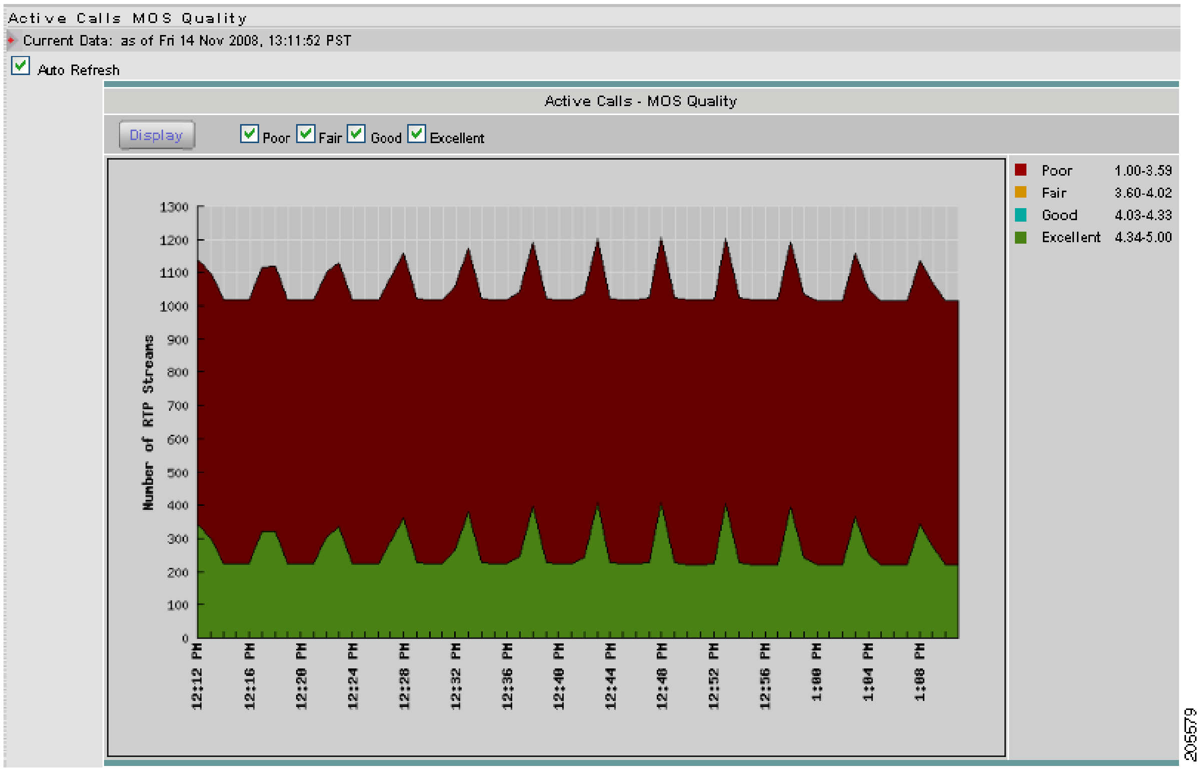
To view the Active Calls MOS Quality chart:

Step 1 Choose **Monitor** > **Voice/Video**.

Step 2 In the content menu under Active Calls, click **MOS Quality Chart**.

The Active Calls MOS Quality Chart displays. Figure 4-16 shows an example of the Active Calls MOS Quality chart.

Figure 4-16 Active Calls MOS Quality Chart



Active Calls MOS Quality

Current Data: as of Fri 14 Nov 2008, 13:11:52 PST

☑ Auto Refresh

The Active Calls MOS Quality Chart displays a graph that indicates the active calls and the time when they occurred. You can choose a specific quality ((Poor, Fair, Good, or Excellent) of active call using the check boxes above the chart, then click **Display** to see one or more of that specific quality of active calls.

Alarm Threshold Chart

To view the Active Calls Alarm Threshold chart:

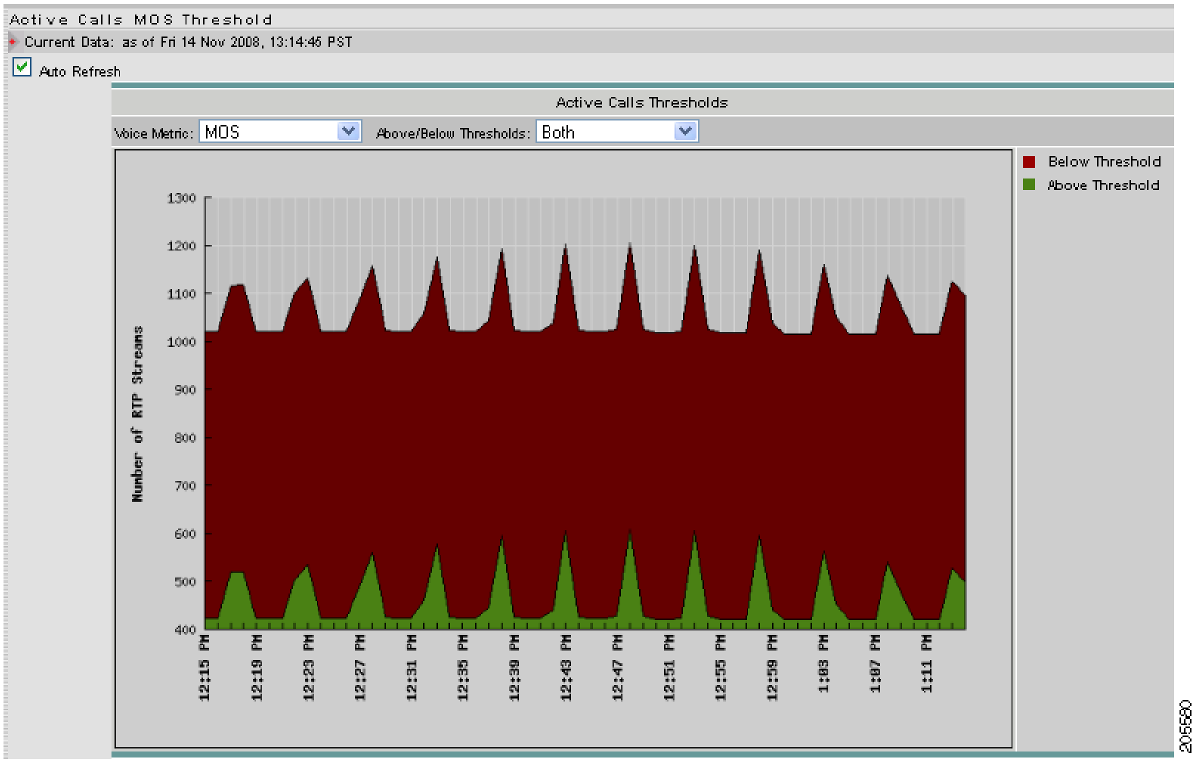
Step 1 Choose **Monitor** > **Voice/Video**.

Step 2 In the content menu under Active Calls, click **Active Calls Thresholds Chart**.

The Active Calls MOS Quality Chart displays. Figure 4-17 shows an example of the Active Calls Alarm Thresholds chart.

Use the Voice Metric pull-down menu to choose the voice quality metric to display. Use the Above/Below Thresholds pull-down metric to display calls above the threshold, below the threshold, or both above and below the threshold you set.

Figure 4-17 Active Calls Alarm Thresholds Chart



Active Calls MOS Threshold

Current Data: as of Fri 14 Nov 2008, 13:14:46 PST

☑ Auto Refresh

Active Calls Thresholds

Voice Metric: MOS

Above/Below Thresholds: Both

Active Calls Table

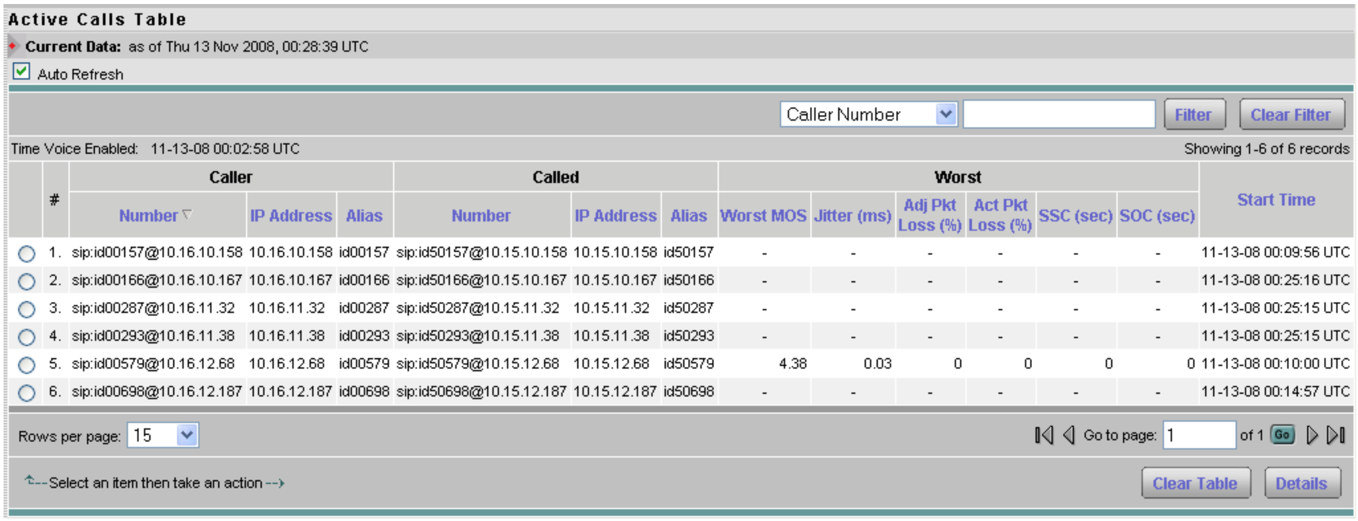
To view the Active Calls Table:

Step 1 Choose **Monitor** > **Voice/Video**.

Step 2 In the content menu under Active Calls, click **Table**.

The Active Calls Table displays. Figure 4-18 shows an example of the Active Calls table. The Active Calls Table (Figure 4-18) shows a list of all currently active calls.

Figure 4-18 Active Calls Table



Active Calls Table

Current Data: as of Thu 13 Nov 2008, 00:28:39 UTC

☑ Auto Refresh

Caller Number | Filter | Clear Filter

Time Voice Enabled: 11-13-08 00:02:58 UTC

Showing 1-6 of 6 records

	#	Caller			Called			Worst						Start Time
		Number	IP Address	Alias	Number	IP Address	Alias	Worst MOS	Jitter (ms)	Adj Pkt Loss (%)	Act Pkt Loss (%)	SSC (sec)	SOC (sec)	
○	1.	sip:id00157@10.16.10.158	10.16.10.158	id00157	sip:id50157@10.15.10.158	10.15.10.158	id50157	-	-	-	-	-	-	11-13-08 00:09:56 UTC
○	2.	sip:id00166@10.16.10.167	10.16.10.167	id00166	sip:id50166@10.15.10.167	10.15.10.167	id50166	-	-	-	-	-	-	11-13-08 00:25:16 UTC
○	3.	sip:id00287@10.16.11.32	10.16.11.32	id00287	sip:id50287@10.15.11.32	10.15.11.32	id50287	-	-	-	-	-	-	11-13-08 00:25:15 UTC
○	4.	sip:id00293@10.16.11.38	10.16.11.38	id00293	sip:id50293@10.15.11.38	10.15.11.38	id50293	-	-	-	-	-	-	11-13-08 00:25:15 UTC
○	5.	sip:id00579@10.16.12.68	10.16.12.68	id00579	sip:id50579@10.15.12.68	10.15.12.68	id50579	4.38	0.03	0	0	0	0	11-13-08 00:10:00 UTC
○	6.	sip:id00698@10.16.12.187	10.16.12.187	id00698	sip:id50698@10.15.12.187	10.15.12.187	id50698	-	-	-	-	-	-	11-13-08 00:14:57 UTC

Rows per page: 15

Go to page: 1 of 1 Go

Select an item then take an action -->

Clear Table | Details

Table 4-15 provides descriptions of the fields of the Active Calls Table.

Table 4-15 Active Calls Table

Field	Description
Caller	
Number	Number of the phone placing the call.
IP Address	IP address of the phone placing the call.
Alias	Alias name, MGCP endpoint ID, or SIP URI of the calling party phone.
Called	
Number	Number of the phone receiving the call.
IP Address	IP address of the phone receiving the call.
Alias	Alias name, MGCP endpoint ID, or SIP URI of the called party phone.
Worst	
Worst MOS	Mean Opinion of Service is a system of grading the voice quality of telephone connections.
Jitter (ms)	Jitter is an unwanted variation of one or more characteristics of voice traffic quality.
Adjusted Packet Loss (%)	Packet loss on the network.
Actual Packet Loss (%)	Packet loss within a buffer emulation time (default is 45 ms).
Total SSC (sec)	Total number of seconds of severe concealment.
SOC (sec)	Seconds of concealment.

Terminated Calls

The Terminated Calls windows provide information about calls that have terminated. These windows provide a historical archive based on the parameters you choose on each window. You can view the following Terminated Calls windows:

- Overview, page 4-27
- Worst N Calls, page 4-28

Overview

To view the Terminated Calls Overview window:

Step 1 Choose **Monitor** > **Voice/Video**.

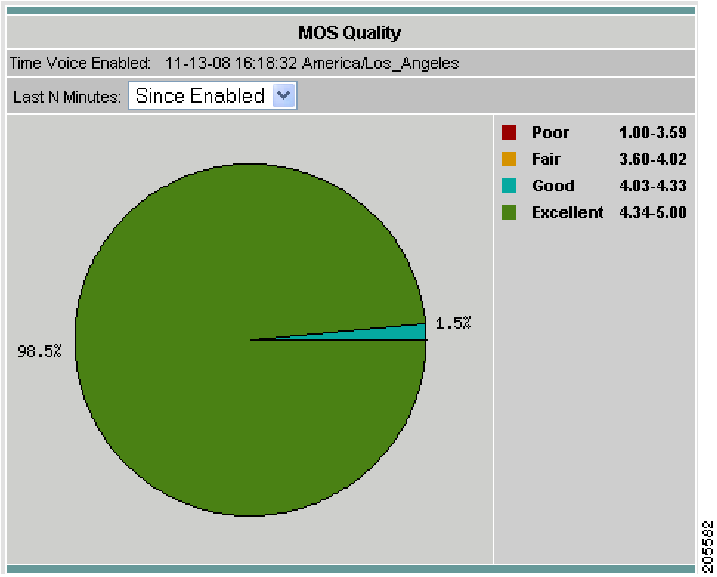
The Active Calls MOS Quality Chart displays.

Step 2 In the Content Menu, click **Terminated Calls -- Overview**.

The Voice Quality Overview window displays. Figure 4-19 shows an example of the Terminated Calls - Overview window. The Terminated Calls - Overview window is a pie chart that displays the various terminated call quality using colors for Poor, Fair, Good, and Excellent quality. Use the Last N Minutes pull-down menu to display the chart for the one of the following:

- 5 minutes
- 15 minutes
- 30 minutes
- 45 minute
- 60 minutes
- Since Enabled (Displays quality of calls since you enabled Voice monitoring.)

Figure 4-19 Terminated Calls - Overview Window



MOS Quality

Time Voice Enabled: 11-13-08 16:18:32 America/Los_Angeles

Last N Minutes: Since Enabled

🟥	Poor	1.00-3.59
🟧	Fair	3.60-4.02
🟦	Good	4.03-4.33
🟩	Excellent	4.34-5.00

Worst N Calls

You can use the Worst N Calls window to view the poorest quality calls monitored by the NAM.

To view the worst quality calls:

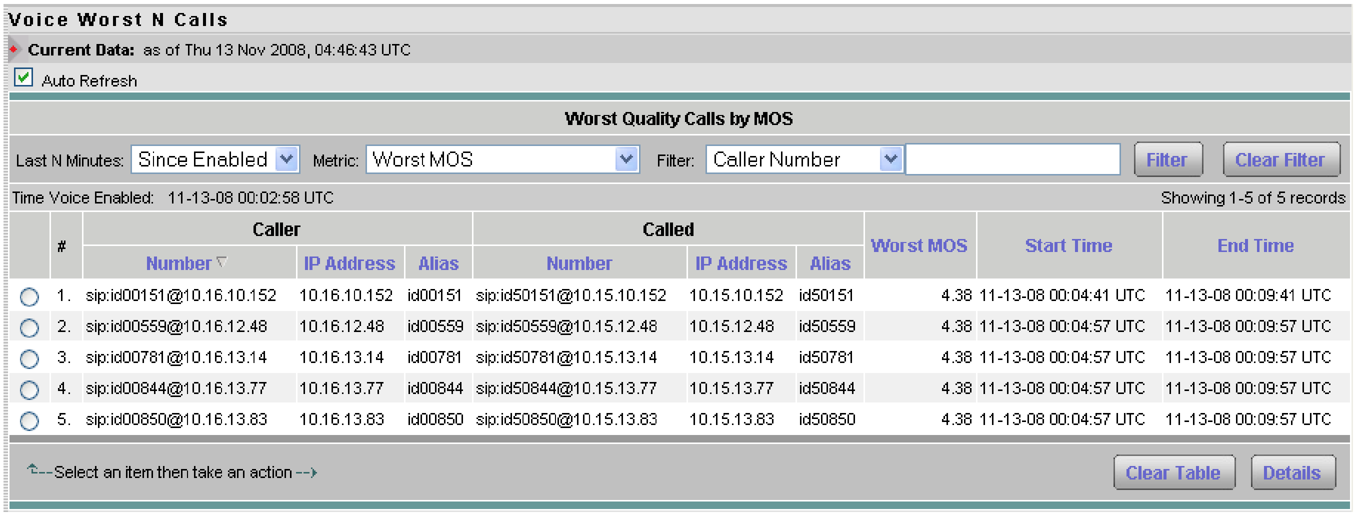
Step 1 Choose **Monitor** > **Voice/Video**.

The Voice Quality Overview window displays.

Step 2 In the content menu, click **Worst N Calls**.

The Voice Worst N Calls window displays a list of the worst calls in tabular format. Figure 4-20 shows an example of the Voice Worst N Calls window.

Figure 4-20 Voice Worst N Calls Window



Voice Worst N Calls

Current Data: as of Thu 13 Nov 2008, 04:46:43 UTC

☑ Auto Refresh

Worst Quality Calls by MOS

Last N Minutes: Since Enabled Metric: Worst MOS Filter: Caller Number

Time Voice Enabled: 11-13-08 00:02:58 UTC

Showing 1-5 of 5 records

	#	Caller			Called			Worst MOS	Start Time	End Time
		Number ▽	IP Address	Alias	Number	IP Address	Alias			
○	1.	sip:id00151@10.16.10.152	10.16.10.152	id00151	sip:id50151@10.15.10.152	10.15.10.152	id50151	4.38	11-13-08 00:04:41 UTC	11-13-08 00:09:41 UTC
○	2.	sip:id00559@10.16.12.48	10.16.12.48	id00559	sip:id50559@10.15.12.48	10.15.12.48	id50559	4.38	11-13-08 00:04:57 UTC	11-13-08 00:09:57 UTC
○	3.	sip:id00781@10.16.13.14	10.16.13.14	id00781	sip:id50781@10.15.13.14	10.15.13.14	id50781	4.38	11-13-08 00:04:57 UTC	11-13-08 00:09:57 UTC
○	4.	sip:id00844@10.16.13.77	10.16.13.77	id00844	sip:id50844@10.15.13.77	10.15.13.77	id50844	4.38	11-13-08 00:04:57 UTC	11-13-08 00:09:57 UTC
○	5.	sip:id00850@10.16.13.83	10.16.13.83	id00850	sip:id50850@10.15.13.83	10.15.13.83	id50850	4.38	11-13-08 00:04:57 UTC	11-13-08 00:09:57 UTC

Table 4-16, Worst N Calls Window, provides definitions of the calls that fall into the category based on the Last N Minutes, Metric, and the Filter you choose.

Table 4-16 Worst N Calls Window

Field	Definition
Caller	
Number	Phone number of the caller
IP Address	IP Address of the callers phone
Alias	Name of Email Alias
Called	
Number	Phone number of the called phone.
IP Address	IP Address of the called phone
Alias	Name of Email Alias
Worst MOS	Worst MOS of this call. This will be the metric you choose from the Display Metric pull-down window.
Start Time	Start time of the call.
End Time	End time of the call.

Viewing Known Phones

You can view basic and detailed information on all known monitored phones in your network.

If you are using MGCP gateways in your network, the MGCP endpoint and endpoint IDs represent the ports of the MGCP gateway that are used to establish connections with the specified call.

To view known phones:

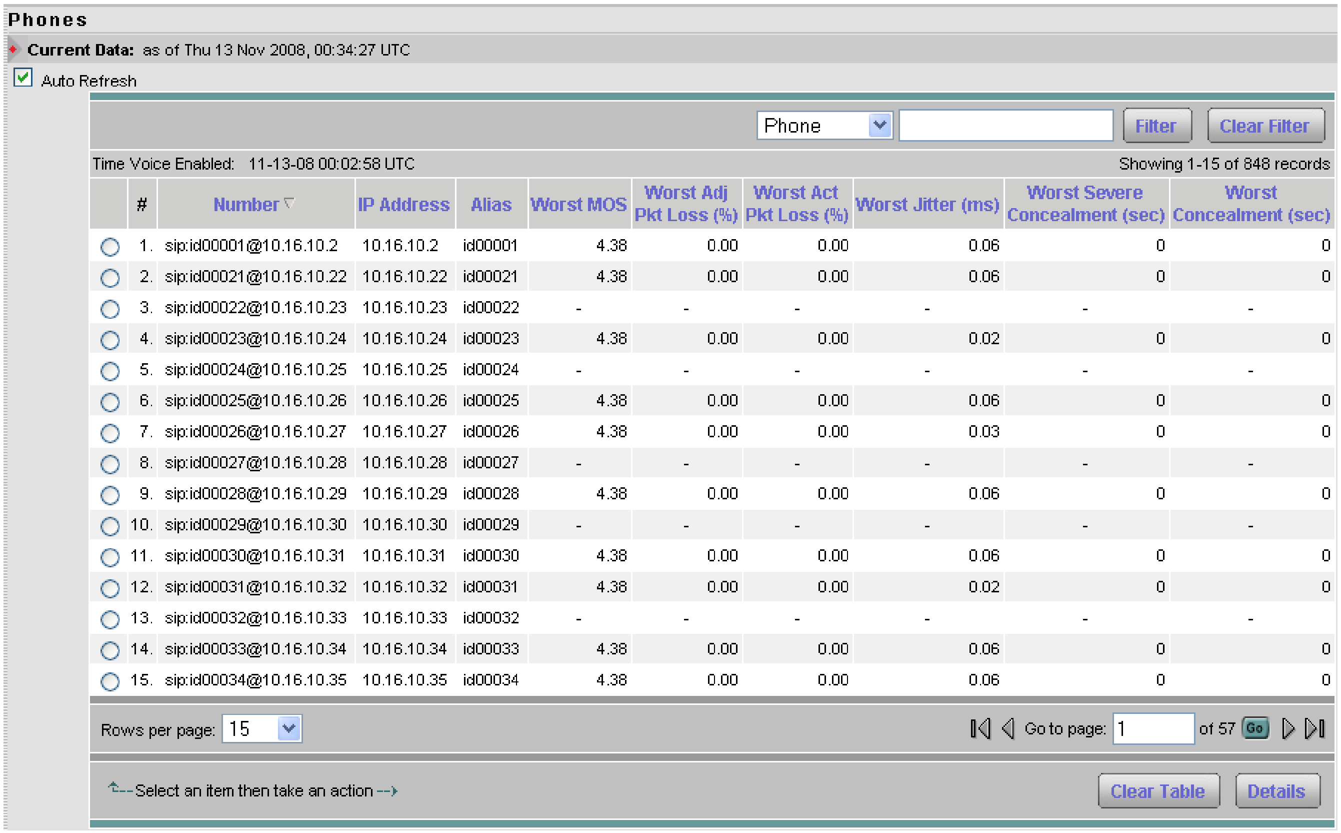
Step 1 Choose **Monitor** > **Voice/Video**.

The Voice Quality Overview window displays.

Step 2 In the contents, click **Known Phones**.

The Phones Table displays. Figure 4-21 shows an example of the Known Phones table.

Figure 4-21 Known Phones Table



Phones

Current Data: as of Thu 13 Nov 2008, 00:34:27 UTC

☑ Auto Refresh

Time Voice Enabled: 11-13-08 00:02:58 UTC

Showing 1-15 of 848 records

	#	Number	IP Address	Alias	Worst MOS	Worst Adj Pkt Loss (%)	Worst Act Pkt Loss (%)	Worst Jitter (ms)	Worst Severe Concealment (sec)	Worst Concealment (sec)
○	1.	sip:id00001@10.16.10.2	10.16.10.2	id00001	4.38	0.00	0.00	0.06	0	0
○	2.	sip:id00021@10.16.10.22	10.16.10.22	id00021	4.38	0.00	0.00	0.06	0	0
○	3.	sip:id00022@10.16.10.23	10.16.10.23	id00022	-	-	-	-	-	-
○	4.	sip:id00023@10.16.10.24	10.16.10.24	id00023	4.38	0.00	0.00	0.02	0	0
○	5.	sip:id00024@10.16.10.25	10.16.10.25	id00024	-	-	-	-	-	-
○	6.	sip:id00025@10.16.10.26	10.16.10.26	id00025	4.38	0.00	0.00	0.06	0	0
○	7.	sip:id00026@10.16.10.27	10.16.10.27	id00026	4.38	0.00	0.00	0.03	0	0
○	8.	sip:id00027@10.16.10.28	10.16.10.28	id00027	-	-	-	-	-	-
○	9.	sip:id00028@10.16.10.29	10.16.10.29	id00028	4.38	0.00	0.00	0.06	0	0
○	10.	sip:id00029@10.16.10.30	10.16.10.30	id00029	-	-	-	-	-	-
○	11.	sip:id00030@10.16.10.31	10.16.10.31	id00030	4.38	0.00	0.00	0.06	0	0
○	12.	sip:id00031@10.16.10.32	10.16.10.32	id00031	4.38	0.00	0.00	0.02	0	0
○	13.	sip:id00032@10.16.10.33	10.16.10.33	id00032	-	-	-	-	-	-
○	14.	sip:id00033@10.16.10.34	10.16.10.34	id00033	4.38	0.00	0.00	0.06	0	0
○	15.	sip:id00034@10.16.10.35	10.16.10.35	id00034	4.38	0.00	0.00	0.06	0	0

Rows per page: 15

Go to page: 1 of 57

Select an item then take an action -->

Table 4-17 describes the fields of the Known Phones Table.

Table 4-17 Phones Table

Field	Description
Number	Phone number or MGCP endpoint.
IP Address	IP address of the phone.
Alias	Alias name or MGCP endpoint ID of the phone.
Worst MOS	Worst MOS quality for this call.
Worst Adj Pkt Loss %	Average packets loss on the phone.
Worst Act Pkt Loss %	Average packets loss on the phone.
Worst Jitter	Worst jitter on the phone (in milliseconds) for selected call.
Worst Severe Concealment (sec)	Worst severe concealment for this call.
Worst Concealment (sec)	Worst concealment for this call.

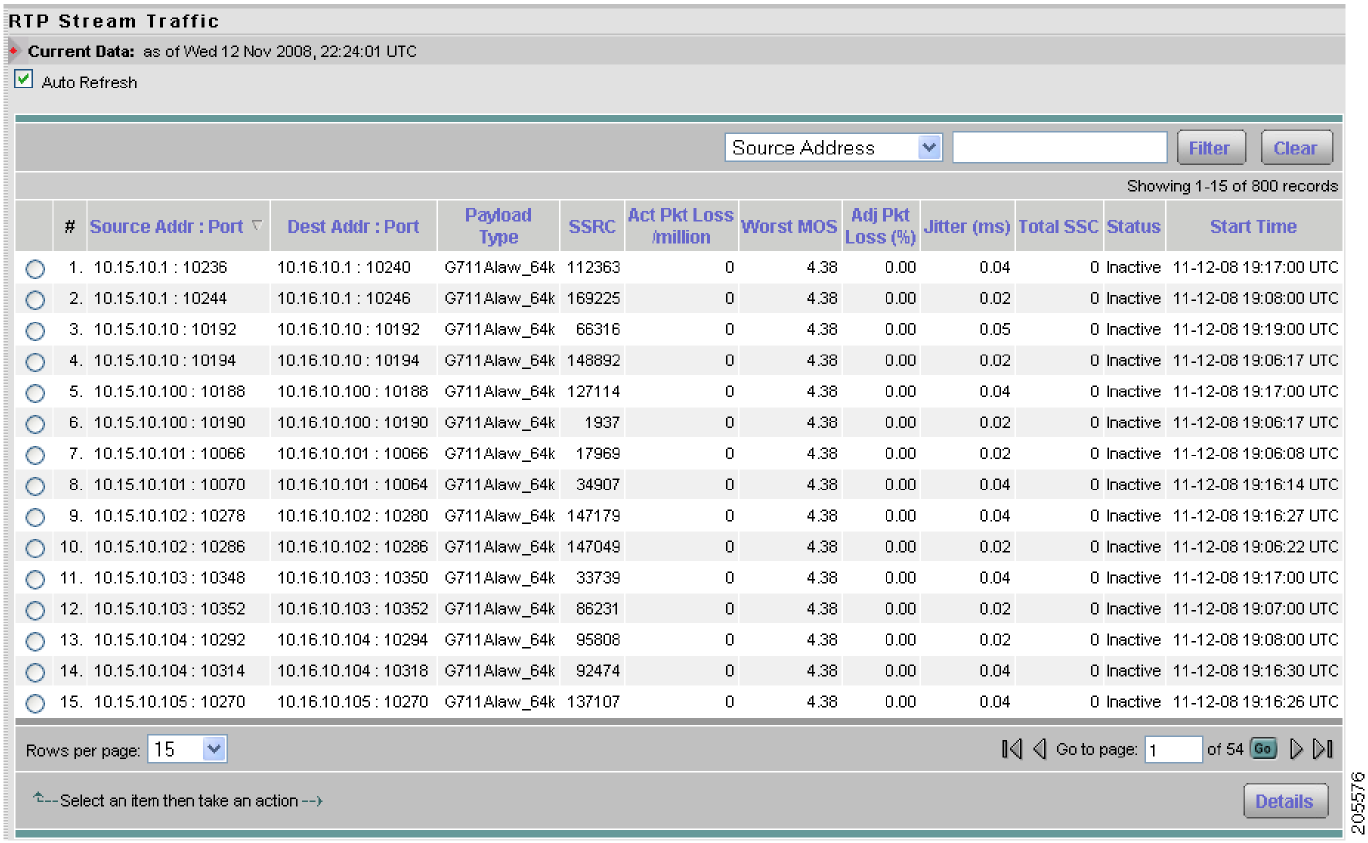
Tip To turn off auto refresh, deselect the Auto Refresh check box.

Viewing RTP Stream Traffic

To view RTP Stream Traffic, choose **Monitor** > **Voice/Video**, then choose **RTP Stream Traffic** in the content menu. The RTP Stream Traffic Window (Figure 4-22) displays.

Note NAM 4.0 does not support IPv6 for RTP stream analysis.

Figure 4-22 RTP Stream Traffic Window



RTP Stream Traffic

Current Data: as of Wed 12 Nov 2008, 22:24:01 UTC

☑ Auto Refresh

Source Address ▾ [ ] Filter Clear

Showing 1-15 of 800 records

	#	Source Addr : Port ▽	Dest Addr : Port	Payload Type	SSRC	Act Pkt Loss /million	Worst MOS	Adj Pkt Loss (%)	Jitter (ms)	Total SSC	Status	Start Time
○	1.	10.15.10.1 : 10236	10.16.10.1 : 10240	G711Alaw_64k	112363	0	4.38	0.00	0.04	0	Inactive	11-12-08 19:17:00 UTC
○	2.	10.15.10.1 : 10244	10.16.10.1 : 10246	G711Alaw_64k	169225	0	4.38	0.00	0.02	0	Inactive	11-12-08 19:08:00 UTC
○	3.	10.15.10.10 : 10192	10.16.10.10 : 10192	G711Alaw_64k	66316	0	4.38	0.00	0.05	0	Inactive	11-12-08 19:19:00 UTC
○	4.	10.15.10.10 : 10194	10.16.10.10 : 10194	G711Alaw_64k	148892	0	4.38	0.00	0.02	0	Inactive	11-12-08 19:06:17 UTC
○	5.	10.15.10.100 : 10188	10.16.10.100 : 10188	G711Alaw_64k	127114	0	4.38	0.00	0.04	0	Inactive	11-12-08 19:17:00 UTC
○	6.	10.15.10.100 : 10190	10.16.10.100 : 10190	G711Alaw_64k	1937	0	4.38	0.00	0.02	0	Inactive	11-12-08 19:06:17 UTC
○	7.	10.15.10.101 : 10066	10.16.10.101 : 10066	G711Alaw_64k	17969	0	4.38	0.00	0.02	0	Inactive	11-12-08 19:06:08 UTC
○	8.	10.15.10.101 : 10070	10.16.10.101 : 10064	G711Alaw_64k	34907	0	4.38	0.00	0.04	0	Inactive	11-12-08 19:16:14 UTC
○	9.	10.15.10.102 : 10278	10.16.10.102 : 10280	G711Alaw_64k	147179	0	4.38	0.00	0.04	0	Inactive	11-12-08 19:16:27 UTC
○	10.	10.15.10.102 : 10286	10.16.10.102 : 10286	G711Alaw_64k	147049	0	4.38	0.00	0.02	0	Inactive	11-12-08 19:06:22 UTC
○	11.	10.15.10.103 : 10348	10.16.10.103 : 10350	G711Alaw_64k	33739	0	4.38	0.00	0.04	0	Inactive	11-12-08 19:17:00 UTC
○	12.	10.15.10.103 : 10352	10.16.10.103 : 10352	G711Alaw_64k	86231	0	4.38	0.00	0.02	0	Inactive	11-12-08 19:07:00 UTC
○	13.	10.15.10.104 : 10292	10.16.10.104 : 10294	G711Alaw_64k	95808	0	4.38	0.00	0.02	0	Inactive	11-12-08 19:08:00 UTC
○	14.	10.15.10.104 : 10314	10.16.10.104 : 10318	G711Alaw_64k	92474	0	4.38	0.00	0.04	0	Inactive	11-12-08 19:16:30 UTC
○	15.	10.15.10.105 : 10270	10.16.10.105 : 10270	G711Alaw_64k	137107	0	4.38	0.00	0.04	0	Inactive	11-12-08 19:16:26 UTC

Rows per page: 15 ▾ Go to page: 1 of 54 Go

↑-- Select an item then take an action --> Details

205576

Table 4-18 describes the fields of the RTP Stream Traffic window.

Table 4-18 RTP Stream Traffic Window Fields

Field	Description
Source Address: Port	Source address and port of the RTP stream traffic
Destination Address: Port	Destination address and port of the RTP stream traffic
RTP Payload Type	Payload type as seen in the RTP stream
SSRC Value	Synchronization Source of the RTP packet
Act Pkt Loss/million	Actual packet loss rate (divided by 1,000,000 for ease of viewing)
Worst MOS	Worst (lowest) MOS score for this RTP stream
Adjusted Packet Loss	Adjusted packet loss percentage for this RTP stream
Jitter (ms)	Average jitter value (ms) of this RTP stream
Total SSC	Sum of all seconds of severe concealment value for this RTP stream
Status	• Active indicates an active RTP stream • Inactive indicates an RTP stream that has ended
Start Time	Start time for this RTP stream

Monitoring Hosts

You can view results from any active hosts collections in the RMON1 and RMON2 host tables on the NAM.

To view hosts data:

Step 1 Click **Monitor** > **Hosts**.

The Network Hosts table displays with three radio buttons above it. You can select a radio button for:

- Viewing the Network Hosts Current Rates Table, page 4-33
- Viewing the Network Hosts Top N Chart, page 4-36
- Viewing the Network Hosts Cumulative Data Table, page 4-37

Step 2 To view the data based on the host MAC addresses, click **MAC Stations** in the contents.

Note MAC statistics are not available on NM-NAM or NME-NAM devices.

The Mac Stations table displays with three radio buttons above it. You can select a radio button for:

- Viewing the MAC Stations Current Rates Table, page 4-38
- Viewing the MAC Stations Top N Chart, page 4-39
- Viewing the MAC Stations Cumulative Data Table, page 4-40

Viewing the Network Hosts Current Rates Table

The Network Current Rates table enables you to view the various data collected for each host. The information displayed represents the data collected per second over the last time interval. For information on setting the time interval, see the "Setting Global Preferences" section on page 3-87.

To view the Network Current Rates table:

Step 1 Click **Monitor** > **Hosts**.

The Network Hosts Current Rates Table (Table 4-19) displays by default.

Table 4-19 Network Hosts Current Rates Table

Field	Description
Address	Network address of the host.
Via	Protocol being monitored.
In Packets/s	Number of input packets collected per second.
Out Packets/s	Number of output packets collected per second.
In Bytes/s	Number of input bytes collected per second.
Out Bytes/s	Number of output bytes collected per second.
Non Unicast/s	Number of non unicast broadcast packets collected per second.

Step 2 Choose a data source to monitor from the Data Source list.

Step 3 Enter an address to filter in the Address text box, then click **Filter**.

The specified address displays.

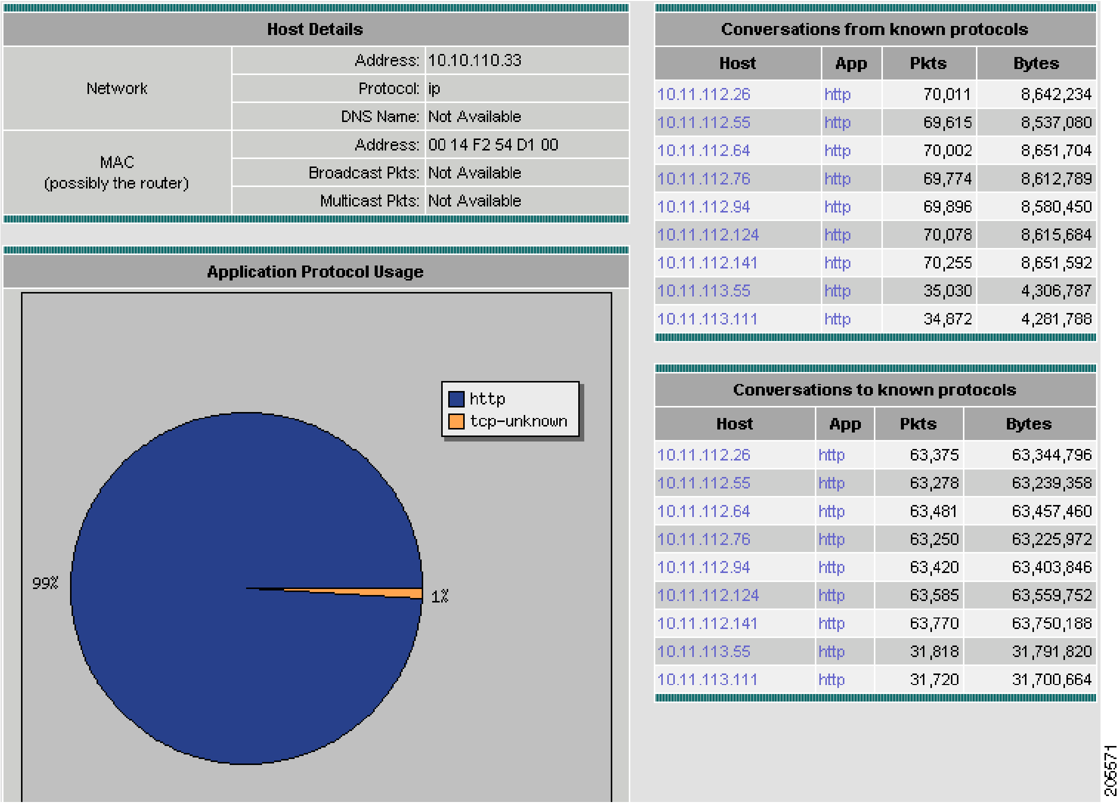
Tip

- To turn off auto refresh, deselect the Auto Refresh check box.
- To sort a table variable by percentage of the total, click on the column header. The variable is listed in descending order according to the percentage of the total.

Viewing Network Host Details

To view details for a specific host, click on the address in the Address column of the Network Hosts table, or click to select a specific host and click **Details**. The Network Hosts Detail Window displays, as shown in Figure 4-23.

Figure 4-23 Network Hosts Detail Window



Host Details

Network	Address:	10.10.110.33
	Protocol:	ip
	DNS Name:	Not Available
MAC (possibly the router)	Address:	00 14 F2 54 D1 00
	Broadcast Pkts:	Not Available
	Multicast Pkts:	Not Available

Application Protocol Usage

Conversations from known protocols

Host	App	Pkts	Bytes
10.11.112.26	http	70,011	8,642,234
10.11.112.55	http	69,615	8,537,080
10.11.112.64	http	70,002	8,651,704
10.11.112.76	http	69,774	8,612,789
10.11.112.94	http	69,896	8,580,450
10.11.112.124	http	70,078	8,615,684
10.11.112.141	http	70,255	8,651,592
10.11.113.55	http	35,030	4,306,787
10.11.113.111	http	34,872	4,281,788

Conversations to known protocols

Host	App	Pkts	Bytes
10.11.112.26	http	63,375	63,344,796
10.11.112.55	http	63,278	63,239,358
10.11.112.64	http	63,481	63,457,460
10.11.112.76	http	63,250	63,225,972
10.11.112.94	http	63,420	63,403,846
10.11.112.124	http	63,585	63,559,752
10.11.112.141	http	63,770	63,750,188
10.11.113.55	http	31,818	31,791,820
10.11.113.111	http	31,720	31,700,664

- Host Details—Displays detailed information for the host.
- Application Protocol Usage Chart—Displays the application protocol usage for the host in graphical format.

- Conversations From Known Protocols—Displays known conversations and statistics *from* the specified host to other hosts on the network using known protocols.
- Conversations To Known Protocols—Displays known conversations and statistics *to* the specified host from other hosts on the network using known protocols.

Note To view the full protocol name, move the cursor over the protocol name in the Application Protocol Usage chart.

Tips

To view the full protocol name, move the cursor over the protocol name in the Application Protocol Usage chart.

Capturing Network Host Data from the Network Host Table

You can capture data for a specific host directly from the Network Host table.

Choose the host from the table, then click **Capture**. The Packet Browser displays. For more information on viewing packets using the Packet Browser, see the "Viewing Detailed Protocol Decode Information" section on page 6-14.

If a capture is already running, a message window displays. Click **Yes** to stop the current capture or **No** to disregard your selection.

The Capture button is available only for a subset of reported protocols. For protocols such as IP, IPv6, and GRE, you must set up a custom filter. For more information on setting up custom filters, see the "Creating Custom Capture Filters" section on page 6-19.

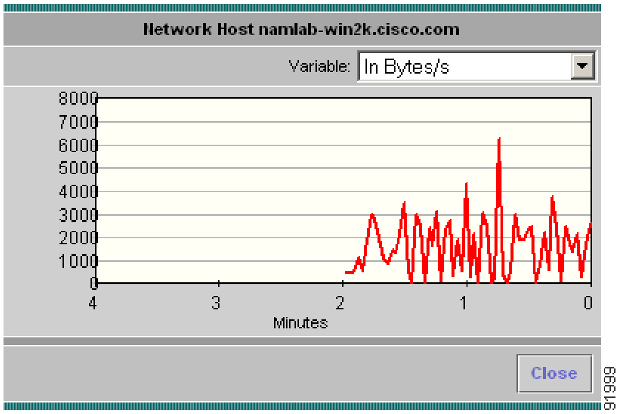
Note The Capture button is disabled for NetFlow-based data sources.

Viewing Real-Time Traffic Statistics from the Hosts Table

You can view real-time traffic statistics in a graphical format for a specific host. Choose the host from the table, then click **Real-Time**. The Real-Time Graph (Figure 4-24) displays.

Note The Real-Time button is disabled for NetFlow-based data sources.

Figure 4-24 Real-Time Graph



Viewing Reports from the Network Hosts Table

You can view reports directly from the Network Hosts table. Choose the host for which to view a report, then click **Report**. The Basic Reports graph displays. If a report is not configured, the Basic Reports screen appears and a new report is created for the selected host and data source.

For more information on viewing and creating reports, see Chapter 5, "Creating and Viewing Reports."

Viewing the Network Hosts Top N Chart

The Network Hosts Top N Chart enables you to various data for the TopN hosts in a graphical format. The information displayed represents the data collected per second over the last time interval. For information on setting the time interval, see the "Setting Global Preferences" section on page 3-87.

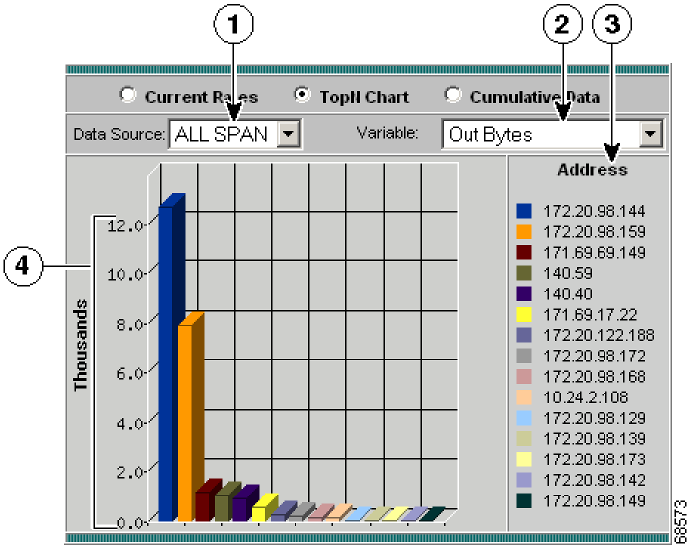
To view the Network Hosts Top N Chart:

Step 1 In the contents, click **Network Hosts**.

Step 2 Click the TopN Chart radio button.

The Top N Network Hosts Chart (Figure 4-25) displays.

Figure 4-25 *Top N Network Hosts Chart*



○ Current Rates ● TopN Chart ○ Cumulative Data

Data Source: ALL SPAN

Variable: Out Bytes

1	Data Source list.	**3**	Top N network host addresses.
2	Variable list.	**4**	Number of packets/bytes input/output per second for each Top N host.

Step 3 Choose the data source to monitor from the Data Source list.

Step 4 Choose one of the following from the Sort Option list:

- In Pkts—Displays the number of input packets.
- Out Pkts—Displays the number of output packets.
- In Bytes—Displays the number of input bytes.
- Out Bytes—Displays the number of output bytes.
- Non Unicast Pkts—Displays the number of non-unicast packets.

Tip To turn off auto refresh, deselect the Auto Refresh check box.

Viewing the Network Hosts Cumulative Data Table

The Network Hosts Cumulative Data Table enables you to view various data collected for each host. The information displayed represents the total data collected since the collection was created or since the NAM was restarted.

To view the Network Hosts Cumulative Data Table:

Step 1 In the contents, click **Network Hosts**.

Step 2 Click the Cumulative Data radio button.

The Network Hosts Cumulative Data Table (Table 4-20) displays.

Table 4-20 Network Hosts Cumulative Data Table

Field	Description
Address	Network address of the host.
Via	Protocol being monitored.
In Pkts	Total number of input packets over the last interval.
Out Pkts	Total number of output packets over the last interval.
In Bytes	Total number of input bytes over the last interval.
Out Bytes	Total number of output bytes over the last interval.
Non Unicast	Total number of non-unicast broadcast packets over the last interval.

Step 3 Choose a data source to monitor from the Data Source list.

Step 4 To view data for a specific address, enter the address in the Address text box, then click **Filter**.

Any matching addresses are displayed.

Tip

- To turn off auto refresh, deselect the Auto Refresh check box.
- To sort a table variable by percentage of the total, click on the column header. The variable is listed in descending order according to the percentage of the total.

Viewing the MAC Stations Current Rates Table

Note This section does not apply to NM-NAM or NME-NAM devices.

The MAC Stations Current Rates table enables you to view the various data collected for each host. The information displayed represents the data collected per second over the last time interval. For information on setting the time interval, see the "Setting Global Preferences" section on page 3-87.

To view the MAC Stations Current Rates table:

Step 1 In the contents, click **MAC Stations**.

Step 2 Click the Current Rates Table radio button.

The MAC Stations Table (Table 4-21) displays.

Table 4-21 MAC Stations Table

Field	Description
Address	MAC address of the host.
In Packets/s	Number of packets received by the host per second.

Table 4-21 MAC Stations Table (continued)

Field	Description
Out Packets/s	Number of packets sent by the host per second.
In Bytes/s	Number of bytes received by the host per second.
Out Bytes/s	Number of bytes sent by the host per second.
Broadcasts/s	Number of broadcasts sent by the host per second.
Multicasts/s	Number of multicasts sent by the host per second.

Step 3 Choose a data source to monitor from the Data Source list.

Step 4 Enter an address to filter in the Address text box, then click **Filter**.

The specified address displays.

Tip

- To turn off auto refresh, deselect the Auto Refresh check box.
- To sort a table variable by percentage of the total, click on the column header. The variable is listed in descending order according to the percentage of the total.

Viewing the MAC Stations Top N Chart

Note This section does not apply to NM-NAM or NME-NAM devices.

The MAC Stations Top N chart enables you to view the various data collected for each host in a graphical format. The information displayed represents the data collected per second over the last time interval.For information on setting the time interval, see the "Setting Global Preferences" section on page 3-87.

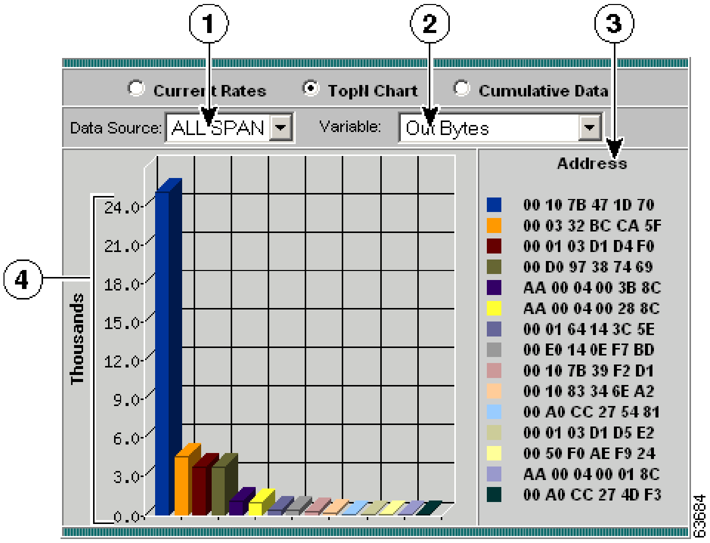
To view the MAC Stations Top N chart:

Step 1 In the contents, click **MAC Stations**.

Step 2 Click the TopN Chart radio button.

The Top N MAC Stations Chart (Figure 4-26)displays.

Figure 4-26 Top N MAC Stations Chart



○ Current Rates ● TopN Chart ○ Cumulative Data

Data Source: ALL SPAN Variable: Out Bytes

Address

- 00 10 7B 47 1D 70
- 00 03 32 BC CA 5F
- 00 01 03 D1 D4 F0
- 00 D0 97 38 74 69
- AA 00 04 00 3B 8C
- AA 00 04 00 28 8C
- 00 01 64 14 3C 5E
- 00 E0 14 0E F7 BD
- 00 10 7B 39 F2 D1
- 00 10 83 34 6E A2
- 00 A0 CC 27 54 81
- 00 01 03 D1 D5 E2
- 00 50 F0 AE F9 24
- AA 00 04 00 01 8C
- 00 A0 CC 27 4D F3

1	Data Source list.	**3**	Top N MAC host addresses.
2	Variable list.	**4**	Number of packets/bytes input/output per second for each Top N host.

Step 3 Choose the data source to monitor from the Data Source list.

Step 4 Choose one of the following from the Sort Option list:

- In Packets—Displays the number of input packets per second.
- Out Packets—Displays the number of output packets per second.
- In Bytes—Displays the number of input bytes per second.
- Out Packets—Displays the number of input bytes per second.
- Broadcast Packets—Sorts the addresses based on the number of broadcast packets per second.
- Multicast Packets—Sorts the addresses based on the number of multicast packets per second.

Tip To turn off auto refresh, deselect the Auto Refresh check box.

Viewing the MAC Stations Cumulative Data Table

Note This section does not apply to NM-NAM or NME-NAM devices.

The MAC Stations Cumulative Data Table enables you to view the various data collected for each host. The information displayed represents the total data collected since the collection was created or since the NAM was restarted.

To view the MAC Stations Cumulative Data Table:

Step 1 In the contents, click **MAC Stations**.

Step 2 Click the Cumulative Data radio button.

The MAC Stations Cumulative Data Table (Table 4-21) displays.

Table 4-22 MAC Stations Cumulative Data Table

Field	Description
Address	MAC address of the host.
In Packets	Total number of packets received by the host over the last time interval.
Out Packets	Total number of packets sent by the host over the last time interval.
In Bytes	Total number of bytes received by the host over the last time interval.
Out Bytes	Total number of bytes sent by the host over the last time interval.
Broadcasts	Total number of broadcasts sent by the host over the last time interval.
Multicasts	Total number of multicasts sent by the host.

Step 3 Choose a data source to monitor from the Data Source list.

Step 4 Enter an address to filter in the Address text box, then click **Filter**.

The specified address displays.

Tip

- To turn off auto refresh, deselect the Auto Refresh check box.
- To sort a table variable by percentage of the total, click on the column header. The variable is listed in descending order according to the percentage of the total.

Viewing Conversations Data

You can view conversations data collected on the NAM. Conversations data represents the number of packets and bytes collected between two hosts. Click **Monitor** > **Conversations** to view conversations data.

NAM provides three menu options for monitoring conversations:

- Viewing Network Hosts, page 4-42
- Viewing the Application Hosts, page 4-46
- Viewing MAC Stations, page 4-47

Viewing Network Hosts

The Network Hosts Conversations table displays statistics between pairs of IP addresses *talking* to each other. The statistics pertain to all packets between the hosts, regardless of protocol or application. There are three options you can use to display the Network Hosts Conversations table:

- Viewing the Network Host Conversations Current Rates Table, page 4-42
- Viewing the Network Host Conversations Top N Chart, page 4-44
- Viewing the Network Host Conversations Cumulative Data Table, page 4-45

Viewing the Network Host Conversations Current Rates Table

The Network Host Conversations Current Rates table enables you to view the number of packets and bytes collected for each host conversation. The data displayed is the number of packets and bytes collected per second over the last time interval. For information on setting the time interval, see the "Setting Global Preferences" section on page 3-87.

To view the Network Host Conversations Current Rates table:

Step 1 In the contents, click **Network Hosts**.

Step 2 Click the Current Rates Table radio button.

The Network Host Conversations Current Rates Table (Table 4-23) displays.

Table 4-23 Network Host Conversations Current Rates Table

Field	Description
Source	Source address of the conversation.
Via	Network layer protocol over which the hosts are conversing.
Destination	Destination address of the conversation.
Packets/s	Number of packets collected per second for the conversation over the last interval.
Bytes/s	Number of bytes collected per second for the conversation. over the last interval.

Step 3 Choose the data source to be monitored from the Data Source list.

Step 4 To view data for a specific source or destination, select Source, Destination, or Source or Destination from the list.

Step 5 Enter the address in the text box, then click **Filter**.

Any matching source or destination addresses are displayed.

Tip

- To turn off auto refresh, deselect the Auto Refresh check box.
- To sort a table variable by percentage of the total, click on the column header. The variable is listed in descending order according to the percentage of the total.

Viewing Network Host Conversation Details

To view conversation details for a specific network conversation, click the network address in the Source or Destination column. The following tables are displayed:

- Host Details—Displays detailed information for the source or destination host.
- Application Protocol Usage Chart—Displays the application protocol usage for the source of destination host in graphical format.
- Conversations From Known Protocols—Displays known conversations and statistics from the specified host to other hosts on the network using known protocols.
- Conversations To Known Protocols—Displays known conversations and statistics to the specified host from other hosts on the network using known protocols.

Note To view the full protocol name, move the cursor over the protocol name in the Application Protocol Usage chart.

Capturing Network Host Conversation Data from the Network Host Conversations Table

You can capture data for a specific network host conversation directly from the Network Host Conversations table.

Choose the conversation from the table, then click **Capture**. The Packet Browser displays. For more information on viewing packets using the Packet Browser, see the "Viewing Detailed Protocol Decode Information" section on page 6-14.

If a capture is already running, a message window displays. Click **Yes** to stop the current capture or **No** to disregard your selection.

The Capture button is available only for a subset of reported protocols. For protocols such as IP, IPv6, and GRE, you must set up a custom filter. For more information on setting up custom filters, see the "Creating Custom Capture Filters" section on page 6-19.

Note The Capture button is disabled for NetFlow-based data sources.

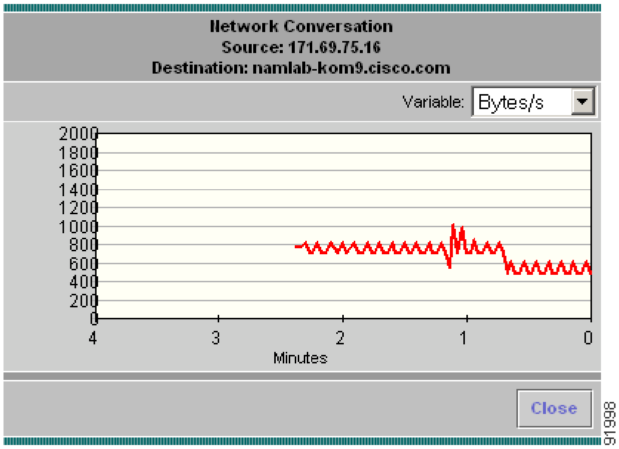
Viewing Real-Time Traffic Statistics from the Network Host Conversations Table

You can view real-time traffic statistics in a graphical format for a specific host conversation.

Choose the conversation from the table, then click **Real-Time**. The Real-Time Graph (Figure 4-24)displays.

Note The Real-Time button is disabled for NetFlow-based data sources.

Figure 4-27 Real-Time Graph


Network Conversation
Source: 171.69.75.16
Destination: namlab-kom9.cisco.com

Variable: Bytes/s

Viewing Reports from the Network Host Conversations Table

You can view reports directly from the Network Hosts Conversations table. Choose the conversation you wish to view a report on, then click **Report**. The Basic Reports graph displays. If a report is not configured, the Basic Reports screen appears and a new report is created for the selected host and data source.

For more information on viewing and creating reports, see Chapter 5, "Creating and Viewing Reports."

Viewing the Network Host Conversations Top N Chart

The Top N Network Host Conversations Chart enables you to view the number of packets and bytes collected for the Top N network host conversations in a graphical format. The data displayed is the number of packets and bytes collected per second over the last time interval. For information on setting the time interval, see the "Setting Global Preferences" section on page 3-87.

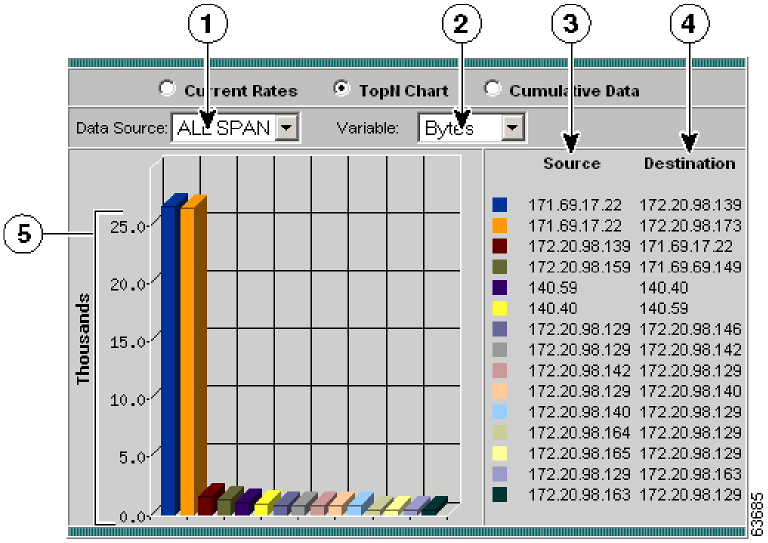
To view the Top N Network Host Conversations chart:

Step 1 In the contents, click **Network Hosts**.

Step 2 Click the TopN Chart radio button.

The Top N Network Host Conversations Chart (Figure 4-28) displays.

Figure 4-28 Top N Network Host Conversations Chart



○ Current Rates ● TopN Chart ○ Cumulative Data

Data Source: ALL SPAN Variable: Bytes

	Source	Destination
■	171.69.17.22	172.20.98.139
■	171.69.17.22	172.20.98.173
■	172.20.98.139	171.69.17.22
■	172.20.98.159	171.69.69.149
■	140.59	140.40
■	140.40	140.59
■	172.20.98.129	172.20.98.146
■	172.20.98.129	172.20.98.142
■	172.20.98.142	172.20.98.129
■	172.20.98.129	172.20.98.140
■	172.20.98.140	172.20.98.129
■	172.20.98.164	172.20.98.129
■	172.20.98.165	172.20.98.129
■	172.20.98.129	172.20.98.163
■	172.20.98.163	172.20.98.129

1	Data Source list.	**4**	Top N destination network addresses.
2	Variable list.	**5**	Number of packets or bytes collected per second.
3	Top N source network addresses.		

Step 3 Choose the data source to be monitored from the Data Source list.

Step 4 Choose one of the following from the Variable list:

- Packets—Sorts the addresses based on the number of packets.
- Bytes—Sorts the addresses based on the number of bytes.

Viewing the Network Host Conversations Cumulative Data Table

The Network Host Conversations Cumulative Data Table enables you to view the number of packets and bytes collected for each host conversation. The data displayed is the total number of packets and bytes collected since the collection was created or since the NAM was restarted.

To view the Network Host Conversations Cumulative Data table:

Step 1 In the contents, click **Network Hosts**.

The Network Hosts Conversations Current Rates table displays.

Step 2 Click the **Cumulative Data** radio button.

The Network Host Conversations Cumulative Data Table (Table 4-24) displays.

Table 4-24 Network Host Conversations Cumulative Data Table

Field	Description
Source	Source address of the conversation.
Via	Network layer protocol over which the hosts are conversing.
Destination	Destination address of the conversation.
Packets	Total number of packets collected over the last time interval for the conversation.
Bytes	Total number of bytes collected over the last time interval for the conversation.

Step 3 Choose a data source to monitor from the Data Source list.

Step 4 Enter an address to filter in the Address text box, then click **Filter**.

The specified address displays.

Step 5 To refresh the table, click **Refresh**.

Tip To sort a table variable by percentage of the total, click on the column header. The variable is listed in descending order according to the percentage of the total.

Viewing Network Host Conversation Details

To view conversation details for a specific network conversation, click the network address in the Source or Destination column. The following tables are displayed:

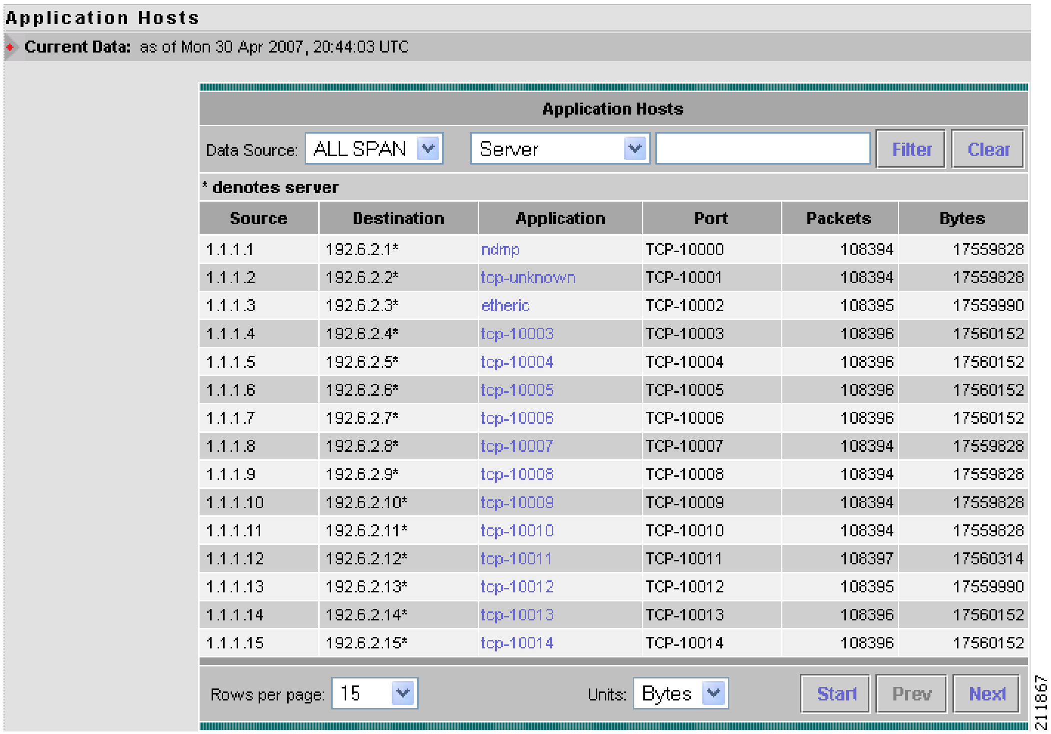
- Host Details—Displays detailed information for the source or destination host.
- Application Protocol Usage Chart—Displays the application protocol usage for the source of destination host in graphical format.
- Conversations From Known Protocols—Displays known conversations and statistics from the specified host to other hosts on the network using known protocols.
- Conversations To Known Protocols—Displays known conversations and statistics to the specified host from other hosts on the network using known protocols.

Viewing the Application Hosts

The Application Hosts table enables you to view the number of packets and bytes collected for each host conversation. You can use this data to identify application hosts conversations and port numbers that can help you design access control lists on switches and routers to allow or block certain ports between certain hosts. The data displayed is the number of packets and bytes collected per second over the last time interval.

To view the Application Hosts table, click **Monitor** > **Conversations** > **Application Hosts**. Figure 4-29 shows an example of the Application Hosts table.

Figure 4-29 Application Hosts Table



Application Hosts

Current Data: as of Mon 30 Apr 2007, 20:44:03 UTC

Application Hosts

Data Source: ALL SPAN   Server

* denotes server

Source	Destination	Application	Port	Packets	Bytes
1.1.1.1	192.6.2.1*	ndmp	TCP-10000	108394	17559828
1.1.1.2	192.6.2.2*	tcp-unknown	TCP-10001	108394	17559828
1.1.1.3	192.6.2.3*	etheric	TCP-10002	108395	17559990
1.1.1.4	192.6.2.4*	tcp-10003	TCP-10003	108396	17560152
1.1.1.5	192.6.2.5*	tcp-10004	TCP-10004	108396	17560152
1.1.1.6	192.6.2.6*	tcp-10005	TCP-10005	108396	17560152
1.1.1.7	192.6.2.7*	tcp-10006	TCP-10006	108396	17560152
1.1.1.8	192.6.2.8*	tcp-10007	TCP-10007	108394	17559828
1.1.1.9	192.6.2.9*	tcp-10008	TCP-10008	108394	17559828
1.1.1.10	192.6.2.10*	tcp-10009	TCP-10009	108394	17559828
1.1.1.11	192.6.2.11*	tcp-10010	TCP-10010	108394	17559828
1.1.1.12	192.6.2.12*	tcp-10011	TCP-10011	108397	17560314
1.1.1.13	192.6.2.13*	tcp-10012	TCP-10012	108395	17559990
1.1.1.14	192.6.2.14*	tcp-10013	TCP-10013	108396	17560152
1.1.1.15	192.6.2.15*	tcp-10014	TCP-10014	108396	17560152

Rows per page: 15   Units: Bytes

Table 4-25 lists the fields of the Application Hosts Conversations table.

Table 4-25 Application Hosts Conversations

Field	Description
Source	Source address of the conversation
Destination	Destination address of the conversation
Application	Application used in conversation
Port	Port used for the conversation.
Packets	Total number of packets collected over the last time interval for the conversation
Bytes	Total number of bytes collected over the last time interval for the conversation

Viewing MAC Stations

The Media Access Control (MAC) Stations Conversations table displays statistics of conversations between two MAC addresses instead of two IP addresses.

- Viewing the MAC Station Conversations Current Rates Table, page 4-48
- Viewing the MAC Conversations Top N Chart, page 4-48
- Viewing the MAC Station Conversations Cumulative Data Table, page 4-50

Viewing the MAC Station Conversations Current Rates Table

Note This section does not apply to NM-NAM or NME-NAM devices.

The MAC Station Conversations Current Rates table enables you to view the number of packets and bytes collected for each host conversation. The data displayed is the number of packets and bytes collected per second over the last time interval. For information on setting the time interval, see the "Setting Global Preferences" section on page 3-87.

To view the MAC Station Conversations Current Rates table:

Step 1 In the contents, click **Monitor** > **Conversations** > **MAC Stations**.

The MAC Station Conversations Current Rates Table (Table 4-26) displays.

Table 4-26 MAC Station Conversations Current Rates Table

Field	Description
Source	Source MAC address of the conversation.
Destination	Destination MAC address of the conversation.
Packets/s	Number of packets collected per second for the conversation over the last interval.
Bytes/s	Number of bytes collected per second for the conversation. over the last interval.
Errors/s	Number of errors collected per second for the conversation. over the last interval.

Step 2 Choose the data source to be monitored from the Data Source list.

Step 3 To view data for a specific address, enter the full or partial MAC address in the Address text box, then click **Filter**.

Any matching addresses are displayed.

Tip To turn off auto refresh, deselect the Auto Refresh check box.

Viewing the MAC Conversations Top N Chart

Note This section does not apply to NM-NAM or NME-NAM devices.

The Top N MAC Station Conversations Chart enables you to view the number of packets and bytes collected for the Top N MAC station conversations in a graphical format. The data displayed is the number of packets and bytes collected per second over the last time interval. For information on setting the time interval, see the "Setting Global Preferences" section on page 3-87.

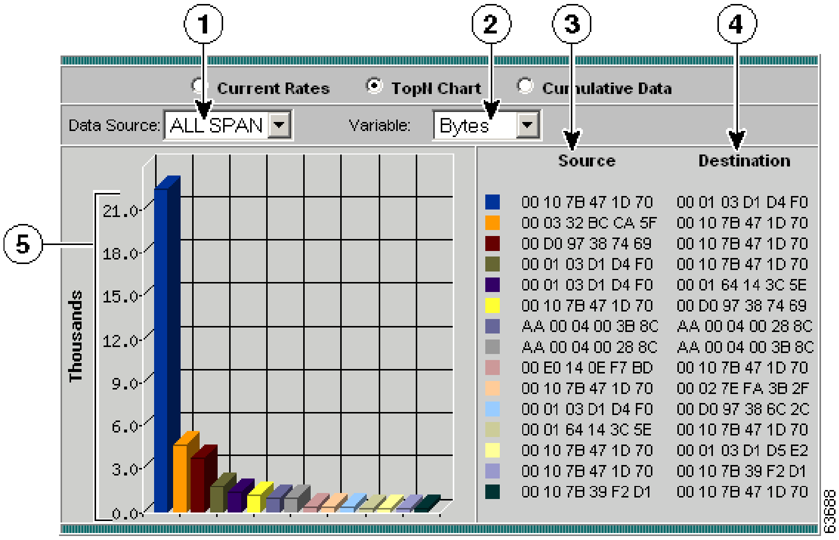
To view the Top N MAC Station Conversations chart:

Step 1 In the contents, click **MAC Stations**.

Step 2 Click the TopN Chart radio button.

The Top N MAC Station Conversations Chart (Figure 4-30) displays.

Figure 4-30 Top N MAC Station Conversations Chart



○ Current Rates ● TopN Chart ○ Cumulative Data

Data Source: ALL SPAN

Variable: Bytes

	Source	Destination
■	00 10 7B 47 1D 70	00 01 03 D1 D4 F0
■	00 03 32 BC CA 5F	00 10 7B 47 1D 70
■	00 D0 97 38 74 69	00 10 7B 47 1D 70
■	00 01 03 D1 D4 F0	00 10 7B 47 1D 70
■	00 01 03 D1 D4 F0	00 01 64 14 3C 5E
■	00 10 7B 47 1D 70	00 D0 97 38 74 69
■	AA 00 04 00 3B 8C	AA 00 04 00 28 8C
■	AA 00 04 00 28 8C	AA 00 04 00 3B 8C
■	00 E0 14 0E F7 BD	00 10 7B 47 1D 70
■	00 10 7B 47 1D 70	00 02 7E FA 3B 2F
■	00 01 03 D1 D4 F0	00 D0 97 38 6C 2C
■	00 01 64 14 3C 5E	00 10 7B 47 1D 70
■	00 10 7B 47 1D 70	00 01 03 D1 D5 E2
■	00 10 7B 47 1D 70	00 10 7B 39 F2 D1
■	00 10 7B 39 F2 D1	00 10 7B 47 1D 70

1	Data Source list.	**4**	Top N destination MAC addresses.
2	Variable list.	**5**	Number of packets, bytes, or errors collected per second.
3	Top N source MAC addresses.		

Step 3 Choose the data source to be monitored from the Data Source list.

Step 4 Choose one of the following from the Variable list:

- Packets—Displays the number of packets.
- Bytes—Displays the number of bytes.
- Errors—Displays the number of errors.

Tip To turn off auto refresh, deselect the Auto Refresh check box.

Viewing the MAC Station Conversations Cumulative Data Table

Note This section does not apply to NM-NAM or NME-NAM devices.

The MAC Station Conversations Cumulative Data Table enables you to view the number of packets and bytes collected for each MAC station conversation. The data displayed is the total number of packets and bytes collected since the collection was created or since the NAM was restarted.

To view the MAC Station Conversations Cumulative Data table:

Step 1 In the contents, click **MAC Stations**.

Step 2 Click the Cumulative Data radio button.

The MAC Station Conversations Cumulative Data Table (Table 4-27) displays.

Table 4-27 MAC Station Conversations Cumulative Data Table

Field	Description
Source	Source MAC address of the conversation.
Destination	Destination MAC address of the conversation.
Pkts	Total number of packets collected over the last time interval for the conversation.
Bytes	Total number of bytes collected over the last time interval for the conversation.
Errors	Total number of errors collected over the last time interval for the conversation.

Step 3 Choose the data source from the Data Source list.

Step 4 Enter an address to filter in the Address text box, then click **Filter**.

The specified address displays.

Step 5 To refresh the table, click **Refresh**.

Tip To turn off auto refresh, deselect the Auto Refresh check box.

Viewing VLAN Data

Note This section does not apply to NM-NAM or NME-NAM devices.

You can view VLAN traffic statistics or VLAN priority (COS) statistics collected on the NAM. Supervisor engine module collections are done independent of any collections done on the NAM.

Note Supervisor engine module-based collections require Supervisor II engine module or later on your switch.

To view VLAN data:

Step 1 Click **Monitor** > **VLAN**.

The VLAN Traffic Statistics table displays with three radio buttons above it. You can select a radio button for:

- Viewing the VLAN Traffic Statistics Current Rates Table, page 4-51.
- Viewing the VLAN Traffic Statistics Top N Chart, page 4-52.
- Viewing VLAN Traffic Statistics Cumulative Data Table, page 4-53.

Step 2 To view the VLAN data based on VLAN priority (COS) statistics, click **VLAN Priority (COS) Statistics** in the contents.

The VLAN Priority (COS) Statistics table displays with three radio buttons above it. You can select a radio button for:

- Viewing the VLAN Priority (COS) Statistics Current Rates Table, page 4-54.
- Viewing the VLAN Priority (COS) Statistics Top N Chart, page 4-55.
- Viewing the VLAN Priority (COS) Statistics Cumulative Data Table, page 4-56.

Viewing the VLAN Traffic Statistics Current Rates Table

Note This section does not apply to NM-NAM or NME-NAM devices.

The VLAN Traffic Statistics Current Rates table enables you to view various data collected for each VLAN ID. The information displayed represents the data collected per second over the last time interval. For information on setting the time interval, see the "Setting Global Preferences" section on page 3-87.

To view the VLAN Traffic Statistics Current Rates table, click the Current Rates radio button.

The VLAN Traffic Statistics Table (Table 4-28) displays.

Table 4-28 VLAN Traffic Statistics Table

Field	Description
VLAN ID	VLAN ID number.
Packets/s	Number of packets collected per second over the last time interval.
Bytes/s	Number of bytes collected per second over the last time interval.
Non-Unicast Packets/s	Number of non-unicast packets collected per second over the last time interval.
Non-Unicast Bytes/s	Number of non-unicast bytes collected per second over the last time interval.

Tip

- To turn off auto refresh, deselect the Auto Refresh check box.
- To sort a table variable by percentage of the total, click on the column header. The variable is listed in descending order according to the percentage of the total.

Viewing Reports from the VLAN Traffic Statistics Table

You can view reports directly from the VLAN Traffic Statistics table. Choose the VLAN ID you wish to view a report on, then click **Report**. The Basic Reports graph displays. If a report is not configured, the Basic Reports screen appears and a new report is created for the selected VLAN and data source.

For more information on viewing and creating reports, see Chapter 5, “Creating and Viewing Reports.”

Viewing the VLAN Traffic Statistics Top N Chart

Note This section does not apply to NM-NAM or NME-NAM devices.

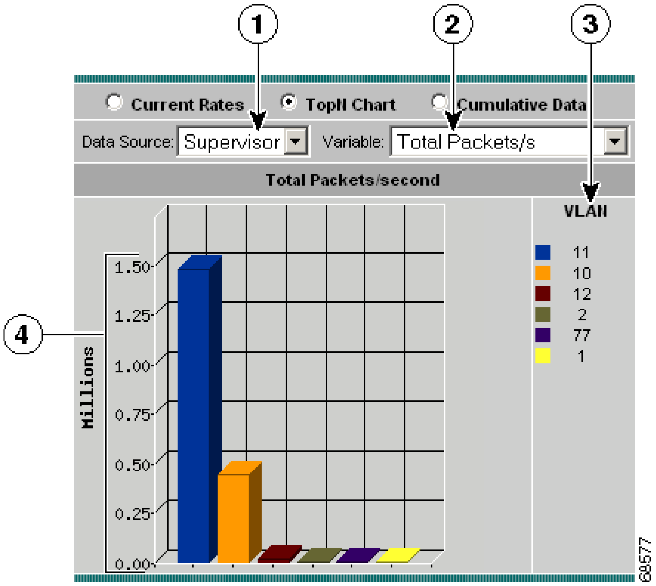
The Top N VLAN Traffic Statistics Chart enables you to view the various data collected for the top N VLAN IDs in a graphical format. The information displayed represents the data collected per second over the last time interval. For information on setting the time interval, see the “Setting Global Preferences” section on page 3-87.

To view the Top N VLAN Traffic Statistics chart:

Step 1 Click the TopN Chart radio button.

The Top N VLAN Traffic Statistics Chart (Figure 4-31)displays.

Figure 4-31 Top N VLAN Traffic Statistics Chart



Data Source: Supervisor
Variable: Total Packets/s

1	Data source list.	**3**	Top N VLAN IDs.
2	Variable list.	**4**	Number of packets/bytes collected per second.

Step 2 Choose the data source from the Data Source list.

Step 3 Choose one of the following from the Variable list:

- Total Packets—Displays the number of total packets.
- Total Bytes—Displays the number of total bytes.
- Non-unicast Packets—Displays the number of non-unicast packets.
- Non-unicast Bytes—Displays the number of non-unicast bytes.

Tip To turn off auto refresh, deselect the Auto Refresh check box.

Viewing VLAN Traffic Statistics Cumulative Data Table

Note This section does not apply to NM-NAM or NME-NAM devices.

The VLAN Traffic Statistics Cumulative Data table enables you to view various data collected for each VLAN ID. The information displayed represents the total data collected since the collection was created or since the NAM was restarted.

To view the VLAN Traffic Statistics Cumulative Data table, click the Cumulative Data Table radio button.

The VLAN Traffic Statistics Cumulative Data Table (Table 4-29) displays.

Table 4-29 VLAN Traffic Statistics Cumulative Data Table

Field	Description
VLAN ID	VLAN ID number.
Packets	Total number of packets collected over the last time interval.
Bytes	Total number of bytes collected over the last time interval.
Non-Unicast Packets	Total number of non-unicast packets collected over the last time interval.
Non-Unicast Bytes	Total number of non-unicast bytes collected over the last time interval.

Tip To sort a table variable by percentage of the total, click on the column header. The variable is listed in descending order according to the percentage of the total.

Viewing the VLAN Priority (COS) Statistics Current Rates Table

Note This section does not apply to NM-NAM or NME-NAM devices.

The VLAN Priority (COS) Statistics Current Rates table enables you to view user priority distributions per data source. The displayed information represents the data collected each second during the last time interval. For information on setting the time interval, see the "Setting Global Preferences" section on page 3-87.

To view the VLAN Priority (COS) Statistics Current Rates table:

Step 1 In the contents, click **Priority (COS) Statistics**.

The VLAN Priority (COS) Statistics Current Rates Table (Table 4-30) displays.

Table 4-30 VLAN Priority (COS) Statistics Current Rates Table

Field	Description
Priority	Value of the three bit user priority field encoded in the Tag Control Information field.
Packets/s	Number of packets collected on this priority level. Data is the rate per second over the last time interval.
Bytes/s	Number of bytes collected on this priority level. Data is the rate per second over the last time interval.

Step 2 Choose the data source to monitor from the Data Source list.

Tip

- To turn off auto refresh, deselect the Auto Refresh check box.
- To sort a table variable by percentage of the total, click on the column header. The variable is listed in descending order according to the percentage of the total.

Viewing the VLAN Priority (COS) Statistics Top N Chart

Note This section does not apply to NM-NAM or NME-NAM devices.

The Top N VLAN Priority (COS) Statistics Chart enables you to view user priority distributions per data source in a graphical format. The information displayed represents the data collected *per second* over the last time interval. For information on setting the time interval, see the "Setting Global Preferences" section on page 3-87.

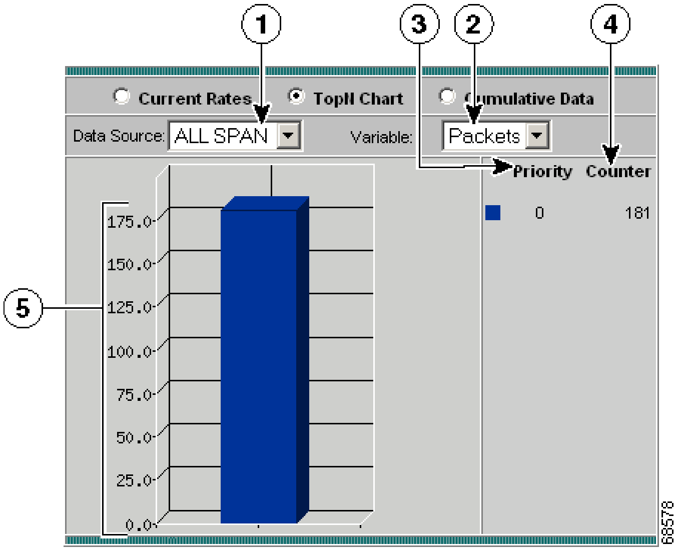
To view the Top N VLAN Priority (COS) Statistics chart:

Step 1 In the contents, click **Priority (COS) Statistics**.

Step 2 Click the TopN Chart radio button.

The Top N VLAN Priorities (COS) Statistics Chart (Figure 4-32) displays.

Figure 4-32 Top N VLAN Priorities (COS) Statistics Chart



1	Data Source list.	**4**	VLAN counter.
2	Variable list.	**5**	Number of packets/bytes collected per second.
3	Top N VLAN priorities.		

Step 3 Choose the data source to be monitored from the Data Source list.

Step 4 Choose one of the following from the Variable list:

- Packets—Displays the number of packets.
- Bytes—Displays the number of bytes.

Tip To turn off auto refresh, deselect the Auto Refresh check box.

Viewing the VLAN Priority (COS) Statistics Cumulative Data Table

Note This section does not apply to NM-NAM or NME-NAM devices.

The VLAN Priority (COS) Statistics Cumulative Data table enables you to view user priority distributions per data source. The information displayed represents the total data collected since the collection was created or since the NAM was restarted. For information on setting the time interval, see the "Setting Global Preferences" section on page 3-87.

To view the VLAN Priority (COS) Statistics Cumulative Data table:

Step 1 In the contents, click **Priority (COS) Statistics**.

Step 2 Click the Cumulative Data radio button.

The VLAN Priority (COS) Statistics Cumulative Data Table (Table 4-31)displays.

Table 4-31 VLAN Priority (COS) Statistics Cumulative Data Table

Field	Description
Priority	Value of the three bit user priority field encoded in the Tag Control Information field.
Packets	Total number of packets collected on this priority level.
Bytes	Total number of bytes collected on this priority level.

Step 3 Choose the data source to monitor from the Data Source list.

Tip To sort a table variable by percentage of the total, click on the column header. The variable is listed in descending order according to the percentage of the total.

Viewing DiffServ Data

You can view the distribution of packets and bytes based on the Differential Services (DiffServ) data collected on the NAM.

Note DiffServ data is not available for local NetFlow devices. This is applicable to WS-SVC-NAM-1, and WS-SVC-NAM-2 devices.

To view DiffServ data:

Step 1 Click **Monitor** > **DiffServ**.

The DiffServ Traffic Statistics table displays with three radio buttons above it. You can select a radio button for:

- Viewing the DiffServ Traffic Statistics Current Rates Table, page 4-57.
- Viewing the DiffServ Traffic Top N Chart, page 4-58.
- Viewing the DiffServ Traffic Statistics Cumulative Data Table, page 4-59.

Step 2 To view the DiffServ data based on the application statistics, click **Application Stats** in the contents.

The DiffServ Applications Statistics table displays with three radio buttons above it. You can select a radio button for:

- Viewing the DiffServ Application Statistics Current Rates Table, page 4-60.
- Viewing the DiffServ Application Statistics Top N Chart.
- Viewing the DiffServ Application Statistics Cumulative Data Table, page 4-63.

Step 3 To view the DiffServ data based on the host statistics, click **Host Stats** in the contents.

The DiffServ Host Statistics table displays with three radio buttons above it.

You can select a radio button for:

- Viewing the DiffServ Host Statistics Current Rates Table, page 4-64.
- Viewing the DiffServ Host Statistics Top N Chart, page 4-66.
- Viewing the DiffServ Host Statistics Cumulative Data Table, page 4-67.

Viewing the DiffServ Traffic Statistics Current Rates Table

To view the DiffServ Traffic Statistics Current Rates table:

Step 1 In the contents, click **Traffic Stats**.

Step 2 Click the Current Rates Table radio button.

The DiffServ Traffic Statistics Current Rates Table (Table 4-32) displays.

Table 4-32 DiffServ Traffic Statistics Current Rates Table

Field	Description
Aggregation Group	Name of the aggregation group.
Packets/s	Total packets collected per second over the last interval.
Bytes/s	Total bytes collected per second over the last interval.

Step 3 Choose the data source and profile to monitor from the Data Source-Profile list.

Step 4 Enter the aggregation group to filter in the Aggregation text box, then click **Filter**.

The specified aggregation group displays.

Tip

- To turn off auto refresh, deselect the Auto Refresh check box.
- To sort a table variable by percentage of the total, click on the column header. The variable is listed in descending order according to the percentage of the total.

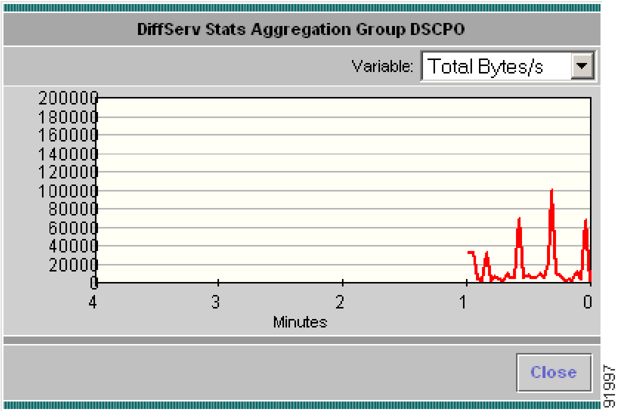
Viewing Real-Time Traffic Statistics from the DiffServ Traffic Statistics Table

You can view real-time traffic statistics in a graphical format for a specific aggregation group in the DiffServ Traffic Statistics table.

Choose the aggregation group from the table, then click **Real-Time**. The Real-Time Graph (Figure 4-24)displays.

Note The Real-Time button is disabled for NetFlow-based data sources.

Figure 4-33 Real-Time Graph


DiffServ Stats Aggregation Group DSCP0

Variable: Total Bytes/s

Viewing Reports from the DiffServ Traffic Statistics Table

You can view reports directly from the DiffServ Traffic Statistics table. Choose the aggregation group you wish to view a report on, then click **Report**. The Basic Reports graph displays. If a report is not configured, the Basic Reports screen appears and a new report is created for the selected data source.

For more information on viewing and creating reports, see Chapter 5, "Creating and Viewing Reports."

Viewing the DiffServ Traffic Top N Chart

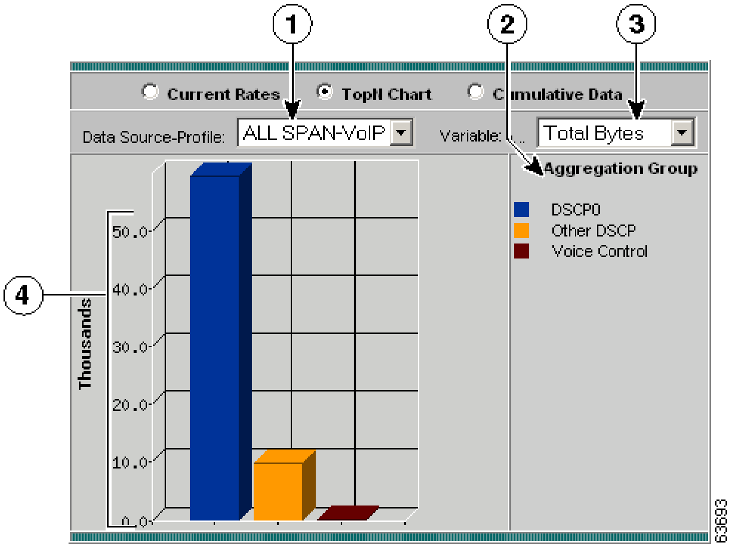
To view the DiffServ Traffic Top N chart:

Step 1 In the contents, click **Traffic Stats.**

Step 2 Click the TopN Chart radio button.

The Top N DiffServ Aggregation Group Chart (Figure 4-34) displays.

Figure 4-34 Top N DiffServ Aggregation Group Chart



1	Data Source-Profile list.	**3**	Variable list.
2	Top N aggregation groups.	**4**	Number of packets/bytes collected per second.

Step 3 Choose the data source and profile to monitor from the Data Source-profile list.

Step 4 Choose one of the following from the Variable list:

- Total Packets—Displays the number of total packets.
- Total Bytes—Displays the number of total bytes.

Tip To turn off auto refresh, deselect the Auto Refresh check box.

Viewing the DiffServ Traffic Statistics Cumulative Data Table

To view the DiffServ Traffic Statistics Cumulative Data table:

Step 1 In the contents, click **Traffic Stats**.

Step 2 Click the Cumulative Data radio button.

The DiffServ Traffic Statistics Cumulative Data (Table 4-33) displays.

Table 4-33 DiffServ Traffic Statistics Cumulative Data

Field	Description
Aggregation Group	Name of the aggregation group.
Packets	Total packets collected over the last interval.
Bytes	Total bytes collected over the last interval.

Step 3 Choose the data source and profile to monitor from the Data Source-profile list.

Step 4 Enter the aggregation group to filter in the Aggregation text box, then click **Filter**.

The specified aggregation group displays.

Tip

- To turn off auto refresh, deselect the Auto Refresh check box.
- To sort a table variable by percentage of the total, click on the column header. The variable is listed in descending order according to the percentage of the total.

Viewing the DiffServ Application Statistics Current Rates Table

To view the DiffServ Application Statistics Current Rates table:

Step 1 In the contents, click **Application Stats**.

Step 2 Click the Current Rates Table radio button.

The DiffServ Application Statistics Current Rates (Table 4-34) table displays.

Table 4-34DiffServ Application Statistics Current Rates

Field	Description
Protocol Name	Name of the monitored protocol.
Packets/s	Total packets collected per second over the last interval.
Bytes/s	Total bytes collected per second over the last interval.

Step 3 Choose the data source and profile to monitor from the Data Source-Profile list.

Step 4 Choose the aggregation group from the Aggregation list.

Step 5 To view a specific protocol, enter the protocol in the Protocol text box, then click **Filter**.

The specified protocol displays.

Tip

- To view the full protocol name, move the cursor over the protocol name.
- To turn off auto refresh, deselect the Auto Refresh check box.

- To sort a table variable by percentage of the total, click on the column header. The variable is listed in descending order according to the percentage of the total.

Displaying Application Conversation Details From Application Statistics Table

To view the Application Conversations details table, click the protocol name in the Protocol Name column. The Application Conversations Table (Table 4-35)displays.

Table 4-35 Application Conversations Table

Field	Description
Source	Source host address of the conversation.
Destination	Destination host address of the conversation.
Packets	Number of packets during the conversation.
Bytes	Number of bytes during the conversation.

Tip To turn off auto refresh, deselect the Auto Refresh check box.

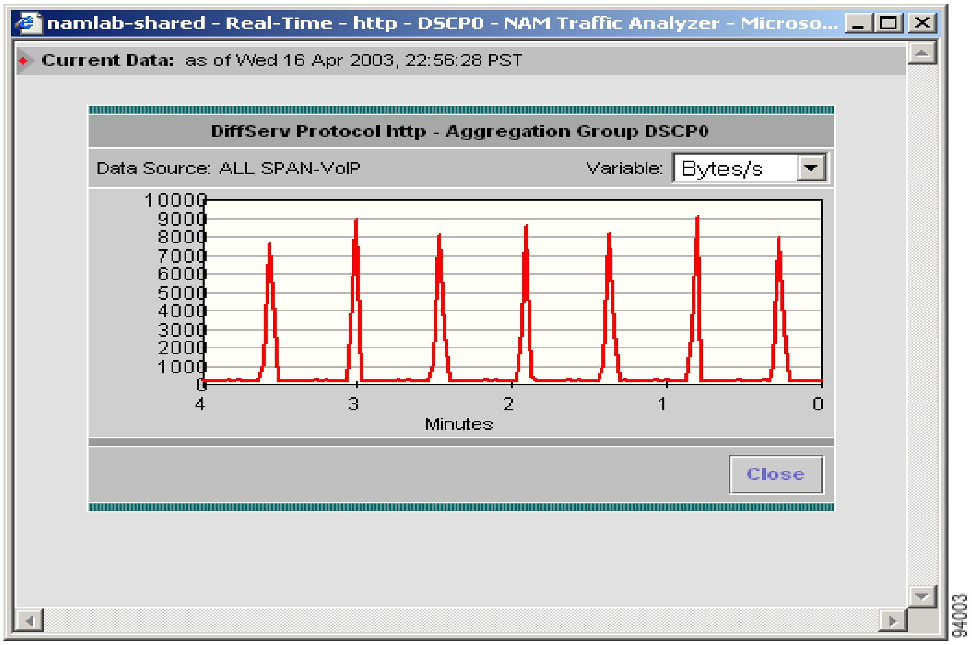
Viewing Real-Time Traffic Statistics from the DiffServ Application Statistics Table

You can view real-time traffic statistics in a graphical format for a specific application protocol in the DiffServ Application Statistics table.

Choose the application protocol from the table, then click **Real-Time**. The Real-Time Graph (Figure 4-24)displays.

Note The Real-Time button is disabled for NetFlow-based data sources.

Figure 4-35 Real-Time Graph



namlab-shared - Real-Time - http - DSCP0 - NAM Traffic Analyzer - Microso...

Current Data: as of Wed 16 Apr 2003, 22:56:28 PST

DiffServ Protocol http - Aggregation Group DSCP0

Data Source: ALL SPAN-VoIP

Variable: Bytes/s

Viewing Reports from the DiffServ Application Statistics Table

You can view reports directly from the DiffServ Application Statistics table. Choose the application protocol you wish to view a report on, then click **Report**. The Basic Reports graph displays. If a report is not configured, the Basic Reports screen appears and a new report is created for the selected application and data source.

For more information on viewing and creating reports, see Chapter 5, "Creating and Viewing Reports."

Viewing the DiffServ Application Statistics Top N Chart

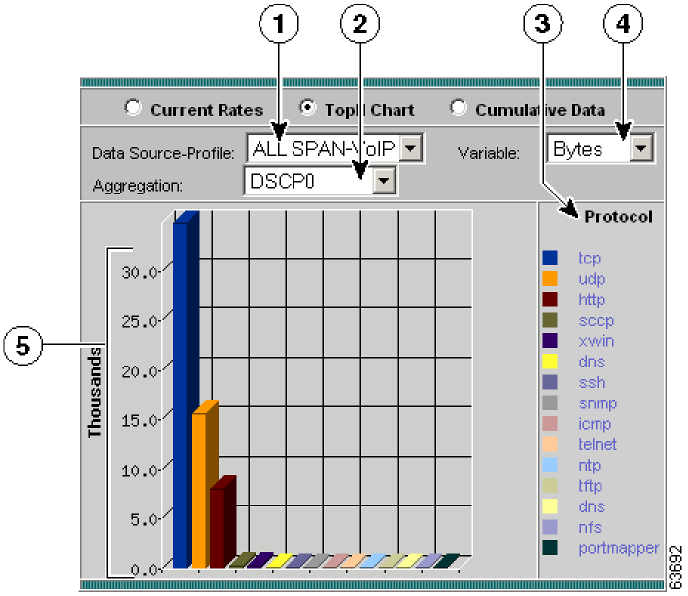
To view the Top N DiffServ Application Statistics chart:

Step 1 In the contents, click **Application Stats**.

Step 2 Click the TopN Chart radio button.

The Top N DiffServ Application Statistics Chart (Figure 4-36) displays.

Figure 4-36 Top N DiffServ Application Statistics Chart



1	Data Source-Profile list.	4	Variable list.
2	Aggregation group list.	5	Total packets/bytes collected per second for each protocol.
3	Top N protocols sorted by color.		

Step 3 Choose the data source to monitor from the Data Source list.

Step 4 Choose the aggregation group from the Aggregation list.

Step 5 Choose one of the following from the Variable list:

- Total Packets—Sorts the addresses based on the number of total packets.
- Total Bytes—Sorts the addresses based on the number of total bytes.

Tip To turn off auto refresh, deselect the Auto Refresh check box.
To view the full protocol name, move the cursor over the protocol name

Viewing the DiffServ Application Statistics Cumulative Data Table

To view the DiffServ Application Statistics Cumulative Data table:

Step 1 In the contents, click **Application Stats**.

Step 2 Click the Cumulative Data radio button.

The DiffServ Application Statistics Cumulative Data Table (Table 4-36) displays.

Table 4-36 DiffServ Application Statistics Cumulative Data Table

Field	Description
Protocol Name	Name of the monitored protocol.
Packets	Total packets collected over the last interval.
Bytes	Total bytes collected over the last interval.

Step 3 Choose the data source and profile to monitor from the Data Source-Profile list.

Step 4 Choose the aggregation group from the Aggregation list.

Step 5 To view a specific protocol, enter the protocol in the Protocol text box, then click **Filter**.

The specified protocol displays.

Tip

- To view the full protocol name, move the cursor over the protocol name.
- To turn off auto refresh, deselect the Auto Refresh check box.
- To sort a table variable by percentage of the total, click on the column header. The variable is listed in descending order according to the percentage of the total.

Viewing the DiffServ Host Statistics Current Rates Table

To view the DiffServ Host Statistics Current Rates table:

Step 1 In the contents, click **Host Stats**.

Step 2 Click the Current Rates radio button.

The DiffServ Host Statistics Current Rates Table (Table 4-37) displays.

Table 4-37 DiffServ Host Statistics Current Rates Table

Field	Description
Address	Address of the host.
Type	Type of protocol monitored.
In Packets/s	Total number of input packets collected per second.
Out Packets/s	Total number of output packets collected per second.
In Bytes/s	Total number of input bytes collected per second.
Total Bytes/s	Total number of output bytes collected per second.

Step 3 Choose the data source and profile to monitor from the Data Source-Profile list.

Step 4 Choose the aggregation group from the Aggregation list.

Step 5 To view a specific address, enter the address in the Address text box, then click **Filter**.

The specified address displays.

Tip

- To turn off auto refresh, deselect the Auto Refresh check box.
- To sort a table variable by percentage of the total, click on the column header. The variable is listed in descending order according to the percentage of the total.

Displaying Host Conversation Details From the DiffServ Host Statistics Table

To view the Host Conversations details table, click the address name in the Address column. The Host Conversations Table (Table 4-38)displays.

Table 4-38 Host Conversations Table

Field	Description
Source	Source host address of the conversation.
Application	The application protocol used on the conversation.
Destination	Destination host address of the conversation.
Packets	Number of packets during the conversation.
Octets	Number of octets during the conversation.

Tip To turn off auto refresh, deselect the Auto Refresh check box.

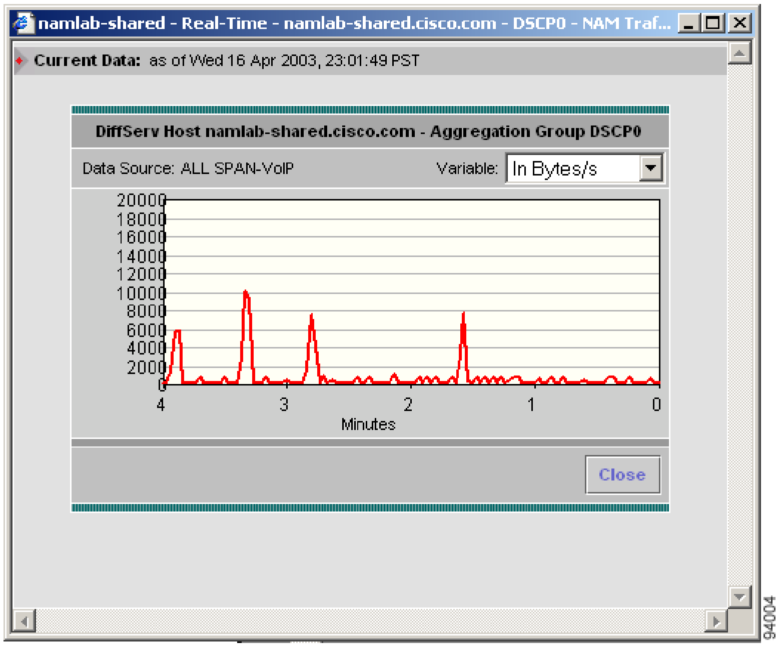
Viewing Real-Time Data from the DiffServ Host Statistics Table

You can view real-time data in a graphical format for a specific host in the DiffServ Host Statistics table.

Choose the host from the table, then click **Real-Time**. The Real-Time Graph (Figure 4-24)displays.

Note The Real-Time button is disabled for NetFlow-based data sources.

Figure 4-37 Real-Time Graph



namlab-shared - Real-Time - namlab-shared.cisco.com - DSCP0 - NAM Traf...
Current Data: as of Wed 16 Apr 2003, 23:01:49 PST
DiffServ Host namlab-shared.cisco.com - Aggregation Group DSCP0
Data Source: ALL SPAN-VoIP
Variable: In Bytes/s
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
4
3
2
1
0
Minutes
Close
94004

Viewing Reports from the DiffServ Host Statistics Table

You can view reports directly from the DiffServ Host Statistics table. Choose the host you wish to view a report on, then click **Report**. The Basic Reports graph displays. If a report is not configured, the Basic Reports screen appears and a new report is created for the selected host and data source.

For more information on viewing and creating reports, see Chapter 5, "Creating and Viewing Reports."

Viewing the DiffServ Host Statistics Top N Chart

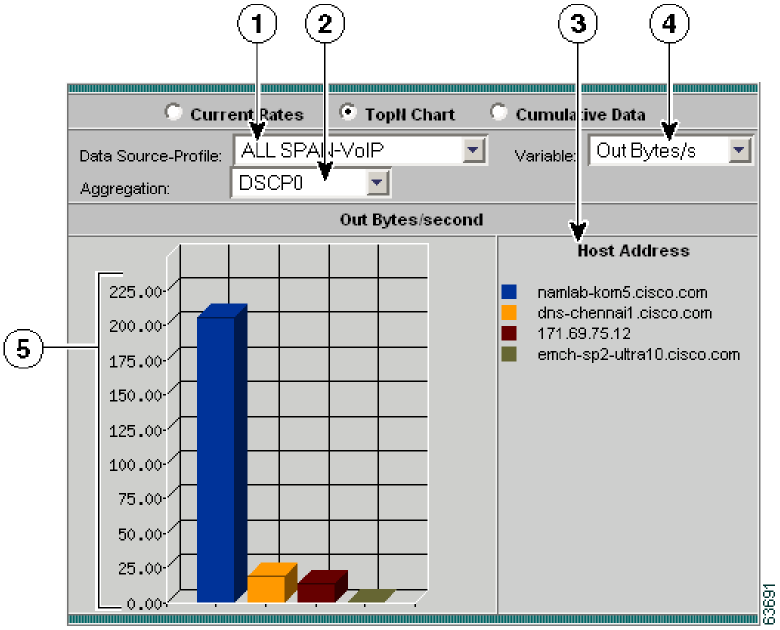
To view the DiffServ Top N Host Statistics chart:

Step 1 In the contents, click **Host Stats**.

Step 2 Click the TopN Chart radio button.

The DiffServ Top N Host Statistics Chart (Figure 4-38) displays.

Figure 4-38 DiffServ Top N Host Statistics Chart



○ Current Rates ● TopN Chart ○ Cumulative Data

Data Source-Profile: ALL SPAN-VoIP

Aggregation: DSCP0

Variable: Out Bytes/s

Out Bytes/second

Host Address
🟦 namlab-kom5.cisco.com
🟧 dns-chennai1.cisco.com
🟥 171.69.75.12
🟩 emch-sp2-ultra10.cisco.com

1	Data Source-Profile list.	**4**	Variable list.
2	Aggregation group list.	**5**	Total packets/bytes collected per second for each address.
3	Top N host addresses sorted by color.		

Step 3 Choose the data source and profile from the Data Source-Profile list.

Step 4 Choose the aggregation group from the Aggregation list.

Step 5 Choose one of the following from the Variable list:

- Total Packets—Sorts the addresses based on the number of total packets.
- Total bytes—Sorts the addresses based on the number of total bytes.

Tip To turn off auto refresh, deselect the Auto Refresh check box.

Viewing the DiffServ Host Statistics Cumulative Data Table

To view the DiffServ Host Statistics Cumulative Data table:

Step 1 In the contents, click **Host Stats**.

Step 2 Click the Cumulative Data radio button.

The DiffServ Host Statistics Cumulative Data Table (Table 4-39) displays.

Table 4-39 DiffServ Host Statistics Cumulative Data Table

Field	Description
Address	Address of the host.
Type	Type of protocol monitored.
In Packets	Total number of packets received over the last time interval.
Out Packets	Total number of packets sent over the last time interval.
In Bytes	Total number of bytes received over the last time interval.
Out Bytes	Total number of bytes sent over the last time interval.

Step 3 Choose the data source to monitor from the Data Source list.

Step 4 Choose the aggregation group from the Aggregation list.

Step 5 To view a specific address, enter the address in the Address text box, then click **Filter**.

The specified address displays.

Tip

- To turn off auto refresh, deselect the Auto Refresh check box.
- To sort a table variable by percentage of the total, click on the column header. The variable is listed in descending order according to the percentage of the total.

Monitoring Response Time Data

NAM 4.0 monitors TCP packet flow between client and server and measures response time data to provide greater visibility into application response times (ART) and network latency. NAM 4.0 response time monitoring provides end-to-end response times to help you locate possible network and application delays.

Note NAM 4.0 does not support IPv6 for response time monitoring.

You can set up the NAM to measure network round trip time (RTT), client response time, server response time, and total transaction time to improve application performance. Figure 4-39 shows the various points in network packet flow where the NAM gathers data and the trip times you can monitor.

Figure 4-39 NAM Application Response Time Measurements

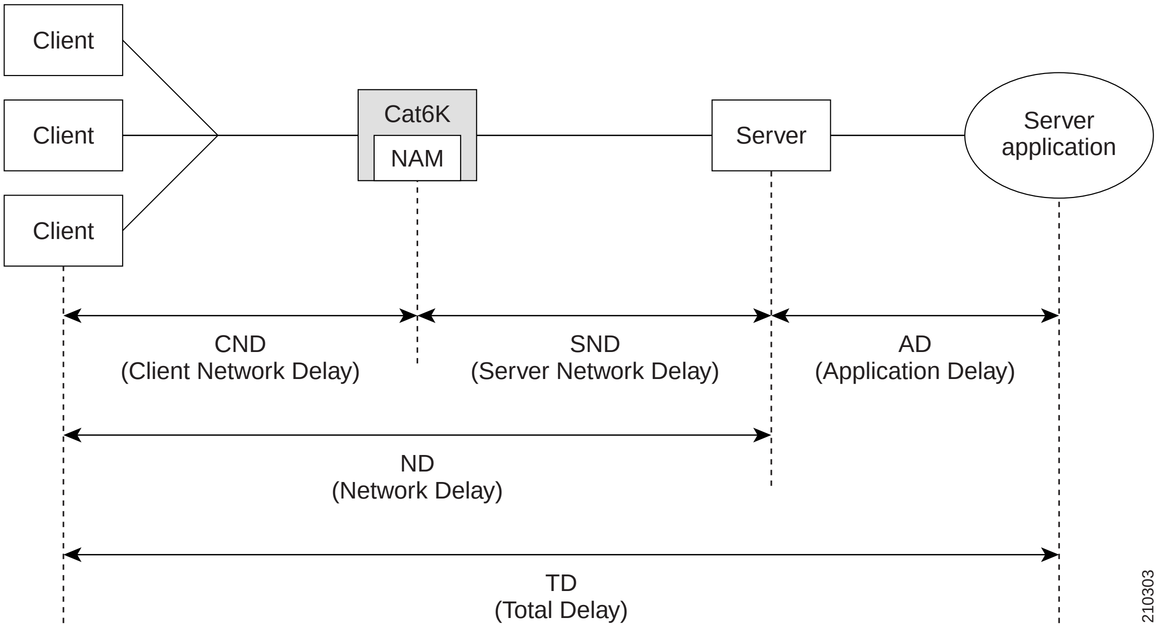


Figure 4-40 shows a representation of total transaction time as opposed to application response time.

Figure 4-40 Transaction Time versus Response Time Measurements

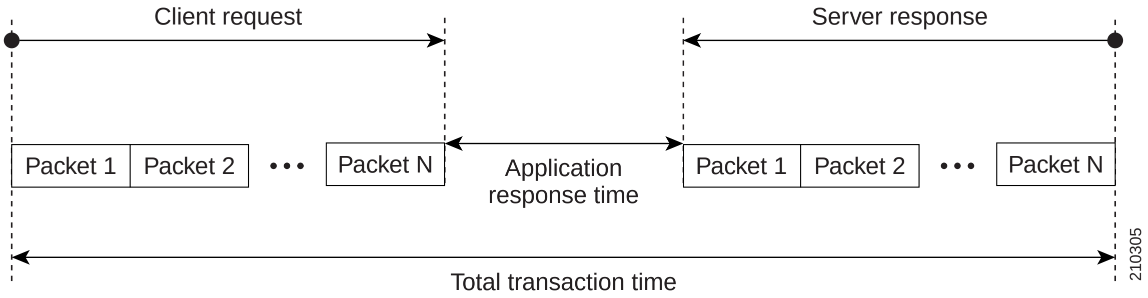


Table 4-40 lists and describes the ART metrics measured by NAM 4.0.

Table 4-40 Application Response Time Metrics

Metric	Description
Response Time (average) Response Time (minimum) Response Time (maximum)	Response Time is the amount of time it takes a server to send the initial response to a client request as seen by the NAM. This is the initial server *think time*. Increases in the response time usually indicate problems with server resources, such as the CPU, Memory, Disk, or I/O due to a lack of necessary resources or a poorly written application.
Number of responses	Total number of responses observed during the monitoring interval
Number of late responses	Total number of responses that exceed the Max Response Time; see Setting Up Response Time Configuration, page 3-54.

Table 4-40 Application Response Time Metrics (continued)

Metric	Description
Number of responses by response time	7-bucket histogram; see Setting Up Response Time Configuration, page 3-54.
Client Bytes	Number of TCP bytes sent from a client during the monitoring interval.
Server Bytes	Number of TCP bytes sent from a server
Client Packets	Number of TCP packets sent from a client
Server Packets	Number of TCP packets sent from a server
Number of connections (new sessions)	Number of TCP connections (new sessions) made during the monitoring interval.
Completed Sessions	Number of TCP connections closed
Refused Sessions	Number of TCP connections refused by a server
Unresponsive Sessions	Number of times a server does not reply to TCP SYN requests within a timeout period
Session Duration	Average duration of the TCP sessions
Application Delay (AD) - average	AD is the time it takes a server application (for example, a web server application) to respond to a request. AD is the time between the client request arriving at the server application and the first response being returned by the application.
Application Delay - minimum	
Application Delay - maximum	
Network Delay (ND) - average	The network round trip (flight time) between a client and a server through the NAM switch or router. ND is equal to the sum of CND and SND. The network round trip (flight time) between a client and a server through the NAM switch or router. ND is equal to the sum of CND and SND. NAM measures the ND using TCP 3-way handshakes. If there are no new TCP connections made during the monitoring interval, this metric is not reported.
Network Delay - minimum	
Network Delay - maximum	
Client Network Delay (CND) - average	CND is the network round trip time (or flight time) between a client and the NAM switch or router. In WAAS monitoring, CND from a WAE client data source represents the network RTT between the client and its edge WAE, while CND from the WAE server data source represents the WAN RTT (between the edge and core WAEs).
Client Network Delay - minimum	
Client Network Delay - maximum	
Server Network Delay (SND) - average	SND is the network round-trip time between a server and the NAM switch or router. In WAAS monitoring, CND from a Server data source represents the network RTT between the server and its core WAE.
Server Network Delay - minimum	
Server Network Delay - maximum	
Total Delay (TD) - average	TD is the total amount of time from the first packet of a client request until the client receives the first response packet from the application server. Total Delay (TD) is the sum of the Network Delay (ND) and the Application Delay (AD). Use TD with care because it is not measured directly and mixes the response time metric (SRT) with the connection metric (CND).
Total Delay - minimum	
Total Delay - maximum	
Total Transaction Time - average	Total amount of time from the first packet of a client request until the client receives the final response packet from the server. TTT is a key indicator for detecting application performance anomalies. Transaction times might vary depending upon application types. Relative thresholds are useful in this situation.
Total Transaction Time - minimum	
Total Transaction Time - max	
Number of Transactions	The number of transactions completed during the measurement interval.

Table 4-40 Application Response Time Metrics (continued)

Metric	Description
Data Transfer Time - average	Average elapsed time from the first server-response packet to the last server-response packet, excluding retransmission time. Data transfer time is always measured in the server-to-client direction and can be used to detect problems for a particular type of transaction of an application.
Number of Packets Retransmitted	Number of TCP packets retransmitted during the monitoring interval. (The metric for the client-to-server direction is not provided.)
Number of Bytes Retransmitted	The number of retransmitted server-to-client bytes. (The metric for the client-to-server direction is not provided.)
Retransmission Delay - average	Average time to retransmit lost packets per transaction.
Round Trip Time (RTT)	Average round trip time for the client to acknowledge (ACK) a server TCP packet.

To view response time data, click **Monitor** > **Response Time**. NAM 4.0 provides network and application response time (ART) monitoring for the following:

- Server Application Responses, page 4-71
- Viewing Server Application Responses, page 4-71

Server Application Responses

The Server Application Responses window displays by default when you click **Monitor** > **Response Time**. The All Data window also displays by default. Click to view the TopN Chart instead to view the most active network.

- Viewing Server Application Responses, page 4-71
- Viewing Server Application Transactions, page 4-76
- Server Network Response Time, page 4-79

Viewing Server Application Responses

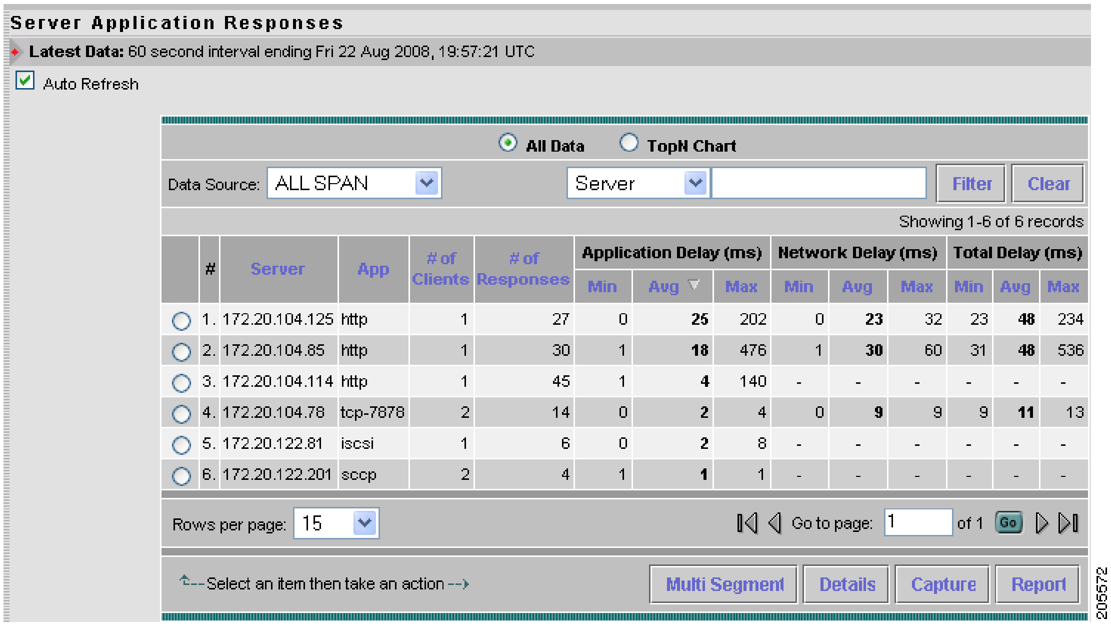
The Server Application Response Time window provides a summary of the application response times (ART) per server application displaying the server IP address, application used, and minimum, average, and maximum response times for the following:

- Application delay
- Network delay
- Total delay

Note NAM uses the TCP three-way handshake to calculate network delay. If there are no new TCP connections during the polling interval, the NAM GUI displays a dash (-) for the delay value indicating there is no delay data for that interval.

Figure 4-41 shows the Server Application Responses Window.

Figure 4-41 Server Application Responses Window



Server Application Responses

Latest Data: 60 second interval ending Fri 22 Aug 2008, 19:57:21 UTC

☑ Auto Refresh

● All Data ○ TopN Chart

Data Source: ALL SPAN

Server

Showing 1-6 of 6 records

	#	Server	App	# of Clients	# of Responses	Application Delay (ms)			Network Delay (ms)			Total Delay (ms)		
						Min	Avg	Max	Min	Avg	Max	Min	Avg	Max
○	1.	172.20.104.125	http	1	27	0	**25**	202	0	**23**	32	23	**48**	234
○	2.	172.20.104.85	http	1	30	1	**18**	476	1	**30**	60	31	**48**	536
○	3.	172.20.104.114	http	1	45	1	**4**	140	-	-	-	-	-	-
○	4.	172.20.104.78	tcp-7878	2	14	0	**2**	4	0	**9**	9	9	**11**	13
○	5.	172.20.122.81	iscsi	1	6	0	**2**	8	-	-	-	-	-	-
○	6.	172.20.122.201	sccp	2	4	1	**1**	1	-	-	-	-	-	-

Rows per page: 15

Go to page: 1 of 1

Select an item then take an action

Table 4-41, Server Application Responses, provides definitions of the Server Application Responses fields.

Table 4-41 Server Application Responses

Field	Definition
Server	Name or IP address of the server
App	Application currently running
# of Clients	Total number of clients
# of Responses	Total number of responses observed during the monitoring interval
Application Delay	Minimum, average, and maximum values of AD, the time it takes a server application (for example, a web server application) to respond to a request. AD is the time between the client request arriving at the server application and the first response being returned by the application.
Network Delay	Minimum, average, and maximum values of ND. ND the network round trip (flight time) between a client and a server through the NAM switch or router. ND is equal to the sum of CND and SND.
Total Delay	Total amount of time from the first packet of a client request until the client receives the first response packet from the application server.

Click **Details** to see the Server ART Details. See Viewing Server ART Details, page 4-73 for more information.

Click **Multi Segment** to see response time metrics of the select server or client-server pair from applicable data sources. See Viewing Response Time across Multiple WAAS Segments, page 4-83 for more information.

Viewing Server ART Details

To view details for a specific server, click the radio button in the Select column, then click **Details**. The Server ART Detail window displays detailed ART information from the server. Table 4-42 provides a detailed description of the fields of the Server Application Response Time Details Window.

Table 4-42 Server Application Response Time Details

Field	Description
Server Name	Name or IP address of server being measured
Server Address	IP address of server
Application	Application being used by server
Number of Clients	Total number of clients
Client Bytes	Number of TCP bytes sent from a client during the monitoring interval.
Client Packets	Number of TCP bytes sent from a client during the monitoring interval.
Server Bytes	Number of TCP bytes sent from a server
Server Packets	Number of TCP packets sent from a server
Number of Responses	Total number of responses observed during the monitoring interval
Application Delay	This column displays the minimum, average, and maximum values of AD, the time it takes a server application (for example, a web server application) to respond to a request. AD is the time between the client request arriving at the server application and the first response being returned by the application.
Network Delay	This column displays the minimum, average, and maximum values of ND. ND the network round trip (flight time) between a client and a server through the NAM switch or router. ND is equal to the sum of CND and SND.
Server Network Delay	Also called Server Connection Time, this is the round-trip time between the server-site NAM (or WAAS-FA) and server during TCP connection setup. Measured on the server segment, this metric indicates the condition of a particular network segment. Server network delay is useful in isolating the problem.
Total Delay	Total amount of time from the first packet of a client request until the client receives the first response packet from the application server.
Number of Transactions	The number of transactions completed during the measurement interval.
Transaction Time	Time (ms) elapsed from the start of a client request to the completion of server response. Transaction times might vary significantly depending upon application types. Relative thresholds are useful in this situation. Transaction time is a key indicator when detecting application performance anomalies.
App Response Time	Amount of time it takes a server to send the initial response to a client request as seen by the NAM.

Table 4-42 Server Application Response Time Details

Field	Description
Data Transfer Time	Time from the first server-response packet to the last server-response packet, excluding retransmission time. Data transfer time is always measured in the server-to-client direction and can be used to detect problems for a particular type of transaction of an application.
Average Retransmission Time	Average inter-packet time intervals started by retransmitted packets from server to client in each transaction, measured at server-site.
Bytes Retransmitted	The number of retransmitted server-to-client packets.
Packets Retransmitted	The number of retransmitted server-to-client bytes.
Round Trip Time	Time elapsed from a server-to-client packet to its client-to-server acknowledgement in each transaction. Round trip time is a key indicator for network-caused problems. Check WAN interface utilization, CND, and SND to isolate the problem.
Number of Round Trips	Number of times a server-to-client packet or client-to-server acknowledgement occurs in each transaction.
Connections (New Sessions)	Number of TCP connections (new sessions) made during the monitoring interval.
Completed Sessions	Number of TCP connections closed
Refused Sessions	Number of TCP connections refused by a server
Unresponsive Sessions	The number of TCP connections unresponsive during the measurement interval, this metric indicates a WAN problem if client-site measurement is significantly large than the server-site measurement. Useful to compare client-side measurements with server-side measurements.
Session Duration	Average duration of the TCP sessions.

Capturing Server ART Data

You can capture data from a specific server directly from the Server ART table.

Click the radio button in the Select column to choose the server from the table, then click **Capture**. The Packet Browser displays. For more information on viewing packets using the Packet Browser, see the "Viewing Detailed Protocol Decode Information" section on page 6-14.

If a capture is already running, a message window displays. Click **Yes** to stop the current capture or **No** to disregard your selection.

The Capture button is only available for a subset of reported protocols. For protocols such as IP, IPv6, and GRE, you must set up a custom filter. For more information on setting up custom filters, see the "Creating Custom Capture Filters" section on page 6-19.

Note The Capture button is disabled for NetFlow-based data sources.

Viewing Reports from the Server Application Response Time Window

You can view reports directly from the Server Application Response Time window. Choose the server you wish to view a report on, then click **Report**. The Basic Reports graph displays. If a report is not configured, the Basic Reports screen appears and a new report is created for the selected server and data source.

For more information on viewing and creating reports, see Chapter 5, "Creating and Viewing Reports."

Viewing the Application Response Time TopN Chart

Click **TopN Chart** to view the most active network. To view the TopN Chart for Server Application Response Time:

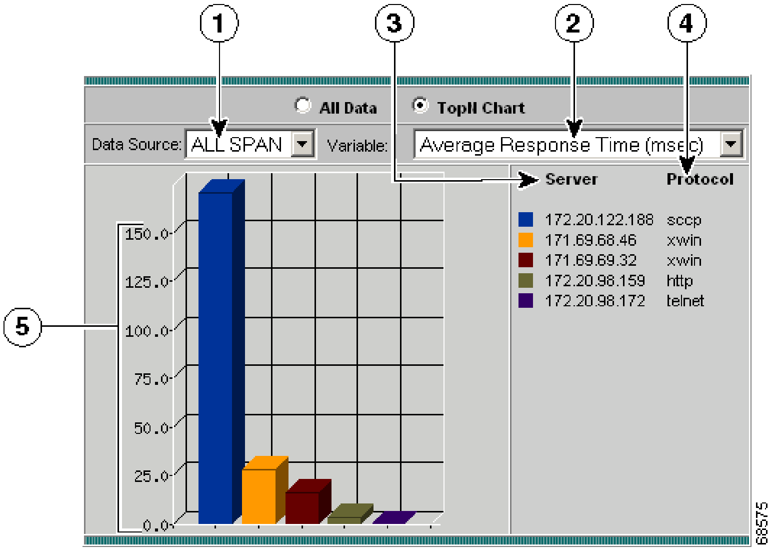
Step 1 Click **Monitor** > **Response Time**.

The Server Application Response Time window displays.

Step 2 Click the **TopN Chart** radio button.

The Server Application Response Time Top N Chart (Figure 4-42) displays.

Figure 4-42 Server Application Response Time Top N Chart



○ All Data ● TopN Chart

Data Source: ALL SPAN Variable: Average Response Time (msec)

	Server	Protocol
🟦	172.20.122.188	sccp
🟧	171.69.68.46	xwin
🟥	171.69.69.32	xwin
🟩	172.20.98.159	http
🟪	172.20.98.172	telnet

1	Data Source list.	**4**	Protocol used by server.
2	Variable list.	**5**	Variable value displayed per second.
3	Top N server addresses sorted by color.		

Step 3 Choose the data source to be monitored from the Data Source list.

Step 4 Choose the sorting option from the Variable list.

The specified option displays in the chart.

Tip

- To turn off auto refresh, deselect the Auto Refresh check box.
- To view the full protocol name, move the cursor over the protocol name in the Protocol column of the table.

Viewing Server Application Transactions

The Server Application Transaction window displays when you click **Monitor** > **Response Time** > **Server Transactions**. The All Data window also displays by default. You can also view the TopN Chart to view the most active network.

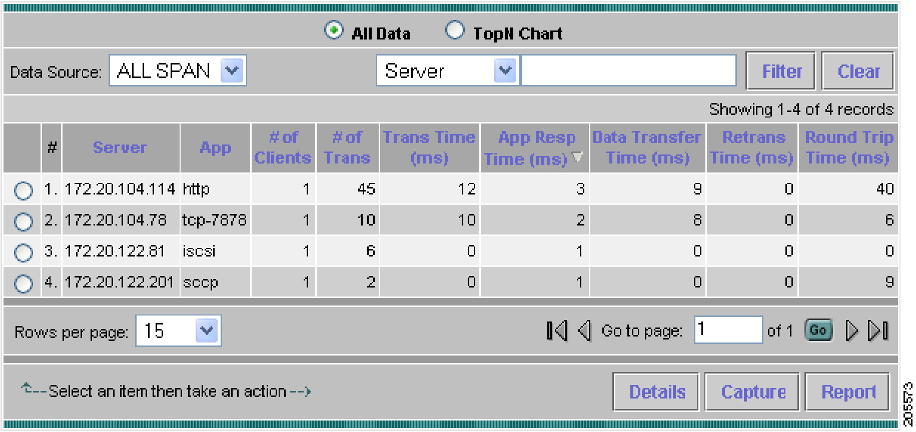
The Server Application Transactions window provides a summary of the server application transaction response times (ART) per server application displaying the server IP address, application used, and minimum, average, and maximum response times for the following:

- Application Response Time
- Data Transfer Time
- Retransmit Time
- Round Trip Time

Note NAM uses the TCP three-way handshake to calculate network delay. If there are no new TCP connections during the polling interval, the NAM GUI displays a dash (-) for the delay value indicating there is no delay data for that interval.

Figure 4-43 shows the Server Application Transactions Window.

Figure 4-43 Server Application Transactions Window



● All Data ○ TopN Chart

Data Source: ALL SPAN   Server

Showing 1-4 of 4 records

	#	Server	App	# of Clients	# of Trans	Trans Time (ms)	App Resp Time (ms)	Data Transfer Time (ms)	Retrans Time (ms)	Round Trip Time (ms)
○	1.	172.20.104.114	http	1	45	12	3	9	0	40
○	2.	172.20.104.78	tcp-7878	1	10	10	2	8	0	6
○	3.	172.20.122.81	iscsi	1	6	0	1	0	0	0
○	4.	172.20.122.201	sccp	1	2	0	1	0	0	9

Rows per page: 15   Go to page: 1 of 1

Select an item then take an action -->

Table 4-43, Server Application Transactions Metrics, provides definitions of each field of the Server Application Transactions window.

Table 4-43 Server Application Transactions Metrics

Field	Description
Server	Name or IP address of the server
App	Application currently running
# of Clients	Total number of clients
# of Trans	Total number of transactions
Trans Time	Time (ms) elapsed from the start of a client request to the completion of server response. Transaction times might vary significantly depending upon application types. Relative thresholds are useful in this situation. Transaction time is a key indicator when detecting application performance anomalies.
App Resp Time	Amount of time it takes a server to send the initial response to a client request as seen by the NAM.
Data Transfer Time	Average elapsed time from the first server-response packet to the last server-response packet, excluding retransmission time. Data transfer time is always measured in the server-to-client direction and can be used to detect problems for a particular type of transaction of an application.
Retrans Time	Average time to retransmit lost packets, per transaction.
Round Trip Time	Average round trip time for the client to acknowledge (ACK) a server TCP packet.

Click **Details** to see the Server ART Details. See Viewing Server ART Details, page 4-73 for more information.

Click **Multi Segment** to see response time metrics of the select server or client-server pair from applicable data sources. See Viewing Response Time across Multiple WAAS Segments, page 4-83 for more information.

Viewing Server Application Transaction Details

To view details for a specific server, click the radio button in the Select column, then click **Details**. The Server ART Detail window displays. You can view detailed information from the server such as server network delay response time, a histogram, octet counts, and maximum and minimum values as well as a chart displaying the response time distribution.

Table 4-42 provides a detailed description of the fields of the Server Application Transaction Window.

Capturing Server Application Transaction Data

You can capture data from a specific server directly from the Server ART table.

Click the radio button in the Select column to choose the server from the table, then click **Capture**. The Packet Browser displays. For more information on viewing packets using the Packet Browser, see the “Viewing Detailed Protocol Decode Information” section on page 6-14.

If a capture is already running, a message window displays. Click **Yes** to stop the current capture or **No** to disregard your selection.

The Capture button is only available for a subset of reported protocols. For protocols such as IP, IPv6, and GRE, you must set up a custom filter. For more information on setting up custom filters, see the "Creating Custom Capture Filters" section on page 6-19.

Note The Capture button is disabled for NetFlow-based data sources.

Viewing Reports from the Server Application Transactions Window

You can view reports directly from the Server Application Transactions window. Choose the server you wish to view a report on, then click **Report**. The Basic Reports graph displays. If a report is not configured, the Basic Reports screen appears and a new report is created for the selected server and data source.

For more information on viewing and creating reports, see Chapter 5, "Creating and Viewing Reports."

Viewing the Server Application Transactions TopN Chart

Click **TopN Chart** to view the most active network. To view the TopN Chart for Server Application Transactions:

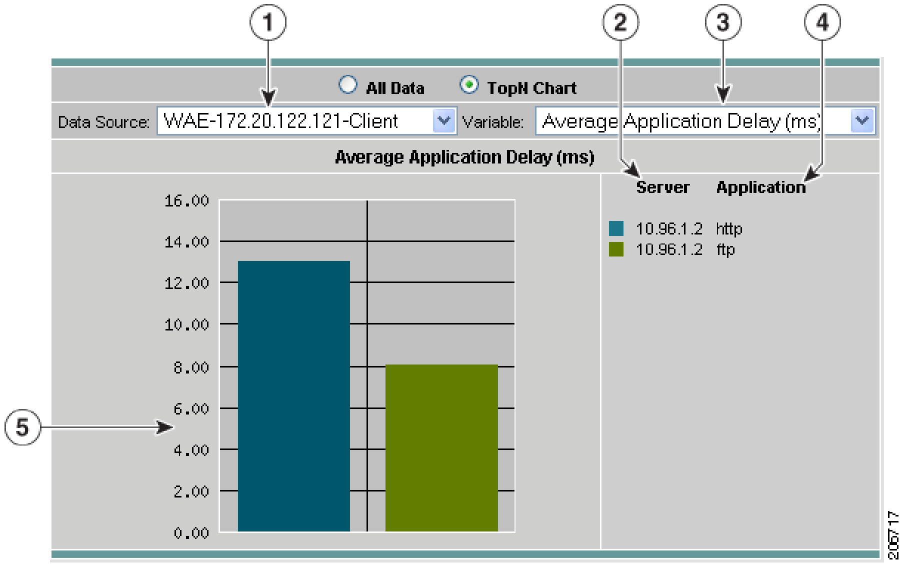
Step 1 Click **Monitor** > **Response Time**.

The Server Application Transactions window displays.

Step 2 Click the **TopN Chart** radio button.

The Server Application Response Time Top N Chart (Figure 4-42) displays.

Figure 4-44 Server Application Transactions Top N Chart



○ All Data ● TopN Chart

Data Source: WAE-172.20.122.121-Client

Variable: Average Application Delay (ms)

1	Data Source list.	**4**	Protocol used by server.
2	Variable list.	**5**	Variable value displayed per second.
3	Top N server addresses sorted by color.		

Step 3 Choose the data source to be monitored from the Data Source list.

Step 4 Choose the sorting option from the Variable list.

The specified option displays in the chart.

Tip

- To turn off auto refresh, deselect the Auto Refresh check box.
- To view the full protocol name, move the cursor over the protocol name in the Protocol column of the table.

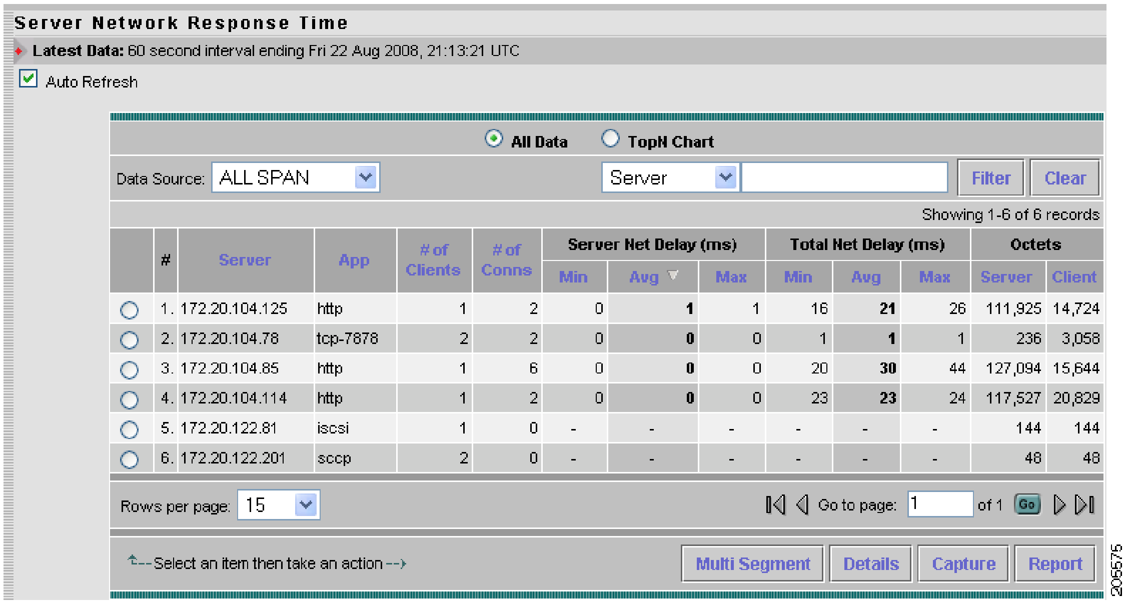
Server Network Response Time

The Server Network Response Time window shows the network connectivity and responsiveness between the server and the switch.

Figure 4-45 shows the Server Network Response Time Window.

Note NAM uses the TCP three-way handshake to calculate network delay. If there are no new TCP connections during the polling interval, the NAM GUI displays a dash (-) for the delay value indicating there is no delay data for that interval.

Figure 4-45 Server Network Response Time Window



Server Network Response Time

Latest Data: 60 second interval ending Fri 22 Aug 2008, 21:13:21 UTC

☑ Auto Refresh

● All Data ○ TopN Chart

Data Source: ALL SPAN | Server | Filter | Clear

Showing 1-6 of 6 records

	#	Server	App	# of Clients	# of Conns	Server Net Delay (ms)			Total Net Delay (ms)			Octets	
						Min	Avg	Max	Min	Avg	Max	Server	Client
○	1.	172.20.104.125	http	1	2	0	**1**	1	16	**21**	26	111,925	14,724
○	2.	172.20.104.78	tcp-7878	2	2	0	**0**	0	1	**1**	1	236	3,058
○	3.	172.20.104.85	http	1	6	0	**0**	0	20	**30**	44	127,094	15,644
○	4.	172.20.104.114	http	1	2	0	**0**	0	23	**23**	24	117,527	20,829
○	5.	172.20.122.81	iscsi	1	0	-	-	-	-	-	-	144	144
○	6.	172.20.122.201	sccp	2	0	-	-	-	-	-	-	48	48

Rows per page: 15 Go to page: 1 of 1 Go

--Select an item then take an action -->

Table 4-44, Server Network Response Times, provides definitions of each field of the Server Network Response Times window.

Table 4-44 Server Network Response Times

Field	Description
Server	Server name or IP address
App	Application in use
# of Clients	Number of active client sessions
# of Conns	Number of active connections
Server Network Delay	SND is the network round trip time (or flight time) between a server and the NAM switch, router, or managed device (minimum, average, and maximum server network delay in ms.)
Total Net Delay	This column displays the minimum, average, and maximum values of TD. TD is the total amount of time from the first packet of a client request until the client receives the first response packet from the application server. Total Delay (TD) is the sum of the Network Delay (ND) and the Application Delay (AD).
Octets	Number of server octets and client octets transmitted.

Click **Details** to see the Server ART Details. See Viewing Server ART Details, page 4-73 for more information.

Click **Multi Segment** to see response time metrics of the select server or client-server pair from applicable data sources. See Viewing Response Time across Multiple WAAS Segments, page 4-83 for more information.

Click Capture to capture data from a specific server directly from the Server Network Response Time window. See Capturing Data from the Server Network Response Time Window, page 4-81, for more information.

Click Reports to view reports directly from the Server Network Response Time window. See Viewing Reports from the Server Network Response Time Window, page 4-82, for more information.

- Viewing Server-Client Application Response Time

Viewing Server Network Response Time Details

Table 4-45 provides a detailed description of the fields of the Server Network Response Time Window.

Table 4-45 Server Network Response Time Window Details

Field	Description
Server	Name of server being measured
App	Application being used by server
# of Clients	Number of clients attached to server
# of Conns	Number of active connections with the server
Server Net Delay (SND)	This column displays the minimum, average, and maximum values of SND. SND is the network round trip time (or flight time) between a server and the NAM switch or router.
Total Net Delay	This column displays the minimum, average, and maximum values of TD. TD is the total amount of time from the first packet of a client request until the client receives the first response packet from the application server. Total Delay (TD) is the sum of the Network Delay (ND) and the Application Delay (AD).
Octets	For server, number of octets (bytes) sent from the server to the client. For client, number of octets (bytes) sent from the client to the server.

Capturing Data from the Server Network Response Time Window

You can capture data from a specific server directly from the Server Network Response Time window.

Click the radio button in the Select column to choose the server from the table, then click **Capture**. The Packet Browser displays. For more information on viewing packets using the Packet Browser, see the "Viewing Detailed Protocol Decode Information" section on page 6-14.

If a capture is already running, a message window displays. Click **Yes** to stop the current capture or **No** to disregard your selection.

The Capture button is only available for a subset of reported protocols. For protocols such as IP, IPv6, and GRE, you must set up a custom filter. For more information on setting up custom filters, see the "Creating Custom Capture Filters" section on page 6-19.

Note The Capture button is disabled for NetFlow-based data sources.

Viewing Reports from the Server Network Response Time Window

You can view reports directly from the Server Network Response Time window. Choose the server you wish to view a report on, then click **Report**. The Basic Reports graph displays. If a report is not configured, the Basic Reports screen appears and a new report is created for the selected server and data source.

For more information on viewing and creating reports, see Chapter 5, “Creating and Viewing Reports.”

Viewing the Server Network Response Time Top N Chart

Click **TopN Chart** to view the most active network. To view the TopN Chart for Server Application Response Time:

Step 1 Click **Monitor** > **Response Time**.

The Server Application Response Time window displays.

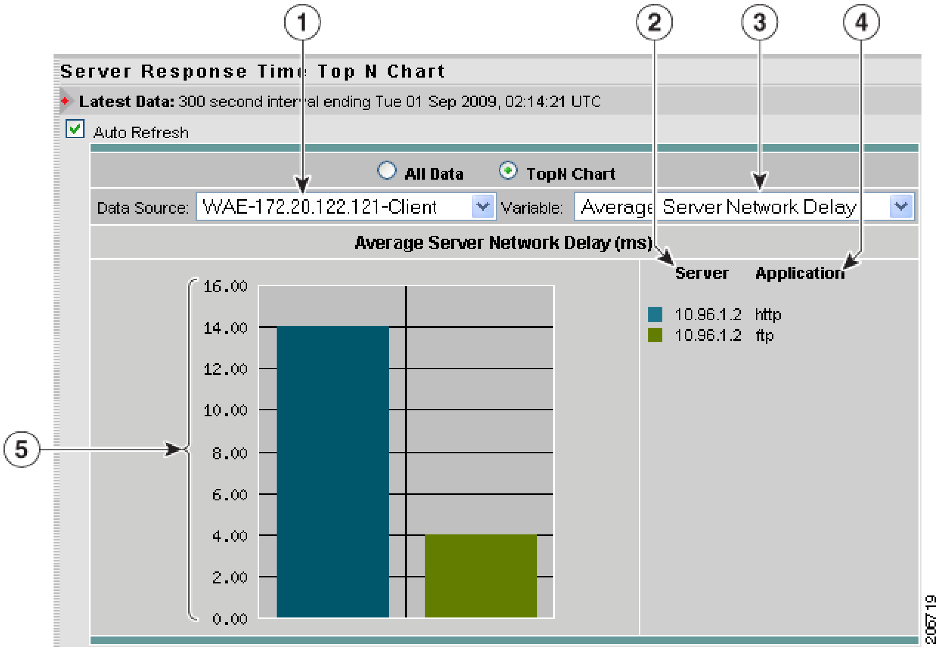
Step 2 Click **Server Network** in the menu area.

The Server Network Response Time window displays.

Step 3 Click the **TopN Chart** radio button.

The Server Network Response Time Top N Chart (Figure 4-46) displays.

Figure 4-46 Server Network Response Time Top N Chart



Server Response Time Top N Chart

Latest Data: 300 second interval ending Tue 01 Sep 2009, 02:14:21 UTC

☑ Auto Refresh

○ All Data ● TopN Chart

Data Source: WAE-172.20.122.121-Client Variable: Average Server Network Delay

Average Server Network Delay (ms)

	Server	Application
🟦	10.96.1.2	http
🟩	10.96.1.2	ftp

1	Data Source list.	**4**	Protocol used by server.
2	Variable list.	**5**	Variable value displayed per second.
3	Top N server addresses sorted by color.		

Step 4 Choose the data source to be monitored from the Data Source list.

Step 5 Choose the sorting option from the Variable list.

The specified option displays in the chart.

Tip

- To turn off auto refresh, deselect the Auto Refresh check box.
- To view the full protocol name, move the cursor over the protocol name in the Protocol column of the table.

Viewing Response Time across Multiple WAAS Segments

This window applies only if you configure NAM to monitor WAAS traffic.Use this window to view and compare response time metrics from multiple WAAS segments (data sources).

From Any Response Time window, select a server or a client-server pair, then click **Multi Segment**.

The Multi Segment screen will show response time metrics of the selected server or client-server pair from applicable data sources. More relevant metrics are showed in bold font. See Table 4-40, Application Response Time Metrics, for more information.

Server-Client Application Response Times

The Server/Client ART window provides a summary of the server/client application response time data. You can select an entry in the window to view more detailed information.

- Viewing Server-Client Application Response Time, page 4-83
- Viewing the Server-Client Transactions, page 4-87
- Viewing the Server-Client Network Response Time, page 4-88

Viewing Server-Client Application Response Time

To view the Server-Client Application Response Time window:

Step 1 Click **Monitor** > **Response Time**.

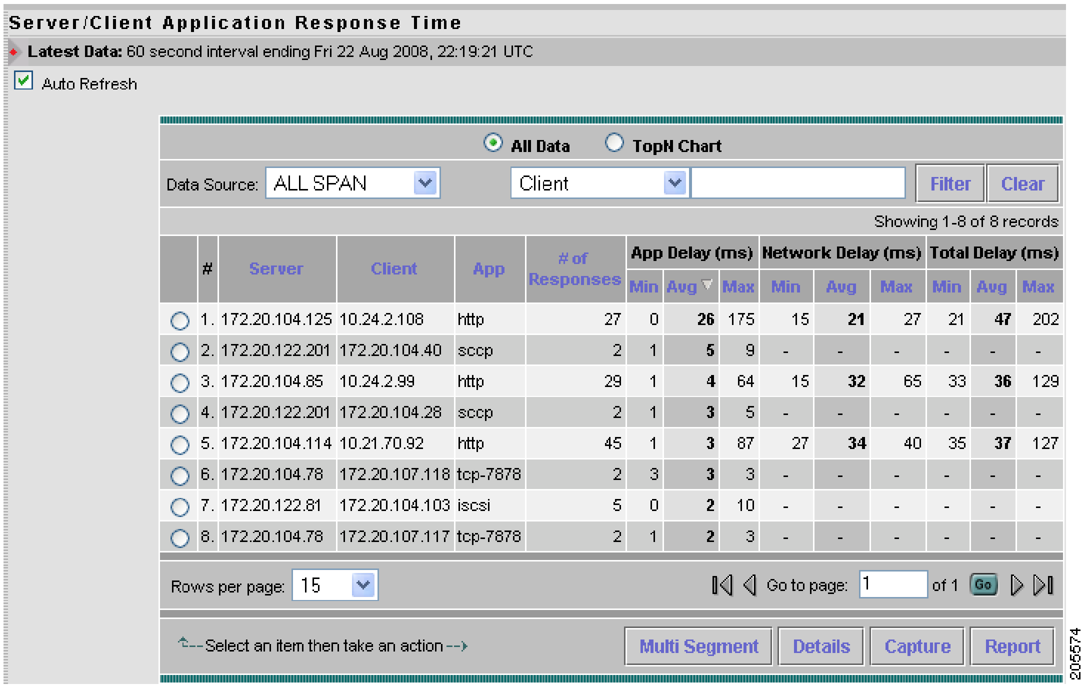
The Server Application Response Time window displays.

Step 2 In the contents, click **Server/Client Application.**

Figure 4-47 shows the Server/Client Application Response Time window.

Note NAM uses the TCP three-way handshake to calculate network delay. If there are no new TCP connections during the polling interval, the NAM GUI displays a dash (-) for the delay value indicating there is no delay data for that interval.

Figure 4-47 Server/Client Application Response Time Window



Server/Client Application Response Time

Latest Data: 60 second interval ending Fri 22 Aug 2008, 22:19:21 UTC

☑ Auto Refresh

● All Data ○ TopN Chart

Data Source: ALL SPAN Client Filter Clear

Showing 1-8 of 8 records

	#	Server	Client	App	# of Responses	App Delay (ms)			Network Delay (ms)			Total Delay (ms)		
						Min	Avg	Max	Min	Avg	Max	Min	Avg	Max
○	1.	172.20.104.125	10.24.2.108	http	27	0	**26**	175	15	**21**	27	21	**47**	202
○	2.	172.20.122.201	172.20.104.40	sccp	2	1	**5**	9	-	-	-	-	-	-
○	3.	172.20.104.85	10.24.2.99	http	29	1	**4**	64	15	**32**	65	33	**36**	129
○	4.	172.20.122.201	172.20.104.28	sccp	2	1	**3**	5	-	-	-	-	-	-
○	5.	172.20.104.114	10.21.70.92	http	45	1	**3**	87	27	**34**	40	35	**37**	127
○	6.	172.20.104.78	172.20.107.118	tcp-7878	2	3	**3**	3	-	-	-	-	-	-
○	7.	172.20.122.81	172.20.104.103	iscsi	5	0	**2**	10	-	-	-	-	-	-
○	8.	172.20.104.78	172.20.107.117	tcp-7878	2	1	**2**	3	-	-	-	-	-	-

Rows per page: 15 Go to page: 1 of 1 Go

Select an item then take an action --> Multi Segment Details Capture Report

The Server/Client Application Response Time Window (Table 4-46) displays.

Table 4-46 Server/Client Application Response Time Window

Field	Description
Server	Host address of the server.
Client	Host address of the client.
App	Application being used by server
# of Responses	Total number of responses observed during the monitoring interval
Application Delay (AD)	This column displays the minimum, average, and maximum values of AD, the time it takes a server application (for example, a web server application) to respond to a request. AD is the time between the client request arriving at the server application and the first response being returned by the application.

Table 4-46 Server/Client Application Response Time Window (continued)

Field	Description
Network Delay (ND)	This column displays the minimum, average, and maximum values of ND, the network round trip (flight time) between a client and a server through the NAM switch or router. ND is equal to the sum of CND and SND.
Total Delay (TD)	TD is the total amount of time from the first packet of a client request until the client receives the first response packet from the application server. Total Delay (TD) is the sum of the Network Delay (ND) and the Application Delay (AD).

Step 3 Choose the data source to be monitored from the Data Source list.

Step 4 Choose a variable to filter from the filter list.

Step 5 Enter the name of the variable to filter in the filter box, then click **Filter**.

The specified variable displays.

Click **Details** to see the Server ART Details. See Viewing Server ART Details, page 4-73 for more information.

Click **Multi Segment** to see response time metrics of the select server or client-server pair from applicable data sources. See Viewing Response Time across Multiple WAAS Segments, page 4-83 for more information.

Tip

- To turn off auto refresh, deselect the Auto Refresh check box.
- To view the full protocol name, move the cursor over the protocol name in the Protocol column of the table.

Viewing Server/Client Application Response Time Details

To view details for a specific client/server conversation, click the radio button in the Select column, and click **Details**. The Server/Client Response Time Detail window displays. You can view detailed information from the client/server conversation as well as a chart displaying the response time distribution.

Capturing Protocol Data from the Client/Server Application Response Time Window

You can capture data for a specific protocol directly from the Client/Server Response Time table.

Choose the server protocol from the table, then click **Capture**. The Packet Browser displays. For more information on viewing packets using the Packet Browser, see the "Viewing Detailed Protocol Decode Information" section on page 6-14.

The Capture button is available only for a subset of reported protocols. For protocols such as IP, IPv6, and GRE, you must set up a custom filter. For more information on setting up custom filters, see the "Creating Custom Capture Filters" section on page 6-19.

Note The Capture button is disabled for NetFlow-based data sources.

Viewing Reports from the Client/Server Application Response Time Window

You can view reports directly from the Client/Server Response Time table. Choose the protocol you wish to view a report on, then click **Report**. The Basic Reports graph displays. If a report is not configured, the Basic Reports screen appears and a new report is created for the selected client/server and data source.

For more information on viewing and creating reports, see Chapter 5, "Creating and Viewing Reports."

Viewing the Client/Server Application Response Time Top N Chart

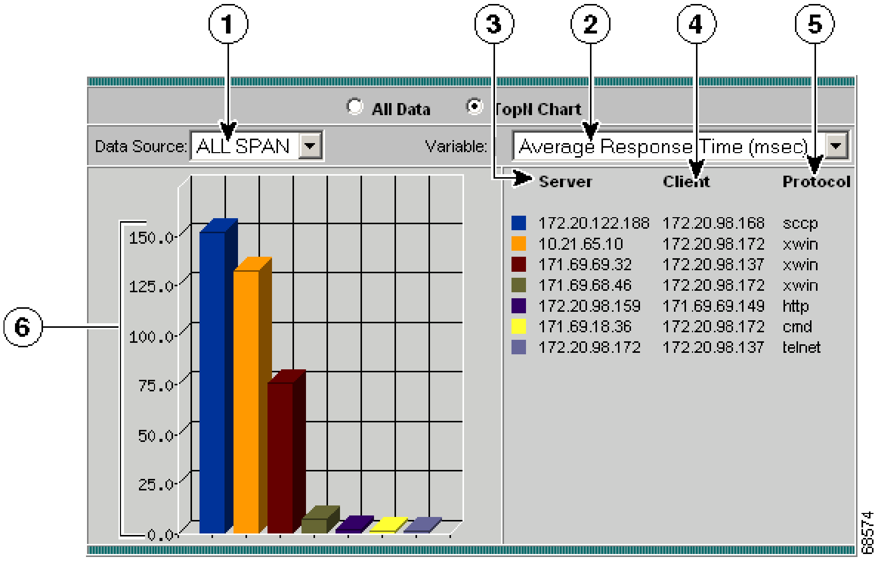
To view the Client/Server Response Time Top N chart:

Step 1 In the contents menu, click **Client/Server Application**.

Step 2 Click the TopN Chart radio button.

The Client/Server Application Response Time Top N Chart (Figure 4-48) displays.

Figure 4-48 Client/Server Application Response Time Top N Chart



○ All Data ● TopN Chart

Data Source: ALL SPAN

Variable: Average Response Time (msec)

	Server	Client	Protocol
🟦	172.20.122.188	172.20.98.168	sccp
🟧	10.21.65.10	172.20.98.172	xwin
🟥	171.69.69.32	172.20.98.137	xwin
🟩	171.69.68.46	172.20.98.172	xwin
🟪	172.20.98.159	171.69.69.149	http
🟨	171.69.18.36	172.20.98.172	cmd
🟦	172.20.98.172	172.20.98.137	telnet

1	Data Source list.	4	Top N clients sorted by color.
2	Variable list.	5	Protocol used for the conversation.
3	Top N servers sorted by color.	6	Variable value (per second) for each client/server conversation.

Step 3 Choose the data source to be monitored from the Data Source list.

Step 4 Choose the sorting option from the Variable list.

The specified option displays in the chart.

Tip

- To turn off auto refresh, deselect the Auto Refresh check box.
- To view the full protocol name, move the cursor over the protocol name in the Protocol column of the table.

Viewing the Server-Client Transactions

The Server-Client Application Transaction window displays when you click **Monitor** > **Response Time > Server-Client Transactions**. The All Data window also displays by default. You can also view the TopN Chart to view the most active network.

The Server-Client Application Transactions window provides a summary of the server application transaction response times (ART) per server application displaying the server IP address, application used, and minimum, average, and maximum response times for the following:

- Application Response Time
- Data Transfer Time
- Retransmit Time
- Round Trip Time

Note

NAM uses the TCP three-way handshake to calculate network delay. If there are no new TCP connections during the polling interval, the NAM GUI displays a dash (-) for the delay value indicating there is no delay data for that interval.

Table 4-47 Server/Client Transactions Response Time Window

Field	Description
Server	Host address of the server.
Client	Host address of the client.
App	Application being used by server
# of Trans	Total number of responses observed during the monitoring interval
Trans Time	Total amount of time from the first packet of a client request until the client receives the final response packet from the server. TTT is a key indicator for detecting application performance anomalies.
App Resp Time	
Data Transfer Time	Average elapsed time from the first server-response packet to the last server-response packet, excluding retransmission time. Data transfer time is always measured in the server-to-client direction and can be used to detect problems for a particular type of transaction of an application.
Retrans Time	Average time to retransmit lost packets, per transaction.
Round Trip Time	Average round trip time for the client to acknowledge (ACK) a server TCP packet.

Click **Details** to see the Server ART Details. See Viewing Server ART Details, page 4-73 for more information.

Click **Multi Segment** to see response time metrics of the selected server or client-server pair from applicable data sources. See Viewing Response Time across Multiple WAAS Segments, page 4-83 for more information.

Viewing the Server-Client Network Response Time

The Server/Client Network Response Time window shows information about network connectivity (also known as network flight time) between servers and clients.

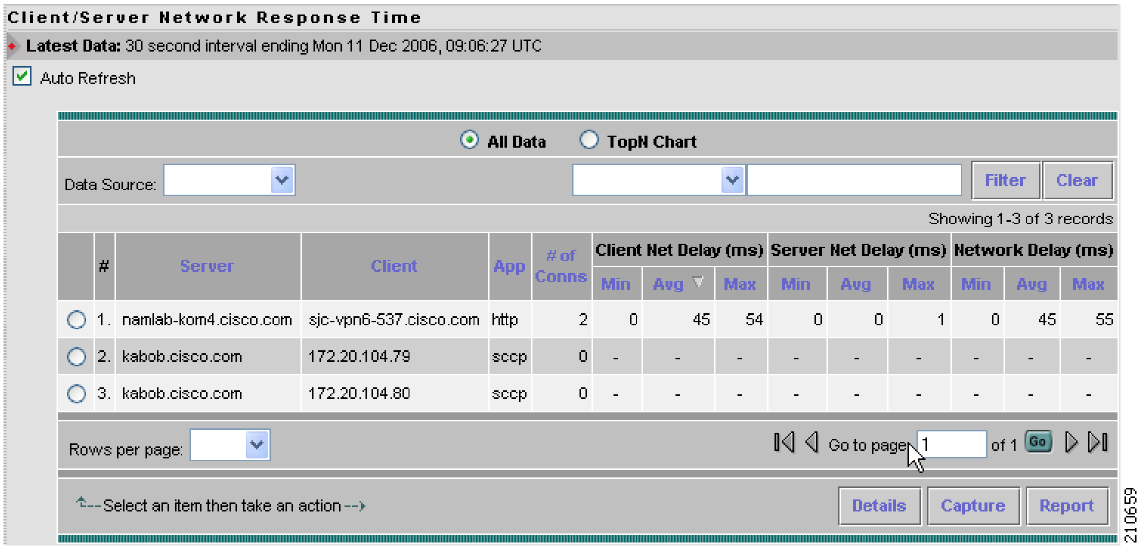
To view the Server/Client Network Response Time window:

Step 1 In the contents, click **Server/Client Network.**

Figure 4-49 shows the Server/Client Network Response Time window.

Note NAM uses the TCP three-way handshake to calculate network delay. If there are no new TCP connections during the polling interval, the NAM GUI displays a dash (-) for the delay value indicating there is no delay data for that interval.

Figure 4-49 Server/Client Network Response Time Window



Client/Server Network Response Time

Latest Data: 30 second interval ending Mon 11 Dec 2006, 09:06:27 UTC

☑ Auto Refresh

● All Data ○ TopN Chart

Data Source:

Showing 1-3 of 3 records

	#	Server	Client	App	# of Conns	Client Net Delay (ms)			Server Net Delay (ms)			Network Delay (ms)		
						Min	Avg	Max	Min	Avg	Max	Min	Avg	Max
○	1.	namlab-kom4.cisco.com	sjc-vpn6-537.cisco.com	http	2	0	45	54	0	0	1	0	45	55
○	2.	kabob.cisco.com	172.20.104.79	sccp	0	-	-	-	-	-	-	-	-	-
○	3.	kabob.cisco.com	172.20.104.80	sccp	0	-	-	-	-	-	-	-	-	-

Rows per page: Go to page 1 of 1

Select an item then take an action -->

Table 4-46 describes the fields of the Server/Client Network Response Time window.

Table 4-48 Server/Client Network Response Time Window

Field	Description
Server	Host address of the server.
Client	Host address of the client.
App	Application being used by server
# of Conns	Current number of connections
Client Network Delay	Minimum, average, and maximum values of time

Table 4-48 Server/Client Network Response Time Window (continued)

Field	Description
Server Network Delay	Minimum, average, and maximum values of total network delay
Network Delay	Minimum, average, and maximum values of total network delay

Step 2 Choose the data source to be monitored from the Data Source list.

Step 3 Choose a variable to filter from the filter list.

Step 4 Enter the name of the variable to filter in the filter box, then click **Filter**.

The specified variable displays.

Click **Details** to see the Server ART Details. See Viewing Server ART Details, page 4-73 for more information.

Click **Multi Segment** to see response time metrics of the select server or client-server pair from applicable data sources. See Viewing Response Time across Multiple WAAS Segments, page 4-83 for more information.

Tip

- To turn off auto refresh, deselect the Auto Refresh check box.
- To view the full protocol name, move the cursor over the protocol name in the Protocol column of the table.

Viewing Server/Client Response Time Details

To view details for a specific client/server conversation, click the radio button in the Select column, and click **Details**. The Server/Client Response Time Detail window displays detailed information from the client/server conversation as well as a chart displaying the response time distribution.

Capturing Protocol Data from the Client/Server Application Response Time Window

You can capture data for a specific protocol directly from the Client/Server Response Time table.

Choose the server protocol from the table, then click **Capture**. The Packet Browser displays. For more information on viewing packets using the Packet Browser, see the "Viewing Detailed Protocol Decode Information" section on page 6-14.

The Capture button is available only for a subset of reported protocols. For protocols such as IP, IPv6, and GRE, you must set up a custom filter. For more information on setting up custom filters, see the "Creating Custom Capture Filters" section on page 6-19.

Note The Capture button is disabled for NetFlow-based data sources.

Viewing Reports from the Client/Server Response Time Window

You can view reports directly from the Client/Server Response Time table. Choose the protocol you wish to view a report on, then click **Report**. The Basic Reports graph displays. If a report is not configured, the Basic Reports screen appears and a new report is created for the selected client/server and data source.

For more information on viewing and creating reports, see Chapter 5, "Creating and Viewing Reports."

Viewing the Client-Server Network Response Time TopN Chart

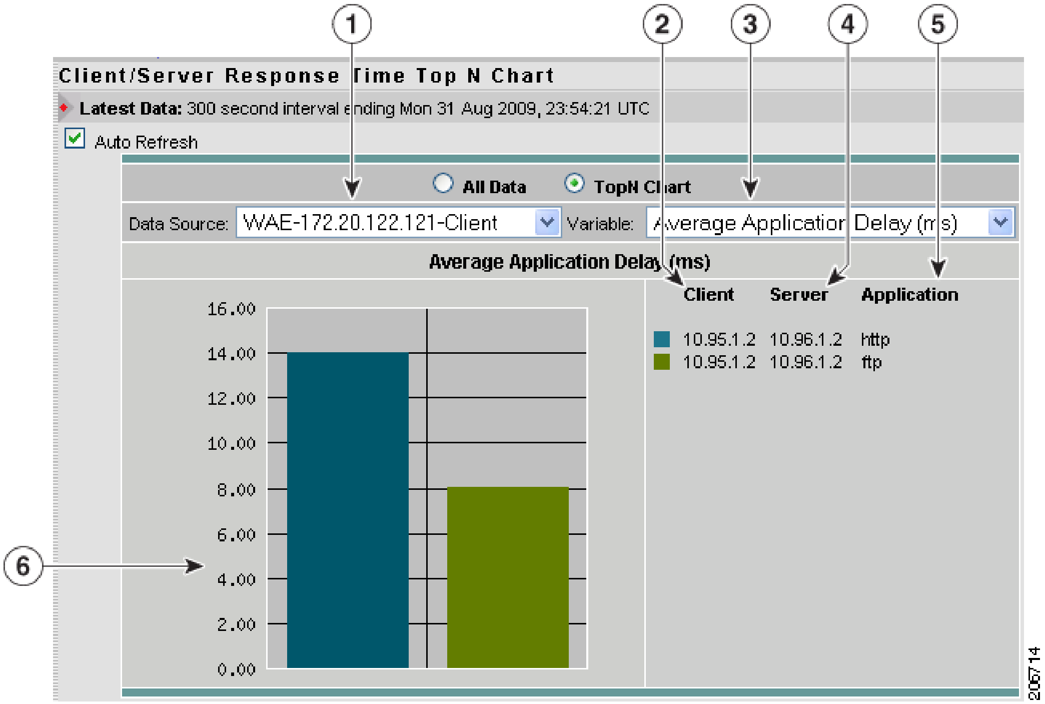
To view the Server/Client Network Response Time Top N chart:

Step 1 In the contents, click **Client/Server**.

Step 2 Click the TopN Chart radio button.

The Client/Server Network Response Time Top N Chart (Figure 4-50) displays.

Figure 4-50 Client/Server Network Response Time Top N Chart



Client/Server Response Time Top N Chart

Latest Data: 300 second interval ending Mon 31 Aug 2009, 23:54:21 UTC

☑ Auto Refresh

○ All Data ● TopN Chart

Data Source: WAE-172.20.122.121-Client Variable: Average Application Delay (ms)

Average Application Delay (ms)

	Client	Server	Application
🟦	10.95.1.2	10.96.1.2	http
🟩	10.95.1.2	10.96.1.2	ftp

1	Data Source list.	**4**	Top N servers sorted by color.
2	Top N clients sorted by color.	**5**	Protocol used in the conversation.
3	Variable list.	**6**	Variable value (per second) for each client/server conversation.

Step 3 Choose the data source to be monitored from the Data Source list.

Step 4 Choose the sorting option from the Variable list.

The specified option displays in the chart.

Tip

- To turn off auto refresh, deselect the Auto Refresh check box.
- To view the full protocol name, move the cursor over the protocol name in the Protocol column of the table.

Viewing Port/Interface Statistics Data

To view the various data collected for the switch or router, click **Monitor,** then **Switch** or **Router**. The Port Stats or Interface Stats table displays with three radio buttons above it.

For Port Stats, you can click a radio button for:

- Viewing the Port Stats Current Rates Table, page 4-91.
- Viewing the Port Stats Top N Chart, page 4-95.
- Viewing the Port Stats Cumulative Data Table, page 4-98.

For Interface Stats you can click a radio button for:

- Viewing the Interface Stats Current Rates Table, page 4-93.
- Viewing the Interface Stats Top N Chart, page 4-96.
- Viewing the Interface Stats Cumulative Data Table, page 4-99.

Note For NM-NAM or NME-NAM devices, if you have set up **Interfaces** under **Setup** > **Data Sources**, you will be able to view hosts, conversations, and applications in the Details window.

Viewing the Port Stats Current Rates Table

The Port Stats Current Rates table enables you to view the various data collected for the switch. The information displayed represents the data collected per second over the last time interval. For information on setting the time interval, see the “Setting Global Preferences” section on page 3-87.

The Count Types drop down menu enables you to view the default Traffic Rates

To view the Port Stats Current Rates Table (Traffic Rates):

Step 1 Click the Current Rates Table radio button.

The Port Stats Current Rates Table (Traffic Rates) (Table 4-49) lists the fields displayed when the Count Type is set to Traffic Rates.

Table 4-49 Port Stats Current Rates Table (Traffic Rates)

Field	Description
Port Name	Port number. Depending on the IOS running on the Supervisor, port names are displayed differently. Earlier versions of CatOS displayed port names as 2/1 and 3/1 meaning module 2, port 1 and module 3 port 1. Newer versions of IOS software display a port name as Gi2/1 to represent a Gigabit port on module 2 port 1.In the Virtual Switch software (VSS), a port name might be displayed as Gi1/2/1to represent a Gigabit port on switch 1, module2, port 1.
Utilization %	Utilization percentage of the port.
Bytes/s	Number of bytes collected on the port per second.
Packets/s	Number of packets collected on the port per second.
Broadcast Packets/s	Number of broadcast packets collected per second.
Multicast Packets/s	Number of multicast packets collected per second.
Errors	Number of all types of errors detected. See Table 4-50 for a list of all errors.

The Port Stats Current Rates Table (Error Rates) (Table 4-50) lists the fields displayed when the Count Type is set to Error Rates.

Table 4-50 Port Stats Current Rates Table (Error Rates)

Field	Description
Port Name	Port number Depending on the IOS running on the Supervisor, port names are displayed differently. Earlier versions of CatOS displayed port names as 2/1 and 3/1 meaning module 2, port 1 and module 3 port 1. Newer versions of IOS software display a port name as Gi2/1 to represent a Gigabit port on module 2 port 1.In the Virtual Switch software (VSS), a port name might be displayed as Gi1/2/1to represent a Gigabit port on switch 1, module2, port 1.
Utilization %	Utilization percentage of the port
Dropped Events/s	Number of dropped events per second
CRC Align Errors/s	Number of CRC align errors collected per second
Undersize packets/s	Number of packets collected under 64 octets in length
Oversize Packets/s	Number of packets collected over 1518 octets in length
Fragments/s	Number of packets collected per second that were less than 64 octets in length and had bad a Frame Check Sequence (FCS)
Jabbers/s	Number of collected packets collected per second that were longer than 1518 octets in length and had a bad Frame Check Sequence (FCS)
Collisions/s	Number of collisions collected per second on the Ethernet segment

Note Table 4-49 and Table 4-50 are also valid for the Cumulative Data radio button.

Step 2 Enter the port name to filter in the Port Name text box, then press **Filter**.

The specified port name displays.

Tip To turn off auto refresh, deselect the Auto Refresh check box.

Viewing the Interface Stats Current Rates Table

The Interface Stats Current Rates table enables you to view the various data collected for the router. The information displayed represents the data collected per second over the last time interval. For information on setting the time interval, see the "Setting Global Preferences" section on page 3-87.

To view the Interface Stats Current Rates table:

Step 1 Click the Current Rates radio button.

The Interface Stats Current Rates Table (Table 4-51) displays.

Table 4-51 Interface Stats Current Rates Table

Field	Description
Interface	Interface number.
In % Utilization	Utilization percentage of the port.
Out % Utilization	Utilization percentage of the port.
In Packets/s	Number of packets collected per second.
Out Packets/s	Number of packets sent out per second.
In Bytes/s	Number of bytes collected per second.
Out Bytes/s	Number of bytes sent out per second.
In Non-Unicasts/s	Number of non-unicasts collected per second.
Out Non-Unicasts/s	Number of non-unicasts sent out per second.
In Discards/s	Number of discards collected per second.
Out Discards/s	Number of discards sent out per second.
In Errors/s	Number of errors collected per second.
Out Errors/s	Number of errors sent out per second.

Step 2 Enter the name of the to filter in the Filter text box, then click **Filter**.

The specified interface name displays.

Tips

- To turn off auto refresh, deselect the Auto Refresh check box.

Viewing Port/Interface Details

To view packet distribution details on a specific port or interface, click the number of the port in the Port Name column or the number of the interface in the Interface column. The detail window displays a chart that shows. the packet distribution per second on the specified port or interface.

Depending on the IOS running on the Supervisor, port names are displayed differently. Earlier versions of CatOS displayed port names as 2/1 and 3/1 meaning module 2, port 1 and module 3 port 1. Newer versions of IOS software display a port name as Gi2/1 to represent a Gigabit port on module 2 port 1. In the VSS, a port name might be displayed as Gi1/2/1to represent a Gigabit port on switch 1, module2, port 1.

Note For NM-NAM or NME-NAM devices, if you have set up an interface on the **Setup** > **Data Source** > **Interface** window, applications, hosts, and conversation TopN tables are displayed in the detail window.

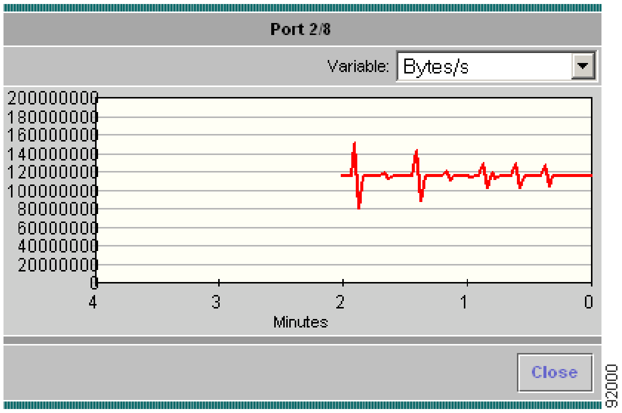
Viewing Real-Time Traffic Data from the Port/Interface Stats Table

You can view real-time data in a graphical format for a specific switch port or interface in the Port Stats or Interface Stats table.

Choose the switch port or interface from the table, then click **Real-Time**. The Real-Time Graph(Figure 4-51) displays.

Note The Real-Time button is disabled for NetFlow-based data sources.

Figure 4-51 Real-Time Graph



Port 2/8

Variable: Bytes/s

Viewing Reports from the Port/Interface Stats Table

You can view reports directly from the Port Stats or Interface Stats table. Choose the switch port or interface for which to view a report, then click **Report**. The Basic Reports graph displays. If a report is not configured, the Basic Reports screen appears and a new report is created for the selected port and data source.

For more information on viewing and creating reports, see Chapter 5, “Creating and Viewing Reports.”

Viewing the Port Stats Top N Chart

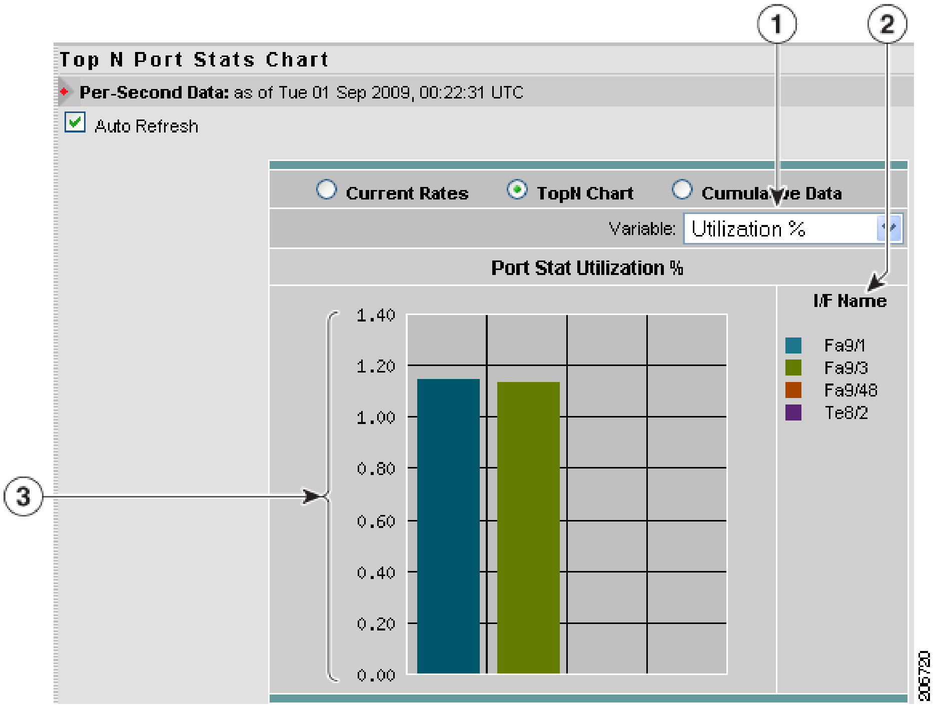
The Port Stats Top N Chart enables you to view the various data collected for each port in a graphical format. The information displayed represents the data collected per second over the last time interval.

To view the Top N Port Stats chart:

Step 1 Click the TopN Chart radio button.

The Top N Port Stats Chart (Figure 4-52) displays.

Figure 4-52 Top N Port Stats Chart



Top N Port Stats Chart

Per-Second Data: as of Tue 01 Sep 2009, 00:22:31 UTC

☑ Auto Refresh

○ Current Rates ● TopN Chart ○ Cumulative Data

Variable: Utilization %

1	Variable list.	**3**	Variable value (per second) for each switch port.
2	Top N switch ports.		

Step 2 Choose one of the following from the Variable list:

- Utilization—Sorts the interface number based on the utilization percentage. If the utilization percentage is less than 0.1%, the percentage is displayed as 0.0% in the chart.
- Dropped Events—Sorts the interface number based on the number of dropped events.
- Bytes—Sorts the interface number based on the number of bytes.
- Packets—Sorts the interface number based on the number of packets.
- Broadcast Pkts—Sorts the interface number based on the number of broadcast packets.
- Multicast Pkts—Sorts the interface number based on the number of multicast packets.
- CRC Align Errors—Sorts the interface number based on the number of CRC Align errors.
- Undersize Pkts—Sorts the interface number based on the number of undersize packets.
- Oversize Pkts—Sorts the interface number based on the number of oversize packets.
- Fragments—Sorts the interface number based on the number of fragments.
- Jabbers—Sorts the interface number based on the number of jabbers.
- Collisions—Sorts the interface number based on the number of collisions.

Tip To turn off auto refresh, deselect the Auto Refresh check box.

Viewing the Interface Stats Top N Chart

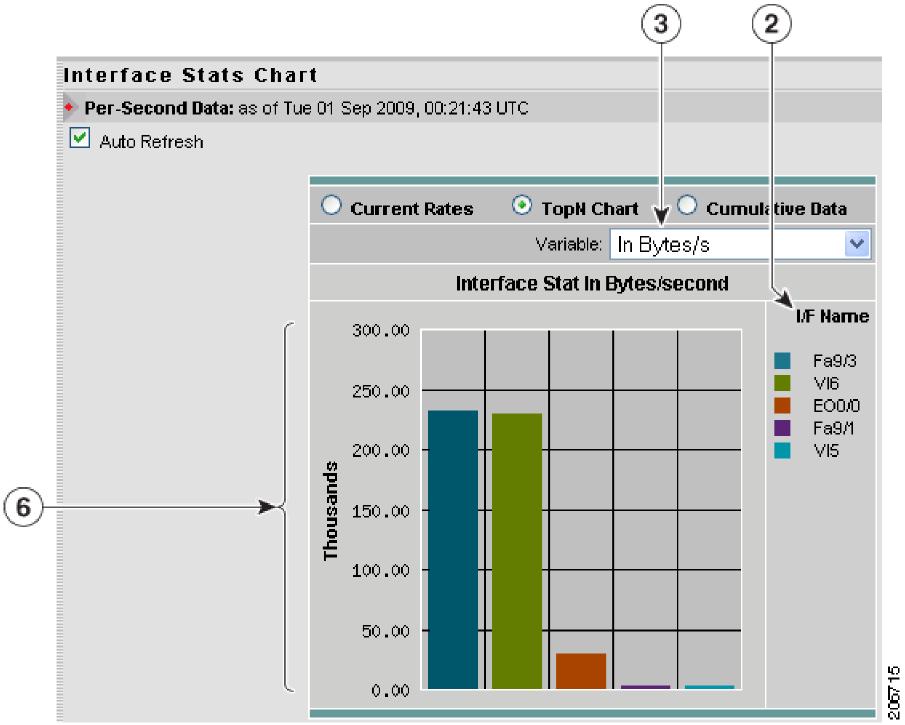
The Interface Stats Top N Chart enables you to view the various data collected for each interface in a graphical format. The displayed information represents the data collected per second over the last time interval.

To view the Top N Interface Stats chart:

Step 1 Click the TopN Chart radio button.

The Interface Stats Top N Chart (Figure 4-53) displays.

Figure 4-53 Interface Stats Top N Chart



Interface Stats Chart

Per-Second Data: as of Tue 01 Sep 2009, 00:21:43 UTC

☑ Auto Refresh

○ Current Rates ● TopN Chart ○ Cumulative Data

Variable: In Bytes/s

1	Variable list.	**3**	Variable value (per second) for each interface.
2	Top N interfaces.		

Step 2 Choose one of the following from the Variable list:

- In Packets/s—Sorts the interface number based packets collected per second.
- Out Packets/s—Sorts the interface number based on the number of packets sent out per second.
- In Bytes/s—Sorts the interface number based on the number of bytes collected per second.
- Out Bytes/s—Sorts the interface number based on the number of bytes sent out per second.
- In Non-Unicast Pkts/s—Sorts the interface number based on the number of non-unicast packets collected per second.
- Out Non-Unicast Pkts/s—Sorts the interface number based on the number of non-unicast packets sent out per second.
- In Errors/s—Sorts the interface number based on the number of errors collected per second.
- Out Errors/s—Sorts the interface number based on the number of errors sent out per second.
- In Discards/s—Sorts the interface number based on the number of discards collected per second.
- Out Discards/s—Sorts the interface number based on the number of discards sent out per second.

Tip To turn off auto refresh, deselect the Auto Refresh check box.

Viewing the Port Stats Cumulative Data Table

The Port Stats Cumulative Data table enables you to view the various data collected for the switch. The information displayed represents the total data collected since the collection was created or since the NAM was restarted. For information on setting the time interval, see the "Setting Global Preferences" section on page 3-87.

To view the Port Stats Cumulative Data table:

Step 1 Click the Cumulative Data radio button.

The Port Stats Cumulative Data Table (Table 4-52) displays. When you select Traffic Rates, only the traffic data are shown along with a field for total errors. When you select Error Rates, the Port Name and Utilization fields are shown with fields for each error type. Choose All to view all traffic rates and all errors at once.

Table 4-52 Port Stats Cumulative Data Table

Field	Description
Port Name	Port number. Depending on the IOS running on the Supervisor, port names are displayed differently. Earlier versions of CatOS displayed port names as 2/1 and 3/1 meaning module 2, port 1 and module 3 port 1. Newer versions of IOS software display a port name as Gi2/1 to represent a Gigabit port on module 2 port 1.In the VSS, a port name might be displayed as Gi1/2/1to represent a Gigabit port on switch 1, module2, port 1.
Utilization	Utilization percentage of the port.
Bytes	Number of bytes collected on the port.
Packets	Number of packets collected on the port.
Broadcast Packets	Number of broadcast packets collected.
Multicast Packets	Number of multicast packets collected.
Errors	Total of all errors **Note** This field is shown only when you select Traffic Rates.
Dropped Events	Number of dropped events.
CRC Align Errors	Number of CRC align errors collected.
Undersize packets	Number of collected packets under 64 octets long.
Oversize Packets	Number of collected packets over 1518 octets long.
Fragments	Number of collected packets collected that were less than 64 octets long and had bad Frame Check Sequence (FCS).
Jabbers	Number of collected packets collected that were longer than 1518 octets long and had bad Frame Check Sequence (FCS).
Collisions	Number of collected collisions on the Ethernet segment.

Step 2 To refresh the data in the table, click **Refresh**.

Step 3 Enter the port name to filter in the Port Name text box, then press **Filter**.

The specified port name displays.

Viewing the Interface Stats Cumulative Data Table

The Interface Stats Cumulative Data table enables you to view the various data collected for the router. The displayed information represents the total data collected since the collection was created or since the NAM was restarted. For information on setting the time interval, see the "Setting Global Preferences" section on page 3-87.

To view the Interface Stats Cumulative Data table:

Step 1 Click the Cumulative Data radio button.

The Interface Stats Cumulative Data Table (Table 4-53)displays.

Table 4-53 Interface Stats Cumulative Data Table

Field	Description
Interface	Interface number.
In Packets/s	Number of packets collected per second.
Out Packets/s	Number of packets sent out per second.
In Bytes/s	Number of bytes collected per second.
Out Bytes/s	Number of bytes sent out per second.
In Non-Unicasts/s	Number of non-unicasts collected per second.
Out Non-Unicasts/s	Number of non-unicasts sent out per second.
In Discards/s	Number of discards collected per second.
Out Discards/s	Number of discards sent out per second.
In Errors/s	Number of errors collected per second.
Out Errors/s	Number of errors sent out per second.

Step 2 To refresh the data in the table, click **Refresh**.

Step 3 Enter the interface name to filter in the Filter text box, then click **Filter**.

The specified interface name displays.

Viewing Interface Details

To view packet distribution details on a specific interface, click the interface number in the Interface column. The detail window displays with a chart that shows the total packet distribution on the specified interface.

Viewing System Health

You can use the NAM Traffic Analyzer to view system health data. To view system health data collected for the switch or router, choose **Monitor** > **Router** or **Monitor** > **Switch** then select **Health** from the Content Menu.

Depending on the type of device, one of the following windows displays:

- Switch Health
- Router Health
- Appliance Health (Managed Device)

Switch Health

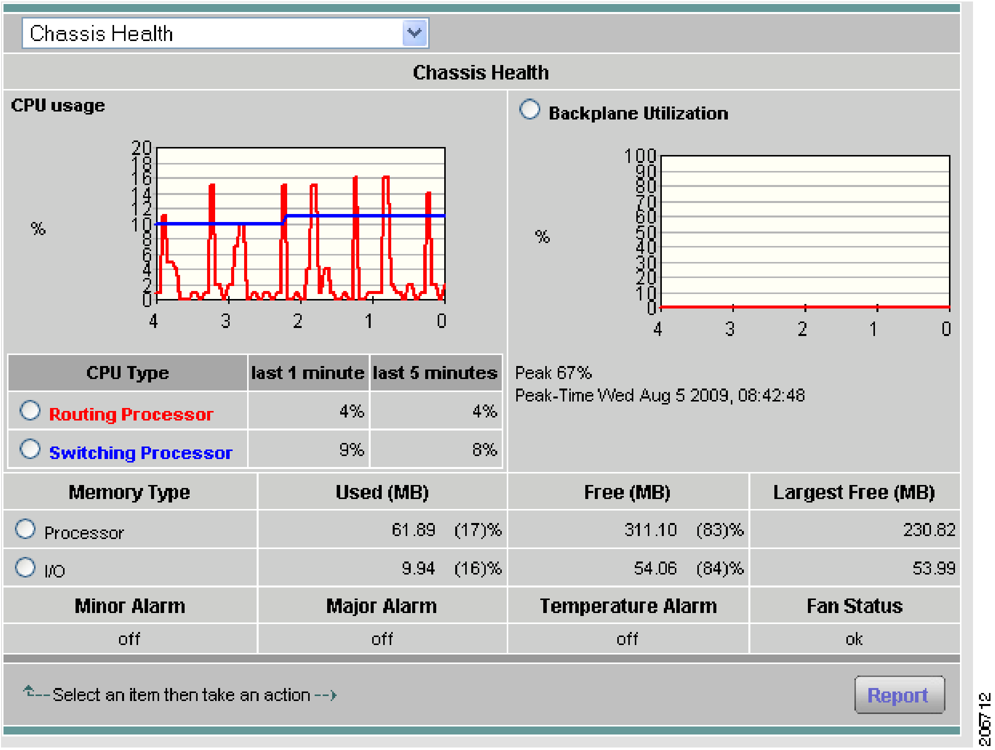
The Switch Health window is displays with a drop-down menu that provides the following options:

- Chassis Health
- Chassis Information
- Crossbar Switching Fabric
- Ternary Content Addressable Memory Information

Chassis Health

The Chassis Health window (Figure 4-54) displays two real-time graphs.

Figure 4-54 Switch Health Window



Chassis Health

CPU Type	last 1 minute	last 5 minutes
○ Routing Processor	4%	4%
○ Switching Processor	9%	8%

Peak 67%
Peak-Time Wed Aug 5 2009, 08:42:48

Memory Type	Used (MB)	Free (MB)	Largest Free (MB)
○ Processor	61.89 (17)%	311.10 (83)%	230.82
○ I/O	9.94 (16)%	54.06 (84)%	53.99
Minor Alarm	**Major Alarm**	**Temperature Alarm**	**Fan Status**
off	off	off	ok

CPU usage within the last five seconds

CPU type

- Usage for last 1 minute (%)
- Usage for last 5 minutes (%)

Traffic Bandwidth

- Peak %
- Peak Time (For example: Mon October 1 2007, 15:26:55)

The Switch Health window also displays a matrix with the following information:

- Minor Alarm (on, off)
- Major Alarm (on, off)
- Temperature Alarm (on, off)
- Fan Status (other, ok, minorFault, majorFault, unknown)

Table 4-54 Switch Memory Information

Column	Description
Memory Type	Type of memory including DRAM, FLASH, NVRAM, MBUF, CLUSTER, MALLOC.
Used	Number of used MB for a particular memory type.

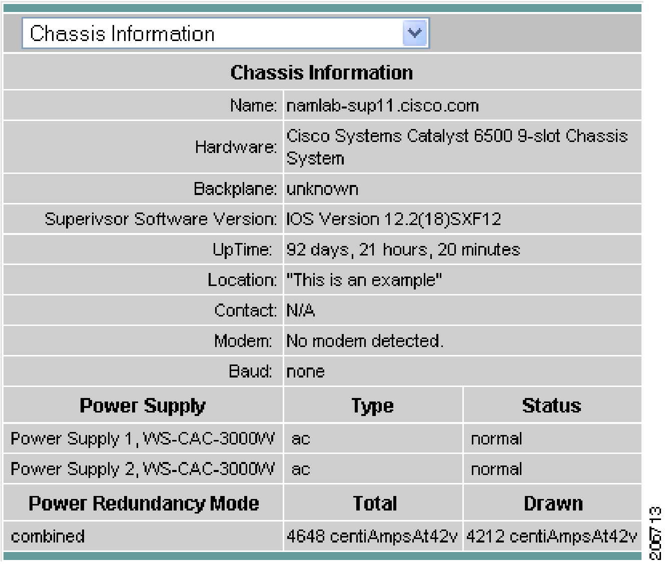
Table 4-54 Switch Memory Information

Column	Description
Free	Number of free MB for a particular memory type.
Largest Free	Number of largest contiguous free MB for a particular memory type.

Chassis Information

The Chassis Information window (Figure 4-55) displays.

Figure 4-55 Chassis Information Window



Chassis Information

Chassis Information		
Name:	namlab-sup11.cisco.com	
Hardware:	Cisco Systems Catalyst 6500 9-slot Chassis System	
Backplane:	unknown	
Superivsor Software Version:	IOS Version 12.2(18)SXF12	
UpTime:	92 days, 21 hours, 20 minutes	
Location:	"This is an example"	
Contact:	N/A	
Modem:	No modem detected.	
Baud:	none	
Power Supply	**Type**	**Status**
Power Supply 1, WS-CAC-3000W	ac	normal
Power Supply 2, WS-CAC-3000W	ac	normal
Power Redundancy Mode	**Total**	**Drawn**
combined	4648 centiAmpsAt42v	4212 centiAmpsAt42v

Table 4-55 Switch Information

Field	Description
Name	Name an administrator assigned to this managed node, this is the node's fully-qualified domain name.
Hardware	A textual description which should contain the manufacturer's name for the physical entity and be set to a distinct value for each version or model of the physical entity.
Backplane	The chassis backplane type.
Supervisor Software Version	The full name and version identification of the system's software operating-system and networking software.
UpTime	The time (in hundredths of a second) since the network management portion of the system was last re-initialized.
Location	The physical location of this node.

Table 4-55 Switch Information

Field	Description
Contact	The textual identification of the contact person for this managed node and information on how to contact this person.
Modem	Indicates whether the RS-232 port modem control lines are enabled.
Baud rate	The baud rate in bits per second of the RS-232 port.
Power Supply	Description of the power supply being instrumented.
Power Supply Type	The power supply source: unknown ac dc externalPowerSupply internalRedundant
Power Supply Status	The current state of the power supply being instrumented. 1: normal 2: warning 3: critical 4: shutdown 5: notPresent 6: notFunctioning
Power Redundancy Mode	Power Redundancy Mode: The power-supply redundancy mode. 1: not supported 2: redundant 3: combined
Power Total	Total current available for FRU usage. When Redundancy Mode is redundant, the total current available will be the capability of a power supply with the lesser power capability of the two power supplies. When Redundancy Mode is combined, the total current available will be the sum of the capacities of all operating power supplies.
Power Drawn	Total Current Drawn by powered-on FRUs.

Crossbar Switching Fabric

This option shows the Crossbar Switching Fabric information.

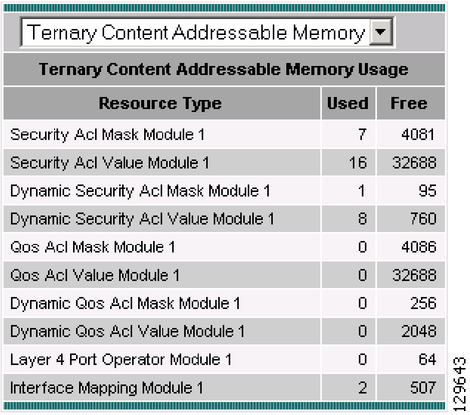
Table 4-56 Crossbar Switching Fabric Information

Field	Description
Crossbar Switching Fabric	Physical and configuration information about the module: **Active slot**—Indicates the slot number of the active switching fabric module. A value of zero indicates that the active switching fabric module is either powered down or not present in the chassis. **Backup slot**—Indicates the slot number of the backup switching fabric module. A value of zero indicates that the backup switching fabric module is either powered down or not present in the chassis. **Bus Only Mode Allowed**—Determines the value of each module. If set to True, each and every module is allowed to run in bus-only mode. If set to False, none of the modules are allowed to run in bus-only mode. (All the non-fabric capable modules will be powered off.) Absence of fabric module results in all the fabric capable modules being powered off. **Truncated Mode Allowed**—Indicates whether truncated mode is administratively enabled on the device or not.
Module Switching Mode	Indicates switching mode of the module: **busmode**—Module does not use fabric. Backplane is used for both lookup and data forwarding. **crossbarmode**—Module uses the backplane for forwarding decision and fabric for data forwarding. **dcefmode**—Module uses fabric for data forwarding and local forwarding is enabled.
Module-Channel	Module slot number
Module-Status	Status of the fabric channel at the module
Fabric Status	Status of the fabric channel at the slot
Speed (MB)	Speed (MB/second) of the module
Module-Channel	Channel for the module
In Errors	The total number of error packets received since this entry was last initialized.
Our Errors	The total number of error packets transmitted since this entry was last initialized.
Dropped	The total number of dropped packets transmitted since this entry was last initialized.
In Utilization (%)	Input utilization of the channel for the module.
Our Utilization (%)	Output utilization of the channel for the module.

Ternary Content Addressable Memory Information

Shows the Ternary Content Addressable Memory (TCAM) (Figure 4-56) usage information. Table 4-57 lists and describes the TCAM information.

Figure 4-56 Ternary Content Addressable Memory Information



Ternary Content Addressable Memory Usage

Resource Type	Used	Free
Security Acl Mask Module 1	7	4081
Security Acl Value Module 1	16	32688
Dynamic Security Acl Mask Module 1	1	95
Dynamic Security Acl Value Module 1	8	760
Qos Acl Mask Module 1	0	4086
Qos Acl Value Module 1	0	32688
Dynamic Qos Acl Mask Module 1	0	256
Dynamic Qos Acl Value Module 1	0	2048
Layer 4 Port Operator Module 1	0	64
Interface Mapping Module 1	2	507

Table 4-57 Ternary Content Addressable Memory Information

Field	Description
Security Acl Mask	Indicates that TCAM space is allocated to store ACL masks.
Security Acl Value	Indicates that TCAM space is allocated to store ACL value.
Dynamic Security Acl Mask	Indicates that TCAM space is allocated to dynamically store ACL masks.
Dynamic Security Acl Value	Indicates that TCAM space is allocated to dynamically store ACL values.
Qos Acl Mask	Indicates that TCAM space is allocated to store QoS masks.
Qos Acl Value	Indicates that TCAM space is allocated to store QoS value.
Dynamic Qos Acl Mask	Indicates that TCAM space is allocated to dynamically store QoS masks.
Dynamic Qos Acl Value	Indicates that TCAM space is allocated to dynamically store ACL values.
Layer 4 Port Operator	Indicates that TCAM space is allocated for layer 4 port operators purpose.
Interface Mapping Module	Indicates that TCAM space is allocated for interface mapping purpose.

Router Health

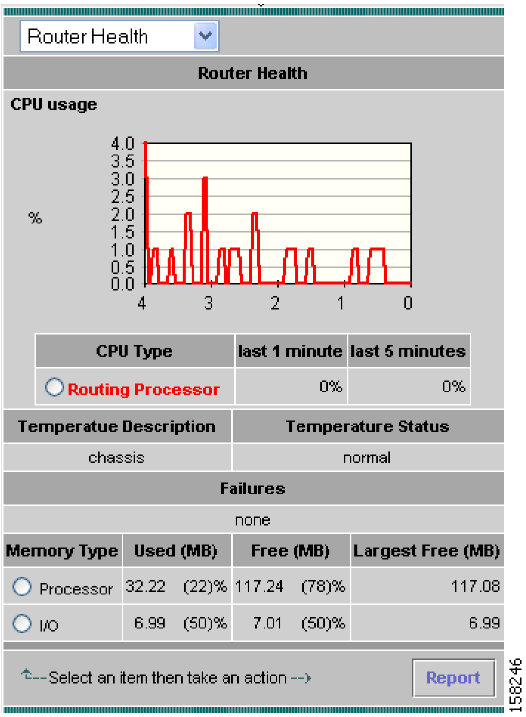
If your device is a router, the Router Health window displays with a drop-down box that provides the following options:

- Router Health
- Router Information

Router Health

The Router Health window displays a real-time graph and out information about the health of a router as shown in Figure 4-57. Table 4-58 describes the contents of the Router Health window.

Figure 4-57 Router Health Window



Router Health

CPU Type	last 1 minute	last 5 minutes
○ Routing Processor	0%	0%

Temperatue Description	Temperature Status
chassis	normal

Failures

none

Memory Type	Used (MB)	Free (MB)	Largest Free (MB)
○ Processor	32.22 (22)%	117.24 (78)%	117.08
○ I/O	6.99 (50)%	7.01 (50)%	6.99

Select an item then take an action -->

Table 4-58 Router Health Information

Field	Description
CPU Usage (graph)	Overall CPU busy percentage in the last 5 second period
CPU Type	Describes type of CPU being monitored
Last 1 minute	Overall CPU busy percentage in the last 1 minute period.
Last 5 minutes	Overall CPU busy percentage in the last 5 minute period.
Temperature Description	Description of the test point being measured

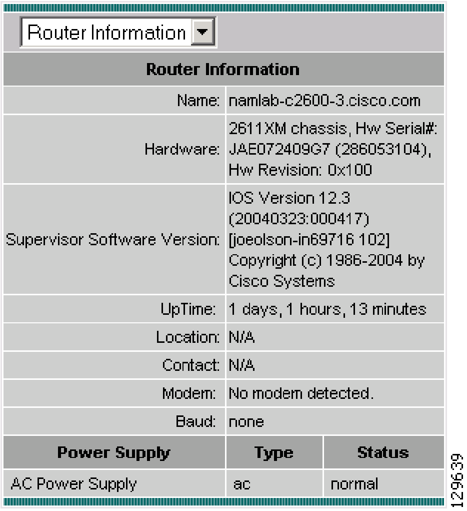
Table 4-58 Router Health Information

Field	Description
Temperature Status	The current state of the test point being instrumented; one of the following are the states: • Normal • Warning • Critical • Shutdown • Not Present • Not Functioning • Unknown
Failures	The failing component of the power supply being measured: • None—No failure • inputVoltage—Input power lost in one of the power supplies • dcOutputVoltage—DC output voltage lost in one of the power supplies • Thermal—Power supply thermal failure. • Multiple—Multiple failures. • Fan—Fan failure • Overvoltage—Over voltage.
Memory Type	Type of memory including processor and I/O.
Used	Number of used MB for a particular memory type.
Free	Number of free MB for a particular memory type.
Largest Free	Number of largest contiguous free MB for a particular memory type.

Router Information

The Router Information window(Figure 4-58) displays router information. Table 4-59 lists and describes the fields of the Router Information window.

Figure 4-58 Router Information Window



Router Information	
Name:	namlab-c2600-3.cisco.com
Hardware:	2611XM chassis, Hw Serial#: JAE072409G7 (286053104), Hw Revision: 0x100
Supervisor Software Version:	IOS Version 12.3 (20040323:000417) [joeolson-in69716 102] Copyright (c) 1986-2004 by Cisco Systems
UpTime:	1 days, 1 hours, 13 minutes
Location:	N/A
Contact:	N/A
Modem:	No modem detected.
Baud:	none

Power Supply	Type	Status
AC Power Supply	ac	normal

Table 4-59 Router Information

Field	Description
Name	Name an administrator assigned to this managed node, this is the node's fully-qualified domain name.
Hardware	A textual description which should contain the manufacturer's name for the physical entity and be set to a distinct value for each version or model of the physical entity.
Supervisor Software Version	The full name and version identification of the system's software operating-system and networking software.
Up Time	The time (in hundredths of a second) since the network management portion of the system was last re-initialized.
Location	The physical location of this node.
Contact	The textual identification of the contact person for this managed node and information on how to contact this person.
Modem	Indicates whether the RS-232 port modem control lines are enabled.
Baud	The baud rate in bits per second of the RS-232 port.
Power Supply	Description of the power supply being instrumented.

Table 4-59 Router Information

Field	Description
Power Supply Type	The power supply source: unknown ac dc externalPowerSupply internalRedundant
Power Supply Status	The current state of the power supply being instrumented. 1: normal 2: warning 3: critical 4: shutdown 5: notPresent 6: notFunctioning

Viewing NBAR

You can use the NAM Traffic Analyzer to view Network Based Application Recognition (NBAR) data. To view the NBAR data collected for a switch or router, select **Monitor > Router** or **Switch** > **NBAR**.

The NBAR Current Rates Table displays with three radio buttons above it.

You can click a radio button for:

- Viewing the NBAR Current Rates Table, page 4-109.
- Viewing the Top N NBAR Chart, page 4-110.
- Viewing the NBAR Cumulative Data Table, page 4-111.

Viewing the NBAR Current Rates Table

The NBAR Current Rates table enables you to view the protocol data collected for the device. The information displayed represents the data collected per second over the last time interval. For information on setting the time interval, see the "Setting Global Preferences" section on page 3-87.

To view the NBAR Current Rates table:

Step 1 Click the Current Rates radio button.

The NBAR Current Rates Table (Table 4-60) displays.

Table 4-60 NBAR Current Rates Table

Field	Description
Protocol/s	Protocol type.
In Packets/s	Number of packets collected per second.
Out Packets/s	Number of packets sent out per second.

Table 4-60 NBAR Current Rates Table (continued)

Field	Description
In Bytes/s	Number of bytes collected per second.
Out Bytes/s	Number of bytes sent out per second.
In Bit rate/s	In bound bit rate per second.
Out Bit rate/s	Out bound bit rate per second.

Step 2 (Optional) Enter the protocol name to filter in the Filter text box, then click **Filter**.

The specified protocol displays.

Step 3 (Optional) Choose the interface name in the drop-down box.

The specified interface displays.

Step 4 (Optional) Choose a protocol and click Real-Time.

A Real-Time graph of the specified protocol displays.

Tip To turn off auto refresh, deselect the Auto Refresh check box.

Viewing the Top N NBAR Chart

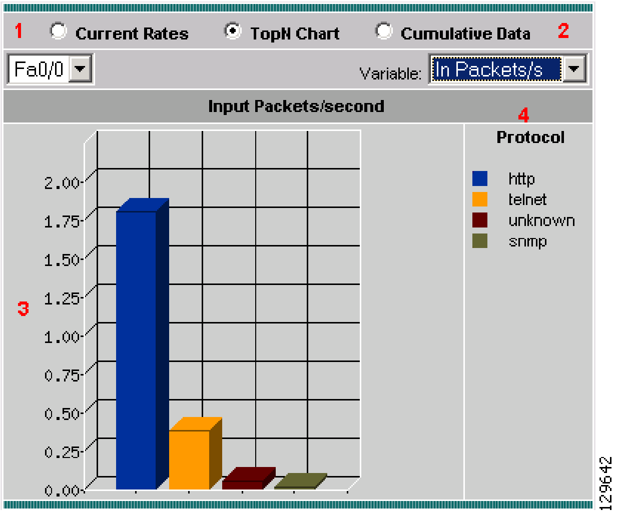
The NBAR Top N Chart enables you to view the various data collected for each protocol in a graphical format. The information displayed represents the data collected per second over the last time interval.

To view the NBAR Top N chart:

Step 1 Click the TopN Chart radio button.

The Top N NBAR Chart (Figure 4-59) displays.

Figure 4-59 Top N NBAR Chart



1	Interface list (for example, Fa0/0)	3	Variable value (per second) for each protocol
2	Variable list (In Packets/s, Out Packets/s, In Bytes/s, Out Bytes/s, In Bit Rate, Out Bit Rate)	4	Top N protocols

Step 2 Choose an interface from the Interface list:

Step 3 Choose one of the following from the Variable list:

- In Packets/s—Sorts the interface number based on the number of in packets/s.
- Out Packets/s—Sorts the interface number based on the number of out packets/s.
- In Bytes/s—Sorts the interface number based on the number of in bytes/s.
- Out Bytes/s—Sorts the interface number based on the number of out bytes/s.
- In Bit Rate—Sorts the interface number based on the in bit rate.
- Out Bit Rate—Sorts the interface number based on the out bit rate.

Tip To turn off auto refresh, deselect the Auto Refresh check box.

Viewing the NBAR Cumulative Data Table

The NBAR Cumulative Data table enables you to view the various data collected for the switch or router. The information displayed represents the total data collected since the collection was created or since the NAM was restarted. For information on setting the time interval, see Setting Global Preferences, page 3-87.

To view the NBAR Cumulative Data table:

Step 1 Click the Cumulative Data radio button.

The NBAR Cumulative Data Table(Table 4-61) displays.

Table 4-61 NBAR Cumulative Data Table

Field	Description
Protocol	Name of protocol.
In Packets/s	Number of packets collected per second.
Out Packets/s	Number of packets sent out per second.
In Bytes/s	Number of bytes collected per second.
Out Bytes/s	Number of bytes sent out per second.
In Bit rate/s	In bound bit rate per second.
Out Bit rate/s	Out bound bit rate per second.

Step 2 (Optional) Enter the protocol name to filter in the Filter text box, then click **Filter**.

The specified protocol displays.

Step 3 (Optional) Choose the interface name in the drop-down box.

The specified interface displays.

Step 4 (Optional) Choose a protocol and click Real-Time.

A Real-Time graph of the specified protocol displays.

Viewing MPLS Traffic Statistics

When data packets containing MPLS tag are spanned to the NAM, the traffic can be monitored by the tag inside the data packet. This feature is especially useful in a network that deploys MPLS/VPN where each VPN is uniquely identified by an MPLS tag. When NAM encounters stacked MPLS tags, only the relevant inner-most tag is used for monitoring.

This section describes the following topics:

- Viewing VRF Statistics, page 4-113
- Viewing Virtual Circuit Statistics, page 4-114
- Viewing All Labels, page 4-115

Viewing VRF Statistics

To view VRF statistics:

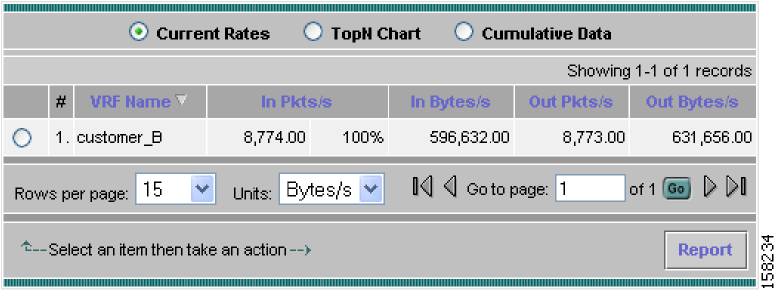
Step 1 Click **Monitor** > **MPLS**.

Step 2 In the content menu, click **VRF Statistics**.

The GUI displays the MPLS VRF Statistics Current Rates Table, the default view. You can also choose two other display formats, the TopN Chart or Cumulative Data.

VRF statistics are displayed in the same formatas shown in Figure 4-60.

Figure 4-60 VRF Statistics



● Current Rates ○ TopN Chart ○ Cumulative Data

Showing 1-1 of 1 records

	#	VRF Name ▽	In Pkts/s		In Bytes/s	Out Pkts/s	Out Bytes/s
○	1.	customer_B	8,774.00	100%	596,632.00	8,773.00	631,656.00

Rows per page: 15 Units: Bytes/s Go to page: 1 of 1

Table 4-63 explains the fields of the VRF Statistics window.

Table 4-62 VRF Statistics Window

Field	Description
VRF/VC Name	Name of the VRF data source
InPackets	The number of packets received
In Bytes	The total number of bytes received
Out Packets	The total number of bytes delivered
Out Bytes	The number of packets delivered

Viewing Virtual Circuit Statistics

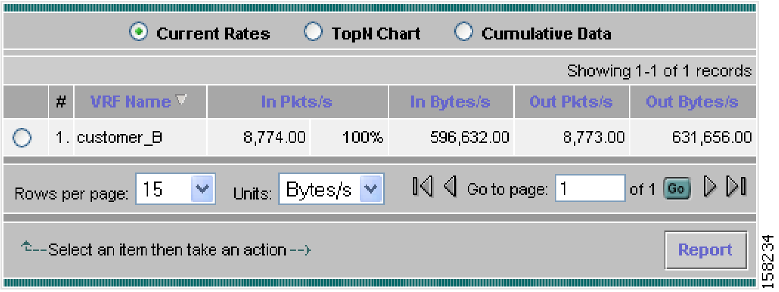
Step 1 Click **Monitor** > **MPLS**.

Step 2 In the content menu, click **L2 Virtual Circuit Statistics**.

The GUI displays the MPLS Virtual Circuit Statistics Current Rates Table, the default view. You can also choose two other display formats, the TopN Chart or Cumulative Data.

Virtual Circuit statistics are displayed in the same formatas shown in Figure 4-61.

Figure 4-61 Virtual Circuit Statistics Window



● Current Rates ○ TopN Chart ○ Cumulative Data

Showing 1-1 of 1 records

	#	VRF Name	In Pkts/s		In Bytes/s	Out Pkts/s	Out Bytes/s
○	1.	customer_B	8,774.00	100%	596,632.00	8,773.00	631,656.00

Rows per page: 15 Units: Bytes/s Go to page: 1 of 1 Go

Select an item then take an action -->

Table 4-63 explains the fields of the Virtual Circuit Statistics window.

Table 4-63 Virtual Circuit Statistics Window

Field	Description
VRF/VC Name	Name of the VRF or VC data source
InPackets	The number of packets received
In Bytes	The total number of bytes received
Out Packets	The total number of bytes delivered
Out Bytes	The number of packets delivered

Viewing All Labels

To view MPLS traffic statistics,

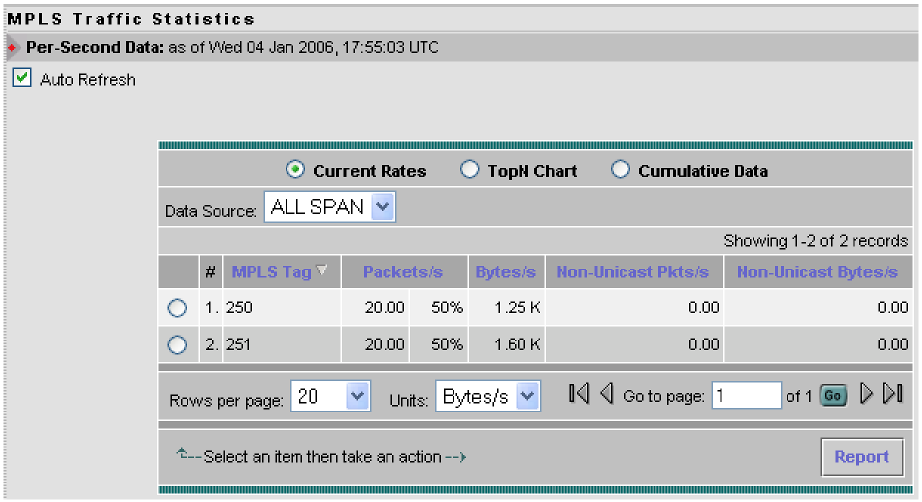
Step 1 Click **Monitor** > **MPLS**.

Step 2 In the content menu, click **All Labels**.

The GUI displays the MPLS Traffic Statistics Current Rates Table, the default view. You can also choose two other display formats, the TopN Chart or Cumulative Data.

Figure 4-62 shows the MPLS Traffic Statistics display for all MPLS-tagged traffic received from the NAM data ports.

Figure 4-62 Viewing MPLS Traffic Statistics



MPLS Traffic Statistics

Per-Second Data: as of Wed 04 Jan 2006, 17:55:03 UTC

☑ Auto Refresh

● Current Rates ○ TopN Chart ○ Cumulative Data

Data Source: ALL SPAN

Showing 1-2 of 2 records

	#	MPLS Tag	Packets/s		Bytes/s	Non-Unicast Pkts/s	Non-Unicast Bytes/s
○	1.	250	20.00	50%	1.25 K	0.00	0.00
○	2.	251	20.00	50%	1.60 K	0.00	0.00

Rows per page: 20 Units: Bytes/s Go to page: 1 of 1 Go

Select an item then take an action --> Report

158238

Traffic Statistics per MPLS Tag

Like VLAN monitoring, you should be able to see traffic statistics broken down by tag. MPLS tagged traffic statistics can be monitored by the following:

- Total number of packets
- Total number of bytes
- Total number of non-unicast packets
- Total number of non-unicast bytes

Custom RMON Data Source

To enable RMON monitoring, you must first configure a data source. To enable monitoring of MPLS traffic, create a form of virtual interface to be tied to a particular MPLS tag. You can select a particular MPLS tag and create a custom data source for that tag.

Monitoring Application per MPLS Tag

After you create a custom data source, you can enable application monitoring on the data source. This capability gives you insight into the applications being carried using a particular MPLS tag.

Monitoring Host per MPLS Tag

After you create a custom data source, you can enable host monitoring on this data source. This capability gives you insight into the traffic being generated by hosts using a particular MPLS tag.

Monitoring Host Conversation per MPLS Tag

After you create a custom data source, you can enable application monitoring on this data source. This capability gives you insight into host conversations being carried using a particular MPLS tag.

CHAPTER 5

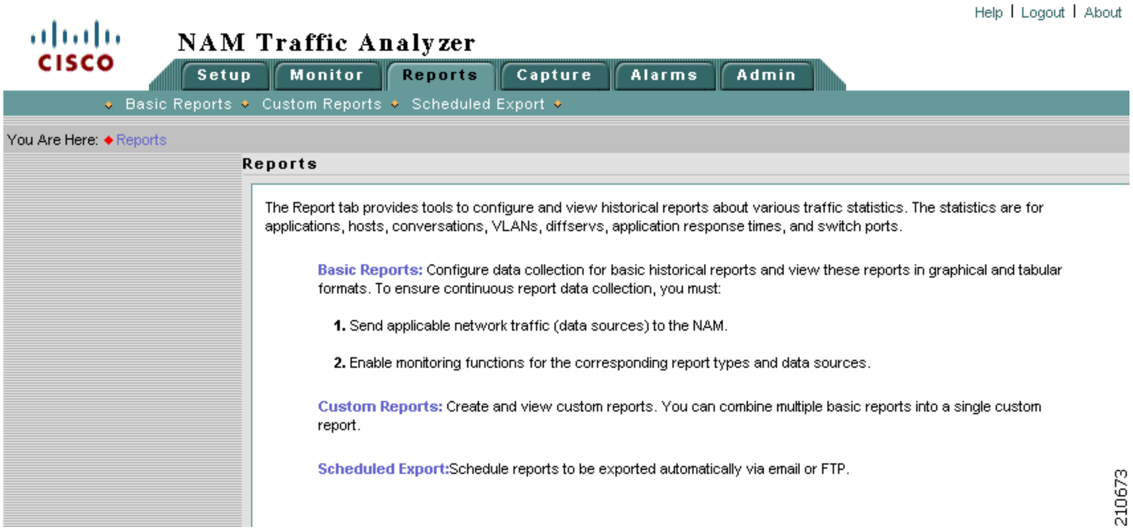
Creating and Viewing Reports

The reports function allows you to store and retrieve up to 100 days of historical data about the network traffic monitored by the NAM. The Reports window (Figure 5-1) provides options for creating and viewing basic, custom, and scheduled exports. The submenu of the Reports window provides the following options:

- Basic Reports, page 5-2, enables you to configure data collection for basic historical reports and view these reports in several different formats.
- Custom Reports, page 5-24, enables you to create and view custom reports. You can also combine multiple basic reports into a single custom report.
- Scheduled Exports, page 5-27, enables you to schedule a report to be generated automatically and exported by Email or FTP transfer.

Note NAM 4.0 supports IPv6 for all reporting functionality.

Figure 5-1 Reports Window



The Report tab provides tools to configure and view historical reports about various traffic statistics. The statistics are for applications, hosts, conversations, VLANs, diffservs, application response times, and switch ports.

Basic Reports: Configure data collection for basic historical reports and view these reports in graphical and tabular formats. To ensure continuous report data collection, you must:

1. Send applicable network traffic (data sources) to the NAM.
2. Enable monitoring functions for the corresponding report types and data sources.

Custom Reports: Create and view custom reports. You can combine multiple basic reports into a single custom report.

Scheduled Export: Schedule reports to be exported automatically via email or FTP.

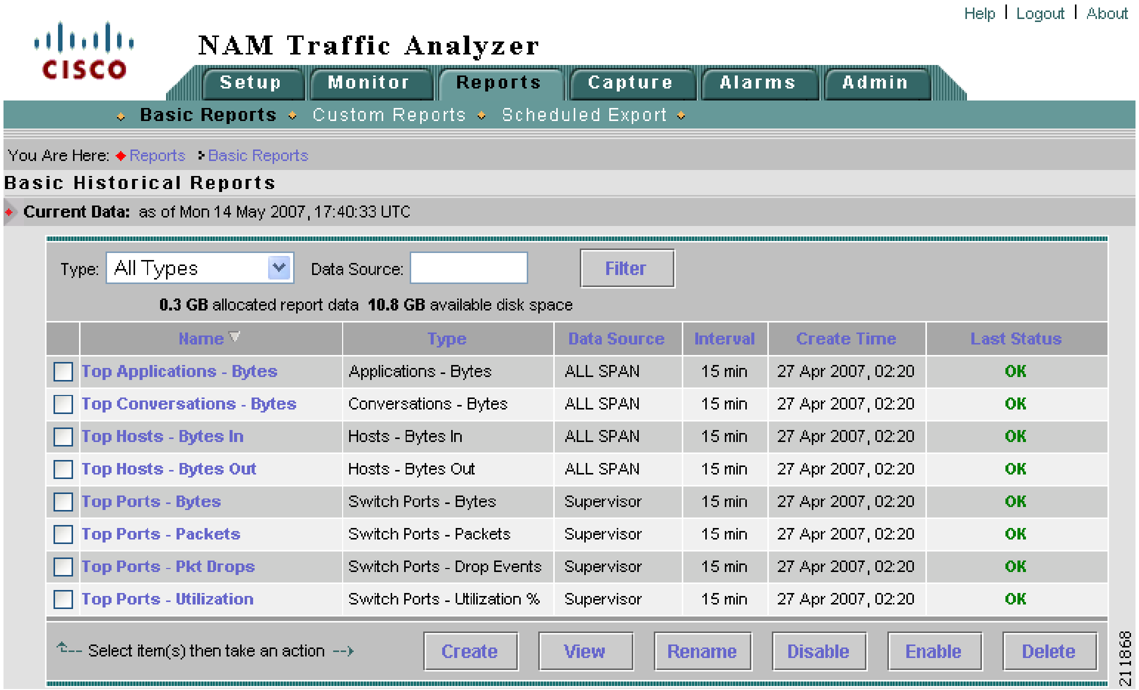
Basic Reports

The Basic Reports option enables you to view reports about a specific target like a network host, a protocol, or the TopN list of the most active hosts or the TopN list of the most active top protocols.

When a basic report is created, a background process periodically polls the datasource and stores the data in the database. You can configure the polling interval when you create the basic report. See the section Creating a Basic Report, page 5-4, for more information.

Figure 5-2 shows an example of the Basic Reports window.

Figure 5-2 Basic Reports Window



You Are Here: Reports Basic Reports

Basic Historical Reports

Current Data: as of Mon 14 May 2007, 17:40:33 UTC

Type: All Types Data Source:

0.3 GB allocated report data 10.8 GB available disk space

	Name	Type	Data Source	Interval	Create Time	Last Status
□	Top Applications - Bytes	Applications - Bytes	ALL SPAN	15 min	27 Apr 2007, 02:20	OK
□	Top Conversations - Bytes	Conversations - Bytes	ALL SPAN	15 min	27 Apr 2007, 02:20	OK
□	Top Hosts - Bytes In	Hosts - Bytes In	ALL SPAN	15 min	27 Apr 2007, 02:20	OK
□	Top Hosts - Bytes Out	Hosts - Bytes Out	ALL SPAN	15 min	27 Apr 2007, 02:20	OK
□	Top Ports - Bytes	Switch Ports - Bytes	Supervisor	15 min	27 Apr 2007, 02:20	OK
□	Top Ports - Packets	Switch Ports - Packets	Supervisor	15 min	27 Apr 2007, 02:20	OK
□	Top Ports - Pkt Drops	Switch Ports - Drop Events	Supervisor	15 min	27 Apr 2007, 02:20	OK
□	Top Ports - Utilization	Switch Ports - Utilization %	Supervisor	15 min	27 Apr 2007, 02:20	OK

Select item(s) then take an action -->

Table 5-1 lists and describes the fields of the Basic Reports window.

Table 5-1 Basic Reports Table

Field	Description
Basic Report Type	Filters the list of reports by report type
Name	Name of the basic report
Type	Type of the report data
Data Source	The data source from which the report data were collected

Table 5-1 Basic Reports Table (continued)

Field	Description
Interval	The polling interval of the report data collection. The default is 15 minutes. A more frequent polling interval allows the report to have finer granularity but requires more data storage space. **Note** Polling intervals are based on a 60-minute clock that begins at the top of the hour. If you use the default polling interval and start collecting data for a report at seven minutes past the hour, the first polling interval will end at 15 minutes past the hour and have a duration of eight minutes. Similarly, the current polling interval might also show as less than the polling interval.
Create Time	Time the report was created.
Last Status	**Note** See Table 5-16, Last Status Conditions, for a complete list status conditions and their definitions. • OK—Enabled and data is being collected. • Disabled—No data is being collected. • Pending—Report is enabled, but no data collected. • Inactive Data Source—Data source was deleted. • No Data—No data was collected for this period. This can be due to the report being disabled, the NAM not running, or the Report Data Collection task not running. • No Activity—The NAM does not detect any traffic activity for this target. This might be caused by an inactive target or a data source configuration problem. See Table 5-15 or Table 5-16 for more information about reports that show no activity. However for certain monitoring metrics when the system is missing data on errors, special conditions, and similar measurements, the status *No Activity* is substituted by a more appropriate term such as *No Drops Stats* or *No Concealment Stats*. This means there was no information on drops or concealment, but does not imply there was no normal activity during the reported period. • Not Monitored—The monitoring function for this type of traffic statistic is not enabled or is not available for the NAM and/or switch. **Note** If no data was collected, a time stamp displays the last collection.

WS-SVC-NAM-1 and WS-SVC-NAM-2 devices have the following reports created by default:

- Top Applications—Bytes
- Top Conversations—Bytes
- Top Hosts—Bytes In
- Top Hosts—Bytes Out
- Top Ports—Bytes
- Top Ports—Packets

- Top Ports—Packet Drops
- Top Ports—Utilization

NME-NAM devices have the following reports created by default:

- Top Applications—Bytes
- Top Conversations—Bytes
- Top Hosts—Bytes In
- Top Hosts—Bytes Out
- Top Interfaces—Bytes In
- Top Interfaces—Bytes Out
- Top Interfaces—Utilization In
- Top Interfaces—Utilization Out

NAM appliances have the following reports created by default:

- Top Applications—Bytes
- Top Conversations—Bytes
- Top Hosts—Bytes In
- Top Hosts—Bytes Out
- Top Ports—Bytes
- Top Ports—Packets
- Top Ports—Packet Drops
- Top Ports—Utilization

Note If you turn off collections on a data source on which a report is running, the reports function will automatically turn the collections back on.

The following sections describe how to manage your basic reports:

- Creating a Basic Report, page 5-4
- Viewing Basic Reports, page 5-20
- Renaming a Report, page 5-24
- Enabling Reports, page 5-23
- Disabling Reports, page 5-24
- Deleting a Report, page 5-24

Basic reports can be customized and combined to create custom reports. See Custom Reports, page 5-24, for more information about customized reports.

Creating a Basic Report

Before you can create reports, you should make sure the applicable network traffic is being sent to the NAM and that monitoring functions are enabled for the type of statistic and data sources. For more information on enabling monitoring functions, see the “Monitoring” section on page 3-47.

To create a basic report:

Step 1 Click **Reports** > **Basic Reports**.

The Basic Historical Reports window displays.

Step 2 Click **Create**.

The Create Basic Historical Report window displays as shown in Figure 5-3. Using a NAM-1 or NAM-2 device, you can create the following reports:

- Applications—See Creating an Applications Report, page 5-6
- Application Groups—See Creating an Application Groups Report, page 5-8
- Hosts—See Creating a Hosts Report, page 5-8
- Conversations—See Creating a Conversations Report, page 5-10
- VLANs—See Creating a VLANs Report, page 5-11
- Differentiated Services—See Creating a DiffServ Report, page 5-12
- Response Time—See Creating a Response Time Report, page 5-13
- Switch Port—See Creating a Switch Port Report, page 5-14
- Switch Health—Creating a Switch Health Report, page 5-15
- MPLS—See Creating an MPLS Stats Report, page 5-17
- Voice Over IP/RTP Stream Statistics—Creating a Voice Over IP/RTP Stream Report, page 5-18

Using NME-NAM devices, you can create the following reports:

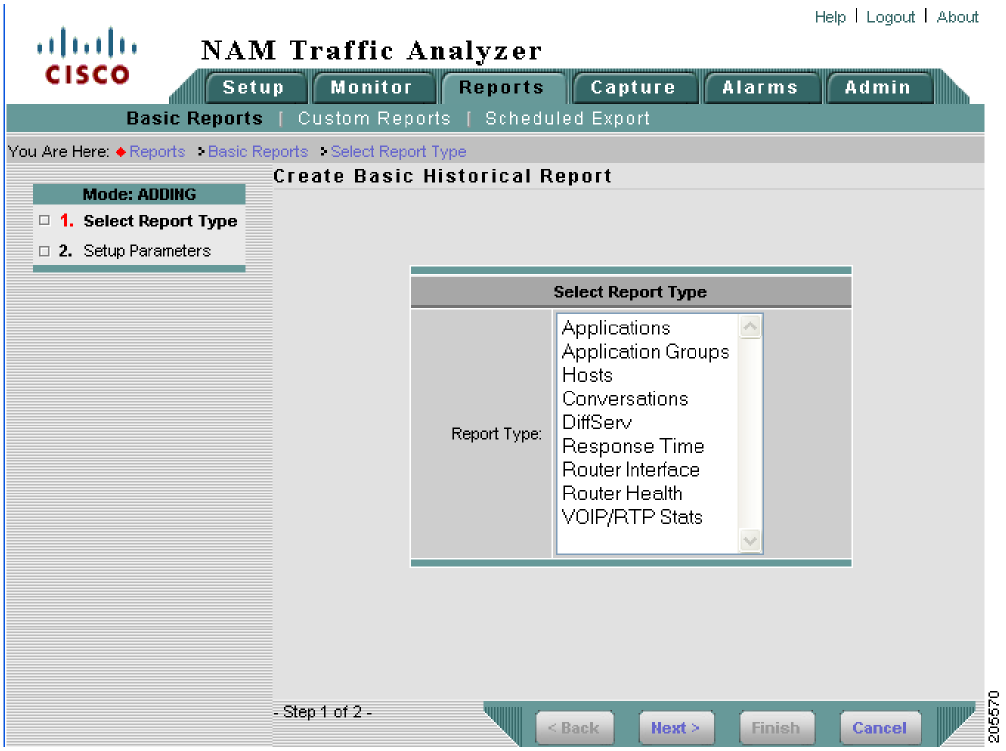
- Applications—See Creating an Applications Report, page 5-6
- Application Groups—See Creating an Application Groups Report, page 5-8
- Hosts—See Creating a Hosts Report, page 5-8
- Conversations—See Creating a Conversations Report, page 5-10
- Differentiated Services—See Creating a DiffServ Report, page 5-12
- Response Time—See Creating a Response Time Report, page 5-13
- Router Interface—See Creating a Router Interface Report, page 5-16
- Router Health—Creating a Router Health Report, page 5-16
- Voice Over IP/RTP Stream Statistics—Creating a Voice Over IP/RTP Stream Report, page 5-18

Step 3 Choose the report type, then click **Next**.

Step 4 Enter the parameters required for your selected report type.

Step 5 Click **Finish**.

Figure 5-3 Creating a Basic Historical Report



Creating an Applications Report

To create an Application Protocols report:

Step 1 Click **Reports** > **Basic Reports**.

The Basic Historical Reports window displays.

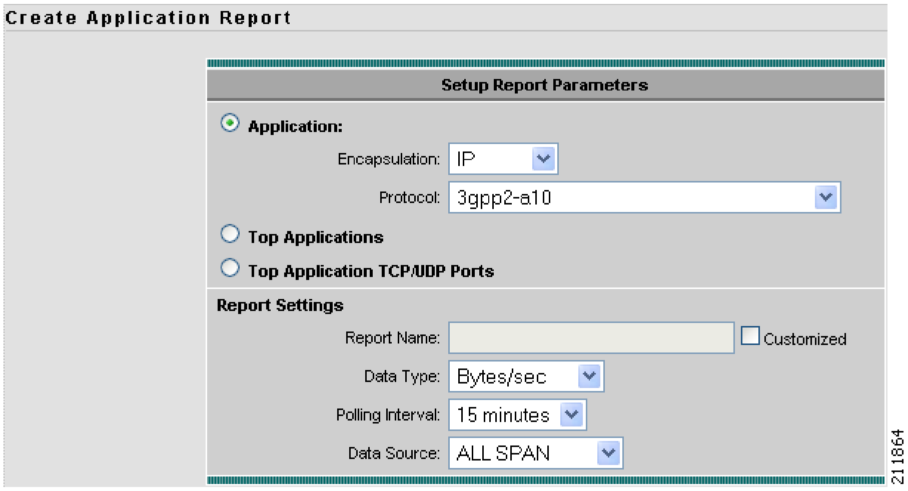
Step 2 Click **Create**.

The Create Basic Historical Report window displays as shown in Figure 5-3.

Step 3 Choose **Applications**, then click **Next**.

The Create Applications Report window displays as shown in Figure 5-4.

Figure 5-4 Create Application Report Window



Create Application Report

Setup Report Parameters

● Application:

Encapsulation: IP

Protocol: 3gpp2-a10

○ Top Applications

○ Top Application TCP/UDP Ports

Report Settings

Report Name: □ Customized

Data Type: Bytes/sec

Polling Interval: 15 minutes

Data Source: ALL SPAN

Table 5-2 describes the Applications report parameters.

Table 5-2 Applications Report Parameters

Field	Description	Usage Notes
Application	Application check box	Check Application (the default) to choose a specific application (Encapsulation and Protocol).
Encapsulation	Protocol encapsulation type	Choose an encapsulation from the list of IP, IPIP4, GRE.IP, IPv6, or Others.
Protocol	Name of the application protocol.	Choose a protocol from the list.
TopN Applications	Reports on most active application protocols based on bytes/second or packets/second	Check TopN Applications to create a report about the most active applications.
TopN Application TCP/UDP Ports	Reports on most active TCP and UDP ports based on bytes/second or packets/second	Check TopN Application TCP/UDP Ports to create a report about the most active TCP and UDP ports.
Report Settings		
Report Name	Name of the report.	The report name is generated automatically. To change the name of the report, select **Customized**, then enter the name.
Data Type	The type of data.	Choose a type from the list.
Polling Interval	The interval in which the report data will be polled	Choose an interval from the list.
Data Source	The network traffic source from which report data will be collected	Choose a source from the list.

Step 4 Enter the parameters required for an Applications report.

Step 5 Click **Finish**.

Creating an Application Groups Report

To create an Application Groups report:

Step 1 Choose **Reports** > **Basic Reports**.

The Basic Historical Reports window displays.

Step 2 Click **Create**.

The Create Basic Historical Report window as shown in Figure 5-3 displays.

Step 3 Choose Application Group type, then click **Next**.

The Create Application Group Report Parameters dialog box displays. Table 5-3 describes the Application Group report parameters.

Table 5-3 Application Group Report Parameters

Field	Description	Usage Notes
Application Group	Name of the application group.	
Report Name	Name of the report.	The report name is generated automatically. To change the name of the report, select **Customized**, then enter the name.
Data Type	The type of data.	Choose a type from the list.
Polling Interval	The interval in which the report data will be polled.	Choose an interval from the list.
Data Source	The network traffic source from which report data will be collected.	Choose a source from the list.

Step 4 Enter the required parameters required for an Application Group report.

Step 5 Click **Finish**.

Creating a Hosts Report

To create a Hosts report:

Step 1 Click **Reports** > **Basic Reports**.

The Basic Historical Reports window displays.

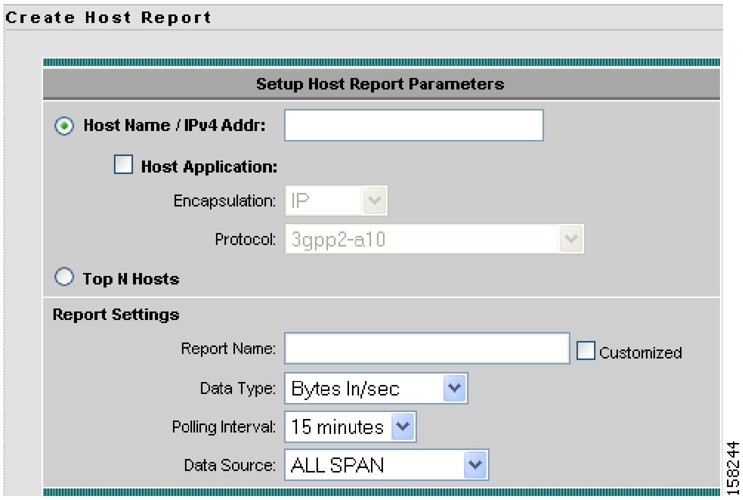
Step 2 Click **Create**.

The Create Basic Historical Report window displays as shown in Figure 5-3.

Step 3 Choose the Hosts report type, then click **Next**.

The Create Hosts Report window displays as shown in Figure 5-5.

Figure 5-5 Create Hosts Report Window



Create Host Report

Setup Host Report Parameters

● Host Name / IPv4 Addr:

□ Host Application:

Encapsulation: IP

Protocol: 3gpp2-a10

○ Top N Hosts

Report Settings

Report Name: □ Customized

Data Type: Bytes In/sec

Polling Interval: 15 minutes

Data Source: ALL SPAN

Table 5-4 describes the Hosts report parameters.

Table 5-4 Hosts Report Parameters Dialog Box

Field	Description	Usage Notes
Host Name or IP Address	The name of the host from which data is polled	Enter the host name or IP address of the host.
Host Application	Check to report on a specific application of the host	When checked, choose protocol and encapsulation type.
Encapsulation	Protocol encapsulation type	Choose an encapsulation from the list.
Protocol	Name of the application protocol	Choose a protocol from the list (optional).
TopN Hosts	Reports on most active host address based on bytes/second (in or out) or packets/second (in or out)	Check TopN Hosts to create a report about the most active hosts
Report Settings		
Report Name	Name of the report	The name of the report is generated generated. To change the name, click **Customized**, then enter the new name.
Data Type	The type of data	Choose a type from the list
Polling Interval	The interval in which the report data will be polled	Choose an interval from the list
Data Source	The network traffic source from which report data will be collected	Choose a source from the list

Step 4 Enter the parameters required for a Hosts report.

Step 5 Click **Finish**.

Creating a Conversations Report

To create a Conversations report:

Step 1 Click **Reports** > **Basic Reports**.

The Basic Historical Reports window displays.

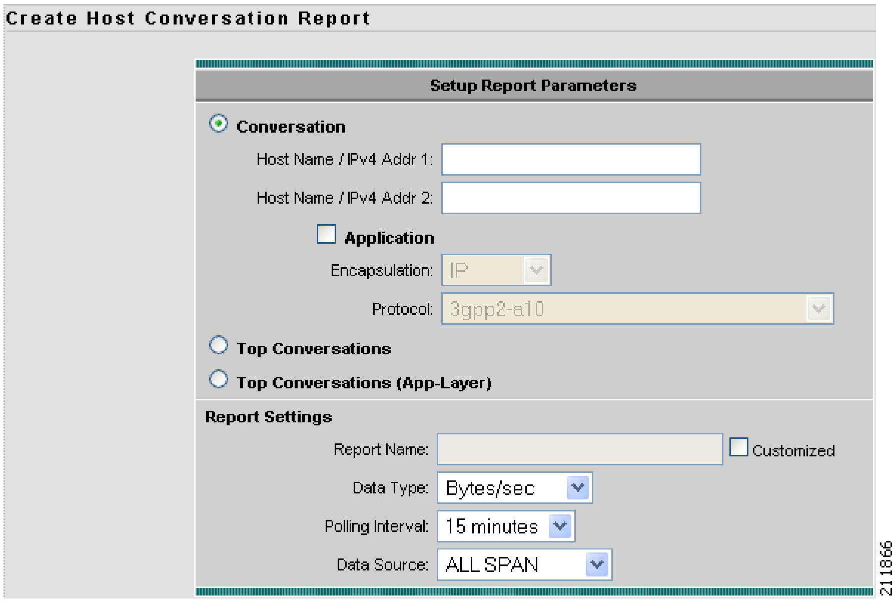
Step 2 Click **Create**.

The Create Basic Historical Report window displays as shown in Figure 5-3.

Step 3 Choose **Conversations**, then click **Next**.

The Create Host Conversation Report window displays as shown in Figure 5-6.

Figure 5-6 Create Host Conversation Report Window



Create Host Conversation Report

Setup Report Parameters

◉ Conversation

Host Name / IPv4 Addr 1:

Host Name / IPv4 Addr 2:

□ Application

Encapsulation: IP

Protocol: 3gpp2-a10

○ Top Conversations

○ Top Conversations (App-Layer)

Report Settings

Report Name: □ Customized

Data Type: Bytes/sec

Polling Interval: 15 minutes

Data Source: ALL SPAN

Table 5-5 describes the Conversations report parameters.

Table 5-5 Conversations Report Parameters

Field	Description	Usage Notes
Conversation	Conversation check box	Check Conversation (the default) to enter specific host names or IP addresses.
Host 1 and Host 2	The identification of the conversation hosts to be reported.	• Host 1—Enter the host name or IP address of host 1. • Host 2—Enter the host name or IP address of host 2.
Encapsulation	Protocol encapsulation type.	Choose an encapsulation from the list.
Protocol	Name of the application protocol.	Choose a protocol from the list.
TopN Conversations	TopN Conversations check box	Check TopN Conversations to create a report about the most active host conversations based on bytes/second or packets/second.

Table 5-5 Conversations Report Parameters (continued)

Field	Description	Usage Notes
Top Conversations (App-Layer)	Top Conversations (Application Layer) check box	Check Top Conversations (App-Layer) to create a report about the most active host conversations based on bytes/second or packets/second occurring in the application layer.
Report Settings		
Report Name	Name of the report.	The report name is automatically generated. To change the report name, click **Customized** and enter the name.
Data Type	The type of data.	Choose a type from the list.
Polling Interval	The interval in which the report data will be polled.	Choose an interval from the list.
Data Source	The network traffic source from which report data will be collected.	Choose a source from the list.

Step 4 Enter the parameters required for the Conversations report.

Step 5 Click **Finish**.

Creating a VLANs Report

Note This section is not applicable to NM-NAM or NME-NAM devices.

To create a VLAN report:

Step 1 Click **Reports** > **Basic Reports**.

The Basic Historical Reports window displays.

Step 2 Click **Create**.

The Create Basic Historical Report window displays as shown in Figure 5-3.

Step 3 Choose the VLAN report type, then click **Next**.

The Create VLAN Report Parameters dialog box displays. Table 5-6 describes the VLAN report parameters.

Note VLAN reports are not available for NetFlow data sources.

Table 5-6 VLAN Report Parameters

Field	Description	Usage Notes
VLAN Number	Name or number of the VLAN to be reported.	Enter the VLAN name or number.
Top N VLANs	Reports the top N VLANs.	Click to select the reporting of the top N VLANs.

Table 5-6 VLAN Report Parameters (continued)

Field	Description	Usage Notes
Report Name	Name of the report.	The report name is automatically generated. To change the report name, click **Customized** and enter the name.
Data Type	The type of data.	Choose a type from the list.
Polling Interval	The interval in which the report data will be polled.	Choose an interval from the list.
Data Source	The network traffic source from which report data will be collected.	Choose a source from the list. **Note** Supervisor engine module- based data sources require Supervisor II engine module or later.

Step 4 Enter the parameters required for a VLAN report.

Step 5 Click **Finish**.

Creating a DiffServ Report

To create a Differentiated Services (DiffServ) report:

Step 1 Click **Reports** > **Basic Reports**.

The Basic Historical Reports window displays.

Step 2 Click **Create**.

The Create Basic Historical Report window displays as shown in Figure 5-3.

Step 3 Choose the **DiffServ**, then click **Next**.

The Create DiffServ Report Parameters dialog box displays. Table 5-7 describes the DiffServ parameters.

Table 5-7 Differentiated Services Report Parameters

Field	Description	Usage Notes
DiffServ Information	The identification of the differentiated services (DiffServ) statistics to be reported.	• DiffServ Profile—Choose the name of the DiffServ profile. • Aggregation Group—Choose the aggregation group. • Encapsulation—If the Protocol checkbox is selected, select an encapsulation from the list. • Protocol—If the Protocol checkbox is selected, select a protocol from the list. • Host Name—If the Host checkbox is selected, enter the hostname or IP address of the host (optional).
Report Name	Name of the report.	The report name is automatically generated. To change the report name, click **Customized** and enter the name.
Data Type	The type of data.	Choose a type from the list.

Table 5-7 Differentiated Services Report Parameters

Field	Description	Usage Notes
Polling Interval	The interval in which the report data will be polled.	Choose an interval from the list.
Data Source	The network traffic source from which report data will be collected.	Choose a source from the list. **Note** NetFlow is not an available data source.

Step 4 Enter the parameters required for a DiffServ report.

Step 5 Click **Finish**.

Creating a Response Time Report

To create an Application Response Time report:

Step 1 Choose **Reports** > **Basic Reports**.

The Basic Historical Reports window displays.

Step 2 Click **Create**.

The Create Basic Historical Report window displays as shown in Figure 5-3.

Step 3 Choose **Response Time**, then click **Next**.

The Create Response Time Report Parameters dialog box displays. Table 5-8 describes the Response Time report parameters.

Table 5-8 Response Time Report Parameters

Field	Description	Usage Notes
Target	The identification of the application response time (ART) statistics to be reported.	• Encapsulation—Choose an encapsulation from the list. • Protocol—Choose a protocol from the list. • Server—Enter the name or IP address of the server. • Client—Enter the name or IP address of the client (optional).
Report Name	Name of the report.	The report name is automatically generated. To change the report name, click **Customized** and enter the name.
Data Type	The type of data.	Choose a data type from the list.
Polling Interval	The interval in which the report data will be polled.	Choose an interval from the list.
Data Source	The network traffic source from which report data will be collected.	Choose a source from the list. **Note** NetFlow is not an available data source.

Step 4 Enter the parameters required for an Application Response Time report.

Step 5 Click **Finish**.

Creating a Switch Port Report

Note This section also applies to the Cisco 2200 Series NAM appliances. Menu options for the NAM appliances would use Managed Device Port Report.

Note This section is not applicable to NM-NAM or NME-NAM devices.

To create a Switch Port Statistics report:

Step 1 Click **Reports** > **Basic Reports**.

The Basic Historical Reports window displays.

Step 2 Click **Create**.

The Create Basic Historical Report window displays as shown in Figure 5-3.

Step 3 Choose **Switch Port Statistics** or for the NAM appliance choose **Managed Device Port Statistics**, then click **Next**.

The Create Switch Port Statistics Report Parameters dialog box displays. Table 5-9 describes the Switch Port Statistics parameters.

Table 5-9 Switch Port Statistics Report Parameters Dialog Box

Field	Description	Usage Notes
Switch Module/Port	List of switch modules and the corresponding ports available on the module.	Choose a switch module and port to generate reports from.
Top N Ports	Reports the top N switch ports.	Click to select reporting of the top N ports. This requires mini-RMON to be enabled on the Supervisor engine module.
Report Name	Name of the report.	The report name is automatically generated. To change the report name, click **Customized** and enter the name.
Data Type	Type of data to be reported: • Bytes/sec • Packets/sec • Utilization % • Broadcast Bytes/sec • Multicast Bytes/sec • Drop Events/sec	Choose the data type from the list.
Polling Interval	The interval in which the report data will be polled.	Choose an interval from the list.

Step 4 Enter the parameters required for the Switch Port Statistics report.

Step 5 Click **Finish**.

Creating a Switch Health Report

Note This section also applies to the Cisco 2200 Series NAM appliances. Menu options for the NAM appliances would use Managed Device Health Report.

Note This section is not applicable to NM-NAM or NME-NAM devices.

A Switch Health report is a historical report about the switch health statistics. To create a Switch Health report:

Step 1 Click **Reports** > **Basic Reports**.

The Basic Historical Reports window displays.

Step 2 Click **Create**.

The Create Basic Historical Report window displays as shown in Figure 5-3.

Step 3 Choose **Switch Health** or for the NAM appliance choose **Managed Device Health**, then click **Next**.

The Create Switch Statistics Report Parameters dialog box displays. Table 5-10 describes the Switch Health report parameters.

Table 5-10 Switch Statistics Report Parameters Dialog Box

Field	Description	Usage Notes
Component	Component upon which to report	Choose from Switch DRAM Memory, Switch Backplane, Switching CPU, or Routing CPU.
Report Name	Name of the report	The report name is automatically generated. To change the report name, click **Customized** and enter the name.
Data Type	Type of data to be reported	Utilization percentage of the selected component.
Polling Interval	The interval in which the report data will be polled.	Choose an interval from the list.

Step 4 Enter the parameters required for a Switch Statistics report.

Step 5 Click **Finish**.

Creating a Router Interface Report

Note This section is only applicable to NM-NAM or NME-NAM devices.

A router interface report contains a history of a router's interface statistics. To create an Router Interface report:

Step 1 Click **Reports** > **Basic Reports**.

The Basic Historical Reports window displays.

Step 2 Click **Create**.

The Create Basic Historical Report window displays as shown in Figure 5-3.

Step 3 Choose **Router Interfaces**, then click **Next**.

The Create Interface Stats Report Parameters dialog box displays. Table 5-11 describes the Router Interfaces report parameters.

Table 5-11 Router Interfaces Report Parameters

Field	Description	Usage Notes
Interface	List of interfaces	Choose an interface to generate reports from.
Top N Interfaces	Reports the top N interfaces	Click to select reporting of the top N interfaces.
Report Name	Name of the report	The report name is automatically generated. To change the report name, click **Customized** and enter the name.
Data Type	Type of data to be reported	Choose the data type from the list: Bytes/sec, Packets/sec, Non-unicasts Packets/sec, Discarded Packets/sec, Error Packets/sec, Utilization
Polling Interval	Interval in which the report data will be polled	Choose an interval from the list.

Step 4 Enter the parameters required to create a Router Interfaces report.

Step 5 Click **Finish**.

Creating a Router Health Report

Note This section applies only to NM-NAM or NME-NAM devices.

A Router Health report is a historical report about the router health statistics. To create a Router Health report:

Step 1 Click **Reports** > **Basic Reports**.

The Basic Historical Reports window displays.

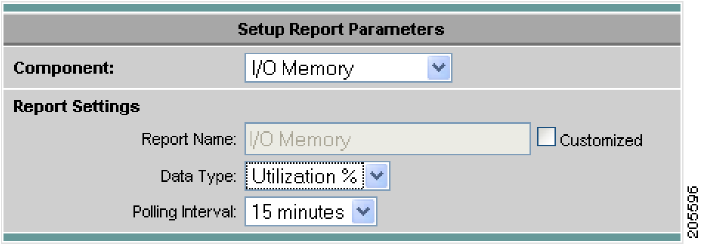
Step 2 Click **Create**.

The Create Basic Historical Report window displays as shown in Figure 5-7.

Step 3 Choose **Router Health**, then click **Next**.

The Setup Router Health Report Parameters dialog box displays. Table 5-12 describes the Router Health Report parameters.

Figure 5-7 Set Up Router Health Report Parameters



Setup Report Parameters

Component: I/O Memory

Report Settings

Report Name: I/O Memory ☐ Customized

Data Type: Utilization %

Polling Interval: 15 minutes

Table 5-12 Router Statistics Report Parameters Dialog Box

Field	Description	Usage Notes
Component	Component upon which to report	Choose from Routing CPU, Processor Memory, or I/O Memory.
Report Settings		
Report Name	Name of the report	The report name is automatically generated. To change the report name, click **Customized** and enter the name.
Data Type	Utilization %	Utilization percentage of the selected component.
Polling Interval	The interval in which the report data will be polled.	Choose an interval from the list.

Step 4 Enter the parameters required for a Switch Statistics report.

Step 5 Click **Finish**.

Creating an MPLS Stats Report

Note This section is not applicable to NM-NAM or NME-NAM devices.

An MPLS report contains a collection of MPLS data. You can set up a report about a specific MPLS tag. To create an MPLS report:

Step 1 Click **Reports** > **Basic Reports**.

The Basic Historical Reports window displays.

Step 2 Click **Create**.

The Create Basic Historical Report window displays as shown in Figure 5-3.

Step 3 Choose **MPLS Stats**, then click **Next**.

The Create MPLS Report Parameters dialog box displays. Table 5-13 describes the MPLS Report Parameters dialog box.

Table 5-13 MPLS Stats Report Parameters

Field	Description	Usage Notes
MPLS Type	Specific MPLS type	Selects one of VRF, VC, Label, or All Labels; this selects the MPLS data source type.
Name	Name of the MPLS data source	Selects the MPLS data source (if defined) for one of the selected MPLS types.
Top N MPLS	System-wide Top N report	Selects the system-wide Top N report for one of the selected MPLS types.
Report Settings		
Report Name	Name of the report.	Choose one of the following: Bytes/sec (default), Packets/sec, Non-unicast Bytes/sec, or Non-unicast Packets/sec
Data Type	Type of data	Choose one of the following: 5 minutes (default), 15 minutes, 30 minutes, 1 hour, 2 hours, 4 hours, or 8 hours
Customized		
Polling Interval	The network traffic source from which the report data will be collected.	Choose one of the following: 1 minute, 5 minutes, 15 minutes, 30 minutes, 1 hour, 2 hours, 4 hours, or 8 hours.

Step 4 Enter the parameters required for an MPLS report.

Step 5 Click **Finish**.

Creating a Voice Over IP/RTP Stream Report

You can configure the NAM to create a report for a specific VOIP phone or to gather report data for the following:

- Worst phones
- Worst calls
- Call Volume
- Top RTP Streams

To create a VOIP/RTP Streams report:

Step 1 Choose **Reports** > **Basic Reports**.

The Basic Historical Reports window displays.

Step 2 Click **Create**.

The Create Basic Historical Report window displays as shown in Figure 5-3.

Step 3 From the pull-down menu, choose VOIP/RTP Stats.

The Setup Report Parameters window displays as shown in Figure 5-8, Setup VOIP Report Parameters.

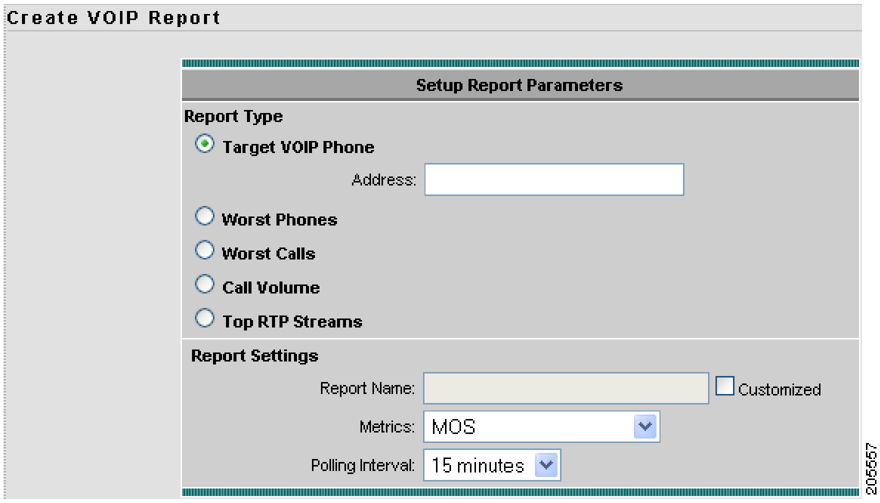
Step 4 Click a radio button to choose the type of report to create.

Table 5-14, VOIP Report Types, describes the different types of reports you can create.

Table 5-14 VOIP Report Types

Report Type	Description
Target VOIP Phone	Enter the IP address of a specific phone to generate a report based on the Metrics and polling interval.
Worst Phones	Creates a report of the worst quality phones based on the Metrics and polling interval.
Worst Calls	Creates a report of the worst quality calls based on the Metrics and polling interval.
Call Volume	Creates a report of total call volume.
Top RTP Streams	Creates a report of Top N RTP Streams based on chosen metrics.

Figure 5-8 Setup VOIP Report Parameters



Create VOIP Report

Setup Report Parameters

Report Type

● Target VOIP Phone

Address:

○ Worst Phones

○ Worst Calls

○ Call Volume

○ Top RTP Streams

Report Settings

Report Name: □ Customized

Metrics: MOS

Polling Interval: 15 minutes

Step 5 Under Report Settings, enter a name for the report.

Step 6 Use the pull-down menu to choose the Metrics upon which to base the report.

MOS	Mean opinion score is a number from 1 to 5 where the higher number indicates better quality.
Jitter	Delay and delay variation of a call stream
Adjusted Packet Loss	Adjusted percentage of packets lost
Actual Packet Loss	Actual percentage of packets lost
SSC	Seconds of severe concealment
SOC	Seconds of concealment

Step 7 Use the pull-down menu to choose the Polling Interval upon which to base the report.

The Polling Interval determines how often the metrics for the chosen report type are collected. The Polling Interval can be from one minute to eight hours; the default Polling Interval is 15 minutes.

Step 8 Click **Finish**.

After clicking Finish, the report is added to the list of Basic Reports.

Step 9 Click to choose the report, then click **Enable** to begin gathering data for the report.

Viewing Basic Reports

Report data is stored in the NAM database for 100 days. Report data older than 100 days is overwritten sequentially by new report data.

To view a basic report, click **Reports** > **Basic Reports**.

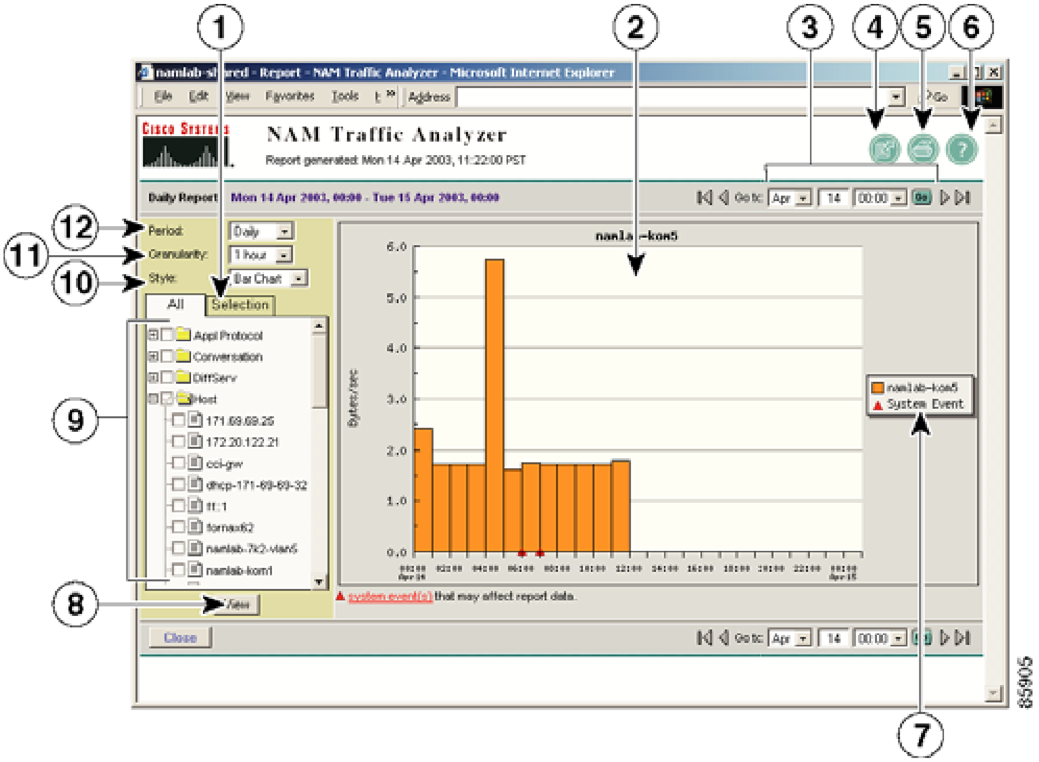
The Basic Reports Window displays and lists all basic reports that have been set up for data collection as shown in Figure 5-2.

Viewing Report Details

To view the details of a report, click the report name in the Basic Reports window, or select report and click **View**.

Figure 5-9 shows an example of an Application report window.

Figure 5-9 Viewing Report Details



namlab-shared - Report - NAM Traffic Analyzer - Microsoft Internet Explorer

NAM Traffic Analyzer

Report generated: Mon 14 Apr 2003, 11:22:00 PST

Daily Report Mon 14 Apr 2003, 00:00 - Tue 15 Apr 2003, 00:00

Period: Daily

Granularity: 1 hour

Style: Bar Chart

▸ system event(s) that may affect report data.

1	Displays the selected reports.	**7**	Name of the report.
2	Report graph.	**8**	Click to view the selected reports.
3	Navigated between time periods.	**9**	Choose the target reports to be displayed.
4	Downloads the report to a file.	**10**	Style of the graph.
5	Prints the report.	**11**	Granularity of the report.
6	Launches the online help.	**12**	Length of the report time period.

You can select multiple target reports and display them all in the same graph. If you select multiple reports with different units, they will be displayed as subreports in the report graph area.

Note You can select only one Top N report.

You can view generated reports as tables or graphs. Tables provide exact values, while graphs show bars, area, or line charts with differing orders of magnitude. It is often difficult to determine the actual value of shorter bar graphs when the bar values differ by several orders of magnitude. Smaller bars might not be visible, and zero values are not visible using the bar or area style. Zero values are only apparent in tables and in line charts.

Report granularity cannot exceed the polling frequency of the report. For example, a report with a 15-minute polling interval cannot be displayed with a 5-minute granularity. If you select a report granularity lower than the polling frequency, the report data will be aggregated accordingly.

A red exclamation mark will be displayed in the report selector for disabled reports and reports with error conditions. For more information on reports with error conditions, see Table 5-15, Report Error Conditions. Also see Table 5-16, Last Status Conditions, for a complete list status conditions and what they mean.

Table 5-15 Report Error Conditions

Error Condition	Description
Not Started	The report has not been created and data collection has not been started for this time period.
Data Pending	Data for the current period is being collected.
No Data	No data was collected for this period. This can be due to: • Report is disabled. • NAM is not running. • Report Data Collection task is not running.
Blank data	No traffic to display during selected period.
No Activity	The NAM does not detect any traffic activity for this target. This can be caused by an inactive target or a data source configuration problem. The NAM does not detect any traffic activity for this target. This might be caused by an inactive target or a data source configuration problem. However for certain monitoring metrics when the system is missing data on errors, special conditions, and similar measurements, the status *No Activity* is substituted by a more appropriate term such as *No Drops Stats* or *No Concealment Stats*. This means there was no information on drops or concealment, but does not imply there was no normal activity during the reported period.
Not Monitored	The monitoring function for this type of traffic statistic is not enabled or is not available for the NAM and/or switch.
Data Expired	Indicates that the data is more than 100 days old and no longer be available; NAM stores historical data for up to 100 days.

Viewing the System Event Log

System events that affect report data collection and are displayed as red triangles in the Reports Window. Events that are logged include system restarts, SPAN changes and the enabling, disabling, creating, editing, and deleting of reports.

To view the System Events Log, click **system events**. The System Config Log is displayed with the system configuration event, the time of the event and the user. The events that are displayed correspond to the report period. For example, if you are viewing a weekly report, the System Config Log will display events that occurred during the week.

Tip

- Move the mouse cursor over the report name in the report selector to see more information about the report.
- Use the tabular report style to view numeric data and information about the errors or exception conditions related to the report data collection.

Enabling Reports

Enable a report to activate the background process that polls the data for the report. You can enable reports directly from the Basic Reports window. To enable a report, choose a report from those listed, then click **Enable**. When a report is enabled, it continues to run until it is disabled.

Note Reports in the Basic Reports table are enabled by default. In other words.

After you enable a report, you can check the status of the report in the right-most column on the **Reports** > **Basic Reports** window. Table 5-16 provides status definitions of the conditions you might see under the Last Status column.

Table 5-16 Last Status Conditions

Condition	Description
OK	Report is enabled and collecting data
Disabled	Report is not enabled and no data is being collected
Pending	Data for the current period is being collected but is not yet displayed.
Inactive Data Source	Report is enabled, but the data source for which this report is configured is in either the inactive or disabled state.
No Data	No data was collected for this period. This can be due to: • Report is disabled • NAM is not running • Report Data Collection task is not running
Not Monitored	The monitoring function for this type of traffic statistic is not enabled or is not available for the NAM and/or switch.
Data Expired	Indicates that the data is more than 100 days old and no longer be available; NAM stores historical data for up to 100 days.
Counter Reset	Indicates that the data collection was reset by the monitoring daemon.
Data Error	Indicates an internal error with NAM reporting
No Activity	No Activity—The NAM does not detect any traffic activity for this target. This might be caused by an inactive target or a data source configuration problem. However for certain monitoring metrics when the system is missing data on errors, special conditions, and similar measurements, the status *No Activity* is substituted by a more appropriate term such as *No Drops Stats* or *No Concealment Stats*. This means there was no information on drops or concealment, but does not imply there was no normal activity during the reported period. **Note** If no data was collected, a time stamp displays the last collection.
No Retries Stats	Indicates that traffic is normal and there are no *retry* statistics to be reported for *ART retries* and *retries* bytes.
No Timeouts	Indicates that traffic is normal and there are no *ART timeout* statistics to be reported.

Table 5-16 Last Status Conditions (continued)

Condition	Description
No Outage Stats	Indicates that traffic is normal and there are no *outage* statistics to be reported ART refused sessions, unresponsive connections, and VOIP MOS-based and jitter-based metrics reports.
No Utilization Stats	Indicates that traffic is normal and there are no *retry* statistics to be reported for ART retries.
No Drops Stats	Indicates that traffic is normal and there are no *drop* statistics to be reported. No packets were dropped for any of the chassis ports.
No Packet Loss Stats	Indicates that traffic is normal and there are no actual packet loss or adjusted packet loss statistics to be reported for VOIP.
No Concealment Stats	Indicates that traffic is normal and there are no *concealment* statistics to be reported for VOIP seconds of concealment (SOC) and severe seconds of concealment (SSC).

Disabling Reports

Disable a report to suspend the background process that polls the data for the report. You can still view the data collected previously, but no new data are added to the database. You can disable reports directly from the Basic Reports window. To disable a report, select the report from those listed, then click **Disable**.

Renaming a Report

Step 1 Choose a report from the Basic Reports window and click **Rename**.

A text window appears.

Step 2 Enter the new name of the report and do one of the following:

- To accept the changes, click **OK**.
- To delete the changes and return to the Basic Reports table, click **Cancel**.

Deleting a Report

To delete a report, select the report from the Basic Reports window and click **Delete**.

Custom Reports

After you create reports in the Basic Reports table, you can combine and customize them. The following sections describe how to manage your custom reports:

- Creating a Custom Report, page 5-25.
- Editing a Custom Report, page 5-26.

- Deleting a Custom Report, page 5-26.
- Viewing a Custom Report, page 5-26.

Creating a Custom Report

To create a custom report:

Step 1 Choose **Reports** > **Custom Reports**.

The Custom Reports table displays.

Step 2 Click **Create**.

The Create Custom Report Dialog Box (Table 5-17) displays.

Table 5-17 Create Custom Report Dialog Box

Field	Usage Note
Report Name	Enter the name of the custom report
Folder	Choose the folder you want the report to be in.
Period	Choose the length of the report time period.
Granularity	Choose the date granularity of the report.
Style	Choose the style of the graph.
Report Data	Choose the basic reports to include in the custom report. You can select multiple target data report types, but you can only include one TopN report type in a custom report. To view all of your selected reports, click the Selection tab.

Step 3 Do one of the following:

- To accept the changes, click **Submit**.
- To clear the changes, click **Reset**.

Creating a New Folder

You can create a new folder directly from the Custom Reports table to store additional custom reports.

Step 1 Click **New Folder**.

A text box appears.

Step 2 Enter the name of the folder, then click **OK**.

The new folder appears in the Custom Reports table.

Editing a Custom Report

To edit a custom report:

Step 1 Choose **Reports** > **Custom Reports**.

The Custom Reports table displays.

Step 2 Choose the custom report to edit, then click **Edit**.

The Edit Custom Reports dialog box displays.

Step 3 Make the necessary changes, then do one of the following:

- To accept the changes, click **Submit**.
- To leave the configuration unchanged, click **Reset**.

Deleting a Custom Report

To delete a custom report, select it in the Custom Report window, then click **Delete**.

Viewing a Custom Report

To view a custom report:

Step 1 Choose **Reports** > **Custom Reports**.

The Custom Reports window displays.

Step 2 Choose the custom report to view, then click **View**.

The Viewing Report Details (Figure 5-9)displays.

Moving a Custom Report to a Different Folder

To move a custom report to a different folder:

Step 1 Click **Reports** > **Custom Reports**.

The Custom Reports window displays.

Step 2 Choose the custom report to edit, then click **Edit**.

The Edit Custom Reports dialog box displays.

Step 3 Choose a new folder from the Folder drop-down list and click **Submit**.

Scheduled Exports

The Scheduled Exports option enables you to schedule a report to be generated automatically and to be exported at a specific time. The format of the report can be PDF, HTML, CSV, or XML. The NAM transmits the HTML reports by Email. The other formats can be transmitted by EMail or FTP.

Scheduling a Report Export

To schedule a report export:

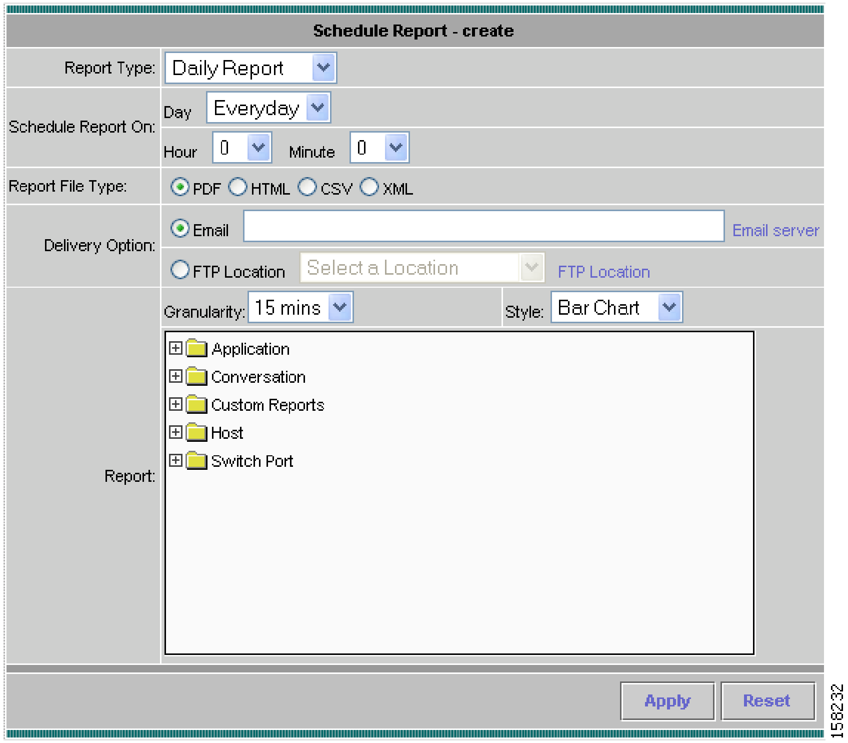
Step 1 To schedule a report export, you must first create a basic or customized report.

See either section Basic Reports, page 5-2, or section Custom Reports, page 5-24 for information about creating a report.

Step 2 Click **Reports** > **Scheduled Exports**.

The Scheduled Exports window displays. Figure 5-10 shows an example of the Scheduled Export window.

Figure 5-10 Create Scheduled Exports



Schedule Report - create

Report Type: Daily Report

Schedule Report On: Day Everyday
Hour 0 Minute 0

Report File Type: ● PDF ○ HTML ○ CSV ○ XML

Delivery Option: ● Email Email server
○ FTP Location Select a Location FTP Location

Granularity: 15 mins Style: Bar Chart

Report:
- ⊞ Application
- ⊞ Conversation
- ⊞ Custom Reports
- ⊞ Host
- ⊞ Switch Port

Table 5-18, Scheduled Exports Window Options, describes the Scheduled Exports options available.

Table 5-18 Scheduled Exports Window Options

Field	Description	Usage Notes
Report Type	Type of report	Choose an option from among Daily, Weekly, or Monthly
Schedule Report On	Day and time to export report	Choose an option from the list and enter the time (hour and minute) to export the report: • Daily—Report is exported every day • Weekly—Choose a day of the week to export the report • Monthly—Choose a day of the month to export the report; choose a specific date or choose the first or last day of the month.
Report File Type	File format of exported report	You can export report in one of four formats: PDF, HTML, CSV, or XML.
Delivery Option	Method of report delivery	Choose EMail and provide one or more valid EMail addresses separated by a space. **Note** You might schedule different reports to go to different individuals. Choose FTP Location and choose a location from those in the drop-down list. See section FTP Configuration, page 2-16, for information about configuring the FTP delivery option.
Granularity	Frequency of report	Choose an option from among 15 minutes, 30 minutes, 1 hour, 4 hours, 8 hours, 12 hours, or 1 day. Granularity specifies the frequency of the data points to be showed in the report. For example a daily report can have 24 hourly data points or 96 15-minute data points. The later will have more granularity.
Style	Output style of report	Choose from among Bar Chart, Stack Bar, Line Chart, Area Chart, or Tabular.
Report	Folders with configured reports	Each folder contains reports that have been configured and can be exported.

Step 3 Choose the Report Type from the options in the list.

Step 4 Choose the day on which to export the report.

This option depends on the Report Type you select. If you select Daily Report, the default (and only option) is Every Day. For a Weekly Report, select the day of the week on which to run the report. For a Monthly Report, select the date on which to run the report.

Step 5 Enter the hour and minute for the time you want to export the report.

Step 6 Choose the Report File Type.

Step 7 Click to choose a Delivery Option for the report export, then enter the Email address or choose the FTP Location.

Step 8 Choose the Granularity and Report style.

Step 9 After specifying Scheduled Export parameters, click **Apply** to commit the scheduled export, or click **Reset** to abandon the scheduled export.

Editing a Report Export

After you schedule a report to be exported, you can modify its configuration. To edit a report export:

Step 1 Choose **Reports** > **Scheduled Export**s.

The Schedule Export window displays.

Step 2 Choose a report from those listed by clicking its check box, then click **Edit**.

The selected Scheduled Export - edit window displays and lists the current configuration for that report.

Step 3 Make any changes to the report export and click **Apply**, or click **Reset** to cancel your changes.

See Table 5-18, Scheduled Exports Window Options, for information about the configuration options.

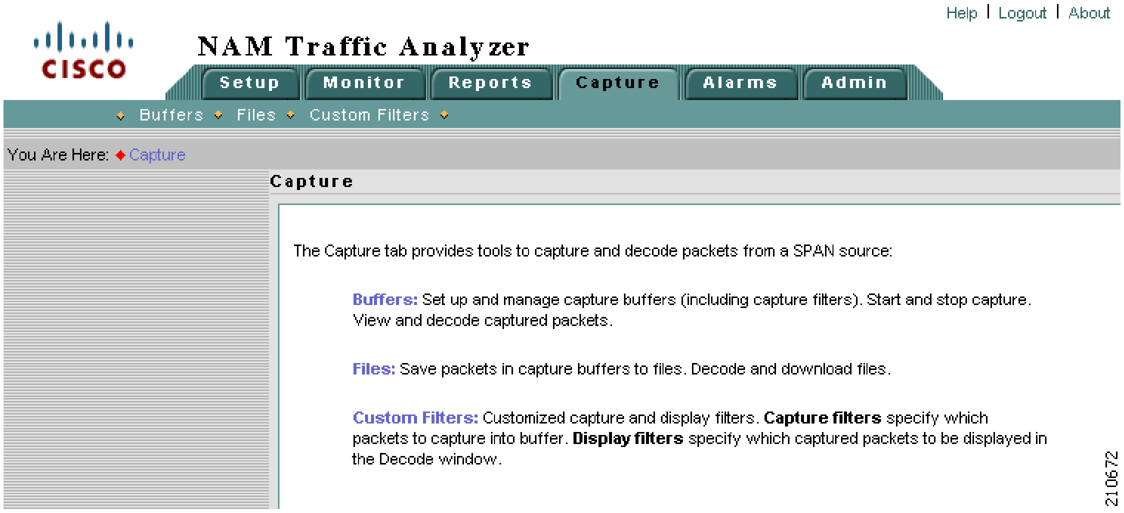
CHAPTER 6

Capturing and Decoding Packet Data

The Capture tab allows you to set up multiple buffers for capturing, filtering, and decoding packet data, manage the data in a file control system, and display the contents of the packets.

The Capture Tab (Figure 6-1) shows the options available for capturing and decoding packet data.

Figure 6-1 Capture Tab



The Capture tab provides tools to capture and decode packets from a SPAN source:

Buffers: Set up and manage capture buffers (including capture filters). Start and stop capture. View and decode captured packets.

Files: Save packets in capture buffers to files. Decode and download files.

Custom Filters: Customized capture and display filters. **Capture filters** specify which packets to capture into buffer. **Display filters** specify which captured packets to be displayed in the Decode window.

From the Capture tab, you can select three options:

- Buffers, page 6-2

  Use the Buffers option to access the basic operations for capturing, viewing and decoding packet data on the NAM.
- Files, page 6-14

  Use the Files option to save, decode, or download files.
- Custom Capture Filters, page 6-19

  Use the Custom Filters option to create customized capture and display filters.

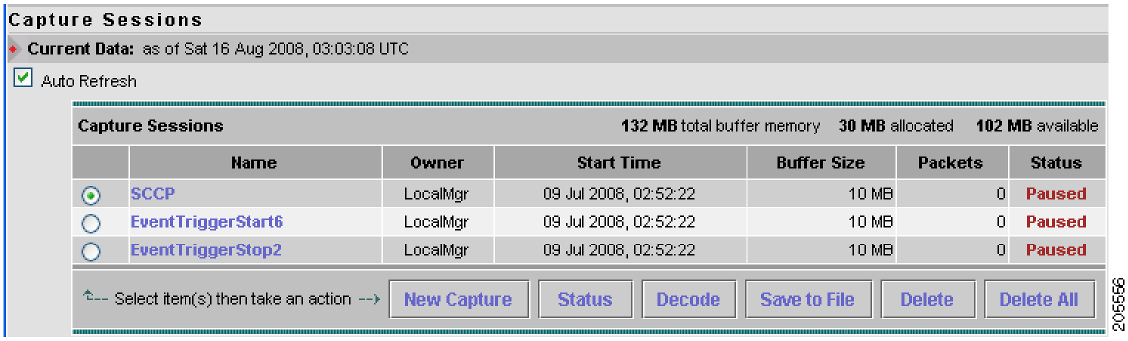
Note NAM 4.0 supports IPv6 for all capture functionality.

Buffers

The Capture Buffers (Figure 6-2) window shows the list of capture buffers. You can configure multiple capture buffers and multiple automatic capture buffers.

Note If you check the Auto Refresh check box, the Capture Buffers window refreshes automatically every 60 seconds.

Figure 6-2 Capture Buffers



Capture Sessions

Current Data: as of Sat 16 Aug 2008, 03:03:08 UTC

☑ Auto Refresh

Capture Sessions 132 MB total buffer memory 30 MB allocated 102 MB available

	Name	Owner	Start Time	Buffer Size	Packets	Status
●	SCCP	LocalMgr	09 Jul 2008, 02:52:22	10 MB	0	Paused
○	EventTriggerStart6	LocalMgr	09 Jul 2008, 02:52:22	10 MB	0	Paused
○	EventTriggerStop2	LocalMgr	09 Jul 2008, 02:52:22	10 MB	0	Paused

Capture Buffer Fields, Table 6-1, describes the Capture Buffers fields.

Table 6-1 Capture Buffer Fields

Operation	Description
Name	Name of the capture buffer
Owner	Owner of the buffer
Start Time	Time capture starts
Buffer Size	Size of the buffer **Note** *Capture to files* indicates the capture is being stored in one or more files and is a clickable link to those files.
Packets	Number of packets
Status	The current status of the capture: • Running—Packet capture is in progress • Paused—Packet capture is paused. Captured packets remain in buffer, but no new packets are captured • Cleared—Capture is stopped (by user) and capture buffer is cleared • Locked—Capture is locked (stopped) because the buffer is full

Capture Buffer Operations (Table 6-2) describes the operations that you can perform from the Capture Buffers window.

Table 6-2 Capture Buffer Operations

Operation	Description
New Capture	Click to create a new capture buffer. See Configuring Capture Settings.
Status	Click to display status and settings of selected capture.
Decode	Click to view decoded packets. See Viewing Packet Decode Information.
Save to File	Click to save a buffer to a file on the NAM hard disk. See Files.
Delete	Click to delete a buffer.
Delete All	Click to delete all buffers.

Configuring Capture Settings

The Capture Settings window enables you to configure the settings for a new capture and control the capture process. You can also configure capture filters to narrow down the packets to be captured.

To configure a new capture buffer:

Step 1 Go to the **Capture** > **Buffers** window.

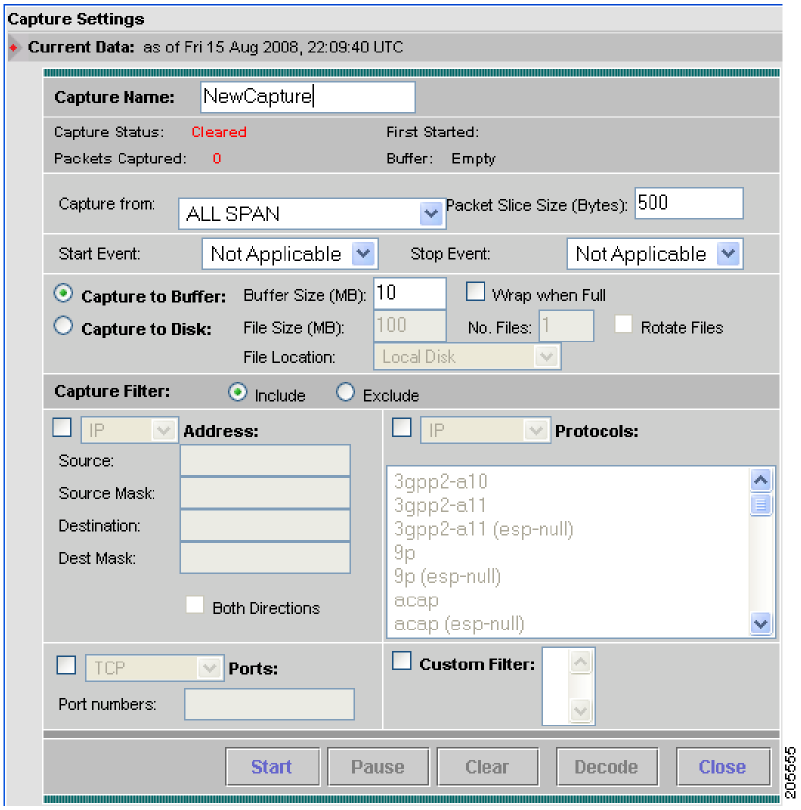
Step 2 Choose **New Capture** to set up a new capture, or choose an existing buffer and click **Status** to modify, pause, clear, or restart capture settings.

The NAM Traffic Analyzer displays the Capture Settings (Figure 6-3) window. The Capture Settings window provides a field for you to enter a name for the capture and four status indicators described in Table 6-3.

Table 6-3 Capture Settings Status Indicators

Status Indicator	Description
Capture Status	The current status of the capture: • Running—Packet capture is in progress. • Paused—Packet capture is paused. Captured packets remain in buffer, but no new packets are captured. • Cleared—Capture is stopped (by user) and capture buffer is cleared. • Locked—Capture is locked because the buffer is full.
Packets Captured	The number of packets captured and stored in the capture buffer. **Note** When the capture buffer is full and capture is in wrap-when-full mode, the number of packets captured may fluctuate as new packets arrive and old packets are discarded from the buffer.
First Started	Shows when the current capture started. You can pause and restart the capture as many times as necessary. If you stop the capture and start a new capture, this field shows the start time of the *new* capture.
Buffer	Current buffer or file state—Empty, Space Available, Full (Wrap), or Full (Locked).

Figure 6-3 ***Capture Settings***



Capture Settings

Current Data: as of Fri 15 Aug 2008, 22:09:40 UTC

Capture Name: NewCapture

Capture Status: Cleared   First Started:

Packets Captured: 0   Buffer: Empty

Capture from: ALL SPAN   Packet Slice Size (Bytes): 500

Start Event: Not Applicable   Stop Event: Not Applicable

● **Capture to Buffer:** Buffer Size (MB): 10   □ Wrap when Full

○ **Capture to Disk:** File Size (MB): 100   No. Files: 1   □ Rotate Files

File Location: Local Disk

Capture Filter: ● Include ○ Exclude

□ IP **Address:**

Source:

Source Mask:

Destination:

Dest Mask:

□ Both Directions

□ IP **Protocols:**

3gpp2-a10
3gpp2-a11
3gpp2-a11 (esp-null)
9p
9p (esp-null)
acap
acap (esp-null)

□ TCP **Ports:**

Port numbers:

□ **Custom Filter:**

Step 3 Enter information in the Capture Settings Fields (Table 6-4) as appropriate.

Table 6-4 ***Capture Settings Fields***

Field	Description	Usage Notes
Capture Name	Name of the capture	Enter a capture name.
Capture from	Data source from which to capture packets	Choose an entry from the list.
Start Event	Alarm event that starts the capture	You can configure Alarm Events from the **Setup** > **Alarms** > **Alarm Event** window. When an alarm event theshold is crossed, the alarm event starts or stops the capture session. **Note** When a capture is configured to start with a Start Event, the capture session waits in the *Paused* state until the Start Event occurs.
Stop Event	Alarm event that stops the capture	
Packet Slice Size	The slice size in bytes; used to limit the size of the captured packets.	Enter a value of 64 or higher. Enter zero (0) to not perform slicing. If you have a small buffer but want to capture as many packets as possible, use a small slice size. If the packet size is larger than the specified slice size, the packet is *sliced* before it is saved in the capture buffer. For example, if the packet is 1000 bytes and slice size is 200 bytes, only the first 200 bytes of the packet is stored in the capture buffer.

Table 6-4 Capture Settings Fields (continued)

Field	Description	Usage Notes
Capture to Buffer	Check to store captures in buffers	Enter values for **Buffer Size** and **Wrap when Full**.
Buffer Size	Size of the capture buffer in MB.	Enter a number from 1 up to your platform maximum. If system memory is low, the actual buffer size allocated might be less than the number specified here. After starting the capture, this field shows the actual buffer size allocated. NAM devices have the following buffer sizes: NAM-1-250S — 200 MB NAM-1 — 125 MB with memory upgrade (MEM-C6KNAM-2GB) — 200 MB NAM-2-250S — 500 MB NAM-2 — 300 MB with memory upgrade (MEM-C6KNAM-2GB) — 500 MB NAM 2220 — 10 GB NAM 2204 — 2 GB NME-NAM-80S — 132 MB NME-NAM-120S — 300 MB NM-NAM — 70 MB
Wrap when Full	Check to wrap data in buffer when it exceeds buffer size	Check **Wrap when Full** to enable continuous capture. **Note** When the buffer is full, older packet data is removed to make room for new incoming packets.
Capture to Disk	Check to store captures in files	Enter values for **File Size** and **No. Files**. **Note** About 400MB of free disk space is reserved for working files. If available disk space is below 400MB, you will not be able to start new capture-to-disk sessions.
File Size (MB)	Maximum size of each capture file	File size can be from 1 to 2 GB or up to 10 GB for the NAM appliances.
File Location	Choose an option from the pull-down menu.	Local disk is the default, or choose a previously configured remote storage location. You can add (NFS and iSCSI) remote storage locations by clicking **Admin** > **System** and choosing Capture Data Storage from the Content menu.
No. Files	Number of files to use for continuous capture	Number of files can be from 1 to 200.
Rotate Files	Check to rotate files in continuous capture	Available only for remote storage or NAM 2200 Series appliances See section Capture Data Storage, page 2-17, for information about configuring remote storage.
Capture Filter: Include		Include filters capture only packets that match the filter conditions (recommended)
Capture Filter: Exclude		Exclude filters capture packets that *exclude* the filter conditions (recommended)

Step 4 If capturing to buffers, check **Capture to Buffer**, enter MB size in **Buffer Size**, and check **Wrap when Full** if you want to continuously capture most recent data.

This type of capture stores packet data up to the size you set in Buffer Size. If you do not check **Wrap when Full**, capture will end when amount of data reaches size of buffer.

Step 5 If capturing to files, check **Capture to File(s)**, and enter values in **File Size** and **No. Files**.

When capturing to multiple files, a suffix is added to the file name. For example, the first file for a capture named **CaptureA** would be labeled as **CaptureA_1** the second **CaptureA_2**, and so on.

Step 6 If capturing to files, check **Rotate Files** to continuously capture the most recent packet data.

The Rotate Files option can only be used with remote storage or the NAM 2200 Series appliance’s local disk. See the section Capture Data Storage, page 2-17, for information about configuring remote storage.

Note If you choose the **Rotate Files** option, when you reach the highest number file, the earliest file is overwritten. For example, if you specify **No. Files** to 10, file **CaptureA_1** is overwritten after the NAM writes capture data to file **CaptureA_10**. To determine the most recent capture, check each file’s timestamp.

Step 7 In the Capture Filter pane, check Include or Exclude.

Include filters capture only packets that match the filter conditions. Exclude captures packets that *exclude* the filter conditions.

Step 8 Choose one of the following check boxes to enable the applicable filter types:

- **Address** to filter traffic based on a type of IP, IPIP4, IPv6, GRE.IP, or MAC address. (See the “Capturing Using an Address Filter” section on page 6-7.)
- **Protocols** to filter traffic based on specific protocols. (See the “Capturing Using a Protocol Filter” section on page 6-9.)
- **Ports** to use a port filter. (see the “Capturing Using a Port Filter” section on page 6-9.)
- **Custom Filter** to use a customized filter. (See the “Capturing Using a Custom Filter” section on page 6-9.)

  For more information on creating and editing a custom capture filter, see the “Custom Capture Filters” section on page 6-19.

Step 9 Choose one of the operations listed in Table 6-5, Capture Settings Operations.

Table 6-5 Capture Settings Operations

Operation	Description
Start	Click to start a capture operation.
Pause	Click to pause a capture operation. Capture data remains in the capture buffer, but no new data is stored. Click Start to resume the capture.
Clear	Click to stop a capture and clear the capture buffer. You must clear the capture buffer before you change capture settings.
Decode	Click to display the capture buffer. (This could take a few minutes.) **Note** Capture sessions appear in the *Paused* state when decoding a buffer.
Close	Click to close the capture window.

For example, to capture only HTTP and HTTPS packets in the 111.122 Class B network, do the following:

Step 1 Click the **Inclusive** check box.

Step 2 Click the **Address** check box.

Step 3 Click the IP button.

Step 4 Choose the **Both Directions** check box.

Step 5 In the Source, enter `111.122.0.0`.

Step 6 In the Source Mask, enter `255.255.0.0`.

Step 7 Click the **Protocol** check box.

Step 8 Press **Shift-Click** to select HTTP and HTTPS from the list.

Capturing Using an Address Filter

If you selected the **Address** check box, enter information in the Capture Settings Address Filter Dialog Box, Table 6-6, as appropriate.

Note When filtering on tunnel addresses such as IPIP4 or GRE.IP, the filters will match the addresses on the inner and outer IP header.

Table 6-6 Capture Settings Address Filter Dialog Box

Field	Description	Usage Notes
Address	Indicated what address to filter by.	• Choose MAC to use the source/ destination MAC address of the packets. • Choose IP to use the source/destination IP addresses of the packets. • Choose IPIP4 for IP addresses including those tunneled over IP protocol 4. • Choose GRE.IP for IP addresses including those tunneled over GRE. • Choose IPv6 for addresses using IP version 6.
Both directions.	Indicates whether the filter is applied to traffic in both directions.	If the source is host A and the destination is host B, enabling both directions filters packets from A to B and B to A. If the source is host A and the destination is not specified, enabling both directions filters packets both to and from host A.
Source	Source address of the packets.	• For IP, IPIP4, and GRE.IP address, enter a valid IPv4 address in dotted-quad format *n.n.n.n*, where *n* is 0 to 255. • For IPv6 address, enter a valid IPv6 address in any allowed IPv6 address format. For example: – 1080::8:800:200C:417A – ::FFF:129.144.52.38 **Note** See RFC 2373 for valid text representations. • For MAC address, enter *hh hh hh hh hh hh*, where *hh* is a hexadecimal number from 0 to 9 or a to f.
Source Mask	The mask applied to the source address. • If a bit in the Source Mask is set to 1, the corresponding bit in the address is relevant. • If a bit in the Source Mask is set to 0, the corresponding bit in the address is ignored.	• For IP, IPIP4, and GRE.IP address, enter a valid IPv4 address in dotted-quad format *n.n.n.n*, where *n* is 0 to 255. The default (if blank) is 255.255.255.255. • For IPv6 address, enter a valid IPv6 address in any allowed IPv6 address format. The default mask (if blank) for IPv6 addresses is ffff:ffff:ffff:ffff:ffff:ffff:ffff:ffff **Note** See RFC 2373 for valid text representations. For MAC address, enter *hh hh hh hh hh hh*, where *hh* is a hexadecimal number from 0 to 9 or a to f. The default is ff ff ff ff ff ff.

Table 6-6 Capture Settings Address Filter Dialog Box (continued)

Field	Description	Usage Notes
Destination	Destination address of the packets.	• For IP, IPIP4, and GRE.IP address, enter a valid IPv4 address in dotted-quad format *n.n.n.n*, where *n* is 0 to 255. The default (if blank) is 255.255.255.255. • For IPv6 address, enter a valid IPv6 address in any allowed IPv6 address format. For example: – 1080::8:800:200C:417A – ::FFF:129.144.52.38 **Note** See RFC 2373 for valid text representations. For MAC address, enter *hh hh hh hh hh hh*, where *hh* is a hexadecimal number from 0 to 9 or a to f. The default is ff ff ff ff ff ff.
Dest. Mask	The mask applied to the destination address. • If a bit in the Dest. Mask is set to 1, the corresponding bit in the address is relevant. • If a bit in the Dest. Mask is set to 0, the corresponding bit in the address is ignored.	• For IP, IPIP4, and GRE.IP address, enter a valid IPv4 address in dotted-quad format *n.n.n.n*, where *n* is 0 to 255. The default (if blank) is 255.255.255.255. • For IPv6 address, enter a valid IPv6 address in any allowed IPv6 address format. The default mask (if blank) for IPv6 addresses is ffff:ffff:ffff:ffff:ffff:ffff:ffff:ffff **Note** See RFC 2373 for valid text representations. For MAC address, enter *hh hh hh hh hh hh*, where *hh* is a hexadecimal number from 0 to 9 or a to f. The default is ff ff ff ff ff ff.

Capturing Using a Protocol Filter

If you selected the **Protocol** check box, select one or more protocols to capture from the drop-down list.

Use Shift + Click to select multiple protocols.

Capturing Using a Port Filter

From the Capture Settings window, select the Ports check box and enter one or more ports separated by commas.

Capturing Using a Custom Filter

Step 1 Click the **Custom** check box.

Note The Address Filter and Protocol Filter check boxes are disabled if you select the Custom Filter check box and vice versa.

Step 2 Choose one or more custom capture filters from the list. Use Shift + click to select multiple filters. If you select multiple custom filters, the filters' conditions will be ORed together (match any).

Note If the list is empty, see the "Creating Custom Capture Filters" section on page 6-19 for instructions on creating custom capture filters.

To view or edit the selected custom capture filter, choose **Custom Filters > Capture Filters**.

Using Alarm-Triggered Captures

You can configure multiple alarm-triggered captures that start and stop automatically by alarm events you define.

To set up an alarm-triggered capture:

Step 1 Create an alarm event from the **Setup** > **Alarms** > **Alarm Events** window.

Configure an Alarm Event for the type of event for which you want to capture data. See Setting Up Alarm Events, page 3-75, for more information.

Step 2 Set a threshold for the event from the **Setup** > **Alarms** > **Alarm Thresholds** window.

Configure the threshold of parameters of interest in the associated Alarm Event. See Setting Alarm Thresholds, page 3-76, for more information.

Step 3 Set up a capture buffer from the **Capture** > **Buffers** window. Click **New Capture**.

Choose the Start Event and/or the Stop Event for the associated Alarm Event. See Configuring Capture Settings, page 6-3, for more information.

Viewing Packet Decode Information

After some packets have been captured in the buffer, you can use the Packet Decoder to view the packet contents.

The Packet Decoder window has four parts:

- Packet Decoder operations
- Packet browser pane
- Protocol decode (See the "Viewing Detailed Protocol Decode Information" section on page 6-14).
- Packet hexadecimal dump.

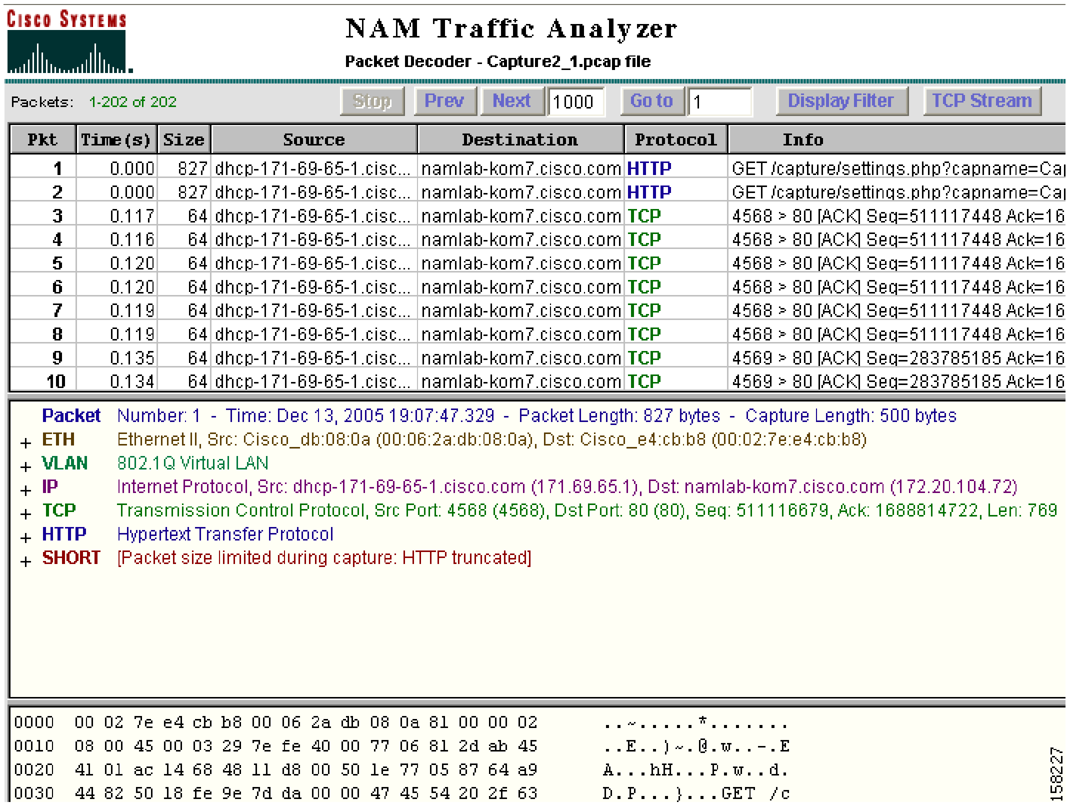
To view packet decode information:

Step 1 Choose **Capture > Buffers** or **Capture > Files**.

Step 2 Choose a capture buffer or file then click **Decode**.

The Packet Decoder window displays as shown in Figure 6-4.

Figure 6-4 Packet Decoder Window



Pkt	Time(s)	Size	Source	Destination	Protocol	Info
1	0.000	827	dhcp-171-69-65-1.cisc...	namlab-kom7.cisco.com	HTTP	GET /capture/settings.php?capname=Ca
2	0.000	827	dhcp-171-69-65-1.cisc...	namlab-kom7.cisco.com	HTTP	GET /capture/settings.php?capname=Ca
3	0.117	64	dhcp-171-69-65-1.cisc...	namlab-kom7.cisco.com	TCP	4568 > 80 [ACK] Seq=511117448 Ack=16
4	0.116	64	dhcp-171-69-65-1.cisc...	namlab-kom7.cisco.com	TCP	4568 > 80 [ACK] Seq=511117448 Ack=16
5	0.120	64	dhcp-171-69-65-1.cisc...	namlab-kom7.cisco.com	TCP	4568 > 80 [ACK] Seq=511117448 Ack=16
6	0.120	64	dhcp-171-69-65-1.cisc...	namlab-kom7.cisco.com	TCP	4568 > 80 [ACK] Seq=511117448 Ack=16
7	0.119	64	dhcp-171-69-65-1.cisc...	namlab-kom7.cisco.com	TCP	4568 > 80 [ACK] Seq=511117448 Ack=16
8	0.119	64	dhcp-171-69-65-1.cisc...	namlab-kom7.cisco.com	TCP	4568 > 80 [ACK] Seq=511117448 Ack=16
9	0.135	64	dhcp-171-69-65-1.cisc...	namlab-kom7.cisco.com	TCP	4569 > 80 [ACK] Seq=283785185 Ack=16
10	0.134	64	dhcp-171-69-65-1.cisc...	namlab-kom7.cisco.com	TCP	4569 > 80 [ACK] Seq=283785185 Ack=16

```
  Packet  Number: 1  -  Time: Dec 13, 2005 19:07:47.329  -  Packet Length: 827 bytes  -  Capture Length: 500 bytes
+ ETH     Ethernet II, Src: Cisco_db:08:0a (00:06:2a:db:08:0a), Dst: Cisco_e4:cb:b8 (00:02:7e:e4:cb:b8)
+ VLAN    802.1Q Virtual LAN
+ IP      Internet Protocol, Src: dhcp-171-69-65-1.cisco.com (171.69.65.1), Dst: namlab-kom7.cisco.com (172.20.104.72)
+ TCP     Transmission Control Protocol, Src Port: 4568 (4568), Dst Port: 80 (80), Seq: 511116679, Ack: 1688814722, Len: 769
+ HTTP    Hypertext Transfer Protocol
+ SHORT   [Packet size limited during capture: HTTP truncated]
```

```
0000  00 02 7e e4 cb b8 00 06 2a db 08 0a 81 00 00 02    ..~.....*.......
0010  08 00 45 00 03 29 7e fe 40 00 77 06 81 2d ab 45    ..E..)~.@.w..-.E
0020  41 01 ac 14 68 48 11 d8 00 50 1e 77 05 87 64 a9    A...hH...P.w..d.
0030  44 82 50 18 fe 9e 7d da 00 00 47 45 54 20 2f 63    D.P...}...GET /c
```

Table 6-7 describes the packet decoder operations.

Note If you enable DNS on the **Admin** > **System** > **Preferences** window, packet decoding can take a very long time due to DNS name resolution.

Table 6-7 Packet Decoder Operations

Button	Description
Stop	Stop packet loading
Prev	Load and decode the previous block of packets from the NAM
Next	Load and decode the next block of packets from the NAM
Go To	Load and decode a block of packets starting from the specified packet number.
Display Filter	Launch the Display Filter dialog. See Filtering Packets Displayed in the Packet Decoder, page 6-12.
TCP Stream	Follow the TCP stream of the selected TCP packet. **Note** This might take a long time depending on the traffic pattern.

Table 6-8 describes the information displayed in the packet browser pane.

Table 6-8 Packet Browser

Field	Description
Pkt	Packet numbers, listed numerically in capture sequence. If the decode (display) filter is active, the packet numbers might not be consecutive.
Time	Time the packet was captured relative to the first packet displayed (not the first packet in the buffer). **Note** To see the absolute time, see the Detail window.
Size	Size of the packet, in bytes.
Source	Packet source, which might be displayed as hostname, IP, IPX, or MAC address. **Note** To turn hostname resolution on and off for IP addresses, click the Setup tab and change this setting under Preferences.
Destination	Packet destination, which might be displayed as hostname, IP, IPX, or MAC address.
Protocol	Top-level protocol of the packet.
Info	Brief text information about the packet contents.

Browsing Packets in the Packet Decoder

You can use the packet browser to browse the list of captured packets and do the following:

- Filter by protocol, IP address, MAC address, and custom display filter.
- Use the **Next**, **Previous**, and **Go To** buttons to load packets from the capture buffer.

Note The capture must be paused or stopped for you to use these features.

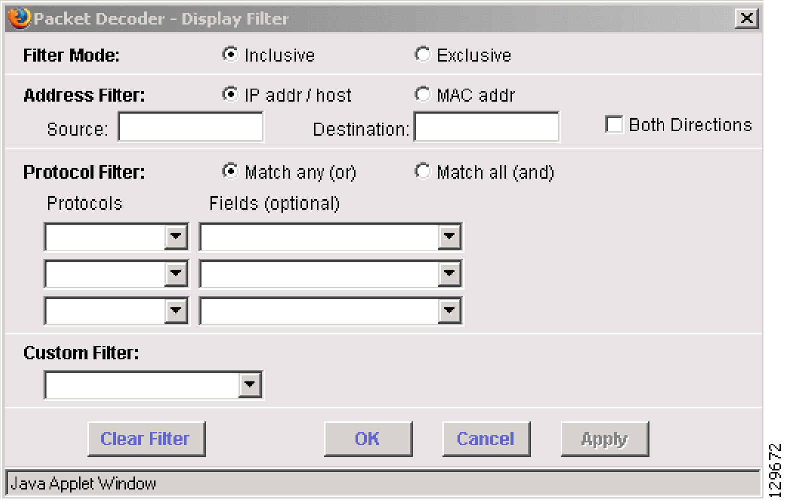
Filtering Packets Displayed in the Packet Decoder

To filter packets displayed in the packet decoder:

Step 1 From the Packet Decoder window, click the Display Filter button:

The Packet Decoder - Display Filter Window (Figure 6-5) displays.

Figure 6-5 Packet Decoder - Display Filter Window



Filter Mode: ● Inclusive ○ Exclusive

Address Filter: ● IP addr / host ○ MAC addr

Source: Destination: □ Both Directions

Protocol Filter: ● Match any (or) ○ Match all (and)

Custom Filter:

Step 2 Do the following:

- Choose a **Filter Mode**:
  – **Inclusive** displays packets that match the condition(s.)
  – **Exclusive** displays packets that do not match the condition(s).
- Choose an **Address Filter**:
  – **IP address** filters on IP address.
  – **MAC Address** filter on MAC address.
  – **Source** allows you to specify the source address, or leave it blank if not applicable.
  – **Destination** allows you to specify the destination address, or leave it blank if not applicable.
  – **Both Directions** allows you to match of packets travelling in both directions.
- Define a **Protocol Filter**.
  – Choose **Match any** to display packets that match any of the protocols or fields

  or

  – Choose **Match all** to display packets that match all of the protocols or fields.
  – Choose a protocol from the **Protocols** list.

Note You can type the first few letters of the protocol name to go directly to the protocol. If you make a typo, type **ESC** or **SPACE** to reset.

  – Choose a protocol field from the Fields list, then specify the field value if applicable.
- Choose a **Custom Filter**. See Custom Display Filters for how to set up a custom display filter.

Step 3 Specify the protocol name, IP address, MAC address, matching text, or custom decode filter.

Step 4 Click **Filter**.

Step 5 To display packets that *exclude* the filter conditions, select the **exclusive** check box next to the Filter button.

Viewing Detailed Protocol Decode Information

To view detailed protocol information:

Step 1 Highlight the packet number about which you want more information.

Detailed information about that packet is displayed in the Protocol Decode and hexadecimal dump panes at the bottom of the window.

Note If you highlight the details in the Protocol Decode pane, the corresponding bytes are highlighted in the hexadecimal dump pane below it.

Step 2 To review the information, use the scrolling bar in the lower panes.

Note When you decode SCCP traffic, the NAM lists the protocol as *skinny*, not SCCP.

Tip

- Protocols are color coded both in the Packet Browser and the Protocol Decode pane.
- Click the protocol name in the Protocol Decode pane to collapse and expand protocol information.
- To adjust the size of any of the panes, click and drag the pane frame up or down.

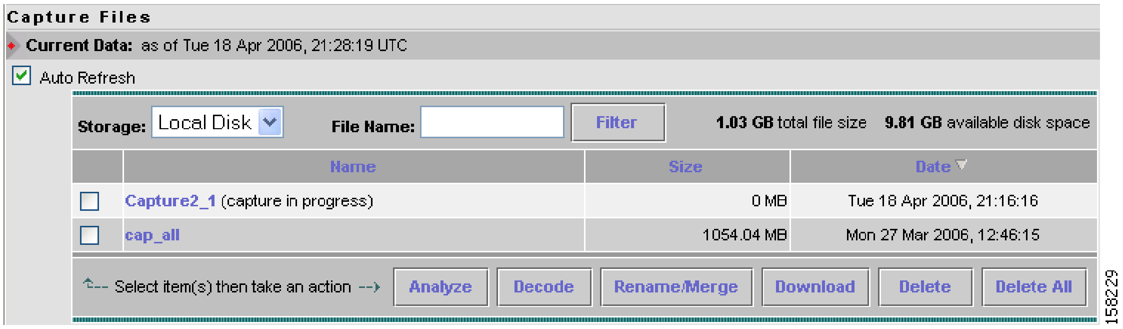
Files

Use the Files option to analyze, decode, merge, download, or delete saved capture files. See the section Buffers, page 6-2 and Table 6-2 for information about how to save capture buffers to files. You can download files from the Sniffer **.enc** or **.pcap** file formats. See Setting Global Preferences, page 3-87, for information about setting the Sniffer download file format.

Choose **Capture** > **Files** to display the Capture Files window (Figure 6-6).

Note If you check the Auto Refresh check box, the Capture Files window refreshes automatically every 60 seconds.

Figure 6-6 Capture Files Window



Capture Files

Current Data: as of Tue 18 Apr 2006, 21:28:19 UTC

☑ Auto Refresh

Storage: Local Disk File Name:

1.03 GB total file size **9.81 GB** available disk space

	Name	Size	Date
□	Capture2_1 (capture in progress)	0 MB	Tue 18 Apr 2006, 21:16:16
□	cap_all	1054.04 MB	Mon 27 Mar 2006, 12:46:15

Select item(s) then take an action -->

The Capture Files window provides the following options:

- Choose a storage location from the pull-down list to view capture files in that location. Subdirectories of remote storage are listed only if the NAM has full access rights to those remote directories.
- Choose a capture and click **Analyze** to display the packets in a file.
- Choose a capture and click **Decode** to display the packets in a file.
- Click **Convert/Rename/Merge** to merge packets of files. The packets in the file are merged in chronological order.

Note Do not add a file suffix when you provide the filename. The suffix **.pcap** is added automatically.

- Click **Download** to download a file to your computer in Sniffer **.enc** or **.pcap** file format.
- Click **Delete** or **Delete All** to delete files.

Note Capture files on the NAM 2200 Series appliances are stored in native NAM format. You can convert the capture file format to **.pcap** using the **Convert/Rename/Merge** button on the **Capture** > **Files** window.

Analyzing Capture Files

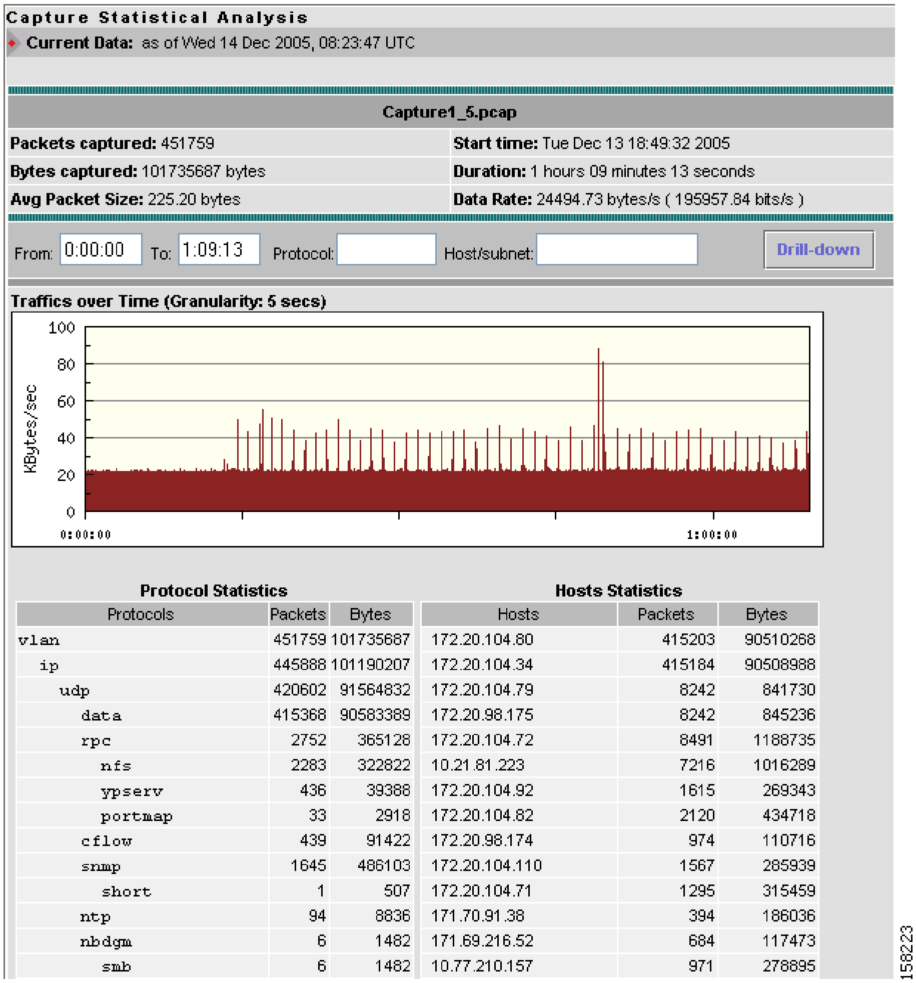
The Analyze button of the Capture Files window enables you to obtain different statistics including traffic rate (bytes/second) over a capture period, lists of hosts, conversations, and applications associated with network traffic. Figure 6-7 shows an example of the Capture Analysis window.

This window also enables you to drill down for a more detailed look at a particular set of network traffic. The pane above the **Traffic over Time** graph displays the time shown in the graph in the **From:** and **To:** fields. It also provides fields for Protocol and Host/subnet, and a **Drill-Down** button.

Each slice in the **Traffic over Time** graph displays the amount of traffic for the amount of time set in the Granularity of the capture file.

You can view more detail about a specific time frame by entering the time in the **From:** and **To:** fields and clicking **Drill-Down**. You can also drill down on a specific **Protocol** or **Host/subnet** address.

Figure 6-7 Capture Statistical Analysis Window



Capture Statistical Analysis

Current Data: as of Wed 14 Dec 2005, 08:23:47 UTC

Capture1_5.pcap

Packets captured: 451759	**Start time:** Tue Dec 13 18:49:32 2005
Bytes captured: 101735687 bytes	**Duration:** 1 hours 09 minutes 13 seconds
Avg Packet Size: 225.20 bytes	**Data Rate:** 24494.73 bytes/s (195957.84 bits/s)

From: 0:00:00 To: 1:09:13 Protocol: Host/subnet:

Traffics over Time (Granularity: 5 secs)

Protocol Statistics

Protocols	Packets	Bytes
vlan	451759	101735687
ip	445888	101190207
udp	420602	91564832
data	415368	90583389
rpc	2752	365128
nfs	2283	322822
ypserv	436	39388
portmap	33	2918
cflow	439	91422
snmp	1645	486103
short	1	507
ntp	94	8836
nbdgm	6	1482
smb	6	1482

Hosts Statistics

Hosts	Packets	Bytes
172.20.104.80	415203	90510268
172.20.104.34	415184	90508988
172.20.104.79	8242	841730
172.20.98.175	8242	845236
172.20.104.72	8491	1188735
10.21.81.223	7216	1016289
172.20.104.92	1615	269343
172.20.104.82	2120	434718
172.20.98.174	974	110716
172.20.104.110	1567	285939
172.20.104.71	1295	315459
171.70.91.38	394	186036
171.69.216.52	684	117473
10.77.210.157	971	278895

Table 6-9 describes the different areas of the capture analysis window.

Table 6-9 Capture Analysis Window Fields

Field	Description
Capture Overview	Provides a summary of the displayed capture including number of packets captured, bytes captured, average packet size, capture start time, duration of capture, and data transfer rate (both bytes and bits per second)
Traffic over Time	Displays a graphic image of network traffic (KB/second)
Protocol Statistics	Displays packets and bytes transferred for each protocol
Hosts Statistics	Displays packets and bytes transferred for each host address

Decoding Capture Files

Decoding capture files is described in section Viewing Packet Decode Information, page 6-10.

Renaming or Merging Capture Files

Use the **Rename/Merge** button to rename a single capture file or merge multiple capture files into one file.

Note On NAM 2200 Series appliances, this button is labeled **Convert/Rename/Merge**.

Renaming Capture Files

To rename a capture file:

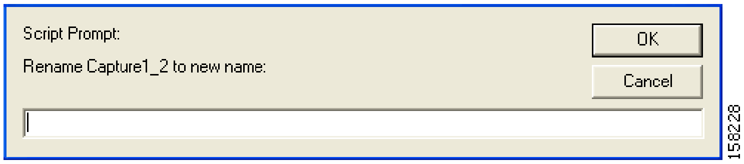
Step 1 Choose **Capture** > **Files**.

Step 2 Choose a capture file from the list of captures.

Step 3 Click **Convert/Rename/Merge**.

A dialog box displays and asks you to enter the new name for the selected capture file.

Figure 6-8 Rename Capture File Dialog Box



Script Prompt:

Rename Capture1_2 to new name:

Step 4 Enter a new name for the capture file and click **OK**.

Merging Capture Files

To merge multiple capture files into one capture file:

Step 1 Choose **Capture** > **Files**.

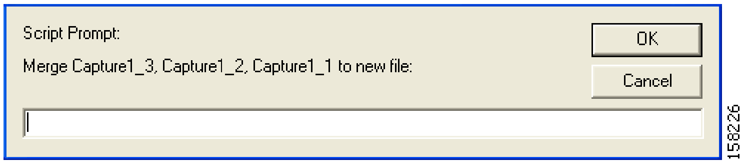
Step 2 Choose two or more capture files from the list of captures.

Step 3 Click **Convert/Rename/Merge**.

A dialog box displays and asks you to enter the new name for the merged capture files.

Note Merged files cannot exceed 2 GB.

Figure 6-9 Merging Capture Files Dialog Box



Script Prompt:

Merge Capture1_3, Capture1_2, Capture1_1 to new file:

Step 4 Enter a name for the merged capture files and click **OK**.

The capture files are merged in timestamp order from oldest to most recent.

Downloading Capture Files

The following procedure describes how to download a capture file to your computer. You can only download one capture file at a time.

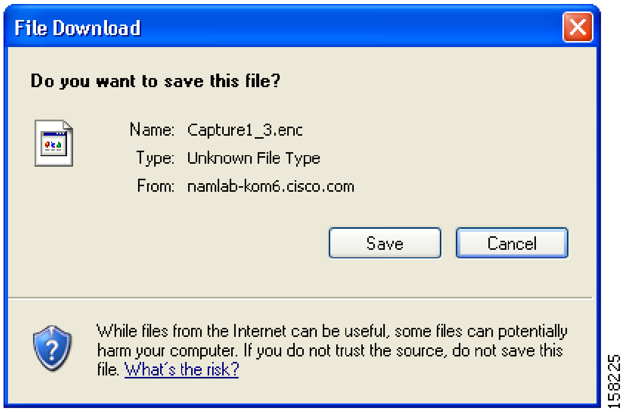
Step 1 Choose **Capture** > **Files**.

Step 2 Choose a capture file from the list of captures.

Step 3 Click **Download**.

A **File Download** dialog box displays and asks "**Do you want to save this file?**"

Figure 6-10 Download Capture File Dialog Box



File Download

Do you want to save this file?

Name: Capture1_3.enc

Type: Unknown File Type

From: namlab-kom6.cisco.com

While files from the Internet can be useful, some files can potentially harm your computer. If you do not trust the source, do not save this file. What's the risk?

Step 4 Click **Save**.

A **Save As** dialog box opens and provides a way for you to rename and save the file at a location of your choice.

Deleting a Capture File

To delete a capture file:

Step 1 Choose **Capture** > **Files**.

Step 2 Choose a capture file from the list of captures.

Step 3 Click **Delete**.

A dialog box displays and asks "**Delete the following file(s)?**" and displays the file name.

Step 4 Click **OK** to delete the file or **Cancel** to allow the file to remain.

Deleting All Capture Files

To delete all capture files at once:

Step 1 Choose **Capture** > **Files**.

Step 2 Choose a capture file from the list of captures.

Step 3 Click **Delete All**.

A dialog box displays and asks "**Delete all capture file(s)?**"

Step 4 Click **OK** to delete all the files or **Cancel** to allow them to remain.

Custom Capture Filters

You can use custom capture filters to create and save specialized filters to disregard everything except the information you are interested in when you capture data.

For more information about using custom filters when capturing data, see the "Capturing Using a Custom Filter" section on page 6-9.

See these topics for help setting up and managing custom capture filters:

- Creating Custom Capture Filters, page 6-19
- Editing Custom Capture Filters, page 6-22
- Deleting Custom Capture Filters, page 6-22

Creating Custom Capture Filters

To create a custom capture filter:

Step 1 Choose **Capture** > **Custom Filters**.

The Custom Capture Filters dialog box is displayed.

Step 2 Click **Create**.

The Custom Capture Filter Dialog Box (Table 6-10)displays.

Step 3 Enter information in each of the fields as appropriate.

Table 6-10 Custom Capture Filter Dialog Box

Field	Description and Usage Notes
Filter Name	Enter a name of the new filter.
Description	Brief description of the filter. Enter a description from 1 to 35 characters.
Protocol	The protocol to match with the packet. Choose the encapsulation from the drop-down list, then select the protocol.
Data	The data pattern to be matched with the packet. Use the Offset field to specify the starting location for the data to be checked. Enter `hh hh hh ...`, where `hh` represents hexadecimal numbers from 0 to 9 or a to f. For example, to designate the decimal value *15*, use the hexadecimal value *0f*. For the decimal value *255*, use the hexadecimal value *ff*. For the decimal value *16*, use the hexadecimal value *10*. See Tips for Creating Custom Capture Filter Expressions, page 6-21, for more examples. Leave blank if not applicable. If the packet is too short and does not have enough data to match, the packet match fails.
Data Mask	The mask applied to the data matching. Enter `hh hh hh ...`, where `hh` represents hexadecimal numbers from 0 to 9 or a to f. Leave blank if all data bits are relevant. If a bit in the Data Mask is set to 1, the corresponding bit in the packet is relevant in the matching algorithm. If a bit in the Data Mask is set to 0, the corresponding bit in the packet is ignored. If you do not specify the Data Mask, or if it is shorter than the Data field, the Data Mask is padded with “1” bits up to the length of the Data field. For example, if you enter a four-byte value in the Data field and leave the Data Mask field blank, that is the same as specifying a Data Mask of *ff ff ff ff*.
Data Not Mask	The mask applied to reverse data matching. Enter `hh hh hh ...`, where `hh` represents hexadecimal numbers from 0 to 9 or a to f. Leave blank for no reverse data matching. For those bits in the Data Not Mask that are set to 0 (or not specified), the relevant bits in the packet must match the corresponding bit in the Data field. For those bits in the Data Not Mask that are set to 1, at least one relevant bit in the packet must be different than the corresponding bit in the Data field. If you do not specify the Data Not Mask, or if it is shorter than the Data field, the Data Not Mask is padded with “0” bits up to the length of the Data field.
Offset	Enter a decimal number, the offset (in bytes, from the Base) where packet data-matching begins. This offset applies to the Data, Data Mask, and Data Not Mask fields.

Table 6-10 Custom Capture Filter Dialog Box (continued)

Field	Description and Usage Notes
Base	Choose absolute or a protocol, the base from which the offset is calculated. If you select absolute, the offset is calculated from the absolute beginning of the packet (the beginning of the Ethernet frame). You must account for an 802.1q header when calculating an offset for NAM-1 and NAM-2 devices. If you select protocol, the offset is calculated from the beginning of the protocol portion of the packet. If the packet does not contain the protocol, the packet fails this match.
Status	The status to match with the packet. Enter a number from 0 to 65535; leave blank if not applicable. For Ethernet packet captures, the status bits are: Bit 0—Packet is longer than 1518 octets. Bit 1—Packet is shorter than 64 octets. Bit 2—CRC or alignment error. For example, an Ethernet fragment has a status value of 6 (bits 1 and 2 set).
Status Mask	The mask applied to the status matching. Enter a number from 0 to 65535; leave blank if all status bits are relevant. If a Status Mask bit is set to 1, the corresponding bit in the packet status is relevant in the matching algorithm. If a Status Mask bit is set to 0, the corresponding bit in the packet status is ignored. If you do not specify a Status Mask, or if it is shorter than the Status field, the Status Mask is padded with “1” bits up to the length of the Status field.
Status Not Mask	Enter a number from 0 to 65535, the mask applied to reverse status matching. Leave blank for no reverse status matching. For those bits in the Status Not Mask that are set to 0 (or not specified), the relevant status bits of the packet must match the corresponding bit in the Status field. For those bits in the Status Not Mask that are set to 1, at least one relevant bit of the status packet must be different than the corresponding bit in the Status field. If you do not specify a Status Not Mask, it is padded with “0” bits.

Step 4 Click **Apply** to create the filter, or click **Reset** to cancel the changes.

Tips for Creating Custom Capture Filter Expressions

The TOS value is stored in byte 1 (the second byte) in the IP header. To match the IP packet with a TOS value of 16 (0x10), enter:

Data—10
Offset—1
Base—IP

With nothing in the Data Mask, its effective value is *ff*.

The source address of an IP packet is stored in bytes 12 to 15 in the IP header. To match IP packets with a source address of 15.16.17.18, enter:

Data—0f 10 11 12
Offset—12
Base—IP

To match IP packets with a source address of 15.*.*.18 (where * is any number from 0 to 255), enter:

Data—0f 00 00 12
Data Mask—ff 00 00 ff
Offset—12
Base—IP

To match IP packets with a source address of 15.16.17.18 and a destination address different than 15.16.17.19, enter:

Data—0f 10 11 12 0f 10 11 13
Data Mask—ff ff ff ff ff ff ff ff
Data Not Mask—00 00 00 00 00 00 00 00
Offset—12
Base—IP

Editing Custom Capture Filters

To edit custom capture filters:

Step 1 Choose **Capture** > **Custom Filters**.

The Custom Capture Filters dialog box is displayed.

Step 2 Choose the filter to edit, then click **Edit**.

The Custom Capture Filter dialog box (see Table 6-10 on page 6-20) is displayed.

Step 3 Enter information in each of the fields as appropriate.

Step 4 Do one of the following:

- To apply the changes, click **Apply**.
- To cancel the changes, click **Reset**.

Deleting Custom Capture Filters

To delete custom capture filters:

Step 1 Choose **Capture** > **Custom Filters**.

The Custom Capture Filters dialog box is displayed.

Step 2 Choose the filter to delete, then click **Delete**.

Step 3 In the confirmation dialog box, do one of the following:

- To delete the filter, click **OK**.

- To cancel, click **Cancel**.

Custom Display Filters

Use custom display filters to create and save customized filters to use in the Decode window to limit which packets are to be displayed.

See these topics for help setting up and managing custom display filters:

- Creating Custom Display Filters, page 6-23
- Editing Custom Display Filters, page 6-27
- Deleting Custom Display Filters, page 6-27

Creating Custom Display Filters

To create custom display filters:

Step 1 Choose **Capture** > **Custom Filters**.

Step 2 In the contents, click **Display Filters**.

The Custom Display Filters dialog box is displayed.

Step 3 Click **Create**.

The Custom Decode Filter Dialog Box, Table 6-11, displays.

Step 4 Enter information in each of the fields as appropriate.

Table 6-11 Custom Decode Filter Dialog Box

Field	Description	Usage Notes
Filter Name	The name of the capture filter.	Enter the name of the filter to be created.
Description	The description of the capture filter.	Enter a description of the filter.
Protocol	The protocol to match with the packet.	Choose a protocol from the list. (Select **All** to match all packets regardless of protocol.)
Address (MAC or IP)	Indicates whether to filter by MAC or IP address.	Choose MAC to filter using the source/destination MAC address of the packets. Choose IP to filter using the source/destination addresses of the packets.
Both Directions	Indicates whether the filter is applied to traffic in both directions.	If the source is host A and the destination is host B, enabling both directions filters packets from A to B and B to A. If the source is host A and the destination is not specified, enabling both directions filters packets both to and from host A.

Table 6-11 Custom Decode Filter Dialog Box (continued)

Field	Description	Usage Notes
Source	Source address of the packets.	For IP address, enter *n.n.n.n*, where *n* is 0 to 255 or *n.n.n.n/s* where *s* is the subnet mask (0 to 32). For MAC address, enter *hh hh hh* ..., where *hh* are hexadecimal numbers from 0 to 9 or a to f.
Destination	Destination address of the packets.	For IP address, enter *n.n.n.n*, where *n* is 0 to 255 or *n.n.n.n/s* where *s* is the subnet mask (0 to 32). For MAC address, enter *hh hh hh hh hh hh*, where *hh* are hexadecimal numbers from 0-9 or a-f.
Offset	The offset (in bytes) from the Base where packet data-matching begins.	Enter a decimal number.
Base	The base from which the offset is calculated. If you select absolute, the offset is calculated from the absolute beginning of the packet (for example, the beginning of the Ethernet frame). If you select protocol, the offset is calculated from the beginning of the protocol portion of the packet. If the packet does not contain the protocol, the packet fails this match.	Choose **absolute** or a protocol.

Table 6-11 Custom Decode Filter Dialog Box (continued)

Field	Description	Usage Notes
Data Pattern	The data to be matched with the packet.	Enter `hh hh hh ...`, where `hh` are hexadecimal numbers from 0-9 or a-f. Leave blank if not applicable.
Filter Expression	An advanced feature to set up complex filter conditions. The simplest filter allows you to check for the existence of a protocol or field. For example, to see all packets that contain the IPX protocol, you can use the simple filter expression **ipx**.	See the "Tips for Creating Custom Decode Filter Expressions" section on page 6-25.

Step 5 Do one of the following:

- To create the filter, click **Apply**.
- To cancel the changes, click **Reset**.

Tips for Creating Custom Decode Filter Expressions

You can construct custom decode filter expressions using the following logical and comparison operators listed in Table 6-12.

Table 6-12 Logical and Comparison Operators

Operator	Meaning
and	Logical AND
or	Logical OR
xor	Logical XOR
not	Logical NOT
==	Equal
!=	Not equal
>	Greater than

You can also group subexpressions within parentheses. You can use the following fields in filter expressions:

Field	Filter By	Format
eth.addr eth.src eth.dst	MAC address	*`hh:hh:hh:hh:hh:hh`*, where h is a hexadecimal number from 0 to 9 or a to f.

Field	Filter By	Format
ip.addr ip.src ip.dst	IP address	`n.n.n.n or n.n.n.n/s` , where n is a number from 0 to 255 and s is a 0-32 hostname that does not contain a hyphen.
tcp.port tcp.srcport tcp.dstport	TCP port number	A decimal number from 0 to 65535.
udp.port udp.srcport udp.dstport	UDP port number	A decimal number from 0 to 65535.
protocol	Protocol	Click the Protocol list in the Custom Decode Filter dialog box to see the list of protocols on which you can filter.
protocol **[***offset***:***length***]**	Protocol data pattern	*hh:hh:hh:hh...*, where hh is a hexadecimal number fro 0 to 9 or a to f. *offset* and *length* are decimal numbers. *offset* starts at 0 and is relative to the beginning of the *protocol* portion of the packet.
frame.pkt_len	Packet length	A decimal number that represents the packet length, not the truncated capture packet length.

Examples of Custom Decode Filter Expressions

- To match SNMP packets from 111.122.133.144, enter:

  snmp and (ip.src == 111.122.133.144)

- To match IP packets from the 111.122 Class B network, enter:

  ip.addr == 111.122.0.0/16

- To match TCP packets to and from port 80, enter:

  tcp.port == 80

- The TOS value is stored in byte 1 (the second byte) in the IP header. To match the IP packet with the TOS value 16 (0x10), enter:

  ip[1:1] == 10

- The TCP acknowledgement number is stored in bytes 8 through 11 in the TCP header. To match the TCP packet with acknowledgement number 12345678 (0xBC614E), enter:

  tcp[8:4] == 00:BC:61:4E

Note You can use a filter expression with other fields in the Custom Decode Filter dialog box. In this case, the filter expression is ANDed with other conditions.
Invalid or conflicting filter expressions result in no packet match.

Editing Custom Display Filters

To edit custom display filters:

Step 1 **Choose Capture** > **Custom Filters**.

Step 2 In the contents, click **Display Filters**.

The Custom Display Filters dialog box is displayed.

Step 3 Choose the filter to edit, then click **Edit**.

Step 4 Change the information in each of the fields as appropriate.

Step 5 Do one of the following:

- To apply the changes, click **Apply**.
- To cancel the changes, click **Reset**.

Deleting Custom Display Filters

To delete custom display filters:

Step 1 Choose **Capture** > **Custom Filters**.

Step 2 In the contents, click **Display Filters**.

The Custom Display Filters dialog box is displayed.

Step 3 Choose the filter to delete, then click **Delete**.

Step 4 In the confirmation dialog box, do one of the following:

- To delete the filter, click **OK**.
- To cancel, click **Cancel**.

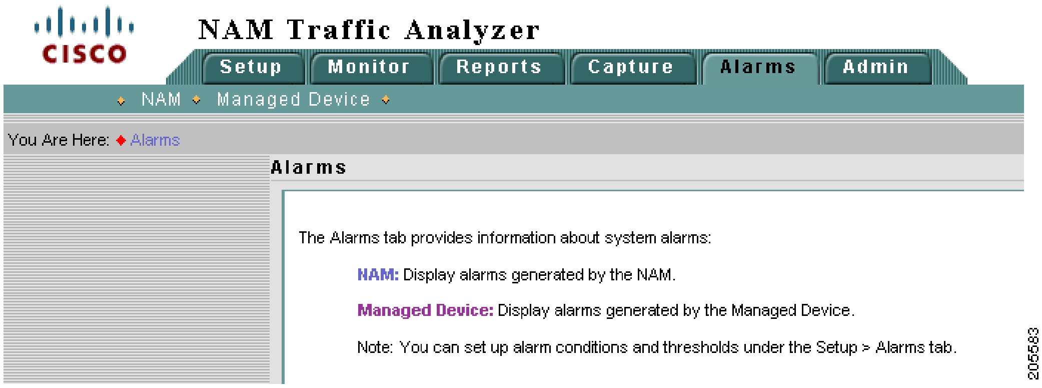
CHAPTER 7

Viewing Alarms

Alarms are predefined conditions based on a rising data threshold, a falling data threshold, or both. 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.

Note NAM 4.0 supports IPv6 for all alarm functionality.

Figure 7-1 Alarms Window



The Alarms tab provides information about system alarms:

NAM: Display alarms generated by the NAM.

Managed Device: Display alarms generated by the Managed Device.

Note: You can set up alarm conditions and thresholds under the Setup > Alarms tab.

Note NAM-1 and NAM-2 devices list *Chassis* as the second option instead of Managed Device and provide alarms generated by Catalyst 6000 Series Switches, Catalyst 6500 Series Switches, and Cisco 7600 Series Routers.

You can set up the following:

- Alarm events based on an SNMP trap community string

  See Setting Up Alarm Events, page 3-75 for more detailed information.
- Alarm thresholds based on parameters you specify from a list of pre-selected variables

  See Setting Alarm Thresholds, page 3-76 for more detailed information.
- Voice/Video stream thresholds

  See Setting Up Voice/Video Stream Thresholds, page 3-80 for more detailed information.

Note You can use an external SNMP manager to set up thresholds for NAM MIB variables by configuring the alarm and event tables in the NAM. However, you can set up thresholds for voice-monitoring variables only with the Catalyst 6500 NAM Traffic Analyzer.

Syslog messages are created for MIB threshold events, voice threshold events, or systems alerts. You can view two alarm logs:

- Viewing NAM Threshold Alarms, page 7-2.
- Viewing Chassis Threshold Alarms, page 7-2.

Note The Switch Log does not apply to NM-NAM or NME-NAM devices, nor does it apply to the Cisco 2200 Series NAM appliances.

Viewing NAM Threshold Alarms

The NAM Threshold Alarms window displays all threshold-crossing events for NAM MIB thresholds and NAM voice-monitoring thresholds.

Step 1 Choose **Alarms** > **NAM**.

Step 2 The NAM Threshold Alarms window, Table 7-1, displays.

Table 7-1 NAM Threshold Alarms

Field	Description
Date	Date the alarm occurred.
Time	Time the alarm occurred.
Description	Description of the alarm.
Variable	Alarm variable that was triggered.
Alarm Value	Value of the alarm.
Message	Alarm message.

Step 3 To clear the screen, click **Clear**.

Tip To turn off auto refresh, deselect the Auto Refresh check box.

Viewing Chassis Threshold Alarms

Note This section does not apply to NM-NAM or NME-NAM devices.

The switch log displays the RMON log table from the switch mini-RMON MIB.

You can set up switch thresholds from the application using the switch CLI or by an external SNMP manager configuring the switch mini-RMON MIB.

For information on using the application to set up switch thresholds, see the "Creating Chassis or Managed Device Thresholds" section on page 3-83.

For information on using the switch CLI, see *Catalyst 6000 Content Switching Module Installation and Configuration Note*.

Step 1 Choose **Alarms** > **Switch**.

The Switch Threshold Alarms window (Table 7-2) displays.

Table 7-2 Switch Threshold Alarms

Field	Description
Date	The date the alarm.
Time	Time the alarm occurred.
Description	Description of the alarm.

Tip To turn off auto refresh, deselect the Auto Refresh check box.

APPENDIX A

Troubleshooting

This appendix addresses some common issues you might encounter while using the NAM Traffic Analyzer.

- Username and Password Issues, page A-2
- Login Issues, page A-3
- Packet Capturing Issues, page A-6
- Alarm and Interface/Port Stats Issues, page A-8
- SPAN Related Issues, page A-5
- NetFlow and NBAR Monitoring Problems, page A-8
- Report Problems, page A-12
- Image Upgrade and Patch Issues, page A-13
- Web Browser Response Time and Display Issues, page A-13
- NAM Switch Date and Time Synchronization Issues, page A-14
- Diagnostic Error Message Issues, page A-14
- Hostname Resolution Issues, page A-15
- Data Mismatch Issues, page A-16
- HTTPS/Security Certificate Issues, page A-16
- SNMP Issues, page A-17
- Protocol Support Issues, page A-18
- Voice Monitoring Issues, page A-19
- WAAS Application Response Time Issues, page A-20

General NAM Issues

Q. What information should I collect and what else should I do when the NAM is not responding?

A. Determine the answers to the following questions and gather the following information:

- Does **session** from the switch/router CLI work?
- Does **ping** over EOBC (127 subnet) work?
- Does **ping** to the management IP address work?

- Collect output of **show tech-support** command from both the NAM and the switch or router.
- Collect core files.
- Check if NAM is seated correctly in chassis
- Reset NAM
- Reset into maintenance image or helper
- Clear the configuration
- Reinstall the application image (possibly with the repartition option --*install*)

CPU Usage Percentage

Q. The NAM output of **show tech-support** command shows CPU usage that exceeds 100% for a process. Is there a problem with that process?

A. No; the value shown is the sum of all current CPU usage for this process. In the following example, PID 1925 shows 305% CPU usage. This means that the total usage percentage of all of the NAMs CPUs totaled 305%.

```
PID  USER      PR  NI  VIRT  RES  SHR S %CPU %MEM   TIME+   COMMAND
1925 root      15   0 3266m 1.4g 5804 S  305  8.9   3569:25 mond
9626 root      20   0 10516 1172  784 R    2  0.0   0:00.01 top
   1 root      15   0  3676  568  476 S    0  0.0   0:03.87 init
```

Using a NAM with only one CPU, the CPU usage percentage will never exceed 100%, while using a NAM with two CPUs, the CPU usage percentage would never exceed 200%. Using a Cisco NAM 2220 appliance with eight CPUs, the CPU usage percentage can exceed 200% or more. The value shown represents the sum of all current CPUs used by this process, not the over the length of process run time.

A high individual CPU usage percentage value for NAMs with multiple CPUs is a different case, but not unexpected. A software change in NAM 4.0 provides improved performance but can show high CPU usage percentage, even when the NAM is not busy, as the NAM polls incoming packets. When more packets arrive, the time used for packet polling shifts to real packet processing.

To see current CPU usage percentages, including individual and average for all, click **Admin** > **System** to view the System Resources window as described in section System Resources, page 2-10.

Username and Password Issues

Q. Can I use my CLI username (root or guest) and password to log into the NAM Traffic Analyzer? Or, can I use my NAM Traffic Analyzer username and password to log into the NAM CLI?

A. No. Web and CLI users are administered separately. You can create web users with a local database or using TACACS+. You can create a web user with the same username and password as used on the CLI. However, you must still make password changes in both places.

Q. If I use TACACS+, must I still have web users defined in my local database?

A. No. You can use TACACS+ either in addition to a local database or instead of a local database. (The local database is always checked first.) To use only TACACS+, you can eliminate the local database users by either of these methods:

- Use the NAM CLI **rmwebusers** command to remove only local users, not TACACS+ users, as they are administered separately on the TACACS+ server.

- From the Admin tab, click **Users**, then delete all local database users individually.

Caution Do not delete all local database web users until you have verified that you can log into the NAM Traffic Analyzer as a TACACS+ user.

Q. How can I recover the local web admin user password?

A. You can recover the password in situations where you have forgotten the local web admin user password, or when another user with Account permission logged in and changed the local web admin user password.

To recover the local web admin user password:

Step 1 Access the NAM CLI.

Step 2 Enter the following commands:

```
web-user
user name <name>
exit
```

Step 3 At the prompt, enter the new password.

Step 4 Enter **Y** to confirm the new password.

Q. How can I recover when I mixed up the TACACS+ configuration between my NAM and TACACS+ server, and I do not have a local database user account to fix my TACACS+ configuration on my NAM?

A. If you cannot fix this problem from the TACACS+ server, go to the NAM CLI and enter **ip http tacacs+ enable** to reconfigure the TACACS+ settings.

Q. Are there restrictions on using passwords when performing upgrades or applying patches?

A. Yes. Do not include the password as an argument in upgrade and patch commands. Use command syntax of this form:

```
patch ftp://user@host/full-patch/filename
```

Enter the password when prompted.

Login Issues

Q. Why does my login session time out?

A. Your login session automatically times out after approximately 1 hour of inactivity, then logs you out of the NAM Traffic Analyzer.

Note If you are viewing a window in which the autorefresh feature is enabled, your login session does not time out.

Q. Why do users remain logged in after their user accounts are deleted?

A. If you delete user accounts while users are logged in, they remain logged in and retain their privileges. The session remains in effect until they log out. Deleting an account or changing permissions in mid-session affects only future sessions. To force off a user who is logged in, restart the NAM.

Q. Why am I unable to log into the NAM Traffic Analyzer with TACACS+ configured?

A. Verify that you entered the correct TACACS+ server name and secret key and that you are using the same the secret key as the one configured in the
TACACS+ server. If you use a generic TACACS+ server, make sure that it supports Password Authentication Protocol (PAP) and that PAP is selected.

You can also check system alerts for any TACACS+-related messages.

Step 1 Log into the NAM Traffic Analyzer as a local user.

Step 2 Choose **Admin** > **Diagnostics**.

Step 3 In the contents, click **Tech Support**.

Step 4 Scroll down to the **/var/log/messages** section.

Step 5 Look for messages similar to the following, then take the appropriate action.

Message	Likely Cause and Action
`...PAM-tacplus[612]:auth failed: Login incorrect`	The username and password do not match any usernames and passwords in the TACACS+ server. 1. Log into the TACACS+ server. 2. Configure the server to authenticate and authorize NAM users. (See the"Establishing TACACS+ Authentication and Authorization" section on page 2-6.)

`... httpd: tac_authen_pap_read: error reading PAP authen header, read -1 of 12: Connection reset by peer`
`... PAM-tacplus[10455]: auth failed: Authentication error, please contact administrator.`
	The NAM has not been added to the NAS (AAA client) list of the ACS/TACACS+ server.
	1. Log into the TACACS+ server.
	2. Make sure that the NAM is in the NAS (AAA client) list and TACACS+ is selected as the authentication method.
	(See the"Establishing TACACS+ Authentication and Authorization" section on page 2-6.)

`...httpd:tac_authen_pap_read: invalid reply content, incorrect key?`
`...PAM-tacplus[616]:auth failed: Authentication error, please contact administrator.`
	The TACACS+ secret key configured in the NAM does not match the secret key of the TACACS+ server.
	1. Choose **Admin** > **Users**.
	2. In the contents, click **TACACS+**.
	3. Enter the correct secret key in the Secret Key and Repeat Secret Key fields.
	4. Click **Apply**.

Message	Likely Cause and Action

`..httpd:tac_connect:connection to 172.20.122.183 failed:Connection timed out`
`...httpd:tac_connect:all possible TACACS+ servers failed`
`...PAM-tacplus[613]:connection failed srv 0: Connection timed out`
`...PAM-tacplus[613]:no more servers to connect`
	An incorrect TACACS+ server IP address is configured on the NAM.
	1. Click **Admin**.
	2. Click **Users**.
	3. In the contents, click **TACACS+**.
	4. Enter the correct TACACS+ server address.
	5. Click **Apply**.

`Not authorized...` (when accessing NAM Traffic Analyzer)	The user does not have the necessary access rights. 1. Log into the TACACS+ server. 2. Grant the appropriate rights to the user. (See the"Adding a NAM User or User Group" section on page 2-7.)

SPAN Related Issues

Note This section applies to NAM-1 and NAM-2 only.

Q. What if the SPAN session does not show up in the Active SPAN window?

A. If you have a switch that is running Catalyst OS, a SPAN session will become inactive if the module that contains the destination port is removed from the switch chassis. In this case, the NAM will not see the SPAN session because the SPAN configuration has been removed from the SNMP agent by the Supervisor engine module.

Q. Why does my create SPAN session fail on a switch running Cisco IOS?

A. For switches running Cisco IOS, a SPAN session can be partially defined with either a source type or destination port only. The NAM will not see this partial SPAN session. However, the partially configured SPAN session may cause the create SPAN request to fail if there is a conflict with either the source type or destination port.

Q. How do I change the SPAN session so it only spans in one direction—or, change the SPAN session type from switch port to VLAN or VLAN to switch port?

A. You cannot edit these characteristics using the NAM Traffic Analyzer after creating the SPAN session. Instead, you must delete the SPAN session and create a new one with the desired characteristics.

You can also simply click **Create** (without deleting the SPAN session) to overwrite the current SPAN.

Note You can only add or delete VLANs (if the current SPAN session is already VLAN) in a SPAN session in the Setup SPAN Sources dialog box. You cannot change the SPAN traffic type (such as changing VLAN to ports or changing the traffic direction).

Q. Why do I sometimes see the message, `Failed to create SPAN session for...`, when I create or edit a SPAN session in the Setup SPAN Sources dialog box?

A. This usually happens because you reached the SPAN limit on the switch. To determine the applicable limits, see the appropriate Catalyst OS or Cisco IOS documentation. The simplest solution is to delete the SPAN (or RSPAN, if applicable) session and try to edit or create a new one.

Packet Capturing Issues

Q. Why is the capture buffer locked and why are no packets being captured in the Capture Settings dialog box?

A. This happens because you selected **Lock when full**, which prevents the capture process from overwriting the contents when the buffer fills.

To restart a locked capture, you first have to clear it. You might want to save the capture buffer to a file before clearing it.

Note

- You can also select **Wrap when full** so the newly arriving packets overwrite the oldest packets when the capture buffer is full.

Q. Why am I having problems capturing packets, even after I configured the capture settings in the Capture Settings dialog box and clicked **Start**?

A. This might happen for several reasons.

Verify that the data source you selected in the **Capture packets from** list is spanned to the NAM.

Tip The NAM automatically learns VLANs from the switch, but does not automatically SPAN them—you must still SPAN them using the Active SPAN Sources window.

To verify that your SPAN session is working:

Step 1 Choose **Setup** > **Data Sources**.

Step 2 Verify that packet traffic is spanned from the appropriate source.

Step 3 If not, click **Create** or **Edit**, to add the desired SPAN sources.

Step 4 Click **Submit**.

Step 5 Choose **Capture** > **Settings**.

Step 6 Click **Start**.

You should also verify that you selected filters carefully in the Capture Settings dialog box. The filter you created might be too restrictive. (For more information, see Chapter 6, "Capturing and Decoding Packet Data.")

If you still cannot capture packets, try to remove all capture filters:

Step 1 Choose **Capture** > **Buffers**.

Step 2 Select the capture buffer and click **Settings**.

Step 3 Deselect the Address, Protocol, Port, and Custom check boxes.

Step 4 To restart the capture, click **Start**.

You might also have selected a filter based on a protocol that has been deleted from the NAM protocol directory (by an SNMP manager or another web user).

To see the protocols available for filtering, do the following:

Step 1 Choose **Setup** > **Monitor**.

Step 2 In the contents, click **Protocol Directory**.

Capture might fail to start because no memory is available for capture buffers. To find out about NAM capture memory usage, choose **Capture > Buffers**. Clear or delete old buffers to free up capture memory.

Q. Why do I see duplicate captured packets?

A. When packets appear twice in the Capture Decode dialog box, it might be because you are spanning in both directions (transmit and receive).

Q. Why does the automatic capture trigger not stop or start?

A. The alarm associated with the automatic capture might have not occurred yet. Go to **Alarms > NAM** to see the list of past alarm occurrences. In addition, for start capture triggers, the capture buffer should initially be in a paused state.

If the buffer is cleared or running, a start capture trigger does not work. For stop capture triggers, the capture buffer should be running initially. If the buffer is paused or cleared, a stop trigger does not work. For more information, see the "Configuring Capture Settings" section on page 6-3.

Q. Why am I unable to start a capture from the Monitor window?

A. When the buffer has been completely allocated to other capture processes and the available buffer is 0 MB, the capture process will not start. To solve this problem, clear an existing capture process to free up the buffer so new processes can be started.

Q. Why does the layer two information in packets captured on an internal port of the NM-NAM look wrong.

A. The router copies the packets to the NM-NAM in the CEF path. At that time the layer two has been stripped off. A special layer two header is used to send the packet to the NM-NAM

Q. Why do I see additional traffic on the NM-NAM internal port besides what I configured to be monitored.

A. Besides the traffic copied to the NM-NAM by the analysis-module monitoring feature, management traffic might also be directed to the NM-NAM that is captured.

Alarm and Interface/Port Stats Issues

Q. Why does one of the alarms in the Setup/Alarm/NAM MIB Thresholds window show the Data Source as Collection Deleted?

A. Data Sources are mapped to a table collection index. When you delete the collection from the Setup/Monitor/Core window, the table index is deleted. Because the alarm data source can no longer map to a table index, you must delete the alarm and recreate it.

Q. Why am I unable to create threshold alarms or view interface or port statistics?

A. Two typical reasons might be because there is no connectivity between the switch and the NAM, or that mini-RMON is not enabled on the switch.

For WS-SVC-NAM-1 and WS-SVC-NAM-2 devices

To verify that there is connectivity, go to **Setup** > **Chassis Parameters** > **Chassis Information** and view the SNMP read from switch and SNMP write to switch results. For more information on the Switch Information table, see the "Viewing the Switch Information" section on page 3-2.

To verify that Mini-RMON is enabled on the switch, go to **Setup** > **Chassis Parameters** > **Port Stats (Mini-RMON)** and view the Current Status in the table. For more information on enabling Mini-RMON, see the "Enabling Mini-RMON Collection" section on page 3-49.

For NM-NAM or NME-NAM Devices

To verify that there is connectivity, check that the community strings are configured. You can also go to **Setup** > **Router Parameters** and click the **Test** button to verify that the community string is correct. For more information on testing the router community strings, see the "Testing the Router Community Strings" section on page 3-30.

Q. Why do I see negative values on the Alarms window?

A. The alarm counters wrapped back to zero between the last poll and the current poll.

Q. Why does the Cumulative Data table for port/interface statistics take a long time to load?

A. This might be because of poor or nonexistent connectivity. To check your connectivity, go to **Setup** >**Chassis Parameters** and click **Test**.

Note For NM-NAM or NME-NAM devices, go to **Setup**>**Router Parameters**.

NetFlow and NBAR Monitoring Problems

Q. Why is there no data for the default NetFlow data source of the device?

A. Select **Setup** > **Data Sources** > **NetFlow** > **Listening Mode** and click **Start**. If the device is displayed in the table, see the "Why is there no data in collections even though the Listening Mode table shows that the NAM is receiving NDE packets from the device?" question on page A-9. If the device is not displayed in the table after three refresh cycles, the NAM is not seeing NetFlow packets from the device. There is either a network problem or the device is not configured properly.

To verify that a NetFlow device is configured to send NetFlow packets to UDP port 3000 of the NAM, use the following command:

```
prompt#show ip flow export
```

or

```
prompt#show mls nde
```

Displayed information shows whether NetFlow export is enabled or disabled, to what IP address and port NetFlow packets are being exported, and the number of NDE packets that were sent to the NAM. For more information on configuring your NetFlow device, see the "Configuring NetFlow on Devices" section on page 3-19 or your accompanying device documentation.

Q. Why is there no data in collections even though the Listening Mode table shows that the NAM is receiving NDE packets from the device?

A. Verify that you have data for the collections in the **Monitor** > **Hosts**, **Monitor** > **Apps and Monitor** > **Conversations** pages. If there is NetFlow data on the Monitor pages, then the auto refresh interval might be too fast. For more information on troubleshooting the auto refresh interval, see the "Why are the Monitor > Hosts, Monitor > Apps and Monitor > Conversations pages showing data only every two (or more) auto refresh cycles?" question on page A-9 and the "Why does the Network Conversations table on the Monitor>Conversations page have 0.0.0.0 for all entries in the source column?" question on page A-11.

If there is *no* NetFlow data on the Monitor pages, then you might be using an incompatible version of NDE. Make sure that the NDE version is 1, 5, 6, 7, or 8. For more information, see the "Why do the Monitor>Hosts and Monitor>Conversations pages have no active flow data?" question on page A-10.

Note NDE version v8-AS-Aggregation is not supported.

Q. Why are the **Monitor** > **Hosts**, **Monitor** > **Apps** and **Monitor** > **Conversations** pages showing data only every two (or more) auto refresh cycles?

A. This is caused by the implementation of the NDE source device. Entries in the NetFlow cache expire after a certain level of inactivity, if the end of a connection is detected, or if an expiration time is reached. The expired flow will still be exported to the destination. If the aging time is longer than the NAM refresh interval, no NetFlow packets will appear in one refresh interval of the NAM.

To solve this problem, choose **Setup** > **Preferences** and increase the auto refresh interval on the NAM, or change the aging time of the NetFlow entries. Before you change the aging time on the NDE source device, consult your NDE usage guidelines.

For devices running Cisco IOS, use the following commands to specify the aging time.

```
Prompt(config)#ip flow-cache timeout <active || inactive> <seconds>
```

or

```
Prompt(config)#mls aging <fast time || long || normal> <seconds>
```

For devices running Catalyst OS, use the following command to specify the aging time.

```
Prompt>(enable) set mls agingtime <long-duration || fast || ip>
```

Where:

- long-duration—Sets the aging time for flows that are long active.

- fast—Sets the aging time for flows that do not exceed packet thresholds.
- ip—Sets aging time for IP flows.

Q. Why are there no collections for a custom NetFlow data source?

A. Verify that the data source is setup on an interface with an Input direction. Output and Both directions are recommended only for special cases. They might require you to enable NetFlow on all interfaces to get comprehensive output direction flow data. For more information on NetFlow flow records, see the "Understanding NetFlow Flow Records" section on page 3-19.

You can verify the interface direction by clicking the Detail button on the NetFlow Listening Mode table. For more information on using the NetFlow Listening Mode, see the "Using the Listening Mode" section on page 3-27.

The custom NetFlow data source might also be collecting data on a wrong interface ifIndex. This is due to ifIndices in the remote NetFlow devices not being persisted after device reboots. It is recommended you use the ifIndex persist feature for any supported devices. For devices running Cisco IOS, the ifIndex can be persisted per interface or globally for all ifIndices.
For example:

- snmp ifindex persist
- snmp-server ifindex persist

For devices running Catalyst OS, ifIndices are always persisted.

Q. Why do the Monitor>Hosts and Monitor>Conversations pages have no active flow data?

A. Either the active flow has not expired, the device has an NDE filter, or the cache is full and new entries cannot be inserted into the cache. In any of these cases, the active flow is not in the NetFlow packets that are being exported to the NAM.

To solve this problem make sure there is no NDE filter on the device, check for long aging times, and check for dropped flow packets.

To check for long aging times to see if the active flow has expired, enter one of the following commands:

```
Prompt>(enable)show ip cache flow

Prompt>(enable)show mls netflow aging

Prompt>(enable)show mls
```

Active flows that have an active time *below* the long duration aging time are not yet expired and have not been exported to the NAM. You can set the aging time to a lower value. For information on how to do this, refer to the user documentation for the NDE device.

Q. Why is there no data for a NetFlow data source configured for specific interfaces, but there *is* data for the default NetFlow data source?

A. There might be no NetFlow record that has the specific interface information. Use the Listening Mode to find out what interfaces have NetFlow records.

Step 1 Choose **Setup** > **Data Sources** > **NetFlow**> **Listening Mode**.

Step 2 Click **Start**.

Step 3 Wait until the device table has more than three MDE packet counts.

Step 4 Select the device in interest.

Step 5 Click **Details**.

If the interfaces are not in the Details window, you must configure the NetFlow source device manually.

For Devices Running Cisco IOS

```
Prompt(config)#interface <type> <slot/port>
Prompt(config-if)#ip route cache flow
Prompt(config)#mls nde interface
```

For Devices Running Catalyst OS

```
Prompt>(enable) set mls nde destination-ifindex enable
Prompt>(enable) set mls nde source-ifindex enable
```

Make sure the flow mask is set to full or interface-full.

Q. Why is only the local device address appearing in the drop-down list when I create a NetFlow data source from the **Setup** > **Data Sources** > **NetFlow** > **Custom Data Sources** page?

A. First you must add the device in the **Setup** > **Data Sources** > **NetFlow** > **Devices** page. A default NetFlow data source for the device is displayed on the **Setup** > **Data Sources** > **NetFlow** > **Custom Data Sources** page. The drop down list now contains the devices.

Q. Why is there no available interfaces list when I create a NetFlow data source?

A. Make sure the community string is correct. Use the Test button on the NetFlow Devices table on the **Setup** > **Data Sources** > **NetFlow** > **Devices** page. For more information, see the "Testing NetFlow Devices" section on page 3-25.

If there is an error, the community string might not be correct. Select the device from the NetFlow Devices table, click **Edit**, and enter the correct community string. Also make sure that the remote device accepts SNMP connections.

Q. Why does the Network Conversations table on the Monitor>Conversations page have 0.0.0.0 for all entries in the source column?

A. This is because the NDE device has the flow mask set to destination. To set the flow mask to full, interface-destination-source, or interface-full, use the following commands.

For Devices Running Cisco IOS

```
Prompt(config)#mls flow ip <full || interface-full>
```

For Devices Running Catalyst OS

```
Prompt>(enable) set mls flow full
```

Note The NAM supports NDE versions 1, 5, 6, 7, 8, and 9 source-prefix, destination-prefix, prefix, and protocol-port aggregations.

For more information on flow masks and the Monitor pages, see the "NDE Flow Masks and V8 Aggregation Caches" section on page 4-5.

Q. Why is NBAR not available on switches?

A. Although NBAR can be configured using the command line on the Catalyst 6500 switches, currently the switches do not provide the MIBs to configure and monitor NBAR.

Report Problems

Q. Why does my report not show any data for some or all of the time periods?

A. This could be for several reasons:

- The report might have been created recently and no data has been collected yet. It takes at least two polling intervals for the first data point to show up.
- The applicable traffic data source is not being sent to the NAM. For example, the SPAN session might have been configured improperly and it does not contain applicable traffic for the report. Go to **Setup** > **Data Source** to make sure that the data source for the report is properly configured.
- The report is disabled.
- The NAM was shut down or was not running during the time period.
- The report target is inactive.

Q. Why does the report status shows OK, but the report has no data during some or all of the time periods?

A. There might be an error condition or exception. From the reports window, select the tabular report style and click **system events** to view the report error conditions and exceptions. For more information on report error conditions and exceptions, see Table 5-15 on page 5-22.

Q. Why is there no data in all of my PortStat reports?

A. PortStat reports require the mini-RMON feature on the switch. Make sure that the switch supports mini-RMON and that it is enabled.

Q. Why is there no data in all of my VLAN reports?

A. Top N VLAN reports and target VLAN reports with the Supervisor engine module as a data source require the SMON feature in the switch Supervisor. Make sure that the Supervisor engine module supports the SMON feature and that it is enabled.

Q. Why does the data in my Response Time reports stay constant for multiple time periods?

A. You might have selected a reporting interval that is too long. Select **Setup** > **Monitor**> **Response Time Monitoring** and select a shorter report interval. It is recommended that you select the same polling interval as your Response Time reports. For example, if you select a 60 minute report interval and a 15 minute polling interval for your reports, the report data will be over-polled and the same data will repeat for every four consecutive 15 minute intervals.

Q. What happens to a report if I change the DNS resolution setting?

A. The Monitor window will not be able to see the report. If you create a report with DNS turned on, the report will be set up with the DNS name as the host. If you then turn DNS off, the Monitor window will look for the IP address instead of the DNS name.

Image Upgrade and Patch Issues

Q. How do I upgrade the application image of my NAM?

A. For NAM-1 and NAM-2 see the Catalyst 6500 Series Switch and Cisco 7600 Series Router Network Analysis Module Installation and Configuration.

Note For NME-NAM see the *Network Analysis Module (NM-NAM) Feature Guide*.

Q. Why am I having problems upgrading my NAM image?

A. Verify the following:

1. The NAM booted into the correct partition
   - To upgrade the NAM application image, you must boot the NAM into the maintenance partition.
   - To upgrade the NAM maintenance image, you must boot the NAM into the application partition.
2. The URL specifies the correct image location. If it does not, enter the correct URL.
3. The upgrade was not interrupted. If it was, reboot the NAM and start the upgrade again.

Note For more information, see the *Network Analysis Module (NM-NAM)* feature module.

Q. Why am I having problems applying a patch?

A. Verify the following:

- Does the URL specify the correct image location? If not, enter the correct URL.
- Was the patch process interrupted? If so, start the process again.

Q. How can I verify which patches are installed on the NAM?

A. You can use the command-line **show patches** command or click **About** in the toolbar in the NAM Traffic Analyzer user interface.

Web Browser Response Time and Display Issues

Q. Why do my browser windows (such as the Packet Decode window or those under the Monitor tab) sometimes refresh so slowly?

Q. Why is the Packet Decoder window so slow in displaying packets?

A. You might need to verify that your DNS name servers point to valid DNS servers.

Tip
- If the name servers point to nonexistent or misconfigured DNS servers, lookups time out after 20 to 30 seconds.
- In an environment without DNS, no name servers should be configured.

You also might need to turn off automatic hostname resolution:

Step 1 Choose **Setup** > **Preferences**.

Step 2 Deselect the Perform IP Host Name Resolution check box.

Step 3 Click **Apply**.

Note For more information, see the "Hostname Resolution Issues" section on page A-15.

The browser windows might also refresh slowly because of the amount of data to be sorted and displayed. Consider limiting your collection (such as the number of conversations) and reducing the maximum entries in the appropriate Monitoring window (in the Setup tab) to improve response time.

Q. Why does the formatting of my browser window or popup windows sometime look incorrect?

A. If browser displays are not formatted correctly, click your browser **Refresh** button. If popups are not formatted correctly, close and reopen the popup.

NAM Switch Date and Time Synchronization Issues

Q. Why are the NAM date and time different than the switch date and time?

A. When you boot the NAM, the NAM date and time are synchronized with the date and time on the switch. However, if the dates and times do not match, go to **Admin** > **System** > **NAM System Time** to synchronize the NAM system time with the switch or an NTP server. For more information on using the NAM System Time, see the "NAM System Time" section on page 2-14.

Q. Why does the NAM display an incorrect time when I change the time synchronization method from NTP to switch?

A. For Supervisors running Catalyst OS images earlier than 7.5(1), the NAM system time is synchronized with the switch only at startup. The NAM will not resynchronize time with the switch when you change from NTP time to switch time. To work around this problem, reset the NAM.

Diagnostic Error Message Issues

Q. What do these errors in the Diagnostics Tech Support window indicate?

```
Fri Nov 16 11:33:33 2001] [error] [client 172.20.9.52] File does not exist:
/usr/local/ apache/htdocs/scripts/..%2f../winnt/system32/cmd.exe
[Fri Nov 16 11:35:31 2001] [error] [client 172.20.102.27] File does not exist:
/usr/local/ apache/htdocs/scripts/root.exe
[Fri Nov 16 11:35:31 2001] [error] [client 172.20.102.27] File does not exist:
/usr/local/ apache/htdocs/MSADC/root.exe
[Fri Nov 16 11:35:31 2001] [error] [client 172.20.102.27] File does not exist:
/usr/local/ apache/htdocs/c/winnt/system32/cmd.exe
[Fri Nov 16 11:35:31 2001] [error] [client 172.20.102.27] File does not exist:
/usr/local/ apache/htdocs/d/winnt/system32/cmd.exe
[Fri Nov 16 11:35:31 2001] [error] [client 172.20.102.27] File does not exist:
/usr/local/ apache/htdocs/scripts/..%5c../winnt/system32/cmd.exe
```

A. These errors might indicate a virus-infected client searching for the next system to infect.

Some viruses look for vulnerabilities in a webserver running on port 80. Several remedies exist, including:

- Disinfecting clients (note their IP addresses).
- Implementing access control lists (ACLs) to prevent access to the NAM.
- Running the NAM webserver on a different port (because many virus attacks target only port 80.)

Hostname Resolution Issues

Q. Why did my importing of a remote hosts file fail when I used the **`ip hosts add ...`** command?

A. This might happen because:

- The hosts file is not formatted correctly. For more information see *Catalyst 6500 Series Switch and Cisco 7600 Series Internet Router Network Analysis Module Installation and Configuration Note:*

  http://www.cisco.com/en/US/docs/net_mgmt/network_analysis_module_software/4.0/switch/configuration/guide/swconfig.html

- The local hosts file is limited to 1000 entries. Verify that you are not trying to add more than 1000 entries. You can use the NAM CLI command **show tech-support**, then look for a line that reads;

```
Total number of entries in hosts files: nn
```

Tip

- To review the entries configured in the file, use the **show hosts** command.
- If you need to add more than 1000 hosts, use DNS or select the 1000 most critical hosts for local name resolution.

Q. Why are there long delays during remote Telnet sessions to the NAM?

A. The problem might be with the DNS server address. The DNS server address must be set to the IP address of an operational DNS server. When the NAM cannot reach the server because of an incorrect address, inability to connect to the server, or a non-operational server, you might experience long delays.

To resolve this problem, change the DNS server to the IP address of a working server, or eliminate the server:

Step 1 Choose **Admin** > **System**.

Step 2 In the contents, click **Network Parameters**.

Step 3 Change the parameters as needed.

Step 4 Click **Apply**.

You can also use the NAM CLI command **`ip nameserver`** *`nameserver_addr`* (to select a specific nameserver) or eliminate the nameserver completely with the command **`ip nameserver disable`**.

Q. Why are there long delays while waiting for diagnostic tech support output?

A. The problem might be with the DNS server address. To resolve this problem, change the DNS server to the IP address of a working server, or eliminate the server:

Step 1 Choose **Admin** > **System**.

Step 2 In the contents, click **Network Parameters**.

Step 3 Change the parameters as needed.

Step 4 Click **Apply**.

You can also use the NAM CLI command **`ip nameserver`** *`nameserver_addr`* (to select a specific nameserver) or eliminate the nameserver completely with the command **`ip nameserver disable`**.

Q. Are there restrictions on adding or deleting certain IP addresses to my local hosts file using the **`ip hosts add ...`** and **`ip hosts delete ...`** commands?

A. Yes. Do not add or delete host entries using the NAM IP address or IP addresses beginning with 127.*x.x.x*.

Data Mismatch Issues

Q. I clicked the Monitor tab, then **Hosts** or **Conversations**. The Network Host Table displayed. When I click a hostname, the data in the popup chart and tables sometimes do not match. Why does this happen?

A. The sources of the data used for the chart and tables in the detail popups are independent and might age out at different intervals.

HTTPS/Security Certificate Issues

Q. Why do I see warning messages that my certificate has expired when I point my web browser to the NAM using https?

A. This happens because your certificate has expired. To resolve this, you can either:

- Generate a self-signed certificate.
- Generate a certificate-signing request. Send the request to the certification authority, then install the certificate you receive.
- To do either of these, you use NAM CLI commands. For more information, see *Catalyst 6500 Series Switch and Cisco 7600 Series Internet Router Network Analysis Module Installation and Configuration Note:*

  http://www.cisco.com/en/US/docs/net_mgmt/network_analysis_module_software/4.0/switch/configuration/guide/swconfig.html

Q. What do I do when I see warning messages in my web browser that the name on the security certificate does not match the name of the site?

A. To resolve this, you can either:

- Generate a self-signed certificate—When doing so, enter **no** when asked whether to re-use the certificate-signing request. This generates a new certificate-signing request, then a self-signed certificate. Enter your hostname when prompted for the Common Name.
- Generate a certificate-signing request—Enter your hostname when prompted for the Common Name. Send the request to the certification authority, then install the certificate you receive.
- To do either of these, you use NAM CLI commands. For more information, see *Catalyst 6500 Series Switch and Cisco 7600 Series Internet Router Network Analysis Module Installation and Configuration Note:*

  http://www.cisco.com/en/US/docs/net_mgmt/network_analysis_module_software/4.0/switch/configuration/guide/swconfig.html

  If you have done the above and still see the warning message, try to enter the full host name of the NAM in the browser address window. For example, if the full host name of the NAM is nam1.cisco.com, enter https://nam1.cisco.com instead of https:/nam1.

Q. What do I do when I see warning messages in my browser that the security certificate was issued by a company I have not chosen to trust?

A. View the certificate to determine whether you want to trust the certifying authority. You may see this message if the HTTPS certificate of the NAM is the factory (test) certificate, or a self-signed certificate. Click **Proceed**.

SNMP Issues

Q. Does the NAM support SNMPv3?

A. The NAM supports only SNMPv1 and SNMPv2c, including both external SNMP managers interacting with the NAM and the NAM interacting with the switch for mini-RMON port statistics and switch-based alarms.

Q. When I click **Test** on the Router Parameters dialog box, a window displays that SNMP read from the router failed.

A. You must verify that the SNMP read-write community strings entered are the same SNMP read-write community strings defined for the *router.* If the community strings are correct, and the test fails, verify that the router has IP permit list enabled.

For Switches Running Catalyst OS only

Step 1 Log into the switch in enable mode

Step 2 Enter `show IP permit`.

If IP permit list is enabled, verify that the internal address of the NAM is added to the list.

Note To view the NAM internal IP address from Traffic Analyzer, click **Test** from the Switch Community String dialog box under **Setup > Chassis Parameters**. The Switch Community String Test dialog box is displayed.

Enter **`set IP permit`** *`NAM ip address`* **`SNMP`**.

Q. Must I enable the NAM SNMP agent when I use the NAM Traffic Analyzer?

A. No. You only need the SNMP agent to support SNMP communication from external SNMP managers. To disable SNMP on the NAM:

Step 1 Choose **Admin** > **System**.

Step 2 In the contents, click **NAM SNMP**.

Step 3 In the NAM Community Strings pane, select and delete all NAM community strings.

Q. When I set the timing buckets and report interval of an ART collection using SNMP, why do the settings of other ART collections also change?

A. NAM supports a global setting for ART timing buckets and report interval. So any settings you make using SNMP will apply to all ART collections. See Setting Up Response Time Configuration, page 3-54, for information about using the GUI to configure ART timing and report interval.

Note The method you use last overrides previous settings. So if you change the settings using SNMP, those settings will override the settings made using the GUI, and vice versa.

Protocol Support Issues

Q. Why do some protocols (such as sunrpc) sometimes appear twice in the application statistics windows?

A. Only the highest-level protocols are displayed. In some cases, a higher-level protocol might run on more than one lower layer protocol. For example, sunrpc might run on TCP and UDP. The NAM Traffic Analyzer would display two line items so you can differentiate between the two. Hold your mouse over the protocol and a small popup displays the full protocol stack involved.

Q. When I click the Monitor tab, then **DiffServ**, then **Application Stats**, I sometimes see a protocol such as http with a larger number of packets (or bytes) per second than the lower-layer protocol TCP. Why does this happen?

A. The differentiated services monitoring (DiffServ) statistics counts the packets only in the highest-level protocol possible. Therefore, a ...tcp.http packet counts as only an http packet. Packets classified as TCP mean that was the highest level the NAM could process. This might happen because it was an unrecognized TCP port or a state-based protocol in which the NAM did not detect a preceding packet to classify it.

Q. Where can I find a list of all protocols that the NAM supports?

A. A list of all protocols the NAM monitors is displayed in the Protocol Directory table under **Setup**>**Monitor**. You can also retrieve and modify the protocols using an SNMP tool.

Q. If I do not see a protocol listed on the **Setup**>**Capture**>**Settings** page, does that mean the NAM does not recognize that protocol, and it therefore is not displayed in the Monitor displays?

A. If the Protocols check box is selected and All is selected from the Protocols drop-down list, then all of the protocols the NAM can monitor will be listed in the selection box. You can use the Protocols drop-down list to select a more appropriate subset of protocols for your given environment.

Q. Are all of the protocols that the NAM tracks for Monitor displays (such as Monitor Apps, Monitor Overview) available for decode in the Capture Decode dialog box?

A. No. Decodes are available only for some of the protocols supported by the NAM. For additional decodes, you might consider using a third-party application. You can use the Capture Download feature to export your trace file to the third-party application.

Q. What does the protocol entry labeled *"others"* signify on some of the NAM web windows?

A. The protocol entry labeled *"others"* represents the sum of traffic for which the NAM was unable to identify the topmost application layer in the packet data. For example, these can be unrecognized TCP/UDP ports or dynamically assigned ports for which the NAM was not able to analyze the setup transactions. One way to gain more information is to use the capture capability of the NAM to capture packet data, then look for packets that cannot be fully decoded in the **Capture>Decode** window.

Voice Monitoring Issues

Q. Why are some columns blank in the detail windows that display VoIP phones and phone calls?

A. The amount of detail the NAM can provide for IP telephony traffic depends on the physical placement of the NAM relative to the IP phones, Call Managers, H.323 gatekeepers, and MGCP gateways. It also depends on what subset of traffic in the switch or router is being spanned or copied to the NAM. The NAM sometimes cannot directly observe the call setup transactions for phones on remote networks. In general, all detailed phone and call information that the NAM can observe is populated into the fields of the web displays.

Q. Why do some displays show that the phone protocol is SCCP (H.323 or MGCP) when it is really something else?

A. The protocol associated with a phone denotes the protocol by which the NAM initially *learned* about the phone, not necessarily the protocol used by that phone.

For example, if an SCCP phone calls an H.323 phone, and the NAM directly observes only the SCCP side of the call setup, it associates the SCCP protocol with both sides of the call because that is how the NAM learned about *both* phones.

Q. Why don’t I see quality statistics (jitter, packet loss) for my SCCP phone calls?

A. For the NAM to report jitter and packet loss statistics for SCCP calls, Call Maintenance Records and Call Detail Records must be enabled on the Cisco Call Managers.

To turn on CMR and CDR in Cisco Call Manager 3.1, follow these steps:

Step 1 Go to the Cisco CallManager Administration window.

Step 2 Choose **Service > Service Parameters**.

Step 3 Choose the IP address of your Cisco CallManager server.

Step 4 Click the **Next** button.

Step 5 Choose the Cisco CallManager service.

Step 6 Choose **True** in the Parameter Value field for Call Diagnostics Enabled.

Step 7 Scroll down to the CdrEnabled service parameter and choose **True** for the value.

Step 8 Click the **Update** button.

Step 9 Call detail records start logging immediately.

Note This procedure is only valid on CallManager version 3.1, but other versions have a very similar process.

Q. What is the MGCP Endpoint in the **Monitor**>**Voice**>**Known Phones** window?

A. An MGCP Endpoint entry represents a MGCP gateway trunk port that one or more IP phones use to communicate with phones in the PSTN.

Q. Why do some MGCP Call Detail tables have Q.931 detail information?

A. When Cisco Call Manager and Cisco MGCP gateway traffic is copied to the NAM, the phone number and phone alias information for the MGCP calls might be obtained from Q.931 traffic. When this happens, the MGCP Call Detail table will have separated Q.931 table above it with detail information.

WAAS Application Response Time Issues

Q. Why is there no data in the response time monitor screens?

A. Response Time calculation requires that NAM sees traffic in both directions: from clients to servers and vice versa. If NAM sees traffic in one direction only, it will not be able to calculate and monitor response time. Check you SPAN configuration to make sure that NAM receives traffic in both directions. Also check if there is asymmetric routing in the network, in which returning traffic may follow a different path from originating traffic.

Q. Why does the WAAS device status remain *Inactive*?

A. Use the following WAAS CLI commands to enable the WAAS device to export flow data to the NAM for monitoring.

flow monitor tcpstat-v1 host <*NAM IP address*>

enable

Q. Why is there no data for the WAAS data source?
or
Why does the WAAS device status remain *Pending* and not *Active*?

A. Go to **Setup** > **Data Sources** > **WAAS** > **Monitored Servers** and make sure that you specify the correct application servers to be monitored (for example. web and FTP servers).

Note The monitored servers should be among the servers whose traffic is being optimized by WAAS.

Use the following WAAS CLI command to verify that you have configured the correct monitored servers:

show statistics flow filters

```
Number of Filters:        7
  Status:                   Enabled
  Capture Mode:             FILTER

  Flags:
  CSN: Client-Side Non-Optimized (Edge), SSO: Server-Side Optimized (Edge)
  CSO: Client-Side Optimized (Core), SSN: Server-Side Non-Optimized (Core)
  PT: Pass Through (Edge/Core/Intermediate), IC: Internal Client

      Server             Flow Hits                     Flags
  ---------------  ----------------------  ----------------------------------
  172.20.107.123                      120  CSO SSN
  1.2.3.4                               0  CSO SSN
  10.96.1.2                             0  CSO SSN
  10.31.10.1                            0  CSO SSN
  10.31.10.2                            0  CSO SSN
```

If the WAAS CLI command **show statistics flow filters** output shows ***zero flow hits*** for the servers, these servers have no traffic being optimized, and the WAAS device has no data to export to the NAM to be monitored. In this case, check your WAAS configuration to determine which servers are being optimized, and configure the NAM to monitor these servers.

Finally, make sure you configure the correct data sources for the WAAS devices. Typically, you should configure the Client data sources for wide-area edge (WAE) edge devices and configure Server and Server WAN data sources for WAE core devices. See the section Configuring WAAS Data Sources, page 3-35, for more information.

For more information about WAAS and configuring the WAAS components, see the document:

Cisco Wide Area Application Services Configuration Guide, OL-16376-01
http://www.cisco.com/en/US/docs/app_ntwk_services/waas/waas/v4019/configuration/guide/waas4cfg.html

APPENDIX B

Supported MIB Objects

The NAM supports all of the following MIB groups:

- RMON
- RMON2
- DSMON
- High Capacity RMON—except the medialIndependentGroup.
- SMON
- Application Response Time (ART) MIB

Supported MIBs

Table B-1 lists the RMON and RMON2 MIB objects supported by the supervisor engine and the NAM. The supervisor engine implements some objects from the RMON MIBs as specified in Table B-1. The supervisor engine RMON implementation is completely independent of the NAM implementation, and no MIB objects are shared.

To collect etherStats from a physical interface on the switch, configure the etherStatTable on the supervisor engine instead of on the NAM. The etherStats are collected accurately on multiple physical interfaces simultaneously.

If you are interested in the etherStats for a specific VLAN, configure the etherStatsTable on the NAM. For the data source, use the ifIndex corresponding to that VLAN.

Any alarmVariable configured on the supervisor engine must reference a MIB object on the supervisor engine. An alarmVariable configured on the NAM must reference a MIB object on the NAM.

Note You cannot configure an alarmVariable on the NAM that references a MIB object on the supervisor engine or configure an alarmVariable on the supervisor engine that references a MIB object on the NAM.

Table B-1 Supervisor Engine Module and NAM RMON Support

Module	Object Identifier (OID) and Description	Source

Supervisor Engine	...mib-2(1).rmon(16).statistics(1).etherStatsTable(1)
	...mib-2(1).rmon(16).statistics(1).tokenRingMLStatsTable(2)...mib-2(1).rmon(16).statistics(1).tokenRingPStatsTable(3)
		RFC 2819 (RMON-MIB)
		RFC 1513 (TOKEN-RING-RMON MIB)
		RFC 1513 (TOKEN-RING-RMON MIB)

	Counters for packets, octets, broadcasts, errors, etc.	

Supervisor Engine	...mib-2(1).rmon(16).history(2).historyControlTable(1)
	...mib-2(1).rmon(16).history(2).etherHistoryTable(2)
	...mib-2(1).rmon(16).history(2).tokenRingMLHistoryTable(3)...mib-2(1).rmon(16).history(2).tokenRingPHistoryTable(4)
		RFC 2819 (RMON-MIB)
		RFC 2819 (RMON-MIB)
		RFC 1513 (TOKEN-RING-RMON MIB)
		RFC 1513 (TOKEN-RING-RMON MIB)

	Periodically samples and saves statistics group counters for later retrieval.	
Supervisor Engine	...mib-2(1).rmon(16).alarm(3)	RFC 2819 (RMON-MIB)
	A threshold that can be set on critical RMON variables for network management.	
Network Analysis	...mib-2(1).rmon(16).alarm(3)	RFC 2819 (RMON-MIB)
	A threshold that can be set on critical RMON variables for network management.	
Network Analysis	...mib-2(1).rmon(16).hosts(4)	RFC 2819 (RMON-MIB)
	Maintains statistics on each host device on the segment or port.	
Network Analysis	...mib-2(1).rmon(16).hostTopN(5)	RFC 2819 (RMON-MIB)
	A user-defined subset report of the Hosts group, sorted by a statistical counter.	
Network Analysis	...mib-2(1).rmon(16).statistics(1).etherStatsTable(1)	RFC 2819 (RMON-MIB)
Network Analysis	...mib-2(1).rmon(16).matrix(6)	RFC 2819 (RMON-MIB)
	Maintains conversation statistics between hosts on a network.	
Network Analysis	...mib-2(1).rmon(16).filter(7)	RFC 2819 (RMON-MIB)
	A filter engine that generates a packet stream from frames that match a specified pattern.	
Network Analysis	...mib-2(1).rmon(16).capture(8)	RFC 2819 (RMON-MIB)
	Manages buffers for packets captured by the Filter group for uploading to the management console.	

Table B-1 Supervisor Engine Module and NAM RMON Support (continued)

Module	Object Identifier (OID) and Description	Source
Supervisor Engine	...mib-2(1).rmon(16).event(9)	RFC 2819 (RMON-MIB)
	Generates SNMP traps when an Alarms group threshold is exceeded and logs the events.	
Network Analysis	...mib-2(1).rmon(16).event(9)	RFC 2819 (RMON-MIB)
	Generates SNMP traps when an Alarms group threshold is exceeded and logs the events.	

Supervisor Engine	...mib-2(1).rmon(16).tokenRing(10).ringStation ControlTable(1)
	...mib-2(1).rmon(16).tokenRing(10).ringStation Table(2)
	...mib-2(1).rmon(16).tokenRing(10).ringStation OrderTable(3)
	...mib-2(1).rmon(16).tokenRing(10).ringStationConfig ControlTable(4)
	...mib-2(1).rmon(16).tokenRing(10).ringStationConfig Table(5)
	...mib-2(1).rmon(16).tokenRing(10).sourceRouting StatsTable(6)
		RFC 1513 (TOKEN-RING-RMON MIB)
		RFC 1513 (TOKEN-RING-RMON MIB)
		RFC 1513 (TOKEN-RING-RMON MIB)
		RFC 1513 (TOKEN-RING-RMON MIB)
		RFC 1513 (TOKEN-RING-RMON MIB)
		RFC 1513 (TOKEN-RING-RMON MIB)

	Aggregates detailed Token Ring statistics.	
Network Analysis	...mib-2(1).rmon(16).protocolDir(11)	RFC 2021 (RMON2-MIB)
	A table of protocols for which the Network Analysis Module monitors and maintains statistics.	
Network Analysis	...mib-2(1).rmon(16).protocolDist(12)	RFC 2021 (RMON2-MIB)
	A table of statistics for each protocol in protocolDir(11).	
Network Analysis	...mib-2(1).rmon(16).addressMap(13)	RFC 2021 (RMON2-MIB)
	List of MAC-to-network-layer address bindings.	
Network Analysis	...mib-2(1).rmon(16).nlHost(14)	RFC 2021 (RMON2-MIB)
	Statistics for each network layer address.	
Network Analysis	...mib-2(1).rmon(16).nlMatrix(15)	RFC 2021 (RMON2-MIB)
	Traffic statistics for pairs of network layer addresses.	
Network Analysis	...mib-2(1).rmon(16).alHost(16)	RFC 2021 (RMON2-MIB)
	Statistics by application layer protocol for each network address.	
Network Analysis	...mib-2(1).rmon(16).alMatrix(17)	RFC 2021 (RMON2-MIB)
	Traffic statistics by application layer protocol for pairs of network layer addresses.	

Table B-1 Supervisor Engine Module and NAM RMON Support (continued)

Module	Object Identifier (OID) and Description	Source
Network Analysis	...mib-2(1).rmon(16).usrHistory(18)	RFC 2021 (RMON2-MIB)
	Extends history beyond RMON1 link-layer statistics to include any RMON, RMON2, MIB-I, or MIB-II statistic.	
Supervisor Engine	...mib-2(1).rmon(16).probeConfig(19).	RFC 2021 (RMON2-MIB)
	Displays a list of agent capabilities and configurations.	
Network Analysis	...mib-2(1).rmon(16).switchRMON(22).smonMIB Objects(1) dataSourceCaps(1).dataSourceCapsTable(1).	RFC 2613 (SMON-MIB)
	Maps physical entities and VLANs to ifEntries.	
Network Analysis	...mib-2(1).rmon(16).switchRMON(22).smonMIB Objects(1) smonStats(2).smonVlanStatsControlTable(1).	RFC 2613 (SMON-MIB)
	Traffic statistics by VLAN ID number.	
Network Analysis	...mib-2(1).rmon(16).switchRMON(22).smonMIB Objects(1).smonStats(2).smonPrioStatsControlTable(3) .	RFC 2613 (SMON-MIB)
	Traffic statistics by 802.1p user priority value.	
Network Analysis	...frontier(141).mibdoc2(2).netscout2(1).art(5).art ControlTable(2)	draft-warth-rmon2-artmib-01.txt (ART-MIB)
	Application response time statistics.	
Network Analysis	...mib-2(1).rmon(16).mediaIndependentStats(21)	RFC 3273 (HC-RMON-MIB)
	Counters for packets, octets, broadcasts, errors, etc.	

	rmon.dsmonMib(26).dsmonObjects(1).dsmonAgg Objects(1).dsmonMaxAggGroups(1)
	rmon.dsmonMib(26).dsmonObjects(1).dsmonAgg Objects(1).dsmonAggControlLocked(2)
	rmon.dsmonMib(26).dsmonObjects(1).dsmonAgg Objects(1).dsmonAggControlChanges(3)
	rmon.dsmonMib(26).dsmonObjects(1).dsmonAgg Objects(1)..dsmonAggControlLastChangeTime(4)
	rmon.dsmonMib(26).dsmonObjects(1).dsmonAgg Objects(1).dsmonAggControlTable(5)
	rmon.dsmonMib(26).dsmonObjects(1).dsmonAgg Objects(1).dsmonAggProfileTable(6)
	rmon.dsmonMib(26).dsmonObjects(1).dsmonAgg Objects(1).dsmonAggGroupTable(7)
		RFC 3287 (DSMON-MIB)

	Aggregation or profile control variables and tables	

Table B-1 Supervisor Engine Module and NAM RMON Support (continued)

Module	Object Identifier (OID) and Description	Source

	rmon.dsmonMib(26).dsmonObjects(1).dsmonStatsObjects(2).dsmonStatsControlTable(1)
	rmon.dsmonMib(26).dsmonObjects(1).dsmonStatsObjects(2).dsmonStatsTable(2)
		RFC 3287 (DSMON-MIB)

	Per-datasource statistics collection tables	

	rmon.dsmonMib(26).dsmonObjects(1).dsmonPdistObjects(3).dsmonPdistCtlTable(1)
	rmon.dsmonMib(26).dsmonObjects(1).dsmonPdistObjects(3).dsmonPdistStatsTable(2)
	rmon.dsmonMib(26).dsmonObjects(1).dsmonPdistObjects(3).dsmonPdistTopNCtlTable(3)
	rmon.dsmonMib(26).dsmonObjects(1).dsmonPdistObjects(3).dsmonPdistTopNTable(4)
		RFC 3287 (DSMON-MIB)

	Per-protocol statistics collection tables	

	rmon.dsmonMib(26).dsmonObjects(1).dsmonHostObjects(4).dsmonHostCtlTable(1)
	rmon.dsmonMib(26).dsmonObjects(1).dsmonHostObjects(4).dsmonHostTable(2)
	rmon.dsmonMib(26).dsmonObjects(1).dsmonHostObjects(4).dsmonHostTopNCtlTable(3)
	rmon.dsmonMib(26).dsmonObjects(1).dsmonHostObjects(4).dsmonHostTopNTable(4)
		RFC 3287 (DSMON-MIB)

	Per-host statistics collection tables	
	rmon.dsmonMib(26).dsmonObjects(1).dsmonCapsObjects(5).dsmonCapabilities(1)	RFC 3287 (DSMON-MIB)
	DSMON capabilities variable	

	rmon.dsmonMib(26).dsmonObjects(1).dsmonMatrixObjects(6).dsmonMatrixCtlTable(1)
	rmon.dsmonMib(26).dsmonObjects(1).dsmonMatrixObjects(6).dsmonMatrixSDTable(2)
	rmon.dsmonMib(26).dsmonObjects(1).dsmonMatrixObjects(6).dsmonMatrixDSTable(3)
	rmon.dsmonMib(26).dsmonObjects(1).dsmonMatrixObjects(6).dsmonMatrixTopNCtlTable(4)
	rmon.dsmonMib(26).dsmonObjects(1).dsmonMatrixObjects(6).dsmonMatrixTopNTable(5)
		RFC 3287 (DSMON-MIB)

	Matrix statistics collection tables	
Supervisor Engine	...ciscoMgmt(9).ciscoNbarProtocolDiscoveryMIB(244).cnpdMIBObjects(1).cnpdStatus(1)	CISCO-NBAR-PROTOCOL-DISCOVER-MIB
	Indicates per interface whether nbar protocol discovery is enabled.	

Table B-1 Supervisor Engine Module and NAM RMON Support (continued)

Module	Object Identifier (OID) and Description	Source
Supervisor Engine	...ciscoMgmt(9).ciscoNbarProtocolDiscoveryMIB (244).cnpdMIBObjects(1).cnpdAllStats(2)	CISCO-NBAR-PROTOCOL-DISCOVER-MIB
	Statistics per interface for nbar protocol discovery.	
Network Analysis	...mib-2(1).entityMIB(47).entityMIBObjects(1).entityPhysical(1).entPhysicalTable(1)	RFC 2737 (ENTITY-MIB)
	Entity physical description.	
Network Analysis	...mib-2(1).entityMIB(47).entityMIBObjects(1).entityGeneral(4)	RFC 2737 (ENTITY-MIB)
Network Analysis	...ciscoMgmt(9).ciscoCdpMIB(23).ciscoCdpMIBObjects(1).cdpInterface(1)	CISCO-CDP-MIB
Network Analysis	...ciscoMgmt(9).ciscoCdpMIB(23).ciscoCdpMIBObjects(1).cdpCache(1)	CISCO-CDP-MIB
Network Analysis	...ciscoMgmt(9).ciscoCdpMIB(23).ciscoCdpMIBObjects(1).cdpGlobal(3)	CISCO-CDP-MIB
Supervisor Engine	...ciscoMgmt(9).ciscoProcessMIB(109).ciscoProcessMIBObjects(1).cpmCPU(1).cpmCPUTotalTable(10.cpmCPUTotalEntry(1)	CISCO-PROCESS-MIB
	CPU Statistics	
Supervisor Engine	...cisco(9).workgroup(5).ciscoStackMib(1).systemGrp (1).sysTrafficPeak(19)	CISCO-STACK-MIB
	Peak traffic meter value	
Supervisor Engine	..cisco(9).workgroup(5).ciscoStackMib(1).systemGrp (1).sysTrafficPeakTime(20)	CISCO-STACK-MIB
	Time since last peak traffic meter value occurred.	
Supervisor Engine	...ciscoMgmt(9).ciscoMemoryPoolMIB(48).ciscoMemoryPoolEntry(1)	CISCO-MEMORY-POOL-MIB
	Free and Largest block of contiguous memory	
Supervisor Engine	...mgmt(20.mib-2(1).entityMIB(47).entityMIBObjects(1).entityPhysical(1)	ENTITY-MIB
	Text description of physical entity.	
Supervisor Engine	...ciscoMgmt(9).ciscoEnvMonMib(13).ciscoEnvMonObjects(10)	CISCO-ENVMON-MIB
	Power, Temperature and Fan Status	

Table B-1 Supervisor Engine Module and NAM RMON Support (continued)

Module	Object Identifier (OID) and Description	Source
Supervisor Engine	...cisco(9).workgroup(5).ciscoStackMIB(1).ciscoStatckMIBConformance(31).ciscoStaticMIBGroups(20.chassisGroup(3)	CISCO-STACK-MIB
	Collection of objects providing information about the chassis of the device.	
Supervisor Engine	...ciscoMgmt(9).ciscoCat6kCrossbarMIB(217).ciscoCat6kXbarMIBObjects(1)	CISCO-CAT6K-CROSSBAR-MIB
	Crossbar statistics.	
Supervisor Engine	...ciscoMgmt(9).ciscoMIBObjects(1).cseMIBObjects(1).cseTcamUsage(9).cseTcamUsageTable(1).cseTcamUsageEntry(1)	CISCO-SWITCH-ENGINE
	Description of the resource type, total amount of TCAM allocated for that type as well as the amount of allocated resource that has been used up.	

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